NEW SOUTH WALES.

VOTES

AND

PROCEEDINGS

OF

THE LEGISLATIVE ASSEMBLY,

DURING THE SESSION

OF

1866,

WITH THE VARIOUS DOCUMENTS CONNECTED THEREWITH.

IN FIVE VOLUMES.

VOL. III.

SYDNEY:
THOMAS RICHARDS, GOVERNMENT PRINTER, PHILLIP-STREET.

1867.

612—

LEGISLATIVE ASSEMBLY.

NEW SOUTH WALES.

VOTES AND PROCEEDINGS.

SESSION 1866.

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TO THE

VOTES AND PROCEEDINGS

AND

PAPERS ORDERED TO BE PRINTED

DURING THE SESSION 1866.

1866.

LEGISLATIVE ASSEMBLY.

NEW SOUTH WALES.

LETTERS OF REGISTRATION OF INVENTIONS

UNDER

16 VICTORIA, No. 24.

ORDERED BY THE LEGISLATIVE ASSEMBLY TO BE PRINTED,
25 *July*, 1866.

SYDNEY: THOMAS RICHARDS, GOVERNMENT PRINTER.

1866.

24—*a*

[*Price*, £2 2*s*.]

1866.

LEGISLATIVE ASSEMBLY.

NEW SOUTH WALES.

LETTERS OF REGISTRATION OF INVENTIONS.

(DESCRIPTIONS, SPECIFICATIONS, &c., ACCOMPANYING APPLICATIONS FOR.)

Ordered by the Legislative Assembly to be Printed, 25 *July,* 1866.

RETURN (in part) to an *Address* of the Honorable the Legislative Assembly of New South Wales, dated 10 May, 1861, A.M., praying that His Excellency the Administrator of the Government would be pleased to cause to be laid upon the Table of this House (in addition to the Return already upon the Table),—

"(1.) A copy of the Descriptions and Specifications accompanying any applications for Letters of Registration of Inventions under the Act of Council 16 Victoria, No. 24, together with the date of application for such Letters of Registration, and when granted; also, copies of the Plans or Sections annexed, and of the Report, in each case.

"(2.) That His Excellency will cause similar Returns to be laid before Parliament annually."

(Mr. Hart.)

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A.D. 1855, 15*th January*. No. 1.

MACHINE FOR COMPRESSING PEAT AND COAL, &c.

LETTERS OF REGISTRATION to C. D. Hays, of George-street, Sydney, the Attorney of Christopher Kingsford, of London, for a Machine for compressing Peat and Coal, &c.

[Registered on the 16th day of January, 1855, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir Charles Augustus Fitz Roy, Knight Companion of the Royal Hanoverian Guelphic Order, Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Christopher Dunken Hays, of No. 474, George-street, Sydney, hath by his Petition humbly represented to me that he is the agent and representative in the Australian Colonies, of Christopher Kingsford, of London, the inventor and patentee in Great Britain, of a machine for compressing and solidifying peat, coal, and other substances of a like nature, and that the said machine consists of a mill for grinding coal, kilns for drying and heating the same, and presses for the purpose of consolidating the produce for use; and which machine is particularly described in the specification which is annexed to these Letters of Registration and the explanation thereupon written; and the said Petitioner further represented that the patent for this invention was issued to the said Christopher Kingsford under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date the first day of October, one thousand eight hundred and fifty-two, and that the said Petitioner had deposited the sum of Twenty Pounds with the Colonial Treasurer of the said Colony, to defray the expense of granting these Letters of Registration, as required by the Act of Council 16 Victoria, No. 24; the Petitioner, therefore, humbly prayed that I would be pleased to grant Letters of Registration for the above-named Christopher Kingsford, whereby the exclusive benefit of the said invention might be secured to the said Christopher Kingsford, for a period of fourteen years; and I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of my Executive Council, to grant the Petitioner's request: Know ye, therefore, that I, the said Sir Charles

Machine for compressing Peat and Coal, &c.

Augustus Fitz Roy, as such Governor as aforesaid, with the advice of my Executive Council, and in exercise of the power and authority given to me by the Act of Council 16 Victoria, No. 24, do hereby grant unto the said Christopher Kingsford, his executors, administrators, and assigns, special license, full power, sole privilege, and authority, that he, the said Christopher Kingsford, his executors, administrators, or assigns, and every of them, by himself and themselves, or by his or their deputy or deputies, servants or agents, or such others as the said Christopher Kingsford, his executors, administrators, or assigns, shall at any time agree with, and no other, from time to time and at all times hereafter during the term of years herein expressed, shall and lawfully may make, use, exercise, and vend his said invention and improvement within the Colony of New South Wales, in such manner as to him, the said Christopher Kingsford, his executors, administrators, and assigns, or any of them, shall in his or their discretion seem meet: And that he, the said Christopher Kingsford, his executors, administrators, and assigns, shall and lawfully may have and enjoy the whole profit, benefit, commodity, and advantage from time to time coming, growing, accruing, and arising by reason of the said invention and improvement, for and during the said term of years herein mentioned: To have, hold, exercise, and enjoy the said license, powers, privileges, and advantages hereinbefore granted or mentioned to be granted unto the said Christopher Kingsford, his executors, administrators, and assigns, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended according to the Act in such case made and provided. And to the end that he, the said Christopher Kingsford, his executors, administrators, and assigns, and every of them, may have and enjoy the full benefit and the sole use and exercise of the said invention and improvement according to the intention hereinbefore declared, I do, by these present Letters of Registration, require and strictly command all and every person and persons, bodies politic and corporate, and all and every other the subjects of Her Majesty the Queen, in the said Colony of New South Wales, of what estate, quality, degree, name or condition soever they be, within the said Colony, that neither they nor any of them, at any time during the continuance of the said term of fourteen years hereby granted, either directly or indirectly do make, use, or put in practice the said invention and improvement or any part of the same, nor shall make or cause to be made any addition thereunto or subtraction from the same, whereby to pretend himself or themselves the author or authors, designer or designers thereof, without the license, consent, or agreement of the said Christopher Kingsford, his executors, administrators, or assigns, in writing, under his or their hands and seals, first had and obtained in that behalf, upon such pains and penalties as can or may be justly inflicted on such offenders for their contempt of this my command; and further, to be answerable to the said Christopher Kingsford, his executors, administrators, and assigns, according to law, for his and their damages thereby occasioned: And moreover, I do by these presents, for me and my successors in office as Governors of the said Colony, will and command all and singular the Justices of the Peace, Mayors, Sheriff, Bailiffs, Constables, and all other Officers and Ministers whatsoever of Her Majesty the Queen, in the said Colony, for the time being, that they, or any of them, do not nor shall at any time hereafter during the said term hereby granted, in anywise molest, trouble, or hinder the said Christopher Kingsford, his executors, administrators, or assigns, or any of them, or his or their deputies, servants, or agents, in or about the due and lawful use or exercise of the said invention and improvement, or anything relating thereto: Provided always—and my Letters of Registration are and shall be upon this condition—that if at any time during the said term hereby granted, it shall be made appear to me, or my successors in office as Governors of the said Colony, that these Letters of Registration are contrary to law, or prejudicial or inconvenient to the subjects of Her said Majesty, in the said Colony in general, or that the said invention and improvement is not a new invention or improvement as to the public use and exercise thereof in the said Colony, or not invented, designed, or found out by the said Christopher Kingsford as aforesaid, then upon the signification thereof to be made to me, or my successors in office as Governors of the said Colony, under my or their sign manual and the seal of the said Colony, these my Letters of Registration shall forthwith cease, determine, and be utterly void to all intents and purposes: Provided also that these present Letters of Registration, and anything hereinbefore contained, shall not extend or be construed to extend to give privilege unto the said Christopher Kingsford, his executors, administrators, or assigns, or any of them, to use or imitate any invention or improvement whatsoever which hath heretofore been invented, designed, or found out by any other subjects of Her said Majesty in the said Colony, unto whom like Letters of Registration or privileges have been already granted for the sole use, exercise, and benefit thereof: Provided likewise nevertheless—and these Letters of Registration are upon this condition—that if at any time hereafter these Letters of Registration, and the liberty and privileges hereby granted, shall become vested in or in trust for more than the number of twelve persons, or their representatives, at any one time as partners dividing or entitled to divide the benefit or profit obtained by reason of these Letters of Registration, reckoning executors or administrators as and for the single person whom they represent as to such interest as they are or shall be entitled to in right of their testator; and also, that if the said Christopher Kingsford shall not particularly describe and ascertain the nature of the said invention or improvement, and in what manner the same is to be performed, by an instrument in writing under his hand and seal, and cause the same to be registered in the

the Supreme Court at Sydney, in the said Colony, within three days after the date of these Letters of Registration; and also, that if the said Christopher Kingsford, his executors, administrators, or assigns, shall not supply or cause to be supplied, for the service of the Government of the said Colony, all such articles of the said invention as he or they shall be required to supply by the officers administering the department of the said service for the use of which the same shall be required, in such manner, at such price, and at and upon such reasonable price and terms as shall be settled for that purpose by the said officers so requiring the same, then these Letters of Registration, and all liberties and advantages whatsoever hereby granted, shall utterly cease, determine, and become void, anything hereinbefore contained to the contrary thereof in anywise notwithstanding: Provided that nothing herein contained shall prevent the granting of licenses in such manner and for such considerations as they may by law be granted. And lastly, I do by these presents grant unto the said Christopher Kingsford, his executors, administrators, and assigns, that these Letters of Registration, or the registration or exemplification thereof, shall be in and by all things good, firm, valid, sufficient, and effectual in the law, according to the true intent and meaning thereof, and shall be taken and construed and adjudged in the most favourable and beneficial sense for the best advantage of the said Christopher Kingsford, his executors, administrators, and assigns, as well in all Courts of Record in the said Colony as elsewhere, and by all and singular the officers and ministers whatsoever in the said Colony, and amongst all and every the subjects of Her said Majesty in the said Colony, notwithstanding the not full and certain describing the nature or quality of the said invention or improvement, or of the materials thereto conducing and belonging.

In witness whereof, I have hereunto set my sign manual, and have caused these present Letters of Registration to be sealed with the Seal of the said (L.S.) Colony, at Government House, Sydney, in New South Wales, this fifteenth day of January, in the year of our Lord one thousand eight hundred and fifty-five.

CH$^{S.}$ A. FITZ ROY. (L.S.)

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, CHRISTOPHER KINGSFORD, of London, in England, send greeting:

WHEREAS His Excellency Sir Charles Augustus Fitz Roy, Knight Companion of the Royal Hanoverian Guelphic Order, Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, by Letters of Registration under his sign manual and the seal of the said Colony of New South Wales, bearing date the fifteenth day of January, in the year of our Lord one thousand eight hundred and fifty-five, did, with the advice of his Executive Council, give and grant unto me, the said Christopher Kingsford, his especial license that I, the said Christopher Kingsford, my executors, administrators, and assigns, or such others as I, the said Christopher Kingsford, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend within the said Colony my invention and improvement for compressing and solidifying peat, coal, and other substances of a like nature: In which said Letters of Registration is contained a proviso obliging me, the said Christopher Kingsford, by an instrument under my hand and seal, particularly to describe and ascertain the nature of my said invention and improvement, and in what manner the same is performed, and to cause the same to be registered in the Supreme Court of Sydney, in the said Colony, within three days next and immediately after the date of the said Letters of Registration, as in and by the same reference being had thereunto will more fully and at large appear: Now know ye, that, in compliance with the said proviso, I, the said Christopher Kingsford, do hereby declare that the nature of my said invention and improvement, and the manner in which the same are described and ascertained by the drawing indorsed hereon, and the words written on the margin thereof.

In witness whereof, I, the said Christopher Kingsford, have hereunto set my hand and seal, this fifteenth day of January, in the year of our Lord one thousand eight hundred and fifty-five.

CHRISTOPHER KINGSFORD, (L.S.)
(By his Attorney),
C. D. HAYS.

Taken and acknowledged by the above-named Christopher Kingsford, by Christopher Dunken Hays, his Agent lawfully constituted in that behalf, before me,—

J. NORTH,
Notary Public.

REPORT

Machine for compressing Peat and Coal, &c.

REPORT.

Civil Engineer's Office,
Sydney, 8 July, 1854.

SIR,

In obedience to the instructions contained in your letter, No. 51, 30th June, we have examined and considered the matters stated in the Petition of C. D. Hays, Esq., of No. 474, George-street, Sydney.

2. Detailed drawings, and a specification of Christopher Kingsford's invention for compressing and solidifying peat, coal, and other substances of the like nature, were submitted to us by Mr. Hays; and the process of manufacturing the fuel was explained to us by Mr. Walcott, civil engineer, that gentleman being present professionally, and on behalf of the Patentee.

3. Mr. Hays also produced specimens of the compressed coal.

4. We do ourselves the honor to report, for the information of His Excellency the Governor General, that we consider the invention important, and one tending to develope the resources of the Colony.

5. We therefore recommend that Letters of Registration should issue in favour of Christopher Kingsford, of London, to secure to him in this Colony the patent right of his invention for a period of fourteen years, as prayed for in the Petition of C. D. Hays, Esq., which document is now returned.

We have, &c.,
GOTHER K. MANN.
H. H. BROWNE.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The foregoing Report was drawn prior to the receipt of your letter No. 55, informing us that His Excellency had been pleased to appoint Mr. Walcott to report in conjunction with us. That gentleman, it will be seen, had been previously retained on behalf of the Patentee, by Mr. Hays, and attended accordingly.

Mr. Hays' letter of the 1st July is herewith enclosed.

EXPLANATION.

Fig. I is a vertical section of a mill for grinding the coal; *a* is a cone with teeth on the exterior surface, and set at an opposite angle to similar teeth on the inner surface of the framing (*b*), and revolving with the vertical shaft (*c*). The substance, after being ground in the mill, is conducted by a spout (*d*) and elevators (*e*) to the top of the drying chamber (Fig. II), where it falls on to centre of the uppermost trays (*fff*), and is spread and falls over the exterior edges, and thus descends by the inclines to the centre of the next tray, and so on until it arrives at the bottom of the chamber, where it is conveyed into the machine, to undergo the next and last process. A joggling motion is given to the trays by means of lugs on the vertical shaft (*g*). The chamber is heated from below, and the heat, in ascending, passes through the spaces in the overlapping inclines (*hhh*), and is distributed by the concave under surfaces of the trays. Fig. III represents an end view, and Fig. IV a side elevation, of the press or presses employed for compressing the coal after being heated to the proper temperature in the drying chamber; *ii* are hoppers which conduct the substance into proper moulds fitted with pistons which are forced up by means of a duplex lever worked by the cross shaft (*k*), the shaft making a partial revolution as the main lever (*l*) falls of its gravity, which, upon being raised by means of an expansive steam cylinder or ordinary gearing, frees the compressed blocks and opens the mould, to be filled as before.

[Plan—one sheet.]

EXPLANATION

Fig I. is a vertical section of a Mill for grinding the Coal **A** is a cone with teeth on the exterior surface and set at an opposite angle to similar teeth on the inner surface of the framing b. and revolving with the vertical shaft C. The substance after being ground in the Mill is conducted by a spout d. and elevators e. to the top of the drying Chamber *Fig II.* where it falls on to centre of uppermost hays f.f.f. and is spread and falls over the exterior edges and thus descends by the inclines to the centre of the next tray and so on until it arrives at the bottom of the chamber where it is conveyed into the Machine to undergo the next and last process. A joggling motion is given to the hays by means of lugs on the vertical shaft g. The Chamber is heated from below and the heat in ascending passes through the spaces in the overlapping inclines h.h.h. and is distributed by the concave undersurfaces of the hays *Fig. III.* represents an end view and *Fig IV.* a side elevation of the press or presses employed for compressing the coal after being heated to the proper temperature in the drying chamber, i.i. are hoppers which conduct the substance into proper moulds fitted with pistons which are forced up by means of a duplex lever worked by the cross shaft k the shaft making a partial revolution as the main lever l. falls of its own gravity which upon being raised by means of an expansive steam cylinder or ordinary gearing frees the compressed blocks and opens the mould to be filled as before.

Scale

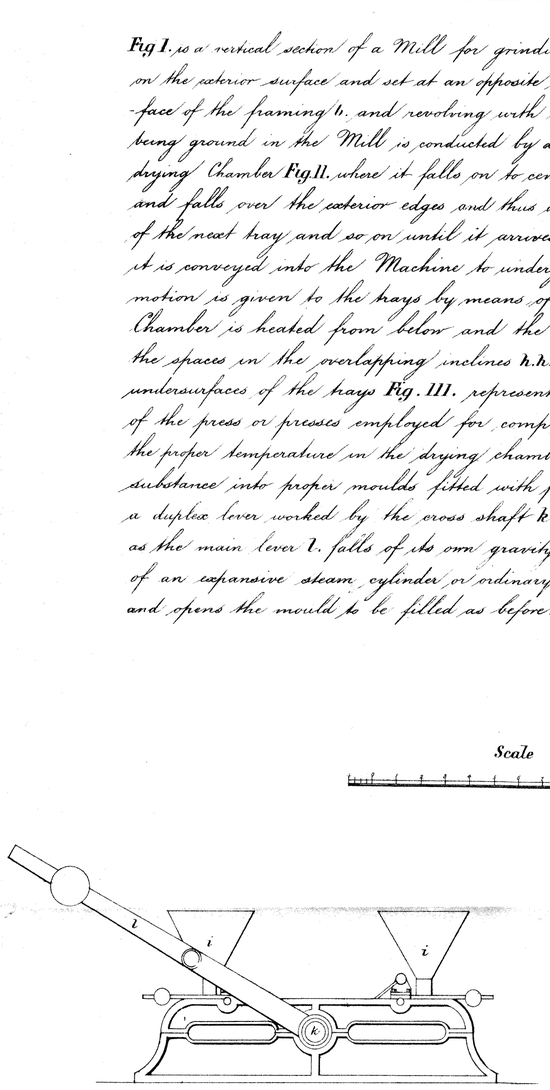


Fig IV.

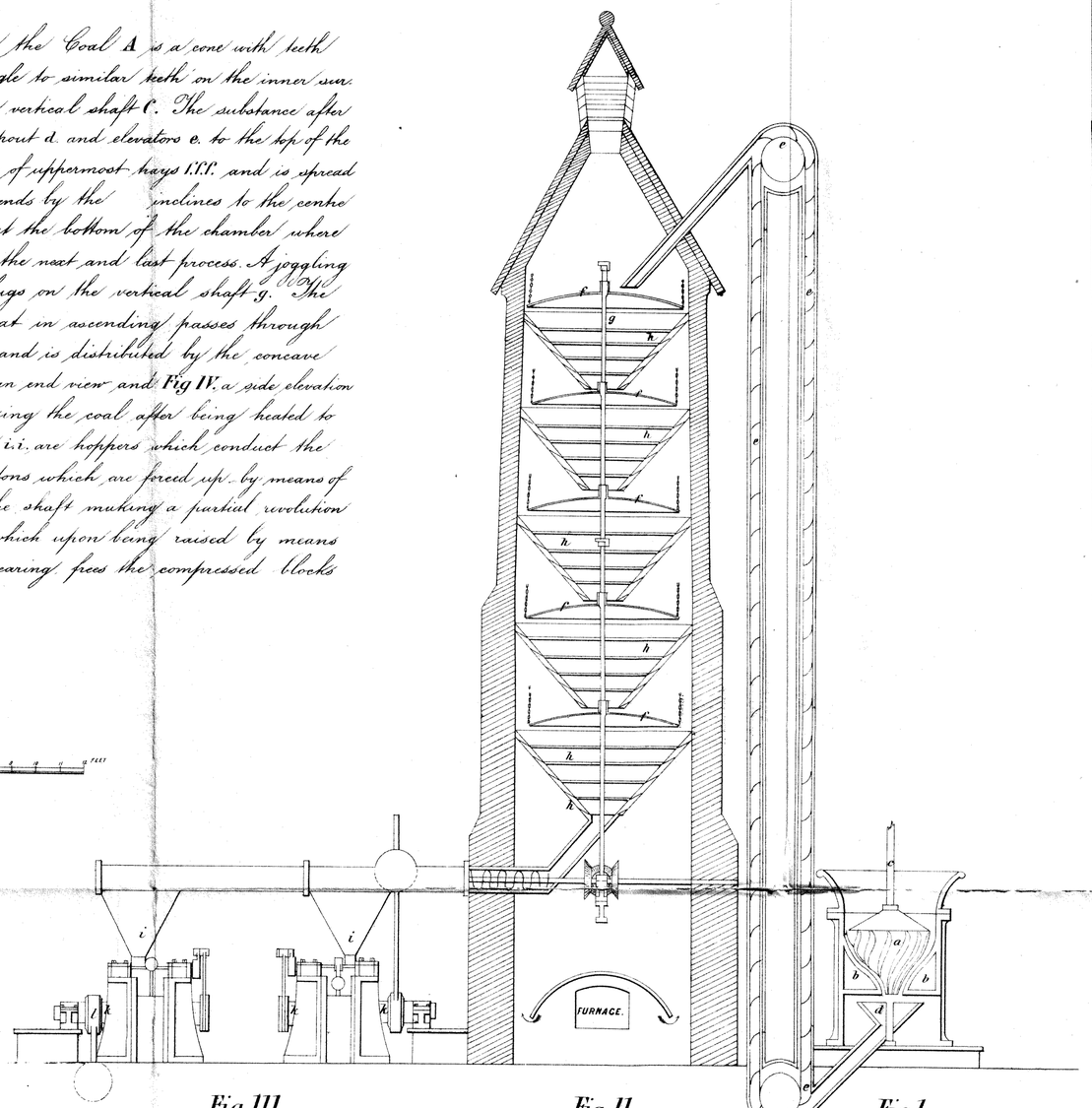
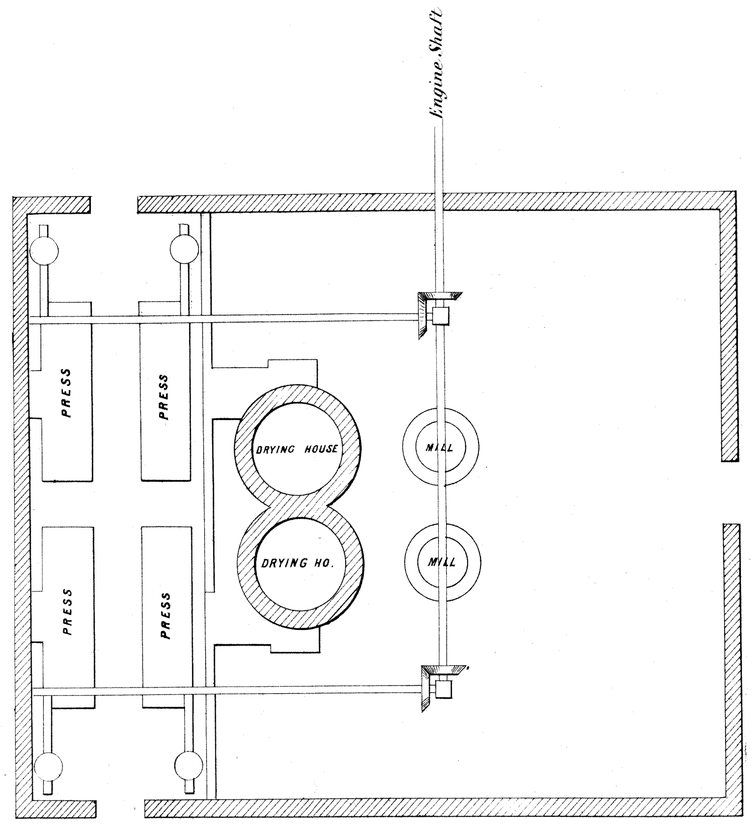


Fig III.

Fig II.

Fig I.



GENERAL PLAN

Scale

PATENT

COMPRESSED COAL MACHINERY.

C. Kingsford C.E. Patentee

A.D. 1855, 25*th May*. No. 2.

PROSPECTING MACHINE.

LETTERS OF REGISTRATION to T. Oultram and J. Braché, for a Prospecting Machine.

[Registered on the 25th day of May, 1855, in pursuance of the Act 16 Vic., No. 24.]

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, &c.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS THOMAS OULTRAM and JACOB BRACHE, of Melbourne, in the Province of Victoria, have, by their Petition to SIR WILLIAM THOMAS DENISON, our Governor of our Colony of New South Wales, represented that they are the authors and designers of a Portable Prospector for searching auriferous lands, and for geological surveys, being a certain invention or improvement to the arts and manufactures, the particulars whereof are contained in the plan annexed to the said Petition, and that the said Petitioners had deposited the sum of Twenty Pounds with the Colonial Treasurer of the said Colony, to defray the expense of granting these Letters of Registration, as required by the Act of the Governor and Legislative Council of the said Colony, passed in the sixteenth year of our reign, intituled, "*An Act to authorize the Governor General with the advice of the "Executive Council to grant Letters of Registration for all Inventions and Improvements "in the Arts and Manufactures to have the same effect as Letters Patent in England so far "as regards this Colony*"; the Petitioners, therefore, humbly prayed that the said Governor would be pleased to grant Letters of Registration for the above-named Thomas Oultram and Jacob Braché, whereby the exclusive enjoyment and advantage of the said invention might be secured to the said Thomas Oultram and Jacob Braché, their executors,

administrators,

administrators, and assigns, for a period of fourteen years; and our said Governor, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the granting of such Letters of Registration for the period of fourteen years, from competent persons appointed by him to examine and consider the matter stated in the said Petition, and to report thereon for his information, is pleased, with the advice of his Executive Council, to grant such Letters of Registration for us and in our name, for the period of fourteen years: Know ye, therefore, that we do hereby grant unto the said Thomas Oultram and Jacob Braché especial license, full power, sole privilege and authority, that they, the said Thomas Oultram and Jacob Braché, and their assigns, by themselves or by their deputy or deputies, servants or agents, or such others as the said Thomas Oultram and Jacob Braché, or their assigns, shall at any time agree with, and no other, from time to time, and at all times hereafter during the term of years herein expressed, shall and lawfully may make, use, exercise, and vend the said invention and improvement within the Colony of New South Wales, in such manner as to the said Thomas Oultram and Jacob Braché, or their assigns, or any of them, shall in his or their discretion seem meet: And that the said Thomas Oultram and Jacob Braché, or their assigns, shall and lawfully may have and enjoy the whole profit, benefit, commodity, and advantage, from time to time coming, growing, accruing, and arising by reason of the said invention and improvement for and during the said term of years herein mentioned: To have, hold, exercise, and enjoy the said license, powers, privileges, and advantages hereinbefore granted or mentioned to be granted unto the said Thomas Oultram and Jacob Braché and their assigns, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended, according to the Act in such case made and provided. And to the end that the said Thomas Oultram and Jacob Braché, and their assigns, and every of them, may have and enjoy the full benefit and the sole use and exercise of the said invention and improvement, according to the intention hereinbefore declared, we do, by these present Letters of Registration, require and strictly command all and every person and persons, bodies politic and corporate, and all and every other our subjects in the said Colony of New South Wales, of what estate, quality, degree, name, or condition soever they be, within the said Colony, that neither they nor any of them, at any time during the continuance of the said term of fourteen years hereby granted, either directly or indirectly, do make, use, or put in practice the said invention and improvement or any part of the same, nor in anywise counterfeit, imitate, or resemble the same, nor shall make or cause to be made any addition thereunto or subtraction from the same, whereby to pretend himself or themselves the author or authors, designer or designers thereof, without the license, consent, or agreement of the said Thomas Oultram and Jacob Braché, or their assigns, in writing, under their hands and seals, first had and obtained in that behalf, upon such pains and penalties as can or may be justly inflicted on such offenders for their contempt of this our command; and further, to be answerable to the said Thomas Oultram and Jacob Braché and their assigns according to law for their damages thereby sustained: And moreover, we do by these presents, for us and our successors, will and command all and singular our Justices of the Peace, Mayors, Sheriff, Bailiffs, Constables, and all other our Officers and Ministers whatsoever in the said Colony for the time being, that they or any of them do not, nor shall at any time hereafter during the said term hereby granted, in anywise molest, trouble, or hinder the said Thomas Oultram and Jacob Braché or their assigns, or any of them, or their deputies, servants, or agents, in or about the due and lawful use or exercise of the said invention and improvement or anything relating thereto: Provided always—and our Letters of Registration are and shall be upon this condition—that if at any time during the said term hereby granted, it shall be made appear to us or to our successors that these Letters of Registration are contrary to law, or prejudicial or inconvenient to our subjects in the said Colony in general, or that the said invention and improvement is not a new invention or improvement as to the public use and exercise thereof in the said Colony, or not invented, designed, or found out by the said Thomas Oultram and Jacob Braché as aforesaid, then, upon the signification thereof to be made by us or our successors under the sign manual of our Governor for the time being of our said Colony, and the seal of the said Colony, these our Letters of Registration shall forthwith cease, determine, and be utterly void to all intents and purposes: Provided also, that these present Letters of Registration, and anything hereinbefore contained, shall not extend or be construed to extend to give privilege to the said Thomas Oultram and Jacob Braché, or their assigns, or any of them, to use or imitate any invention or improvement whatsoever which hath heretofore been invented, designed, or found out by any other of our subjects in the said Colony whatsoever, and publicly used and exercised in the said Colony, unto whom like Letters of Registration or privileges have been already granted for the sole use, exercise, and benefit thereof: Provided likewise, nevertheless—and these Letters of Registration are upon this condition—that if the said Thomas Oultram and Jacob Braché shall not particularly describe and ascertain the nature of the said invention or improvement, and in what manner the same is to be performed, by an instrument in writing under their hands and seals, and cause the same to be registered in the Supreme Court at Sydney in the said Colony, within three days after the date of these Letters of Registration; and also, that if the said Thomas Oultram and Jacob Braché, or their assigns, shall not supply, or cause to be supplied, for the service of the Government of the said Colony, all such articles of the said invention as they

they shall be required to supply by the officers administering the department of the said service for the use of which the same shall be required, in such manner, at such price, and at and upon such reasonable price and terms as shall be settled for that purpose by the said officer so requiring the same, then these Letters of Registration and all liberties and advantages whatsoever hereby granted shall utterly cease and determine and become void, anything hereinbefore contained to the contrary thereof in anywise notwithstanding: Provided that nothing herein contained shall prevent the granting of licenses in such manner and for such considerations as they may by law be granted. And lastly, we do by these presents grant unto the said Thomas Oultram and Jacob Braché, and their assigns, that these Letters of Registration, or the registration or exemplification thereof, shall be in and by all things good, firm, valid, sufficient, and effectual in the law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged in the most favourable and beneficial sense for the best advantage of the said Thomas Oultram and Jacob Braché, or their assigns, as well in all Courts of Record in the said Colony as elsewhere, and by all and singular the officers and ministers whatsoever in the said Colony, and amongst all and every our subjects in the said Colony, notwithstanding the not full and certain describing the nature or quality of the said invention or improvement, or of the materials thereto conducing and belonging.

In witness whereof, our said Governor hath hereunto set his sign manual, and hath caused these our Letters of Registration to be sealed with the Seal of the said Colony, at Government House, Sydney, in New South Wales, this twenty-fifth day of May, in the year of our Lord one thousand eight hundred and fifty-five.

W. DENISON. (L.S.)

TO ALL TO WHOM THESE PRESENTS SHALL COME, THOMAS OULTRAM and JACOB BRACHE, of Melbourne, in the Province of Victoria, Engineers, send greeting:

WHEREAS His Excellency Sir William Thomas Denison, Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, by Letters of Registration in the name and on behalf of Her Majesty the Queen, under his sign manual and the seal of the said Colony, bearing date the twenty-fifth day of May, one thousand eight hundred and fifty-five, did, with the advice of his Executive Council, give and grant unto the said Thomas Oultram and Jacob Braché, their executors, administrators, and assigns, Her Majesty's especial license that they or such others as they should at any time agree with and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend within the said Colony the invention and improvement of the said Thomas Oultram and Jacob Braché therein referred to; in which said Letters of Registration is contained a proviso obliging the said Thomas Oultram and Jacob Braché, by an instrument under their hands and seals, particularly to describe and ascertain the nature of the said invention and improvement, and in what manner the same is performed, and to cause the same to be registered in the Supreme Court at Sydney, in the said Colony, within three days next and immediately after the date of the said Letters of Registration, as in and by the same reference being had thereunto will more fully and at large appear: Now know ye, that, in compliance with the said proviso, we, the said Thomas Oultram and Jacob Braché, do hereby declare that the nature of the said invention and improvement, and the manner in which the same is to be performed, are described and ascertained by the drawing hereon indorsed and the words following, that is to say:—

A Portable Prospector for searching auriferous lands and for geological purposes.

1st. The machine being portable and easy of removal from place to place.

2nd. By means of hollow boring rods a specimen of the strata is continually forcing itself to the top of the machine, and from thence into a washing apparatus for examination; the length of rods being determined by the depth required.

3rd. The upward and downward motions to the rods are given by means of a sliding nut, cut in halves, and capable of being put in and out of gear at pleasure; its connection with the driving screw is made on the top plate, and the screw being hollow forms a passage parallel to the inside diameter of boring rods. Motion is given by means of a toothed wheel and pinion assisted by a fly-wheel, and becomes a hand, horse, or steam machine, according as the power is applied.

4th. When the machine is stationary the carriage becomes a tripod, by reason of three forks let into the ground, so that when the machine is at work the boring rods may be perpendicular.

5th.

5th. The gland on the top plate is to keep the large driving screw in a vertical position when the sliding nuts are drawn back, and of course out of gear, and that it may not have any zigzag motion.

6th. The driving gear is also kept steady by means of four slide rods and two cross bars, very accurately fitted so that they may not shake.

7th. The whole of the top gear is kept steady by means of four rods, fastened to the top plate, and passing through the carriage framing and bolted there.

8th. The pinion shaft is kept in its position by means of a bracket, working loose on the driving screw, and in immediate connection with the boss of the bevel wheel.

9th. The rods are connected to each other by means of bolters and long couplings; the inside diameter of couplings being made to suit the outside diameter of boring rods.

In witness whereof, the said Thomas Oultram and Jacob Braché have hereunto set their hands and seals, this twenty-fifth day of May, in the year of our Lord one thousand eight hundred and fifty-five.

THOS. OULTRAM. (L.S.)

JACOB BRACHÉ. (L.S.)

(By THOS. OULTRAM.)

Taken and acknowledged by the above-named Thomas Oultram and Jacob Braché, before me,—

SAML. FREDK. MILFORD,
Master in Equity.

REPORT.

Colonial Architect's Office,
Sydney, 7 May, 1855.

SIR,

In attention to the minute of His Excellency the Governor General upon the enclosed petition from T. Oultram and J. Braché, for Letters of Registration for a Portable Prospector, their invention,—

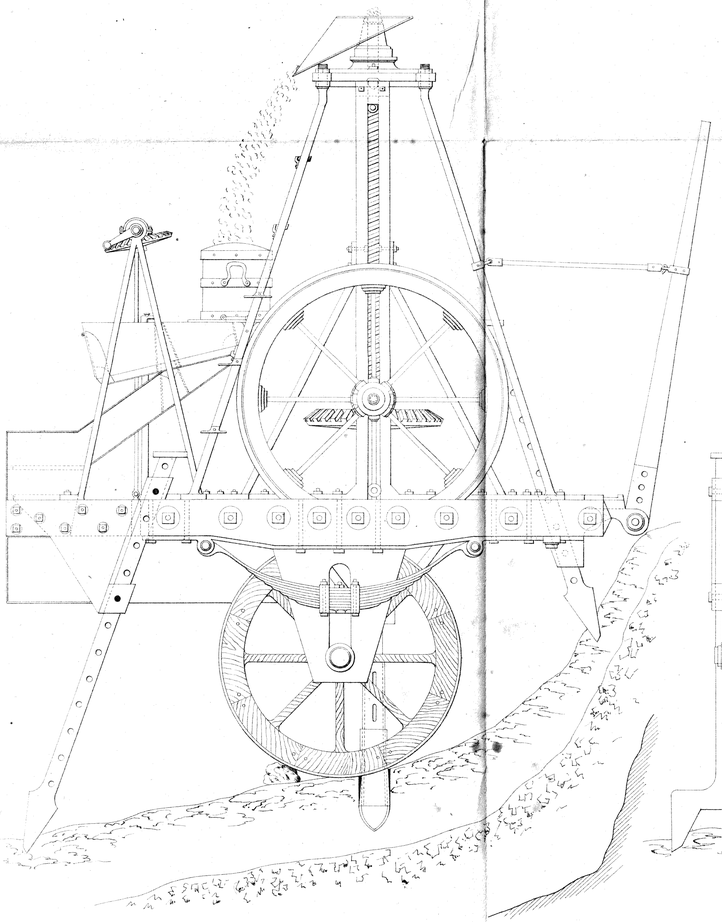
2. I do myself the honor to state, that the Petitioners have not forwarded any specification in explanation of the invention they propose to register; it does not, therefore, appear very clear to what extent it is intended to monopolize the application of this particular description of machinery for boring purposes. Taking the plan, consequently, as an explanation in full of the invention they wish to secure, I am not aware of any objection to the grant of Letters of Registration as applied for.

I have, &c.,
WM. WEAVER,
Colonial Architect.

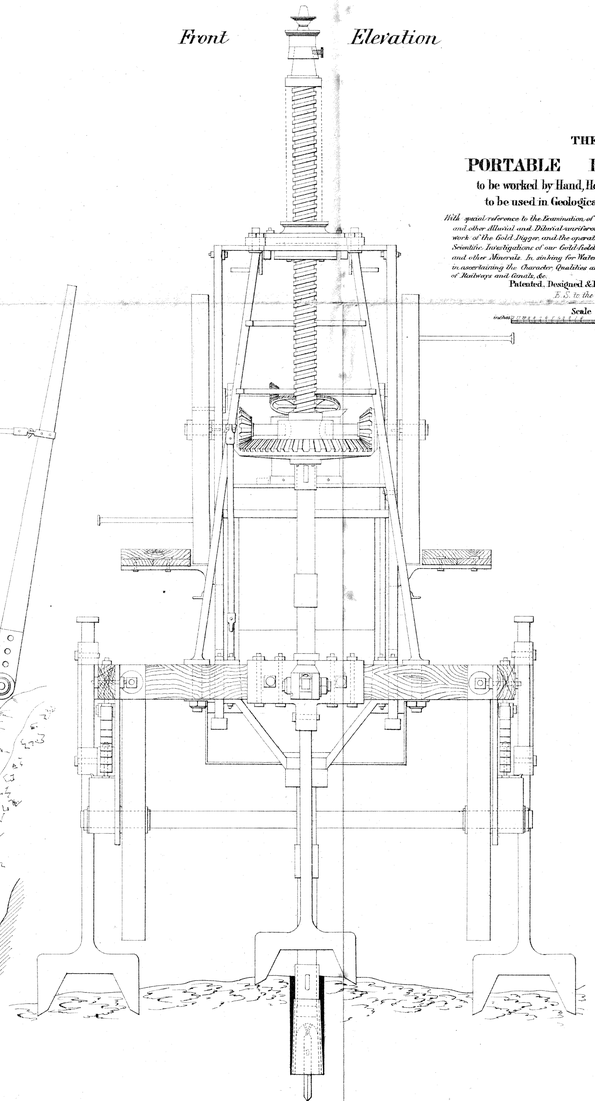
THE HONORABLE
THE COLONIAL SECRETARY.

[Plan—one sheet.]

Side Elevation



Front Elevation



THE

PORTABLE PROSPECTOR

to be worked by Hand, Horse or Steam Power,

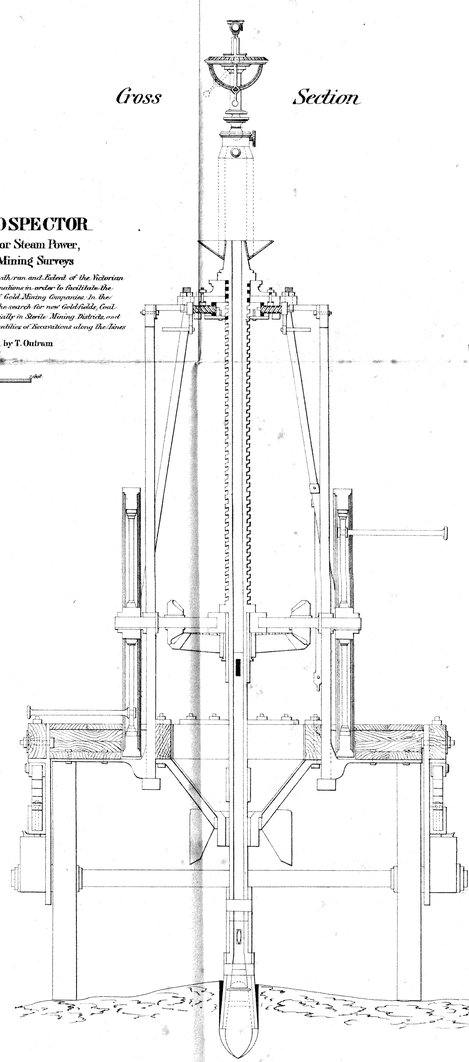
to be used in Geological & Mining Surveys

With special reference to the Examination of the Auriferous Drift runs and Reefs of the Victorian and other Alluvial and Diluvial auriferous Formations in order to facilitate the work of the Gold Digger and the operations of Gold Mining Companies. In the Scientific Investigations of our Gold fields, in the search for new Goldfields, Coal, and other Minerals. In sinking for Water especially in Sterile Mining Districts, and in ascertaining the Character, Qualities and Quantities of Incrustations along the Lines of Railways and Canals, &c.

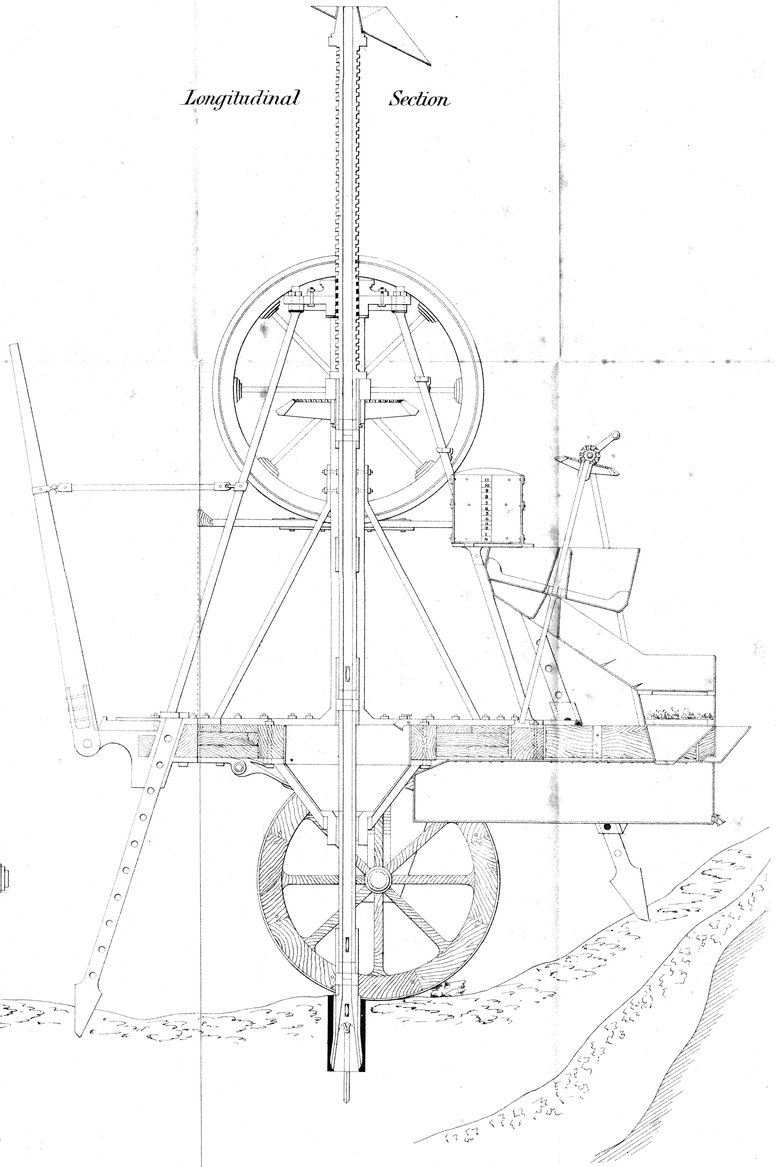
Patented. Designed & Drawn by T. Outram

Scale 1 Inch to the FOOT

Gross Section



Longitudinal Section



A.D. 1855, 30*th July*. No. 3.

PERPETUAL SOLAR WATCH.

LETTERS OF REGISTRATION to Luc Macé, of Sydney, for a Perpetual Solar Watch.

[Registered on the 31st day of July, 1855, in pursuance of the Act 16 Vic., No. 24.]

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, and so forth.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Luc Macé, of Sydney, in our Colony of New South Wales, has by his Petition to Sir William Thomas Denison, our Governor of our said Colony, represented that he is the author and designer of a certain invention called a "Perpetual Solar Watch," concerning which he alleges in his said Petition that at midday, with the aid of the sun, it determines the latitude, and from six in the morning till six in the evening the longitude, at any given moment, with the utmost precision, and that it may be used in or out of doors, or anywhere that the rays of the sun can reach it, and that it possesses the advantage over the sextant that it can be used indifferently on land or sea, and requires no calculations to work out the desired result, and that with its assistance the exact hour of the day may be ascertained in an instant, and moreover, that it possesses the additional advantage of shewing the true meridian, and thereby enabling a person to regulate at the same time both the time-piece and the compass; and the said Petitioner by his said Petition did further represent that he had, as the fact is, deposited the sum of Twenty Pounds with the Colonial Treasurer of our said Colony, to defray the expense of granting these Letters of Registration, as required by the Act of the Governor and Legislative Council of our said Colony, passed in the sixteenth year of our reign, numbered twenty-four; whereupon the said Petitioner humbly prayed that the said Governor would be pleased to grant to him Letters of Registration for the above-named invention, whereby the exclusive benefit of the said invention might be secured to him for a period of fourteen years: And whereas the said Governor, being willing to give encouragement to all inventions

and

and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the granting of such Letters of Registration of the said invention for the period of fourteen years, from competent persons appointed by him to examine and consider the matter stated in the said Petition and to report thereon for his information, is pleased, with the advice of his Executive Council, to grant such Letters of Registration in our name for the period of fourteen years: Know ye, therefore, that we do hereby grant unto the said Luc Macé especial license, full power, sole privilege and authority, that he the said Luc Macé, and his assigns, by himself or themselves, or by his or their deputy or deputies, servants or agents, or such others as the said Luc Macé or his assigns shall at any time agree with, and no other, from time to time, and at all times hereafter, during the term of years herein expressed, shall and lawfully may make, use, exercise, and vend the said invention and improvement within the said Colony of New South Wales, in such manner as to the said Luc Macé or his assigns shall in his or their discretion seem meet; and that the said Luc Macé or his assigns shall and lawfully may have and enjoy the whole profit, benefit, commodity, and advantage from time to time coming, growing, accruing, and arising by reason of the said invention and improvement for and during the said term of years herein mentioned: To have, hold, exercise, and enjoy the said license, powers, privileges, and advantages hereinbefore granted or mentioned to be granted unto the said Luc Macé and his assigns for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended, according to the Act in such case made and provided: And to the end that the said Luc Macé and his assigns may have and enjoy the full benefit and the sole use and exercise of the said invention and improvement, according to the intention hereinbefore declared, we do by these present Letters of Registration require and strictly command all and every person and persons, bodies politic and corporate, and all and every other our subjects in the said Colony of New South Wales, of what estate, quality, degree, name, or condition soever they be, within the said Colony, that neither they nor any of them, at any time during the continuance of the said term of fourteen years hereby granted, either directly or indirectly to make, use, or put in practice the said invention or improvement or any part of the same, nor in any way counterfeit, imitate, or resemble the same, nor shall make or cause to be made any addition thereunto or subtraction from the same, whereby to pretend himself or themselves the author or authors designer or designers thereof, without the license, consent, or agreement of the said Luc Macé or his assigns, in writing under his or their hands and seals, first had and obtained in that behalf, upon such pains and penalties as can or may be justly inflicted on such offenders for their contempt of this our command; and further, to be answerable to the said Luc Macé and his assigns according to law for his or their damages thereby sustained: And moreover, we do by these presents, for us and our successors, will and command all and singular our Justices of the Peace, Mayors, Sheriff, Bailiffs, Constables, and other our Officers and Ministers whatsoever in our said Colony for the time being, that they or any of them do not nor shall at any time hereafter during the said term hereby granted, in anywise molest, trouble, or hinder the said Luc Macé or his assigns, or his or their deputies, servants, or agents, in or about the due and lawful use or exercise of the said invention or improvement, or anything relating thereto: Provided always—and these our Letters of Registration are and shall be upon this condition—that if at any time during the said term hereby granted, it shall be made appear to us or to our successors that these Letters of Registration are contrary to law, or prejudicial or inconvenient to our subjects in our said Colony in general, or that the said invention and improvement is not a new invention or improvement as to the public use and exercise thereof in our said Colony, or not invented, designed, or found out by the said Luc Macé as aforesaid, then upon signification thereof to be made by us or our successors under the sign manual of our Governor for the time being of our said Colony and the seal of our said Colony, these our Letters of Registration shall forthwith cease, determine, and be utterly void to all intents and purposes: Provided also, that these present Letters of Registration, and anything hereinbefore contained, shall not extend or be construed to extend to give privilege to the said Luc Macé or his assigns, to use or imitate any invention or improvement whatsoever which hath heretofore been invented, designed, or found out by any of our subjects in our said Colony whatsoever unto whom like Letters of Registration or privileges have been already granted for the sole use, exercise, and benefit thereof: Provided likewise, nevertheless—and these Letters of Registration are upon this condition—that if at any time hereafter these Letters of Registration, and the liberty and privileges hereby granted, shall become vested in or in trust for more than the number of twelve persons or their representatives, at any one time as partners dividing or entitled to divide the benefit or profit obtained by reason of these Letters of Registration, reckoning executors or administrators as and for the single person whom they represent as to such interest as they are or shall be entitled to in right of their testator or intestate; and also that if the said Luc Macé shall not particularly describe and ascertain the nature of the said invention or improvement, and in what manner the same is to be used, by an instrument in writing under his hand and seal, and cause the same and these presents to be registered in the Supreme Court at Sydney, within three days after the date of these Letters of Registration, or shall not, in default of such written description as aforesaid, within the like time deposit in lieu thereof in the said Supreme Court a model of the said invention, clearly exhibiting the nature and principles of the said invention; and

also that if the said Luc Macé, or his assigns, shall not supply or cause to be supplied for the service of the Government of the said Colony, all such articles of the said invention as he or they shall be required to supply by the officers administering the department of the said service for the use of which the same shall be required, in such manner, at such price, and at and upon such reasonable price and terms as shall be settled for that purpose by the said officer so requiring the same, then these Letters of Registration, and all liberties and advantages whatsoever hereby granted shall utterly cease, determine, and become void, anything hereinbefore contained to the contrary thereof in anywise notwithstanding: Provided that nothing herein contained shall prevent the granting of licenses in such manner and for such considerations as they may by law be granted: And lastly, we do by these presents grant unto the said Luc Macé and his assigns, that these Letters of Registration, or the registration or exemplification thereof, shall be in and by all things good, firm, valid, sufficient, and effectual in the law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged in the most favourable and beneficial sense, and for the best advantage of the said Luc Macé or his assigns, as well in all Courts of Record in the said Colony or elsewhere, and by all and singular the Officers and Ministers whatsoever in the said Colony, and amongst all and every our subjects in the said Colony, notwithstanding the not full and certain describing the nature or quality of the said invention or improvement, or of the materials thereto conducing and belonging.

In witness whereof, our said Governor hath hereunto set his sign manual, and hath caused these our Letters of Registration to be sealed with the Seal of the said Colony, at Government House, Sydney, in New South Wales, this thirtieth day of July, in the year of our Lord one thousand eight hundred and fifty-five.

W. DENISON. (L.S.)

TO ALL TO WHOM THESE PRESENTS SHALL COME, Luc Macé, of Sydney, in the Colony of New South Wales, Mechanic, sends greeting:

WHEREAS His Excellency Sir William Thomas Denison, Captain General and Governor-in-Chief of the said Colony and its Dependencies, by Letters of Registration, in the name and on behalf of Her Majesty the Queen, under his sign manual and the seal of the said Colony, bearing date the thirtieth day of July, one thousand eight hundred and fifty-five, did, with the advice of his Executive Council, give and grant unto the said Luc Macé and his assigns, Her Majesty's especial license that he or they, or such others as he or they should at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within the said Colony, the invention and improvement of the said Luc Macé therein referred to, called a "Perpetual Solar Watch," in which said Letters of Registration is contained a proviso obliging the said Luc Macé, by an instrument under his hand and seal, particularly to describe and ascertain the nature of the said invention and improvement, and in what manner the same is used, and to cause the same to be registered in the Supreme Court at Sydney, in the said Colony, within three days next and immediately after the date of the said Letters of Registration, or in default of such written description as aforesaid, within the like time to deposit, in lieu thereof, in the said Supreme Court, a model of the said invention, clearly exhibiting the nature and principle of the said invention, as in and by the same reference being had thereunto will more fully and at large appear: Now know ye that, in compliance with the said proviso, I, the said Luc Macé, do hereby declare that the nature of the said invention and improvement, and the manner in which the same is to be used, are described and ascertained by the model thereof deposited by me, the said Luc Macé, with these presents, in the Office of the Supreme Court at Sydney aforesaid, which said model exhibits clearly the nature and principles of the said invention; and I do declare that the said invention will at midday, with the aid of the sun, determine the latitude, and from six in the morning until six in the evening will determine the longitude at any given moment with the utmost precision, and that it may be used anywhere that the rays of the sun can reach it; and that it possesses this great advantage over the sextant, that it can be used indifferently on land

or

or sea, and requires no calculations to work out the desired result; and that with its assistance, the exact hour of the day may be ascertained in an instant; moreover, it possesses the additional advantage of shewing the true meridian, and thereby enabling a person to regulate at the same time both the time-piece and the compass.

In witness whereof, the said Luc Macé hath hereunto set his hand and seal, the twenty-first day of July, in the year of our Lord one thousand eight hundred and fifty-five.

L. MACÉ. (L.S.)

Taken and acknowledged by the said Luc Macé, by and before me,—

SAML. FREDK. MILFORD,
Master in Equity.

REPORT.

Civil Engineer's Office,
Sydney, 9 June, 1855.

SIR,

In returning to you the enclosed Memorial from Mr. Luc Macé, praying that Letters of Registration may be granted to him for his invention called a "Perpetual Solar Watch," we do ourselves the honor to report, for the information of His Excellency the Governor General, that we called upon Mr. Macé to produce such models, drawings, or descriptions of his invention, as would tend to explain and elucidate to us his invention.

2. Mr. Macé attended accordingly; and we beg to state that we consider the invention an improved arrangement for a Sun Dial; that the principle of his arrangement is that of the Ring Dial; that it is not divested of the known errors appertaining to Sun Dials, and is consequently inapplicable for accurate scientific purposes.

3. We consider, however, it may be found useful for ordinary purposes, and that there is sufficient originality in his invention (although it cannot correctly be designated a "Perpetual Solar Watch") to warrant us in recommending that Letters of Registration should issue in Mr. Macé's favour.

4. We have intimated to that gentleman that it will be necessary for him to deposit with the Government a model, or a more explicit description of his invention than that contained in his Petition.

We have, &c.,
GOTHER K. MANN.
H. H. BROWNE.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1856, 14*th January*. No. 4.

IMPROVEMENT IN THE MANUFACTURE OF IRON INTO SHEETS.

LETTERS OF REGISTRATION to Messrs. Morewood and Rogers, through their Attorney, E. C. Weekes, for Improvement in the Manufacture of Iron into Sheets.

[Registered on the 15th day of January, 1856, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight, Governor General in and over all Her Majesty's Colonies of New South Wales, Van Diemen's Land, Victoria, South Australia and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same, &c., &c., &c.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Elias Carpenter Weekes, of George-street, in the city of Sydney and Colony of New South Wales, hath by his Petition represented unto me that he is the true and lawful Attorney, in this Colony, of Edmund Morewood and George Rogers, of Dowgate, in the city of London, merchants, the inventors and patentees under the Great Seal of Great Britain, bearing date at Westminster, the ninth day of October, in the ninth year of Her present Majesty's reign, of "Improvements in the manufacture "of Iron into sheets, plates, or other forms; in coating Iron, and in preparing Iron for "coating and other purposes," and that he, the said Petitioner, had, as the fact is, deposited the sum of Twenty Pounds with the Colonial Treasurer of our said Colony, to defray the expense of granting these Letters of Registration, pursuant to the Act of the Governor and Legislative Council of our said Colony, passed in the sixteenth year of our reign

and numbered twenty-four; the Petitioner therefore prayed that I would be pleased to grant to the said Edmund Morewood and George Rogers, Letters of Registration for the said invention and improvements, whereby the exclusive benefit and advantage thereof might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions or improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in such Petition and to report thereon for my information, am pleased, with the advice of my Executive Council, to grant the Petitioner's request: Know ye, therefore, that I, the said Sir William Thomas Denison, as such Governor as aforesaid, with the advice of my said Executive Council, and in exercise of the power and authority given to me by the said Act of Council in that behalf made, have given and granted, and by these present Letters of Registration do give and grant unto the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, my especial license, full power, sole privilege, and authority, that they, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, and every of them, by himself and themselves, or by his or their deputy or deputies, servants or agents, or such others as they, the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, shall at any time agree with, and no others, from time to time, and at all times hereafter, during the term of years herein expressed, shall and lawfully may make, use, exercise, and vend the said invention and improvement within the said Colony of New South Wales, in such manner as to them, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, or any of them, shall in their or his discretions seem meet: And that they, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, shall and lawfully may have and enjoy the whole profit, benefit, commodity, and advantage, from time to time coming, growing, accruing, and arising, by reason of the said invention and improvement, for and during the said term of years herein mentioned: To have, hold, exercise, and enjoy the said license, powers, privileges, and advantages hereinbefore granted unto the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended, according to the Act in such case made and provided: And to the end that they, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, and every of them, may have and enjoy the full benefit and the sole use and exercise of the said invention and improvement according to the intention hereinbefore declared, I do, by these present Letters of Registration, require and strictly command all and every person and persons, bodies politic and corporate, and all and every other the subjects of Her Majesty the Queen, in the said Colony of New South Wales, of what estate, quality, degree, name or condition soever they be, within the said Colony, that neither they nor any of them, at any time during the continuance of the said term of fourteen years hereby granted, either directly or indirectly do make, use, or put in practice the said invention and improvement or any part of the same, nor in anywise counterfeit, imitate, or resemble the same, nor shall make or cause to be made any addition thereunto or subtraction from the same, whereby to pretend himself or themselves the author or authors, designer or designers thereof, without the license, consent, or agreement of the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, in writing, under their or his hands and seals, first had and obtained in that behalf, upon such fines and penalties as can or may be justly inflicted on such offenders for their contempt of this my command; and answerable to the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, according to law, for their damages thereby occasioned: And moreover, I do by these presents, for me and my successors in office as Governors of the said Colony aforesaid, will and command all and singular the Justices of the Peace, Mayors, Sheriffs, Bailiffs, Constables, and all other Officers and Ministers whatsoever of Her Majesty the Queen, in the Colony aforesaid, for the time being, that they, or any of them, do not nor shall at any time hereafter during the said term hereby granted, in anywise molest, trouble, or hinder the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, or any of them, or his or their deputies, servants, or agents, in or about the due and lawful use or exercise of the aforesaid invention and improvement, or anything relating thereto: Provided always—and that my Letters Patent for Registration are and shall be upon this condition—that if at any time during the said term hereby granted, it shall be made appear to me or my successor in office, as Governor of the said Colony aforesaid, that these present Letters of Registration are contrary to the law, or prejudicial or inconvenient to the subjects of Her said Majesty in the said Colony in general, or that the said invention and improvement is not a new invention or improvement as to the public use and exercise thereof in the Colony aforesaid, or not invented, designed, or found out by the said Edmund Morewood and George Rogers as aforesaid, then upon signification thereof to be made by me or my successors in office as Governors of the said Colony aforesaid, under my or their sign manual and the seal of the said Colony, these my Letters of Registration shall forthwith cease, determine, and be utterly void to all intents and purposes: Provided also, that these present Letters of Registration, and anything hereinbefore contained, shall not extend or be construed to extend to give privilege unto the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, or any of them, to use or imitate

imitate any invention or improvement whatsoever which hath heretofore been invented, designed, or found out by any other subject of Her said Majesty whatsoever, and publicly used and exercised, unto whom Letters Patent or like Letters of Registration or privileges have been already granted for the sole use, exercise, and benefit thereof: Provided likewise, nevertheless—and these Letters of Registration are upon this condition—that if at any time hereafter these Letters of Registration, and the liberty and privileges hereby so granted, shall become vested in or in trust for more than the number of twelve persons or their representatives, at any one time as partners dividing or entitled to divide the benefit or profit obtained by reason of these Letters of Registration, reckoning executors or administrators as and for the single person whom they represent as to such interest as they are or shall be entitled to in right of their testator or intestate; and also, that if the said Edmund Morewood and George Rogers shall not particularly describe and ascertain the nature of the said invention or improvement, and in what manner the same is to be performed, by an instrument in writing under their hand and seal, and cause the same to be registered in the Supreme Court of Sydney, in the Colony aforesaid, within three days next immediately after the date of these Letters of Registration; and also, that if the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, shall not supply or cause to be supplied for the service of the Government of the said Colony, all such articles of the said invention as they shall be required to supply by the officers or commissioners administering the department of the said service for the use of which the same shall be required, in such manner, at such price, and at and upon such reasonable price and terms as shall be settled for that purpose by the said officer or commissioners so requiring the same, then these Letters of Registration, and all liberties and advantages whatsoever hereby granted shall utterly cease, determine, and become void, anything hereinbefore contained to the contrary in anywise notwithstanding: Provided that nothing herein contained shall prevent the granting of licenses in such manner and for such considerations as they may by law be granted. And lastly, I do by these presents grant unto the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, that these Letters of Registration, or the enrolment or exemplification thereof, shall be in and by all things good, firm, valid, sufficient, and effectual in the law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged in the most favourable and beneficial sense for the best advantage of the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, as well in all Courts of Record in the said Colony as elsewhere, and by all and singular the officers and ministers whatsoever in the said Colony aforesaid, and amongst all and every the subjects of Her said Majesty in the said Colony, notwithstanding the not full and certain describing the nature or quality of the said invention or improvement, or of the materials thereto conducing and belonging.

In witness whereof, I have hereunto set my sign manual, and have caused these present Letters of Registration to be sealed with the Seal of the said Colony, at Government House, Sydney, in New South Wales, this fourteenth day of January, in the year of our Lord one thousand eight hundred and fifty-six.

(L.S.) W. DENISON.

TO ALL TO WHOM THESE PRESENTS SHALL COME, We, EDMUND MOREWOOD and GEORGE ROGERS, of Dowgate, in the city of London, in England, send greeting:

WHEREAS His Excellency Sir William Thomas Denison, Knight, Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, by Letters of Registration, under his sign manual and the seal of the said Colony of New South Wales, bearing date the day of one thousand eight hundred and fifty-five, did, with the advice of his Executive Council, give and grant unto us, the said Edmund Morewood and George Rogers, his special license that we the said Edmund Morewood and George Rogers, our executors, administrators, and assigns, or such others as we, the said Edmund Morewood and George Rogers, our executors, administrators, and assigns, at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend within the said Colony, our "Invention and Improvement "in the manufacture of Iron into sheets, plates, or other forms; in coating Iron, and in

"preparing

" preparing Iron for coating, and other purposes," in which said Letters of Registration is contained a proviso obliging us, the said Edmund Morewood and George Rogers, by an instrument under our hands and seals, particularly to describe and ascertain the nature of our said invention and improvement, and in what manner the same is performed, and to cause the same to be registered in the Supreme Court of Sydney, in the said Colony, within three days next and immediately after the date of the said Letters of Registration, as in and by the same reference being had thereunto will more fully and at large appear: Now know ye that, in compliance with the said proviso, we, the said Edmund Morewood and George Rogers, do hereby declare that the nature of our said invention and improvement, and the manner in which the same is to be performed, are described and ascertained by the drawings and written description hereto annexed.

In witness whereof, we, the said Edmund Morewood and George Rogers, have hereunto set our hands and seals, this sixth day of December, one thousand eight hundred and fifty-five.

EDMUND MOREWOOD. (L.S.)
(By his Attorney,)
E. C. WEEKES.

GEORGE ROGERS, (L.S.)
(By his Attorney,)
E. C. WEEKES.

Taken and acknowledged by the above-named Edmund Morewood and George Rogers, by Elias Carpenter Weekes, their Agent lawfully constituted in that behalf, before me,—

SAML. FREDK. MILFORD,
Master in Equity.

TO ALL TO WHOM THESE PRESENTS SHALL COME:

I, SIR FRANCIS GRAHAM MOON, Baronet, Lord Mayor of the city of London, do hereby certify, that on the day of the date hereof personally came and appeared before me Charles James Jones, named in the Declaration hereunto annexed, being a person well known and worthy of good credit, and who did before me solemnly and sincerely declare to be true the several matters and things mentioned and contained in the said annexed Declaration pursuant to an Act of Parliament passed in the sixth year of the reign of King William the Fourth.

In faith and testimony whereof, I, the said Lord Mayor, have caused the Seal of the Office of Mayoralty of the said city of London to be hereunto put and affixed, and the office copy Record of Grant of Letters Patent, and office copy of Instrument of Specification mentioned and referred to in and by (L.S.) the said Declaration, to be hereunto also annexed. Dated in London, the fourth day of May, in the year of our Lord one thousand eight hundred and fifty-five.

REYNAL.

DECLARATION.

LONDON.

I, CHARLES JAMES JONES, of Spital Square, in the county of Middlesex, gentleman, do solemnly and sincerely declare, that I was present and did see Francis George Abbott, Esquire, Clerk of the Petty Bag of the Court of Chancery, the proper officer having the custody of the Record of the Grant of Letters Patent for the exclusive use of an invention of "Improvements in the manufacture of Iron into sheets, plates, or other forms; in coating Iron, and in preparing Iron for coating, and other purposes," of which an office copy is hereunto annexed, sign the certificate written at the foot of the said office copy, and that the signature, "F. G. Abbott," thereto subscribed, is the proper handwriting of the said Francis George Abbott; and that I was also present, and did see William Wright, Esquire, Clerk of Enrolments of the Court of Chancery, the proper officer having the custody

custody of the Record of Enrolment of the Specification of the said Invention, of which an office copy is hereunto annexed, sign the certificate written at the foot of the said office copy, and that the signature, "W. Wright," thereto subscribed, is the proper handwriting of the said William Wright. And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the sixth year of the reign of His late Majesty King William the Fourth, intituled, "*An Act to repeal an Act of the present Session of Parliament intituled 'An Act for the "'more effectual abolition of Oaths and Affirmations taken and made in various Depart-"'ments of the State and to substitute Declarations in lieu thereof and for the more entire "'suppression of voluntary and extra-judicial Oaths and Affidavits and to make other "'provisions for the abolition of unnecessary Oaths.'*"

C. J. JONES.

Declared at the Mansion House, London, this 4th day of May, 1855, before me—
F. G. Moon, Mayor.

NINTH PART PATENTS OF THE NINTH YEAR OF THE REIGN OF QUEEN VICTORIA.

VICTORIA, by the Grace of God, &c.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Edmund Morewood, of Thornbridge, in the county of Derby, merchant, and George Rogers, of Stearndale, in the same county, gentleman, have by their Petition humbly represented unto us, that they have invented "Improvements in the "manufacture of Iron into sheets, plates, or other forms; in coating Iron, and in preparing "Iron for coating, and other purposes," that they are the first and true inventors thereof, and that the said invention hath never been practised or used by any other person or persons whomsoever to their knowledge or belief; the Petitioners therefore most humbly prayed that we would be graciously pleased to grant unto them, their executors, administrators, and assigns, our Royal Letters Patent for the sole use, benefit, and advantage of their said invention within England, Wales, and the town of Berwick-upon-Tweed, for the term of fourteen years, pursuant to the statute in that case made and provided; and we being willing to give encouragement to all arts and inventions which may be for the public good, are graciously pleased to condescend to the Petitioners' request: Know ye, therefore, that we, of our especial grace, certain knowledge, and mere motion, have given and granted, and by these presents, for us, our heirs and successors, do give and grant unto the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, our especial license, full power, sole privilege and authority, that they, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, and every of them, by themselves and by their deputy or deputies, servants or agents, or such others as they, the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, shall at any time agree with, and no others, from time to time, and at all times hereafter during the term of years herein expressed, shall and lawfully may make, use, exercise, and vend their said invention within that part of our United Kingdom of Great Britain and Ireland called England, our dominion of Wales, and town of Berwick-upon-Tweed, in such manner as to them, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, or any of them, shall in their discretions seem meet; and that they, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, shall and lawfully may have and enjoy the whole profit, benefit, commodity and advantage from time to time coming, growing, accruing, and arising by reason of the said invention, for and during the term of years herein mentioned; to have, hold, exercise and enjoy the said license, powers, privileges, and advantages hereinbefore granted or mentioned to be granted unto the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended, according to the statute in such case made and provided: And to the end that they, the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, and every of them, may have and enjoy the full benefit and the sole use and exercise of the said invention, according to our gracious intention hereinbefore declared, we do by these presents, for us, our heirs and successors, require and strictly command all and every person and persons, bodies politic and corporate, and all other our subjects whatsoever, of what estate, quality, degree, name, or condition soever they be, within that said part of our

Improvement in the Manufacture of Iron into Sheets.

United Kingdom of Great Britain and Ireland called England, our dominion of Wales, and town of Berwick-upon-Tweed aforesaid, that neither they nor any of them, at any time during the continuance of the said term of fourteen years hereby granted, either directly or indirectly, do make, use, or put in practice the said invention or any part of the same so attained unto by the said Edmund Morewood and George Rogers as aforesaid, nor in anywise counterfeit, imitate, or resemble the same, nor shall make or cause to be made any addition thereunto or subtraction from the same, whereby to pretend himself or themselves the inventor or inventors, deviser or devisers thereof, without the license, consent, or agreement of the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, in writing under their hands and seals first had and obtained in that behalf, upon such pains and penalties as can or may be justly inflicted on such offenders for their contempt of this our royal command; and further to be answerable to the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, according to law, for their damages thereby occasioned: And moreover, we do by these presents, for us, our heirs and successors, will and command all and singular the Justices of the Peace, Mayors, Sheriffs, Bailiffs, Constables, Headboroughs, and all other Officers and Ministers whatsoever of us, our heirs and successors for the time-being, that they, or any of them, do not nor shall at any time during the said term hereby granted in anywise molest, trouble or hinder the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, or any of them, or their deputies, servants or agents, in or about the due and lawful use or exercise of the aforesaid invention or anything relating thereto: Provided always—and these our Letters Patent are and shall be upon this condition—that if at any time during the said term hereby granted, it shall be made appear to us, our heirs or successors, or any six or more of our or their Privy Council, that this our grant is contrary to law, or prejudicial or inconvenient to our subjects in general, or that the said invention is not a new invention as to the public use and exercise thereof in that said part of our United Kingdom of Great Britain and Ireland called England, our dominion of Wales, and town of Berwick-upon-Tweed aforesaid, or not invented and found out by the said Edmund Morewood and George Rogers as aforesaid, then upon signification or declaration thereof to be made by us, our heirs or successors, under our or their signet or privy seal, or by the Lords and others of our or their Privy Council, or any six or more of them, under their hands, these our Letters Patent shall forthwith cease, determine, and be utterly void to all intents and purposes, anything hereinbefore contained to the contrary thereof in anywise notwithstanding: Provided also, that these our Letters Patent, or anything herein contained, shall not extend or be construed to extend to give privilege unto the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, or any of them, to use or imitate any invention or work whatsoever which hath heretofore been found out or invented by any other of our subjects whatsoever, and publicly used or exercised in that said part of our United Kingdom of Great Britain and Ireland called England, our dominion of Wales, or town of Berwick-upon-Tweed aforesaid, unto whom like Letters Patent or privileges have been already granted for the sole use, exercise and benefit thereof; it being our will and pleasure that the said Edmund Morewood and George Rogers, their executors, administrators and assigns, and all and every other person and persons to whom like Letters Patent or privileges have been already granted as aforesaid, shall distinctly use and practise their several inventions by them invented and found out, according to the true intent and meaning of the same respective Letters Patent, and of these presents: Provided likewise, nevertheless—and these our Letters Patent are upon this express condition—that if at any time hereafter these our Letters Patent, or the liberties and privileges hereby by us granted, shall become vested in or in trust for more than the number of twelve persons or their representatives at any one time, as partners dividing or entitled to divide the benefit or profits obtained by reason of these our Letters Patent (reckoning executors or administrators as and for the single person whom they represent, as to such interest as they are or shall be entitled to in right of such their testator or intestate); and also, if the said Edmund Morewood and George Rogers shall not particularly describe and ascertain the nature of the said invention, and in what manner the same is to be performed, by an instrument in writing under their hands and seals, or under the hand and seal of one of them, and cause the same to be enrolled in our High Court of Chancery, within six calendar months next and immediately after the date of these our Letters Patent; and also, if the said Edmund Morewood and George Rogers, their executors, administrators, or assigns, shall not supply or cause to be supplied for our service, all such articles of the said invention as they shall be required to supply by the officers or commissioners administering the department of our service for the use of which the same shall be required, in such manner, at such times, and at and upon such reasonable prices and terms as shall be settled for that purpose by the said officers or commissioners so requiring the same, that then these our Letters Patent, and all liberties and advantages whatsoever hereby granted shall utterly cease, determine, and become void, anything hereinbefore contained to the contrary thereof in anywise notwithstanding: Provided that nothing herein contained shall prevent the granting of licenses in such manner and for such considerations as they may by law be granted. And lastly, we do by these presents, for us, our heirs and successors, grant unto the said Edmund Morewood and George Rogers, their executors, administrators, and assigns, that these our Letters Patent, or the enrolment or exemplification thereof, shall be in and by all things good, firm, valid, sufficient,

and

Improvement in the Manufacture of Iron into Sheets.

and effectual in the law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged in the most favourable and beneficial sense for the best advantage of the said Edmund Morewood and George Rogers, their executors, administrators and assigns, as well in all our Courts of Record as elsewhere, and by all and singular the Officers and Ministers whatsoever of us, our heirs, and successors, in that part of our said United Kingdom of Great Britain and Ireland called England, our dominion of Wales, and town of Berwick-upon-Tweed aforesaid, and amongst all and every the subjects of us, our heirs and successors whatsoever and wheresoever, notwithstanding the not full and certain describing the nature or quality of the said invention, or of the materials thereto conducing and belonging.

In witness, &c., witness, &c., the ninth day of October.

By Writ of Privy Seal.

Examined with the Record in the Petty Bag Office, in Her Majesty's High Court of Chancery, the twenty-sixth day of April, 1855.

(L.S.)

F. G. ABBOTT.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, EDMUND MOREWOOD, of Thornbridge, of the county of Derby, merchant, and GEORGE ROGERS, of Stearndale, in the same county, gentleman, send greeting:

WHEREAS Her present Most Excellent Majesty Queen Victoria, by Her Royal Letters Patent, under the Great Seal of Great Britain, bearing date at Westminster, the ninth day of October, in the ninth year of her reign, did, for herself, her heirs and successors, give and grant unto us the said Edmund Morewood and George Rogers, our executors, administrators, and assigns, her especial license, full power, sole privilege and authority, that we, the said Edmund Morewood and George Rogers, our executors, administrators, and assigns, or such others as we, the said Edmund Morewood and George Rogers, our executors, administrators, or assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend within England, Wales, and the town of Berwick-upon-Tweed, our invention of "Improvements in the manufacture of "Iron into sheets, plates, or other forms; in coating Iron, and in preparing Iron for coating, "and other purposes;" in which said Letters Patent is contained a proviso that we, the said Edmund Morewood and George Rogers, shall cause a particular description of the nature of our said invention, and in what manner the same is to be performed, to be enrolled in Her said Majesty's High Court of Chancery, within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same reference being thereunto had will more fully and at large appear: Now know ye that, in compliance with the said proviso, we, the said Edmund Morewood and George Rogers, do hereby declare that the nature of our said invention, and the manner of performing the same, are fully described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon, that is say:—

Our invention relates, first, to modes of producing corrugations in sheets or plates of wrought iron, either plain or bent into an arch; secondly, our invention relates to manufacturing sheets or plates of wrought iron indented in two or more directions so as to give strength, and so constructed that they will go together to cover a surface, making them particularly useful for roofs of houses; thirdly, our invention relates to coating iron with copper or alloys of copper; fourthly, our invention relates to preparing iron for coating; and fifthly, our invention relates to preparing wrought iron for making ridges and angle-caps of roofs: and in order that our invention may be fully understood, we will proceed to describe the means pursued by us. In the manufacture of wrought iron sheets or plates of corrugated iron, as heretofore practised, it has been usual to employ dies between which parts of each sheet or plate are successively operated on, so as to produce one corrugation or bending at a time, and it has been proposed to make corrugations by means of rollers having longitudinal grooves and projections corresponding with each other; and we mention these in order to state that this part of our invention has for its object peculiar modes of constructing machinery for producing corrugated sheets or plates of iron. One method of corrugating sheets or plates of wrought iron according to our invention, whether coated or not with other metal, is by means of rollers of a peculiar form. A pair of rollers are so grooved and fitted into each other as to give the size and form of the corrugation required (see figures 1, 2, and 3); the grooves or patterns running round them, and not in the direction of the length of the rollers, which rollers are placed directly over each other as at *a b*, the axes of the rollers *a b* being guided in the framing of the machine, as shewn. On

one

one end of the roller *a* is affixed the cog wheel *c*, which is driven by the pinion *d* on the axis d^1, which works in suitable bearings in the framing, and is turned by means of a crank handle, or it might be by other means. On the other end of the roller *a*, as also on the same end of the roller *b*, are cog wheels a^1 b^1 working into each other, by which the roller *a* communicates its motion to the roller *b*. These cog wheels a^1 b^1 should be made of such a size that the rollers will work either close together or at a little distance apart, in order that the different depths of corrugation may be given to the sheet, or that if a deep corrugation be wanted it may be done at several times, as it is difficult to give a deep corrugation to a broad sheet by once passing the sheet between the rollers. The axes of the roller *a* work in stationary bearings, which may either be placed in the frame or form part of it. The axes or necks of the roller *b* work in movable bearings or sockets b^2 b^2, which slide up and down and are guided in the frame, and these bearings b^2 are attached to the ends of the screws b^3, so that by turning the screws b^3 either in one direction or the other, the roller *b* will be raised or depressed, and the requisite pressure may be given to the upper roller. The screws b^3 pass through holes in the framing tapped with female screws, all which is well understood. If we wish to curve the plates, as is indicated by the blue line, we make use of another roller *e*, placed immediately behind the rollers *a b*, the axes or necks of the roller *e* are carried by the bearings e^1, which are supported on the ends of screws e^2 in a similar manner to those before described; or, in place of the roller *e*, a bar may be made use of with suitable corrugations, and the roller or bar may be placed before instead of behind the rollers *a b*, so that the plate may pass over it on entering them. When a bar is used, as well as when a roller is employed, it must be capable of being raised so as to give to the metal the curve required. The greater the curve the higher the roller *e* or bar must be. The curve may be given at the time the sheets are being corrugated, or by separately passing the plate through the rollers.

When the corrugated sheet is required to be straight from end to end, that is to say, from the part which enters first to that which comes out last from the rollers *a b*, we use only the rollers *a b*, the back roller *e* being lowered below the level of the roller *a*. The corrugations may be produced at one or at several times, according to the quality of the iron and the depth of the corrugations required, and the temperature at which the iron is passed through the rollers. If the iron is cold and not good, or if the corrugation is to be deep, it should be done by passing the sheets several times through the rollers, which must be brought nearer together by turning the screws b^3, each time the sheet is passed through. *f f* are guide rollers to guide the metal up to the rollers *a b*. These rollers *f f* are carried on axes or necks *g g*, which are guided in grooves in the table *h*, there being rods *i i* supported in bearings i^1 i^1, which pass through the lower parts of the axes *g g*, there being screws formed on the rods *i* at those parts, so that by turning the rods *i* in one or other direction the guide rollers may be adjusted as required.

The guide rollers on either side will require to be brought nearer the centre of the machine, as the sheet becomes narrower by being corrugated. In some cases, instead of passing the metal through a pair of rollers to produce the corrugations, we make use of a single roller, which is caused to revolve in connection with a travelling table, such travelling table having corrugations formed on its surface corresponding with those on the roller, and as the table travels forward under the roller the metal is taken with it, and the corrugations are thereby produced. The necks or axes of the roller must be capable of adjustment as previously described with respect to the roller *b*. Or in place of using a complete roller, a segment of a roller sufficiently large for the length and width of the metal required to be corrugated might be made use of.

Another mode of corrugating sheets of iron is by means of a peculiar arrangement of dies; and we would remark that heretofore wrought iron has been corrugated by means of dies, as is well understood; but those dies have had only a small number of corrugations upon them, so that the sheets have had to be struck at several times. We, however, make use of a pair of dies sufficiently large to corrugate the whole sheet at once, and so arranged as to come together gradually, they opening on hinges, as is shewn at figures 4 and 5, where *a* is the lower die and *b* the upper die. The upper die *b* may be raised by a lever connected at one end to the eye b^1, or otherwise. By using dies opening and closing upon a hinge, as the upper die is shutting down the corrugations will be formed in succession, beginning of course with the side of the sheet nearest to the hinges of the dies, thus allowing the sheet to become gradually narrower as the corrugations are made. One of the difficulties attending the use of a die sufficiently large for corrugating a whole sheet at once, we believe, has been that cold iron would not generally stand the operation without breaking, and in corrugating by these means we sometimes heat the iron to redness, in which case the corrugating must take place previous to the coating. If sheets of iron or coated iron, after having been corrugated by means of revolving or partly revolving machinery, are not sufficiently straight and true, we propose to make them so by afterwards stamping them in dies the corrugations of which correspond with those of the sheets.

I will now describe the second part of our invention. Figure 6 represents a side view, figure 7 a plan, and figure 8, a cross section of apparatus such as we prefer to use in carrying out this part of the invention; the other views shew parts separately—*j* is the bed plate of the machine, which has grooves *k* formed in one direction, and others *l* not so deep, in the opposite direction; these grooves or indentations receive projections k^1 l^1, formed on or affixed to the plate *m*; the plate *m* is supported on the end of

the

the screw *n*, which passes through a female screw in the frame *o*, and has on its upper end arms and weights similar to an ordinary fly press. A piece of sheet metal is placed on the bed plate *j*, the plate *m* is then caused to descend with considerable force obtained by the momentum of the weighted arms n^1, by which the plate of metal will have the form given to it shewn at figure 9, and any number of such forms may be combined together, as shewn by the sectional longitudinal view, figure 10, and by the sectional end view, figure 11. In place of stamping sheets of iron into the required form, the same might be done by means of suitably formed rollers. We do not confine ourselves to this mode of making the plates, nor to the precise figure of the indentations, the object of this part of our invention being to make plates of wrought iron having indentations in two or more directions, and capable of fitting or going together, for covering surfaces, as herein described.

We will now describe the third part of our invention. In coating with copper, or the alloys of copper, we clean the iron to be coated in the ordinary manner. We then take the alloy or metal to be molten (brass, for instance), and fuse it in a crucible or other convenient vessel. This done, we skim the surface, and cover it with a flux. We then prepare the iron, as hereafter explained, and immerse it into the fused metal by passing it through the flux. When the iron has acquired the temperature of the molten metal we withdraw it gently, and, in cases where hardening the iron is not of importance, we plunge it into water while hot, and clean it therein by rubbing it with a brush, or we permit the iron when taken out to cool, and afterwards clean the surfaces. A flux of chloride of manganese is what we have used on the surface of the molten metal, but other flux may be employed. The chloride of manganese is, when in the dry state, applied to the surface of the fused metal, and we have applied it from a half-inch to an inch in depth on the surface of the metal, and it is important to keep the fused metal well covered with flux. We would remark, that we are aware that it has before been proposed to coat iron with copper and alloys of copper, by dipping it into the same when in a fused or molten state. We do not, therefore, claim the same when uncombined with the use of a flux.

The fourth part of our invention consists of preparing iron for coating with copper, or the alloys of copper, with tin, zinc, bismuth, or antimony, and consists in dipping it (previously to introducing it into fused metal) into a strong or saturated solution of sal ammoniac or borax—but we prefer the former—and the iron, when taken out of the solution, is with care introduced through the flux into the fused metal.

We will now describe the fifth part of our invention. Heretofore, when roofs of certain forms have been made of corrugated metal, considerable difficulty has been experienced in forming a ridge of iron, or coated iron, so as to keep out the weather, as corrugated metal cannot conveniently be bent at an angle across the corrugations, and a plain metal ridge-cap does not fit into the corrugations of the side plates. In order to obviate this difficulty we have dies cast of the form required, the dies being made to agree with those of the side plates of the roof, so that when the ridge-cap is laid on, the grooves and projections upon it fit into those of the adjoining sheets. They may either run continuously over the ridge, or they may gradually diminish, and finally terminate in it. The dies are cast precisely in the form of the ridge-cap. And for a plain ridge, of course the corrugations are at right angles with the ridge. When an angle-cap is wanted, the corrugations on each side of the angle-cap slant downwards, so as to fall into those of the plates of the roof. In preparing ridge or angle-cap in this way, we prefer its being done out of hot iron, in which case the coating must be an after process. When the ridge or angle-caps are required for roofs covered with slates or tiles, or plain iron plates coated with metal or otherwise, it will be evident the corrugation will not be required, and the ridge or angle-caps will simply have to be stamped to suit the angle of the roof. With respect to ridge-caps, the effect desired might be produced by suitably formed rollers.

Having thus described the nature of our invention, and the manner of performing the same, we would have it understood that what we claim is, first, the modes herein described of corrugating and curving wrought sheet iron, or coated iron; secondly, we claim the stamping or rolling of sheets or plates of wrought iron, indented in two or more directions, so as to give strength lengthways as well as crossways, and at the same time to fit and go together for covering surfaces, particularly useful for roofing of houses, as herein described; thirdly, we claim the coating of iron by immersing it in copper, or the alloys of copper, with tin, zinc, antimony, or bismuth, kept molten in a suitable vessel, the surface of the molten metal being covered with a suitable flux; fourthly, we claim the dipping of iron into a solution of sal ammoniac or borax before coating with fused copper, or the alloys of copper, with zinc, bismuth, or antimony, covered with chloride of manganese or other suitable flux; fifthly, we claim the rolling or stamping sheets or plates of wrought iron, and iron coated with metal or otherwise, into angle or ridge caps, of such form or shape as to make it correspond with or fit on to the grooves or projections and other surfaces of roofing.

In witness whereof, we, the said Edmund Morewood and George Rogers, have hereunto set our hands and seals, this ninth day of April, in the year of our Lord one thousand eight hundred and forty-six.

EDMUND D. MOREWOOD.
GEORGE D. ROGERS.

Improvement in the Manufacture of Iron into Sheets.

AND BE IT REMEMBERED, That on the ninth day of April, in the year of our Lord one thousand eight hundred and forty-six, the aforesaid Edmund Morewood and George Rogers came before our said Lady the Queen, in her Chancery, and acknowledged the specification aforesaid, and all and everything therein contained and specified in form above written; and also, the specification aforesaid was stamped according to the tenor of the statute made for that purpose.

Enrolled the ninth day of April, in the year of our Lord one thousand eight hundred and forty-six.

This agrees with the Record.

W. WRIGHT,
Clerk of Enrolments in Chancery.

REPORT.

Civil Engineer's Office,
Sydney, 19 *September*, 1855.

SIR,

In obedience to the instructions of your letter, No. 121, 29th August, we have had under our consideration the Petition of Mr. Elias Carpenter Weekes, applying, on behalf of Messrs. Edmund Morewood and George Rogers, for Letters of Registration under the Act of Council 16 Victoria, No. 24, for Improvements in the manufacture of Iron into sheets, plates, or other forms, in coating Iron and preparing it for coating, &c.; and we do ourselves the honor to report, for the information of His Excellency the Governor General, that we consider the invention of sufficient importance to warrant a compliance with the Petition; and we do therefore recommend that Letters of Registration should issue, securing to Messrs. Morewood and Rogers the patent right of their invention for the term of fourteen years.

2. We would remark that the process has been patented in England, for a term of fourteen years, four years of which are apparently unexpired.

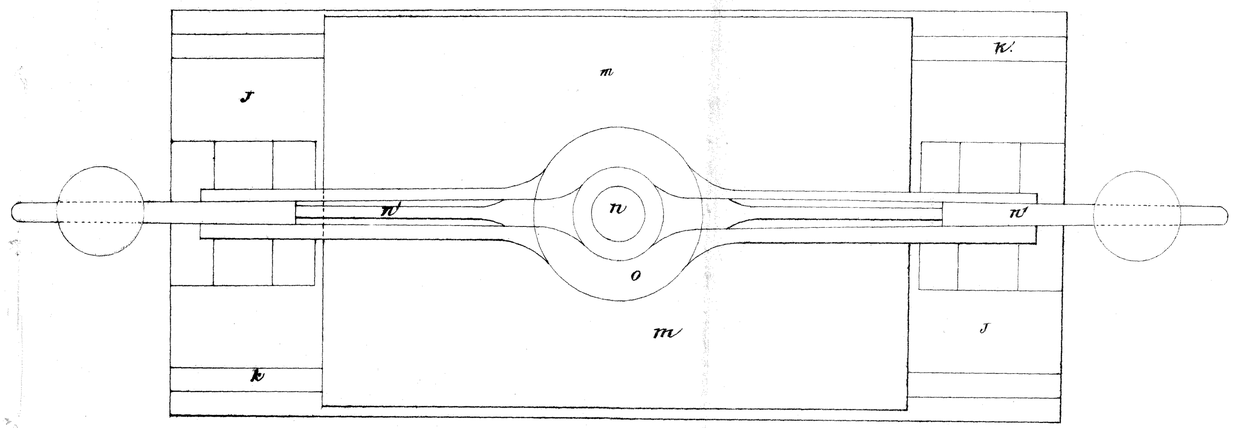
We have, &c.,
GOTHER K. MANN.
H. H. BROWNE.

THE HONORABLE
THE COLONIAL SECRETARY.

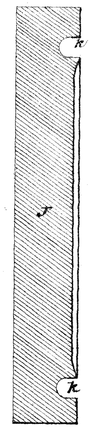
[Plans—three sheets.]

Morewood & Rogers 3 Sheets. 1846

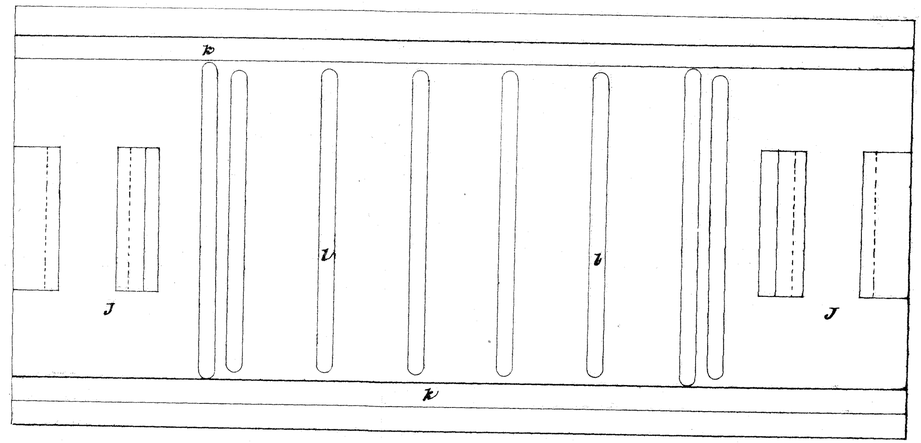
Fig 7.



Gross Section



Separate Views of Bed plate J.



Longitudinal Section

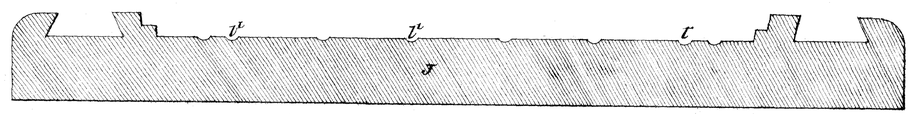


Fig 6

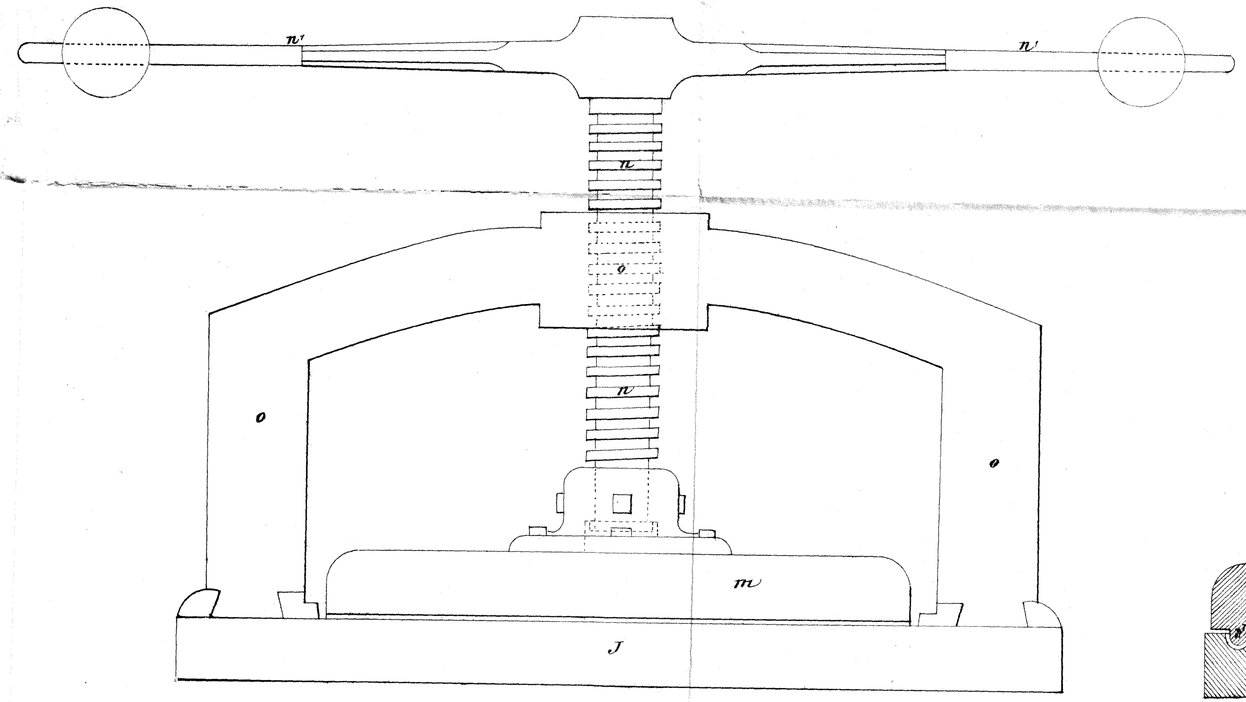
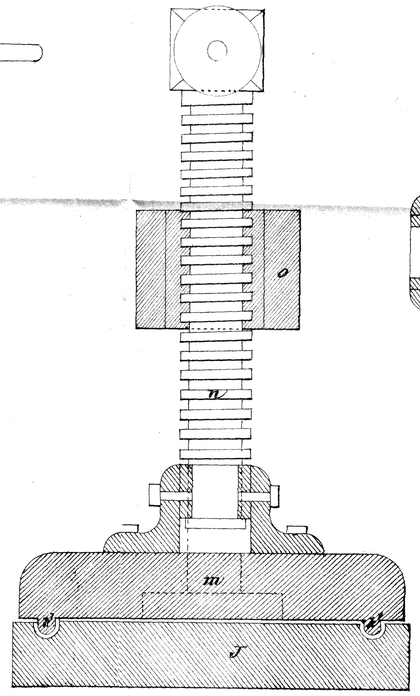
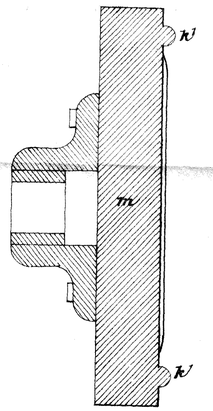


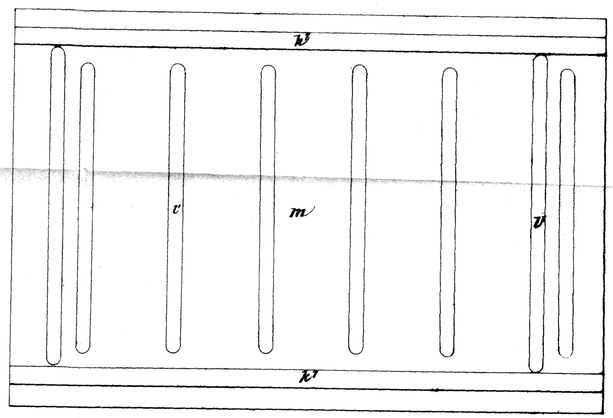
Fig 8.



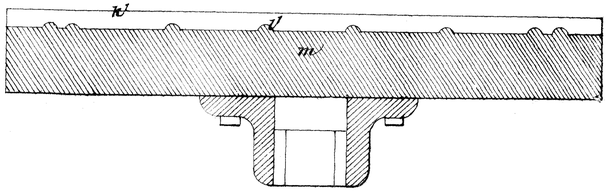
Cross Section



Underside View of plate m

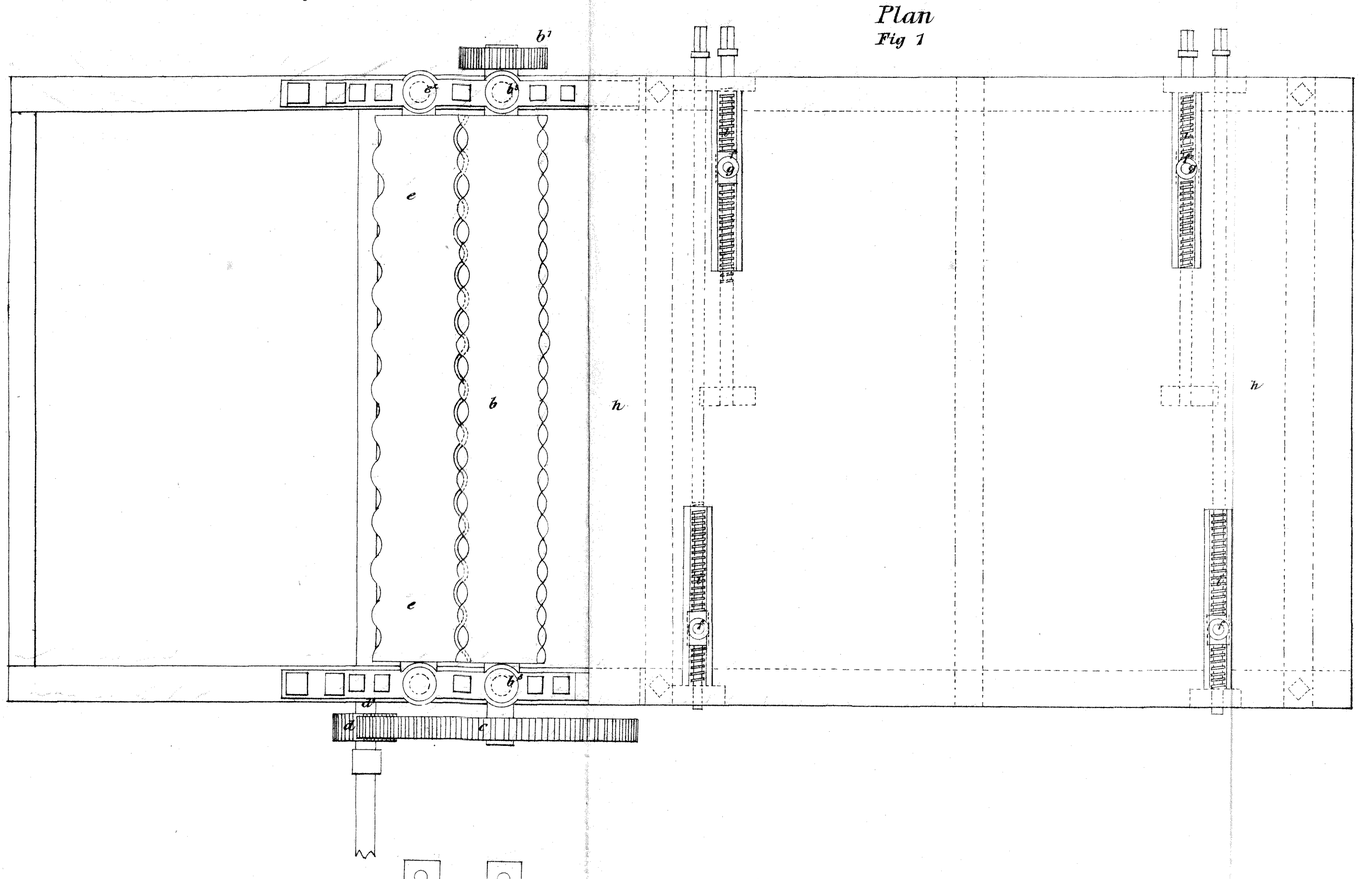


Longitudinal Section

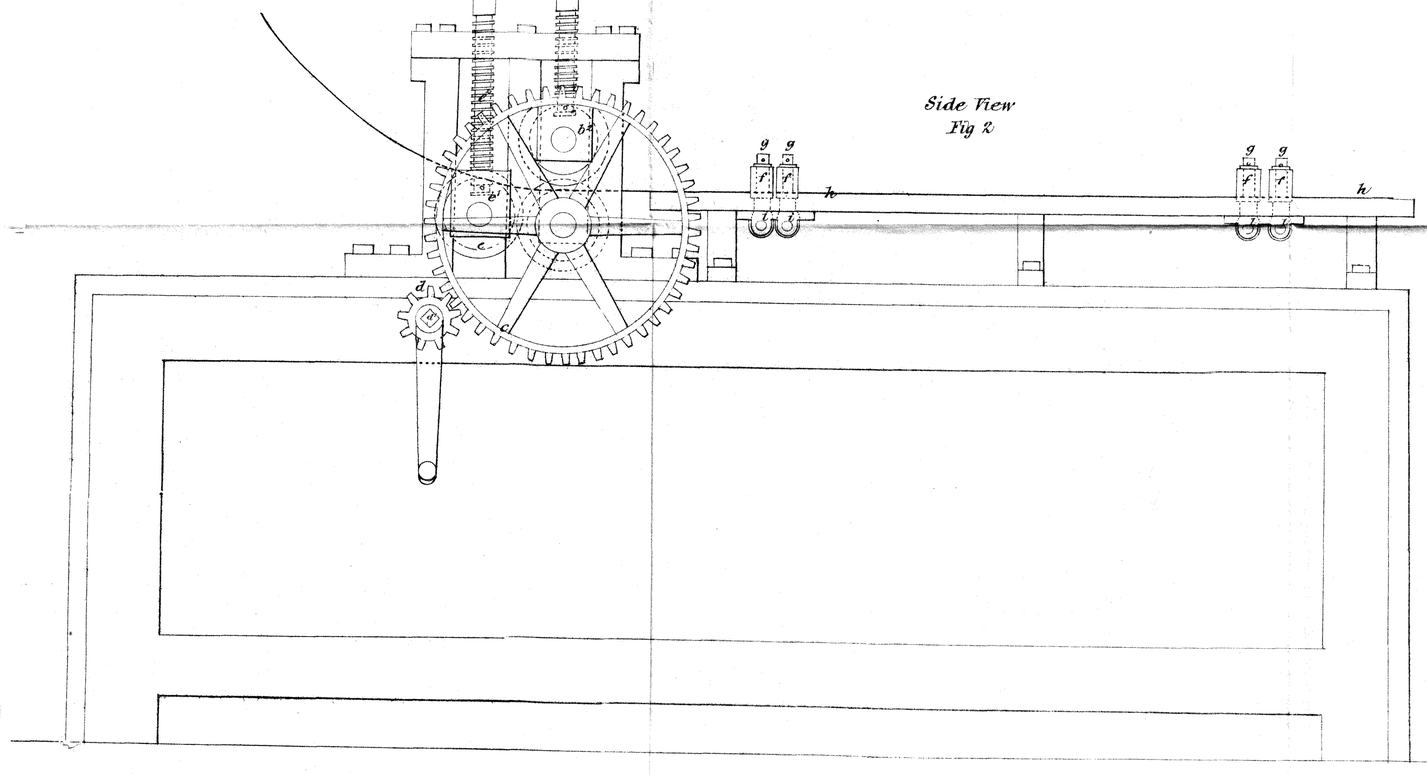


Morewood & Rogers. 1846. 3 Sheets.

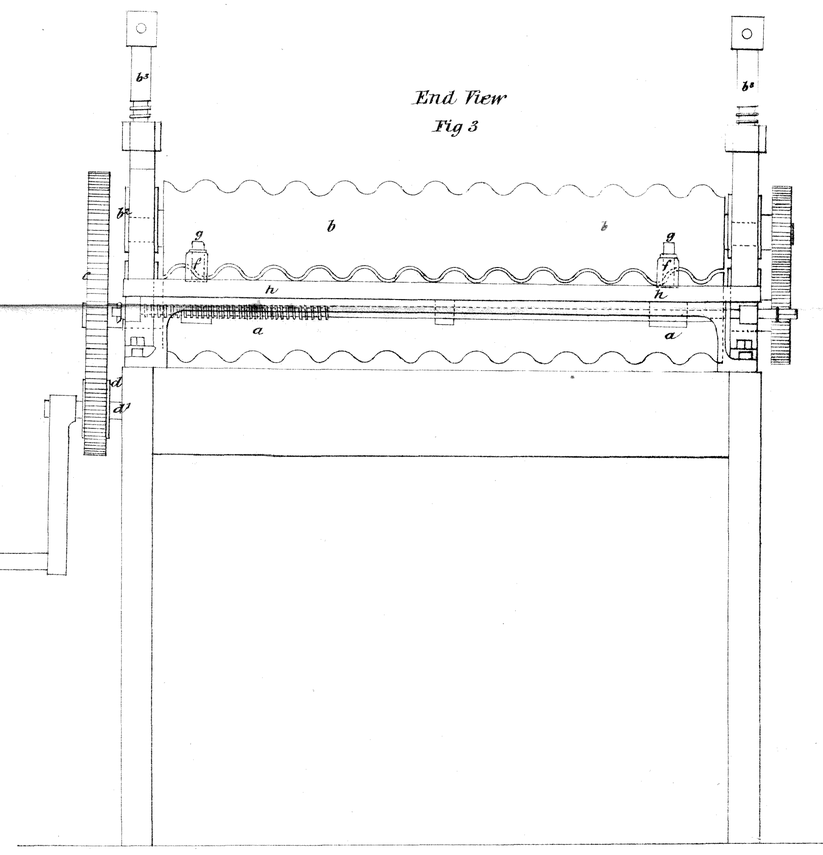
Plan
Fig 1



Side View
Fig 2



End View
Fig 3



Morewood & Rogers 1846. 3 Sheets.

Plan

Fig 4.

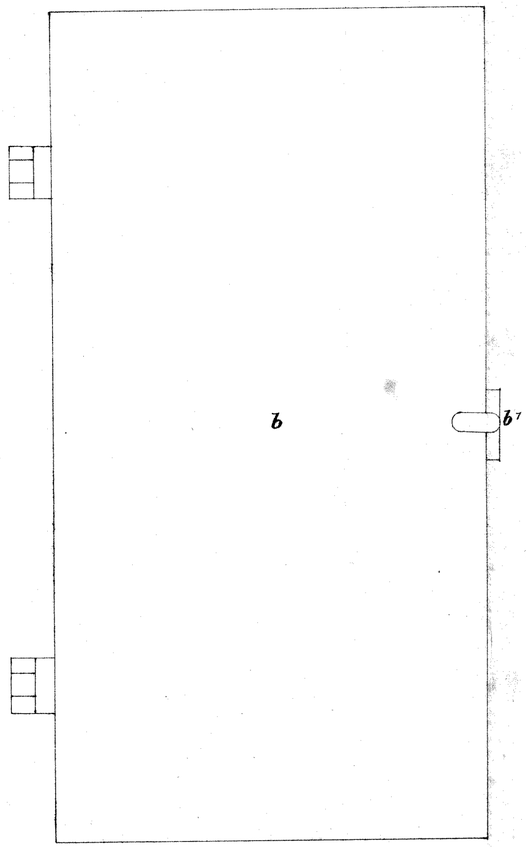


Fig 5.

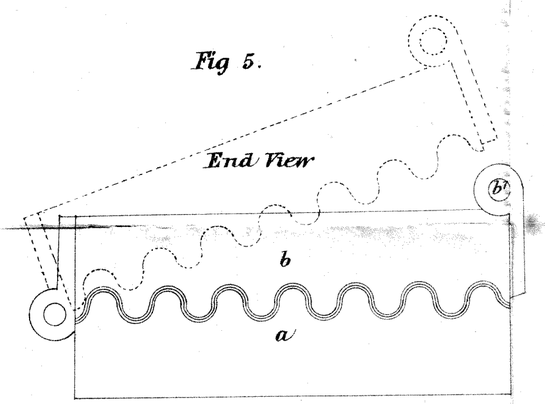


Fig 9.

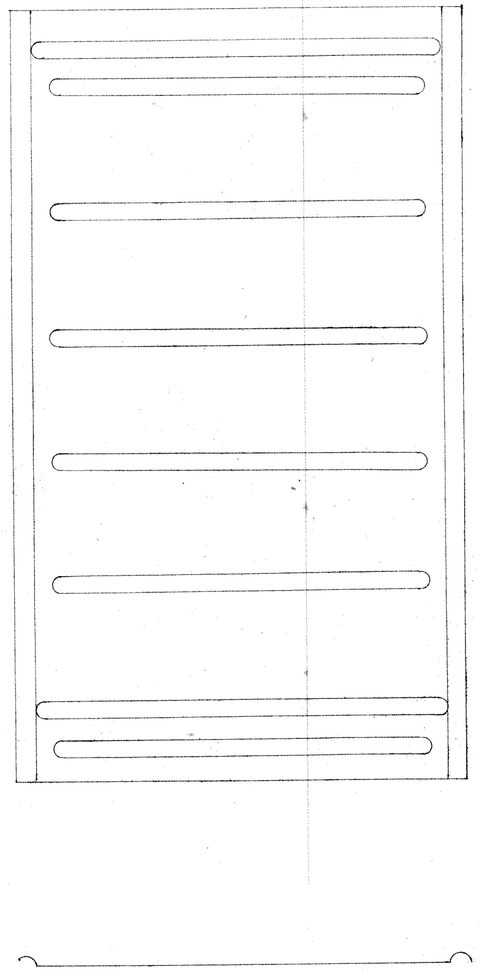


Fig 10.

Fig 11.

A.D. 1857, 13*th November*. No. 5.

IMPROVEMENTS IN TANNING SKINS AND HIDES.

LETTERS OF REGISTRATION to Charles F. P. Funcke, of Sydney, for Improvements in Tanning Skins and Hides.

[Registered on the 14th day of November, 1857, in pursuance of the Act 16 Vic., No. 24.]

BY HIS EXCELLENCY SIR WILLIAM THOMAS DENISON, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS CHARLES FREDERICK PHILIPP FUNCKE, of Sydney, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for Improvements in Tanning Skins and Hides, which is particularly described in the specification which is annexed to these Letters of Registration and the explanation thereupon written; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council, sixteenth Victoria, number twenty-four; the Petitioner, therefore, humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council,

and

and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Charles Frederick Philipp Funcke, his executors, administrators and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said Charles Frederick Philipp Funcke, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Charles Frederick Philipp Funcke shall not within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirteenth day of November, in the year of our Lord one thousand eight hundred and fifty-seven.

(L.S.) W. DENISON.

My invention consists in expediting the introduction of tannic acid into the interior of skins and hides, by counteracting a too rapid action of such tannic acid upon the surface only of the skins and hides, which thereby would be hardened, and in consequence require to be steeped for a long time in tanning liquid before it could penetrate to the interior.

The mode of operation which I have adopted for this purpose, is as follows:—

First—I pass the unhaired skins or hides through water in which soda of commerce has been dissolved, and I then hang them up, and allow them to become nearly dry before I proceed to the actual tanning process.

Secondly—I add diluted vegetable acids to extracts of bark or other vegetable substances containing tannic acid, and subject the skins or hides to the action of the combined liquid by steeping them therein, by which the pores of the skins or hides are opened and extended at the same time as they are exposed to the action of the tannic acid.

Thirdly—I again subject the skins and hides to the action of a liquid similar to the last, by steeping them therein; but in this case I take vegetable acid somewhat stronger than the former, and soften its action by the addition of a solution of sugar.

And, finally, while the skins or hides are subjected to a well known mechanical lifting and falling action, I subject them to the action of a liquid containing tannic acid, until the leather is finished; but as the tanning liquor in my process, in order to act with expedition, is of such strength as to give the leather a colour too deep for most purposes, I reduce this colour, when required, by adding in this last stage of the process some sulphuric acid and salt to the tanning liquid in which the skins or hides are worked.

Having thus stated the nature of my said invention, I proceed to describe in what manner it may be performed. When, for example, forty small calf-skins are to be tanned, I shall state the proportions of ingredients required for that number, but these will of course have to be diminished or increased for a smaller or larger number of skins or hides. Skins or hides of more or less substance will also require proportionately longer or shorter times of working than those hereinafter mentioned. These circumstances every practical man will be able to regulate. I take the skins after they have been unhaired, fleshed, and cleaned in the usual manner, and draw them through cold soft water, in about 600 lbs. of which 3 lbs. 8 ozs. of common soda have been dissolved. I then hang the skins up, and when they are nearly dry, I immerse them in a vat containing tanning liquor, composed of 232 quarts of cold soft water, 32 lbs. of oak bark, 28 lbs. of divi-divi, and 6 ozs. of tartaric acid in powder, and leave them in this liquor for ten minutes. I then take them out and replace them, after a short exposure to the air. I repeat this three times, and then immerse them for half an hour, and air them, as before, and repeat this every half-hour until the skins have been subjected to the action of this liquor in all about four hours. The skins are then sleaked out and hung up to dry for a few hours in an atmos-

phere

phere of a temperature of about 70° of Fahrenheit. I then steep them again in tanning liquor similar to the last described, but to which I add 6 ozs. of acetic acid and 2 lbs. 8 ozs. of loaf sugar, and remove them from and replace them into this liquor every half-hour, until they have been in about four hours in all. I then hang them up in an atmosphere of a temperature of about 70° Fahrenheit, until they are nearly dry, and place them in a drum, together with tanning liquor composed of 24 quarts cold soft water, 10 lbs. of oak bark, 7 lbs. 8 ozs. of divi-divi, 1 lb. of fuming sulphuric acid, and 2 lbs. of common salt, and cause the drum and its contents to rotate for about four hours. When the skins are found to be sufficiently done, I take them out of the drum, wash them with clean water and sleak them; they may then be hung up to be dried or be finished off at once by the currier, dyer, or enameller.

I do not confine myself to the ingredients hereinbefore named, for it is evident that tannic acid extracted from other barks and vegetable substances might be substituted, and that instead of using sugar in the refined, and acetic acid in the rectified state, the impurer articles from which they are produced, namely, molasses and raw sugar, and pyroligneous acid might be taken in proportionate quantities; also that different mechanical means of agitating the skins, and pits for holding the tannic liquor, might be employed; nor do I confine myself to the temperature of 70° Fahrenheit, as from 45° to 100° might be used for drying. I do not claim the use of the several ingredients separately, nor of the drums and vats, as I am well aware that these have been employed before in the manufacture of leather; but what I claim is:—

Firstly—The use of certain vegetable acids, with or without sugar, in combination with, and at the same time as the tanning liquor extracted from, barks and other vegetable substances containing tannic acid.

Secondly—The progressive or successive use of these compound liquors in certain periods, and after previous partial drying of the skins, as described.

Thirdly—The passing of the skins or hides through water containing a small proportion of soda, previous to the first drying period.

This is the specification referred to in the Letters of Registration hereunto annexed, granted to Charles Frederick Philipp Funcke, this thirteenth day of November, 1857.

W. DENISON.

REPORT.

Sydney, 15 *July*, 1857.

Sir,

Having, in compliance with the request in your communication, No. 57-2684, examined into and considered the matters stated in Mr. Charles Frederick Philipp Funcke's Petition for the issue of Letters of Registration for the invention of "Improvements in Tanning Skins and Hides," we are of opinion that the prayer of the Petition may be granted.

We have, &c.,

GOTHER K. MANN.
E. W. WARD.

The Honorable
The Colonial Secretary.

P.S.—The papers forwarded to us are herewith returned.

A.D. 1858, 31*st May*. No. 6.

AUTOMATIC ENGINE.

LETTERS OF REGISTRATION to Frederick Septimus Peppercorne, for an Automatic Engine.

[Registered on the 2nd day of June, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY HIS EXCELLENCY SIR WILLIAM THOMAS DENISON, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS FREDERICK SEPTIMUS PEPPERCORNE, of the Richmond River, in the said Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of the invention of the "Automatic Engine," which is particularly described in the specification which is annexed to these Letters of Registration, and that he, the said Petitioner, has deposited, with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council, sixteenth Victoria, number twenty-four; the Petitioner, therefore, humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information,

am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Frederick Septimus Peppercorne, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof: To have, hold, and exercise unto the said Frederick Septimus Peppercorne, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Frederick Septimus Peppercorne shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirty-first day of May, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

SPECIFICATION of a new application of motive power to machinery, called the "Gravitation," or "Automatic" Engine"; and of the method of applying the force of gravity in the said engine for the purpose of driving machinery. Dated March 15th, 1858.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting, &c.:

NOW know ye, that I, Frederick Septimus Peppercorne, civil engineer, do hereby declare that my said invention and the benefits to be derived therefrom, depend as follows, that is to say:—That I take this patent, and I rest the principal merits thereof, not on the invariable form or construction of any machinery, instrument, matter, or thing that I may from time to time adopt or employ for the accomplishment thereof (whether to purposes already known or not); but I claim the application of the power or force of gravity for the purpose of giving motion to machinery of every description, whether it be for the purpose of lifting the most enormous weights, for propelling vessels on canals, rivers, or the ocean; of propelling carriages on railways, tramways, or on common roads; or of driving machinery of every description, and for any purpose and of any magnitude whatever, such as for grinding, sawing, planing, pressing, forging, stamping, crushing, pumping, or lifting, or for any known or unknown purpose whatsoever, without exception, either with respect to construction, use, or situation; for as the said power is in its nature and extent infinite, its arrangements and combinations must be equally so.

Goods and every description of weights can be raised or lowered to and from warehouses and ships, with perfect safety and expedition, by the Automatic Engine; and the general cranage of goods is one of its principal objects, whether to produce effects already accomplished by manual power, by horse power, by water power, or by steam power.

I claim the employment under this patent of the force of gravity as a motive power (although this force is not usually classed among the prime movers), and the materials I employ may be any heavy substances, whether known or unknown at present, as water, fluid or solid mercury, lead, tin, iron, copper, and any of the other metals, or metallic or mineral substances, as well as oils and resin; and instead of using, as in the steam-engine, a cylinder and piston as the means of producing motion by the force or pressure of steam, I use a cylinder without a piston, or on some occasions I use a plurality of cylinders which contain the motive power, and transfer the effect to the working point of the machinery to be driven.

I claim the application of this force or power to impel machinery for any purpose whatsoever, and were I to attempt to delineate or describe the various methods of construction which a principle so universal in its nature as the force of gravity will of necessity cause me to have recourse to, I should extend this specification to an inconvenient length, and I shall not therefore attempt any minute detail of these various methods, but rest my claim on the *effects* of this principle, and not solely on the organization of the component parts of the machinery employed. But, notwithstanding, I think it proper to state that the Automatic Engine is essentially of rotatory and not of reciprocating action, and I employ toothed wheels and pinions, as spur wheels, bevel wheels, annular wheels, and friction wheels, in order to produce a continuous revolving motion, and to transfer the power to the machinery to be driven. I also employ any combination of wheel and axle work, known under the name of multiplying wheels, together with link work, cranks, pulleys, and belts, rack and pinion work, the ratchet wheel, the endless screw, and various other contrivances for conveying or for modifying motion.

Automatic Engine.

I claim the mechanical application by which the moving power revolves in a circle, and so continues to revolve for any length of time, still producing its due proportion of effect on the weight to be raised, or on the resistance to be overcome, and in this manner the Automatic Engine may be said to contain the power of motion within itself, and to give a result equal to that power, abating friction.

The power suffers no loss or diminution in intensity for years, or even for centuries; and when the engine is worn out the power remains intact, and can again be made use of in other engines; and although it has been said that no machine could be constructed so as to give a result equal to the motive power, and to overcome its own friction, without a maintaining power, and that the time has probably gone by since ingenious persons, reasoning on false data, vainly flattered themselves that they might devise some machine which should continue in perpetual motion, yet I claim for the Automatic Engine the nearest approach to what is commonly called "perpetual motion."

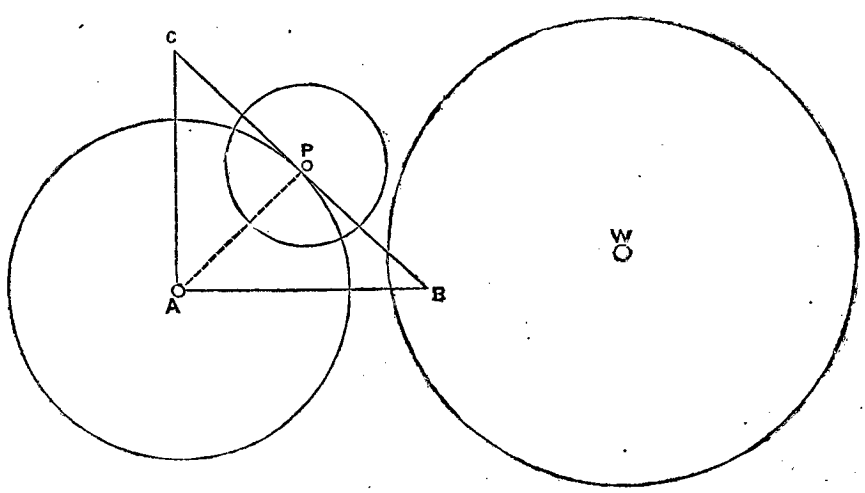
It has long been a desideratum in practical mechanics, to contrive a power engine which shall be ready for use at any time, and be capable of being put in motion without any consumption of fuel or loss of time. It is well known that the steam-engine satisfies none of these conditions, although it is true that by using high pressure steam expansively the important requisite of great power in a small compass is obtained; but it is not less true that the cost of fuel is a constant and a heavy expense in every form of the steam-engine.

In the Automatic Engine, which is actuated by a force so concentrated as to occupy but little space, its applicability to locomotive purposes seems unquestionable; and I think it proper to add, before I conclude this part of my specification, an observation respecting one of the main objects I have in view, namely, the propelling of vessels upon rivers or canals, or on the ocean. This important object, involving such immense advantages to society, will be within my power to attain, without cost of fuel, and without risk of explosion; and I believe that an efficient marine engine can be constructed on this principle, by which the vast expenditure incurred for fuel in sea-going steam-vessels will be obviated, and the mechanical conditions which ensure safety and expedition in long voyages will be attained, without a large proportion of the tonnage of the vessel being occupied by the machinery and fuel.

And again, with respect to locomotive engines on railways, the Automatic Engine is equally applicable, and the public safety will be increased, while the heavy expense attending steam locomotive engines will be in a great measure obviated—a circumstance not only worthy of individual but also of national consideration.

I am the more particular in the recital of these circumstances than perhaps becomes a specification, but my object is to shew the incompatibility of my resting the security of this patent upon minute organic particulars, and to shew also that this patent does not only differ in its nature, and in its boundless applications, from any other patent before sanctioned by the legislative authority of any nation, but that it also lays claim to universal utility.

Having thus shewn what are the effects proposed by the Automatic Engine, I now proceed to explain the nature of the motive power, and its application in the method I employ, on the principle of the application of the power or force of gravity to produce motion and to give motion to machinery. In order to explain one of these applications, I take fluid mercury as my prime mover, one cubic foot of which weighs 848 pounds. I estimate one ton of mercury to be equal to the power of ten horses or thereabouts, consequently, a cylinder containing little more than five cubic feet of mercury will be equivalent to the power of twenty horses; and if it contain ten cubic feet, it will equal in power an engine of forty horse power or thereabouts. The cylinder which contains the motive power has an axis projecting from each end, and a spur wheel is keyed on to this axis at or near each end; this axis rests on the periphery of two friction wheels or more, which revolve loosely on fixed bearings, and the centre of the friction wheel A forms an angle of forty-five degrees, or thereabouts, with the axis of the cylinder P, thus:—



I do not, however, restrict myself to this particular angle of 45°, although I believe that it will be found to be the most advantageous, because the power acts then as on an inclined plane, having a base of 1 horizontal to 1 perpendicular, and in this case the conditions of weight and power are equalized. In other words—if BC be an inclined plane, AB its horizontal base, AC its height, and ABC its angle of elevation, P a heavy body sustained on the plane will require an equal weight to sustain it "*in equilibrio*," and the whole of the power P is therefore available to produce motion, if it be made to act upon another body, as on the large toothed wheel W; and but a small proportion of the power will be absorbed by the friction wheels, which perform the office of a movable inclined plane, on which the power is applied in the most advantageous position to the large wheel W, and can be transferred from it, by means of a crank, drums, or spur gearing, at any requisite velocity, to the machinery to be driven.

But as some inconvenience might result from the great weight of the cylinder acting through the spur wheels fixed thereon, upon the teeth of the large wheel W, by which the teeth of these wheels might become locked or fractured, I employ two guide rings or plates fixed upon the "pitch circles" of these wheels, by which this difficulty is obviated and their respective parts are kept in their proper places; and as, owing to the great weight of the cylinder with its contents, in the larger class of Automatic Engines, there might be danger of fracturing the teeth of the wheels from any sudden shock (unless they be made of very great strength and substance), I use any number of wheels and followers, which are fixed close together. The strain or pressure is thus distributed over a greater number of teeth, and the chance of fracture is thus diminished. A due regard to this arrangement will evince its utility in a great number of applications, particularly in lifting heavy weights with a slow velocity, or in giving motion to a paddle wheel shaft or to the shaft of a screw propeller, where a great speed is required. In order still further to diminish the risk of fracturing the teeth by sudden shocks, by distributing the pressure over a greater number of teeth, I adopt a system of internal gearing, in which the second motion wheels have their teeth in their internal periphery, the driving wheels revolving within them.

It must be apparent that by these means I shall be enabled, by means of the Automatic Engine, to drive machinery of every description, for any purpose, and of any magnitude whatsoever, as recited in the preamble of this specification.

In witness whereof, the said Frederick Septimus Peppercorne hath hereunto set his hand, the day and year first above written.

Signed in the presence of— FREDK. S. PEPPERCORNE.

ELIZABETH WARD.

This is the specification referred to in the annexed Letters of Registration granted to Frederick Septimus Peppercorne, this thirty-first day of May, 1858.

W. DENISON.

We certify that this and the six preceding pages contain a true copy of the original Letters of Registration, the same having been compared therewith by us.—Dated 2nd June, 1858.

W. WILKINSON.
W. H. THOMPSON.

REPORT.

Sydney, 12 *April*, 1858.

SIR,

Having, in conformity with your request, met as a Board to examine and report on the Petition of Mr. F. S. Peppercorne, for Letters of Registration for a new application of motive power to machinery, called the "Automatic Engine," we have the honor to submit the following Report:—

Mr. Peppercorne claims, in his specification and letter of the 29th March last, enclosed, "the employment of the force of Gravity to give motion to Machinery," to be reserved for his exclusive benefit. To this we think he is not entitled, inasmuch as machines of various kinds have been in use for many years to which motion is imparted by the action of gravity as a prime mover. We would instance the water wheel and the pendulum block.

As regards the particular machine described in Mr. Peppercorne's specification, we are of opinion that no injury can accrue to the public by allowing him the exclusive use of it and its various modifications for the term of fourteen years, as requested in his Petition. At the same time, it is right to state our opinion that the force of gravity, acting in the manner and at the point described, is incapable of imparting any motion to a machine of the construction submitted.

The papers forwarded to us are herewith returned.

E. W. WARD.
B. H. MARTINDALE.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1858, *8th June.* No. 7.

IMPROVEMENT IN DRYING SUGAR.

LETTERS OF REGISTRATION to Ralph Mayer Robey, of Sydney, for an Improvement in drying Sugar.

[Registered on the 10th day of June, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Ralph Mayer Robey, of Sydney, in the said Colony of New South Wales, merchant, hath by his Petition humbly represented to me, that Gerd Jacob Bensen, of Christian-street, Saint George's in the East, London, England, sugar refiner, has invented or discovered a certain new and useful "Improvement in drying Sugar," the nature of which invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the statement thereof in the said Petition contained, and which are particularly described in the specification and drawing which are annexed to these Letters of Registration; and that for the said invention or discovery, Letters Patent for the United Kingdom of Great Britain and Ireland were, on the fifteenth day of September, one thousand eight hundred and fifty-seven, granted by Her Most Gracious Majesty Queen Victoria, to the said Gerd Jacob Bensen, for the term of fourteen years from the day of the date thereof; and that the right, title, and interest of the said Gerd Jacob Bensen in the said invention or discovery, so far as the same can, shall, or may be used or made available in any or either of Her Majesty's Colonies in Australia or their Dependencies, and in and to all Letters Patent and Letters of Registration which can, shall, or may be obtained in respect of the same invention or discovery in any or either of the said Colonies, have been duly assigned

and transferred to the said Petitioner, and are now vested in him; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or discovery might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Ralph Mayer Robey, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or discovery, from the day of the date of these presents, until the fifteenth day of September which will be in the year one thousand eight hundred and seventy-one: To have, hold, and exercise unto the said Ralph Mayer Robey, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, from the day of the date of these presents until the fifteenth day of September which will be in the year one thousand eight hundred and seventy-one: Provided always, that if the said Ralph Mayer Robey shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of June, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

THIS invention has for its object an improvement in drying sugar. For this purpose, when the sugar has been crystallized in a vacuum pan, it is run into pneumatic pans having false bottoms perforated with holes which are covered with wire gauze, and it is preferred that the sugar should fill each of such pneumatic pans to about the depth of three feet. The bottoms of such pneumatic pans are connected by suitable pipes with iron tanks, which are kept vacuous by an air pump or otherwise; by this means, when the cock on the pipe between the pneumatic pan and the tank is opened, the pressure of the atmosphere will force the syrup from the crystals of sugar, and the syrup will flow into the vacuous tank. The sugar, having been thus heated, is then conveyed into a chamber, which it is preferred should be kept heated from 120° to 140° of Fahrenheit, and the sugar is placed in similar pneumatic pans, the spaces under the perforated false bottoms of which are kept vacuous when at work, by which the heated air of the chamber will rush through and amongst the crystals of sugar, and dry the same so as to render the sugar fit for the market.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

DESCRIPTION OF THE DRAWING.

Figure 1 shews a section of two pans such as I employ, which are similar to pneumatic pans which have before been used for such purposes. These pans are each provided with a space under the filter or permeable bottom, as shewn; *b* is an air pipe which communicates with one of the pipes *b* of the tanks. Figure 2.—These tanks have the air constantly removed from them by means of air-pumps or otherwise through the pipes *c c*. The crystallized sugar is placed on the permeable bottoms or filters, *a a*, in the pneumatic pans, figure 1. The vacuum in the tanks, figure 2, I prefer to keep at about 28 inches, but this

this may be varied. The syrup from the sugar, as it flows through the bottoms *a a* will pass into the tanks, figure 2, from which it may be drawn through the pipes *d d* by a syrup pump in connection therewith. The sugar having been thus treated in the pneumatic pans, figure 1, is conveyed into a second pan, such as is shewn in section at figure 3; placed in a chamber which is kept heated to a high temperature; I prefer it to be from 120° to 140° Fahrenheit. *e* is a pipe which is below the permeable bottom *f* of this tank or pan, figure 3, which is connected, when situated below the tanks, to the lower end of the pipe *f* of the tanks, figure 2; but when the drying room or chamber is situated above the tanks, the pipe *f*, figure 3, is to be connected with the pipe f^1, figure 2, at its upper end. *g g* is a steam-pipe for heating the drying room or chamber, figure 3; or the heating of such chamber may be by other convenient means.

This is the specification referred to in the annexed Letters of Registration granted to Ralph Mayer Robey, this eight day of June, 1858.

W. DENISON.

REPORT.

New South Wales,
Sydney, 28 *April,* 1858.

SIR,

In reply to your letter of 24th instant, referring to a Petition from Mr. R. M. Robey, for Letters of Registration for an "Improvement in drying Sugar," of which he is the Assignee, with a request to report on the application with reference to the Act of Council 16 Vict., No. 24,—we have the honor to report that Mr. Robey having shewn, by the production of a copy, that a Patent has been granted in Great Britain for the above improvement, and further declared, in the Petition referred to us, that the whole right, title, and interest of the original Patentee in the said invention have been duly assigned to him,—we are of opinion that Letters of Registration for the exclusive enjoyment and advantage of the same in this Colony, may be granted to him till the 15th day of September, 1871—the day on which the original Patent expires.

We have, &c.,

E. W. WARD.
J. SMITH.

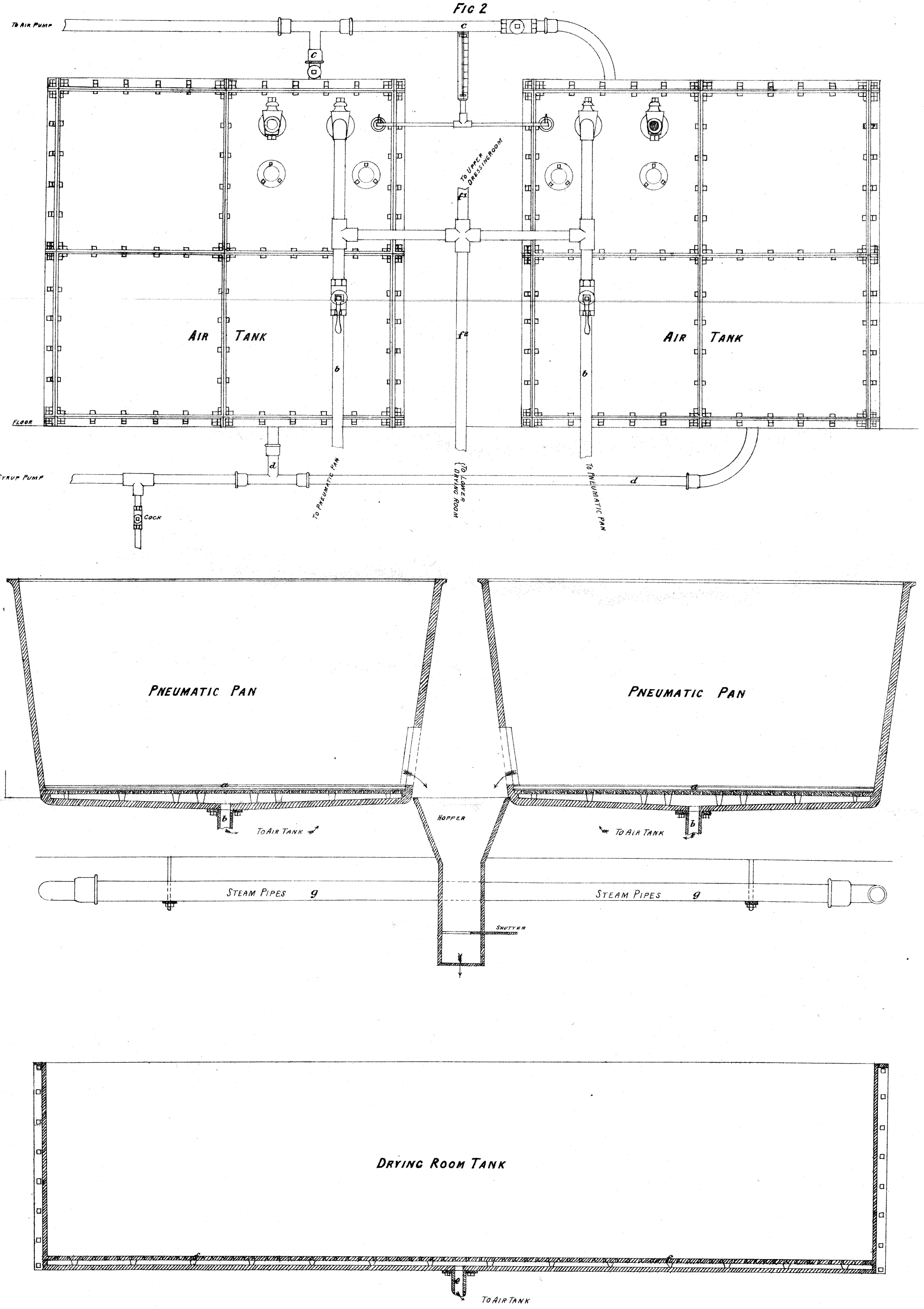
THE HONORABLE
THE COLONIAL SECRETARY.

[Plan—one sheet.]

This is the Plan referred to in the annexed Letters of Registration granted to Ralph Mayer Robey this Eighth Day of June 1858.

(Sd.) W. Benson.

FIG 2



A.D. 1858, 8*th June*. No. 8.

IMPROVEMENT IN REFINING SUGAR.

LETTERS OF REGISTRATION to Ralph Mayer Robey, of Sydney, for an Improvement in refining Sugar.

[Registered on the 10th day of June, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Ralph Mayer Robey, of Sydney, in the said Colony of New South Wales, merchant, hath by his Petition humbly represented to me that one Gerd Jacob Bensen, of Christian-street, St. George's in the East, London, England, Sugar Refiner, has invented or discovered a certain new and useful "Improvement in refining Sugar," the nature of which invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the statement thereof in the said Petition contained, and which are particularly described in the specification and drawing which are annexed to these Letters of Registration; and that for the said invention or discovery Letters Patent for the United Kingdom of Great Britain and Ireland were, on the twenty-eight day of December, one thousand eight hundred and fifty-four, granted by Her Most Gracious Majesty Queen Victoria, to the said Gerd Jacob Bensen, for the term of fourteen years from the day of the date thereof; and that all the right, title, and interest of the said Gerd Jacob Bensen in the said invention or discovery, so far as the same can, shall, or may be used or made available in any or either of Her Majesty's Colonies in Australia, or their Dependencies, and in and to all Letters Patent and

Improvement in refining Sugar.

Letters of Registration which can, shall, or may be obtained in respect of the same invention or discovery, in any or either of the said Colonies, have been duly assigned and transferred to the said Petitioner, and are now vested in him; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16 Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or discovery might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Ralph Mayer Robey, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or discovery from the day of the date of these presents until the twenty-eighth day of December which will be in the year one thousand eight hundred and sixty-eight: To have, hold, and exercise unto the said Ralph Mayer Robey, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, from the day of the date of these presents until the twenty-eighth day of December which will be in the year one thousand eight hundred and sixty-eight: Provided always, that if the said Ralph Mayer Robey shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of June, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

THIS invention is applicable in that part of the process of refining sugar which consists of dissolving sugar in water to produce syrups; and the object of this invention is to carry on that process of refining sugar at a lower temperature than that now resorted to, where free steam is used to "blow up," as it is technically called; and my invention consists of employing numerous streams of air introduced below the sugar and water, when in a suitable open vessel or pan, and heated by pipes having steam or hot fluid within them; for this purpose it is preferred to employ a series of perforated pipes near the bottom of the pan or vessel, and above them to have a series of heated pipes capable of being raised out of the fluid; but the arrangement of the air pipes and the means of applying heat may be varied.

Having thus stated the nature of my said invention, I will proceed to describe the manner of performing the same.

DESCRIPTION OF THE DRAWING.

Fig. I shews a plan of a vessel or pan, and air-supplying tubes, suitable for carrying out my invention. Fig. II is a similar plan of the vessel or pan, shewing an arrangement of tubes or pipes in the vessel for heating the fluid. Fig. III shews a section of the vessel having both the air supply tubes and the heating tubes therein; and Fig. IV is a section of one of the perforated tubes A used for supplying streams of air. The pan or vessel shewn in the drawing is square, but the form of the vessel used may be varied. AA are perforated tubes in connection with the tube B, which, by a branch B^1, is to be connected to any suitable air-blowing machinery. These tubes AA are placed at the lower part of the pan or vessel in which the sugar and water are to be mixed

mixed and the sugar dissolved. CC are a series of pipes or tubes, which are capable of being turned or moved on the fixed tubes EF, in order that the heating apparatus CC may, when desired, be moved out of the way, to allow the bottom of the pan or vessel, or the tubes AA, being cleaned, repaired, or the like. The tubes or pipes CC are connected together, and are combined by the straps DD as shewn. Steam or heated fluid is to be caused to pass through the heating apparatus C, in order, when desired, to heat the fluid in the pan or vessel to the required temperature. G is a false or movable perforated bottom to the pan or vessel on to which the sugar to be dissolved is put. H is a pipe for drawing off the clear liquor; this pipe is made to move as on an axis at K, so that it may be caused to incline as the liquor in the vessel is drawn off, thus facilitating the drawing off only the clear liquor, the subsiding matters being drawn off afterwards at the passage L, which is stopped by a plug, and is covered with the straining or perforated pipe M. The pipe H may be supported in a position just below the level of the fluid by a float, or may turn stiffly and be moved by hand. The sugar and water are introduced into the vessel or pan together with cold or heated water, and the same is kept to any temperature desired, by allowing steam or hot fluid to flow through the pipes CC. Air is to be forced through the tubes or pipes AA, which will agitate the water and sugar, and this agitation is to be kept up till the sugar is dissolved; the liquor is then allowed to stand and settle, the scum is to be removed, and then the clear liquor or syrup may be drawn off by the pipe H. Afterwards the sediment is to be allowed to flow by the passage L, by removing the plug, the perforated cover keeping back the grosser matters.

This is the specification referred to in the annexed Letters of Registration granted to Ralph Mayer Robey, this eighth day of June, 1858.

W. DENISON.

REPORT.

Sydney, New South Wales,
28 *April,* 1858.

SIR,

In reply to your letter of the 24th instant, referring to a Petition from Mr. R. M. Robey, for Letters of Registration for an "Improvement in refining Sugar," of which he is the Assignee, with a request to report on the application, with reference to the Act of Council 16 Victoria, No. 24,—we have the honor to report that Mr. Robey having shewn, by the production of a copy, that a Patent has been granted in Great Britain for the above improvement, and further declared in the Petition referred to us, that the whole right, title, and interest of the original Patentee in the said invention, have been duly assigned to him,—we are of opinion that Letters of Registration for the exclusive enjoyment and advantage of the same in this Colony, may be granted to him till the 28th day of December, 1868—the day on which the original Patent expires.

We have, &c.,

E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

[Plan—one sheet.]

Fig. 1.

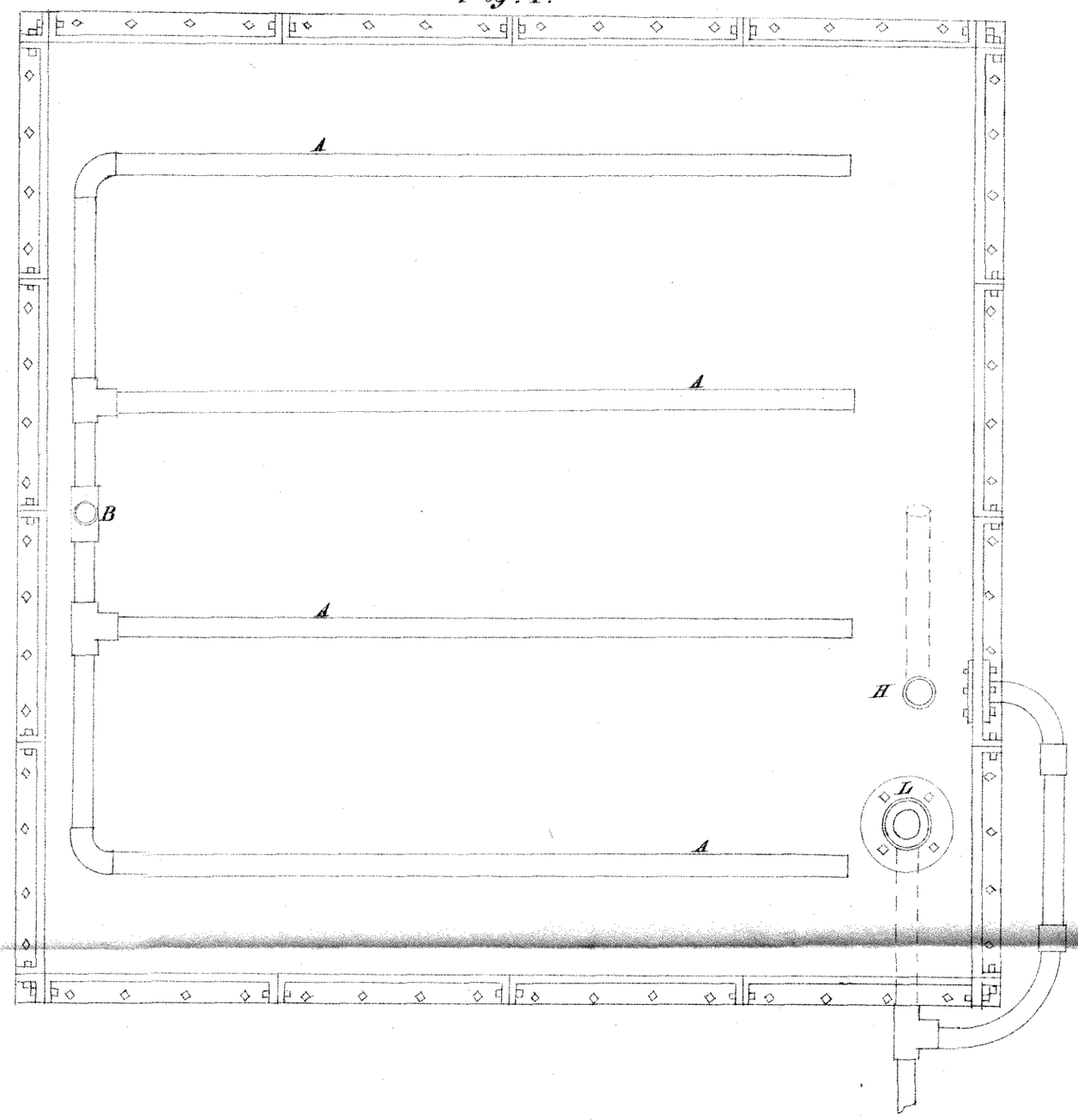


Fig. 2.

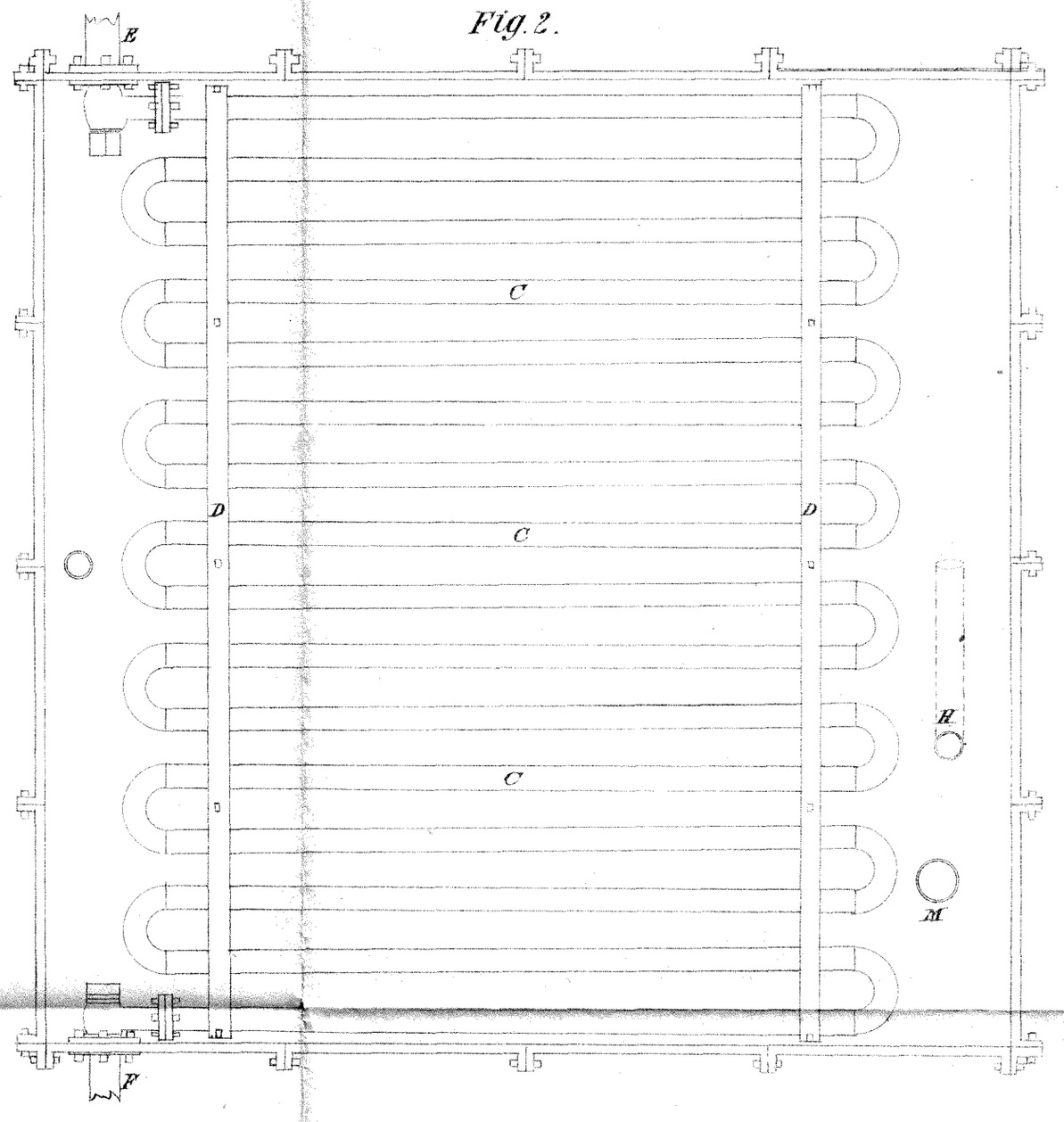


Fig. 3.

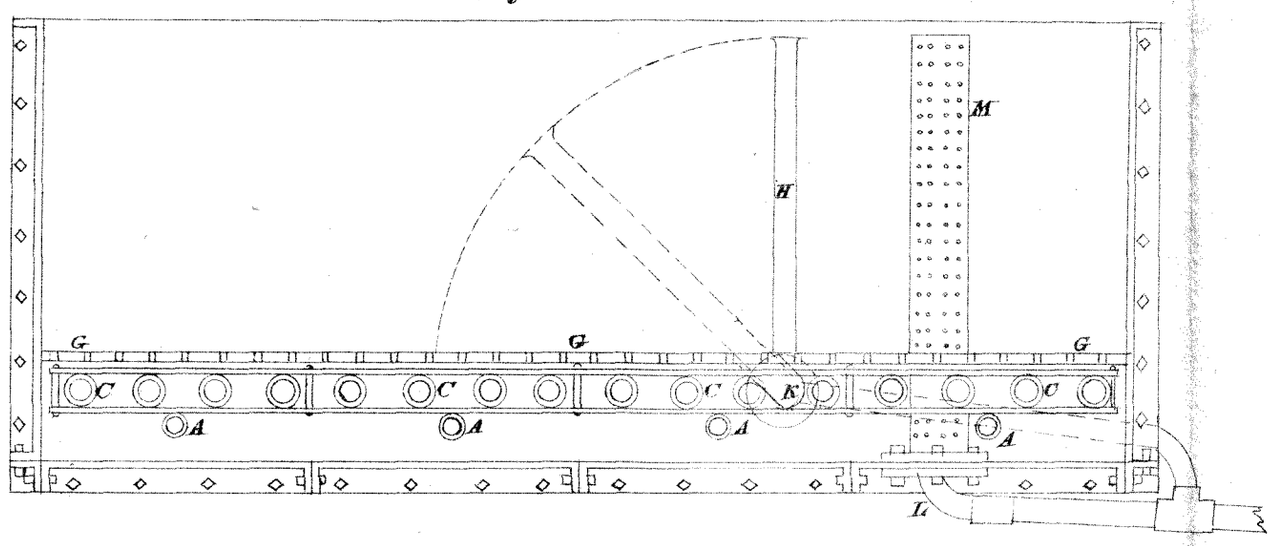
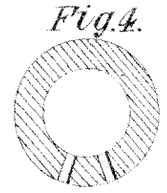


Fig. 4.



This is the Plan referred to in the annexed Letters of Registration granted to Ralph Mayer Roby this eighth day of June 1858.

(Sgd) W. Denison.

A.D. 1858, 20*th July*. No. 9.

REAPING AND DRESSING MACHINE.

LETTERS OF REGISTRATION to James Craig, for a Reaping and Dressing Machine.

[Registered on the 22nd day of July, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Craig, of Morphett Vale, in the Province of South Australia, farmer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures—that is to say, of an invention of a new and improved Machine for reaping and dressing Corn, which is particularly described in the specification which is annexed to these Letters of Registration, and the plan also annexed hereto, and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expenses of granting these Letters of Registration, as required by the Act of Council 16 Vic., No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council to, and do by these Letters of

Reaping and Dressing Machine.

Registration, grant unto the said James Craig, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said James Craig, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Craig shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twentieth day of July, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

SPECIFICATION and PARTICULARS of a new and improved Machine for Reaping and Dressing Corn.

The invention consists in this :—

1st. The retention of grain, which is generally lost with the old machines, when it is found necessary to depress the front of the machine, as is the case in low crops.

2nd. The adapting of fanners to the machine, so as to winnow the grain as it leaves the beaters, thereby doing away with any necessity to pass the grain through another machine.

3rd. A mode of introducing a second time to the beaters any heads which may be thrown into the machine unthrashed.

4th. A better arrangement of gear, whereby the draught is very much lessened, and the belts less liable to slip off their pulleys, the pinion and small pulleys being much larger than in the old machines.

5th. The adoption of a mode by which the machine may be stopped instantly, without strain to the horses, and the quicker parts set free to move until their momentum ceases. This improvement also prevents damage to the machinery, in event of the machine encountering any obstacle suddenly.

6th. The teeth of the comb are each bolted to the transverse bar or back, so that they can be replaced easily in event of damage to any of them, a few spare teeth being kept for that purpose.

7th. Since it is only clean grain (and in damp weather a few unthrashed heads) that is retained, the machine requires emptying less frequently, while the balance of the machine is deranged less than by the old mode, so that a horse in the shafts can bear the pressure or lift easily.

The machine operates as follows :—

When it is drawn forward, motion is communicated simultaneously to a set of fanners and the beaters, as also to a feeding roller. When the machine enters the corn, the grain is thrashed by the beaters, and thrown back over the fanner case to a chamber, the roof of which (being part of the top of the machine) is covered with a strong and close wire gauze, or otherwise left so that the wind from the beaters is allowed to escape freely without allowing any grain to escape.

At the bottom of this chamber is the feeding roller above referred to, which passes the grain, chaff, and straw downwards to a current of air which is driven by the fanners immediately underneath and past the feeding roller towards the back of the machine. Clean grain falls through the current of wind to the bottom of the machine; the heavier unthrashed heads fall also into the same chamber. A movable partition at the back of this chamber divides it from a small chamber at the back of the machine into which the lighter heads are thrown.

Another

Another movable partition, similar to the first, encloses this chamber behind, and forms the back of the machine, over which all the light substances which would be thrown out by a winnowing machine are blown. When the machine is to be discharged, the contents are run out upon a sheet—(it saves a little trouble in sifting to discharge the contents of each chamber upon separate sheets)—and whilst the machine is taking through the crop again, one man can easily pass the grain through a hand-sieve, and bag the clean grain, laying any unthrashed heads aside, to be thrown into a chamber in the front of the machine, the upper part of which is open, and extends from the front of the machine, backwards, over nearly half of the top, and in breadth extends to the whole width of the machine. The front of this chamber is the front of the machine, while the back and bottom are the slope of the passage along which the grain passes from the beaters. The lower part of the front of this chamber is open nearly across, and closed by a vertical slide, which is lifted at pleasure by a lever at the top, to admit the heads to the beaters. The slide is furnished with several long horizontal spikes, so that, should the heads incline to choke the passage, it may be cleared by jigging the lever which lifts the slide. The heads should not be admitted to the beaters until the machine re-enters the standing corn, as otherwise some of the grain might be driven between the teeth and lost.

The teeth are formed chiefly of strong tin, soldered and rivetted upon a root of malleable iron, to give more strength where they approach the beaters, as well as to give a hold to the counter-sunk bolts which fasten them to the back of the comb; the teeth begin to concave immediately on leaving the back, and this concavity is contracted until near the point the tooth terminates in a cone. A cover is soldered upon each tooth, so as to cover about one-third of it towards the point; an opening in the cover there commences, and widens towards the root of the tooth. By this arrangement, when the machine has to be depressed in front, any grain which rolls forward is held in the points of the teeth until it is raised again, when the grain so held rolls backwards to the beaters, and is thrown by them into the body of the machine.

The drawings hereto annexed more particularly describe and specify the invention, and the following descriptive index to such drawings will fully explain the same:—

A is the axle upon which the machine is balanced with a little weight forward; in the drawing the axle appears to pass across the wind tube, but this may be avoided by a knee on the axle at each side of the machine.

B is a spur wheel fixed on the near driving wheel.

C is a pinion (fixed on its shaft) driven by the spur wheel B.

D is a large pulley or fly-wheel, placed loose upon the same shaft with the pinion C, but carried round with it by means of a ratchet (fixed on the shaft) when the machine is drawn forward.

E is a ratchet wheel (enlarged view—scale, two inches to the foot), close by the large pulley D, and fixed upon the shaft in such a manner as to carry D round with it when the machine is drawn forward, but letting it free the instant the machine is stopped.

F are the fanners, enclosed in a case. A sufficient opening is left at each side of the machine, round their axis, to admit the air, which is driven towards the back of the machine.

G are the beaters, which, after thrashing the grain, send it back through a passage to a chamber, where it is passed regularly through a transverse aperture by the feeding roller.

H, the feeding roller, which passes the grain, straw, &c., downwards to the current of wind from the fanners. The roller should be grooved, and studded with spikes.

I, a small pulley, fixed upon the fanner shaft, and driven by a belt from the large pulley D.

J, a large pulley, fixed by the side of I, to drive the small pulley fixed on the beater shaft.

K, the end of the floor of the wind tube, beyond which everything falls, the cleanest grain and a few of the heavier heads falling between this point and the partition L, and the lighter heads between the partitions L and M, while chaff and straw are blown beyond the back of the machine, and fall on the land, to be consumed with the stubble.

L, a vertical partition, of wood, placed between stops at the bottom, and fastened at the top by slide bolts, or in any way so as to be easily removed at pleasure; this partition has an extension of thin wood, or sheet-iron, fastened with thumb-screws, so that the partition may be made higher or lower, to suit the state of the weather or weight of the grain.

M, a partition exactly similar to L, and forming the back of the machine.

N, a small pulley, fixed on the pinion shaft, to drive another fixed on the spindle of the feeding roller.

O, the teeth of the comb; an enlarged view of which is also given (on a scale of two inches to the foot), shewing the manner in which the teeth are bolted to the "back." The long narrow tooth, at each side, is made of plain malleable iron, not covered, being merely for the purpose of gathering in the grain, which otherwise would be crushed by the wheels of the machine.

P, a vertical slide, extending nearly across the machine, and raised by a lever over it, on the top of the machine, to admit those unthrashed heads to the beaters which may be put into the chamber for that purpose. This slide is furnished with several long spikes, fastened horizontally, so as to rake the passage.

By

Reaping and Dressing Machine.

By way of further explanation, it may be remarked that the unthrashed heads should be admitted to the beaters only when the comb is filled with the standing corn, otherwise the comb must be covered, to prevent grain passing between the teeth.

When the machine is to be removed to a distance, the catch, which falls into the teeth of the ratchet, has only to be tied to its spring, when the machine may be removed with great ease.

Where it is wanted to adapt the fanners to an old machine, it is necessary to place one pulley only upon the fanner shaft, in such a way that the belt passing from the fly wheel to the pulley on the beater shaft should press upon it either above or below, according to the construction of the machine, the friction of the belt in passing being sufficient to drive the fanners; where practicable, however, it is much better to introduce a second belt, as in the drawing, as the speed is thereby attained, with pulleys and pinion of a larger size, thereby making the draught much easier.

This is the specification referred to in the annexed Letters of Registration granted to James Craig, dated the twentieth day of July, 1858.

W. DENISON.

REPORT.

Sydney, 8 *June*, 1858.

Sir,

Having, in compliance with the request in your communication No. 58/1960, examined into and considered the matters stated in Mr. James Craig's Petition for the issue of Letters of Registration for the invention of a "New and improved Machine for reaping and dressing Corn," we are of opinion that the prayer of the Petition may be granted.

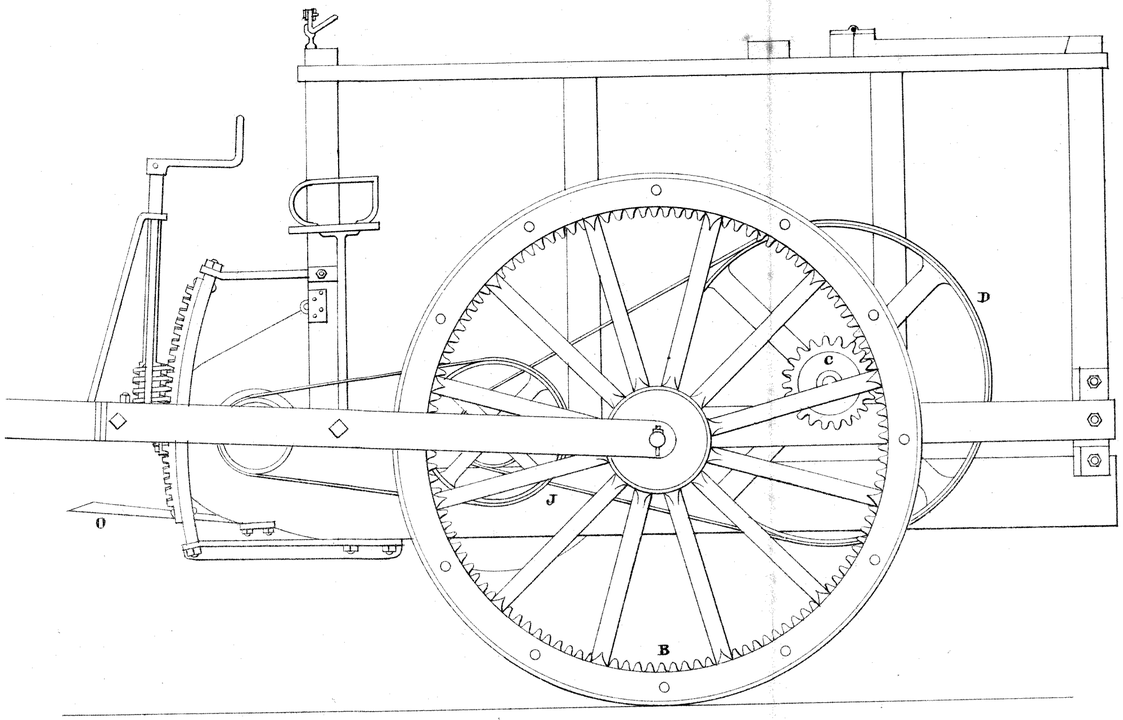
We have, &c.,

E. W. WARD.
B. H. MARTINDALE.

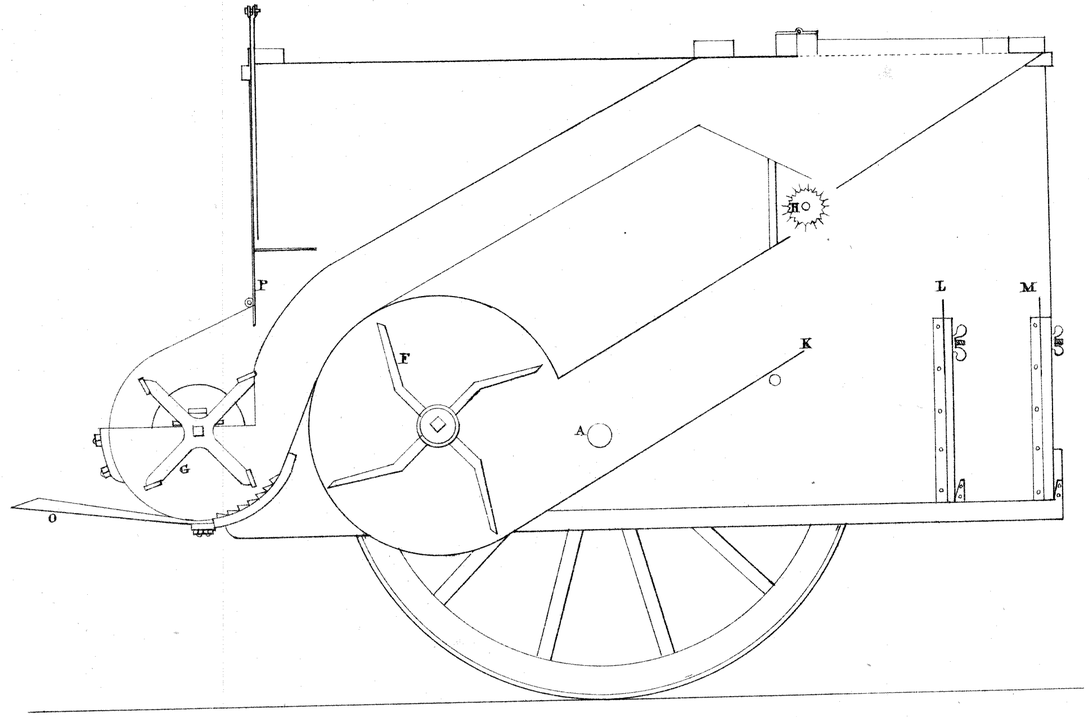
The Honorable
The Colonial Secretary.

P.S.—The paper forwarded to us is returned herewith.

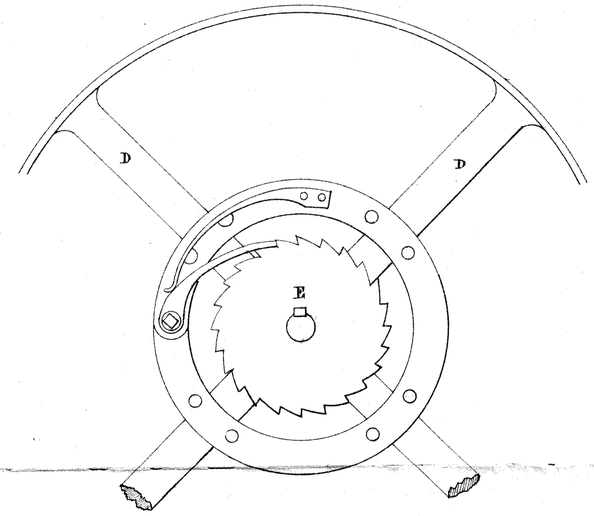
[Plan—one sheet.]



Elevation of near Side

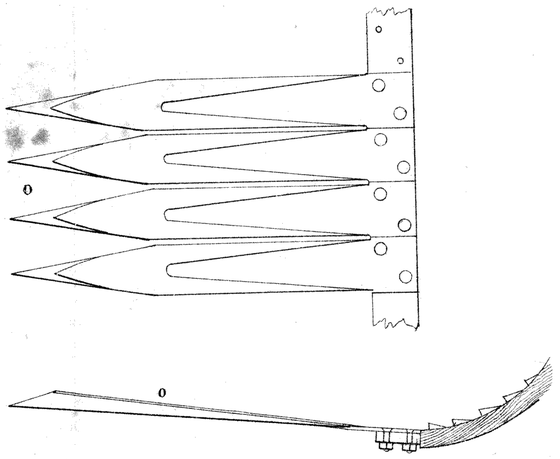


Longitudinal Section



View shewing the manner in which the Fly Wheel, is caught by the Ratchet.

Scale of 2 inches to the foot.

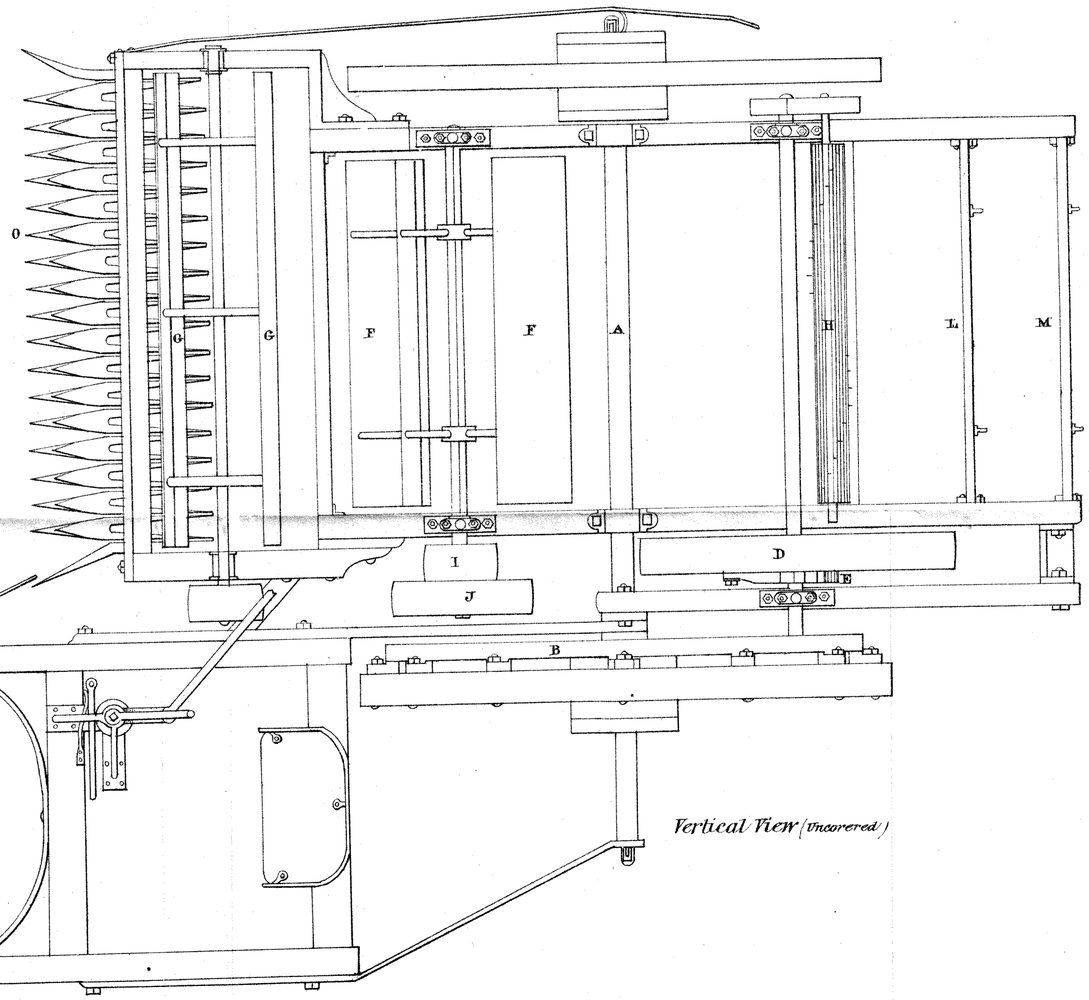


Vertical and side Views of Teeth.

Scale of 2 inches to the foot.

CRAIG'S PATENT REAPING & DRESSING MACHINE

Scale, 1 inch to the foot.



Vertical View (uncovered)

This is the Plan referred to in the annexed Letters of Registration. Granted to James Craig. — Dated this 20th day of July, 1858.

Signed N. Denison

A.D. 1858, 29*th October*. No. 10.

IMPROVEMENTS IN THE MANUFACTURE OF SUGAR.

LETTERS OF REGISTRATION to Conrad William Finzel, Joseph Peers, and Peter Murdoch, for Improvements in the Manufacture of Sugar.

[Registered on the 30th day of October, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:—

WHEREAS Conrad William Finzel, of the city of Bristol, in England, Joseph Peers, of Ruthin, in the county of Denbigh, in North Wales, and Peter Murdoch, of Lang Bank, Mearns, near Glasgow, in North Britain, have by their Petition humbly represented to me that the said Conrad William Finzel is the author or designer of certain improvements in manufactures, that is to say, of "Certain Improvements in the processes and machinery employed in and applicable to the Manufacture of Sugar," which are particularly described in the specification and drawings which are annexed to these Letters of Registration, and for and in respect of which Her Majesty's Letters Patent were granted to the said Conrad William Finzel, on the twelfth day of October, in the year one thousand eight hundred and forty-nine; and that they, the said Petitioners, are now entitled jointly to the benefit of such improvements, for which the said Letters Patent have been granted to the said Conrad William Finzel, as aforesaid; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16 Victoria, No. 24; the Petitioners therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said improvements might be

secured

secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Conrad William Finzel, Joseph Peers, and Peter Murdoch, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of seven years from the date hereof; to have, hold, and exercise unto the said Conrad William Finzel, Joseph Peers, and Peter Murdoch, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of seven years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Conrad William Finzel, Joseph Peers, and Peter Murdoch, shall not within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-ninth day of October, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

(L.S.)

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, CONRAD WILLIAM FINZEL, of the city and county of Bristol, sugar refiner, send greeting:

WHEREAS Her present Most Excellent Majesty Queen Victoria, by Her Royal Letters Patent, under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the twelfth day of October, one thousand eight hundred and forty-nine, in the thirteenth year of Her reign, did, for Herself, Her Heirs and Successors, give and grant unto me, the said Conrad William Finzel, my executors, administrators, and assigns, Her especial license, full power, sole privilege, and authority, that I, the said Conrad William Finzel, my executors, administrators, and assigns, or such others as I, the said Conrad William Finzel, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend within England, Wales, and the town of Berwick-upon-Tweed, and the Islands of Guernsey, Jersey, Alderney, Sark, and Man, and also in all Her said Majesty's Colonies and Plantations abroad, my invention of "Certain Improvements in the processes and machinery employed in and applicable to the Manufacture of Sugar," in which said Letters Patent is contained a proviso that I, the said Conrad William Finzel, shall cause a particular description of the nature of my said invention, and in what manner the same is to be performed, by an instrument in writing, under my hand and seal, to be enrolled in Her Majesty's High Court of Chancery, within six calendar months next and immediately after the date of the said in part recited Letters Patent, reference being thereunto had will more fully and at large appear:

Now know ye, that in compliance with the said proviso, I, the said Conrad William Finzel, hereby declare that the nature of my said improvements, and in what manner the same are to be performed, are fully described and ascertained in and by the present specification thereof, reference being had to the drawings hereunto annexed, that is to say:—

Firstly, my invention consists in a mode of applying steam or liquids to machines used for separating fluids from sugar, by means of centrifugal force, for the purpose of clearing and keeping clear the meshes or apertures in the periphery of the revolving cylinders of such machines. Heretofore, when it has been attempted to extract the molasses or syrups from sugar by centrifugal acting machines, the sugar has been found speedily to clog and stop up the meshes or apertures in the periphery of the revolving cylinder thereof, and thus materially impede the operation of the machinery. Now, my improvement in this part of my invention has for its object the overcoming this difficulty.

Figure

Improvements in the Manufacture of Sugar.

Figure 1 is an elevation, partly in section, of a centrifugal acting machine which was known before the date of my said Letters Patent, to which has been added a steam box or apparatus constructed according to my said invention. Figure 2 is a horizontal section on the line *a b* of Figure 1. H is a narrow recess for receiving such steam box or apparatus, which is formed in the outer casing A, and is about the same height as the revolving cylinder B. H^1 is a steam box or chest, which is placed in the said recess, and is connected by a pipe H^2 with a steam boiler or any other source of steam supply. The box H^1 is perforated with small holes on the side opposite or facing the periphery of the revolving cylinder, so that when the steam is let on, it projects jets of steam against the periphery of the cylinder as it revolves, the lids a^1 a^1 serving to prevent such steam from escaping from the machine. A longitudinal section and plan of the box are given separately on an enlarged scale, in Figures 3 and 4.

The mode of operation with the machine as thus improved may be thus exemplified:—The sugars intended to be operated upon having been first mixed with molasses or syrups, to bring them up to a proper degree of consistency, are then placed in the cylinder B. Motion is now given to the machine; and after it has made a few turns, the steam, according to my improvement, is to be let on and allowed to issue freely against the external surface of the periphery of the cylinder for about one minute, which has the effect of clearing and keeping clear the meshes or apertures of the periphery. Then (and without stopping the machine) the state of the sugar contained in the cylinder may be ascertained from time to time during the process by raising the lids a^1, a^1. If the extraction of the moisture from the sugar appears, upon inspection, to be impeded, the steam is to be again let on for a short space of time, for the purpose of clearing the meshes or apertures as before. The rotation of the machine is to be kept up, and the occasional steaming (when necessary) repeated till the whole or nearly the whole of the syrup or fluid is extracted from the sugar; and in operating upon ordinary sugars the process will generally be completed in a few minutes. Sugars taken from the evaporating pan after partial cooling, may be placed in the machine and operated upon in this way; and sugars in this state of course require no syruping or mixing.

Instead of steam, liquids may, by means of my invention and of a force-pump or other similarly acting machinery, be thrown against the interior of the periphery of the cylinder, but as I believe with less advantage, and I prefer steam, as being in my opinion, more advantageous.

Secondly, my invention consists of a mode of preparing such sugars as require mixing with liquid before being operated upon in such centrifugal acting machines as firstly hereinbefore mentioned. The apparatus which I employ consists of a vessel with a series of steam pipes fixed therein, and of a centrifugal sieve and centrifugal drum fastened on one common shaft, and revolving in such vessel.

Figure 5 is a sectional elevation of the machines, and Figure 6 a plan. A is a vessel having a step a^1, in the centre of its bottom, and in which the shaft B revolves; C C are perforated steam pipes placed under the sieve D, as shewn, the perforations being so placed as to cause the steam to be brought in contact with the particles of sugar thrown through the sieve D, which is made of an iron framework D^1 supporting a wire sieve D^2. The meshes of the wire sieve are made coarser or finer as it is desired to divide the crystals of sugar more or less finely. For the better division of any lumps there may be in the sugar, metal points d^3 are fixed to serve this purpose as shewn. As the speed with which the machine may revolve without throwing the sugar over will depend on the angle or degree of curvature given to the sides of the sieve D, that must be regulated to suit the description of sugar to be operated upon. The form shewn will be found sufficient for most sugars. A receptacle G is made to receive such lumps as may happen to be thrown over the top of the sieve, from which they can be returned into the machine. E is a small centrifugal drum which is attached to the spindle B. The periphery is perforated, and has divisions or leaves projecting inwards, to impart to the fluid the centrifugal force of the speed given. The shaft B is hollow, and has perforations opening into the drum E, in order that the liquid may pass from the former into the latter. The mode of operating with this apparatus is as follows:—The machinery being caused to revolve, and steam being admitted by the pipe C^1 into the pipe C C, the liquid with which it is intended to mix the sugar is conducted into the drum E, through the hollow shaft B. The sugar having been first prepared by the lumps being broken or crushed, is brought to the centre of the sieve; the centrifugal action of the machine throws the sugar towards the outside of the sieve, where it becomes divided and is forced through the sieve. In this divided state the sugar passes through the steam issuing from the steam pipes C C, by which means it is moistened and prepared to receive the syrup which is at the same time thrown from the drum E, and in falling comes in contact with the sugar, and thus completes the mixing. The quantity of liquid with which it is intended to mix any given quantity of sugar must be so regulated in its admission into the drum E, as that the time occupied in passing such sugar through the sieve shall be the same as the time occupied in passing the given quantity of liquids through the drum E.

Thirdly, my invention has relation to the vacuum pan and apparatus connected therewith ordinarily used by sugar refiners, and has for its object the saving of a portion of saccharine matter which is now carried off along with the steam or vapour and air in the ordinary process of boiling.

Figure

Improvements in the Manufacture of Sugar.

Figure 7 is an elevation partly in section of a vacuum pan, with this branch of my improvements added thereto. A is the vacuum pan; B the head, to which there is attached a copper pipe C, which leads to a condenser D.

Figure 8 is a vertical section of the condenser D, shewing its internal construction; and Fig. 9 is a cross section of it on the line *a b*. D^1 is a metal cylinder with two conical ends D^2 D^2, separated from the body of the cylinder by plates F F, the whole being securely connected together by bolts and nuts as shewn. E E are a series of copper pipes, which are inserted at top and bottom into the plates F F, and establish a free communication between both ends of the cylinder. G is a pipe by which cold water is introduced into the cylinder D^1 and around the pipes E E. H is a pipe for carrying off the overflow of water from D^1. J is a receiver connected with the bottom of the condenser by a pipe K, in which there is a stop valve K^2, acted upon by the crank handle K^3.

Figure 10 is a plan of the receiver J with the top removed, shewing in the interior an arrangement for evaporating, by means of steam pipes J^2, the liquor of condensation, as after described. L is a pipe which forms a communication between the receiver J and a second condensing vessel M. This vessel is divided longitudinally near to the top by a perforated plate *m*, which is supported by vertical bearings m^1 m^1. N is a pipe by which cold water is supplied to the upper compartment of the condenser M, whence it descends in a shower through the apertures in the plate *m*, into the midst of, and condenses the aqueous vapour in the lower compartment. O is a pipe which leads to the pumps. The progress of the operation is as follows:—As the vapour arising from the vacuum pan passes through the condenser D, a portion of it, together with the saccharine matters, are condensed in the pipes E E, and falling down to the bottom of the condenser, flow into the receiver J in a state of a weak solution of sugar; steam being admitted into the pipes J^2, the heat of which (in combination with the action of the exhaust pumps) evaporates the solution to a more concentrated state, when it may be drawn off. P is the pipe by which the concentrated solution is drawn off, and K^4 a tap by which air is admitted into the vessel to supply the place of the liquor drawn off. If during this part of the process the pumps are kept still in action, there must be a stop or throttle valve employed to close the pipe L.

And having now described the nature of my said invention, and the manner in which the same is to be performed, I declare that I claim as of my invention:—

First, the mode of applying steam or liquids to machines used for separating syrups or fluids from sugar by means of centrifugal force, for the purpose of clearing and keeping clear the meshes or apertures in the periphery of the revolving cylinders of such machines as hereinbefore described; but I do not confine myself to the particular apparatus described, which, however, I believe to be the best adapted for the purpose.

Secondly, the mode hereinbefore described of preparing such sugars as require mixing with liquid before being operated upon in the centrifugal acting machines firstly hereinbefore mentioned.

And thirdly, the arrangement or combination of machinery hereinbefore described, so far as regards the combination of the condenser D with the other parts of such machinery, for the purpose of obtaining from the vapour arising from the vacuum pans the greater portion of the saccharine matters contained therein, in manner hereinbefore described.

In witness whereof, I, the said Conrad William Finzel, have hereunto set my hand and seal, this twelfth day of April, in the year of our Lord one thousand eight hundred and fifty.

CONRAD WM. (L.S.) FINZEL.

And be it remembered, that on the twelfth day of April, in the year of our Lord 1850, the aforesaid Conrad William Finzel came before our said Lady the Queen, in Her Chancery, and acknowledged the specification aforesaid, and all and every thing therein contained and specified, in form above written. And also, the specification aforesaid was stamped according to the tenor of the statute made for that purpose.

Enrolled the twelfth day of April, in the year of our Lord one thousand eight hundred and fifty.

JEFFERSON.

This is the specification referred to in the Letters of Registration granted to Conrad William Finzel, Joseph Peers, and Peter Murdoch, this twenty-ninth day of October, A.D. 1858.

W. DENISON.

REPORT.

Improvements in the Manufacture of Sugar.

REPORT.

Royal Mint, Sydney,
16 *September*, 1858.

SIR,

In obedience to your request of 6th instant, that we should form a Board, with a view of reporting on the application from Conrad William Finzel, and others (as Assignees of a Patent taken out in England, on the 12th day of October, 1849), through their Attorneys, Sir Daniel Cooper and others, for Letters of Registration for certain improvements in the processes and machinery employed in, and applicable to the manufacture of Sugar,—we have the honor to report that, as the original Patent granted in England will expire on the 11th day of October, 1863, we are of opinion that the Letters of Registration prayed for should be granted, in terms of the Act, for a period of seven years only.

We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

E. W. WARD.
GOTHER K. MANN.

P.S.—The documents forwarded are returned herewith.

[Plans—three sheets.]

FIG. 1.

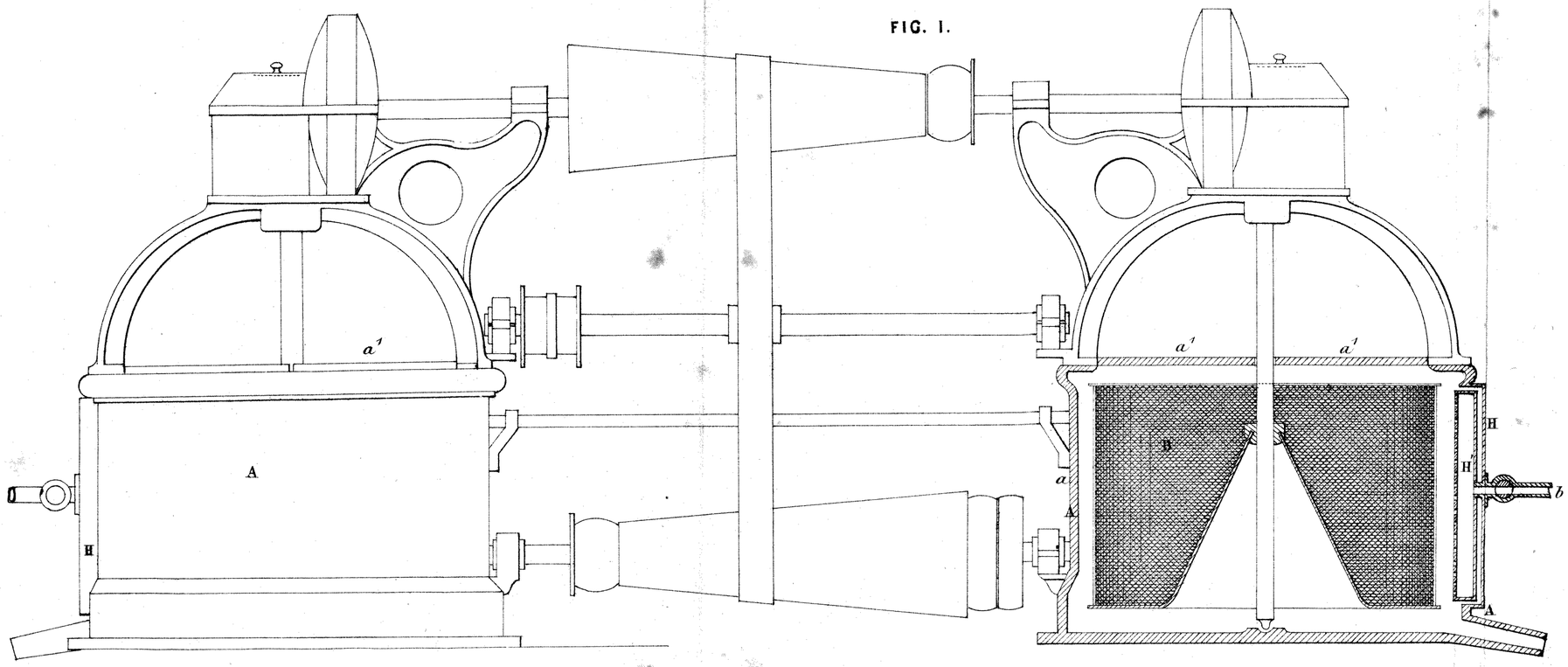


FIG. 2.

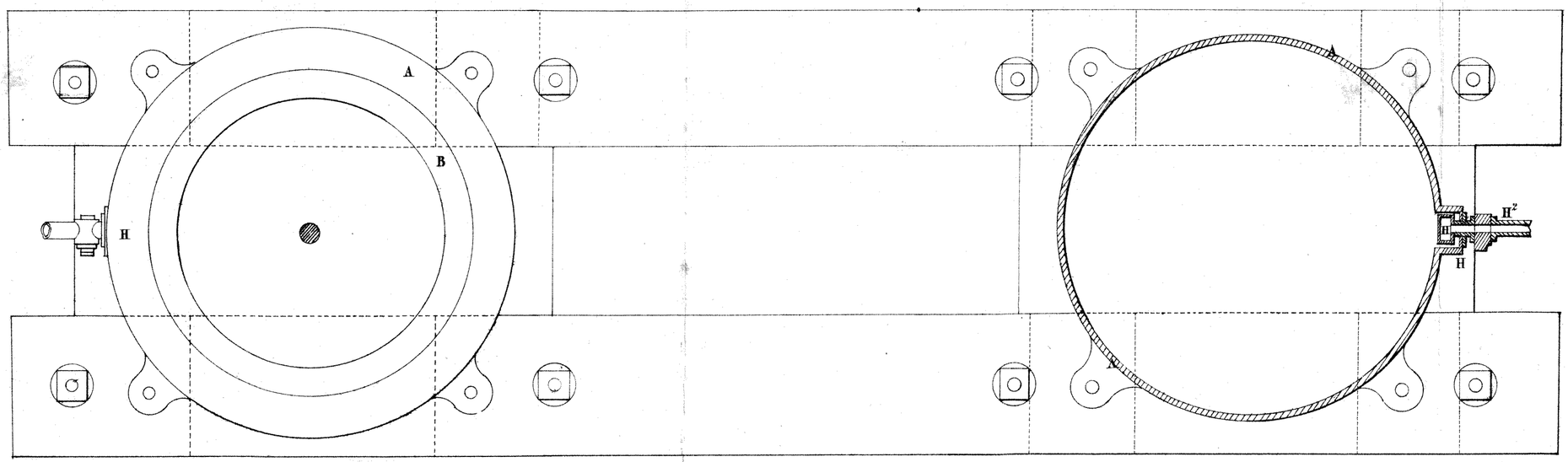


FIG. 3.

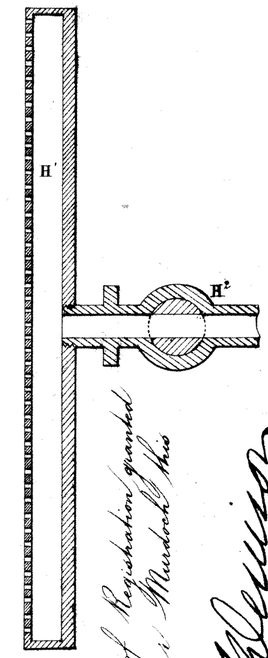
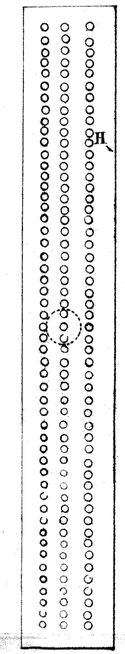


FIG. 4.



This is one of the drawings referred to in the Letters of Registration granted to Conrad William Feigel, Joseph Pass, and Peter Murdock this Twenty ninth day of October A.D. 1868

Signed

Wm Clemmon

FIG. 6.

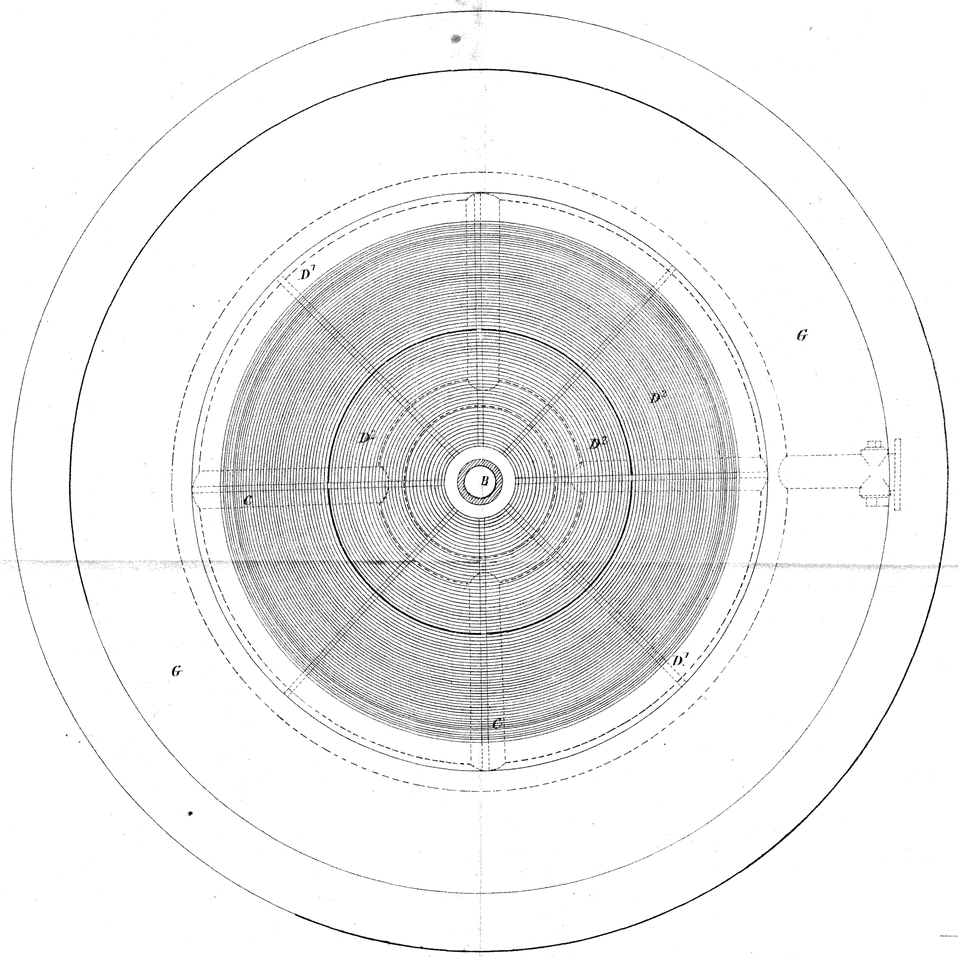
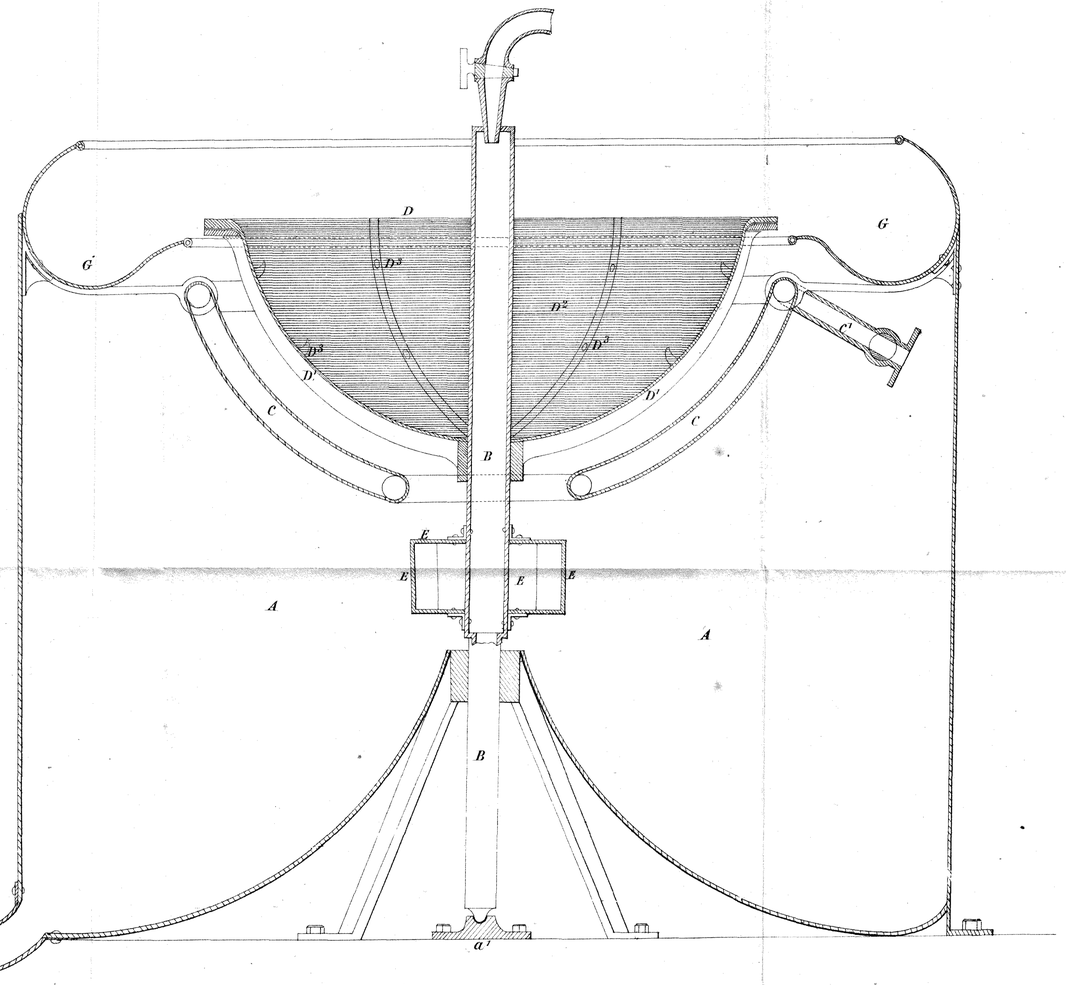


FIG. 5.



This is one of the drawings referred to in the Letters of Registration granted to Conrad William Finzel, Joseph Beers, and Peter Murdoch this Twenty ninth day of October A.D. 1858.

Signed

FIG. 8.

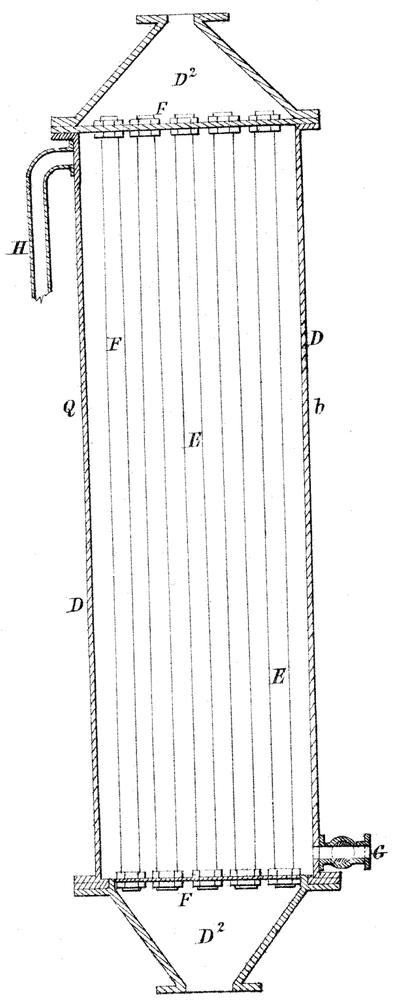


FIG. 9.

FIG. 10.

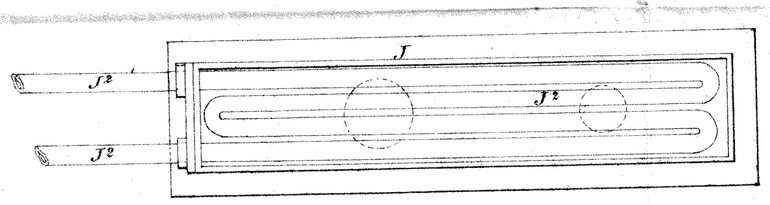
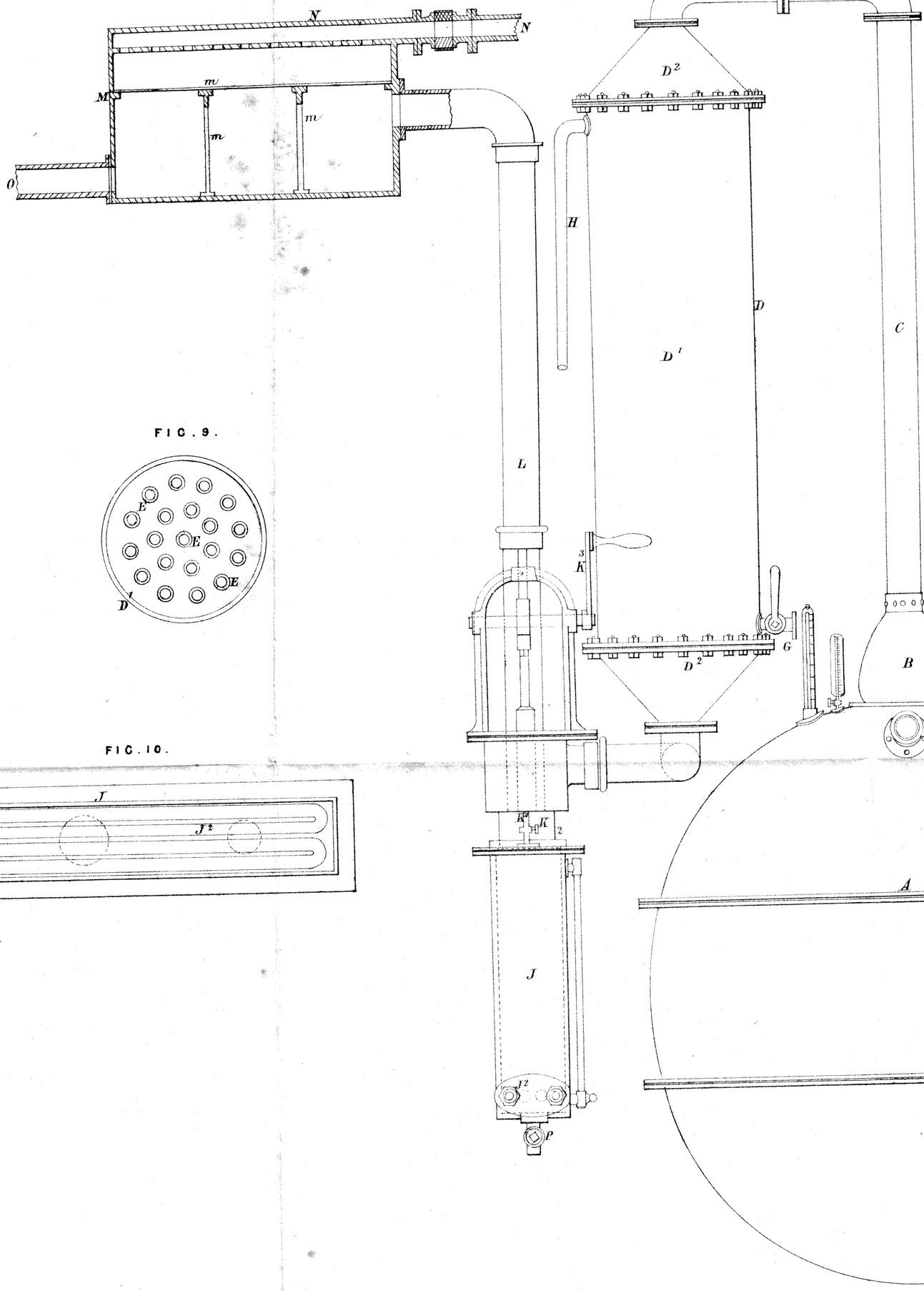


FIG. 7.



This is one of the drawings referred to in the Letters of Registration granted to Conrad William Finzel, Joseph Peers, and Peter Murdoch, this Twenty Ninth day of October 1858.

Signed

A.D. 1858, 8*th November*. No. 11.

IMPROVED FLAT IRONS.

LETTERS OF REGISTRATION to John Herman Athens, for Improvements in the construction of Flat Irons.

[Registered on the 11th day of November, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Herman Athens, of Melbourne, in the Colony of Victoria, tailor, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of "Improvements in the construction of Flat Irons," which improvements are particularly described in the specification and drawing which are annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine

and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said John Herman Athens, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said John Herman Athens, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Herman Athens shall not within three days after the granting of these Letters of Registration register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of November, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

(L.S.)

SPECIFICATION of Mr. John Herman Athens, of Melbourne, in the Colony of Victoria, for "Improvements in the construction of Flat Irons."

The nature of the invention, and the manner of performing the same, are fully described and ascertained in and by the following description, reference being had to the drawing and to the figures and letters marked thereon. Heretofore in the construction of flat irons they have been made of a solid form, and they are heated by being brought in contact with the fire or stoves suitably arranged for that purpose. Now, my invention consists in constructing them hollow, the inner part being so arranged as to burn fuel, by which arrangement a considerable amount of fuel is saved, and the iron more quickly brought into use when required; and by this invention one flat iron will be found capable of doing the work of two ordinary irons, owing to its being in a constant state of heat. But in order that the invention may be clearly understood, I proceed to describe the drawing, in which the same letters indicate the same parts wherever they occur. Figure 1 shews a side elevation of an iron constructed according to my invention; figure 2 is a plan of the same with the lid off; figure 3, an end elevation of the same figure; and figure 4 shews a view of the grating laid at the bottom of the inner part of the iron, and on to which the fuel is placed. A A is the flat iron cast in the form shewn, being the size it is intended to be used, but the size may be varied as required. B is the upper part or lid of the iron, which is hinged to the lower or body part of the iron, as shewn. C is a sliding piece of iron, which is slid into the opening D when the iron is being used, so as to keep it securely closed; at the bottom of the iron, in the inner part, is a projection E, on which a grating F rests, on to which the fire is placed. G G are holes in the sides and one end of the iron, through which the air enters to promote the necessary combustion in the fuel. H is the handle, which is similar in its construction to that of an ordinary flat iron. A small quantity of hot fuel being introduced into the interior of the iron, it will quickly become heated and fit for use. I find charcoal the best description of fuel, although I do not confine myself to that description of fuel. A small space is left at the upper part of the iron, between the top of it and the lid, to facilitate the combustion of the fuel, by which all smoke will be prevented. The under surface of the iron is smooth, the same as all flat irons. Having thus described the nature of the invention, and the manner

manner of performing the same, I would have it understood that I do not confine myself to the precise details herein given, so long as the character of the invention be retained. And I would remark that, although I have spoken of the irons being made of cast iron, I do not intend to confine myself to that material, as they may be made of brass or any other suitable metal; but what I claim as the invention for which I am desirous to secure Letters of Registration for New South Wales, is the mode of constructing flat irons in such manner that the fuel necessary for heating them may be contained within them substantially as herein described.

In witness whereof, I, the said John Herman Athens, have hereunto set my hand and seal, this thirteenth day of March, in the year of our Lord one thousand eight hundred and fifty-eight.

J. H. ATHENS. (L.S.)

In the presence of—

WILLIAM HENRY RITCHIE,
of Melbourne.

This is the specification referred to in the Letters of Registration granted to John Herman Athens, this eighth day of November, 1858.

W. DENISON.

REPORT.

New South Wales,
Sydney, 5 October, 1858.

SIR,

In compliance with your request, having met as a Board, to examine and consider the matters stated in Mr. John Herman Athens' Petition for Letters of Registration for improvements in the construction of Flat Irons, with reference to Act of Council 16 Victoria, No. 24,—we have the honor to report that we consider the Letters of Registration prayed for may be granted.

We have, &c.,
E. W. WARD.
EDWARD BELL.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

John Herman Athens Drawings of

FLAT IRONS

For Letters of Registration for New South Wales.

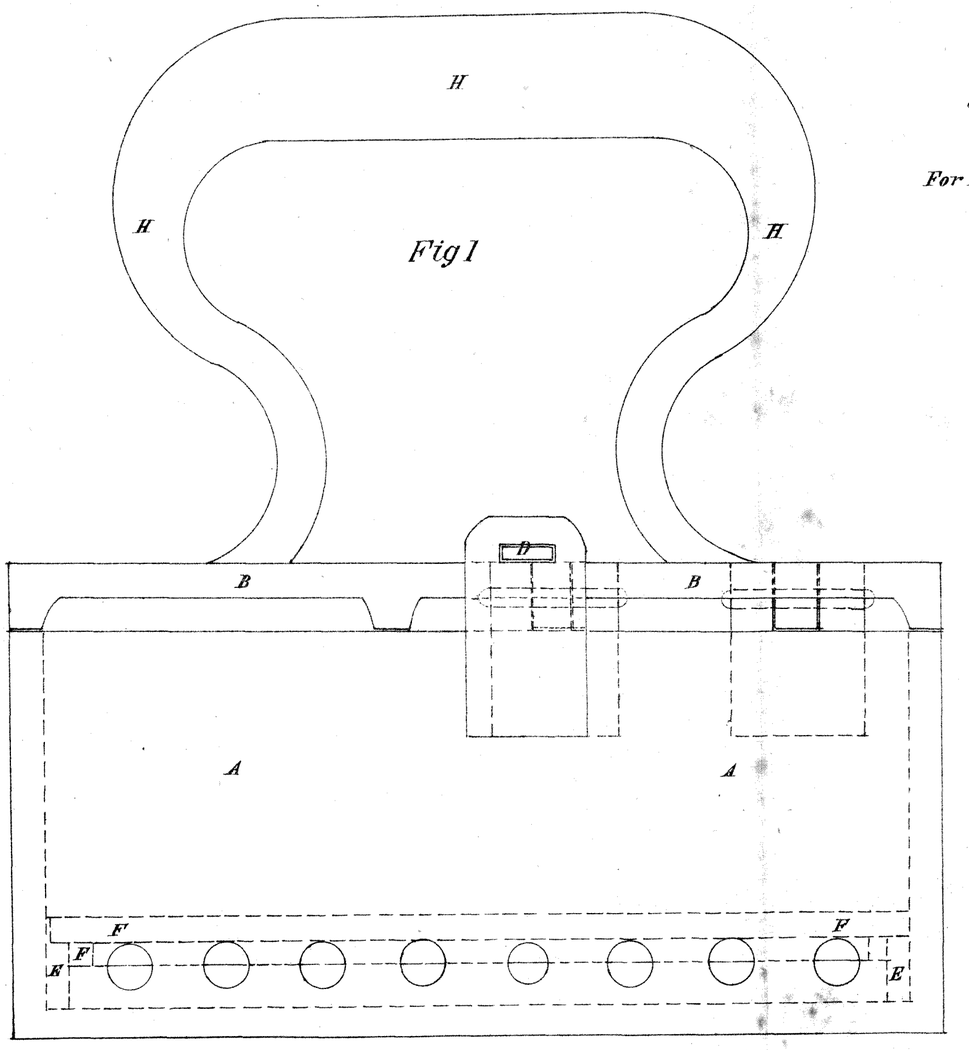


Fig 1

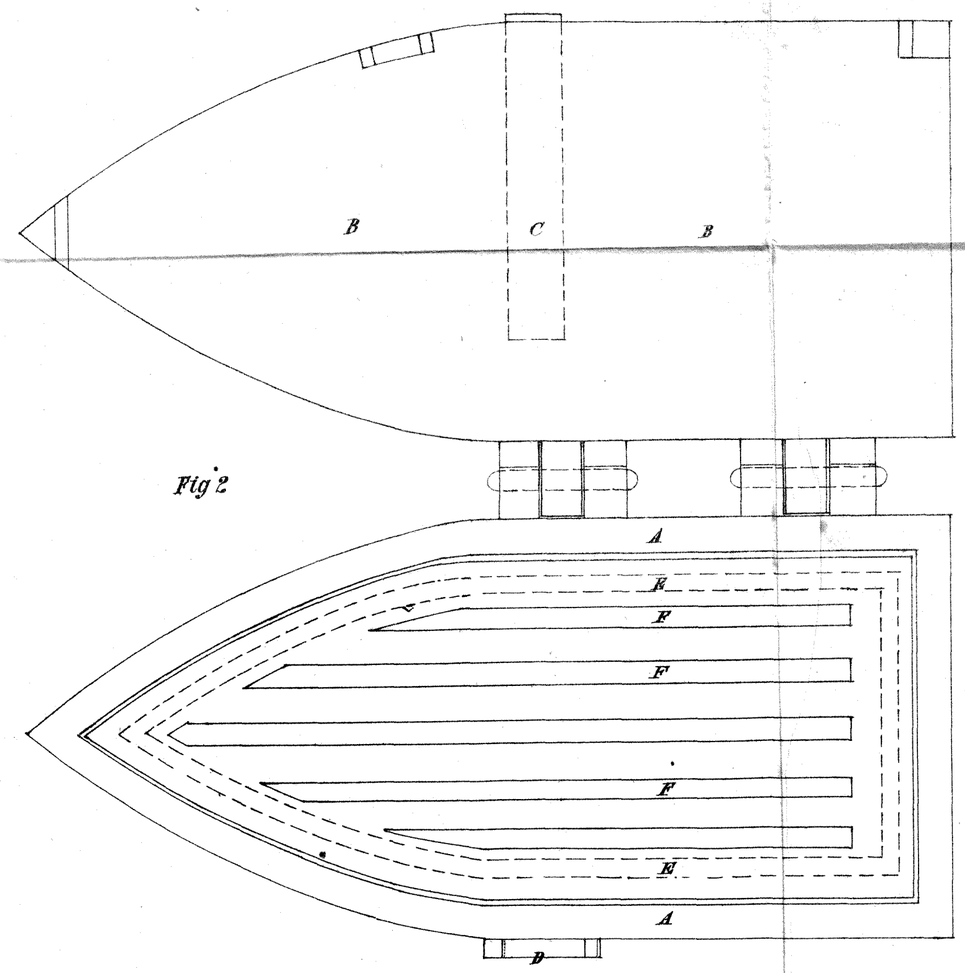


Fig 2

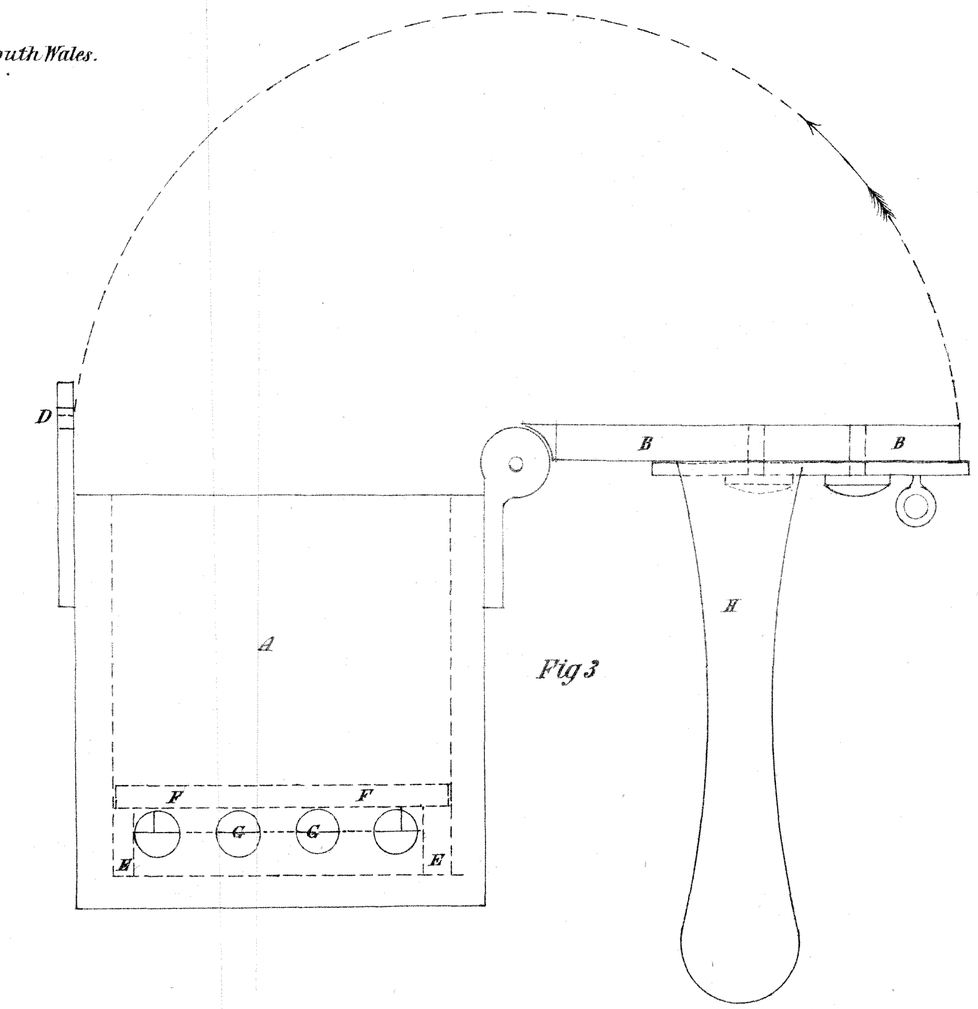
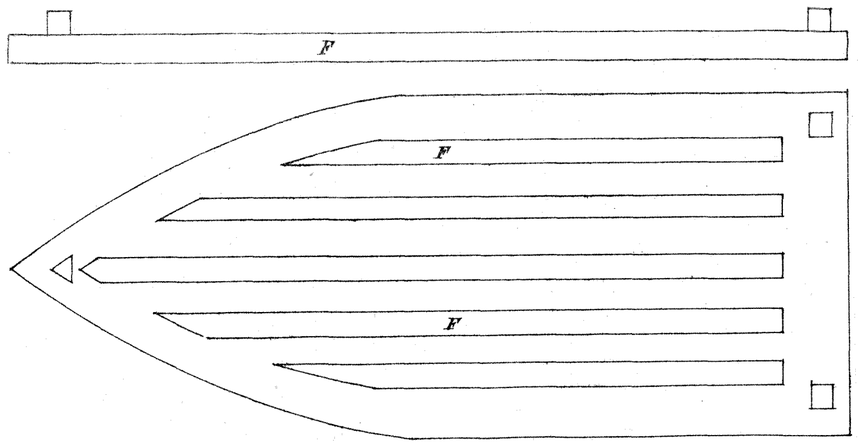


Fig 3

Fig 4



This is the Drawing referred to in the Letters of Registration granted to John Herman Athens this Eighth Day of November 1858

(Sgd) W. Denison.

A.D. 1858, 16*th November*. No. 12.

INVENTION FOR MANUFACTURING GAS.

LETTERS OF REGISTRATION to Bernard Josephson, of Melbourne, for an Invention for manufacturing Gas.

[Registered on the 17th day of November, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Bernard Josephson, of the city of Melbourne, in the Colony of Victoria, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for manufacturing Gas, which is more particularly described in the specification annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Bernard

Josephson,

Josephson, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said Bernard Josephson, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during, and until the full end and term of fourteen years from the date of these presents, next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Bernard Josephson shall not within three days after the granting of these Letters of Registration register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixteenth day of November, in the year of our Lord one thousand eight hundred and fifty-eight.

W. DENISON.

(L.S.)

SPECIFICATION.

THE dung or excrement of human beings and cattle (but that of human beings is the best), also the refuse of slaughter-houses and tar, also slops and rubbish from kitchens, can be used; also the refuse of tanneries. When the manure is collected, and brought to the place or places where it may be required, it is put into a cistern or tank. On the top of said cistern, an iron sieve is placed, to keep any other rubbish from passing into the aforesaid cistern, such as glass, wood, &c., &c.; the liquid part, as when drained off, and excrement is to be placed in a flat iron pan, to be kept stirred, under which a slow fire will be placed, not to exceed one hundred and twenty degrees in heat—this is merely to get rid of the urine, which it is a nature of ammonia. The urine should be saved for purifying the gas, because it will purify better than the lime-water; when it is cold, and exposed to the weather a sufficient time to be stiff enough that it can be worked with shovels, may be thickened in a more rapid manner by mixing rock-lime with it, but it will not produce so much gas; then it will require to have a small quantity of rosin mixed with it, say in the proportion of one part of rosin to ten of manure—perhaps a little more or less; this is necessary in case of any ammonia or anything of the kind being left in the excrement. Also bones can be used, but it will require nearly the same proportion of rosin as above stated, because the bones are short of a little carbonic. The cattle dung will not require straining, but the same preparation as before mentioned—it will then be ready for the retort, but will require a little more rosin. No plan is necessary for this apparatus, any engineer or mechanic will understand it. All the articles I have mentioned above can be manufactured in the same apparatus as the present gas works.

This is the specification referred to in the annexed Letters of Registration granted to Bernard Josephson, this sixteenth day of November, A.D. 1858.

W. DENISON.

REPORT.

Invention for manufacturing Gas.

REPORT.

Sydney, 3 *November*, 1858.

Sir,

Having met as a Board to examine and consider the matter stated in the Petition of Mr. Barnard Josephson, for Letters of Registration for a mode of manufacturing Gas, of which he states himself to be the discoverer, and having examined Mr. Josephson thereupon, we have the honor to report that we consider the Letters of Registration prayed for may be granted.

We have, &c.,

E. W. WARD.
J. SMITH.

The Honorable
The Colonial Secretary.

P.S.—Mr. Josephson's Petition is herewith returned.

A.D. 1858, *8th December.* No. 13.

IMPROVEMENTS IN MACHINERY FOR CRUSHING QUARTZ, &c.

LETTERS OF REGISTRATION to Minor King, for Improvements in Machinery for crushing Quartz and other Ores.

[Registered on the 9th day of December, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Minor King, of the city of Melbourne, in the Colony of Victoria, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in Machinery for crushing Quartz and other Ores," which is more particularly described in the specification and the two drawings annexed to these Letters of Registration, and the explanation thereupon written, and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16 Vic., No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council,

and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Minor King, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof: To have, hold, and exercise unto the said Minor King, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Minor King shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of December, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

SPECIFICATION of the Invention of Mr. Minor King, of Melbourne, in the Colony of Victoria, for Improvements in Machinery for crushing Quartz and other Ores.

DESCRIPTION OF THE DRAWINGS.

Figure 1 is a vertical central section of the mortar and frame of my improved machinery, the working parts being bisected.

Figure 2 is a horizontal section of the framing, taken in the lines *x x*, figure 1. Similar letters are used to indicate the corresponding parts in the two figures. The object of this invention is to obtain a very compact and efficient machine, one that will not be liable to get out of repair, and having its parts so arranged that each will perform its full portion of the work to be accomplished. The invention is designed for crushing auriferous quartz and other ores, and it consists in having a series of pestles placed within an annular mortar, and around a feeding spout, the pestles being actuated by a horizontal double or triple inclined cam, which acts against circular discs on the pestle rods, or by an equivalent device, so that the said pestles will be rotated as they are raised by the cam. The invention also consists in using in connection with the above a screen and drip flange, arranged relatively with each other, and with the mortar and pestles, as will be hereafter described:—

A represents an annular chamber which is the mortar of the machine; this chamber is formed in a circular casting A, which serves as the base of the machine, and around the upper part of the chamber A an annular flange B is formed on its outer side. A vertical upright C projects from the casting, and a vertical shaft, D, is stepped on its upper end, the upper end of the shaft having its bearing at the centre of a circular plate E, which is supported by uprights *a a*, the lower ends of which are secured to the base or casting A. Between the chamber A and the flange B a circular plate is affixed to the uprights *a*, and shaping downwards to the feed hopper L which is bolted on to it, and is formed of boiler iron, and placed around the upright C, and forms a feed passage leading down into the mortar A. *b b* is a dome placed round the upright C, bolted to it at the top, and curving downwards to the top and inner edge of the plate F, through which are holes as shewn in the horizontal section No. 2, through which holes the machine is fed. From the lower and outer edge of the circular plate F, and between the uprights *a a* and bolted to them, are plates of boiler iron M which form a curb, and comes down to the screen N. From the lower edge of the curb down to the upper edge of the mortar A, are placed frames (Y) made of $1\frac{1}{4}$ in. and $\frac{1}{4}$ in. iron, in which are set the screens N through which the powdered rock or pulp passes. About 18 inches above the circular feed plate F, and fastened to the uprights or columns *a a* by lugs and bolts is a circular plate V, in which

which is a series of boxes through which run and form guides for the pestle rods or stems K. On the top of the columns *a* is placed a circular plate E, in which is another series of boxes corresponding with those in the plate V which forms the upper guides for stems K, and in the centre of which is a bearing for the shaft D which is shewn in the figure W. On the shaft D, above the plate E, is placed a bevel wheel P, in which runs a vertical pinion Q on the horizontal shaft H which is supported by and runs in pillar blocks R standing on the circular plate E directly over uprights *a* and fastened by a key through the bolt O, which runs down through the column *a* fastened at the bottom of the mortar with a key. Fastened on the shaft H outside the pillar blocks R is a band wheel or pulley T to which the power is applied by belt. On the shaft D is a cam wheel G, which has on its upper and outer edge three raised cams or inclined planes running horizontally, and which act upon discs *e* which are placed on the pestle rods or stems K, both of which have bevelled faces, and cause the discs and stems to rotate as they are raised up the inclined plane or cam G and drop by its own weight. The discs *e* are fastened on to the stems or rods K by a screw thread cut on the stems, and in the discs, and long enough to be raised or lowered to allow for the wear of the pestles.

Within the annular chamber or mortar A a series of circular dies, I, are placed, which rest upon the bottom of the mortar; they are placed in recesses sunk therein.

The base of the machine or mortar A, the flanged part B, and the upright C, are all cast in one piece.

J represents one of a series of pestles of cylindrical form, which are constructed of the proper weight, and are affixed to the stems K.

The working of the machine is as follows:—The quartz or ore being reduced to the requisite size, is fed over the feed plate F down the space between the cylinder L and upright C into the mortar A, a requisite quantity of water being supplied with the quartz, and motion being communicated to the cam G on the shaft D, the inclined planes of the cams will act upon the disc *e*, and so set the pestles in motion, and the quartz will pass under the pestles and become crushed, and the reduced pulp will pass out through the screens N and over the drip flange. Among the advantages claimed by the use of my invention is, that by having the pestles J rotate as they ascend, each portion of their bottoms are subjected to an equal wear, and will be kept perfectly even and level; and by having the pestles placed in a circular form in an annular mortar, all the ore in the mortar will be perfectly acted upon by the pestles. In the usual rectangular mortars, the quartz is liable to be forced into the angles or corners of the mortar, and there remain so as to prevent the suitable action of the end pestles, the bulk of the work being done by the central ones; this difficulty is obviated by my improvements. The machine will require about one-third less power to work it, and the original cost is not more than one-half of an ordinary mill, and being constructed of iron, is a perfect and efficient one in all its parts. I do not claim broadly the raising of a pestle or weight by having a horizontal cam acting upon a pulley or circular disc on its end or shaft—that has been used before for working drills; but what I claim is, the combination of the circular bed or mortar with the circular pestles working therein substantially as herein described; and secondly, I claim the screen and drip flange arranged relatively to each other with the pestles and mortar as herein described.

Signed this 9th day of September, 1858.

MINOR KING. (L.S.)

Witness—WM. HY. RITCHIE,
79, Chancery-lane, Melbourne.

This is the specification (contained in three sheets of paper) referred to in the annexed Letters of Registration granted to Minor King, this eighth day of December, A.D. 1858.

W. DENISON.

[Registered

Improvements in Machinery for crushing Quartz, &c.

[Registered on the 18th day of August, 1860, in pursuance of the Act 16 Vic., No. 24.]

THIS Indenture, made the sixteenth day of August, in the year of our Lord one thousand eight hundred and sixty, between Minor King, of the city of Melbourne, in the Colony of Victoria, but at present in Sydney, of the one part, and Edward Cutler Wheelock, of Melbourne aforesaid, of the other part: Whereas by certain Letters Patent, or Letters of Registration, bearing date the eighth day of December, in the year of our Lord one thousand eight hundred and fifty-eight, duly registered in the proper office of the Supreme Court, at Sydney, in the Colony of New South Wales, and sealed with the seal of the said Colony of New South Wales, Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same, did grant unto the said Minor King, his executors, administrators, and assigns, the exclusive enjoyment and advantage of a certain invention or improvement in manufactures, that is to say, an invention of "Improvements in Machinery for crushing Quartz and other Ores," for the term of fourteen years: And whereas the said Edward Cutler Wheelock hath contracted with the said Minor King, for the sale to him of one equal third part or share in the said Letters of Registration or Letters Patent, and also of one third part or share of all profits arising from the manufacture and sale of machines thereunder in New South Wales, for the price or sum of two hundred and eight pounds, sixteen shillings and eight pence: Now this Indenture witnesseth that, for and in consideration of the sum of two hundred and eight pounds, sixteen shillings and eight pence, to the said Minor King paid by the said Edward Cutler Wheelock on the execution hereof, the receipt whereof is hereby acknowledged, he, the said Minor King, doth by these presents assign unto the said Edward Cutler Wheelock, his executors, administrators, and assigns, all that the said one equal third part or share of and in the said Letters of Registration or Letters Patent, and also one third part or share of and in all profits arising from the manufacture and sale of all machines made under the said invention and Patent, and sold in New South Wales aforesaid, by the said Minor King, or for or on his account; and all the right, title, and interest of him the said Minor King, of, in, and to the said one third part or share of and in the said Letters of Registration or Letters Patent: To have, hold, use, exercise, and enjoy the said one equal third part or share of and in the said Letters of Registration or Letters Patent, with all benefit and advantage to arise therefrom, and also one third part or share of and in all profits arising from the manufacture and sale of machines thereunder in New South Wales, unto the said Edward Cutler Wheelock, his executors, administrators, and assigns, in as full, ample, and beneficial a manner as he the said Minor King, by virtue of the said Letters of Registration or Letters Patent, might have had or held the same, if these presents had not been made for and during the rest and residue of the said term of fourteen years: And the said Minor King, for himself, his heirs, executors, and administrators, doth hereby covenant with the said Edward Cutler Wheelock, his executors, administrators, and assigns, that he, the said Minor King, at the time of sealing the said Letters of Registration or Letters Patent, was the true and first inventor of the said invention, and that the same was then new as to the public use or knowledge thereof within the said Australian Colonies; and that the said Letters of Registration or Letters Patent were, within three days from the granting thereof, registered in the proper office in the Supreme Court of the said Colony of New South Wales, and that the said Letters of Registration or Letters Patent are good, valid, and effectual for the said inventions, and are in nowise invalidated, avoided, or voidable; and that for and notwithstanding any act, matter, or thing to the contrary by him done or suffered, he, the said Minor King, hath good right, full power, and absolute authority to assign and convey the said one equal third part or share of and in the said Letters of Registration or Letters Patent, and the said one equal third part or share of and in all profits arising from the manufacture of machines thereunder in New South Wales; and that he hath not by any means, directly or indirectly, forfeited any right which he ever had, or might have had, to the said one third part or share in the said Letters of Registration or the said profits arising from manufacture as aforesaid: And that he, the said Edward Cutler Wheelock, his executors, administrators, and assigns, shall and may, by virtue of these presents, have, receive, and take all the profits and advantages whatsoever that shall or may arise from the same one equal third part or share of and in the said Letters Patent or Letters of Registration, or from the said third part or share of the profits arising from the manufacture of machines thereunder in New South Wales, without any let, hinderance, denial, or interruption from the said Minor King, his executors, administrators, and assigns; and that he, the said Minor King, his executors and administrators, shall and will at any time hereafter, upon reasonable request, and at the costs and charges of the said Edward Cutler Wheelock, do and perform all such further and other acts, for the better and more fully and satisfactorily assigning the said one equal third part or share of and in the said Letters of Registration or Letters Patent, and the said one third part

or

or share in the profits to arise as aforesaid from the manufacture of machines thereunder in New South Wales, as by the said Edward Cutler Wheelock, his executors, administrators, and assigns, or his or their counsel in the law, shall be advised and required.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year first above written.

MINOR KING. (L.S.)
E. C. WHEELOCK. (L.S.)

Signed, sealed, and delivered, by the within named E. C. Wheelock, in the presence of

THOS. WARNER,
No. 49, Elizabeth-street, Melbourne,
Attorney, &c.

RECEIVED, on the day and year first within written, of and from the above-named Edward Cutler Wheelock, the sum of two hundred and eight pounds, sixteen shillings and eight pence, being the consideration money within expressed to be paid by him to me—£208 16s. 8d.

MINOR KING.

Witness to the signature of the said Minor King—

A. TANGE.

THE foregoing Indenture was signed, sealed, and delivered by the above-named Minor King, on this sixteenth day of August, one thousand eight hundred and sixty, in the presence of

A. TANGE,
Merchant, Sydney.

RECEIVED into the Office for the Registration of Deeds, &c., at Sydney, this eighteenth day of August, 1860, at half-past ten o'clock in the forenoon, from Edmund Burton, of Sydney aforesaid, solicitor, an examined copy of the within written Deed of Assignment, verified by Anton Tange, of Sydney aforesaid, merchant, and numbered seven.

THEORE. JAS. JAQUES, (L.S.)
Deputy Registrar.

In the Supreme Court of New South Wales.

On this eighteenth day of August, in the year of our Lord one thousand eight hundred and sixty, Edmund Burton, of Sydney, in the Colony of New South Wales, solicitor, being duly sworn, maketh oath and saith as follows:—"The foregoing writing is a true copy of the Deed of Assignment, of which it purports to contain a copy."

E. BURTON.

Sworn by the deponent, on the day and year lastly above written, at Sydney, before me—

D. B. HUTCHINSON,
A Commissioner for Affidavits.

THIS Indenture, made the twenty-first day of November, in the year of our Lord one thousand eight hundred and sixty-three, between Minor King, of the city of Sydney, in the Colony of New South Wales, Engineer, of the one part, and Daniel Cameron Dalgleish, of the same place, Esquire, of the other part: Whereas by certain Letters Patent, dated on or about the fifteenth day of August, one thousand eight hundred and fifty-eight, His Excellency Sir Henry Barkley, Governor of the Colony of Victoria, did grant to the said Minor King, his executors, administrators, or assigns, the exclusive enjoyment and advantage of a certain invention or improvement in manufactures, that is to say, an invention of "Improvements in Machinery for crushing Quartz and other Ores," for the term of fourteen years: And whereas by certain other Letters Patent, dated on or about the eighth day of December, one thousand eight hundred and fifty-eight,

eight, His Excellency Sir William Thomas Denison, Knight, &c., &c., did grant to the said Minor King, his executors, administrators, and assigns, the exclusive enjoyment and advantage of a certain invention or improvement in manufactures, that is to say, an invention of "Improvements in Machinery for crushing Quartz and other Ores," for the term of fourteen years: And whereas by certain other Letters Patent, dated on or about the fifth day of July, one thousand eight hundred and fifty-nine, His Excellency Sir William Young, Governor of Tasmania, did grant to the said Minor King, his executors, administrators, and assigns, the exclusive enjoyment and advantage of a certain invention or improvement in manufactures, that is to say, an invention of "Improvements in Machinery for crushing Quartz and other Ores," for the term of fourteen years: And whereas by an Indenture of Assignment, dated on or about the sixteenth day of August, one thousand eight hundred and sixty, made between the said Minor King, of the one part, and Edward Cutler Wheelock, of the other part, one equal third part or share of and in the secondly recited Letters Patent, and of all profits arising from the manufacture of machinery in New South Wales, were assigned to the said Edward Cutler Wheelock: And whereas the said Minor King has contracted with the said Daniel Cameron Dalgleish for the absolute sale to him of all the said Letters Patent, and all interest therein, and all right thereunder, except as hereinafter mentioned, for the sum of fifty pounds: Now, this Indenture witnesseth that, in pursuance of the said contract, and in consideration of the sum of fifty pounds sterling to the said Minor King paid by the said Daniel Cameron Dalgleish, on or immediately before the execution hereof, the receipt whereof is hereby acknowledged, he, the said Minor King, doth grant, bargain, sell, assign, transfer, and set over unto the said Daniel Cameron Dalgleish, his executors, administrators, and assigns, all and every the said Letters of Registration or Letters Patent hereinbefore recited, and all profits arising from the manufacture of machinery severally thereunder, or under the inventions therein specified, and all profits arising from the sale of machinery manufactured under the said Letters, or either of them, and in all machinery to be manufactured under the said Letters or Patents, or any or either of them, and all rights and privileges vested in the said Minor King, or exercisable by the said Letters or Patents, or either of them, and all the right, title, and interest of the said Minor King in and upon the premises, excepting, nevertheless, from the operation hereof, the said one-third so assigned to the said Edward Cutler Wheelock aforesaid: To have and to hold all and singular the premises hereby assigned, except as aforesaid, unto the said Daniel Cameron Dalgleish, his executors, administrators, and assigns, in as full, ample, and beneficial a manner, to all intents and purposes, as the said Minor King, his executors and administrators, might or could have done prior to the execution hereof; with power to the said Daniel Cameron Dalgleish, his executors, administrators, or assigns, to use the name or names of the said Minor King, his executors or administrators, in any proceedings, legal or equitable, for restraining any infringement upon the said Patents, or either of them, or to recover damages for the infringement of them, or any of them, or for any other purposes in relation to them, or either of them, or to take all such proceedings in the name or names of the said Daniel Cameron Dalgleish, his executors, administrators, and assigns; and with power also to them and him to exercise all rights available under said Patents in the Colony of New Zealand, and to institute the like proceedings in case of breach thereof or of infringement thereof; and the said Minor King, for himself, his executors, and administrators, covenants with the said Daniel Cameron Dalgleish, his executors, administrators, and assigns, that all of the said Patents have been duly registered according to law; and that the same and all rights thereunder shall be held, and received, and enjoyed, and exercised by the said Daniel Cameron Dalgleish, his executors, administrators, and assigns, without interruption or denial whatsoever, except as aforesaid; and that the said Minor King has, except as aforesaid, good right hereby to assign and assure the same premises in manner aforesaid; and that the same premises, and every part thereof, and all interest therein, shall, at all times hereafter, at the request and costs of the said Daniel Cameron Dalgleish, his executors, administrators, and assigns, be further assigned and assured in such manner as he or they may reasonably require.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year first before written.

MINOR KING. (L.S.)

Signed, sealed, and delivered, by the said Minor King, in the presence of

J. T. ROBERTSON.

RECEIVED, on the day and year first before written, of and from the within-named Daniel Cameron Dalgleish, the sum of fifty pounds, being the consideration money within expressed to be paid by him to me—£50.

MINOR KING.

Witness—J. T. ROBERTSON.

RECEIVED

Improvements in Machinery for crushing Quartz, &c.

RECEIVED into the Registrar General's Office, Sydney, New South Wales, this twenty-third day of November, A.D. 1863, at fifteen minutes to eleven o'clock forenoon, from John Thomas Robertson, of Sydney, and verified by him, a copy of this Assignment of Patent.

THEORE. JAS. JAQUES,
Deputy Registrar General.

ON this twenty-third day of November, in the year one thousand eight hundred and sixty-three, John Thomas Robertson, of the city of Sydney, in the Colony of New South Wales, solicitor, being duly sworn, maketh oath and saith as follows :—"The foregoing is "a true copy of the original Assignment of Patent, and of every receipt thereon, and of "the execution and attestation thereof, having been carefully examined with, by me, this "day."

J. T. ROBERTSON.

Sworn by the deponent, on the day first above mentioned, at Sydney aforesaid, before me—

F. H. STEPHEN,
A Commissioner for Affidavits.

RECEIVED into the Supreme Court of New South Wales, this twenty-third day of November, A.D. 1863, at a quarter past twelve o'clock noon, from John Thomas Robertson, of Sydney.

(For the Prothonotary,)
G. J. CROUCH, JUNR.,
Fourth Clerk of the Supreme Court.

REPORT.

Sydney, 10 *November*, 1858.

SIR,

Having met as a Board to examine and consider the matters stated in Mr. Minor King's Petition for Letters of Registration for "Improvements in Machinery for crushing Quartz and other Ores," of which he claims to be the inventor, and having examined the machine in operation, we have the honor to recommend that the Letters of Registration prayed for be granted.

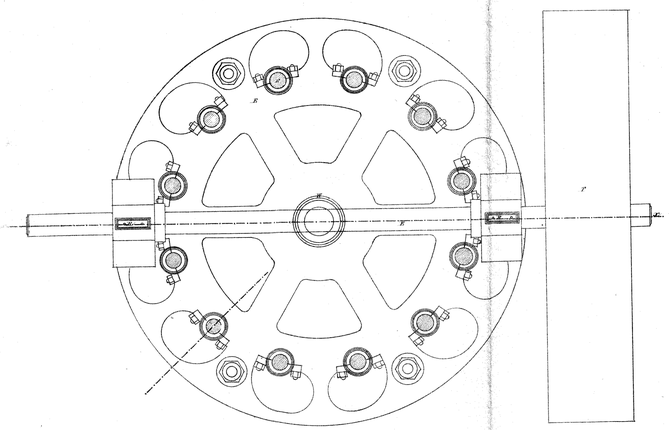
We have, &c.,
E. W. WARD.
GOTHER K. MANN.

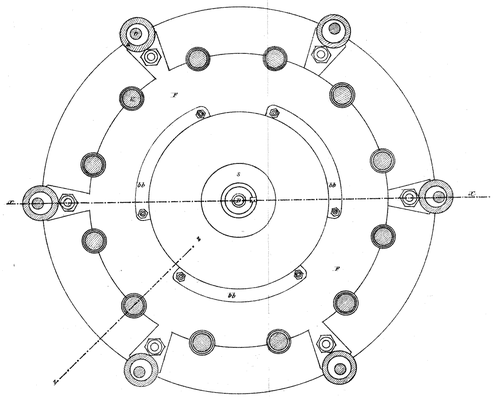
THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents forwarded with your letter are herewith returned.

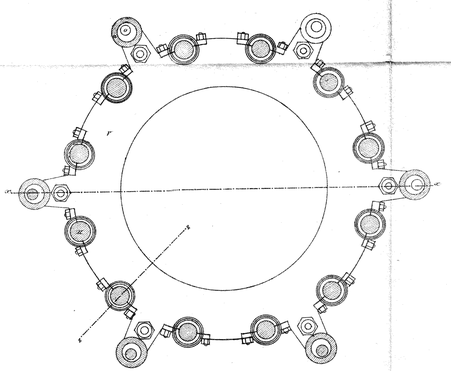
[Plans—two sheets.]

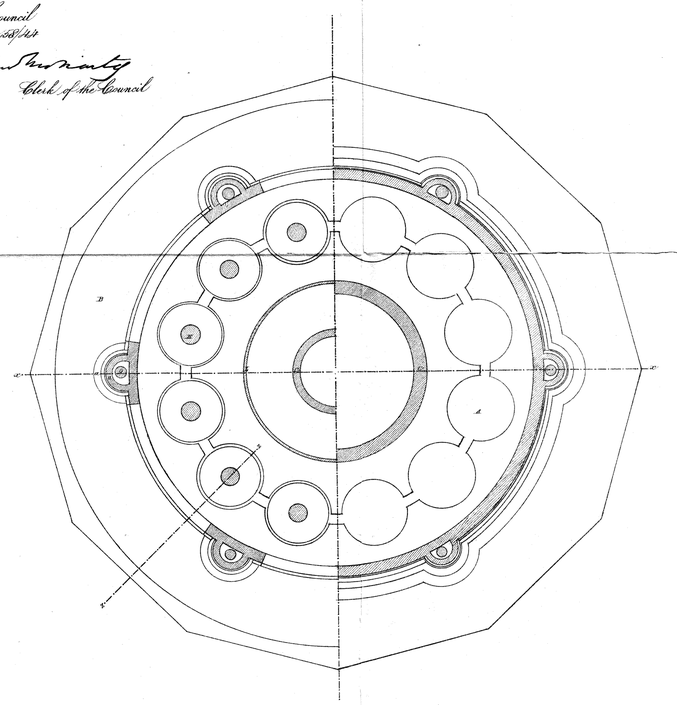
Drawings of Mr. Minor King for Letters of Registration for New South Wales

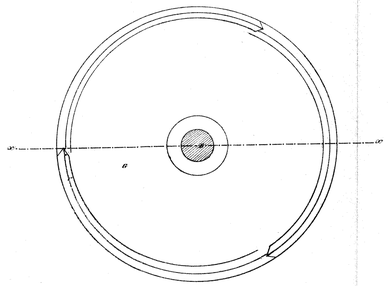


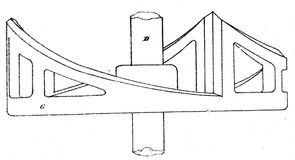


Laid before the Ex. Council
15th. November 1858 Min. No. 58/1417
Signed
Clerk of the Council







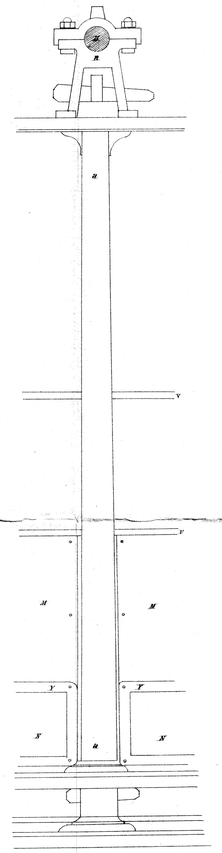


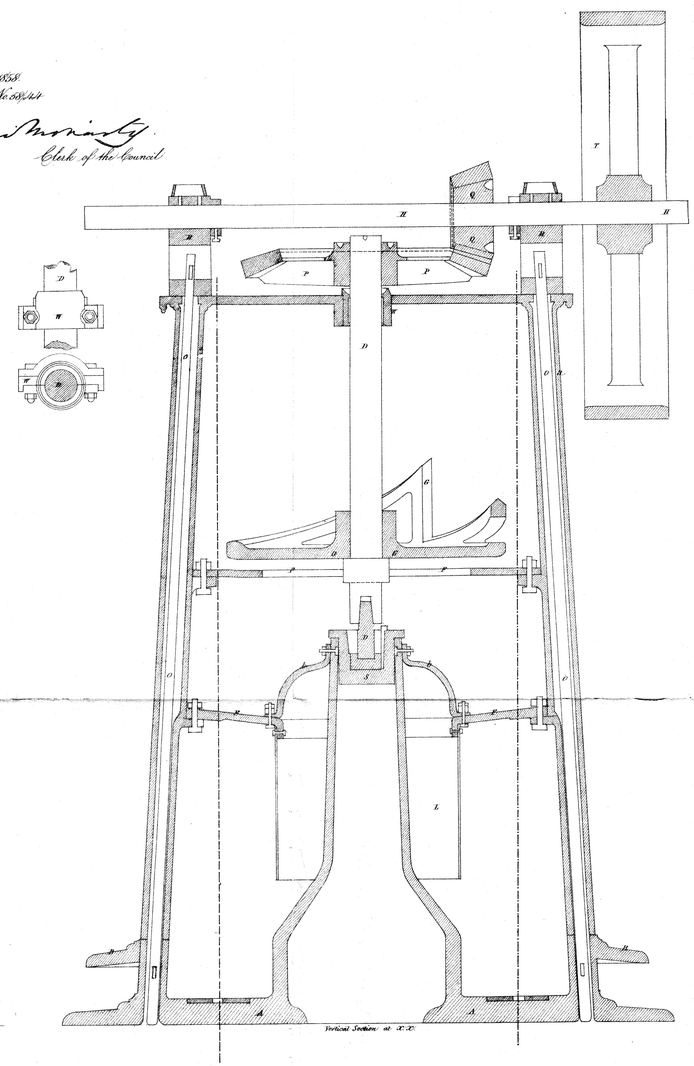
This is one of the two Drawings referred to in the annexed Letters of Registration granted to Minor King this Eighth day of December A.D. 1858.

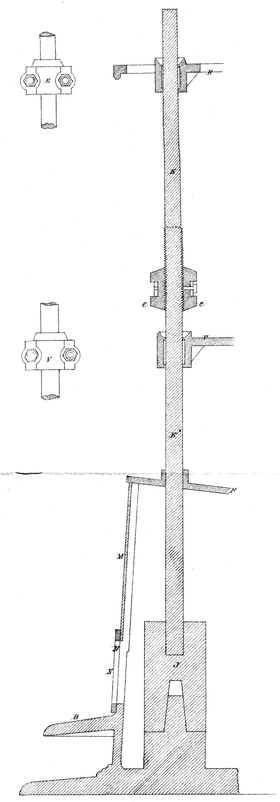
Signed

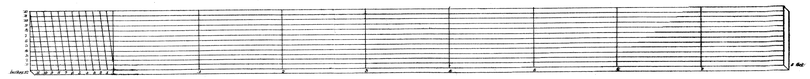
Drawings of Mr. Minor King for Letters of Registration for New South Wales

Ex. Co. Off.
15th. November 1858
Min. No. 58/1417
Signed
Clerk of the Council









This is one of the two Drawings referred to in the annexed Letters of Registration granted to Minor King this Eighth day of December A.D. 1858.

Signed

A.D. 1858, 23*rd December*. No. 14.

IMPROVEMENTS IN REFRIGERATION AND THE MAKING OF ICE, &c.

LETTERS OF REGISTRATION to Bevan George Sloper, of Sydney, for Improvements in Refrigeration and the Making of Ice, &c.

[Registered on the 24th day of December, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY HIS EXCELLENCY SIR WILLIAM THOMAS DENISON, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS BEVAN GEORGE SLOPER, of No. 346, Kent-street, in the city of Sydney, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in Refrigeration and the making of Ice, and the Machinery for effecting the same," which is more particularly described in the specification and drawing annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which

may

may be for the public good, and having received a report from competent persons appointed by me to examine and consider the matters stated in the said Petition, to the effect or in the words following, that is to say, "The said Petitioner claims, first, "'the method of producing cold by the expansion of measured or regulated quantities "'of air,' and second, 'the machine for effecting the same.' The principle of pro- "ducing cold by the expansion of air has long been known, and therefore cannot be "separately claimed, but the mechanical arrangements for carrying the principle into "effect are, to the best of our knowledge, new; we are therefore of opinion that "Letters of Registration may be granted to the Petitioner for his Machinery for Refrigera- "tion and the making of Ice"—am pleased, with the advice of the Executive Council, and in the exercise of the power and authority given to me by the said Act of Council to and do by these Letters of Registration grant unto the said Bevan George Sloper, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention of "Machinery for Refrigeration and the making of Ice," for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Bevan George Sloper, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Bevan George Sloper shall not within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-third day of December, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

SPECIFICATION of an invention of Bevan G. Sloper, of No. 346, Kent-street, Sydney.

The following is the description of his invention, and the means by which the same is to be performed, reference being had to the drawing hereunto annexed, and to the letters and marks placed thereon:—A is an air-pump, of which B is the stuffing box, and C the piston rod, which may be worked by the direct action of a steam cylinder fixed on the same bed plate DD, on which the air-pump is fixed, or by gearing from a detached steam-engine. EE^1 are exhaust valves, opening outwards. FF^1 GG^1 HH^1 are six valve-chests, containing slide valves moved by the valve-rods JJ, which work through stuffing boxes. The valve-rods are worked by short arms at LL, fixed on the rocking shaft KK. The rocking shaft receives its alternate motion by the rod P, worked by an eccentric connected with the steam-engine gearing. MM are brackets fixed on the bed-plate on which the rocking shaft works. The valve-chests FF^1 have side openings at VV^1 allowing the atmospheric air to enter. The valve-chests GG^1 HH^1 have no direct opening to the atmosphere. II^1 are air-chambers holding a measured quantity of air, less than the cylinder of the air-pump. There is no necessary maximum or minimum limit to the ratio of capacity between the air-pump cylinder and the air-chambers, but an effective practical one is as eight to one, or the contents of the air-pump cylinder being that of each air-chamber may be one. The valve-chests HH^1 have porte-ways into the two ends of the cylinder A. SS is an ice-chest, made air-tight when the machine is working. In the drawing, the cover is removed to shew the interior. The pipes OO^1 connect the interior of the air-chambers II^1 by the valve-chests GG^1 with the interior of the ice-chest SS by the pipe Q. The pipes MM^1 connect the interior of the ice-chest by the pipe Q with the interior of the valve-chest HH^1. The ice-chest is divided by the partitions *x x*, for the purpose of obliging the air which enters them from the air-chambers to circulate round the ice-bags R R, before it passes out

out of the ice-chest by the pipe Q and is drawn into the cylinder through the valve-chests H H^1. The ice-bags R R, which are made of American canvas, are suspended from a false lid, and are nearly the depth of the ice-chest; they are filled with water, which is converted into ice by the intensely cold air which is continuously circulating round them. The ice-chest is encased in another chest, T, either filled with water or with a non-conducting material. The action of the machine when at work is as follows:—Supposing the piston of the air-pump to be moving from the E end of the cylinder towards the F^1 end, the self-acting exhaust-valve E will be shut, and the valve E will open by the air forced out through it into the atmosphere; at the same time the valves F, G^1, H^1, are closed, by which F closed excludes the atmospheric air from entering the chamber I. H closed shuts off the communication between the cylinder and pipe N^1. G closed shuts the communication of the air-chamber I^1 with the air-chest. The valves in chests G and H are open, allowing the air contained in the air-chamber I to expand and pass into the ice-chest, and the air in the ice-chest to pass into the cylinder by the valve-chest H. At the return stroke of the piston, the valves E F H^1 G^1 open, while E^1 F^1 H and G shut, by which the air in the air-chamber I^1 passes into the ice-chest, and the air in the ice-chest is drawn through the valve-chest H into the cylinder, to be expelled from it by the exhaust-valve E^1 at the next stroke of the piston. By the repetition of this mechanical action at each alternate stroke of the piston, a measured or regulated quantity of air enters one of the air-chambers, which expands into the ice-chest at the next stroke of the piston, producing intense cold by its expansion, circulates in a continuous stream round the ice-bags, converting the water they contain into ice, and passes off by the valve-chests HH into the air-pump cylinder, and thence by the exhaust valves EE^1 into the atmosphere. Having now explained the nature of his said invention, and the manner in which the same is to be performed, claims as his invention—first, the method of producing cold by the expansion of measured or regulated quantities of air, as described—second, the machine for effecting the same, as described.

This and the preceding sheet of paper contain the specification referred to in the annexed Letters of Registration granted to B. G. Sloper, this twenty-third day of December, 1858.

W. DENISON.

REPORT.

University of Sydney,
13 *November*, 1858.

SIR,

In reply to your letter of 5th November, requesting us to report on an application from Mr. B. G. Sloper, for Letters of Registration for "Improvements in Refrigeration and the making of Ice, and the Machinery for effecting the same," we have the honor to state that, having considered the accompanying documents (herewith returned), and having obtained further information from Mr. Sloper, we have arrived at the following conclusion:—

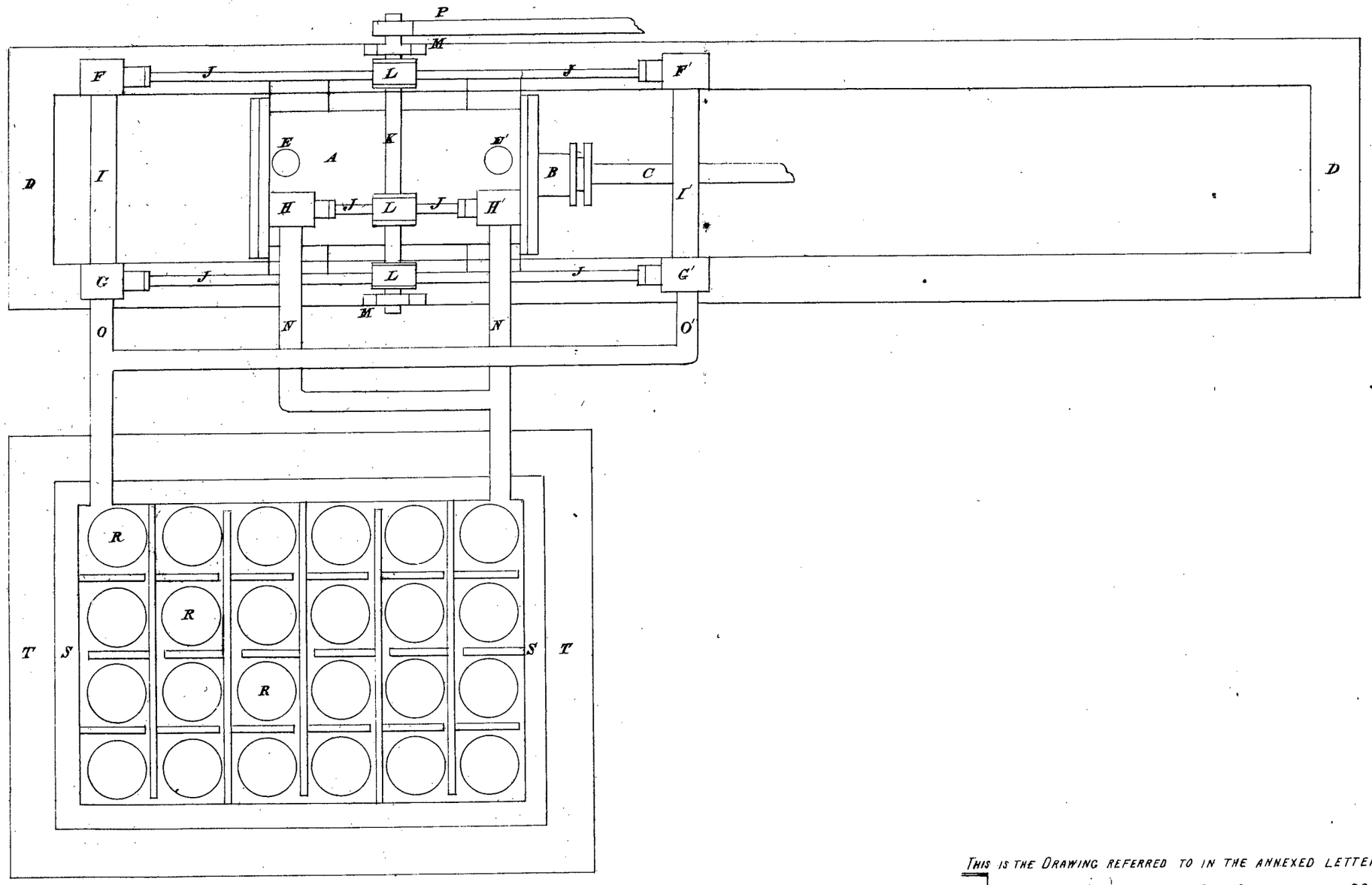
Mr. Sloper claims, first, "the method of producing cold by the expansion of measured or regulated quantities of air—the machine for effecting the same." The principle of producing cold by the expansion of air has long been known, and therefore cannot be separately claimed; but the mechanical arrangements for carrying the principle into effect are, to the best of our knowledge, new. We are therefore of opinion that Letters of Registration may be granted to Mr. Sloper, for his "Machinery for Refrigeration and the making of Ice."

We have, &c.,

J. SMITH.
GEORGE BENNETT.

THE HONORABLE
THE COLONIAL SECRETARY.

[Plan—one sheet.]



This is the Drawing referred to in the annexed letters of Registration granted to B.C. Sloper this 23rd Day of December 1858.

(Sgd) W. Denison.

A.D. 1858, 23*rd December*. No. 15.

IMPROVEMENTS IN EXTRACTING THE STUMPS OF TREES, AND IN PULLING DOWN TREES.

LETTERS OF REGISTRATION to F. P. Mansfield and C. Hewitt, of Melbourne, Victoria, for Improvements in extracting the Stumps of Trees, and in pulling down Trees.

[Registered on the 24th day of December, 1858, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Francis Porter Mansfield and Cyrus Hewitt, both of the city of Melbourne, in the Colony of Victoria, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of "Improvements in extracting the Stumps of Trees, and in pulling down Trees," which is more particularly described in the specification and drawing annexed to these Letters of Registration; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioners therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public

good,

good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Francis Porter Mansfield and Cyrus Hewitt, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Francis Porter Mansfield and Cyrus Hewitt, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Francis Porter Mansfield and Cyrus Hewitt shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-third day of December, in the year of our Lord one thousand eight hundred and fifty-eight.

(L.S.) W. DENISON.

SPECIFICATION of the Invention of Mr. Francis Porter Mansfield, of Melbourne, in the Colony of Victoria, and Cyrus Hewitt, of the same place.

Improvements in extracting the Stumps of Trees, and in pulling down Trees.

THE invention consists of the application of the power of the lever, in combination with mechanical instruments, for the purpose of extracting the stumps and pulling down trees; but in order that the invention may be clearly understood, I will proceed to describe the drawings, in which Figure 1 shews an arrangement employed by me for extracting the stumps of trees. A is the lever (which I prefer to be made of iron) from which the power is obtained. This lever is supported at the ends by wheels B, and to the end of which the animals for working it are attached. In the back part of this lever is a mortise, which extends through it to the length of the hooks, and in which the anchor-loop works, being connected to the chain G F; the other end of the chain being affixed to a stump or other permanent object. The anchor-loop forms the turning point or fulcrum of the lever. In front of the lever are eight links or hooks, four on each side of the anchor-loop, by which the power obtained from the lever is applied to the chains and rod K and I, by which it is connected to the object to be removed. There are two chains K affixed to the front of the lever, the one being shewn in the hands of the workman ready to be fixed in the links, and the other fixed; and as the lever is moved, the short chain will be hooked into one of the links on the front side, and by each turn of the lever will be hitched further and further upon the main or taking up chain, by which the object to be removed is forced from its position. H P shews a side view of the crotch over which the chain passes when the apparatus is used for extracting stumps, and changes its position from a sliding to a lifting motion, whereby the stump, instead of being dragged out of its bed, is lifted up. To raise the crotch or shears with ease, I use a pike pole. M I N are parts of the apparatus which are used to facilitate the working, and which connect the top of the shears with the stump Q; under ordinary circumstances these parts may be dispensed with. The drawing shews the apparatus applied for extracting the stumps of trees; but when used for pulling down trees, the chain will be fastened round the trunk of the tree, and the lever worked as before; the crotch, and all the parts connected with it, can be dispensed with. Figure 2 shews detached views of the different instruments used by me to facilitate the carrying out my invention. No. 1 is what I call the anchor chain, which has a link on each side coupled by a bent hook with a bolt through it, which connects the lever with the anchor stump No. 2. No. 3 is the take-up chain. No. 4 a rod with a link at one end and a hook at the other. No. 5 is

the

the crotch or shears, shewing the two parts of it: there are two links in front of it by which it is connected with the rods, and two links at the back by which it is connected to the stump chain. No. 6 is a pike pole. No. 7 is a bar which connects with links of the ring at the top of the shears; the hook at the other end has two links which spread out to receive the chain. No. 8 is the chain which is attached to the roots. No. 9 is a hook. Nos. 10 and 11 are links used for moving some of the parts.

Having thus described the nature of the invention and the manner of performing the same, I would have it understood that I do not confine myself to the precise details, so long as the character of the invention be retained; but what I claim as the invention for which I am desirous to secure Letters of Registration is, the application of the lever in combination with the mechanical arrangements, for the purpose of extracting the stumps and pulling down trees; and I also claim the constructing the lever with the mortise or groove in which the anchor-loop works, whereby an additional power is obtained; and I also claim the use of the different implements for the purposes herein described.

In witness whereof, I, the said Francis Porter Mansfield, have hereunto set my hand and seal, this ninth day of September, in the year of our Lord one thousand eight hundred and fifty-eight.

F. P. MANSFIELD. (L.S.)
CYRUS HEWITT. (L.S.)

This and the two preceding sheets of paper contain the specification referred to in the annexed Letters of Registration granted to Francis Porter Mansfield and Cyrus Hewitt, this twenty-third day of December, 1858.

W. DENISON.

THIS Indenture, made the twenty-fourth day of December, in the year of our Lord one thousand eight hundred and fifty-nine, between Francis Porter Mansfield, of Melbourne, in the Colony of Victoria, gentleman, of the one part, and Cyrus Hewitt, of the same place, coach proprietor, of the other part: Whereas His Excellency Sir William Denison, by Letters of Registration under his sign manual and the Seal of the Colony of New South Wales, dated on or about the twenty-third day of December, one thousand eight hundred and fifty-eight, granted unto the said Francis Porter Mansfield and Cyrus Hewitt, their executors, administrators, and assigns, the exclusive enjoyment and advantage of a certain invention for "Improvements in extracting the Stumps of Trees, and in pulling down Trees," for the term of fourteen years from the date thereof: And whereas the said Francis Porter Mansfield hath agreed with the said Cyrus Hewitt for the absolute sale to him of all the interest of him, the said Francis Porter Mansfield, of and in the said invention and Letters of Registration, and all future benefit thereof respectively, free from incumbrances, at the price of two hundred and fifty pounds: Now this indenture witnesseth that, in pursuance of the said agreement, and in consideration of the sum of two hundred and fifty pounds sterling, by the said Cyrus Hewitt to the said Francis Porter Mansfield, paid at or before the execution of these presents (the receipt whereof is hereby acknowledged), he, the said Francis Porter Mansfield, doth by these presents grant, bargain, sell, assign, and release unto the said Cyrus Hewitt, his executors, administrators, and assigns, all the share, right, title, and interest of him, the said Francis Porter Mansfield, of, in, and to all those the invention and Letters of Registration hereinbefore mentioned, and the privileges by the said Letters of Registration granted, and the exclusive enjoyment and advantage of the said invention and privilege, and all rights, powers, authorities, privileges, advantages, profits, emoluments, and benefits to the said Letters of Registration, invention, and premises, or any of them, in anywise appertaining or belonging, and all the right, title, interest, term or terms of years, benefit, property, advantage, claim, and demand whatsoever, both at law and in equity, of him the said Francis Porter Mansfield, to, of, or upon the said Letters of Registration and premises, or any of them; to have, hold, use, exercise, and enjoy the said Letters of Registration, invention, and premises, unto and by the said Cyrus Hewitt, his executors, administrators, and assigns, henceforth for all the residue of the said term of fourteen years now unexpired, and for all other the term and terms of years which the said Francis Porter Mansfield and Cyrus Hewitt may now have, or which may hereafter be granted or obtained therein, in as full, ample, and beneficial a manner as the said Francis Porter Mansfield and Cyrus Hewitt might have done if these presents had not been made: And the said Francis Porter Mansfield, for himself, his heirs, executors, and administrators, doth hereby covenant with the said Cyrus Hewitt, his executors, administrators, and assigns, that they, the said Francis Porter Mansfield and Cyrus Hewitt, at the time of the deposit of the specifications for the said Letters of Registration,

tion, were the first inventors of the said invention, and that the same was then new as to the public use and exercise thereof; and that they, the said Francis Porter Mansfield and Cyrus Hewitt were the first inventors thereof; and also that the said Letters of Registration expressed to be hereby assigned are good, valid, and effectual for the said invention, and are in nowise invalidated, avoided, or voidable; and that the said Francis Porter Mansfield now hath in himself good right and full power and authority by these presents to assign his right, title, and interest of, in, and to the said Letters of Registration, invention, and premises, unto the said Cyrus Hewitt, his executors, administrators, and assigns, in manner aforesaid, according to the true intent and meaning of these presents; and that the said Letters of Registration, privileges, invention, and premises respectively, shall henceforth be held, used, and enjoyed during the term or terms aforesaid, by the said Cyrus Hewitt, his executors, administrators, or assigns, without any lawful denial, interruption, hinderance, prevention, or disturbance by any person or persons whomsoever; and lastly, that the said Francis Porter Mansfield, his executors and administrators, and all other persons having or lawfully claiming any right, title, interest, or authority whatsoever, either at law or in equity, or in respect of the said Letters of Registration and premises, or any of them, will and shall, from time to time, and at all times hereafter, upon any reasonable request, and at the costs of the said Cyrus Hewitt, his executors, administrators, or assigns, make, do, and execute all such further acts, deeds, applications, petitions, assurances, matters, and things whatsoever, for the better or more effectually assigning, assuring, confirming, or extending the said Letters of Registration, invention, term or terms of years, and premises, or any of them, or the enjoyment thereof respectively, unto or for the benefit of the said Cyrus Hewitt, his executors, administrators, or assigns, or for enabling him, them, or any of them, to prevent or to commence, bring or prosecute any actions, suits, or other proceedings, in respect of any infringement or infringements of the said privileges and premises intended to be hereby assured; or otherwise to secure him and them the sole and exclusive use, benefit, and enjoyment of the said invention and premises, as by the said Cyrus Hewitt, his executors, administrators, or assigns, shall be devised or required.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year first before written.

FRANCIS PORTER MANSFIELD.
By his Attorney—G. WIGRAM ALLEN. (L.S.)

Signed with the name, sealed with the seal, and delivered as the act and deed of the said Francis Porter Mansfield, by his Attorney, George Wigram Allen, duly appointed by deed-poll under the hand and seal of the said Francis Porter Mansfield, bearing date the fifteenth day of December, A.D. 1859, in the presence of

J. W. PIKE,
Clerk to Messrs. Allen and Bowden, Solicitors, Sydney, New South Wales.

RECEIVED, on the day and year first before written, of and from the within-named Cyrus Hewitt, the sum of two hundred and fifty pounds sterling, being the consideration within expressed to be paid by him to me—£250 0s. 0d.

FRANCIS PORTER MANSFIELD.
By his Attorney—G. WIGRAM ALLEN.

Witness—J. W. PIKE.

Sydney, in the Colony of New South Wales, to wit.

ON this day of in the year one thousand eight hundred and Edward Wise McKenny, Clerk to Messrs. Allen and Bowden, Solicitors, being duly sworn, maketh oath and saith, that this and the three preceding sides contain a true copy of the original Indenture of Assignment, and that the same has been carefully compared therewith by me.

EDW. W. McKENNY.

Sworn by the deponent, on the day first above mentioned, at Sydney, before the

A Commissioner for Affidavits.

REGISTERED and entered of record, in the office of the Supreme Court, this 24th day of December, A.D. 1859, in pursuance of the Act 16 Vic., No. 24, s. 2.

(For the Prothonotary,)
J. A. READ,
4th Clerk, Supreme Court.

REPORT.

Improvements in extracting the Stumps of Trees, &c.

REPORT.

Sydney, 24 *September*, 1858.

SIR,

In compliance with the instructions contained in your letter of the 17th instant, requesting us to inquire into the Petition of Francis Porter Mansfield and Cyrus Hewitt, of Melbourne, in the Colony of Victoria, for Letters of Registration, in the Colony of New South Wales, for "Improvements in extracting the Stumps of Trees, and in pulling down Trees," we have the honor to report that, having examined the plans and specifications submitted to us, we are of opinion that the prayer of the Petition may be granted.

We have, &c.,

JOHN WHITTON.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—Petition, duplicate, plans, and specifications, are herewith returned.

[Drawings—one sheet.]

Drawings of the Invention of Francis Porter Mansfield and Cyrus Hewitt for Extracting Stumps and Pulling down Trees.

FIG. 1.

Mansfield's

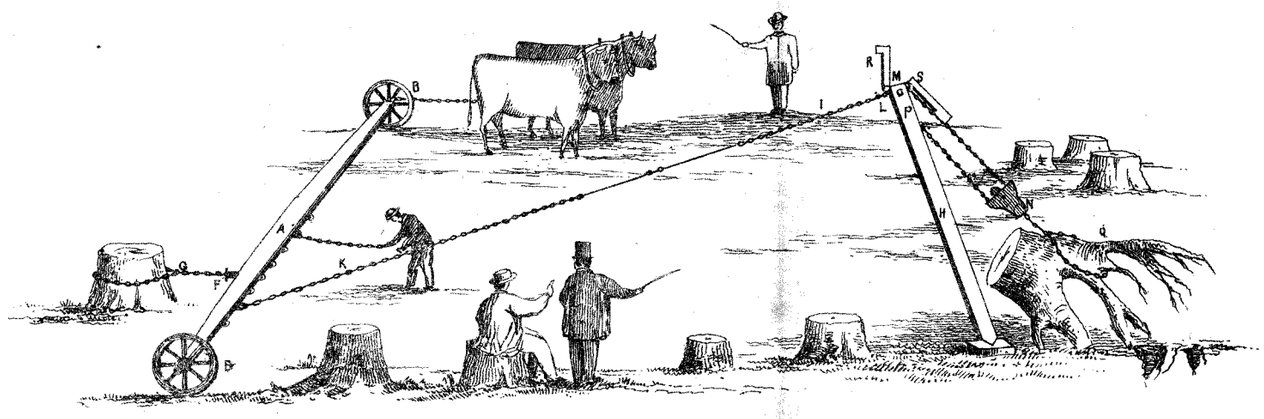
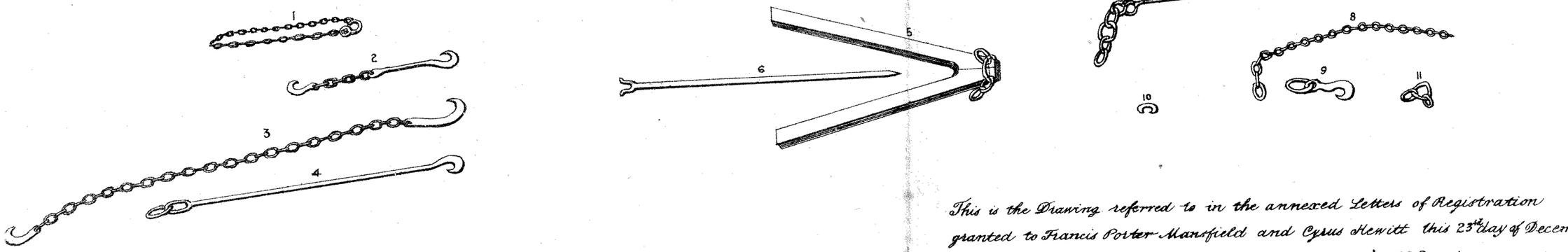


FIG. 2



This is the Drawing referred to in the annexed Letters of Registration granted to Francis Porter Mansfield and Cyrus Hewitt this 23rd day of December 1858.

(Sgd) W. Denison.

A.D. 1859, *8th February.* No. 16.

IMPROVED GRATE FOR BURNING WOOD.

LETTERS OF REGISTRATION to Thomas Woore, of Pomeroy, near Goulburn, for an Improved Grate for burning Wood.

[Registered on the 10th day of February, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Thomas Woore, of Pomeroy, near Goulburn, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of a mechanical contrivance for burning wood for the purpose of heating apartments, which is particularly described in the description which is annexed to these Letters of Registration and the drawing also annexed hereto; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive

Council,

Improved Grate for burning Wood.

Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Thomas Woore, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said Thomas Woore, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Thomas Woore shall not within three days after the granting of these Letters of Registration register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of February, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

DESCRIPTION.

THE platform in which the fire reposes is cast in metal, two feet square or less.

This platform is placed on the usual stone hearth, with its front edge in a line with the front edge of the hearth, and fitted so closely to the hearth as to exclude any air from passing beneath it.

An arch is erected over the platform two feet in height, or less, in a direction parallel with the front of the platform, and at half the square of the platform to the back, and from this arch extends to the rear a vertical metal casing fitted round the edge of the platform, which vertical metal casing forms the back of the fireplace.

On the back of the intrados of this metal arch, a ledge is cast to receive the intrados of a brick arch, turned to correspond with the metal, which rests on brick jambs brought up on each side in contiguity with the metal. The brickwork being extended on all sides so as to occupy the whole space within the fireplace with the exception of the metal archway, and leaving only that space open for the air to enter the chimney, the current will thus be confined to the immediate vicinity of the fire reposing on the platform below. The entrance to the flue is thus between the soffit of the brick arch and the vertical metal casing being the back of the grate.

From the lower part of the piers of the metal arch, a vertical projection six inches in height is carried to the front on each side of the platform, with the object of confining the fire on to the platform, and obstructing the air from entering at the sides, leaving the front open for its free passage between the billets of wood.

These billets are to be placed with their ends pointing outwards, that is at right angles with the front edge of the grate, so as most effectually to allow of the current of air passing between them.

The outer surface of the brickwork which occupies the space between the metal grate and the extremes of the fireplace to be formed in elliptical curves, plastered with lime putty, and painted with lampblack, in order to afford a good radiating surface, and thus throw the heat back into the room.

Improved Grate for burning Wood.

The advantages claimed for this invention are:—

First—That the wood is burned on the hearth, without a cold draught beneath, by which means a greater amount of heat is radiated from a lesser quantity of fuel; and in consequence of the ashes remaining constantly ignited, and the hearth being kept up to a high degree of temperature, greater heat is given out than in ordinary fireplaces.

Second—That the fire is capable of being kept smouldering with a small quantity of fuel on it for an indefinite period, and may be lighted up quickly when required.

Third—That the current of air from the room into the chimney being so confined to a narrow space in the immediate vicinity of the fire, is compelled to pass rapidly between the billets of wood, and is thus brought more rapidly and completely in contact with the combustible matter of the fire than in the common grates for burning wood.

Fourth—That the introduction of a mass of masonry behind the fire, the outer surface of which is formed in elliptical curves and coated with lampblack, causes a greater amount of heat to be radiated into the room than in any grate at present in use.

Fifth—That from the entrance to the flue being confined to such a small space, the current of air passes through it with such force that it is scarcely possible for it to return and bring the smoke into the room.

This is the description referred to in the annexed Letters of Registration granted to Thomas Woore, the 8th day of February, 1859.

W. DENISON.

REPORT.

Railway Office,
Sydney, 27 January, 1857.

SIR,

In reply to your letter of the 2nd instant, transmitting to us a Petition from Mr. Woore, for Letters of Registration for certain improvements in the construction of Grates, and requesting our joint Report on the same,—we do ourselves the honor to state that, having examined Mr. Daintry, and considered the specification in Mr. Woore's Petition, we are of opinion that the particular improvements claimed by Mr. Woore are not sufficiently detailed; and we are therefore unable to form an opinion as to the expediency of granting the Letters of Registration asked for.

We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

E. W. WARD.
GOTHER K. MANN.

Sydney, 12 *May*, 1857.

SIR,

In reply to your communication of the 4th instant, referring to us a detailed description of Mr. Woore's Grates for burning wood, for which Letters of Registration are requested,—we have the honor to report, for the information of His Excellency the Governor General, that the means by which Mr. Woore hopes to secure the advantages he has enumerated are sufficiently novel to justify the issue of the Registration sought for.

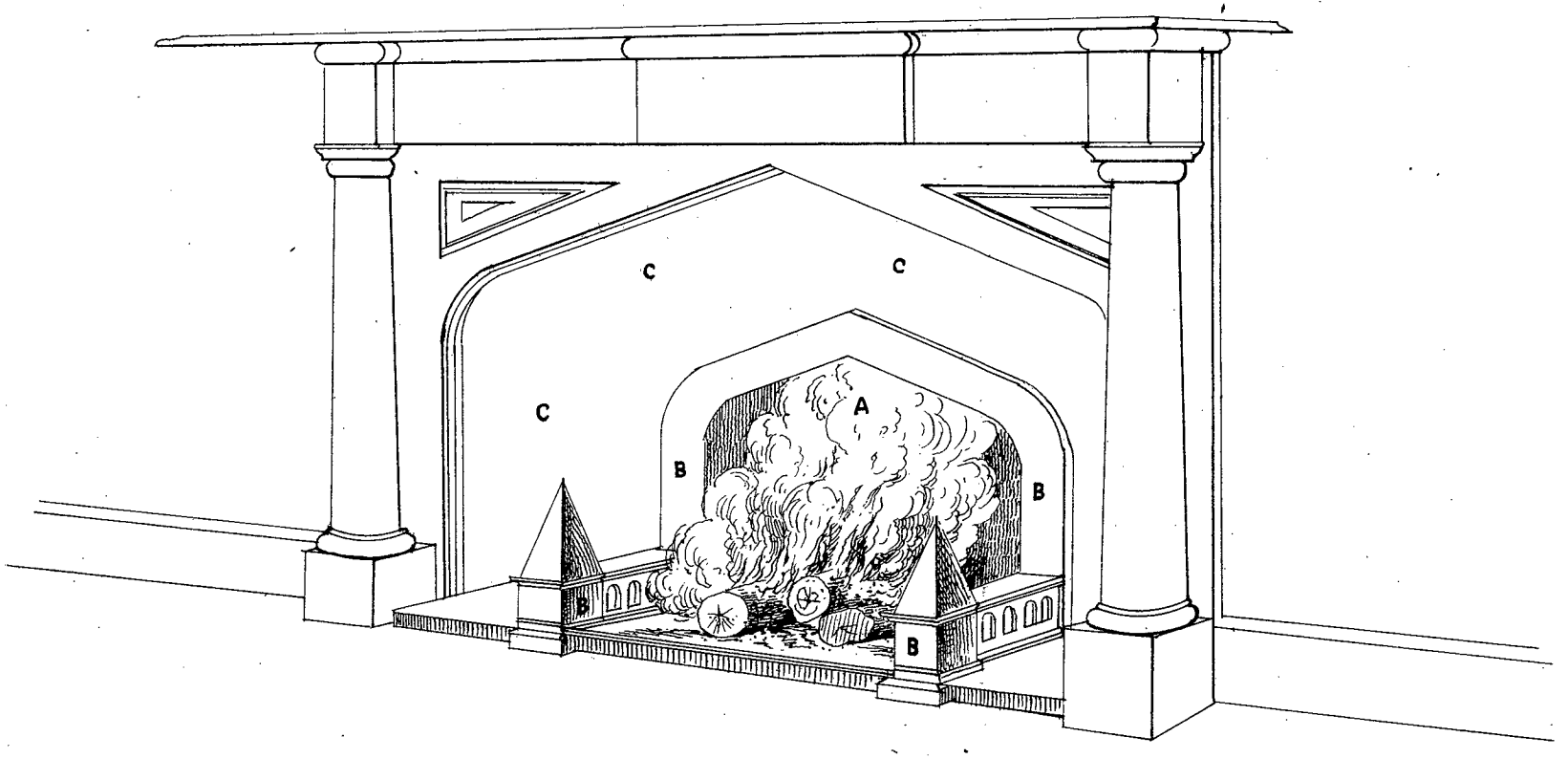
We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

GOTHER K. MANN.
E. W. WARD.

[Plan—one sheet.]

A ENTRANCE TO THE FLUE
B CAST IRON GRATE
C RADIATING SURFACE COMPOSED OF BRICK MASONRY, PLASTERED WITH LIME AND PAINTED WITH LAMP BLACK, THE OUTER SURFACE FORMED IN ELLIPTICAL CURVES PROJECTED FROM THE IRON GRATE TO THE EXTREMES OF THE FIREPLACE.



THIS IS THE DRAWING REFERRED TO IN THE ANNEXED LETTERS OF REGISTRATION GRANTED TO THOMAS WOORE THE EIGHTH DAY OF FEBRUARY 1869

(Sgd) W. DENISON.

A.D. 1859, *7th March.* No. 17.

IMPROVED SUN BLINDS.

LETTERS OF REGISTRATION to E. Teillard and E. D. Nicolle, for an improved mode of constructing Sun Blinds.

[Registered on the 9th day of March, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Edward Teillard, and Eugene Dominique Nicolle, both of the city of Sydney, in the Colony of New South Wales, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of "An improved mode of constructing Sun Blinds," which is particularly described in the specification and the two plans, all of which are annexed to these Letters of Registration; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioners therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the

matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Edward Teillard and Eugene Dominique Nicolle, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of seven years from the date hereof, to have, hold, and exercise unto the said Edward Teillard and Eugene Dominique Nicolle, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of seven years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always that if the said Edward Teillard and Eugene Dominique Nicolle shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this seventh day of March, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

SPECIFICATION of an improved mode of constructing Sun Blinds.

The nature of our invention consists in the new and improved method of constructing certain mechanisms to stretch the sun blind over the place to be shaded, and to be self-supported; therefore doing away with the present posts and ropes in its application to the shop sun blinds, and also to set the blind to any required angles, in order to protect the shop from the sun's rays, without obstructing the light therein.

DESCRIPTION OF PLANS.

No. 1 represents an elevation of the blind, in which the half of it (A) shews the blind stretched; the other half (B) representing the mechanism, the canvas for that purpose being omitted.

No. 2 represents an end view of the blind, complete and full stretched; also a diagram pointing the direction of the motion of the blind, with the mechanism to wind it.

a Wood or metallic roller, fitted with iron ferrule at each end, and provided with iron centre-pins, to enable the roller to revolve freely.

b Cast iron box, containing a worm and wheel, made to retard the motion according to the size of the blind; the wheel is fixed on the iron centre-pin of the roller.

b^1 Cast iron box to support the other end of the roller, and to form a bearing to the iron centre-pin.

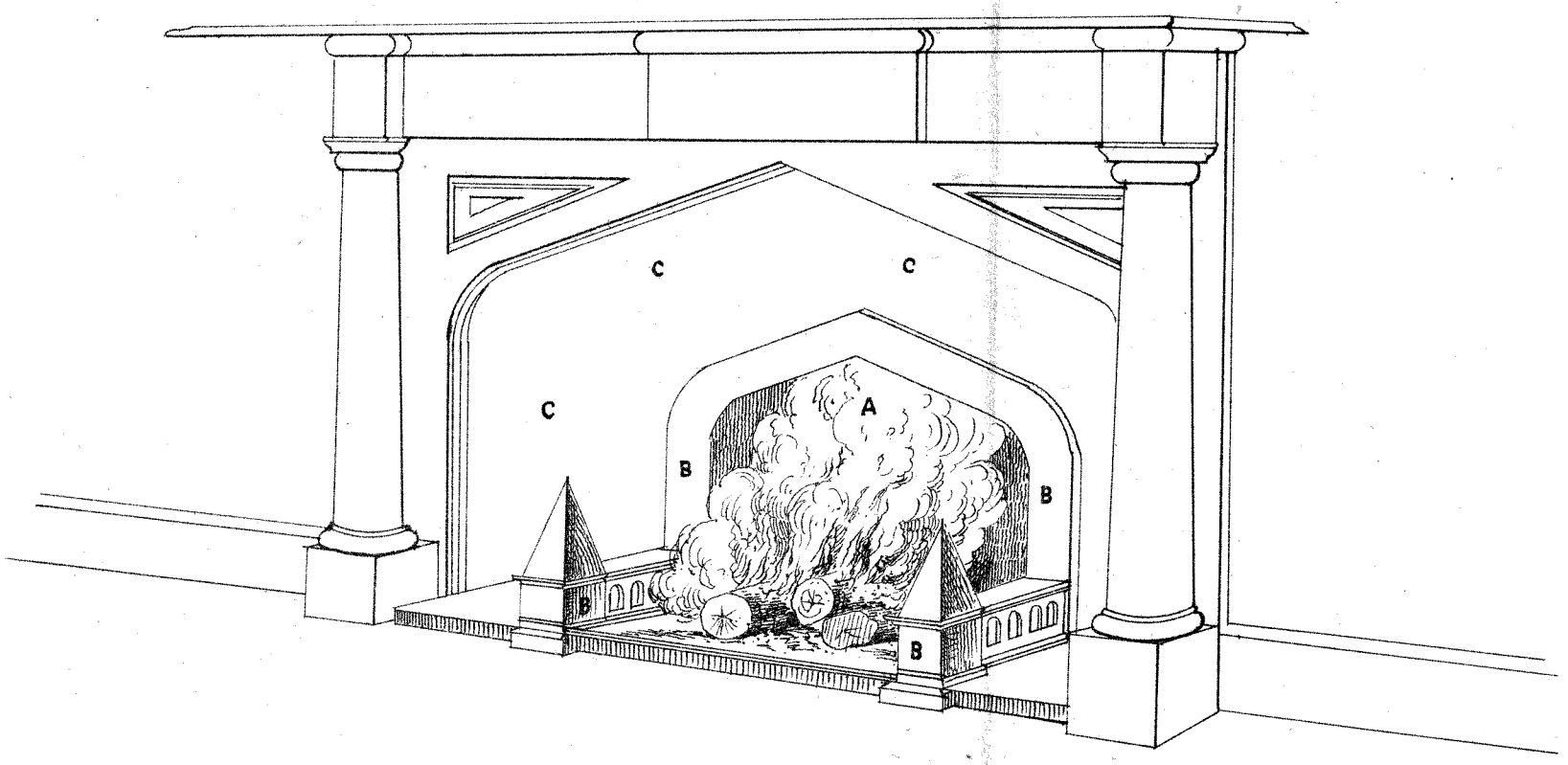
c Vertical spindle, fitted with a worm gearing; the wheel is fixed at the end of the roller, and also enclosed in the box *b*.

d Cast iron box, containing the end of the spindle *c*, in which is fixed a small ratchet-pinion, made bevel, in which fits a catch which rises and falls by a small key fitted at its end, thus enabling the blind to be secured at any height required.

e Hand-wheel, keyed on the spindle *c*, and serving to give the motion to the worm and wheel, and thereby causing the roller to revolve.

f Small key, to raise the catch in the box *d* to enable the motion of the blind, and to fix it.

A ENTRANCE TO THE FLUE
B CAST IRON GRATE
C RADIATING SURFACE COMPOSED OF BRICK MASONRY, PLASTERED WITH LIME AND PAINTED WITH LAMP BLACK, THE OUTER SURFACE FORMED IN ELLIPTICAL CURVES PROJECTED FROM THE IRON GRATE TO THE EXTREMES OF THE FIRE PLACE.



THIS IS THE DRAWING REFERRED TO IN THE ANNEXED LETTERS OF REGISTRATION GRANTED TO THOMAS WOORE THE EIGHTH DAY OF FEBRUARY 1859

(Sgd) W. DENISON.

g is an iron tube, varying in size according to the span of the blind, which for 20 feet span would be $\frac{3}{4}$ bore.

hh^1 Two iron elbows, tapped and screwed, to receive the tube *g*, which is screwed tight at each end.

ii^1 Two stretcher-bars, made of iron tube, of the same size as the tube *g*, one end of them being screwed in the elbows at a right angle, so as to form a solid frame; the other ends are fitted with joints, so as to articulate freely.

kk^1 Two iron wall-plates, forming the remainder part of the joints, and connected to the stretcher-bars by small pins.

ll^1 Two iron tubular braces, rivetted to the upper tube *g*, and to the stretcher-bars *ii*^{1}.

m is the canvas or covering, which is tacked on the wood roller, and screwed to the upper tube *g*.

n is the curtain, which is either made fast on to the blind or attached with hooks and eyes.

Having described the mode of constructing the apparatus, we shall now proceed to its fixing against any building whatever, made of wood, brick, or stone, which is done in a simple and effective manner, as follows:—

The boxes *b* and *b*^{1} are first secured to the building by screwed nails or bolts cemented in the bricks or stones, at a respective distance, which will enable the roller to move freely; the spindle *c* is then put in its place with its wheel in the upper box, and the lower box *d* is secured to the building. This being done, the roller will move round by turning the handle wheel *e*; the frame is next attached by the two iron wall-plates *kk*^{1}, which are fixed at a height of seven feet from the footpath, the canvas or covering being tacked to the roller. There now only remains but to sew the other end of it to the upper tube *g*, and the blind is in working order.

Claims.

1. The application of worm and wheel bevel and mitre wheels, fitted in compact boxes, attached to the building, whereby no dust or weather can injure the mechanism.

2. The mode of setting the blind, at any height, by means of toothed wheels or friction wheels.

3. The application of metallic tubes and roller, for making the canvas framing.

On this and the preceding sheet of paper is contained the Specification referred to in the annexed Letters of Registration granted to Edward Teillard and Eugene Dominique Nicolle, this seventh day of March, 1859.

W. DENISON.

REPORT.

Improved Sun Blinds.

REPORT.

Royal Mint, Sydney,
19 *January*, 1859.

SIR,

In compliance with your request, having examined the Petition of Messrs. Teillard and Nicolle for Letters of Registration for a tubular Sun Blind, I have explained to those gentlemen that their Petition (which I now enclose) does not, as directed by the Act of Council 16th Victoria, No. 24, set forth that they are the authors, or designers, or agents, or assignees of the invention to which the Petition refers.

They have agreed to forward to the Government a Petition in accordance with the Act, which, on being referred to me, can be laid before the Board you have appointed to investigate the claim.

I have, &c.,

E. W. WARD.

THE HONORABLE
THE COLONIAL SECRETARY.

Royal Mint, Sydney,
3 *February*, 1859.

SIR,

Having, in compliance with the request in your communication of the 12th ultimo, No. 59-115, examined into and considered the matters stated in the Petition of Messrs. Teillard and Nicolle, for the issue of Letters of Registration for the invention of a tubular Sun Blind, we are of opinion that the prayer of the Petition may be granted.

We have, &c.,

E. W. WARD.
ALEX. DAWSON,
Colonial Architect.

THE HONORABLE
THE COLONIAL SECRETARY.

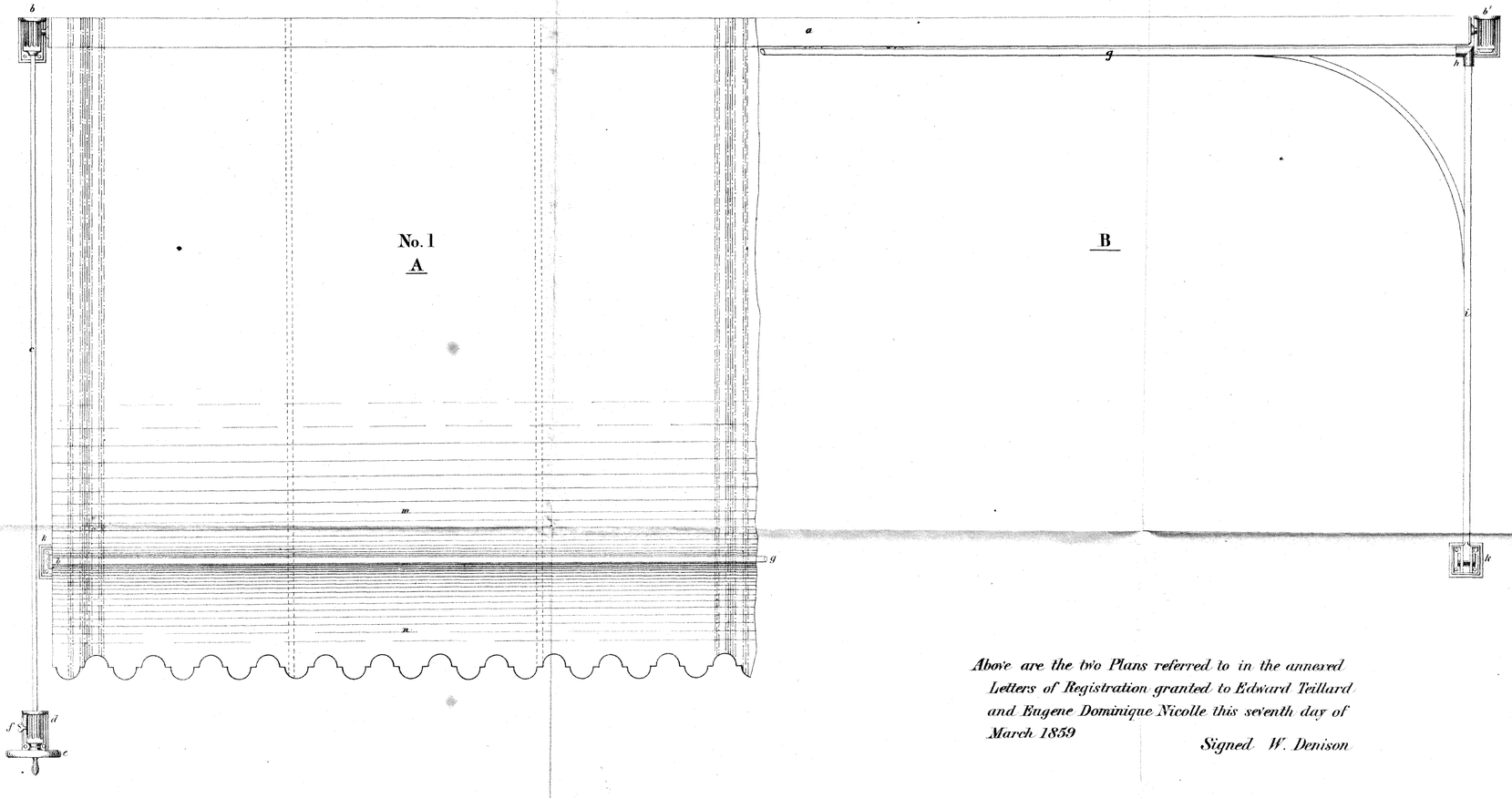
P.S.—The plan and papers forwarded to us are herewith returned.

[Plans—one sheet.]

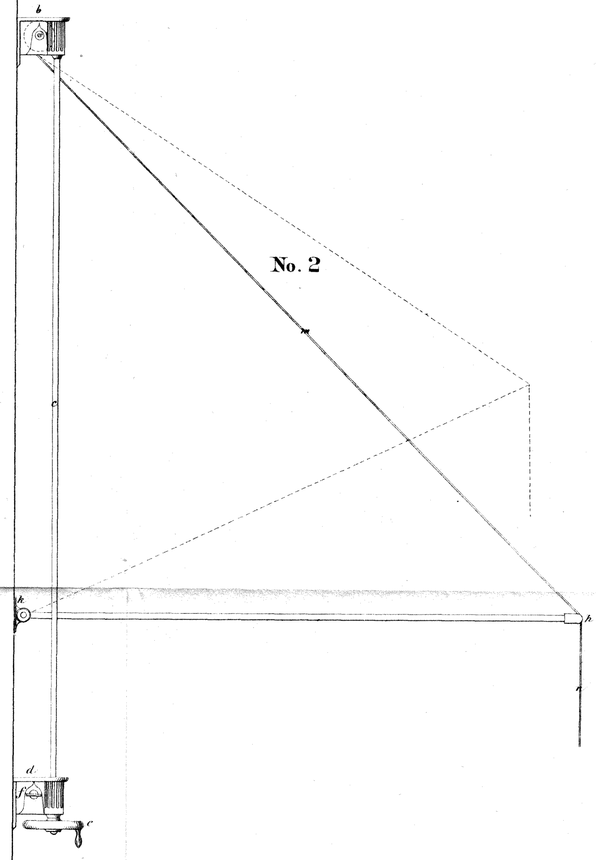
SUN BLIND

Scale: 1 Inch to 1 Foot

Front Elevation



End View



Above are the two Plans referred to in the annexed Letters of Registration granted to Edward Teillard and Eugene Dominique Nicolle this seventh day of March 1859

Signed W. Denison

Signed { *E. Teillard*
E. D. Nicolle

A.D. 1859, 19*th May*. No. 18.

IMPROVED WELL BUCKET AND LIFTING GEAR.

LETTERS OF REGISTRATION to Edward Peter Capper, of West Maitland, for an Improved Well Bucket and Lifting Gear.

[Registered on the 20th day of May, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Edward Peter Capper, of West Maitland, in the Colony of New South Wales, ironmonger, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an improved Well Bucket and of Lifting Gear to be used therewith, which said invention or improvement is more particularly described in the papers annexed to these Letters of Registration, and marked with the letters A and B respectively; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by

the

the said Act of Council, to and do by these Letters of Registration grant unto the said Edward Peter Capper, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said Edward Peter Capper, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Edward Peter Capper shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this nineteenth day of May, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

A.

SCATURIGINOSUM, invented by Edward P. Capper, Esq.

This new application of motive power is intended to be used when the weight or quantity of water is greater than can be raised by the common windlass. The improvements are as follow:—1, the split link H to which the bucket is attached; 2, the stop guide J attached to the cross beam of the framing, which is requisite for guiding and preventing the fouling of the rope to which the bucket is attached, and also for checking the haulage on the rope when the bucket has reached such a height as will admit of the discharge of its contents; 3, the vertical and horizontal friction rollers K, for facilitating the easy, uniform, and rapid delivery of the rope in the required direction, for the raising and descending of the bucket, as also to neutralize any irregularity in the traction of the motive power; 4, the cone-stop L, which has a hole through the transverse axis, in order to admit of its adjustment to the depth of the water in the well. The cone-stop is used in conjunction with a post or frame against which it abuts, to sustain the bucket when it has reached a proper elevation for the discharge of its contents, and whilst the animal or motive power is reversed; 5, the ring and hook M which fastens the draught chain to the surcingle and resists the impetus of the descending bucket as the motive power returns towards the friction rollers K.

This is the paper, marked A, referred to in the annexed Letters of Registration granted to Edward Peter Capper, this nineteenth day of May, 1859.

W. DENISON.

B.

DESIGN FOR WELL BUCKET.

The useful purpose effected by the novel shape or configuration in my design, is facility in filling with water well buckets. Figure 1 of the drawing represents, in vertical section, a well bucket made according to my design. Figure 2 represents a side elevation of the same; and figure 3 represents a plan of the same. *a* is the body of the bucket, and *b* the bottom of the same, the said bottom *b* having the thickness represented in figure 1. In the axis or centre of the said bottom *b* I make an opening *c*, which said opening is closed by a valve *d*, the said valve opening upwards and sliding upon the pins *e e*. Figure 4 represents the bucket with the valve open, and the water rising in it to the depth of the water in the well. When the bucket is depressed in the well, and comes in contact with the water, it sinks immediately sufficiently deep to cause the pressure of the water to raise the valve *d*, and the bucket rapidly fills. On raising the bucket from the well,

well, the valve *d* closes upon its seat, and the escape of the water is thus prevented. The water may be drawn from the bucket by the hose pipe *f*, which is sufficiently long to turn up over the top when the bucket descends, and is secured by the hook *g*.

The form of the parts marked *b c d e f g* is new; the rest is old. The drawing is to a geometrical scale.

This is the paper marked B, referred to in the annexed Letters of Registration granted to Edward Peter Capper, this nineteenth day of May, 1859.

W. DENISON.

REPORT.

Sydney, 28 *March*, 1859.

SIR,

In compliance with your request, having met as a Board to examine and consider the matters stated in Mr. Edward Peter Capper's Petition, under the Act of Council 16th Victoria, No. 24, for Letters of Registration for an improved Well Bucket and Lifting Gear, of which he states that he is the designer,—we have the honor to recommend that the prayer of the Petition be granted.

We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

E. W. WARD.
E. O. MORIARTY.

P.S.—The papers accompanying your letter are returned herewith.

[Drawings—two sheets.]

A

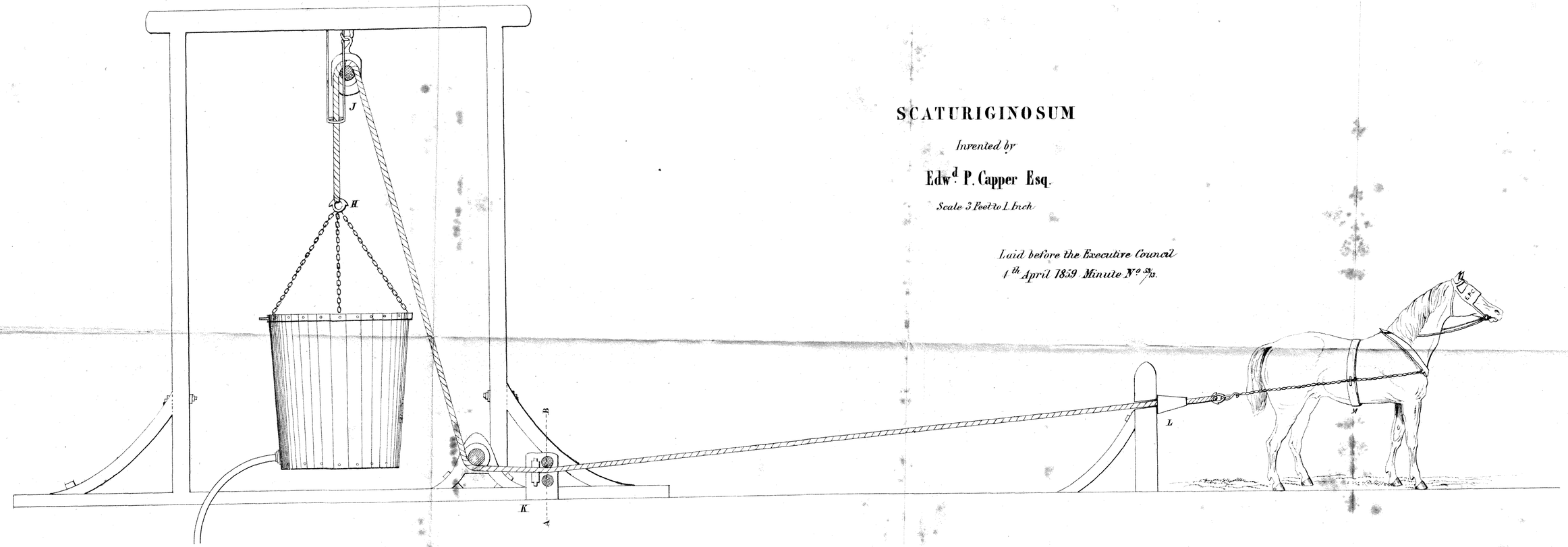
SCATURIGINOSUM

Invented by

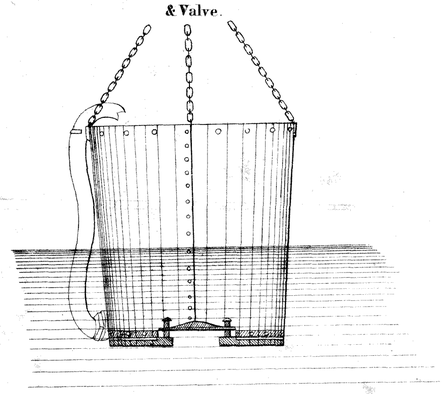
Edw^d P. Capper Esq.

Scale 3 Feet to 1 Inch

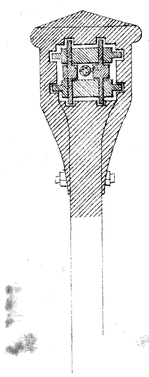
Laid before the Executive Council
1^th April 1859 Minute N^o 8^9.

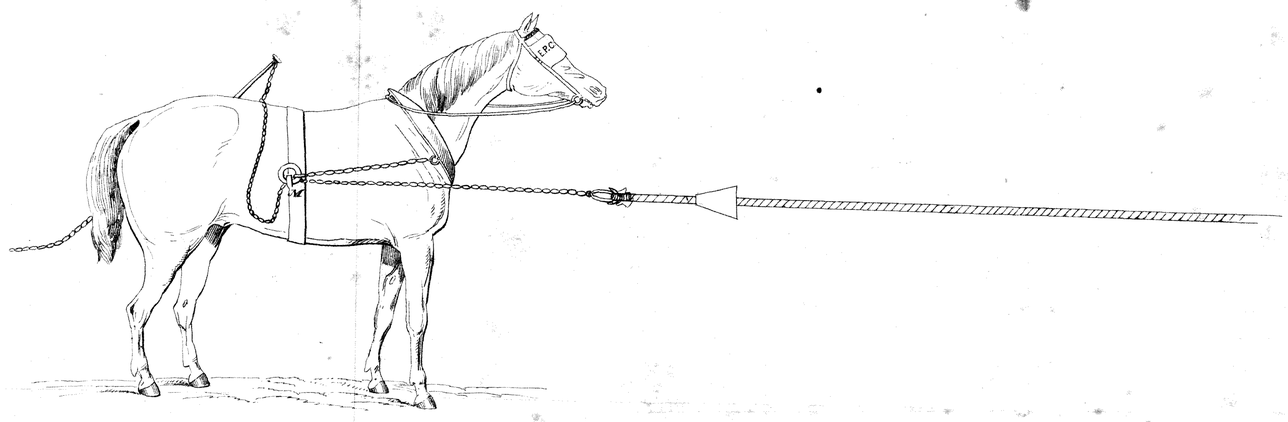


Section of Bucket & Valve.



Section of Post & Rollers through A.B.





This new Application of motive power is intended to be used when the weight or quantity of water is greater than can be raised by the common windlass. The improvements are as follow 1 The split link H to which the Bucket is attached. 2 The stop Guide J attached to the cross beam of the framing requisite for guiding and preventing the fouling of the rope to which the Bucket is attached and also for checking the haulage on the rope when the bucket has reached such a height as will admit of the discharge of its contents. 3 The vertical and horizontal friction Rollers K for facilitating the easy, uniform, and rapid delivery of the rope in the required direction for the raising and descending of the bucket as also to neutralize any irregularity in the traction of the motive power. 4 The Cone Stop L which has a hole through the transverse axis in order to admit of its adjustment to the depth of the water in the well. The Cone Stop is used in conjunction with a post or frame against which it abuts to sustain the bucket when it has reached a proper elevation for the discharge of its contents and whilst the animal or motive power is reversed. 5 The Ring and Hook M which fastens the draft chain to the circingale and resists the impetus of the descending bucket as the motive power returns towards the friction Rollers K.

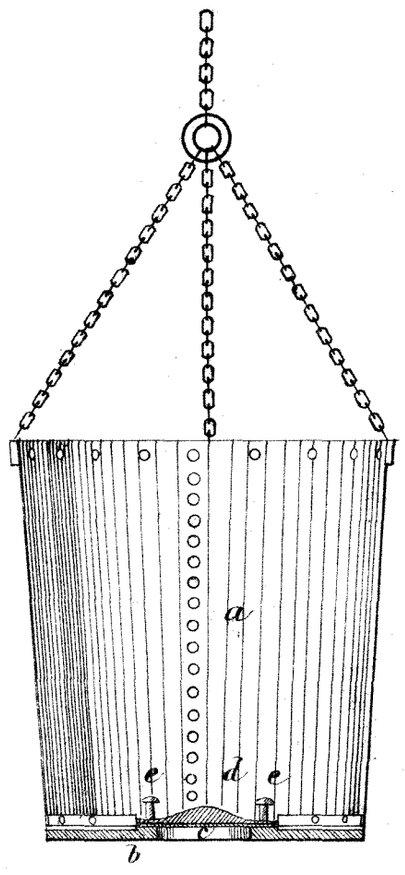
This is the Paper marked A referred to in the annexed Letters of Registration granted to Edward Peter Capper this nineteenth day of May 1859.

Signed

Wm Morrison

B

FIG. 1.



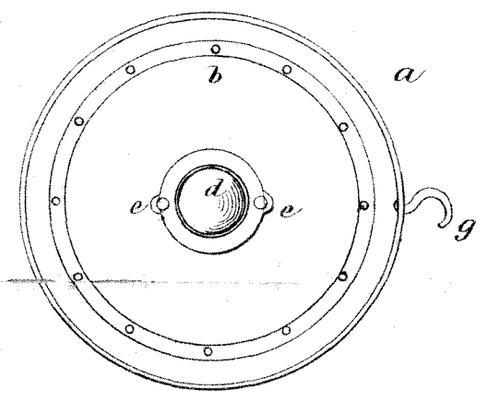


FIG. 3.

FIG. 2.

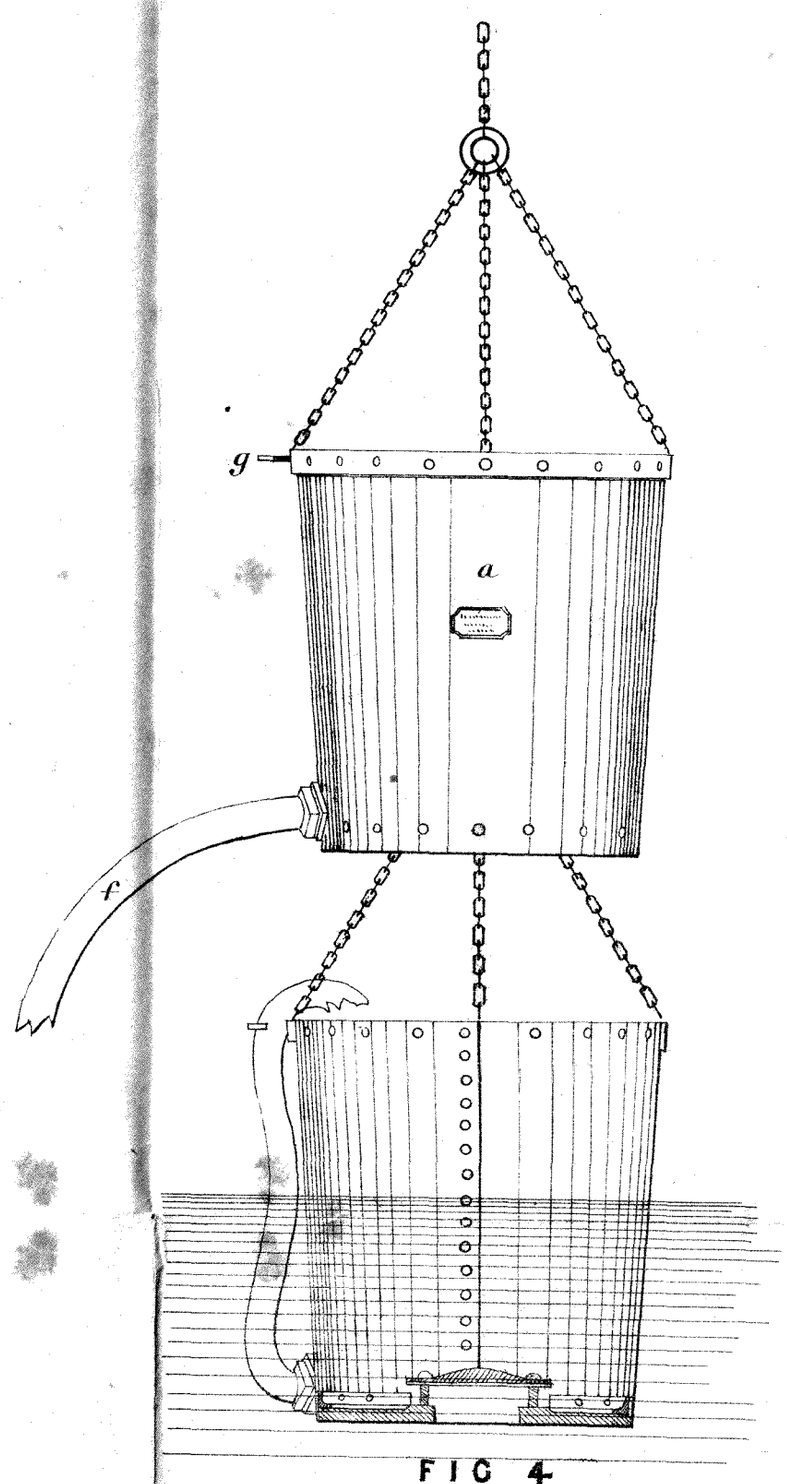


FIG 4.

This is the Paper marked B referred to in the annexed letters of Registration granted to Edw.d Peter Capper this nineteenth day of May 1859

Signed

Design for Well Bucket

The useful purpose effected by the novel shape or configuration in my design is facilitv in filling with water well buckets. Figure 1. of the drawing represents in vertical section a well bucket made according to my design. Figure 2. represents a side elevation of the same. and figure 3. represents a plan of the same. a. is the body of the bucket and b. the bottom of the same, the said bottom b. having the thickness represented in Figure 1. In the axis or centre of the same bottom b. I make an opening c which said opening is closed by a valve d. the said valve opening upwards and sliding upon the pins e.e. Figure 4. represents the bucket with the valve open and the water rising in it to the height of the water in the well When the bucket is depressed in the well and comes in contact with the water it sinks immediately sufficiently deep to cause the pressure of the bucket to raise the valve d. and the bucket rapidly fills. On raising the bucket from the well the valve d. closes upon its seat and the escape of the water is thus prevented. The water may be drawn from the bucket by the hose pipe f. which is sufficiently long to turn up over the top when the bucket descends and is secured by the hook g.

The form of the parts marked b.c.d.e.f.g. is new. The rest is old. The drawing is to a geometrical scale.

Laid before the Executive Council
4th April 1859. Minute N° 59/13.

A.D. 1859. 19*th May.* No. 19.

IMPROVEMENTS IN THE EXTRACTION OF GOLD AND SILVER, AND OTHER METALS.

LETTERS OF REGISTRATION to Richard Goulding, for Improvements in the extraction of Gold and Silver, and other Metals.

[Registered on the 23rd day of May, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Richard Goulding, of Melbourne, in the Colony of Victoria, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the extraction of Gold and Silver, and other Metals," and which is more particularly described in the specification and the two drawings, all of which are annexed to these Letters of Registration; and that the said Petitioner has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for the period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Richard Goulding, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date thereof, to have,

hold,

hold, and exercise unto the said Richard Goulding, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Richard Goulding shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, this nineteenth day of May, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

SPECIFICATION of Mr. Richard Goulding's invention for "Improvements in the extraction of Gold and Silver, and other Metals."

The object of my said invention is to effect amalgamation of the metallic particles that may be contained in any auriferous or argentiferous ores or matrices by chemical combination with quicksilver, the ores or matrices being previously reduced to powder, and minutely comminuted by the mechanical action of stamps and mills of the ordinary kind; or, in the case of alluvial or diluvial deposits, the stone contained therein may be extracted by means of the ordinary perforated cones or sieves, so as to reduce the ore in these deposits to a suitable granulated condition. The pulverized rock or ore is passed into and through cylinders or barrels, in which the chemical combination is induced by the action of screw blades or propellers, revolving on a shaft on the principle of an ordinary propeller, and combining the spiriform shape and action so as to form a spiral screw delivery from end to end. The motion may either be continuous or intermittent, and be imparted by manual, or animal, or steam power; and the agitation thus promoted by the circular and alternate-circular motion above stated is favourable to the deposition of the heavy particles of metal in the state of amalgam. The aforesaid cylinder is constructed so as to permit the amalgam (that is, the combined metals) to subside through the quicksilver, which is in the bottom of the said cylinder, into the groove or recess placed under the same and suitably connected thereto. The cylinder is fitted with pipes and cocks for the supply of the ore and water thereto, and for the introduction and evacuation of any of the contents thereof, the pipe or pipes being constructed so as to introduce the ore, &c., under the level of the quicksilver in the bottom. I propose to apply heat to the quicksilver to stimulate the chemical action thereof, and to use the said heat upon the reverberatory principle, either by enclosing the before-mentioned cylinder in an outer case or jacket, or by covering only the lower part containing the quicksilver, the interval between being filled with heated water, air, or steam. In order to explain my invention as completely as possible, I now proceed to describe the best means I am acquainted with for carrying the same into practical effect, reference being had to the illustrative drawings hereunto annexed, and to the numerical figures and letters of reference marked thereon respectively, as follows:—

DESCRIPTION OF THE DRAWINGS.

The drawing, sheet 1, figure 1, exhibits a side elevation of an amalgamating machine, constructed according to my said invention, and adapted for extracting gold, silver, and other metals. Figure 2 is a horizontal section through the line AB, at figure 1.

At sheet 2, figure 3, is a longitudinal and vertical section through the line CD, at figure 4; this last figure is an end elevation of the machine. Figure 6 exhibits a view of the interior of the machine as it would appear if the end were removed, shewing the position of the incline G. Figure 7 is a transverse and vertical section through the line EF, at figure 3. Figure 8 is a detached view of the disc P. Figure 5 is an end elevation of the feeding end of the machine. The body of the machine may be made of a cylindrical or other convenient shape, and the material be of wood, iron, glass, pottery ware, or other suitable material. The machine is placed in a horizontal position, at a short distance from the ground, and has an inverted cone-shaped groove or recess, A, fixed thereto; the

the said recess extending along the entire length of the body B of the machine. C is a shaft passing through glands or stuffing boxes *a a* at each end of the body of the machine, and revolving therein. Around this said shaft are affixed a series of propeller blades or paddles, forming in combination the helical shaped screw delivery arrangement E. G is an inclined platform, and H a cock communicating therewith. I is a vessel containing quicksilver. The upper part of this vessel is connected to the lower part of the cylinder by a flange to the under side of the cone-shaped groove A. This groove opens up into the bottom of the body B of the machine, and allows free communication between the body B and the vessel I. To prevent the possibility of the quicksilver passing off with the tailings, I propose that there should be a little space between the end of the incline G and the end of the machine, that in the event of any quicksilver passing up the said incline, it may fall from its gravity into the groove A below. K is a feed pipe, the lower end of which is connected to the upper part of the vessel I; and to the upper part of the feed pipe K a hopper, L, is attached, into which the ore to be operated upon is placed. M is a spindle, the lower end whereof works in a suitable bearing in the vessel I, and the upper end of the said spindle is suitably supported within the body of the machine, and has a mitre wheel fixed thereon, gearing into another mitre wheel O, fixed on the main driving shaft. P is a disc, or perforated piece of metal or any other suitable material, fixed upon the spindle M, and revolving therewith, or there may be several of such said discs. R is a cock for drawing off the contents of the vessel I. S is a lever or winch-handle for imparting motion to the main driving shaft of the machine and parts in connection therewith. An important feature in this invention consists in arranging the helical blades upon the shaft C in the manner exhibited at figure 3 of sheet 2, where it will be seen that each blade, or pair of blades, is or are so placed with respect to each other, or each, as to produce (when thus combined together, and looking endwise thereof) two perfect helices or double thread of blades made up or composed of several distinct and separate parts or blades, instead of one continuous piece of material, as the thread of a screw. I do not intend to limit or confine myself to the use of the above-mentioned separate helical blades, as they may be used in combination with a continuous helical blade similar to the thread of an ordinary screw, and when this is the case I arrange the blades E in the spaces of the said continuous helix or thread, and thus I form a species of triple-threaded screw. The mode of operating with the above machine, for the purpose of extracting gold and silver, and other metals, from their ores or matrices, is as follows:—

Quicksilver is poured into the machine, so as to fill the chamber or vessel I, and also the longitudinal cone-shaped groove or recess A in the bottom of the machine, and the machinery set in motion. The incline G, extending for about one-third of the entire length of the body of the machine, serves to displace the quicksilver for this distance in the vessel A, the intention of this incline being to prevent the quicksilver escaping with the tailings by the cock H. The pulverized rock or other prepared ore is fed into the hopper L, at the top of the feed pipe K, in such proportions as may be necessary. This may be effected either by hand or by any suitable self-acting machinery. A stream of water is introduced with the ore in the said hopper, and passes therewith through the feed pipe into the centre of the mass of quicksilver in the chamber or vessel I, where it is triturated by the rotating disc P through the perforations, in which (after having deposited in the quicksilver therein a certain portion of its metallic contents) it ascends into the body of the machine, where it is subjected to further agitation by the action of the screw-blades therein, which have the effect of beating or forcing the suspended metallic particles into the horizontal column of quicksilver in the groove A, which deprives the prepared ore of its remaining metallic particles, and the refuse matter or waste and water are screwed or forced out of the quicksilver and along the inclined platform G, and discharged from the body of the machine by the cock H, which is kept open during the operation. The feed pipe should be of such a height that when filled with pulverized ore and water, the pressure of this hydrostatic column shall overcome the resistance offered by the quicksilver in and above the vessel I; or instead of the above-named hydrostatic principle, an

ordinary

ordinary force-pump may be employed, the said pump exerting sufficient pressure to force the ore and water into the centre of the vertical column of quicksilver in the vessel I. The amalgam resulting from the chemical combination produced by the mechanical means above described is drawn off along with the quicksilver, at the end of the operation, through the cock R in the bottom of the chamber or vessel I; the gold or silver, as may be, is then obtained by volatilizing the quicksilver in an ordinary retort. I would here observe that, in the event of the ores being of a refractory nature, or presenting any unusual practical difficulties, and in order to render mines which are at present considered as valueless, sources of legitimate enterprise and profit, a modification of the above-described process involving the application of heat would in some cases be found advantageous, although I do not here intend or recommend for ordinary use an operation requiring the nicest skill in its application to so volatile a fluid as quicksilver; but as the object of my said invention is to supply the want of a perfect process for the extraction of the precious metals in every conceivable case, and to obviate the difficulties which have hitherto attended such operation, according to the various methods now in use, I propose, therefore, in cases where it is necessary to stimulate the action of the quicksilver, to employ heat upon the reverberatory principle, which may be effected by enclosing the machine (or only that portion thereof which contains the quicksilver) in an outer case or jacket, and filling the surrounding internal space with either heated water, heated air, or steam. The screw paddles, E, may have either continuous or intermittent, circular or alternate-circular motion imparted thereto by any suitable prime mover; and (supposing the diameter of the helix to be eighteen or twenty inches) I have found about eighteen or twenty revolutions or vibrations thereof per minute answer well in practice, the principal object being to produce chemical combination or amalgamation, without at the same time breaking up the quicksilver or oxydizing it by too much mechanical agitation.

Having now fully described the nature and object of my said invention, together with the best means I am acquainted with for carrying the same into practical effect, I would remark, in conclusion, that I hereby declare my invention to consist in, and I claim, the extraction of gold and silver, and other metals, from their ores and matrices, by the use of the apparatus of the construction herein described, set forth, and represented by the illustrative drawings hereunto annexed; and especially I claim the mode set forth of operating upon the prepared ore by the hydrostatic column K, or by a pump for forcing the said ore into and amongst the quicksilver in the vessels I and A, in combination (or separately) with the separate segmental blades and continuous blades or screw for bringing the ore which is in the body of the machine into contact with the quicksilver in the vessel I and the groove A, thereby extracting and precipitating the metallic particles contained in the ore. I also claim the inclined plane, G, for preventing the quicksilver in the groove or recess A, passing off with the tailings, as above stated. I also claim the application of the principle of gravitation involved in the hydrostatic column hereinbefore referred to to every other machine, inasmuch as the principal merit of my invention consists in the fact that every other machine is fed by allowing the pulverized quartz or other ore to fall on the surface of the quicksilver, which being so dense a body, does not permit the light particles of gold to sink into the mass of the quicksilver; my process, on the contrary, is to introduce it by its own gravity under the surface level of the mercury, or by the other appliances referred to, thereby affording increased facilities for the affinities of the quicksilver and gold, and allowing the waste sand and other refuse matter to rise up through the mass of quicksilver, and pass out at the waste end of the machine. And lastly, I claim the peculiar method of applying heat to the quicksilver upon the reverberatory principle herein described, by surrounding the recess A, or the cylinder B, with a jacket into which heated air, water, or steam is admitted.

In witness whereof, I, the said Richard Goulding, have hereunto set my hand and seal, this thirty-first day of December, in the year of our Lord one thousand eight hundred and fifty-eight.

R. GOULDING.

REPORT.

Improvements in the extraction of Gold, &c.

REPORT.

Sydney, 19 *April,* 1859.

SIR,

Having met as a Board to examine and consider the matter stated in the Petition of Mr. Richard Goulding, for Letters of Registration for improvements of his invention in extracting Gold, Silver, and other metals,—we have the honor to recommend that the Letters of Registration prayed for be granted.

We have, &c.,

E. W. WARD.
GOTHER K. MANN.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—Mr. Goulding's Petition, plans, and papers, are herewith returned.

[Drawings—two sheets.]

Drawings of M^r Goulding's 'Patent' for New South Wales.

Fig 1

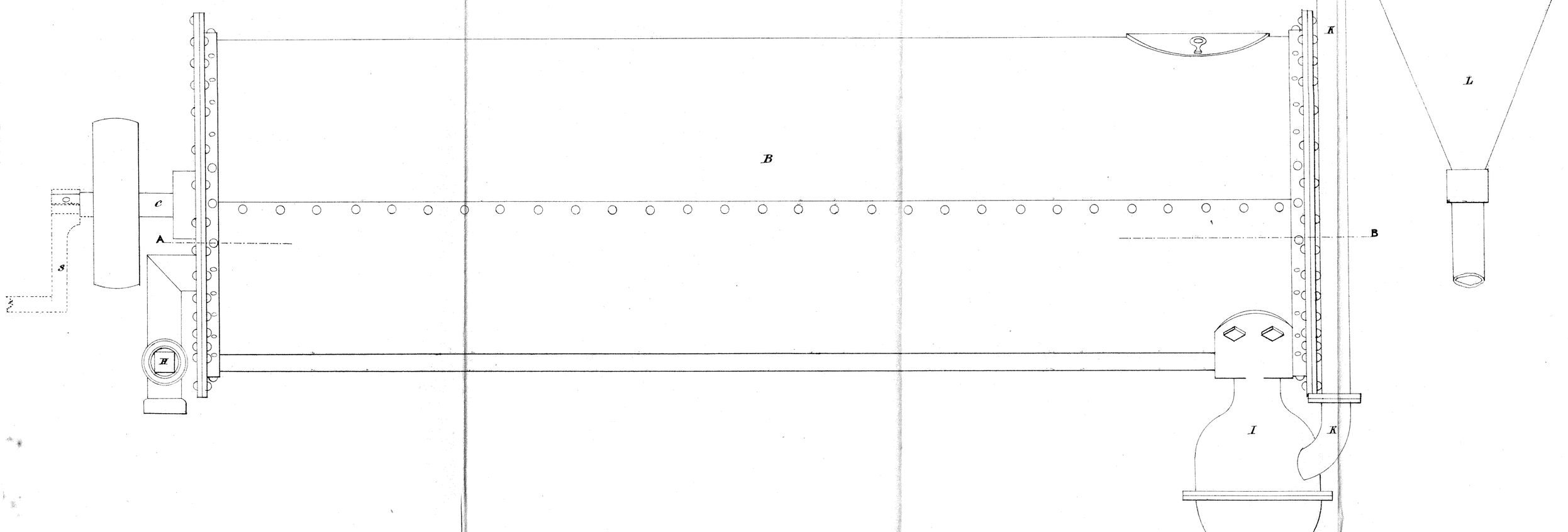


Fig 2.

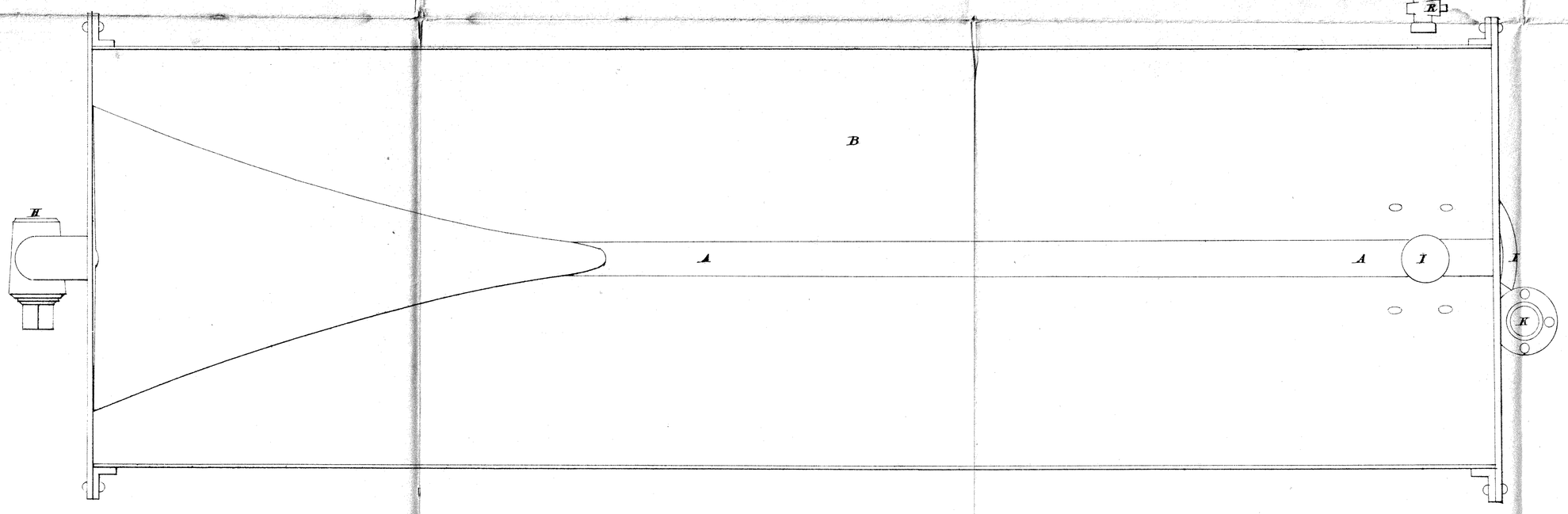


Fig 3.

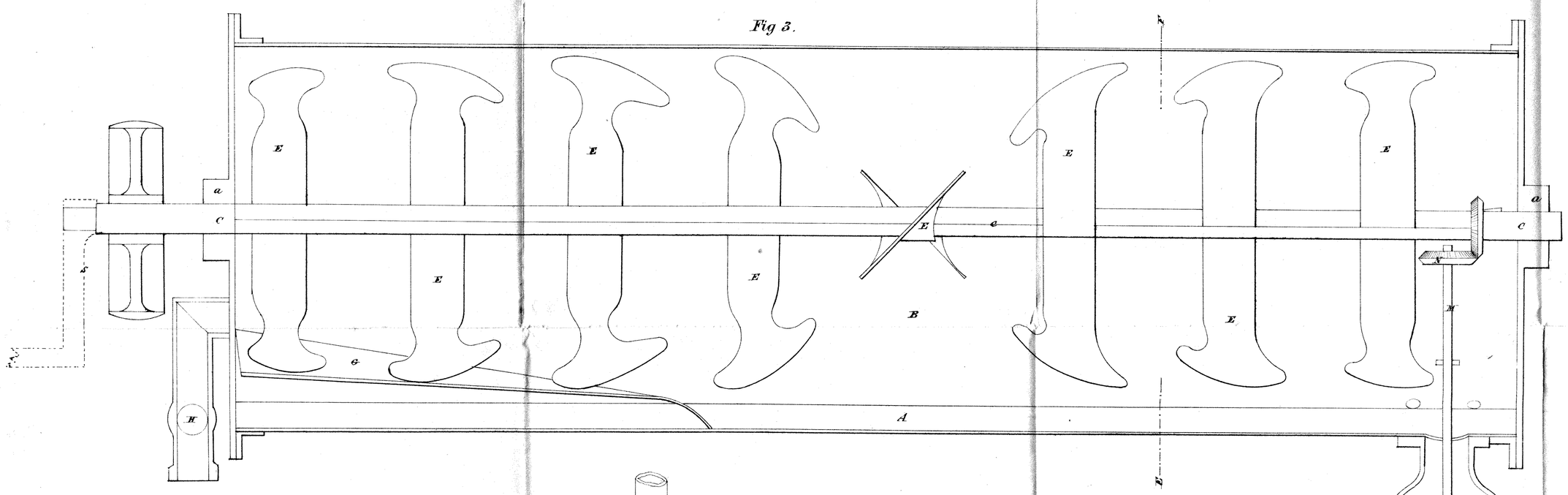


Fig 4

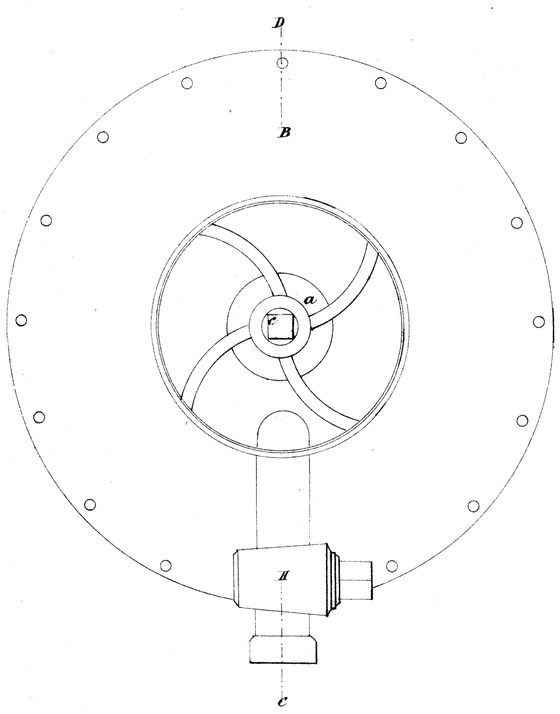


Fig 5

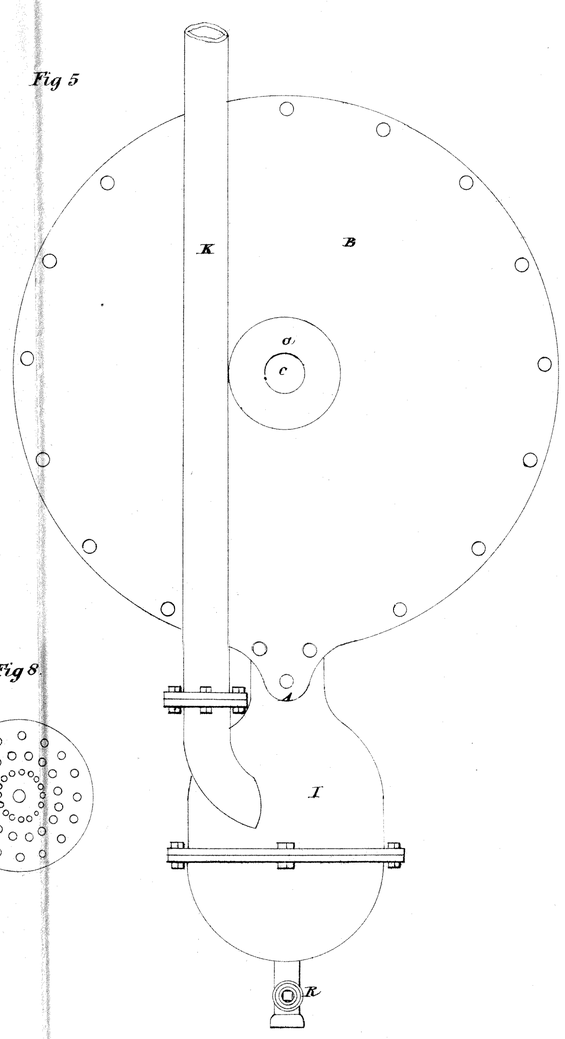


Fig 8

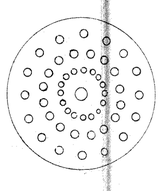


Fig 7

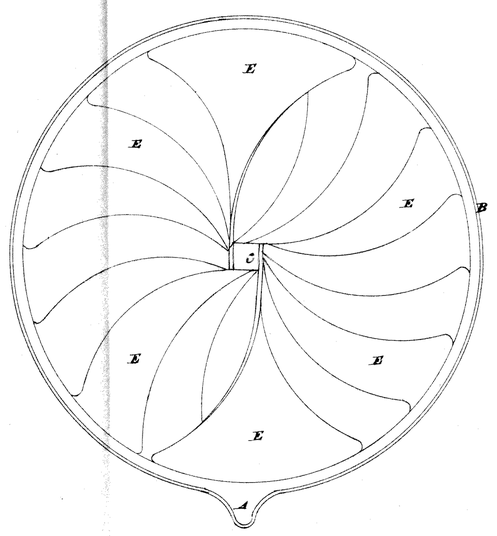
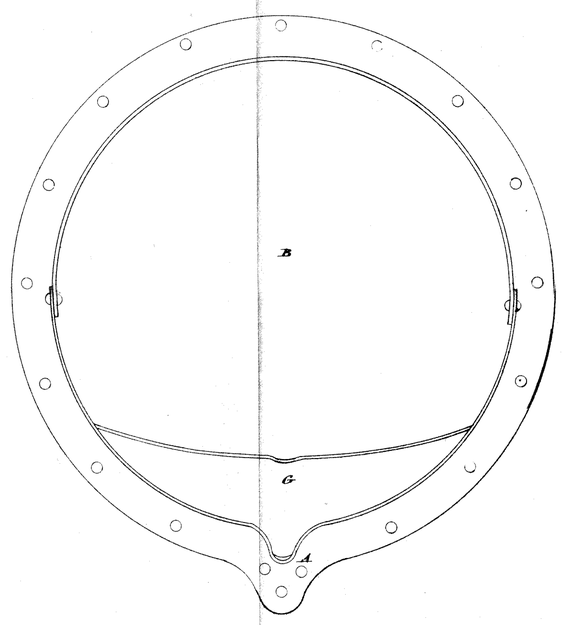


Fig 6



A.D. 1859, *6th July.* No. 20.

IMPROVEMENTS IN MACHINERY FOR MAKING MOULD CANDLES.

LETTERS OF REGISTRATION to Willis Humiston, of Troy, in the United States of America, for Improvements in Machinery for making Mould Candles.

[Registered on the 8th day of July 1859, in pursuance of the Act 16 Vic., No. 24.]

BY THEIR EXCELLENCIES JOHN MAXWELL PERCIVAL, Esquire, Colonel in Her Majesty's 12th Regiment of Foot, the Officer next in Seniority to the Officer actually commanding Her Majesty's Land Forces in all the Colonies of Australia, SIR WILLIAM WESTBROOKE BURTON, Knight, the President of the Legislative Council of New South Wales, and CHARLES COWPER, Esquire, the Colonial Secretary for the said Colony, for the time-being the duly constituted Administrators of the Government of the Territory of New South Wales and its Dependencies, in the absence from the said Colony, of HIS EXCELLENCY SIR WILLIAM THOMAS DENISON, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS WILLIS HUMISTON, of Troy, in the State of New York, in the United States of America, gentleman, hath by his Petition humbly represented to His said Excellency Sir William Thomas Denison, that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in Machinery for making Mould Candles," which is more particularly

described

Improvements in Machinery for making Mould Candles.

described in the specification and drawing which are annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that His said Excellency Sir William Thomas Denison would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And we, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by His said Excellency Sir William Thomas Denison to examine and consider the matters stated in the said Petition and to report thereon for his information, are pleased, with the advice of the Executive Council, and in exercise of the power and authority vested in us, to and do by these Letters of Registration grant unto the said Willis Humiston, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said Willis Humiston, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Willis Humiston shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, we have hereunto set our hands, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixth day of July, in the year of our Lord one thousand eight hundred and fifty-nine.

J. M. PERCIVAL, Colonel.
(L.S.) W. W. BURTON.
CHARLES COWPER.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIS HUMISTON, of the City of Troy, and State of New York, in the United States of America, gentleman, send greeting:

WHEREAS I have invented or discovered "Improvements in Machinery for making Mould Candles": Now know ye, that I, the said Willis Humiston, do hereby declare the nature of my said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the drawing hereunto annexed, and to the letters and figures marked thereon, that is to say:—

My invention of improvements in machinery for making mould candles relate to that class of candle-making machines wherein pistons are employed to force the candles from the moulds. The first improvement consists in making each piston in two parts, with a joint of such construction that a certain amount of longitudinal play is allowed between the upper part which receives the tip of the candle and the lower part to which the force is applied to eject the candles from the moulds, so that when the force is first applied, the said lower parts to which it is applied may move a short distance independently of the upper parts which receive the tips of the candles, and then strike the latter parts suddenly and with the effect of a smart blow, which will start the candles better than a very heavy force steadily applied.

The invention also consists in the employment of clamps to lay hold of the candles themselves while the latter are in the condition in which they have been forced from the moulds, which affords greater facility for the repetition of the pouring into the moulds than the ordinary methods of clamping the wicks, or the employment of tip bars to support the candles, besides possessing other important advantages hereafter noticed.

The invention is illustrated in the accompanying drawing, in which Figures 1 and 2 are vertical sections, at right angles to each other, of a candle-making machine constructed according to the present improvements. Fig. 3 is an inverted plan of the clamps for holding the candles after their expulsion from the moulds; similar letters of reference indicate corresponding parts in the several figures.

Improvements in Machinery for making Mould Candles.

A is the framing of the machine, upon the top of which are placed troughs or reservoirs, *CC*, for receiving such tallow or other material from which the candles are made as may overflow the moulds or be spilled in the act of filling the moulds. *BB* are the moulds the upper ends or butts of which are secured to the bottom of the trough *C*, and their lower ends or points in a stationary board *K*, constituting part of the framing. *DD* are the pistons, secured at their bottoms in frames *EE*, of which there may be any convenient number in the machines, though only two of them are represented, and which are fitted to slide up and down in guides in the framing *A*. The pistons *DD* are hollow, and have their tips *a a* formed to correspond with the tips of the candles. They are each made in two parts, *m* and *n*, of which the upper parts, *n n*, on which the tips *a a* are formed, are fitted to the moulds, and also fitted to slide up and down a short distance within the lower parts *m m*, which are secured firmly into the frames *EE*. The upper parts *n n* are also provided on opposite sides with lugs *c c*, which project through slots *e e* cut in the lower parts *m m*, so that by means of these lugs and slots a limited play is allowed between the upper and lower parts, but the upper parts are prevented from being drawn out of the lower parts. *GG* are two upright toothed racks, secured one to each end of each frame *E* by foot pieces. G^1 G^1 working through slots *r r* in the framing *A*, and gearing with the pinions *d* and *f* at each end of the machine. The pinions *d* are stud pinions, but those marked *f* are secured to a horizontal shaft *H*, which extends the whole length of the machine, and works in bearings in the end uprights of the framing. The pinions *d* and *f* at each end of the machine are geared together, so that by turning the shaft *H* by a crank *I* at one end of the machine, or by turning either of the pinions by a crank attached to it, all the four pinions are set in motion, and the frames *EE* may be either raised or lowered so as to move the pistons *D* up through the moulds or draw them down, the frames *E* being always retained in horizontal positions during that operation. Pawls f^1 are applied to the pinions *f* to prevent the frames *E* from descending until required. *FF* are clamps arranged in sets, two pairs in a set, so that each set will take the candles from two rows of moulds. It may be here remarked that, as a matter of convenience, each trough *C* is made to contain but two rows of moulds, and each frame *E* two rows of pistons arranged to fit the moulds in one trough, and every two rows of moulds and pistons have their own distinct set of clamps. Each pair of clamps consists of two wooden boards of the whole length of the machine, and of a width nearly equal to the length of the candles. The boards have grooves made in their faces, of a proper form to receive and clamp the candles firmly without crushing them; and these faces should be lined with cotton or other cloth. The clamps of each set are prevented from getting out of place relatively to each other in a vertical direction, by means of two bars e^1 e^1 passing transversely through the whole of them; and these bars e^1 e^1 have their ends projecting so that they may be received upon small standards *g g* on the top of the framing *A*, and be thus supported over the moulds. Each pair of clamps has interposed springs *k k* tending to force them open. Between and parallel with the slides of the two pairs of clamps in the set, are arranged two bars *JJ* hinged together by two hinges *h h*, and each of these bars which has a cam-like character has jointed to it two rods *i i*, which pass through the pair of clamps from which the bar is most distant, and are furnished with nuts or collars *j j* outside the clamps. Each bar *J* is furnished with a short lever *K* at one end of the clamps; when these levers K^1 K^1 are left perfectly free, the springs *k k* force open each pair of clamps as far as is permitted by the bars *JJ* and nuts or collars *j j* on the rods *i i*, as is indicated in black outline in Figures 1 and 3, the levers K^1 K^1 being then in a horizontal position, but by drawing the two levers up together the cam-like form of the bars *JJ* causes the said bars to force apart the two inside boards of the set of clamps towards the outside ones, and the rods *i i* are caused to draw towards each other the two outside boards, as is illustrated in Fig. 1 (where the positions of all the parts are exhibited in dotted outline) to correspond with the position of the bars. This forcing apart of the two inside boards of the set, and drawing together the two outside boards, it is evident, closes both pair of clamps in the set, and by fastening both of the levers K^1 K^1 together by a clamp *l*, the clamps *FF* are secured in a closed condition. *p p* are the wick bobbins, one for each mould and piston, arranged to turn freely on spindles *q q* near the bottom of the machine.

The operation of the machine is as follows:—On commencing, the extremities of the wicks *s s* are secured above the moulds in the ordinary way, and the piston frames *EE* are brought down to the position shewn at Fig. 1, so that the pistons supported by those frames, will be drawn to the bottom of the moulds. The moulds are then to be filled by pouring the tallow into them in the usual way. The clamps having been opened, the frames *EE* are slightly lowered by the pinions and racks, to allow the parts *m m* of the pistons to descend the length allowed by the play of the lugs *c c* in the slots *e e*, before bringing them up again suddenly to start the pistons in the moulds, which is effected by the lugs striking the upper ends of the slots with an effect like a tap or slight blow with a hammer, which is what is required to start the candles. As the upward movement of the frames *EE* and pistons *DD* is continued, the candles are raised up above the moulds and pass between the clamps *FF*, which, when the candles still resting in the tips *a a* of the pistons, are forced by the pistons *D* some distance out of the moulds, as shewn in Fig. 2 (where *v v* are the candles), are closed upon the candles by the aid of the levers K^1 K^1, or by other means provided for the purpose; after which the pistons are drawn down again to the bottoms of the moulds by turning the shaft *H*, which leaves the candles in the clamps, at such a distance above the troughs *C* as not to obstruct the

next

next pouring. By retaining the candles in a vertical position in the clamps during the return of the pistons to their normal or depressed position, the tips of the candles will be effectually protected from being broken. The centreing of the wicks in the moulds is effected simply by allowing the clamps to remain in the machine until the next pouring has set and is ready to be forced up; the wicks are then cut by a sliding or swinging knife, which severs the whole at one sweep or stroke, and then the clamps containing the candles are removed, and other clamps are put in their places ready to receive the last pouring of candles when forced up from the moulds as above described. An important advantage, incident on the downward movement of the pistons, is that they will not only draw the wicks to tension, but also lay the loose fibres.

Having now described my invention, I would have it understood that I claim, first, making the pistons whereby the candles are forced out of the moulds, each in two parts, united by a joint of such construction as to allow a certain degree of longitudinal play between the one part which receives the tip of the candle and the other to which the force is applied to expel the candles from the moulds, so that the last-named part may be brought up to or against the first-named part suddenly, with the effect of a blow, to start the candle from the mould, as herein described; and secondly, I claim the employment of clamps, so constructed and applied to the machine as to seize the bodies of the candles themselves in the position in which they are forced from the moulds, and thus hold them so as to centre the wicks for the next pouring, and until the same has set in the moulds and is ready to be removed therefrom; the whole being arranged in such a manner as to afford facility for pouring into or filling the moulds without any risk or danger of breaking the candles or their tips, as herein described.

In witness whereof, I, the said Willis Humiston, have hereunto set my hand and seal, the twenty-third day of January, in the year of our Lord one thousand eight hundred and fifty-nine.

WILLIS HUMISTON.

This is the specification referred to in the annexed Letters of Registration granted to Willis Humiston, this sixth day of July, 1859.

By us,
J. M. PERCIVAL, Colonel.
W. W. BURTON.
CHARLES COWPER.

REPORT.

Royal Mint,
Sydney, 25 *May,* 1859.

SIR,

Having, in compliance with your request, examined and considered the matter stated in Mr. Willis Humiston's Petition for Letters of Registration for his improvements in machinery for making Mould Candles, we have the honor to report that Mr. William Caporn, who is the Agent in this Colony for Mr. W. Humiston, is not able to inform us of the period for which Her Majesty's Letters Patent, which appear to have been issued for the protection of this invention in England, have been granted.

As we consider it was not intended by the Act of Council 16 Victoria, No. 24, to permit Letters of Registration to have force in this Colony after the Patent granted in England for the same invention had expired, we have the honor to recommend that the Letters of Registration sought for, be granted to Mr. Humiston, with the proviso that they shall not have effect for a period exceeding fourteen years, nor after the Patent granted in England for his improvements shall have expired.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

The documents forwarded are herewith returned.

[Drawing—one sheet.]

FIG: 1

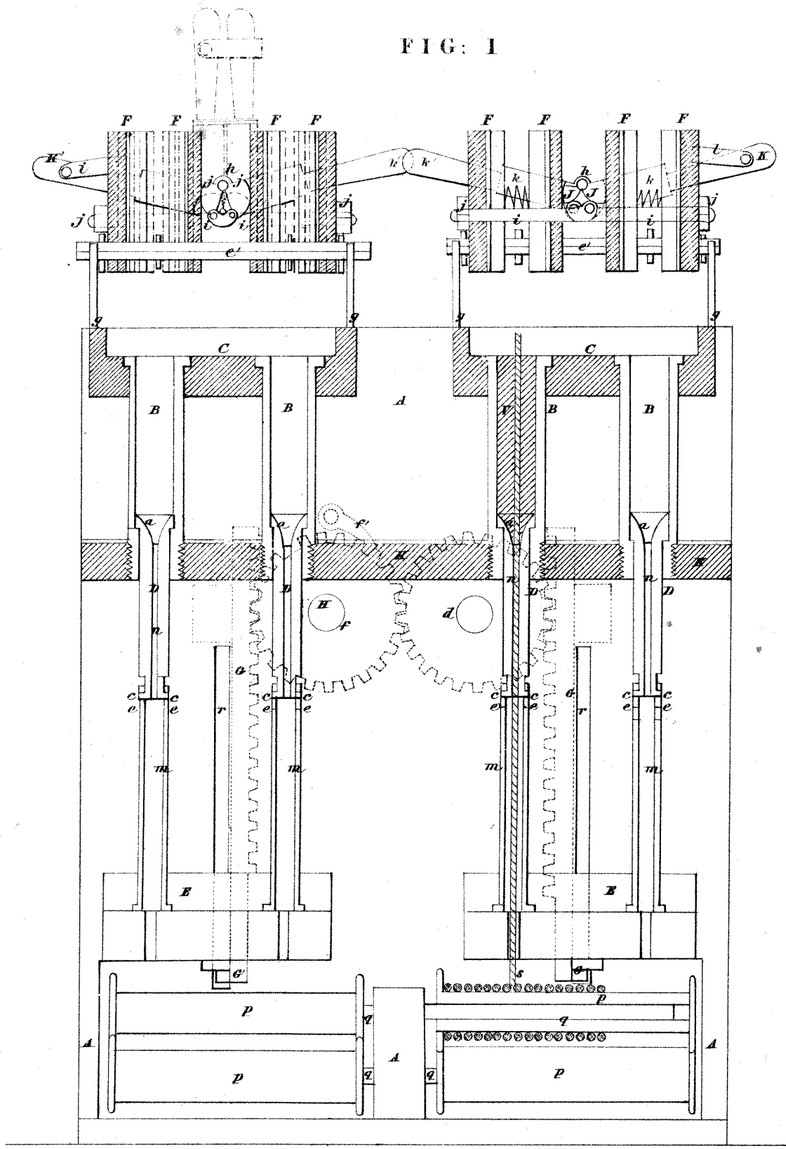


FIG: 2

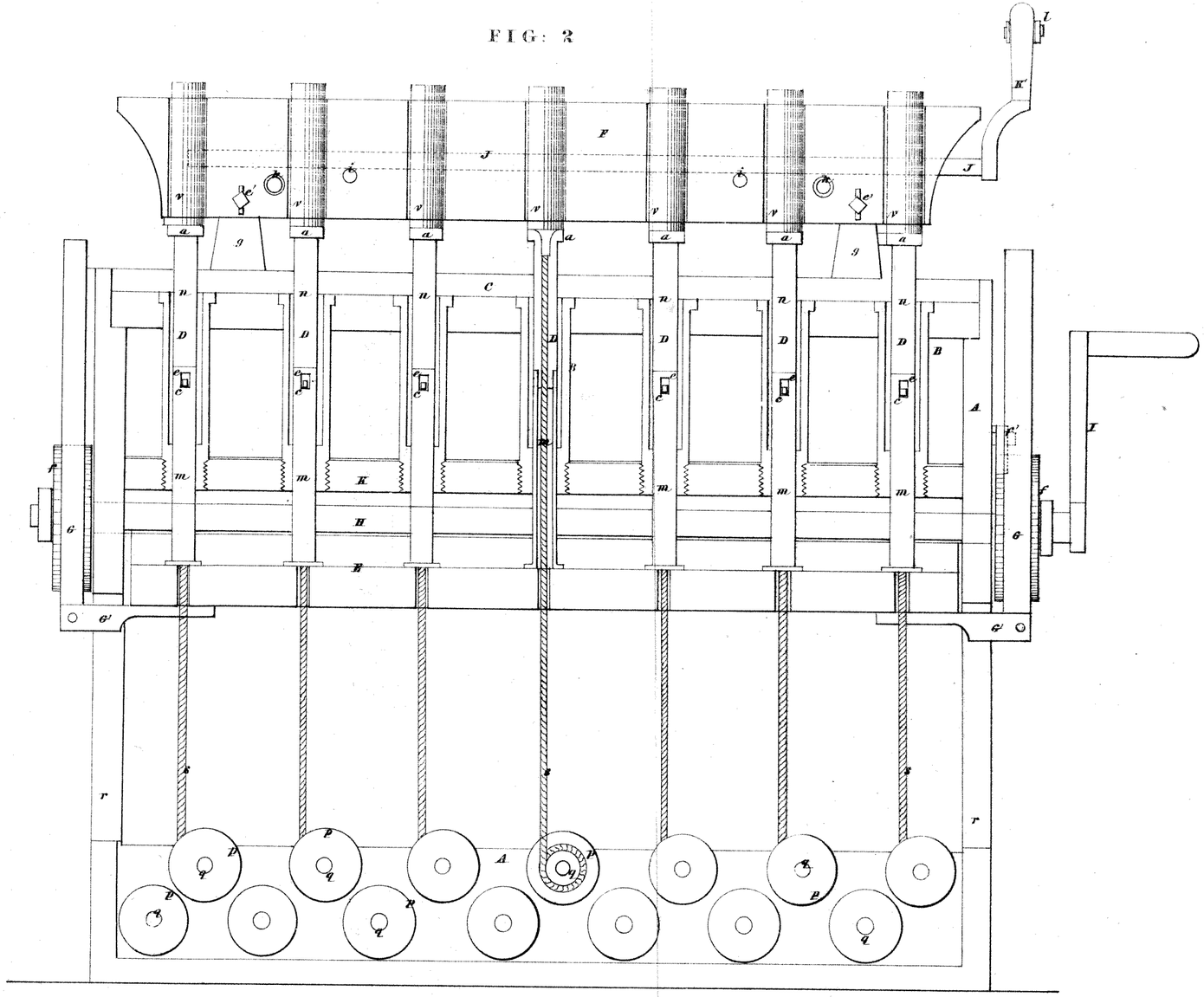
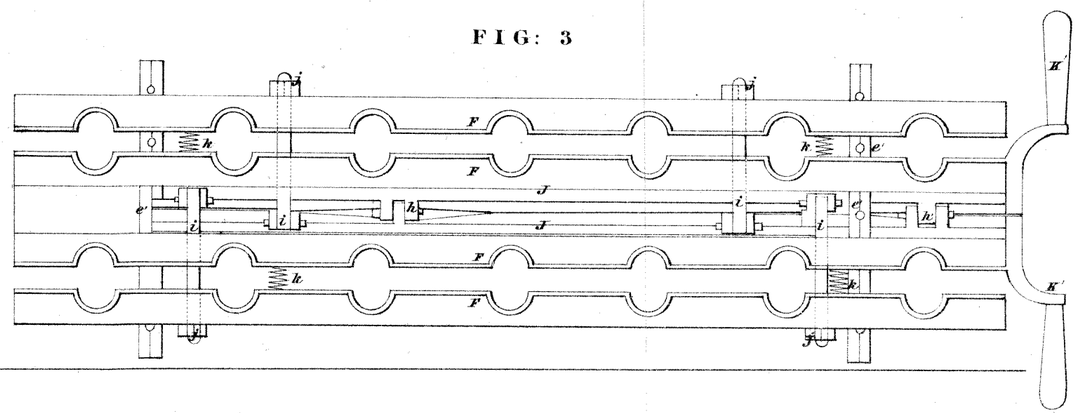


FIG: 3



This is the Drawing referred to in the annexed Letters of Registration granted to Willis Humiston this sixth day of July 1859

By us

Signed { *J. M. Percival, Colonel*
W. W. Burton
Charles Cowper

Newton & Son
66 Chancery Lane, LONDON.
AGENTS for the PATENTEE

A.D. 1859, 21*st July*. No. 21.

IMPROVEMENT IN LIGHTING AND EXTINGUISHING GAS.

LETTERS OF REGISTRATION to Mr. Richard Henry Jeffreys, for an improvement in lighting and extinguishing Gas.

[Registered on the 22nd day of July, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Richard Henry Jeffreys, of Sydney, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "lighting Gas by platinum or other wires, heated by current electricity," and of "extinguishing Gas, by closing the gasway by means of an electro-magnet," which is more particularly described in the papers annexed to these Letters of Registration, and marked A, B, and C, respectively; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of

the

the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Richard Henry Jeffreys, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Richard Henry Jeffreys, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Richard Henry Jeffreys shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-first day of July, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

A.

CLAIM FOR LIGHTING GAS.

I claim, as my invention, the lighting of Gas by heated platinum wire, or of wire made of palladium; and the electricity I employ for this purpose, and for which I desire protection, is current electricity of any nature. I subjoin a diagram of the manner of using these metals for the purpose described; but I would wish to state that I do not intend that this sketch should confine me to the particular way I have here applied the platinum wire, namely, by small clamps or screws; but I would desire to have the latitude I should see necessary, by soldering these metallic wires or screwing them in the main circuit, as may appear necessary; and, to be more explicit, I would desire latitude in the length and thickness of the wire for igniting, and also in the number of wires of the same material to be employed.

CLAIM FOR CUTTING OFF GAS APPARATUS.

I also claim as my invention the following method of extinguishing Gas Lights, and attach a diagram of the system, apart from the lighting apparatus:—

The power I employ for this purpose is an electro-magnet, which I employ in various methods in shutting a key, a plug, a valve, or spring, and thereby cutting off the passage of gas, and by the same means or power I allow gas to escape at pleasure; also, by reversing the action of the magnet, or key, plug, valve, or spring, I can produce the contrary effect, namely, when the electro-magnet is in action, to allow gas to escape, and when the iron is not magnetic, to cut the gas off, by allowing the spring, plug, &c., as aforementioned, to take effect by stopping the gasway.

RICHARD HENRY JEFFREYS.

This is the paper A referred to in the annexed Letters of Registration granted to Richard Henry Jeffreys, this twenty-first day of July, 1859, by me—

W. DENISON.

B.

DIAGRAM OF LIGHTING APPARATUS.

INDEX.

L L Lighting circuit.

C C Clamps or fastenings for platinum wire.

P Platinum, rhodium, or palladium wire, for igniting Gas.

This is the paper B referred to in the annexed Letters of Registration granted to Richard Henry Jeffreys, this twenty-first day of July, 1859, by me—

W. DENISON.

C.

Improvement in lighting and extinguishing Gas.

C.

DIAGRAM OF CUTTING OFF GAS APPARATUS.

Figure No. 2:—G, gasways; S, stopper; *s*, spring; A A, armature; M, electro-magnet; E, electrodes to magnet.

When the fluid goes through E E (Figure No. 1), M becomes a magnet, and draws down the armature, A; but in doing so, it necessarily draws down the stopper S, over the gasway G, and appears then as represented in Figure No. 2, and thus effectually cuts off the escape of Gas.

This is the paper marked C referred to in the annexed Letters of Registration granted to Richard Henry Jeffreys, this twenty-first day of July, 1859, by me—

W. DENISON.

REPORT.

University of Sydney,
31 *May*, 1859.

SIR,

In compliance with your letter of 25th instant, we have considered the application of Mr. R. H. Jeffreys for Letters of Registration "for the exclusive right of "lighting Gas by the agency of voltaic, static, or magnetic electricity, in heating platinum "or other metals, in combination with the cutting off or extinguishing of Gas by the "power of the electro-magnet," and we have now the honor to report as follows:— Three enclosures returned.

We find that Mr. Jeffreys desires to be protected in the principles, and not in the minutiæ of the application of those principles; but the lighting of gas by electricity has long been a familiar experiment, and the exclusive right to do so cannot, therefore, be conceded to any one. We are of opinion that Mr. Jeffreys can only be protected in the use of certain apparatus or arrangements contrived or invented by himself; and we therefore recommend that he be requested to amend his Petition for Letters of Registration, and to describe distinctly what mechanism for lighting and extinguishing gas he claims as his own invention.

We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

J. SMITH.
E. O. MORIARTY.

Sydney, 25 *June*, 1859.

SIR,

In compliance with your letter of 15th instant, we have considered Mr. Jeffreys' renewed application for Letters of Registration for "the cutting off or extinguishing of gas by means of the electro-magnet," and we have the honor to report that we see no objection to such letters being granted. Documents returned.

We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

J. SMITH.
E. O. MORIARTY.

Sydney, 27 *June*, 1859.

SIR,

In compliance with your letter of 22nd instant, we have considered the further communication from Mr. Jeffreys, of date 17th instant, containing a more minute specification of his method of lighting and extinguishing gas; and we have the honor to report that we see no objection to granting to Mr. Jeffreys Letters of Registration for his method of "lighting gas by platinum or other wires heated by current electricity," and of "extinguishing gas by closing the gas-way by means of an electro-magnet," as described in his letter and accompanying diagrams. Letter returned.

We have, &c.,

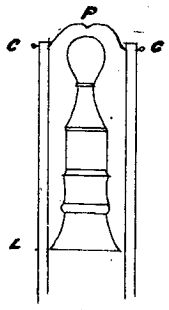
THE HONORABLE
THE COLONIAL SECRETARY.

J. SMITH.
E. O. MORIARTY.

[Diagrams—one sheet.]

Diagram of Lichting Apparatus

B



is the paper B referred to in the annexed Letters of
istration granted to Richard Henry Jeffreys this
day of July 1859 by me.
(Sgd.) W. Denison

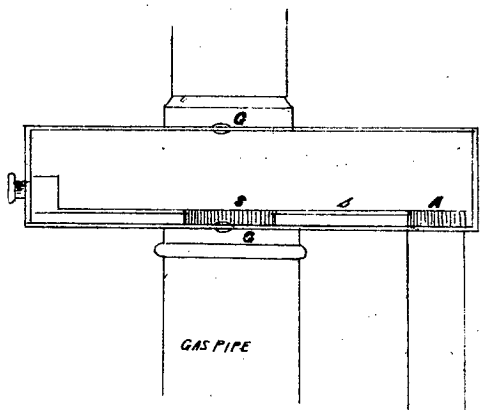
INDEX
L L. Lighting Circuit
C C. Clamps or Fastenings for Platinum Wire
P. Platinum Rhodium or Palladium Wire for igniting Gas.

Diagram of Cutting off Gas Apparatus

C

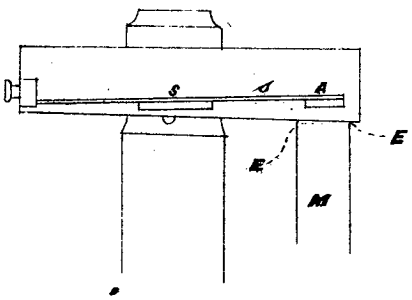
Fig N°2

C. Gas Ways
S. Stopper
S. Spring
A. Armature
M. Electro Magnet
E. Electrodes to Magnet



When the fluid goes through E E (Fig N°1) M becomes a Magnet and draws down the Armature A. Cut in doing so it necessarily draws down the Stopper S over the Gas Way C and appears then as represented in Fig N°2 and thus effectually cuts off the escape of Gas.

Fig N°1



This is the paper marked C referred to in the annexed Letters of Registration granted to Richard Henry Jeffreys this 21st day of July 1859 by me.
(Sgd.) W. Denison

A.D. 1859, 18*th* *August.* No. 22.

SPRING FOR BEDS, &c., AND IMPROVEMENTS IN THE MANUFACTURE OF IRON BEDSTEADS AND MATTRESSES.

LETTERS OF REGISTRATION to Mr. Thomas Chuck, for a new description of Spring applicable to Beds, Chairs, Sofas, and other purposes where Springs are used; also, Improvements in the manufacture of Iron Bedsteads and Mattresses.

[Registered on the 19th day of August, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Thomas Chuck, of Melbourne, in the Colony of Victoria, gentleman, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a new description of Spring applicable to Beds, Chairs, Sofas, and other purposes where Springs are used; also, improvements in the manufacture of Iron Bedsteads and Mattresses; which is more particularly described in the specification marked A, and the two drawings marked B and C respectively, all of which are annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I

would

would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Thomas Chuck, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Thomas Chuck, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Thomas Chuck shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighteenth day of August, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

SPECIFICATION for Letters of Registration for New South Wales, for Mr. Thomas Chuck, of Melbourne.

A new description of Spring applicable to Beds, Chairs, Sofas, and other purposes where Springs are used; also, improvements in the manufacture of Iron Bedsteads and Mattresses.

I will first describe that part of the invention which consists of a new construction of Spring applicable to Beds and other purposes, which is formed of one piece of metal wire. The drawings at Figure 1 shew a perspective view of a spring constructed according to my invention. Figure 2 is a side view, and Figure 3 shews the twisted wire of which it is formed before it is put together; *aa* is a core of wood or other suitable material, into which is inserted one end of the wire *b*, it is then bent into the shape marked 1, 2, and 3, and passed around the other end of the core *c*, and coiled spirally around it, and afterwards formed into the shape marked 4, 5, and 6, and the end fixed into the core *c*, by attaching the two outside portions of the wire between two surfaces such as the framing of the bed, on the seat of a chair or sofa; it will readily be understood that the elasticity of a spring thus constructed will be very great; in applying these springs to beds, any number may be applied according to the extent of the elasticity required. I do not confine myself to the shape of the outside parts of the spring, nor do I claim the construction of spiral springs generally; but what I claim is, the form of springs constructed substantially as herein described. I will now describe that part of the invention which refers to the manufacture of Iron Bedsteads, which consists—first, in making the framing of iron bedsteads of hoop-iron, such framing, by the introduction of springs, being converted both into a bedstead and a palliass; and it also relates to certain arrangements in the manufacture, which will be more fully detailed; but in order that the improvements may be clearly understood, I will proceed to describe the drawings, which, at Figure 4, is shewn a side view of a bedstead constructed according to my invention, and Figure 5 is a plan; the same letters are used to indicate the same parts. By the ordinary construction of iron bedsteads, the top, ends, and sides are made of angle-iron, to which the laths are attached to form the seat of the bed; it will be seen by the drawing, that the whole of the frame on this improved bedstead is constructed of hoop-iron *aa*; and it is formed by

passing

passing the hoop-iron over the top and bottom bar *bb*; thus suspending the frame between these bars, and thus forming an endless metal band, the parts of the hoop-iron being rivetted together; the cross-pieces are interlaced and rivetted. Between the parts of the frame are introduced and fixed springs, *C*; I prefer to use those described above, but the helical springs may be used for the same purpose. The springs are so adjusted by being introduced of different sizes, which give to the top and bottom a convex form, as shewn in the drawing, they being kept apart by means of the springs; the two ends *bb* are kept firmly in their position by means of a curved piece, *D*, which is hooked on to them, and affixed to this stay are supports, C^1, which are screwed into the lower part, *E*, of the cross-bars, *bb*, which are fastened with nuts, *H*; these lower parts form the legs of the bedsteads; *G* is the headpiece, which is rivetted to the bar *b*. The bedstead thus constructed may be covered with cloth, when it will have the character and appearance of a bedstead with a palliass thereon; when these bedsteads are required to be moved, by unscrewing the nuts *H*, the support C^1 can be withdrawn from the legs, which then will fold under, as the hoop-iron is not fastened to the cross-bar, but only passes over it; this will easily be understood by examining the drawing. In some cases the springs may be dispensed with, when only a single band will be suspended from the head and foot bar, and rivetted the one part to the other. I am aware that in the manufacture of iron bedsteads, hoop-iron has been used for the seats. I do not claim the use of hoop-iron generally in the manufacture of iron bedsteads, nor do I confine myself to the precise details, so long as the character of the invention be retained. I will now describe the improvements in mattresses, which consists of the application of the same principle of construction as described above, with this exception—that the ends of the cross-bars will not extend to the ground to form the legs, as described for the bedstead, but will only be sufficiently long to allow for the supports to be attached, and to be fixed to the framing of an ordinary bedstead. In using these mattresses with the ordinary bedsteads, they will be affixed to the angle-iron framing; the drawings shew a mode of applying these mattresses to the external framing of a bedstead. I claim the manufacture of iron bedsteads of hoop-iron, without the use of angle-iron frames; and I claim the manufacture of iron bedsteads of hoop-iron, being suspended from the top and end bars, and supported by stays substantially as herein described; and lastly, I claim the manufacture of mattresses of endless bands of hoop-iron and springs substantially as herein described.

In witness whereof, I have set my hand and seal, this twenty-third day of June, in the year of our Lord one thousand eight hundred and fifty-nine.

THOS. CHUCK. (L.S.)

REPORT.

Sydney, 11 *July*, 1859.

Sir,

In compliance with your request, having met as a Board to examine and consider the matter stated in Mr. Thomas Chuck's Petition, under the Act of Council 16th Victoria, No. 24, for Letters of Registration for a new description of Spring for Beds, &c., of which he states that he is the inventor, we have the honor to recommend that the prayer of the Petition be granted.

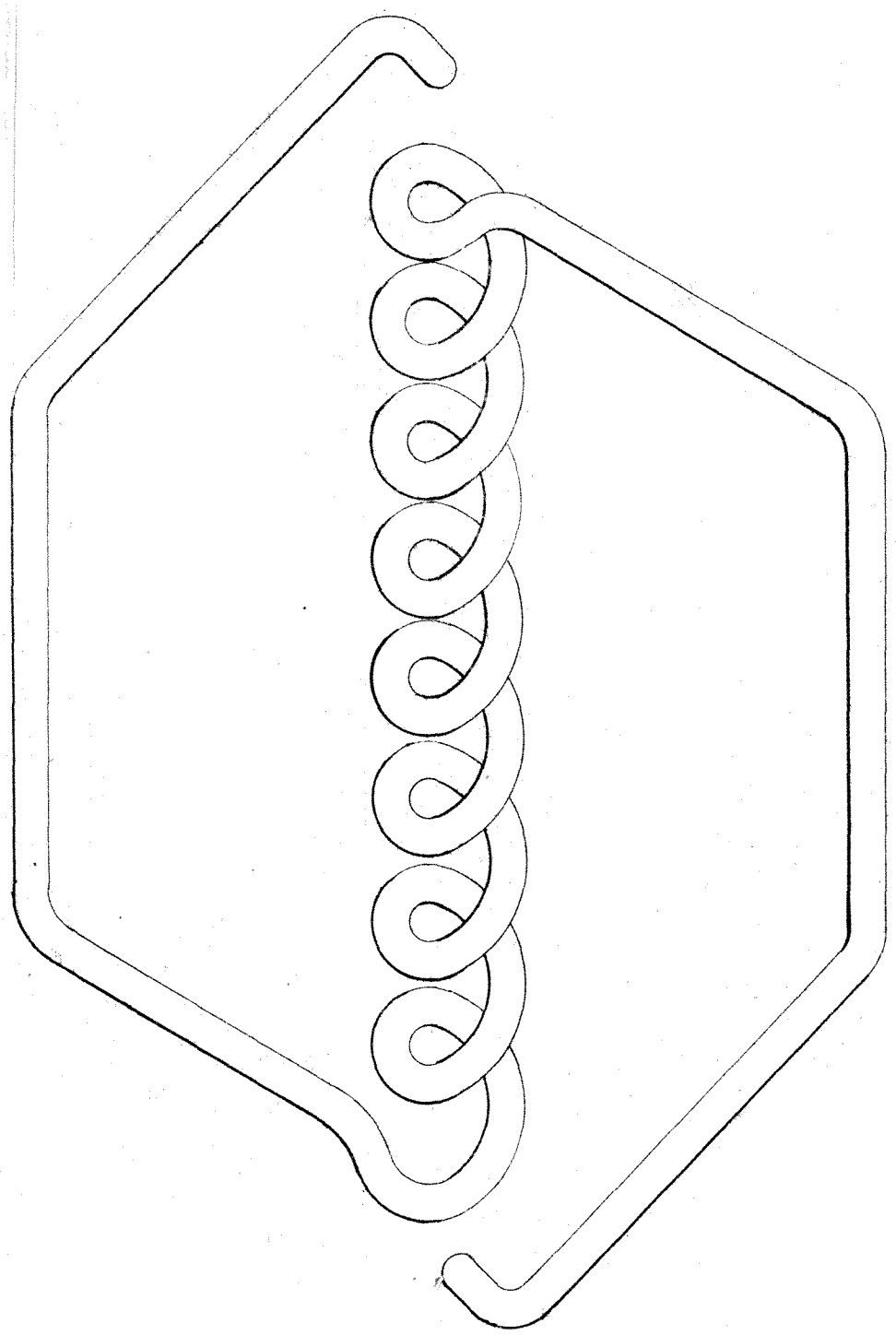
We have, &c.,

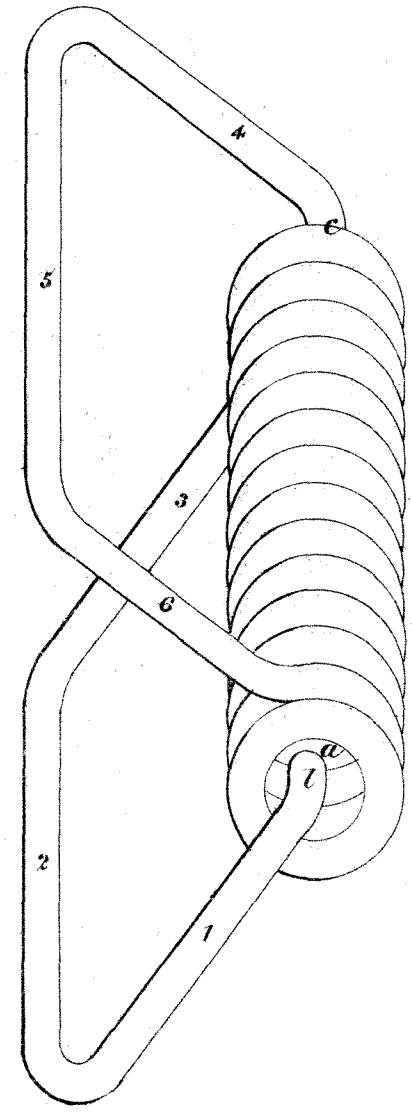
E. W. WARD.
E. O. MORIARTY.

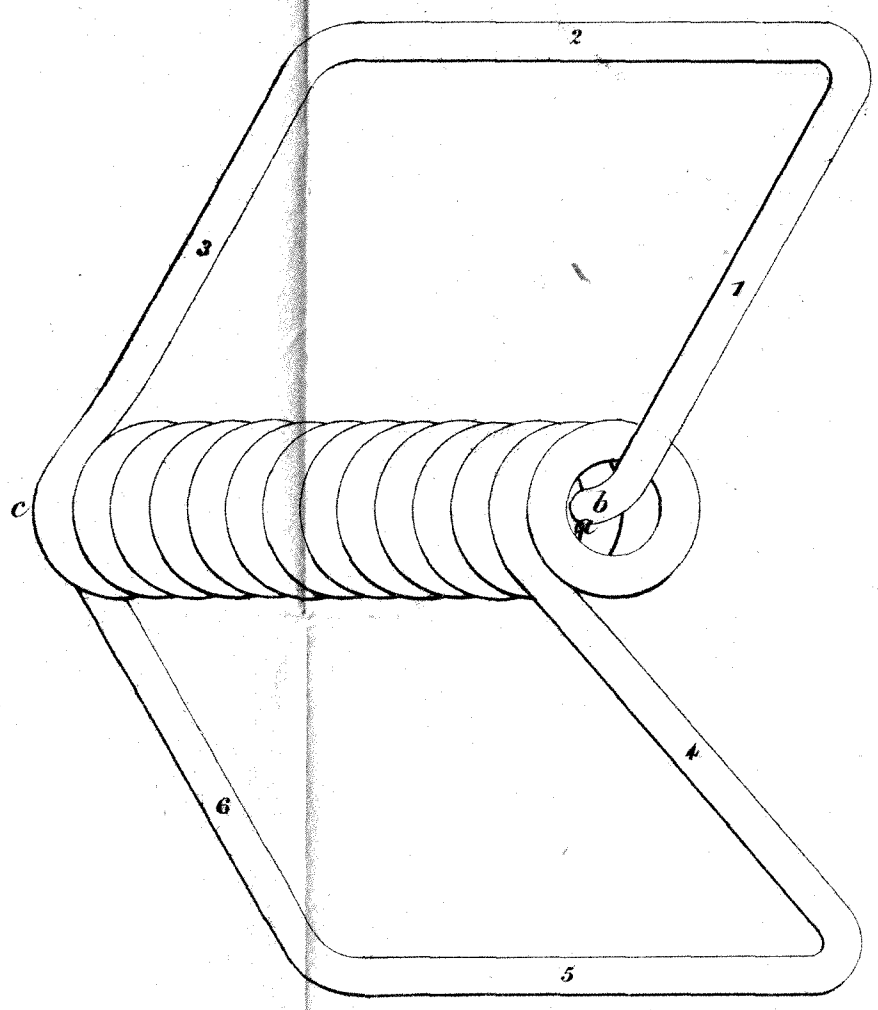
The Honorable
The Principal Secretary.

[Drawings—one sheet.]

Drawings of Mr. Chuck's Invention for a new description of Spring.







Drawing of Mr Chuck,

for New South Wales

Fig. 7.

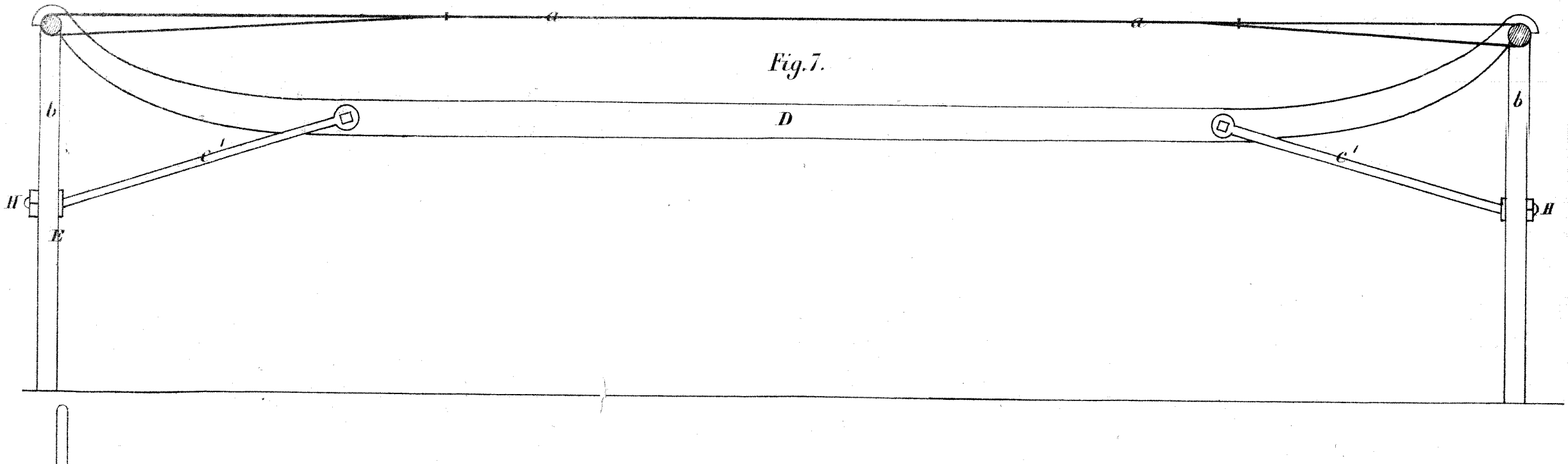


Fig. 4.

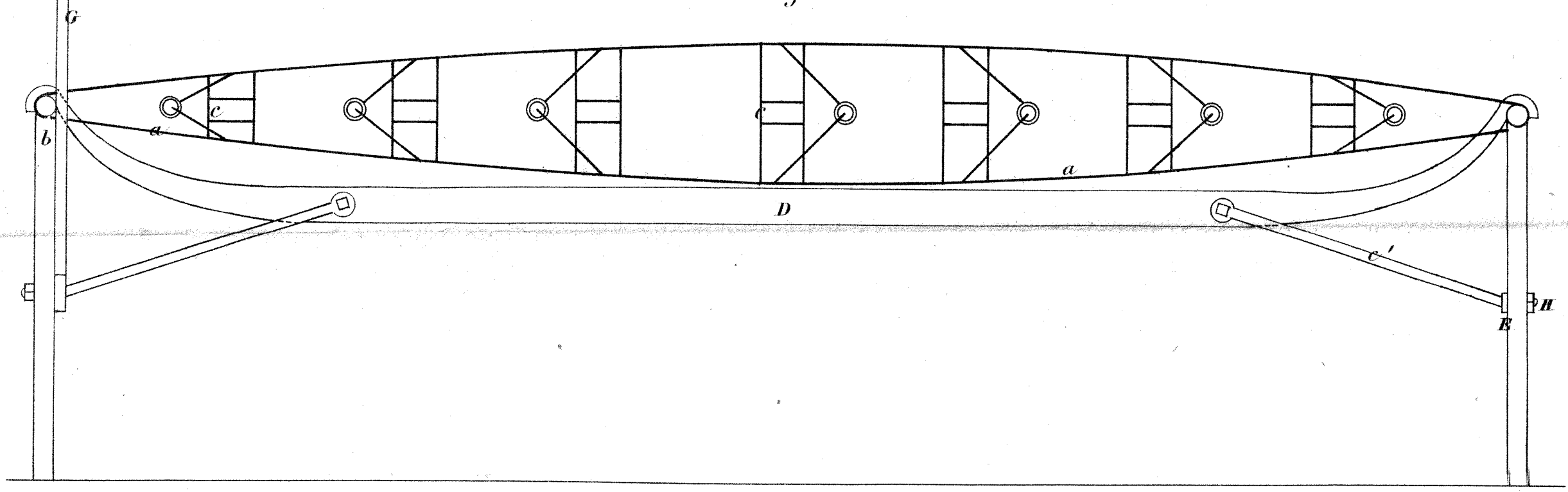


Fig. 5.

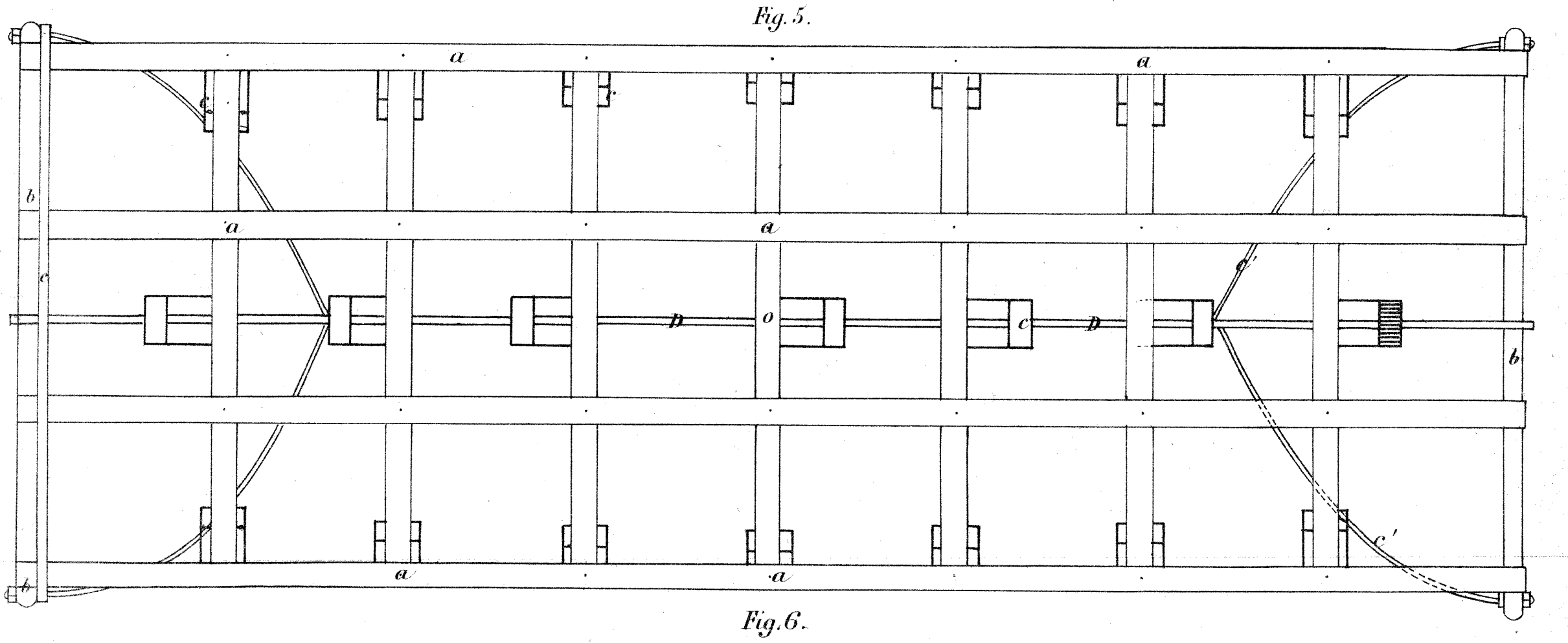
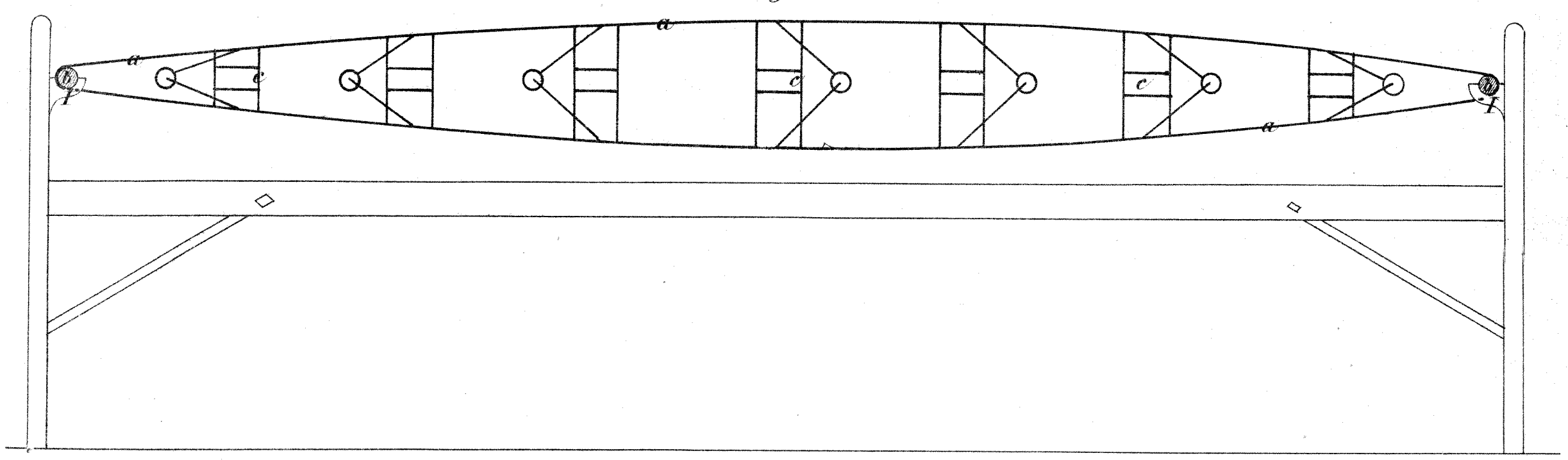


Fig. 6.



A.D. 1859, 20*th September*. No. 23.

PUDDLING MACHINE.

LETTERS OF REGISTRATION to Samuel Lucas, for a Puddling Machine.

[Registered on the 21st day of September, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Samuel Lucas, of Ashfield, in the Colony of New South Wales, agricultural machinist, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a Puddling Machine, which is more particularly described in the description and drawing hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Samuel Lucas, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or

improvement,

improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Samuel Lucas, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Samuel Lucas shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twentieth day of September, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

DESCRIPTION OF PUDDLING MACHINE.

A. Hopper or receiver for washing stone.

BBBB. Iron cylinder, the lower half of which is perforated.

CC. Brush attached to the spindle EE.

D. Iron screw for lifting and discharging the washed stones, &c., through the door *h*.

EE. Rumager to which are attached the brush CC, the knives *aaaa*, &c., and the screw D.

F. Fine sieve for receiving the stuff passing through the perforated cylinder BBBB.

GG. Centre board, to which a vibratory action is communicated by the rocking shaft *ee*.

HH. Discharge door, with slide and shoot for water.

aaaaa. Knives attached to the rumager EE.

bb. Eccentric collar for working the rocking shaft *ee*.

c. Connecting rod.

d. Crank.

ee. Rocking shaft.

ff. Iron arms attached to the rocking shaft in which rests the sieve FF.

g. Shoot under the door *h*, through which the stones, &c., are discharged by the screw D.

k. Spindle to which is attached the connecting rod from the horse power or a lever handle to work by hand.

l. Aperture with plug for emptying machine.

This is the description referred to in the annexed Letters of Registration granted to Samuel Lucas, this twentieth day of September, 1859, by me—

W. DENISON.

REPORT.

Puddling Machine.

REPORT.

Royal Mint, Sydney,
29 August, 1859.

SIR,

Having met as a Board to examine and consider the application of Mr. Samuel Lucas for Letters of Registration, under Act of Council 16th Victoria, 24, for "new and "useful machinery for washing earth in an improved manner, applicable as Gold-"washing Machinery," we have the honor to recommend that the protection sought for be granted for that portion of the machinery only which is described in the drawings and specifications as a Puddling Machine, being the only portion possessing the characteristic of novelty.

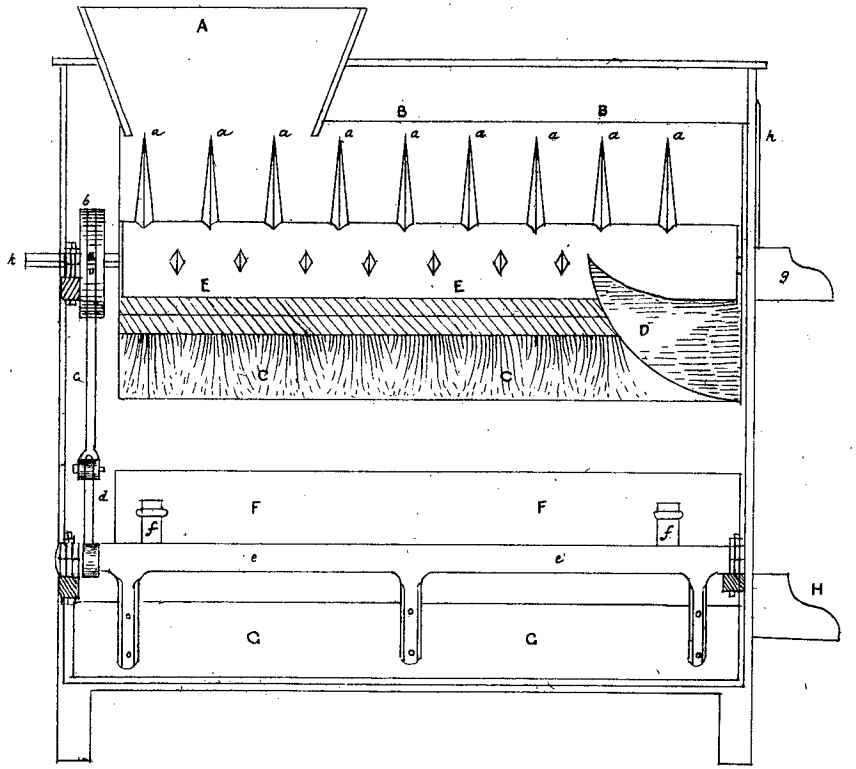
We have, &c.,
E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

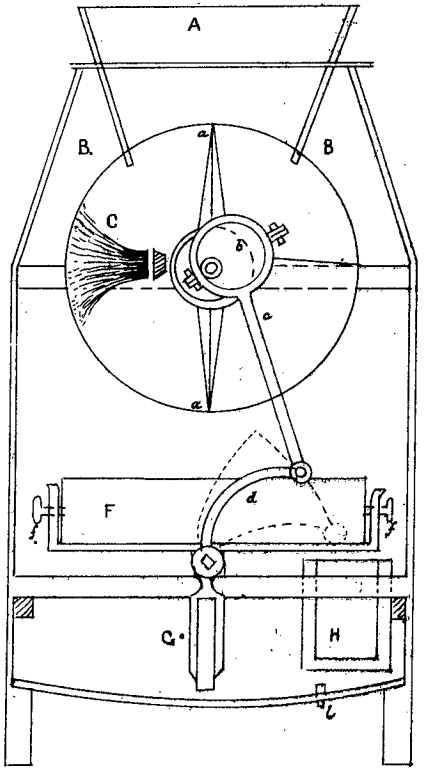
P.S.—The documents received with your communication are herewith returned.

[Drawings—one sheet.]

Pudding Machine



LONGITUDINAL SECTION



TRANSVERSE SECTION

THIS IS THE DRAWING REFERRED TO IN THE ANNEXED LETTERS OF REGISTRATION GRANTED TO SAMUEL LUCAS THIS TWENTIETH DAY OF SEPTEMBER 1859 BY ME

(SIGNED) **W. DENISON**

A.D. 1859, 14*th December*. No. 24.

IMPROVEMENT IN HULLING AND DRESSING RICE.

LETTERS OF REGISTRATION to Mr. Thomas Sutherland, for an improvement in hulling and dressing Rice.

[Registered on the 16th day of December, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Thomas Sutherland, of Melbourne, in the Colony of Victoria, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of a method of his invention for hulling and dressing Rice, which is more particularly described in the statement and paper of drawings that are annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me

to

Improvement in hulling and dressing Rice.

to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said Thomas Sutherland, his executors, administrators and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Thomas Sutherland, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Thomas Sutherland shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourteenth day of December, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

STATEMENT.

THE first part of the invention consists in the use of a cylinder arranged in a nearly horizontal position, having an inclination of about two inches to the foot, and inside the cylinder is suspended a circular stone supported by a strong iron shaft, and running at the same angle as the cylinder; the periphery of this stone works within a quarter of an inch of the internal circumference of the wire covering of the cylinder; this stone is caused to revolve about four hundred and fifty times a minute. The rice or other grain under operation, falls through a hopper placed at the other end of the cylinder, and soon fills up the space between the stone and the wire cylinder; it then comes in contact with the stone, by which it is carried round the cylinder at a great speed, causing a high degree of friction, and by the time the rice reaches the other end of the cylinder it is completely hulled and cleaned, and it falls out at a small opening at the depressed or lower end of the cylinder; it then comes in contact with a blast of air from a powerful fan, by which the hulls and large quantities of the dirt are separated from it; and from thence it passes into a polishing machine, which is constructed as follows:—It consists of two flat surfaces of wood or other suitable material, the lower or bottom one being fixed with two sides and fixed at an angle of forty-five degrees, the bottom padded and covered with buff leather; the top or working part works up and down by means of a crank on two small slides, and kept true in its place by the sides of the bottom of the stationary of the machine; this sliding part is caused to move up and down about five hundred times per minute, it is also padded and covered with buff leather. The rice in passing between these two surfaces becomes finely polished, and from this machine it falls into wire screens, by which any small rice or dust is separated from it, and the rice is then fit for market.

DESCRIPTION OF THE DRAWINGS.

Figure 1 shews a section of the cylinder; figure 2, an elevation. Figures 3 and 4 shew a section of the polishing machine; and 5 and 6 are end views of the cylinder. In the different views, the same letters are used to indicate the same parts. A is the stone cylinder which turns on an axis, B, on C in the framing of the machine; D is the outer casing, which is made of wire gauze. The process of cleaning the rice can be carried on from one cylinder to another, the surfaces of the stone being changed; at the same time, it is not necessary, as the whole of the process can be performed in one cylinder; and I would remark, that I prefer that the hulling should be performed in a separate manner, although it can be done by these stone cylinders. Motion is communicated to the cylinders from a steam-engine or other power, by means of a band working

working over a pulley placed on the shaft. E and F are the two surfaces which form the polishing machine, F being fixed, and E movable; F is a crank by which the motion is communicated to the band E; G is the flyer, which is set to work by means of the band and pulleys, as shewn in the drawing.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood that I do not confine myself to the precise details, so long as the character of the invention be retained; but what I claim as the improvement in hulling and dressing rice is, submitting it to the action of revolving stone cylinders, and afterwards the same substantially as herein described.

This is the statement referred to in the annexed Letters of Registration granted to Thomas Sutherland, this fourteenth day of December, 1859, by me—

W. DENISON.

REPORT.

Royal Mint, Sydney,
22 *November*, 1859.

SIR,

Having, in compliance with your request, examined and considered the matters stated in Mr. Thomas Sutherland's Petition for Letters of Registration for a method of his invention for hulling and dressing Rice, we are of opinion that the prayer of the Petition may be granted.

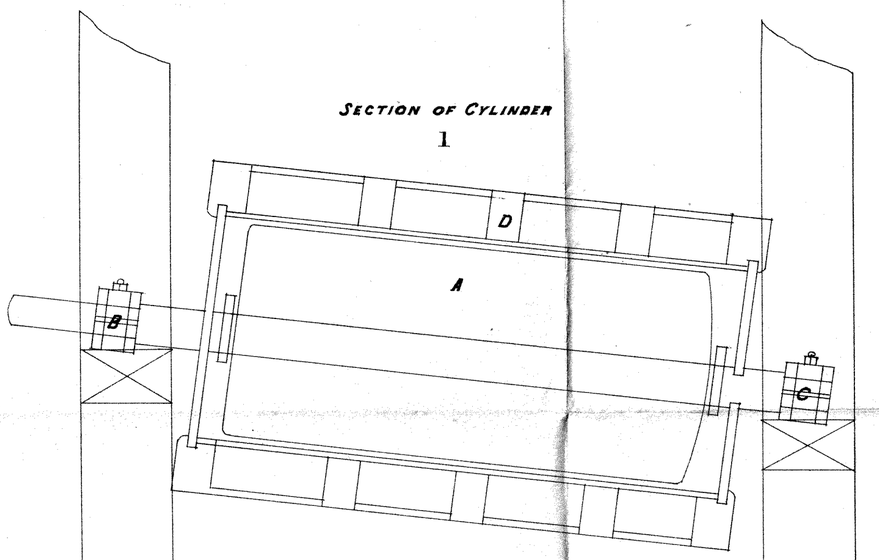
We have, &c.,
E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

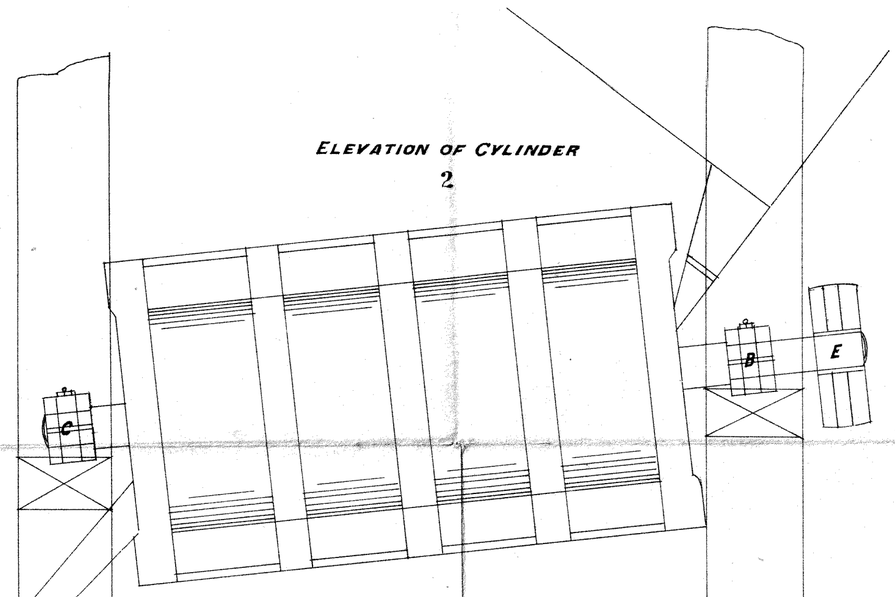
SECTION OF CYLINDER

1



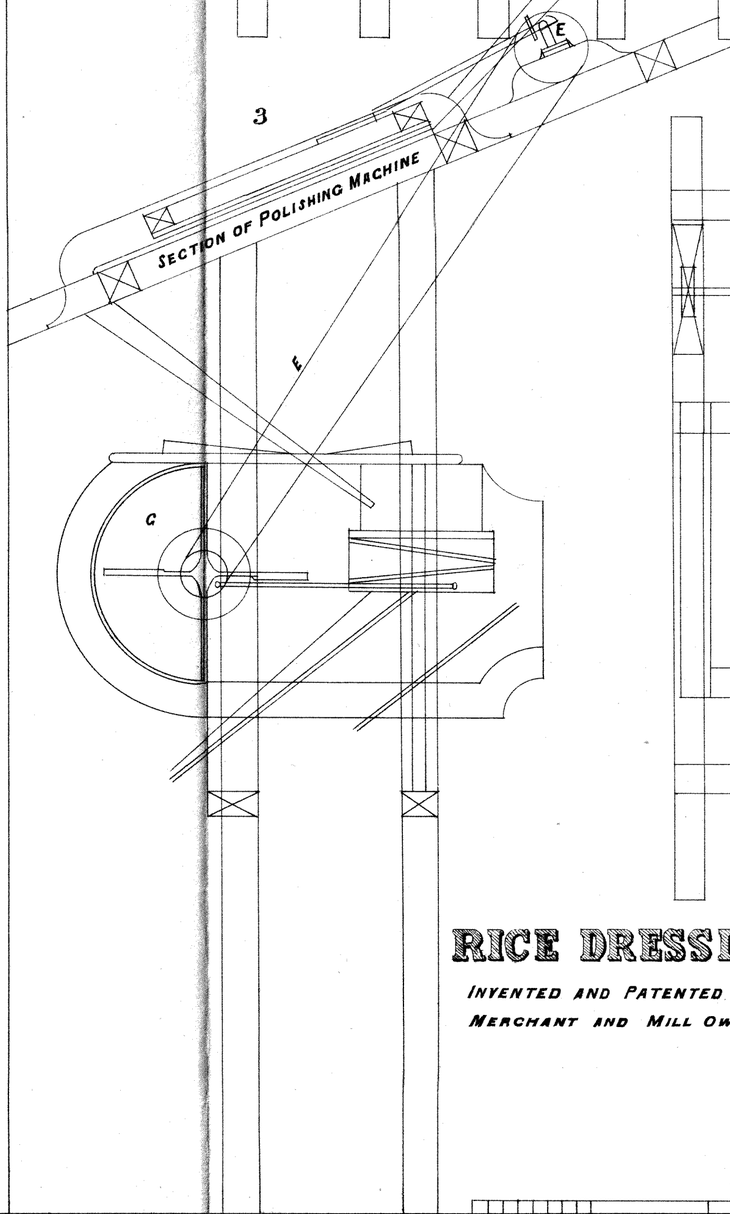
ELEVATION OF CYLINDER

2

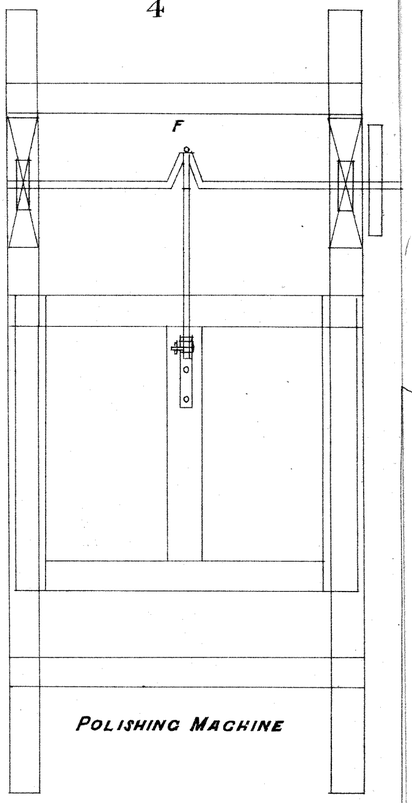


LINE OF FLOOR

3

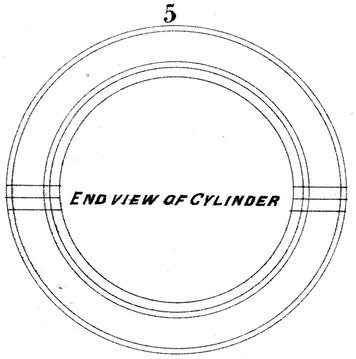


4



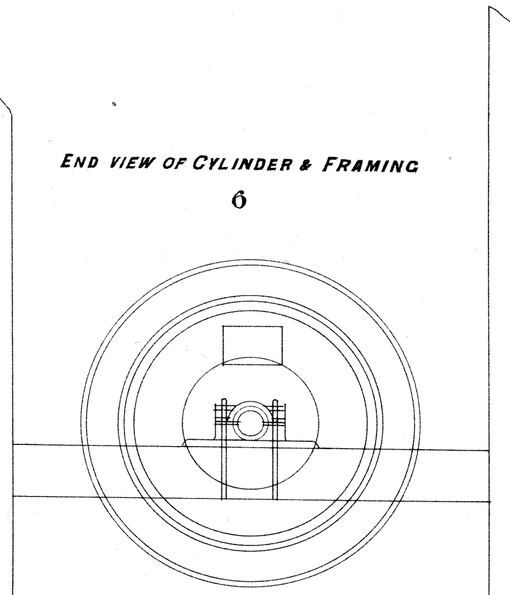
POLISHING MACHINE

5



END VIEW OF CYLINDER & FRAMING

6



RICE DRESSING MACHINE

INVENTED AND PATENTED BY **THOMAS SUTHERLAND**
MERCHANT AND MILL OWNER, MELBOURNE, VICTORIA.
1859

SCALE 1 INCH TO A FOOT

THIS IS THE PAPER OF DRAWINGS REFERRED TO IN THE ANNEXED LETTERS OF REGISTRATION GRANTED TO THOMAS SUTHERLAND THIS 14th DAY OF DEC.r 1859 BY ME
(SIGNED) W. DENISON

A.D. 1859, 14*th December*. No. 25.

IMPROVEMENTS IN COOKING STOVES AND SHIP RANGES.

LETTERS OF REGISTRATION to John Russell, for Improvements in Cooking Stoves and Ship Ranges.

[Registered on the 16th day of December, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Russell, of the city of Sydney, in the Colony of New South Wales, ironfounder, hath by his Petition humbly represented to me that he is the author or designer of certain inventions or improvements in manufactures, that is to say, of the following improvements in Cooking Stoves, namely, the introduction of a flue at the back of the stove, with a view of increasing the draught and allowing the heat to pass all round the ovens and up the chimney or pipe, thereby heating the bottom of the ovens as well as the top; the supporting the steam pipe by means of a separate cast iron oblong pipe attached to the back of the stove, to allow the top or hot plate to be removed for the purpose of cleaning out the flues without taking down the pipe; the introduction of cast iron perforated fire back or shield in the fire-pot, with a view of allowing the air to pass up from behind, increasing the draught, protecting the fire-pot, and permitting the fire back to be replaced when burnt out without removing the fire-pot; which said improvements are more particularly described in the specification and drawing which are annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the

Improvements in Cooking Stoves and Ship Ranges.

Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said inventions or improvements might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said John Russell, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said inventions or improvements for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Russell, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Russell shall not within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourteenth day of December, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

SPECIFICATION of Improvements in Cooking Stoves and Ship Ranges, by John Russell.

1st. By introducing a flue at the back of the stove, which increases the draught, and allows the heat to pass all round the ovens and up the chimney or pipe, thereby heating the bottom of the ovens as well as the top.

2nd. By making the stove pipe larger, and supporting it with a separate cast iron oblong pipe attached to the back of the stove, to allow the top or hot plate to be removed, for the purpose of cleaning out the flues, without taking down the pipe.

3rd. By introducing a cast iron perforated fire back or shield in the fire-pot, which allows the air to pass up from behind, increases the draught, and protects the fire-pot, and which can be replaced when burnt out, without removing the fire-pot.

EXPLANATION OF PLANS.

A No. 1.—The red lines marked explain the improvements in the 2 ft. 6 in. and 3 ft. roasting stoves.

B No. 2.—Do. do. do. 2 ft. 6 in. and 3 ft wood stoves.

C No. 3.—Do. do. do. 3 ft. 9 in., 4 ft. 3 in., 4 ft. 6 in., 5 ft. 4 in., and 6 ft. roasting stoves.

D No. 4.—Do. do. do. 3 ft. 9 in., 4 ft. 3 in., 4 ft. 6 in., 5 ft. 4 in., and 6 ft. wood stoves.

E No. 5.—Do. do. do. solid oven stoves for burning wood or coal, with one or two ovens.

F No. 6.—Do. do. do. cooking ranges or ship stoves, with one or two ovens.

This is the specification referred to in the annexed Letters of Registration granted to John Russell, this fourteenth day of December, 1859, by me—

W. DENISON.

REPORT.

Improvements in Cooking Stoves and Ship Ranges.

REPORT.

Royal Mint, Sydney,
15 *August*, 1859.

SIR,

Having as a Board, examined and considered the matters stated in Messrs. P. N. and John Russell's Petition for Letters of Registration for certain Grates, we have the honor to report, that as it appears from the specification attached to the Petition, and from inquiries we have made, that these grates have been in use in the Colony for a considerable period, and are therefore wanting in the essential condition of novelty, we are of opinion that the prayer of the Petition should not be granted.

It is, however, to be remarked that the specification attached to the Petition describes certain improvements to these stoves lately introduced by Mr. John Russell. The exposition by Godson, of the Patent Law of England applicable to improvements, is as follows :—"A patent may be granted for an addition to an old invention, but the "patent must be confined to the addition or improvement, that the public may purchase "it without being encumbered with other things. If the patent includes the whole it "will be void, for the property in the addition or improvement can give no right to the "thing that has been improved."

It therefore follows, that even improvements to these stoves lately introduced and not hitherto used, cannot be reserved for the sole use of the inventors in conjunction with the stoves themselves.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents transmitted to us are herewith returned.

Royal Mint, Sydney,
2 *November*, 1859.

SIR,

In compliance with the request contained in your letter of the 25th ultimo, we have examined the further plans and specifications forwarded in Messrs. Dunsmure and Stafford's letter of the 6th ultimo, having reference to certain improvements in stoves by Mr. John Russell, which are stated to be his invention, and not to have been used or sold prior to his application for Letters of Registration on their behalf. Having also examined several stoves to which these improvements have been appended, we are of opinion that Letters of Registration may be granted for the following improvements, viz. :—

Firstly.—The introduction of a flue at the back of the stove, with a view of increasing the draught and allowing the heat to pass all round the ovens and up the chimney or pipe, thereby heating the bottom of the ovens as well as the top, as shewn in the drawings and specifications attached to the application.

Secondly.—The supporting the steam-pipe by means of a separate cast iron oblong pipe attached to the back of the stove, to allow the top or hot plate to be removed, for the purpose of cleaning out the flues, without taking down the pipe, as shewn in the drawings and specifications attached to his application.

Thirdly.—The introduction of cast iron perforated fire back or shield in the fire-pot, with a view of allowing the air to pass up from behind, increasing the draught, protecting the fire-pot, and permitting the fire-back to be replaced when burnt out without removing the fire-pot, as shewn in the drawings before referred to.

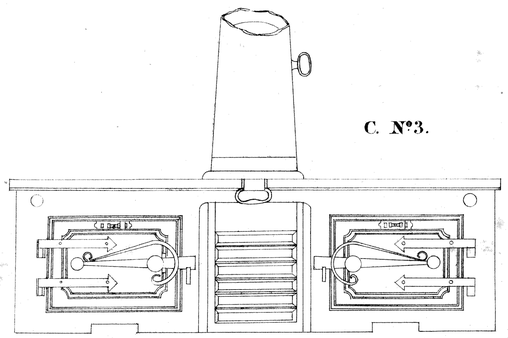
We have, &c.,
E. W. WARD.
J. SMITH.

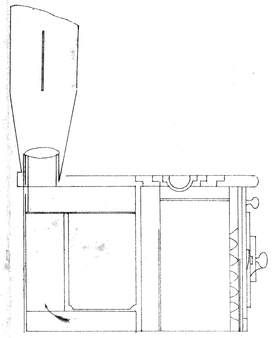
THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents transmitted to us are herewith returned.

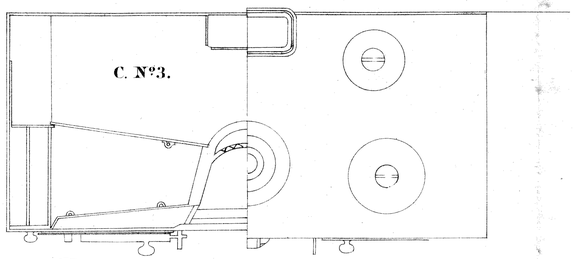
[Drawings—one sheet.]

C. N°3.



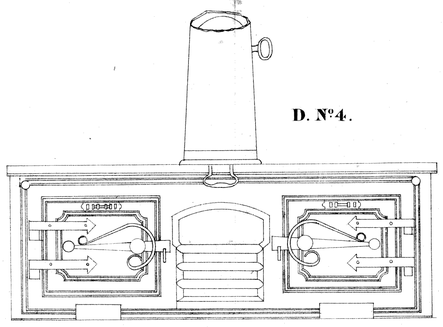


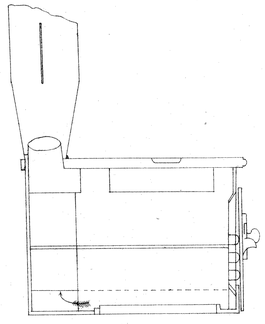
C. N°3.



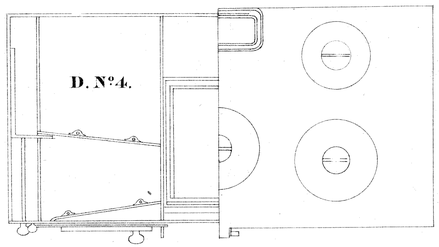
C. N°3.

D. N°4.



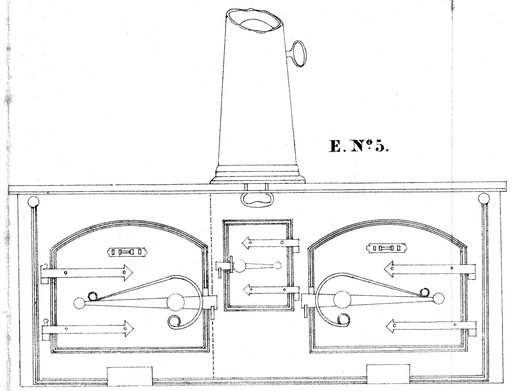


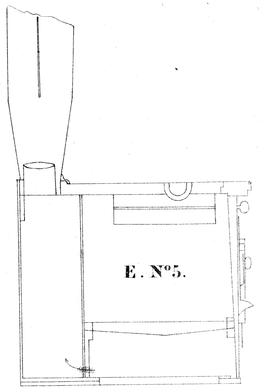
D. N°4.



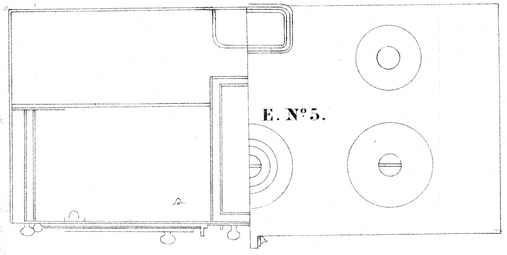
D. N°4.

E. N°5.



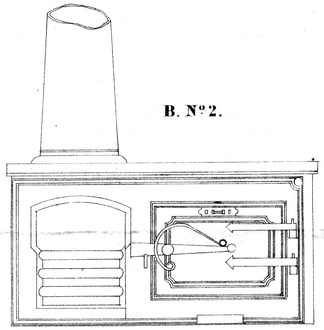


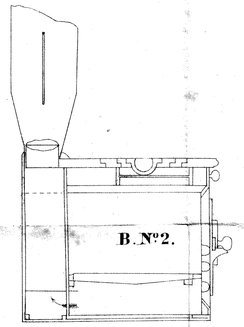
E. N°5.



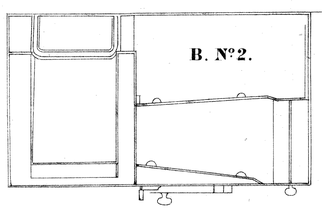
E. N°5.

B. N°2.



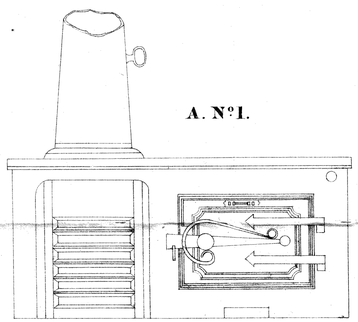


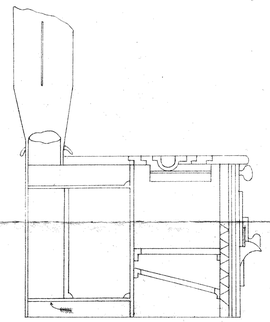
B. N°2.



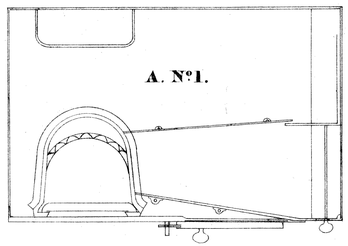
B. N°2.

A. N°1.



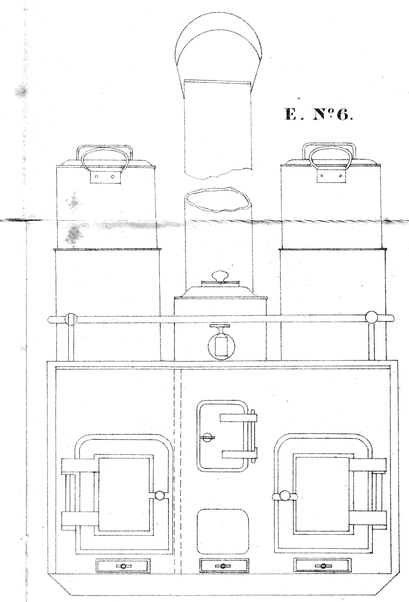


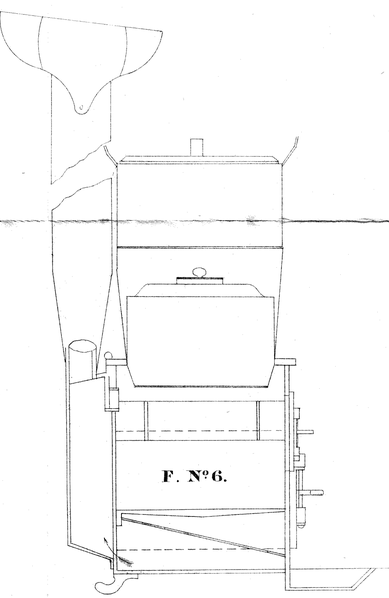
A. N°1.



A. N°1.

E. N°6.





F. N°6.

RUSSELL'S COOKING STOVES

to burn Coal, Wood or Charcoal

Russell's Cooking Ranges or Ships' Stores.

This is the Drawing referred to in the annexed Letters of Registration granted to John Russell this fourteenth day of December 1859. by me

Signed

W. Denison

A.D. 1859, 14*th December*. No. 26.

ATMOSPHERIC PRESSURE ENGINE.

LETTERS OF REGISTRATION to Frederick Septimus Peppercorne, for an Atmospheric Pressure Engine.

[Registered on the 17th day of December, 1859, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Frederick Septimus Peppercorne, of the Richmond River, in the Colony of New South Wales, civil engineer and surveyor, hath by his Petition humbly represented to me, that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of a method of his invention for the employment of atmospheric power for the purpose of compressing, lifting, or giving motion to machinery, as is fully described and set forth in the specification and drawing, both of which are annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the

said

said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Frederick Septimus Peppercorne, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Frederick Septimus Peppercorne shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourteenth day of December, in the year of our Lord one thousand eight hundred and fifty-nine.

(L.S.) W. DENISON.

SPECIFICATION of the Atmospheric Pressure Engine, applicable to the purposes of compressing, of crushing, or of lifting, as well as of giving motion, with any required power, to Machinery.—Dated, November 5th, 1859.

KNOW all men by these presents, that I, Frederick Septimus Peppercorne, of the Colony of New South Wales, civil engineer, do hereby declare that my said invention is, to the best of my knowledge and belief, entirely new, and is founded upon a principle which I term the "pneumatic paradox," and that its principal feature, namely, the piston, is totally unlike any form of piston hitherto employed or made use of, either in steam-engines, pumps, or any other engines where pistons are used. I rest the principal merits of this invention on the following grounds, that is to say:—I claim the use of a form of piston which acts without any friction of rubbing surfaces, and which at the same time indefinitely increases the motive power, without adding inconveniently to its bulk. And the "pneumatic paradox" is, that I am enabled by means of the piston which I employ, to balance or to lift any weight, however large, or to compress substances with any required amount of pressure, by exhausting the air from a tube or cylinder of very small dimensions, with an insignificant expenditure of power. I claim as one feature of my invention the use of a piston which is shewn in figure 1. Here A represents a certain cylinder of six inches diameter; the solid plunger B works in it through a stuffing box, and figure 1 CCC represent three rectangular plates of wood or metal attached to the plunger pole B and working with it. D represents a small pipe leading to the air-pump E.

It is now evident that, by exhausting the air from the cylinder A, which in the drawing contains about one cubic foot, the plunger B will be pressed down with a force proportioned to the area of its upper surface, and this force will be represented as follows:—$6 \times 6 \times 144 \times 14 \times 3 = 217{,}728$ lbs., or 97 tons. If I require a greater pressure than this, I obtain it either by increasing the superficial area of each plate or piston head, or by adding to their number; for it is an undoubted fact in pneumatics, that if the upper surface of a piston be increased in any ratio, the force of the atmosphere which presses it down when the air is exhausted from the cylinder will be increased in exactly the same ratio.

In the drawing, figure 2 represents a pneumatic or atmospheric press, constructed on this principle, and applicable for compressing wool, hay, cotton or flax, for squeezing out the oil from various seeds, and the stearine from tallow or lard, &c.; but the most important application of this principle is, its adaptation to a powerful atmospheric engine, whether for raising water from deep mines, or for the supply of towns, or for any other purposes. In this case I employ a piston which works absolutely without any of that rubbing friction which absorbs so much power in the steam-engine and in common pumps, and which I term the "mercurial anti-friction piston"; although I do not confine myself solely to the use of mercury, but I include tallow and fatty substances, with vegetable and mineral tar and other substances.

Atmospheric Pressure Engine.

I claim in this patent, the use of an inverted cylindrical or rectangular vessel, which I term an " exhausting cylinder," when applied to air-pumps or common pumps; this cylindrical or rectangular vessel works loosely in the space left between two other cylindrical or rectangular vessels, closed at the bottom but open at the top, which vacant space is partly filled with mercury, tallow, or tar, &c.; these substances (and particularly mercury) act as the most perfect " packing"; for it is clear that neither air, steam, nor water can *ascend* through a dense fluid like mercury, which is more than thirteen times heavier than water.

This form of piston is shewn at figure 3; here AA represents a cylindrical vessel, open at the top and closed at the bottom, so as to leave a vacant space of about six inches, and this space I fill with mercury or other substance, to a height corresponding with the pressure of the steam (where steam is employed), or of the water, where it is used to produce a vacuum. B represents an inner cylinder, closed at the bottom and at the top, and attached to the piston cover O; the object of this cylinder is to economize steam or water, as it occupies the space which would otherwise be filled with steam or water, without in the slightest degree diminishing their useful effect. CC represents the working cylinder which replaces the ordinary piston, and which works loosely and without friction in the mercurial or other packing. DD represent two rectangular plates corresponding in size with the piston cover O, and attached to the piston rod; E shews the steam pipe, while F shews the eduction pipe leading to the condenser.

The action of the Atmospheric Steam Engine is as follows:—Steam of a pressure of (say) 15 lbs. to the inch above the atmosphere is admitted below the piston, which, if it have an internal diameter of 60 inches, forces it upwards with a pressure of 42,400 lbs., the air having been previously expelled through the snifting valve G; the steam is then cut off a little before the termination of the stroke, and the exhausting valve is opened; the steam being now condensed, the atmospheric pressure comes into play; and supposing that each of the three plates ODD be eight feet square, and that a barometer gauge shews a vacuum of 28 inches of mercury, the total pressure on the upper surface of the piston will be as follows:—$96^2 \times 14 \times 3 = 394{,}632$ lbs., or 176 tons. This enormous pressure is obtained by the expenditure of one cylinderful of steam, and if water is employed to produce a vacuum, the same effect will be produced.

I now proceed to explain how I employ water beneath the piston of my Atmospheric Pressure Engine:—I attach a force pump to the same side of the beam as the cylinder, so that as the piston descends with the full force of the atmospheric pressure, the pump delivers its contents into an elevated cistern or stand pipe, having a branch pipe communicating with the bottom of the cylinder; this force pump must be of sufficient capacity to deliver a quantity of water equal to that which is expended in the cylinder at each stroke of the engine; and supposing that this water is raised to a height of 66 feet, an hydrostatic pressure of 28 lbs. on the square inch will be obtained.

Before starting the engine, the cistern must be filled with water, while the weight of the plunger pole and pump rods at the other end of the beam maintains the piston at the top of the cylinder; the attendant now opens the valve communicating with the cistern, and the air which previously filled the cylinder is expelled through the snifting valve G, placed near the top of the cylinder, which is now filled with water; he now closes the water valve and opens the exhaustion valve in the eduction pipe F, and the opening of this valve gives free egress to the water, while the atmospheric pressure at the same instant comes into full play; the piston descends, therefore, with the full force of the atmospheric pressure, and the water escapes at the same time into the engine well. The snifting valve, which is loaded like a safety valve, shuts off all communication with the atmosphere, so that the vacuum beneath the piston must be perfect. The piston being now at the bottom of the cylinder, the exhaustion valve is closed by the plug rod of the engine, and the water valve is opened; the pressure of a column of water 66 feet in height now acts upon the lower surface of the piston, and, combined with the weight of the plunger pole and pump rod at the other end of the beam, raises the piston to the

top

top of the cylinder; thus a complete stroke has been performed, and at its termination the plug rod closes the water valve and opens the exhaustion valve, when the engine becomes automatic or self-acting, and performs its strokes with regularity without the aid of the attendant.

As the engine lifts the water into the cistern when the piston is descending with the full force of the atmospheric pressure, there is in point of fact no consumption of power from this source, because the force expended in raising a certain quantity of water to a height of 66 feet in the down stroke of the engine, is returned to it in the up stroke when it re-acts upon the piston, for the engine has a superabundance of power in the down stroke, equal to lift the water to a much greater height than 66 feet, if necessary.

In employing the Atmospheric Pressure Engine to give motion to machinery where a continuous circular motion is required, either for propelling vessels or carriages or for any other purpose, I use two cylinders, which may be fixed in a vertical, an inclined, or a horizontal position; but I prefer for these purposes to place them in an inclined position, at an angle of from 90° to 100° with each other, so that the piston rods may act upon one crank, the latter angle having been found to be most effective in giving a rotatory motion to the crank by the alternating action of the piston rods, and this form of engine is particularly applicable to machinery where an equable motion is required.

The pneumatic principle is also applicable for driving piles where the ground consists of clay, sand, earth, or gravel. The piles I employ in this case are cast iron cylinders, fitted with an enlarged cap-piece which can be removed when the pile has been driven by the atmospheric pressure. When I apply the mercurial piston to air-pumps, or common lift and force pumps, I use an exhausting cylinder without the inner cylinder B, as in these cases it is unnecessary; as the exhausting cylinder rises, the air or water in the suction pipe follows it and fills the space, and when it descends, the valves open and give free egress to the air or water.

It is evident that by these means I do away with all that friction of rubbing surfaces which absorbs so much power and causes so much wear in the piston and cylinder of an ordinary steam-engine or common pump, and that the cylinders or other vessels that I employ require neither to be bored nor polished, but may be rough castings if of metal, or they may be of wood if that material be preferred; and although, when a vacuum is produced in the exhausting cylinder, the mercury in the inner leg of the cylindrical vessel will necessarily rise in that leg and fall in the outer leg, yet this rise and fall of the mercury is provided for, by leaving a space of about 28 inches above its surface when the cylinder is at the bottom; but as the cylinder rises, the mercury in the annular space must necessarily fall, in order to compensate the displacement of the cylinder, so that in practice it will be found that a less space than 28 inches will be sufficient.

I also claim in this patent the application of mercury to valves, whether for air, steam, or water; the form and arrangement of these valves are similar to the mercurial piston, but the valve is united by a rod which passes through a stuffing box. In the drawing, H represents one of these mercurial valves.

In witness whereof, I have hereunto set my hand and seal, the day and year first above written.

(L.S.) FREDK. S. PEPPERCORNE.

Witness—
JAMES R. INNES GREGG.

This is the specification referred to in the annexed Letters of Registration, granted to Frederick Septimus Peppercorne, this fourteenth day of December, 1859, by me—

W. DENISON.

REPORT.

Atmospheric Pressure Engine.

REPORT.

Royal Mint,
15 *November*, 1859.

SIR,

Having, in compliance with your request, examined and considered the matter stated in Mr. Frederick Septimus Peppercorne's Petition for Letters of Registration for a method of his invention (stated to be new and improved), for the employment of atmospheric power for the purpose of compressing, lifting, or giving motion to machinery, we are of opinion that the prayer of the Petition may be granted.

We have, &c.,
E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents transmitted to us are herewith returned.

[Drawings—one sheet.

ATMOSPHERIC PRESSURE ENGINE

FIG 1

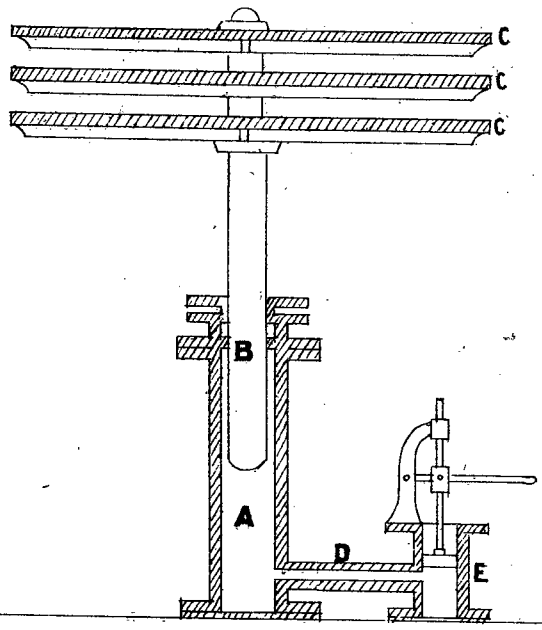


FIG 2

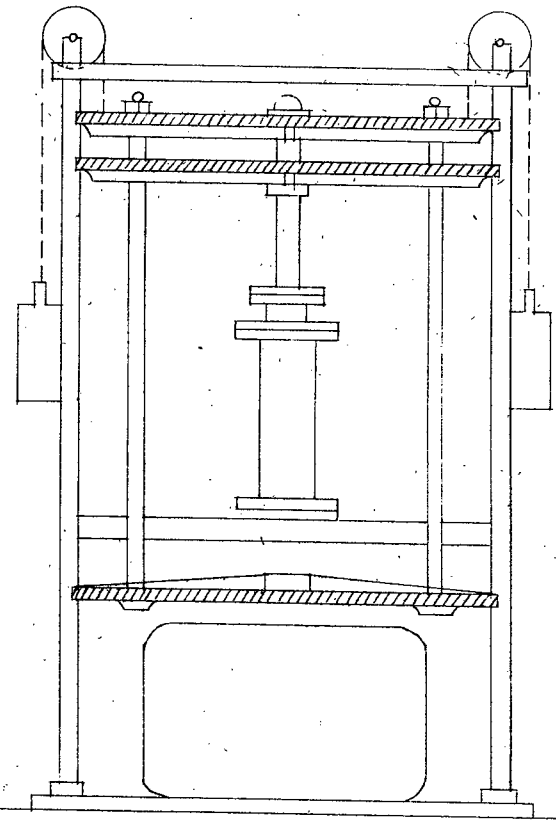
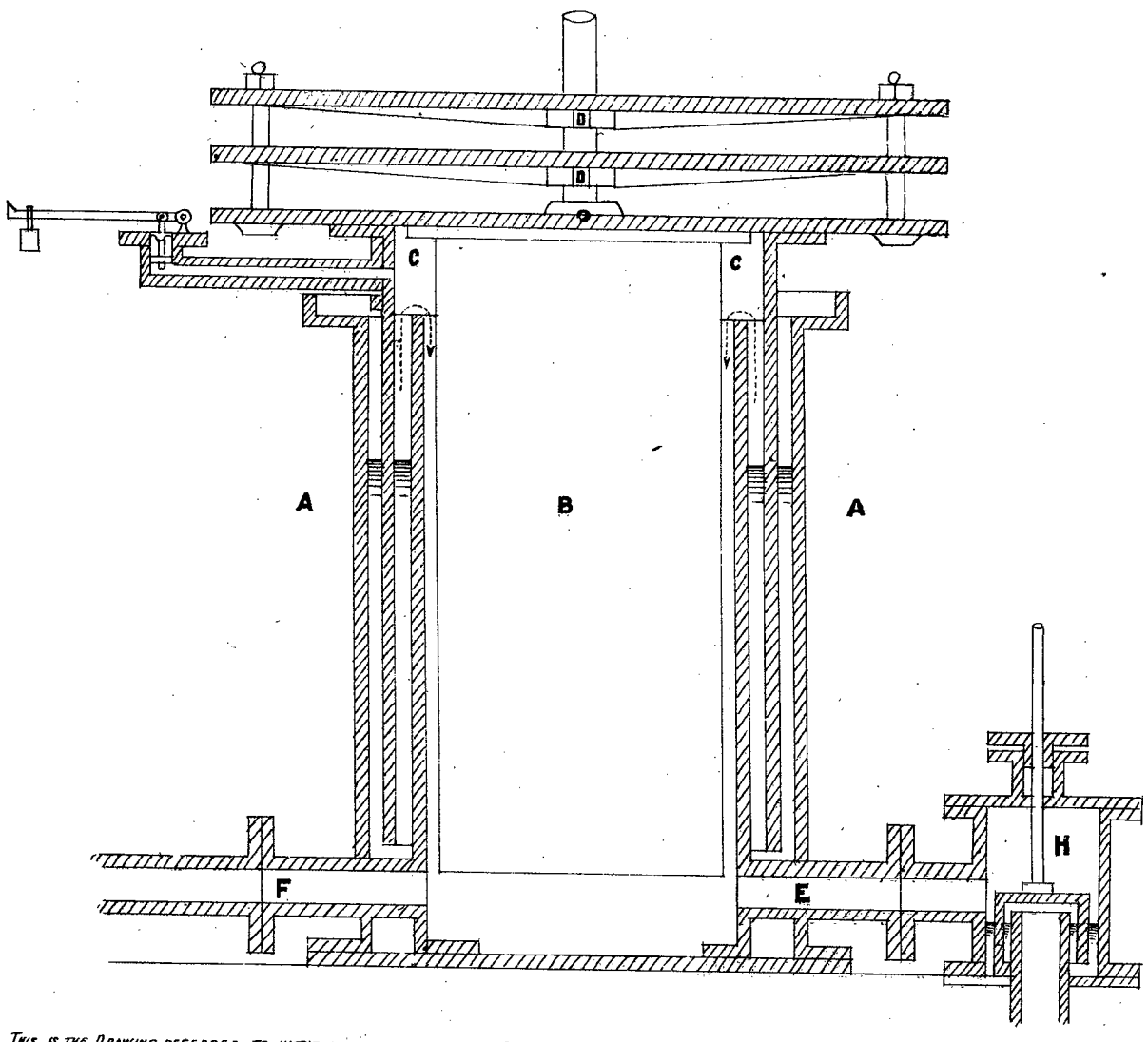


FIG 3



THIS IS THE DRAWING REFERRED TO IN THE ANNEXED LETTERS OF REGISTRATION GRANTED TO FREDERICK SEPTIMUS PEPPERCORNE THIS FOURTEENTH DAY OF DECEMBER 1859

(Sgd) W. DENISON

To accompany my Specification
(Sgd) Fredk S. Peppercorne
1859

A.D. 1860, 18*th April*. No. 27.

IMPROVEMENTS IN OBTAINING LITHOGRAPHC IMPRESSIONS BY THE AID OF PHOTOGRAPHY.

LETTERS OF REGISTRATION to Mr. John Walter Osborne, for Improvements in obtaining Lithographic Impressions by the aid of Photography.

[Registered on the 20th day of April, 1860, in pursuance of the Act 16 Vict., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Walter Osborne, of Melbourne, in the Colony of Victoria, chemist, hath by his Petition humbly represented to me that he is the author or designer of certain inventions or improvements in obtaining Lithographic Impressions by the aid of Photography, that is to say, the employment of a medium such as paper, tinfoil, parchment, or any other flexible surface, whereon to prepare a photographic positive capable of receiving the fatty ink, enabling him to transfer such a positive to a lithographic stone instead of trying to produce the positive directly on the stone itself; the application of transferring ink to a dry gelatinous surface on which a positive image has been impressed, after exposure under a negative, before melting or washing the same; the application of heat to an inked positive, thereby fixing the ink still more firmly on to the altered parts of the gelatinous surface; the use of perchloride of iron in solution of alcohol, ether, sulphuric, hydrochloric, and nitric acid; also acetic, oxalic, and citric acids, either strong or diluted, for cleaning and washing the transfers on paper before laying them on stone, and to harden and give firmness to the altered portions bearing the lithographic transfer ink, together with turpentine and naphtha for the same purposes; also, the use of a solution of soap or lime water to cause the parts of the gelatinous coating to take the ink, to adhere to and hold it more firmly; also, the use of a solution of sugar to mix

with

with and impart to the gelatinous coating the property of more thoroughly yielding to the washing operations having for their end the cleaning of the white parts of the paper; also, the use of tannin or tannic acid to harden and give strength to the altered gelatine; which said improvements are more particularly described in the specification annexed to these Letters of Registration; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said inventions or improvements might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration grant unto the said John Walter Osborne, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said inventions or improvements, for and during the term of fourteen years from the date hereof; to have, hold, and exercise, unto the said John Walter Osborne, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Walter Osborne shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighteenth day of April, in the year of our Lord one thousand eight hundred and sixty.

W. DENISON. (L.S.)

SPECIFICATION of Patent of John Walter Osborne, of Melbourne, in the Colony of Victoria, Chemist, for Invention for certain improvements in obtaining Lithographic Impressions by the aid of Photography.

THE invention has for its object the production of a drawing or design on lithographic stone or metal, in greasy or soapy ink, exactly similar in character and composition to that commonly made use of by lithographers, from which drawing or design an indefinite number of impressions can be printed in the lithographic press in the usual manner. I first prepare a solution of gelatine, metagelatine, gum-arabic, or other gums, isinglass, gun cotton, asphaltum, or resin, or of any gummy or resinous substance whatsoever, dextrine, starch, cellular substance, albumen, caseine or fibrine, or of a mixture of two or more of these substances in water or other suitable solvent, and I add to this solution a variable quantity of a solution of bichromate of potash, or of a chromate or bichromate of any other alkali or base, or of chromic acid, or of any salt of uranium, or any other salt, acid, or chemical substance, capable of giving to all or any of the gelatinous or gummy substances above enumerated, the sensitiveness to the action of light which renders them insoluble after exposure to the luminous influence (actinism) in water or other solvent. In a darkened room, I spread an even layer of this viscid mixture on a flat and even surface of paper, albumenized paper, tinfoil, parchment, stone, or metal, and allow it to dry in the dark; this surface I call the sensitive surface. To add to its smoothness and regularity, I press it in a copper-plate, lithographic, or other suitable press, in contact with the polished face of a steel or other metal plate, or that of a stone or any hard substance, thereby increasing its gloss and density. The sensitive surface being prepared in this manner, and properly defended from the decomposing action of diffused daylight, is now to be exposed under a photographic negative on glass or paper, or in the photographic camera, or in certain cases under a photographic positive or under a common print or drawing, to the action of sunlight or daylight, which, shining through the transparent parts of the superimposed glass or paper picture, acts chemically upon the sensitive surface " upon which it falls, thereby rendering the gelatinous or gummy or resinous substances constituting those parts of the sensitive surface " which have been struck by the luminous rays, insoluble in a greater or less degree in water or other solvent in which they were dissolved, previous to their being spread and dried to form the " sensitive surface " on the paper, stone, or metal, as above described. The sensitive surface having received the proper degree of exposure to light under the photographic negative or positive, or in the photographic camera, the length of time required varying greatly according to the brightness of the weather, the transparency of the superimposed picture, or the sensitiveness

tiveness of the sensitive surface, is now evenly to be covered with a greasy or soapy ink, similar in composition to that known as transfer or retransfer ink among lithographers. This ink, or fatty or resinous matter, may be applied to the whole surface in a state of solution in spirits of wine or turpentine, or such menstra, or with a dabber or brush, or by means of a lithographic ink roller, or by passing it through a copper-plate or other suitable press, in contact with a metal plate or other suitable surface, which has been inked in or had an even or uniform layer of ink of the above-mentioned kind, or any other fatty or resinous matter, distributed evenly over its surface, by means of a lithographic ink roller charged with the aforesaid ink. The greasy ink, however applied, will attach itself, or be imbibed or retained by those parts of the sensitive surface which have been subjected to the luminous action; and the action of either hot or cold water, or of the solvent, of whatever nature it was, in which the substances constituting the sensitive surface were dissolved previous to their being spread upon the paper, stone, or metal, will be to remove the unaltered parts of the gelatinous or gummy coating, and to leave unchanged those parts of the sensitive surface which correspond to the transparent portions of the photographic negative or positive under which it had been exposed, the same parts as those which now retain the ink. I, therefore, immerse the sensitive surface in water of various temperatures, or other solvents, or cause such liquids to flow over it, or damp the sensitive surface after exposure, with a brush or sponge charged with water or other appropriate solvent for the unaltered parts of the sensitive surface; or if it be on paper, I swim it on the surface of water until the substances composing the sensitive surface swell up in all those parts where the light has not acted, and these softened gelatinous or gummy or resinous substances are subsequently more or less perfectly removed, with the ink which lies on them, by exposure to a stream of running water or other solvent, either hot or cold. The result of this final washing will be, to have the desired drawing or design on the surface of the paper, stone, or metal, in the greasy ink before mentioned, which having attached itself firmly to the altered parts of the sensitive surface, is not affected by the water used in washing. From this drawing or design, if on stone or metal, copies may be printed directly in the lithographic press in the usual manner, or an impression may be made on lithographic transfer paper, and a retransfer made therewith on a fresh stone or plate; or if the drawings or designs be on paper, it may be at once used as the impression or transfer paper just mentioned, and a transfer produced therewith on a fresh stone or plate, by inserting it thereon, and passing it through the lithographic press in the usual manner practised by lithographers. I will now describe a process which I find most successful at present, the same being more particularly applicable to the reproduction of maps and plans, by printing them in the usual way, from a delineation on the lithographic stone, which has been executed thereon, through the instrumentality of light, or in other words, by photographic means. This process consists in the following operations:—First, I take a negative on glass prepared by the collodion or any other well known photographic process, bearing to the original map or plan the required ratio as regards scale or size, the mode of doing which is well understood. It will be only necessary to bear in mind that all the black lines on the original drawing or plan are represented by transparent lines on the negative, and every space left white on the original document is represented by an opaque place corresponding to it on the negative. I then prepare two solutions, one of bichromate of potash, consisting of water saturated with that salt; the other solution consists of gelatine dissolved in water, in the proportion of four hundred grains of the former, melted by a gentle heat in three fluid ounces of water. These two solutions are mixed in the following proportions: gelatinous solution, two parts; bichromate solution, three parts by bulk, and this in mixture constitutes the sensitizing solution. I then prepare some albumenized paper, by simply agitating the whites of eggs until all the foam caused thereby has subsided, and the liquid flows clear. The best photographic positive paper is now to be covered on one side with the albumen, either by floating the paper upon the albumen for a few minutes, or by brushing or sponging the albumen on the paper, which is then to be dried, and can, if it is thought expedient, then receive a second coating of the albumen; as soon as dry, the paper is placed with its face or coated side in contact with a highly polished steel or copper plate (such a plate as engravers require to engrave upon), and the paper and the plate are both passed together through a copper-plate or lithographic press, after which, the paper will be found to come out beautifully smooth, and glazed on the albumenized side, free from all creases and folds, and possessed of a density and regularity of surface admirably fitting it for the next operation. I then take a quantity of the sensitizing solution described above, and warm it sufficiently so as to render it perfectly fluid. I then pour it into a tray or flat dish of a suitable size. Upon the upper surface of this liquid, a piece of the albumenized pressed paper (previously described) is laid with its prepared side downwards, or in contact with the fluid in the dish or tray, and this operation must be accomplished in such a way as to ensure the exclusion of all air bubbles from between the paper and the fluid; after a lapse of a minute or two, the sheet of paper may be lifted off by one of its corners, and hung up to dry in a dark and warm room. This paper when perfectly dry, is to be passed through a copper-plate printing press, in the same manner as before described for the albumenized paper, so as to give it the finest possible surface, and the greatest possible density, uniformity, and gloss. This operation completes the preparation of the sensitive paper, and is of the greatest possible importance. The paper will be of a clear yellow colour. I now return to the negative picture on glass, wax, papers, &c., before described, which has been taken off the original map,

map, plan, or drawing of the desired size, and bearing that proportion to the original which it is desired the lithographic prints or impressions should do. Under and pressed into close contact with the negative, in a pressure frame (identical in construction with those used by photographers for taking their positive prints), a sheet of the sensitive paper, as above described, is placed, and the whole is then exposed to the sunlight or daylight, in such a way that the same, shining through the transparent part of the negative, shall strike the sensitive paper below it. The effect of this exposure will be to alter chemically those parts of the sensitive surface which have been illuminated, turning them from a clear yellow to a brown, and altering at the same time their solubility in water, hot or cold. The apparent result of this operation will be the production of a positive picture in brown on a yellow ground, the same being a sharp and accurate imitation of the original map or drawing, and bearing the required proportion to it. A plate of polished steel, by preference—but copper or zinc plates, or lithographic stones, may be used—is next to be covered with a regular coating of lithographic transfer, with a lithographic ink roller, in such a way that the whole presents one even surface of ink, the plate being the full size of the positive print just made. This inked plate is to be laid with its inked face upwards upon the table of the printing press, and upon it with the sensitive surface downwards and in contact with the ink, the exposed print upon the sensitive gelatinous coating is to be laid, and both plate and paper to be pressed together through the press, taking care to shield the sensitive surface as much as possible from light the whole time. The effect of the operation will be to apply evenly, and with greater force, to the print, a regular and dense coating of the ink. After this operation, it may be found necessary to warm the plate slightly to make the paper separate from the inked surface, the paper, when this is accomplished, shewing a surface of ink evenly spread over the whole of the sensitive gelatinous coating, hiding from view the positive print in brown before spoken of, of which the action of the light shining through the transparent parts the negative has impressed upon it. The inked positive photographic print on the sensitive gelatinous surface is to be carried back into the darkened room, and there it is placed swimming upon hot water in such a way that the paper side shall be downwards and in contact with the water, and the sensitive exposed and inked side shall be upwards, and not wetted directly by the water. The effect of this operation is manifold. The ink, which is of a greasy nature, acted upon by the heat, attaches itself more firmly to the altered parts of the gelatinous surface; the water percolates by degrees through the paper, and it and the heat together effect the coagulation of the albuminous coating which is next to the paper, thereby preventing it from being subsequently washed away by the washing process to which the paper may be subjected, for coagulated albumen is not soluble in hot or cold water. The water from below percolates still further, and tends to swell and raise the unaltered portion of the gelatinous sensitive surface, thereby separating the ink, which is to come away, still further from those parts of the paper which must be eventually rendered clean and white. The water also, by wetting the paper from the back, deprives it of all affinity for the greasy ink, and keeps it from being subsequently soiled. The print should swim upon the hot water until the positive picture again becomes visible through the ink, which it will do in a short time, in consequence of those parts of the sensitive surface which have been acted upon by light absorbing the ink to a certain extent, thereby becoming duller than those places where the ink lies upon unaltered gelatine. The print is next to be totally immersed in cold or hot water for a short time, and finally to be washed under a running stream from a tap, the cleansing to be aided, as the case may require, by means of a little gentle friction applied with a brush or sponge. The effect of this final washing will be to remove the gelatinous and inky matter from every part of the surface which has not been reached by the luminous rays; in other words, from all parts of the paper corresponding to the dark or opaque parts of the negative; whilst those parts of the gelatinous surface which were changed and altered by the light shining through the transparent parts of the negative, are unaffected by the washing, and adhere to the paper, retaining their coating of ink which they received in the copper-plate printing press. This paper print, which is in fact a lithographic transfer, in the technical sense of the word, is now, after being dried, fit to be handed to the lithographic printer, who transfers it to the stone in the ordinary way practised by lithographers drawing on lithographic transfer paper made by the hand of an artist, from which transfer to the stone any number of copies can be printed.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood that I do not confine myself to any of the details, so long as the character of the invention be retained, nor do I confine myself to any of the manipulations described, as some of them may be varied without varying the character of the invention; and although I have described certain solutions to be used for the preparation of the sensitive surface, I do not limit myself to them, as in some cases they may be altered altogether, or used with the addition of certain materials particularly described in the claim; and I would remark that, although I have spoken of obtaining copies of maps and plans, my process is equally applicable to obtaining copies from nature and other photographic pictures, whether positive or negative; nor do I restrict myself to producing the greasy picture, drawing, or design, always upon the altered parts of the sensitive surface, as it may also be produced upon the lithographic stone, under the unaffected part of the sensitive surface, by removing the said part completely, with water or other solvent, and having rubbed or rolled in the appropriate ink,

Lithographic Impressions by the aid of Photography.

ink, etching away, or removing, by a weak acid, those portions of the altered sensitive surface still upon the stone, and through which the ink will be found not to have penetrated; neither do I restrict myself to inking the sensitive surface, after exposure under the negative or positive, before washing or removing the whole or part of the altered parts of such surface; but what I claim is, first, the means herein described for obtaining a delineation or drawing in such form that any number of copies may be printed therefrom, in a lithographic press; secondly, I claim the means described for obtaining delineations or drawings on stone or metal to be printed from, whether such had been reduced or enlarged to the size required in the camera or not; and I also claim the employment of a medium such as paper, tinfoil, parchment, or any other flexible surface, whereon to prepare the photographic positive capable of receiving the fatty ink, enabling me to transfer such a positive to the stone, instead of trying to produce the positive directly on the stone itself. I also claim the application of liquid albumen to the surface of such paper, to render it more dense and smooth, and impermeable to the solution of gelatine and other chemicals to be applied to it afterwards; the said coating of albumen, after coagulation, as described in the latter stages of my process, acting (inasmuch as it cannot be washed away) as an adhesive coating, causing the paper, during the operation of transferring to the stone, to adhere to the same, in a manner highly beneficial, in fact, almost indispensable for the successful termination of this last strictly lithographic operation. I also claim the glazing of both the albumenized and gelatinized surfaces by means of the steel plate, which renders them particularly even and smooth and more dense, and admits of sharper pictures being obtained, in consequence of the more perfect contact obtainable between the negative and the prepared paper. I also claim the application of transferring ink to a dry gelatinous surface on which a positive image has been impressed, after exposure under a negative, before wetting or washing the same; also, the application of heat to an inked positive, thereby fixing the ink still more firmly on to the altered parts of the gelatinous surface. I also claim the use of perchloride of iron in solution of alcohol, ether, sulphuric, hydrochloric, and nitric acid, also acetic, oxalic, and citric acids, either strong or diluted, for cleaning and washing the transfers on paper before laying them on stone, and to harden and give firmness to the altered portions bearing the lithographic transfer ink, together with turpentine and naphtha, for the same purposes; also, the use of a solution of soap or lime water to cause the parts of the gelatinous coating to take the ink, to adhere to and hold it more firmly; also, the use of a solution of sugar, to mix with, and impart to, the gelatinous coating the property of more thoroughly yielding to the washing operations having for their end the cleaning of the white parts of the paper; also, the use of tannin or tannic acid to harden and give strength to the altered gelatine. I also claim the modification of the process which I have described, which consists of inking in the altered parts of the gelatinous or resinous substances which have been altered by exposure to light, after having removed the whole or part of the unaltered portions of the sensitive surface, by means of water or other suitable solvent; and I also claim the transfer of an outline map, plan, design, or document, printed or painted on paper or other substance, or any objects produced by photographic means on to stone or metal plate, by the intervention of the photographic processes above described, so as to admit of any number of impressions being printed therefrom, such delineation bearing a definite and known relation to the original from which it was taken.

Signed this 10th day of October, in the presence of William Henry Ritchie, of 79, Chancery-lane, Melbourne. J. W. OSBORNE.

This is the specification (contained in this and the preceding eight sheets of paper) referred to in the annexed Letters of Registration granted to John Walter Osborne, this eighteenth day of April, 1860.

W. DENISON.

Lithographic Impressions by the aid of Photography.

REPORT.

Royal Mint, Sydney,
29 February, 1860.

Sir,

Having, in accordance with your request, examined and considered Mr. J. W. Osborne's application for Letters of Registration for certain "improvements in obtaining Lithographic Impressions by the aid of Photography," which he claims as his invention, we have the honor to recommend that Letters be granted for the following improvements, as more fully explained in the specification accompanying his Petition.

The employment of a medium such as paper, tinfoil, parchment, or any other flexible surface, whereon to prepare a photographic positive capable of receiving the fatty ink, enabling him to transfer such a positive to a lithographic stone, instead of trying to produce the positive directly on the stone itself.

The application of transferring ink to a dry, gelatinous surface on which a positive image has been impressed, after exposure under a negative, before wetting or washing the same; also, the application of heat to an inked positive, thereby fixing the ink still more firmly on to the altered parts of the gelatinous surface.

The use of perchloride of iron in solution of alcohol, ether, sulphuric, hydrochloric, and nitric, and also acetic, oxalic, and citric acids, either strong or diluted, for cleaning and washing the transfers on paper before laying them on stone, and to harden and give firmness to the altered portions bearing the lithographic transfer ink, together with turpentine and naphtha for the same purposes; also, the use of a solution of soap or lime-water, to cause the parts of the gelatinous coating to take the ink, to adhere to, and hold it more firmly; also, the use of a solution of sugar, to mix with and impart to the gelatinous coating the property of more thoroughly yielding to the washing operations having for their end the cleaning of the white parts of the paper; also, the use of tannin or tannic acid, to harden and give strength to the altered gelatine.

The remainder of the improvements claimed have already been used.

We have, &c.,
E. W. WARD.
J. SMITH.

The Honorable
The Colonial Secretary.

A.D. 1860, 21*st May*. No. 28.

IMPROVEMENTS IN THE MANUFACTURE OF PIPES.

LETTERS OF REGISTRATION to William Acland D. Anderson, for Improvements in the Manufacture of Pipes.

[Registered on the 21st day of May, 1860, in pursuance of the Act 16 Vict., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS William Acland Douglas Anderson, late of ——, in the Colony of Victoria, Esquire, but now of London in England, hath by his Petition humbly represented to me that he is the assignee of one Alfred Fauvin Jaloureau, of Paris, in the French Empire, who is the inventor of a certain invention for improvements in the manufacture of Pipes, which is more particularly described in the specification and drawing hereunto annexed; and that for the said invention, Letters Patent for the United Kingdom of Great Britain and Ireland were, on or about the twenty-third day of September, in the year one thousand eight hundred and fifty-eight, granted by Her Most Gracious Majesty Queen Victoria, to the said Alfred Fauvin Jaloureau, for the term of fourteen years from the day of the date thereof, and that the said invention, and the full and exclusive benefit and advantage thereof, and of the said Letters Patent, so far as relates to the Colonies or British Dependencies in Australasia and New Zealand, or any of them, and all the estate and interest of the said Alfred Fauvin Jaloureau therein and thereto, have, by the said Alfred Fauvin Jaloureau, been assigned unto the said William Acland Douglas Anderson, his executors, administrators, and assigns, and are now vested in him; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria,

Improvements in the Manufacture of Pipes.

toria, number twenty-four, the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a certain period in such Petition mentioned or referred to: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said William Acland Douglas Anderson, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, from the day of the date of these presents until the twenty-third day of September which will be in the year one thousand eight hundred and seventy-two; to have, hold, and exercise unto the said William Acland Douglas Anderson, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, from the day of the date of these presents until the twenty-third day of September which will be in the year one thousand eight hundred and seventy-two aforesaid: Provided always, that if the said William Acland Douglas Anderson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-first day of May, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

SPECIFICATION of Paul de Castella, of Yering, in the Colony of Victoria, Esquire, for an Invention for Improvements in the Manufacture of Pipes.

The invention relates to a new mode of manufacturing pipes for the conveyance of water and gases, and for enclosing electric telegraphic wires, and other purposes, and also to a mode of strengthening various descriptions of pipes, and rendering them waterproof and stanch. The process of manufacture consists in the superposition, by rolling on a cylindrical mandril, of sheets of paper, cloth, or other fabrics, materials, or tissues, rendered adhesive between each layer by immersion in a waterproof mastic containing bitumen or caoutchouc or other waterproof material.

The pipes are manufactured by means of the apparatus shewn in vertical section in figure 1 of the accompanying drawing. The band of paper, or cloth, or other material, is rolled upon a roller, *a*, of wood or metal, which is placed in front of the machine; a workman then takes one end of the band and conducts it down an inclined plane, *b*, to a cast iron roller or cylinder, *c*, taking care to keep the paper parallel. The cylinder *c* is partially immersed in a vessel or caldron, *g*, containing the waterproof mastic, and heated by a fire in the furnace A. As the perfection of the pipe depends to a considerable extent upon the manner in which the paper or fabric begins to roll round the cylinder, I have placed upon the furnace A an apparatus which permits the paper to present itself to the cylinder *c* at a right angle to the axis of the cylinder. This apparatus consists simply of two rods, *d*, connected together by a bar, *e*, over which the paper passes, and turning on pivots at *f*. When the paper is about to be applied to the cylinder, the bar *e* is advanced towards the cylinder by pushing the rods *d* by hand. The paper is thus regularly applied to and adheres to the cylinder *c*, which is turned round by a handle, so as to carry the paper down into the mastic, and to present its end at the upper part of the cylinder. An iron mandril, *h*, shewn in elevation in figure 2, and in section at figure 3, is now employed; its surface is greased, and it is inclosed in a sheath of paper, *i*, shewn in figures 4 and 5. The operation of placing this sheath on the mandril may be facilitated by employing a conical piece of wood or other material, in a similar manner to that in which the cotton wicks of argand lamps are placed upon the wick-holder. The bearings or gudgeons of this mandril are placed in hooks or eyes at the ends of two rods *k*, which are raised to the required height by means of a lever, *l*, and a chain and handle,

handle, *m*, and the axis of the mandril is introduced into the forks or guides *n* so that the mandril may rest upon the cylinder *c*. The cylinder *c* and mandril *h* being thus arranged, the edge of the paper is detached from the lower cylinder and applied to the mandril *h*, to which it adheres. Two workmen now turn the two cylinders by means of handles in contrary directions, so as to cause the paper to pass into the bath of mastic, and then to wind upon the mandril *h*. When the whole length of paper has been unwound from the roller *a* and wound upon the mandril, the mandril with its casing of bitumenized paper is lifted out of the guides or supports *n*. Figure 6 is an elevation, and figure 7 is a section of the casing or pipe thus produced.

The mandril with its casing is then carried to a smooth plane table of stone or other suitable material, shewn at B in figure 1, which is covered from time to time with a layer of fine sand. Two workmen take the mandril by its bearings, and roll it upon this table, until the pasty bitumen is covered with a thin layer of sand, and the pipe has acquired a suitable cylindrical form or external surface. The mandril with the bitumenized paper tube or casing is then coated by rotation with melted bitumen or mastic contained in a caldron similar to that shewn in figure 1, so as to receive an external coating of bitumen of about an eighth of an inch thick, or more or less. To give to all the pipes an equal layer or coating of mastic, I fix upon the axis of the cylinder which plunges in the mastic a toothed wheel, *p*, flattened at one point of its circumference, as shewn in figure 8. This wheel in its rotation is in gear with the pinion *o*, on the mandril, which is stopped when it meets the flattened part of the wheel. This stop enables the thickness of the mastic to be regulated in a constant manner. As soon as the external coating has been given, the mandril is again removed from the supports, and again rolled upon a table similar to that shewn at B, so as to cover the pipe with a layer of sand, which mixes with the mastic and increases the strength of the pipe. To accelerate the cooling of the pipe, a shower of water may be allowed to descend upon it. The pipe is now removed from the mandril, by placing it vertically and giving it a slight blow or shock, when the pipe slips off it. The paper sheath which is placed on the mandril at the commencement of the operation facilitates the removal of the pipe. To keep the pipe in shape a wooden mandril is inserted in it, and it is placed in a vertical position until quite dry and hard. The paper sheath is now removed from the interior of the pipe, by means of a wire bottle-brush or other suitable means, and the interior is lined with a layer of waterproof mastic, so as to glaze or varnish the interior, and render it inpermeable to water and gas. For this purpose the pipe is placed vertically, and its lower end is closed by a plug or otherwise, and it is partially filled with melted bitumen, which is afterwards poured out, and the pipe is allowed to drain in a vertical position. The interior of the pipe is thus coated or lined with the impermeable mastic, as indicated in the section, figure 9. The pipe is now finished and ready for use, and consists of a body of bitumenized paper rolled up and having an internal lining of waterproof mastic, and an external coating more or less thick of bitumen and sand. The process of manufacture is applicable to paper in separate sheets, or in a continuous sheet, and to all sheets or substances capable of being rolled up, such as paper, cloth, sheet iron, veneers of wood, wire, cloth, copper, zinc, and in general, any material which by being wound or rolled up upon itself, can be cemented together by a bitumenous or caoutchouc mastic. The same mode of manufacture by cylindrical rolling up of bitumenized paper or cloth, or other suitable material, is also applicable as an auxiliary means of strengthening, preserving, and improving pipes of earthenware, glass, wood, or metal; thus, pipes of sheet iron may be surrounded with paper wound on them without being rivetted, or soldered, or welded; it is sufficient to coat them with bitumenous mastic, and to envelop them with a sufficient number of layers of bitumenized paper, cloth, or other suitable substance. These pipes may be manufactured of various lengths and diameters, and united by various means, and branches may be connected to them in different manners. Figures 10, 11, and 12, shew how these pipes may be joined together end to end. A collar or short tube of sheet iron or zinc, or other suitable material, *r*, provided with projecting strips or wings, *s*, is inserted into the ends of the two pipes to be joined, the wings *s* are bent as shewn in figure 10, and the junction is surrounded with a collar or socket, *t*, cut off from a larger pipe

pipe of bitumenized paper; a quantity of the bitumenous mastic is then poured in at a hole, *u*, which is afterwards closed or plugged. The mastic fills the space between the socket *t* and the two pipes, and makes a strong water-tight joint.

Branch pipes are connected in the following manner, as shewn in figures 13, 14, and 15:—A hole is bored in the pipe *v*, and a caoutchouc collar, *x*, with two flanges, is pushed into it, so that one flange or edge of the collar applies itself to the interior and the other to the exterior of the pipe; a collar, *w*, of iron or other suitable material made in two pieces is placed round the pipe and bolted together; a short piece of pipe, *y*, is then screwed into the collar *w*, and thus forced into the caoutchouc collar *x*.

The space between the collar *w* and the pipe *v* may be filled up with bitumenous mastic. A leaden or other pipe may be soldered or connected to the pipe *y*. Where bends are required, they may be conveniently made of cast iron or other material commonly employed for pipes; thus, figure 16 is a section of a cast iron bent pipe 1 formed with a socket at each end; the two bitumenous paper pipes 2 and 3 are inserted in the two sockets, and bitumenous mastic is poured into the spaces 4 4 between the pipes and the sockets; a neck or contraction may be made in the sockets, so that the mastic in lodging there may give all the required solidity and security to the junctions. In some cases, and particularly when pipes of larger diameter are employed, I connect them in the manner shewn in figure 17; *a a a* are a series of pipes constructed in the manner hereinbefore described, and placed together end to end; these pipes are enclosed in another similar series of larger pipes, *b b b*, also manufactured as hereinbefore described, and shewn in section in the figure. The ends of the pipes *b b* are placed in the middle of the pipes *a a*, so that the pipes "break joint" with each other, and leave an intermediate annular space, *c*, of half an inch or more or less; this space *c* is then filled with a bitumenous cement, or Roman cement, or Portland cement, or other suitable cement, which is poured in through holes, *d d*, in the pipes, *b b*, which serve to confine the cement in the same way as the shorter pipe or socket *t* in figure 10. Figure 18 is a transverse section of the compound pipe thus produced, which possesses great strength, and may be made of a yard or more in diameter if required.

The bitumenized paper pipes, when jointed with bitumenous or other suitable mastic or cement, may be employed for the conveyance of many acid and other liquids and gases, which would corrode cast iron or wrought iron pipes.

Having thus described the nature of my said invention, and in what manner the same is to be performed, I wish it to be understood that what I claim is—

First—The manufacture of pipes, of sheets of paper, cloth, or other fabrics or materials superposed by rolling or winding in a cylindrical form, such sheets being rendered adherent during the progress of the rolling or winding by means of a waterproof mastic, and more particularly by means of a bituminous or caoutchouc mastic as hereinbefore described.

Second—The application of the process of manufacture hereinbefore described, to the incasing of pipes or tubes of earthenware, glass, wood, or metal, so as to strengthen or preserve them, or render them stanch and waterproof.

Third—The mode hereinbefore described of manufacturing rolled bitumenous pipes, consisting of a body of paper, cloth, or other suitable material, in a sheet or sheets, and having an internal lining of waterproof varnish, and an external coating of bitumen and sand.

In witness whereof, I, the said Paul de Castella, have hereunto set my hand and seal, this twentieth day of March, in the year of our Lord one thousand eight hundred and sixty.

PAUL DE CASTELLA. (L.S.)

This is the specification referred to in the annexed Letters of Registration granted to William Acland Douglas Anderson, this twenty-first day of May, 1860.

W. DENISON.

REPORT.

Improvements in the Manufacture of Pipes.

REPORT.

Royal Mint, Sydney,
25 *April*, 1860.

SIR,

Having examined and considered the Petition of Mr. Paul de Castella, under the Act of Council 16 Victoria, No. 24, for Letters of Registration in favour of William Acland Douglas Anderson, for an invention in the manufacture of Pipes, of which he is assignee,—we have the honor to recommend, that the necessary Letters be granted to secure to Mr. Anderson the sole use and enjoyment of the invention until the 23rd September, 1872—the day on which the original patent will expire.

We have, &c.,
E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

FIG.10

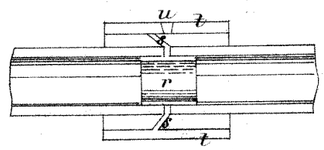


FIG. 1

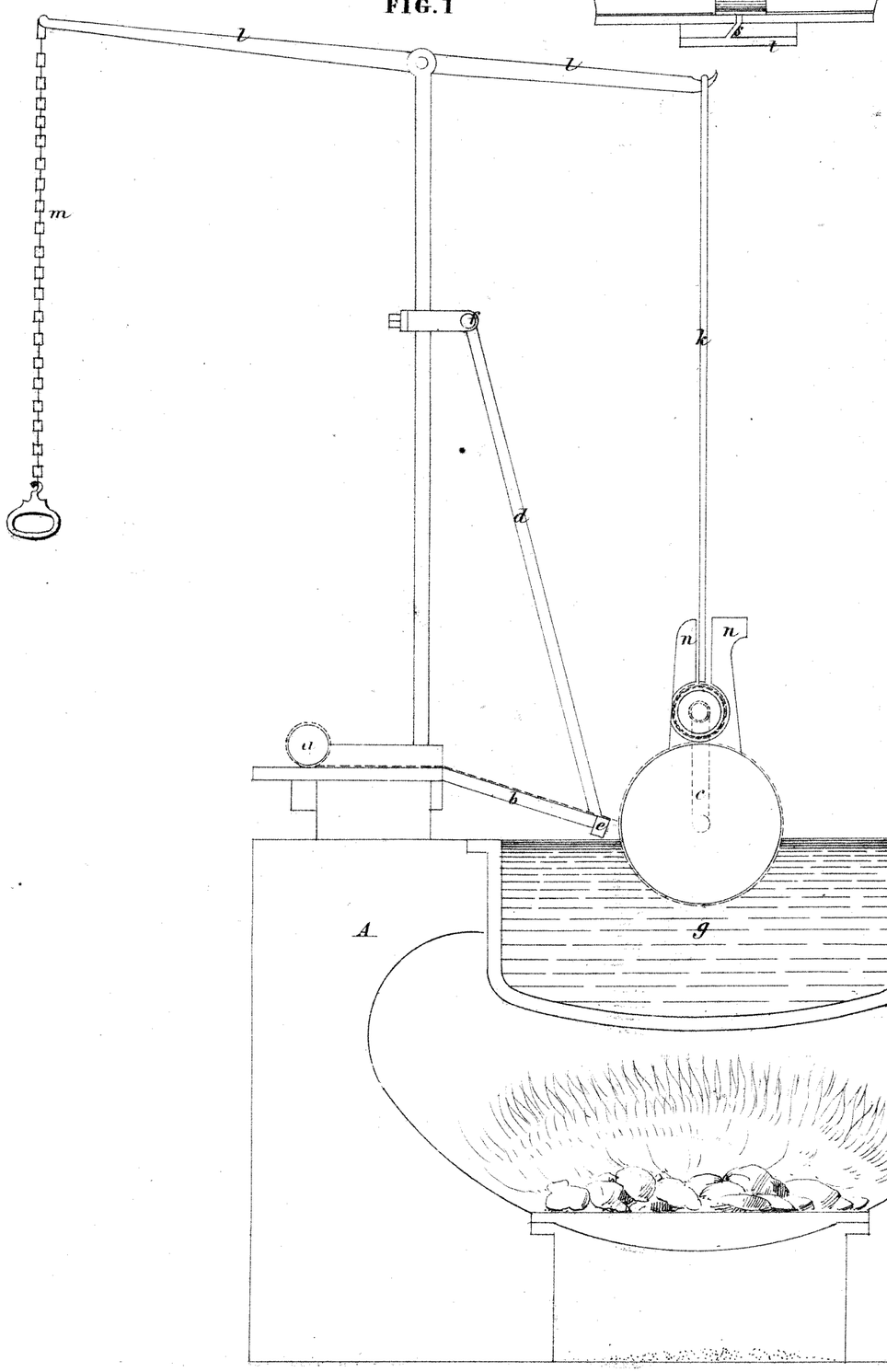


FIG. 11

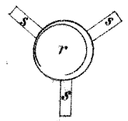


FIG. 12

FIG. 13

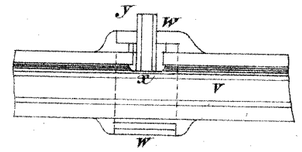


FIG. 14

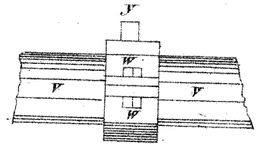


FIG 15

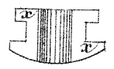


FIG. 6

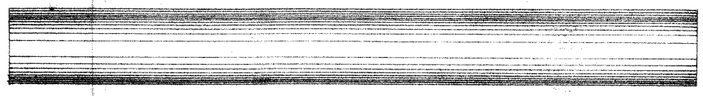


FIG. 7

FIG. 9

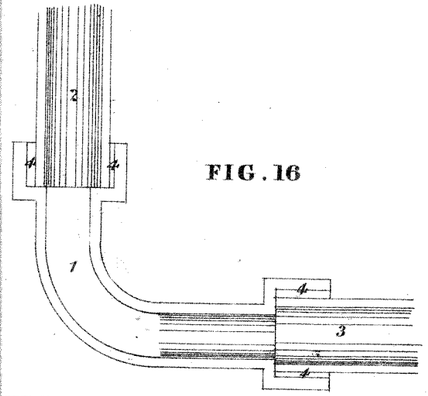


FIG. 16

FIG. 2

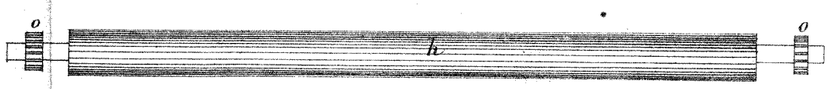


FIG. 3

FIG. 4

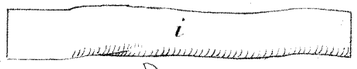


FIG. 5

FIG 8

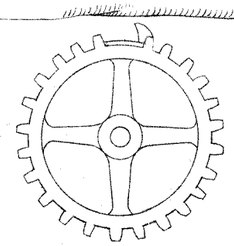


FIG. 17

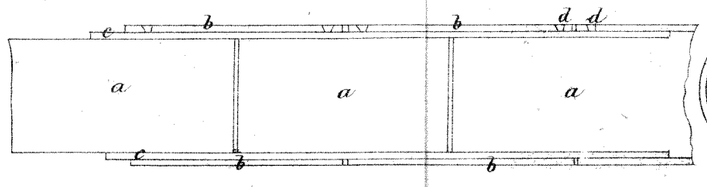


FIG. 18

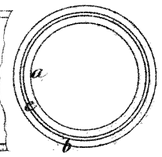
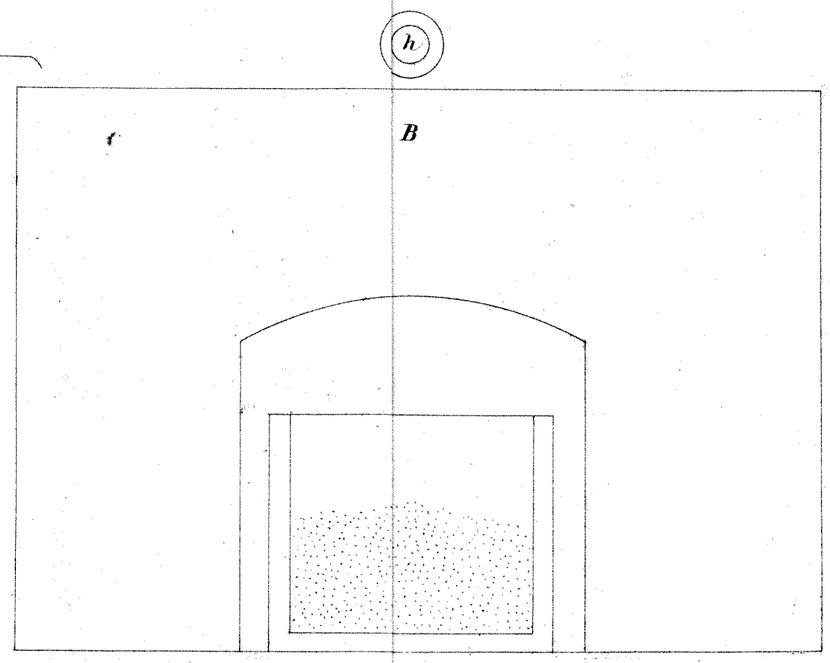


FIG.1



This is the Drawing referred to in the annexed Letters of Registration granted to William Acland Douglas Anderson this twenty first day of May 1860

Signed

W. Denison

A.D. 1860, 21*st May*. No. 29.

TOBACCO FOR DESTROYING VERMIN UPON SHEEP, &c.

LETTERS OF REGISTRATION to George Jaques, for an improved preparation of Tobacco for destroying vermin and removing certain cutaneous diseases upon Sheep and other animals.

[Registered on the 21st day of May, 1860, in pursuance of the Act 16 Vict., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS George Jaques, of Somerville, in the County of Middlesex, and State of Massachusetts, United States of America, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an improved preparation of Tobacco for destroying vermin and removing certain cutaneous diseases upon Sheep and other animals, which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public

good,

good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said George Jaques, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said George Jaques, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said George Jaques shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-first day of May, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, GEORGE JAQUES, of Somerville, in the County of Middlesex, and State of Massachusetts, United States of America, send greeting:

WHEREAS I am in possession of an invention for "an improved preparation of "Tobacco for destroying Vermin and removing certain cutaneous diseases upon Sheep and "other animals," and have petitioned His Excellency the Governor General of New South Wales to grant unto me, my executors, administrators, and assigns, Letters of Registration for the same: Now know ye, that I, the said George Jaques, do hereby declare that the following specification fully describes and ascertains the nature of the said invention, and the manner in which the same is to be performed—that is to say:—

Decoctions of tobacco have heretofore been employed for destroying parasitic animals; and large quantities of this plant are imported into sheep-growing countries, at considerable cost of freight and transportation, for this purpose. To save this expense of transportation, and to relieve the farmer of the disagreeable and tedious labour of preparing the decoction, I have invented a new article of manufacture, consisting of a preparation of tobacco in a highly concentrated form—the method of preparing which I will now proceed to describe.

Tobacco of any description—preference being given to that which is very strong—is placed in a still, and with a quantity of water sufficient to cover it. Heat or steam is applied, and the still is run until a strong solution of the tobacco is formed and has become concentrated by the evaporation of a portion of the water which is distilled over, carrying with it nicotine and volatile oils, which are condensed, and afterwards collected by a suitable process.

The contents of the still are now discharged, the liquid drawn off, and the residuum pressed to extract all the juice, which is then added to the solution. The extract thus obtained may be concentrated by evaporation, if thought necessary. To the extract is added the nicotine and volatile oils which have been produced or separated by distillation.

The preparation thus contains all the active principles, volatile as well as soluble, which can be obtained from the tobacco, and may be used without further preparation, and be transported at a comparatively small expense.

I have also made use of alcohol, ether, and alkaline solutions, in place of water, but prefer the aqueous process, on account of its cheapness.

What I claim as my invention, and desire to secure by Letters Patent as a new article of manufacture is, the within-described preparation of tobacco, consisting of the soluble and volatile portions as set forth.

In witness whereof, I, the said George Jaques, have hereunto set my hand and seal, the eleventh day of January, in the year of our Lord one thousand eight hundred and sixty.

GEORGE JAQUES.

Witnesses:—
THOS. R. ROACH.
THOS. L. GLOVER.

This is the specification referred to in the annexed Letters of Registration granted to George Jaques, this twenty-first day of May, 1860.

W. DENISON.

REPORT.

Tobacco for destroying Vermin upon Sheep, &c.

REPORT.

Royal Mint, Sydney,
25 *April*, 1860.

SIR,

Having examined and considered Mr. George Jaques' Petition, under Act of Council 16 Victoria, No. 24, for Letters of Registration for his improved method of preparing an extract of tobacco "for destroying vermin and removing certain cutaneous diseases on Sheep and other animals," we have the honor to recommend that the prayer of the Petition be granted.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1860, *9th July.* No. 30.

AMALGAMATOR.

LETTERS OF REGISTRATION to B. B. Thayer, of the City and County of San Francisco, and State of California, for an Amalgamator.

[Registered on the 11th day of July, 1860, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Benjamin B. Thayer, of the City and County of San Francisco, and State of California, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a Machine for amalgamating Gold and Silver Ores, the particulars of which invention are more particularly set forth and described in the specification and drawing annexed to these presents; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from

competent

competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Benjamin B. Thayer, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Benjamin B. Thayer, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Benjamin B. Thayer shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this ninth day of July, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

SPECIFICATION of B. B. Thayer's Amalgamator.

Be it known that I, B. B. Thayer, of the City and County of San Francisco, and State of California, have invented a new and useful machine for amalgamating Gold and Silver Ores, and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same; reference being had to the annexed drawings, making a part of this specification, in which fig. 1 is a front elevation of the machine, with the pan and its adjuncts shewn in section; fig. 2 is a side view of the same; fig. 3 is a top view of the pan; fig. 4 is a view of the working face of the muller; fig. 5 is a top view of the centre of the muller whereby the same is driven.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation. The pan A is of cast iron, its sides are slightly bevelled out; the bottom of the pan has a groove, B, in annular form, at about one-fourth of the distance from the centre to the side; a hollow cone, C, is cast in the centre of the pan; on the top of said cone there is a step, D, for the bottom of upright shaft, E, and in the same cone there are discharge apertures FFF; on the outside of the pan there are several discharge orifices, N, at various heights; and diametrically opposite to these, there is another orifice, G, for the purpose of discharging the amalgam; the vertical shaft E receives a rotary motion by means of the bevel wheels HH, and pulley I, or any other suitable and equivalent gearing; to the lower part of said shaft E a driving clutch, J, is fitted, by means of a feather let in the shaft E, on which the clutch J has freedom to raise or fall whilst participating of the rotary motion of the shaft E; the driving clutch J has two projecting teeth, with vertical driving faces sloped backwards, in order that it may engage and drive in only one direction the corresponding teeth cast on the top of the muller centre K; this muller centre is a piece that may be bolted on or cast with the muller shoe L, to which it communicates the rotary motion of shaft E. The muller shoe, L, fig. 4, is made of hard, white iron, and has its working face cut out in rectangular or otherwise shaped grooves, as shewn in figure 4, or their equivalent. Four copper plates are placed vertically, as shewn in fig. 3, and 1 at MMM.

The operation of the machine is as follows:—A certain quantity of quicksilver, as determined by practice, having been introduced in the pan, the ores, in a pulverized state, and mixed with water, are fed to the pan, the upper discharge orifices, F, in the central

cone

cone being at first the only ones kept open, in order to run off the surplus water and the non-auriferous ores and earths, which, being lighter, will float near the surface, whilst the precious particles will by their superior gravity descend to the bottom of the pan.

It will be noticed that the curved grooves in the muller are not concentric with the centre of the pan, but stand at an angle, and that the space swept over by any one groove is overlapped by the spaces swept over by the grooves immediately on each side of the former one. This has two effects. The one is to preserve a uniform wear to the bottom of the pan, as well as to the working face of the muller; and the other, that it produces a sort of shearing motion on the gold-bearing ores which happen to engage in the grooves, and thoroughly incorporates them with the mercury. The hooked form of each wing of the muller has a further tendency to triturate the ores with the quicksilver, by bringing back towards the centre of the pan those particles which the centrifugal force of the rotary motion may drive towards the outer circumference of the pan. The four vertical copper plates MM are coated over with quicksilver; their object is to retain and amalgamate the particles of gold that may and often do exist in a very fine state of division, which would otherwise cause them to be floated off and wasted at the central discharge apertures F. The annular groove B forms a sort of recipient for the amalgam, and the corresponding groove P is made in the muller, in order that any amalgam that may collect in the groove B be not again disturbed by the muller face; it keeps this amalgam in a solid mass, and prevents it from being distributed again and spread over the bottom of the pan. After the operation has been continued long enough, one after the other of the outer orifices N in the side of the pan are opened gradually, no more pulp or ores being fed to the machine, and the upper surface of the liquid is cautiously run off and lowered. Finally, the outer discharge orifice G is open, and the amalgam is carefully collected and discharged from the bottom of the pan through the said orifice G, by means of the clutch-driver J, which can easily be raised out of gear on its feather. The motion may at any time be stopped, and the whole machine can be completely stopped, by throwing the bevel wheel out of gear, through the forked lever Q.

What I claim as my invention, and desire to secure by Letters Patent, is,—

1st. The pan of cast iron, or any other material of the form described, or any other substantially the same for the purposes described.

2ndly. The hollow cone, with its apertures, for the purpose of a central discharge.

3rdly. The annular corresponding grooves in the pan bottom and on the muller face, to serve as a recipient of the amalgam.

4thly. The shape of the muller, and of the eccentric grooves thereof, or of others substantially the same.

5thly. The manner of driving the muller, by a clutch of the form described, or its equivalent.

6thly. The construction of the muller, whereby the same driving centre and bolts may be used for many different shoes, as these shoes can easily be replaced as fast as they wear out.

7thly. The use of the copper vertical plates coated with mercury, arranged in the manner described, or any other substantially the same, for the purpose of retaining the fine floating gold.

BENJAMIN B. THAYER.

This is the specification referred to in the annexed Letters of Registration granted to Benjamin B. Thayer, this ninth day of July, 1860.

W. DENISON.

REPORT.

A.D. 1860. No. 30.

Amalgamator.

REPORT.

Sydney, 19 *May*, 1860.

SIR,

Having examined and considered Mr. Denton Bingham's application, under Act of Council 16 Victoria, No. 24, in favour of Benjamin B. Thayer's invention of a new and useful Machine for amalgamating Gold and Silver Ores, as explained by diagrams and specifications accompanying the application,—we are of opinion that the letters prayed for may be granted.

We have, &c.,

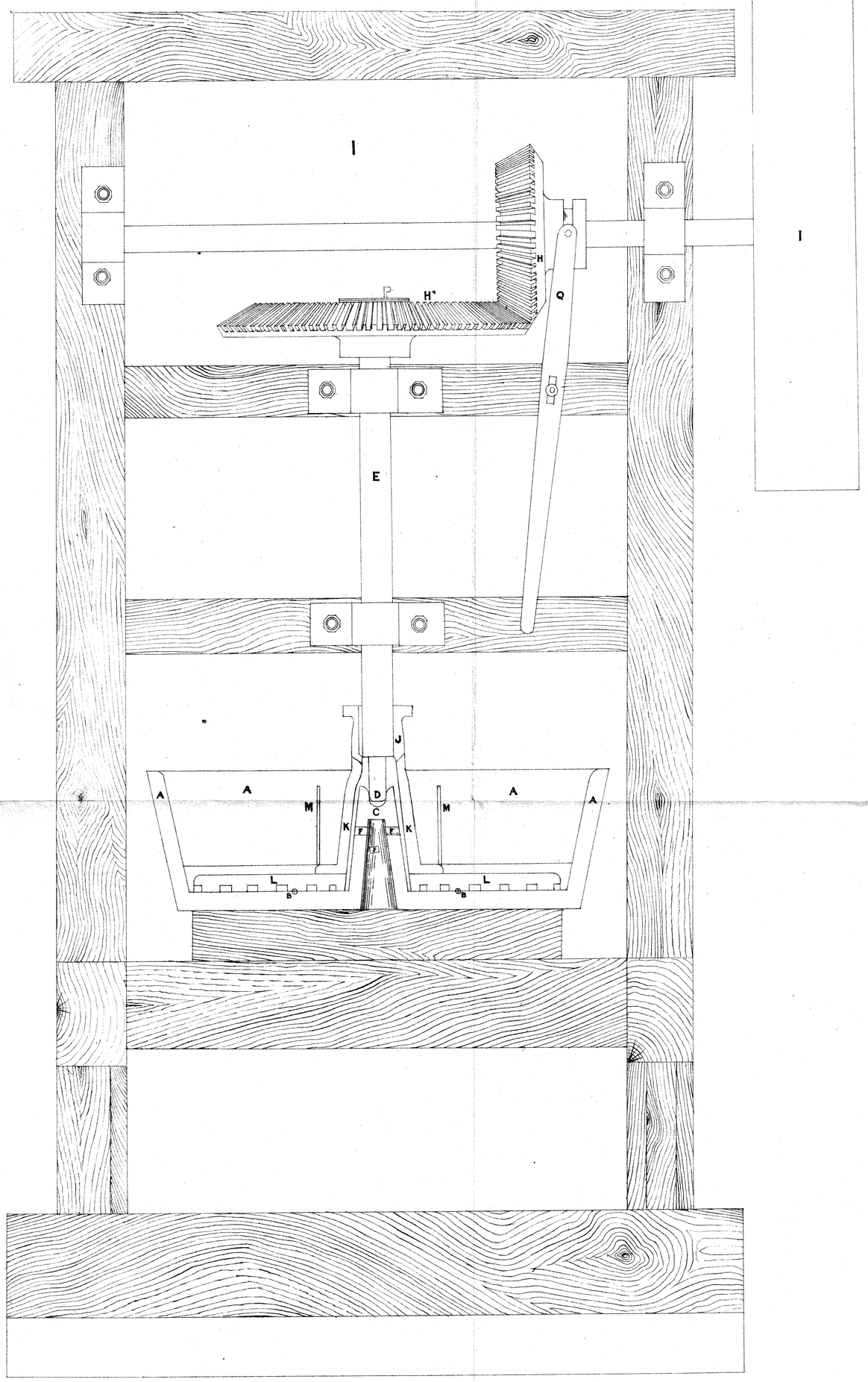
E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

B. B. THAYER'S
AMALGAMATOR

1



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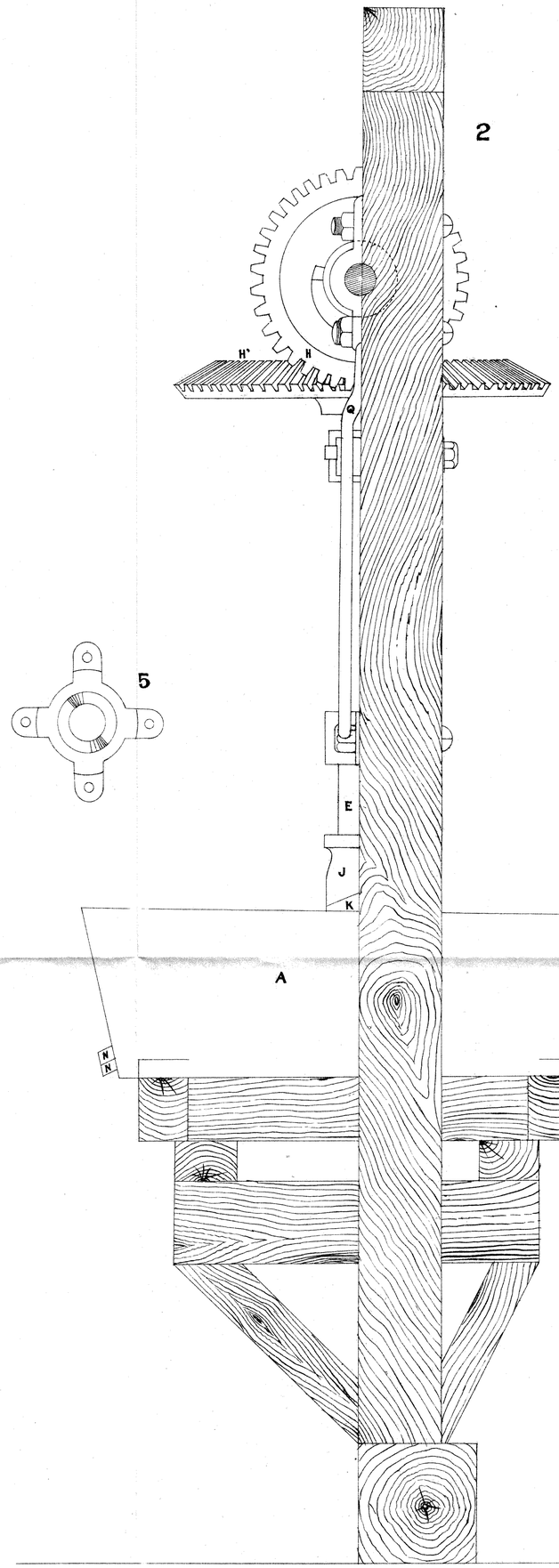

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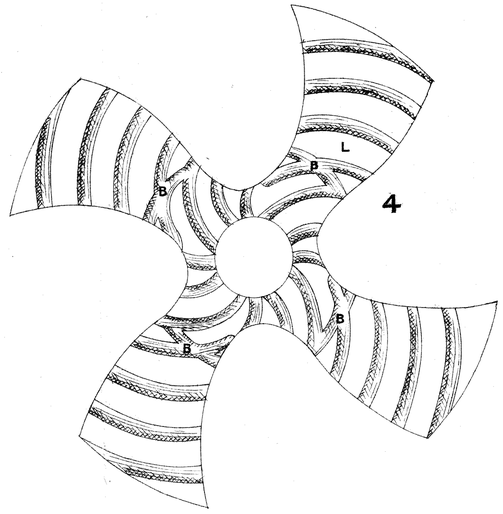

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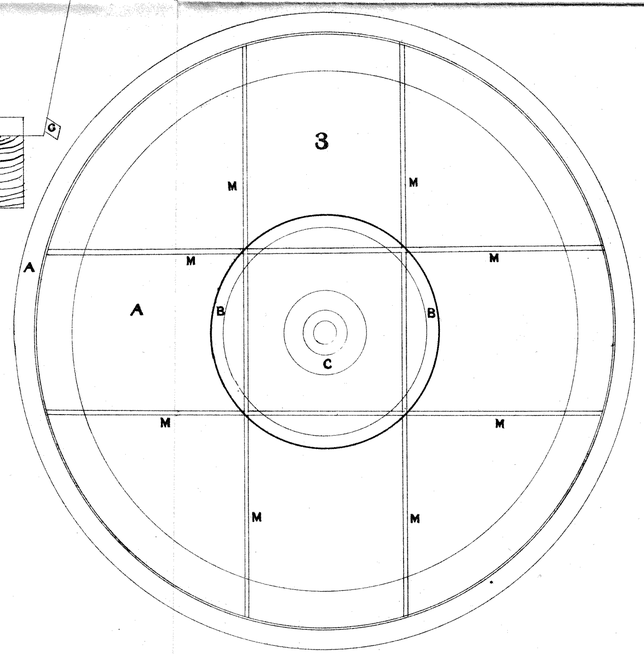


Dexter Brigham
by his Solicitor
E. Burton.

This is the Drawing referred to in the annexed Letters of Registration. Granted to Benjamin B. Thayer. this 9th day of July 1860.
Sgd
W. Denison.

A.D. 1860, 16*th August.* No. 31.

GOLD AMALGAMATOR.

LETTERS OF REGISTRATION to John Whitmee Chapman, Charles Chapman, and George Chapman, for a Gold Amalgamator.

[Registered on the 18th day of August, 1860, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Whitmee Chapman, Charles Chapman, and George Chapman, of Sydney, in the Colony of New South Wales, engineers, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an oscillating corrugated Gold Amalgamator, which is more particularly described in the specification and drawing which are annexed to these Letters of Registration, and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioners therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which

may

may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said John Whitmee Chapman, Charles Chapman, and George Chapman, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Whitmee Chapman, Charles Chapman, and George Chapman, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Whitmee Chapman, Charles Chapman, and George Chapman shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixteenth day of August, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

SPECIFICATION of Chapman Brothers' Gold Amalgamator.

General Description.

A is a bed-plate of cast iron, to be fixed down either to timber or stone, as may be desirable. CC are two standards, bolted down to the bed-plate—the one fitted with a brass bush, which is arranged to slide up and down, the other with two anti-friction rollers marked EE in drawing. F is a shaft, driven by an engine or other motive power. G is a pinion, geared into the wheel marked H, in the ratio of one to three. This wheel is provided with three centres, whose radii are respectively 9 in., 8 in., 7 in. I is a connecting rod; J a cast iron bracket, fitted with three centres, as shewn in end elevation.

Cylinder.

B is the cylinder, cast with four hemispherical recesses, as shewn on sectional elevation, on the bottom of which is placed the mercury. KKKK are four cast iron balls, 9 in. diameter. The cylinder is at an inclination of 1 in 12, but can readily be adjusted to any other angle by the screw, as shewn in end elevation.

Mode of working.

The pulley shaft, on being set in motion, communicates with the wheel through the pinion, which is drawn at thirty revolutions per minute by means of the pin and connecting rod. An oscillating motion is produced in the cylinder's axis, which rocks the cast iron balls to and fro. The oscillation can be adjusted by the pins and connecting rod, which are made movable. The crushed quartz with the water is introduced at the end of the cylinder shewn on the right of the drawing; by means of the uninterrupted agitation thus caused, the mercury readily forms an amalgam. It has ever been found in practice that nearly the whole of the gold has been collected in the two first recesses.

In

Gold Amalgamator.

In the machines used for amalgamating gold of the ordinary construction, no proper provision is made for preserving the mercury and gold, and consequently a great waste ensues; moreover, the construction of, and the great power required in working, such machines, entail considerable expense and inconvenience. Now, our Amalgamator described above, and shewn in the accompanying drawing, is so constructed as to remedy these defects. The mercury is preserved in the chambers or recesses above described, and the gold is deposited in the first three—principally in the first two—and never passes to the fourth; and the simplicity of its construction secures its being made and worked with much less expense and power than those in general use. It is adapted both for the quartz-crushing mill and the alluvial diggings, and it may be constructed on a larger or smaller scale.

CHAPMAN BROTHERS,
(*Per* J. H. KNIBBS.)

This is the specification referred to in the annexed Letters of Registration granted to John Whitmee Chapman, Charles Chapman, and George Chapman, this sixteenth day of August, 1860.

W. DENISON.

REPORT.

Royal Mint, Sydney,
9 *July*, 1860.

SIR,

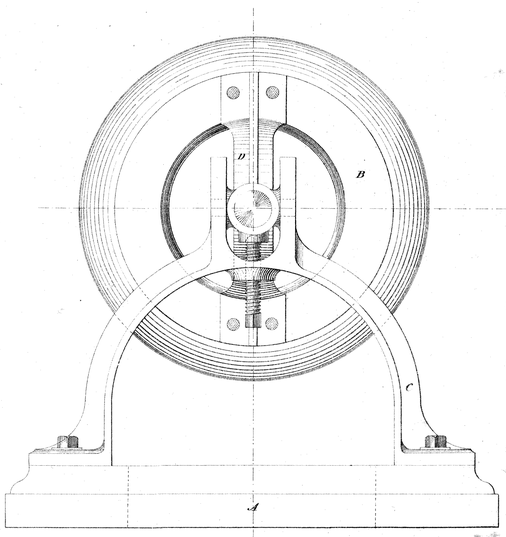
Having examined and considered the Petition of Messrs. Chapman Brothers, for Letters of Registration for an oscillating corrugated Gold Amalgamator, their invention,—we have the honor to recommend that the prayer of the Petition be granted.

We have, &c.,
E. W. WARD.
J. SMITH.

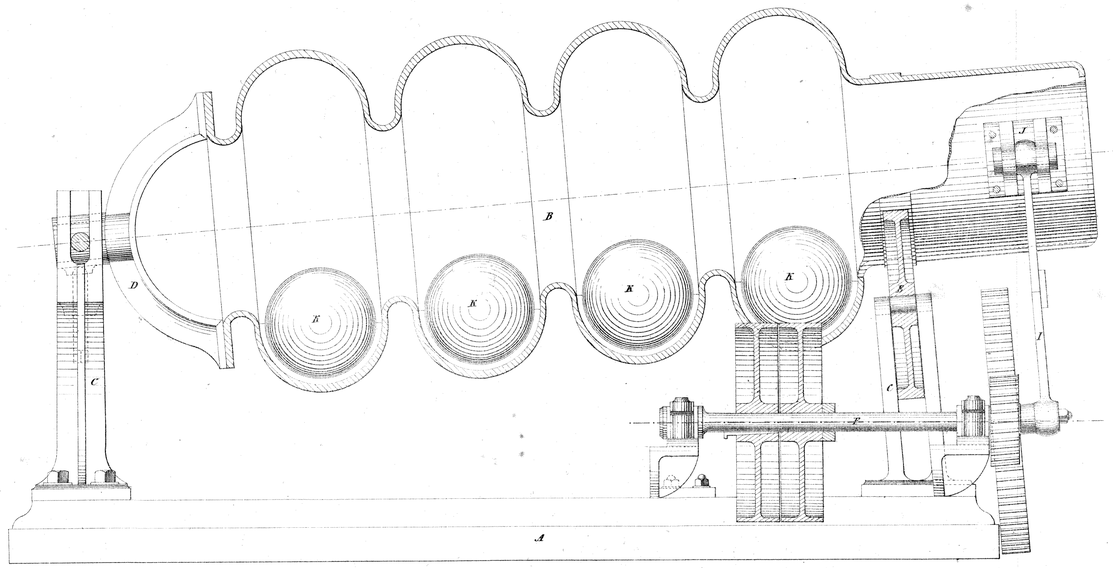
THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

End Elevation



Sectional Elevation



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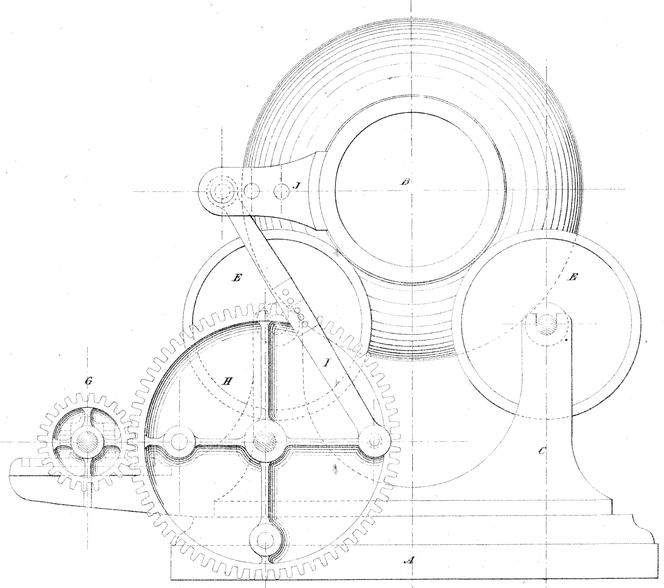
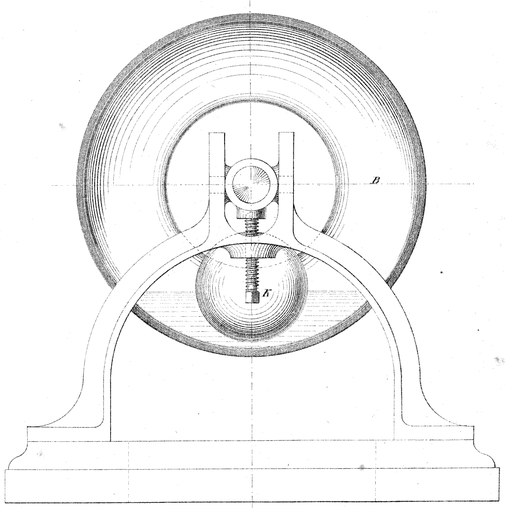
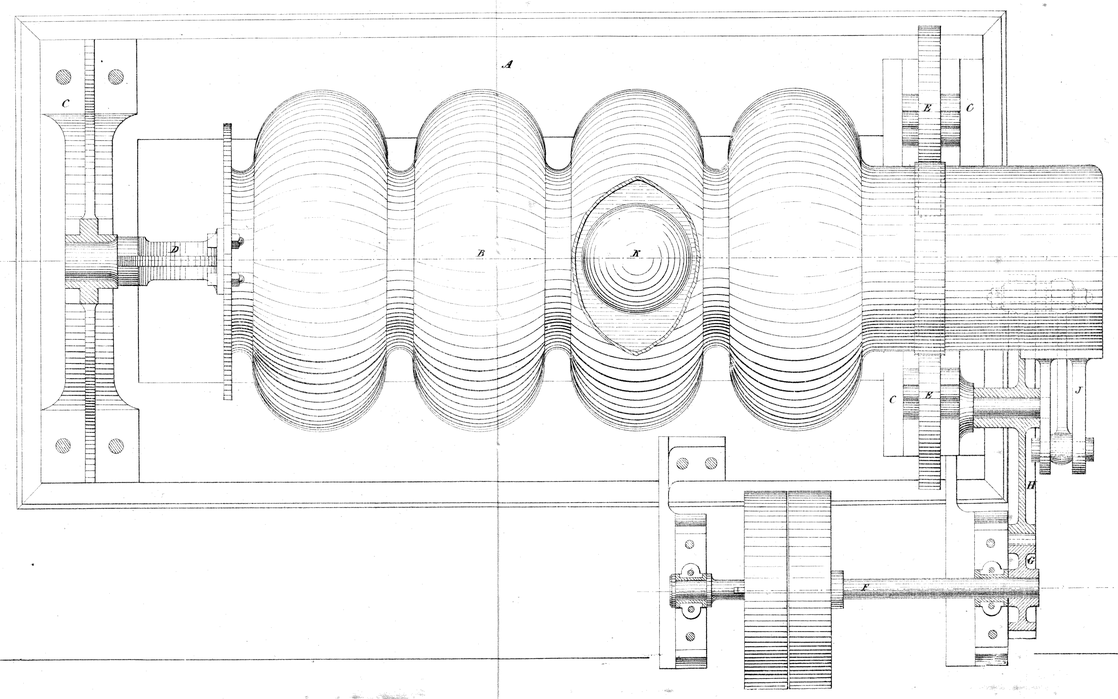


Transverse Section



Plan



CHAPMAN'S

GOLD AMALGAMATOR

This is the Drawing referred to in the annexed Letters of Registration granted to John Whitmore Chapman Charles Chapman and George Chapman this sixteenth day of August 1860

Signed W. Denison

A.D. 1860, *5th September.* No. 32.

INVENTION OR IMPROVEMENT IN RAILWAYS AND IN LOCOMOTIVE ENGINES.

LETTERS OF REGISTRATION to Edward Bell, for an Invention or Improvement in Railways and in Locomotive Engines.

[Registered on the 6th day of September, 1860, in pursuance of the Act 16 Vic., No. 32.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Edward Bell, of Sydney, in the Colony of New South Wales, civil engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention or improvement in Railways, and in Locomotive Engines to be used thereon, which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am

pleased,

Invention or Improvement in Railways and in Locomotive Engines.

pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Edward Bell, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Edward Bell, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Edward Bell shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fifth day of September, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

SPECIFICATION of Edward Bell, of Bourke-street, Surry Hills, in the Colony of New South Wales, civil engineer, for a certain invention or improvement in Railways, and in Locomotive Engines to be used thereon, that is to say:—

In railways as at present constructed, the same rails are invariably used for all the wheels, as well those of the locomotive engines as those of the carriages, trucks, and other rolling stock drawn or propelled thereon; and all such engines, carriages, trucks, and other rolling stock are necessarily constructed so that all the wheels thereof, on the respective sides, pursue the same track and run on the same rails.

The nature of my invention or improvement is as follows, namely, the combination of wooden and metal rails for locomotive engines to run upon, and the use of such combined rails for that purpose; and the drawing or propelling of carriages, trucks, and other rolling stock along the metal rails, by engines running upon such wooden and metal rails combined.

The means by which I propose to perfect or carry into effect my invention or improvement are as follows:—For each line of railway I propose to lay down two or more wooden planes, surfaces, or ways (which may be called, and which I herein throughout designate as "wooden rails"), parallel to each other, in addition to two or more metal rails (or if so desired, there need only be one such wooden plane, surface, or way), such metal rails to be laid parallel with, and either at the side of the wooden rails or upon such wooden rails, in which latter case the wooden rails will form longitudinal supports for the metal rails; the wooden rails, or the portion thereof not occupied by the metal rails, as the case may be, to be laid in proper position for the propelling wheel or wheels of the locomotive engines to run thereon, and the metal rails to be laid in proper position for the guiding and trailing wheels of such engines to run thereon. The propelling wheel or wheels of the locomotive engines to be adjusted to a different width from that of the guiding or trailing wheels thereof, so that the propelling wheel or wheels thereof will run on a different track from that of the guiding and trailing wheels thereof; the propelling wheel or wheels of the engines to be adjusted so as to run on the wooden rails; the guiding and trailing wheels of the engines, and the wheels of the carriages, trucks, and other rolling stock, to be adjusted to the same width, and so that such wheels shall run on the metal rails; and the metal rails to be so constructed or laid that they may be used as guides for the guiding and trailing wheels of the engines, and for the wheels of the carriages, trucks, and other rolling stock, so that under the system of my said invention or improvement, the leading and trailing wheels of the locomotive engines, and the wheels of the carriages, trucks, and other rolling stock drawn or propelled by such engines, will run along, upon, or against metal, as at present, but the propelling wheels of the engines will run upon wood.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to any particular form of wooden or metal rail, or wheel to be used thereon, or to the precise detail herein given, so long as the character of my invention or improvement be retained; but what I claim as my invention, and seek Letters of Registration for, is, the combination of wooden and metal

metal rails in the construction of railways; and the drawing or propelling of carriages, trucks, and other rolling stock, along the metal rails, by engines whose propelling wheels run upon the wooden rails; and the guiding of such engines along the wooden rails, by their guides running in contact with the said metal rails.

This is the specification referred to in the annexed Letters of Registration granted to Edward Bell, this fifth day of September, 1860.

W. DENISON.

REPORT.

Sydney, 9 *July*, 1860.

SIR,

In compliance with the instructions contained in your letter of the 16th June, requesting us to inquire into the Petition of Edward Bell, of Bourke-street, Surry Hills, near Sydney, civil engineer, for Letters of Registration in the Colony of New South Wales, for an invention or improvement in Railways, and in Locomotive Engines to be used thereon,—we have the honor to report that, having examined the specification submitted to us, we are of opinion that the prayer of the Petition may be granted.

We have, &c.,

JOHN WHITTON.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1860, *6th September.* No. 33.

IMPROVEMENTS IN THE REDUCTION OF ORES.

LETTERS OF REGISTRATION to John M'Culloch, for Improvements in the reduction of Ores.

[Registered on the 7th day of September, 1860, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John M'Culloch, of San Francisco, in the United States of America, analytical chemist, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of improvements in the reduction of gold, silver, lead, tin, and copper ores, the particulars of which said invention are fully set forth in the specification hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for

Improvements in the reduction of Ores.

my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said John M'Culloch, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John M'Culloch, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John M'Culloch shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixth day of September, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JOHN M'CULLOCH, of San Francisco, in the United States of America, analytical chemist, send greeting:

WHEREAS I am in possession of an invention for improvements in the reduction of gold, silver, lead, tin, and copper ores, and have petitioned His Excellency the Governor of New South Wales to grant unto me, my executors, administrators, and assigns, Letters of Registration for the same: Now know ye, that I, the said John M'Culloch, do hereby declare that the following specification under my hand and seal fully describes and ascertains the nature of the said invention, and the manner in which the same is to be performed (that is to say):—

The object of this invention is to operate upon the ores containing gold, silver, lead, tin, and copper, or mixtures of these ores and metals, in a more simple and economical manner than heretofore, for the purpose of obtaining the metal or metals therefrom in a metallic or reduced state. To this end, I first reduce the ore to powder, by stampers or other suitable means, and if need be, I then concentrate the metalliferous ingredients, by separating the constituent earthy compounds from the metallic compounds by washing and subsidence. With the ore so prepared I intimately mix powdered charcoal, either animal or vegetable, or any suitable substance containing carbon, such as oils and fats, and I add thereto if necessary, any refuse vegetable matter, such as sawdust, dry leaves or grasses, chopped straw, or the excrementitious matter of herbivorous animals; and this mixture I mould into such forms as will best admit of the application of fire heat thereto, for the reduction or recovery of the metal or metals contained therein. But in order to give a sufficient amount of consistency and resistent strength to the moulded blocks or masses to allow of their being stacked in kilns, clamps, or ovens, and ensure their retaining their shape while being exposed to a high temperature, I work into this mixture a suitable proportion of clay or other equivalent binding material, preferring clay that has been washed with water and collected by subsidence, as that is both cheap and efficient in its action. These several ingredients to form bricks, blocks, or cakes, I work together by the aid of a pug mill or other suitable means, adding water as may be required to facilitate the working. When the materials are thoroughly mixed, I mould them into form either by means of machinery or by hand moulds, and the blocks, bricks, or cakes thus formed I dry previously to subjecting them to artificial heat.

The ores upon which I propose chiefly to operate are auriferous iron and arsenical pyrites, and the sulphides, sulphates, chlorides, carbonates, and oxides of silver, lead, tin, and copper. Having reduced (say) any one of these ores to powder, and worked it into blocks in admixture with the carbonaceous and plastic materials as above explained, I stack the blocks, either in a kiln made after the manner of a brick kiln or in a clamp or oven, preferring, however, the former, and I then fire them as if I were burning ordinary bricks. When sufficiently burnt, I allow the contents of the kiln, clamp, or oven, as the case may be, to cool down; I then remove the burnt bricks or blocks, and reduce them to powder. The gold and silver separately or mixed will be found in a comminuted metallic state scattered through the mass, while the copper may be likewise in a metallic state, or it may be as an oxide, or a mixture of both, similarly scattered through the earthy matters of which the crushed blocks were mainly composed, and the same may then be readily separated from the mass by lixiviation, or (in the case of gold or silver) by amalgamation with

with mercury. The proportions of materials which I have found to yield good results when manufactured into blocks and submitted to kiln, clamp, or oven burning, are—

Ground ore	100	parts by	weight.
Charcoal	25	do.	do.
Sawdust or other vegetable matter	50	do.	do.
Dry clay	50	do.	do.

I have stated that the use of the clay is simply to hold the powdered ore and the other matters enumerated mechanically together, both while the moulding and the burning of the blocks is being effected; and I may also remark that the carbonaceous matters have also a mechanical use, viz., to render the block porous, and allow of the oxygen of the air not merely to play around, but to enter the blocks, while they are under the action of the fire. Thus, for example, when burning blocks containing sulphide of silver, the woody and carbonaceous matter mixed therewith will by its partial combustion render the blocks porous, and thus afford a means for the oxygen of the air to penetrate through every part of the blocks, where, meeting with the sulphur liberated from the ore by the action of the furnace heat, it will form sulphurous acid, and thus carry off the sulphur in a gaseous form, leaving the silver in a metallic state imprisoned in the blocks.

As another example of the use of the charcoal and carbonaceous matter, I will instance the action when combined in a block, according to my invention, with an ore of carbonate of copper. The combustion of the woody matter and charcoal in this case not only renders the block porous, whereby the carbonic acid of the ore set free by the heat is allowed to escape, leaving the metal as oxide of copper, but the carbon still present in the block, by commixture with the ground ore, to a great extent takes up the oxygen from the oxides of copper, leaving such portions of the copper in a metallic state.

It will thus be seen that the carbonaceous matters as applied by my invention for the liberation of gold and the reduction and separation of silver, lead, tin, and copper from their ores, has a materially different and far more efficient action than when simply applied in the manner commonly practised in the reduction of metals; and further, it will be understood that, as the clay acts merely as a medium for holding the comminuted particles together, other substances possessing the same property may doubtless be substituted for that material. I do not therefore claim the use of carbonaceous matters for the separation of gold and the reduction of silver, lead, tin, and copper from their ores, irrespective of the means of applying such carbonaceous matters, neither do I confine myself to the use of the ingredients above mentioned for composing the blocks; but what I do claim is, subjecting the ores of gold, silver, lead, tin, and copper, to kiln, clamp, or oven burning, when moulded or wrought into blocks, slabs, or masses, as above described.

In witness whereof, I, the said John M'Culloch, have hereunto set my hand and seal, the fifteenth day of March, in the year of our Lord one thousand eight hundred and sixty.

JOHN M'CULLOCH. (L.S.)

This is the specification referred to in the annexed Letters of Registration granted to John M'Culloch, this sixth day of September, 1860.

W. DENISON.

REPORT.

Royal Mint, Sydney,
7 August, 1860.

SIR,

Having examined and considered Mr. John M'Culloch's Petition "for Letters of Registration for improvements of his invention in the reduction of Ores," we have the honor to recommend that the prayer of the Petition be granted.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1860, *5th September.* No. 34.

BREAKING-IN SADDLE.

LETTERS OF REGISTRATION to Messieurs Hall and Alderson, for a Breaking-in Saddle.

[Registered on the 8th day of September, 1860, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Thomas Beverley Hall and William Maddison Alderson, of Sydney, in the Colony of New South Wales, merchants and manufacturers, have by their Petition humbly represented to me that they are the Assignees of one William Colburn Mayne, of Sydney aforesaid, who is the author or designer of a certain invention or improvement in manufactures, that is to say, of an improvement in Saddles for the purpose of breaking-in Horses, which is more particularly described in the specification and drawing hereunto annexed; and that by an indenture dated the twenty-third day of August, in the year one thousand eight hundred and sixty, the said William Colburn Mayne, did assign and transfer unto them, the said Thomas Beverley Hall and William Maddison Alderson, their executors, administrators, and assigns, his said invention, and all his right, title, and interest, of, into, and out of the same; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16th Victoria, No. 24; the Petitioners therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good,

and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Thomas Beverley Hall and William Maddison Alderson, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Thomas Beverley Hall and William Maddison Alderson, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Thomas Beverley Hall and William Maddison Alderson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this day of in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

SPECIFICATION.

The nature of my invention consists in the application of two metallic horns, fixed on the tree of the ordinary saddle, and covered with leather or other material; the curve of the horns is made suitable to the shape of the rider's leg, so that while riding quietly, they hardly come in contact with the leg, thereby causing no inconvenience; but should the horse suddenly jump, or make any extraordinary motion, the rider will find himself perfectly secure, the horns forming a fulcrum on each side. The annexed drawings will shew clearly my invention, each part being marked by figures.

By his Agents and Assignees, WILLIAM COLBURN MAYNE.
HALL & ALDERSON.

DESCRIPTION.

Figure 1 on the plan represents an elevation of the saddle, with the horns complete.

Figure 2, a front view of the saddle-tree and horns without the covering.

Figure 3 represents four different modes of fixing the horns.

Figure *a* (see elevation, front view, and No. 1), is the metallic horn covered with leather covering, and screwed into the iron socket, firmly rivetted on to the tree.

b is the metallic lining rivetted on the tree.

c is the socket into which the horn is screwed.

No. 2 represents the horn made with an articulation joint, moving only one fourth part of a circle, and fitted with an internal spring to raise the horn into its proper position.

No. 3 represents the horn fitted with a sliding groove, similar to that of a bayonet.

No. 4 represents the horn fitted with a cone; a spring is fitted on the side with a catch which fixes the horn firmly, and thereby enables the rider to remove the horns in a moment.

CLAIMS.

Breaking-in Saddle.

CLAIMS.

1st. I claim as my invention the application of metallic horns attached to the ordinary saddle.

2nd. The modes of attaching the same, as per plans Nos. 1, 2, 3, 4.

3rd. The contrivance of throwing forward the horn on the near side of the saddle.

4th. The metallic lining of the tree.

By his Agents and Assignees, WILLIAM COLBURN MAYNE.
HALL & ALDERSON.

This is the specification (contained in this and the preceding half-sheet of paper) referred to in the annexed Letters of Registration granted to Thomas Beverley Hall and William Maddison Alderson, this fifth day of September, 1860.

W. DENISON.

REPORT.

Royal Mint, Sydney,
1 *August*, 1860.

SIR,

Having examined the matter of Messrs. Hall and Alderson's Petition in favour of Letters of Registration, for an improvement in Saddles for the purpose of breaking in Horses, invented by W. C. Mayne, Esq., we have the honor to recommend that the prayer of the Petition be granted.

We enclose, with the papers forwarded to us, a drawing and specification furnished by the applicants, setting forth the precise nature of the invention for which the letters are desired.

We have, &c.,
E. W. WARD.
JNO. McLERIE.

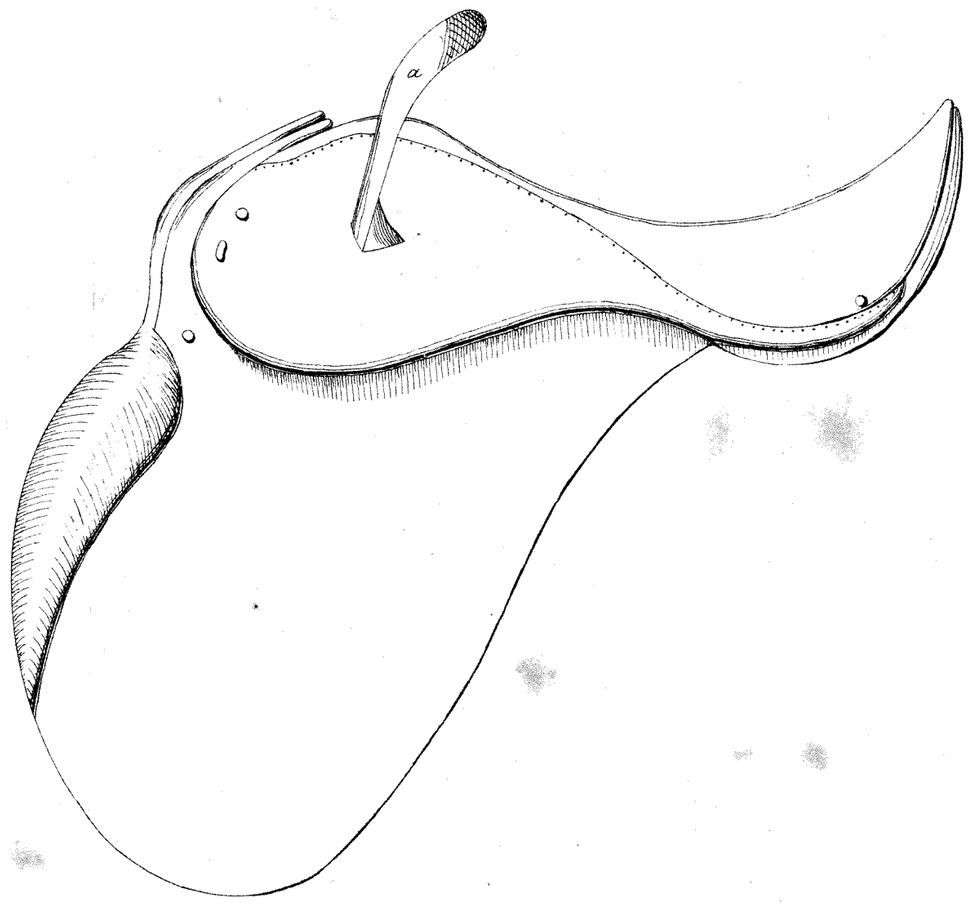
THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

BREAKING IN SADDLE

Fig 1

Elevation



Scale 3 Inches to a Foot

Fig 2

Front View

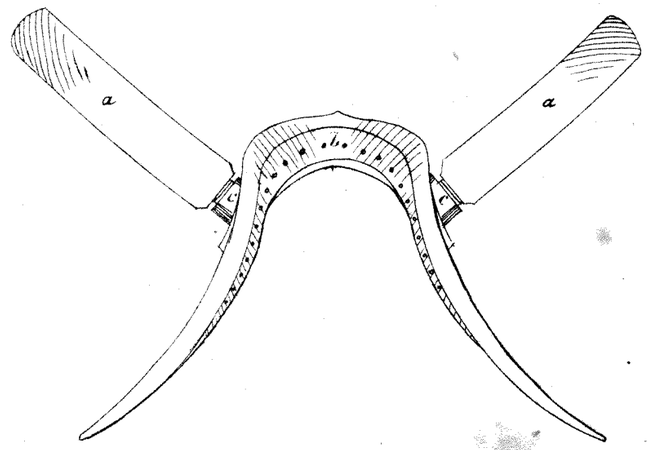
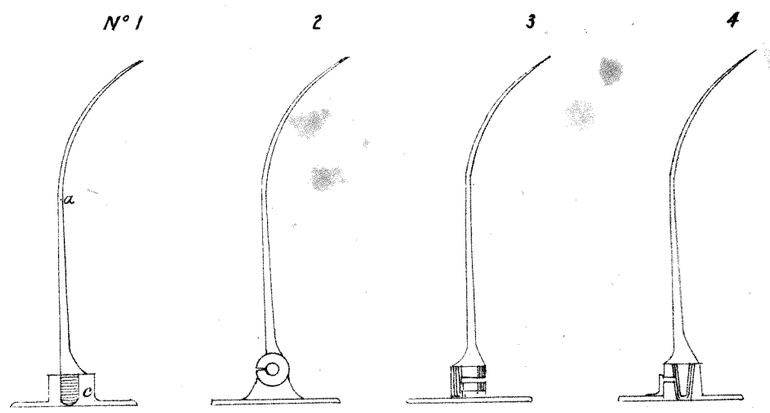


Fig 3



This is the Drawing referred to in the annexed Letters of Recistration granted to Thomas Beverley Hall & William Maddison Alderson this Fifth Day of September 1860.

(Sg°) *W. Denison*

A.D. 1860, 3*rd October*. No. 35.

ANTI-COLLISION DIAL AND SHIPWRECK PREVENTER.

LETTERS OF REGISTRATION to Charles James Clowes Perry, for an Anti-collision Dial and Shipwreck Preventer.

[Registered on the 3rd day of October, 1860, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Charles James Clowes Perry, of Sydney, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of an Anti-collision Dial and Shipwreck Preventer, which is more particularly described in the paper writing marked A, and the drawing marked C.A.B., which are annexed hereunto; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council,

and

and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said Charles James Clowes Perry, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Charles James Clowes Perry, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Charles James Clowes Perry shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this day of in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

A.

PETITION for a Letter of Registration, in compliance with an Act of the Legislature of New South Wales (16 Victoria, No. 24), to secure to the Petitioner, Charles James Clowes Perry, the benefit of an invention of which he is the designer, the same being an instrument to be called "Perry's Anti-collision Dial and Shipwreck Preventer."

To His Excellency Colonel SIR W. T. DENISON, R.E., K.C.B., F.R.S., Governor General of Australia.

May it please your Excellency:—

The humble Petition of Charles James Clowes Perry, formerly master mariner, and late Member of the Legislative Assembly of Victoria, respectfully sheweth—1st. That your Petitioner is the designer of an instrument to be used on board ship, in connection with the compass, for two purposes—1st, for approximating, in certain cases, either in the day or night, the course of an approaching ship, and the angle of her course, with that of the observing vessel, in order to avoid a collision; and 2nd, for approximating, in certain cases, either in the day or night, the distance of the ship from a visible terrestrial object, whilst sailing or steaming along, in order to prevent those shipwrecks which arise from a false estimate being made of the distance from an object when its bearing is taken by the compass. Your Petitioner wishes the instrument to be called "Perry's Anti-collision Dial and Shipwreck Preventer."

The instrument is flat and circular, about sixteen inches diameter, and is made of brass, but it may be made of any other suitable material. Upon three-fourths of the face of it are represented the points of the compass, half-points, quarter-points, and eighths, by lines of perforations drawn with mathematical precision, in the manner represented in the section of the accompanying drawing marked C.A.B.* The points and their subdivisions are divided into miles of distance from the centre, by circular lines, which cross them at regular distances along their lengths; those lines are called mile circles, and are about an inch apart. The perforations divide the miles into tenths, and also serve for marking off positions, by having small pins inserted in them. This division of the points and their subdivisions into tenths of miles throughout their whole length, gives the greatest precision to results that the instrument is capable of; but when this is not so much desired, the miles may be divided to tenths from the centre to the second mile circle only, and to eighths from that circle to the extremity of the points; for whilst this division would generally afford sufficiently correct results for all practical purposes, it has the advantage of being more speedily read off than when the lines are divided to tenths throughout; in this respect, therefore, the instrument may be constructed either way, to suit the different tastes of individuals. Since, then, different distances from the centre, as well as bearing, are shewn by the points and their subdivisions, it follows that both the bearing and distance of an object supposed to be seen from the centre can be marked off simply by inserting a pin on the face of the instrument; for instance, if an object is seen to bear by compass E. by N. $\frac{1}{8}$ N., estimated distance $5\frac{1}{2}$ miles,

* N.B.—The section C.A.B. in the drawing represents the manner in which *all* the lines of the points are perforated.

miles, that position is marked off by inserting a pin half way between the fifth and sixth mile circle on the perforated line representing E. by N. $\frac{1}{8}$ N. The centre of the dial, then, always represents the *first* position of the *observing* ship. Near the outer circumference the names of the points are written in two opposite series; the object of this is to provide for the case of a ship's course or a bearing falling upon that section of the instrument upon which the points are not inscribed, but which is occupied by a distance table; in every such case the north point is to be called south, and the outer series of names used. In addition to the two series of names around the instrument, there is a circle of perforations, representing 60 minutes of time, numbered at every five, like the minute circle of a watch; the use of this is to register the time when a bearing is taken, by inserting a pin in the perforation corresponding to the minute shewn by the watch when the observation was made. As the distance run by a ship between two observations forms a material part of the data employed, it would not always be safe to trust the times to memory, and the mode provided by the dial for noting them is far more simple and convenient than having to resort to pencil and paper. The distance table is written on the face of the instrument, and greatly facilitates its use; for by a momentary inspection, the distance a ship has made between the times of taking two bearings can be taken out to the tenth of a mile, and marked upon the dial; thereby affording a base line between the points the bearings are taken from, and also serving to mark the *second* position of the observing ship. The appurtenances to the instrument consist of—1st. A few small pins, which fit the perforations, and are used to mark off positions with, and also the time on the minute circle when bearings are taken.—2ndly. A pair of parallel rulers, with double slides, having the edges graduated to miles and subdivisions on the same scale as the miles on the dial.—3rdly. Two small flat models of ships, about three inches long, each one so made as to slide down over the pair of pins which mark the first and second positions of either vessel; these models are only for occasional use—they are not always required. Your Petitioner would have it understood that he does not claim novelty for any of the appurtenances, neither do they form any part of the invention for which he petitions for a Letter of Registration. The process of working the instrument is always the same for the same class of cases. For preventing collisions it chiefly consists in marking off three positions, by inserting three small pins; and the data employed are two bearings and (estimated) distances, with a measured interval of time between them, and the mode of proceeding is as follows:—When a vessel or a vessel's light is sighted, the bearing of it is taken by the ship's compass, the time noted by the minute-hand of a watch or time-keeper (disregarding seconds), and the distance estimated; that bearing and distance is at once marked off by inserting a pin at a corresponding distance from the centre, on the line representing the bearing; the pin will then shew the *first* position of the approaching ship, in relation to the first position of the observing one, which, as before observed, is always represented by the centre; a short interval is now allowed to elapse, which may range from four minutes to fifteen, according to the distance the other vessel may be off, and the rapidity or otherwise with which she seems to approach; then a second bearing is taken, the time noted, and the distance estimated as before; this bearing and distance is not marked off from the centre, like the first, but from the second position of the observing vessel, because she changes her place during the interval between the bearings. Now, the distance run from the centre is taken out in a moment from the table, and marked off on the line representing her course, or nearest representing it, and so fixes the second position of the observing vessel; to that position, therefore, the second bearing and distance is referred by means of the parallel ruler, in the same manner as a bearing is transferred from a compass on a chart to any given point. The direction for doing so may be given as follows:—Lay the ruler across the centre of the dial, with its edge along the point of the compass representing the second bearing, then push forward the slide to touch the last inserted pin, and whilst it is in that position count along the distance scale which is on the edge of the ruler, a number of miles from the pin equal to the estimated distance, and fix a pin there, which will mark the second position of the approaching ship. The process will now be complete by making what is called the correcting shift; this is done by estimating the hourly speed of the approaching ship, and shifting the first inserted pin along the same line that it was first placed on, to such a distance from the last inserted one as shall be shewn by the table to be equal to the run of that vessel during the measured interval of time at the estimated speed. The distance scale on the ruler will serve to measure off the proper distance between the pins; the courses of both vessels will then be apparent; that of the approaching ship being shewn by the pair of pins remote from the centre, and that of the observing one by the direction of the other pin from the centre; the angle at which the courses cross each other will also be seen. Then, as a general rule, to know which ship will pass ahead, place the parallel ruler along the line of the first positions, and push forward the slide towards the second positions, then the ship whose pin the slide first comes up against will pass *astern* of the other, and far off or near, according to whether the other pin is far off or near the edge of the ruler at this time; but should it happen that the slide comes up against both pins at once, then the dial indicates that the ships will approach so near together as to be in danger of a collision; and this rule will always hold good, irrespective of any error that may pervade the estimated distances. Finally, by placing a pin in the centre, and then sliding a model down over each pair of pins, the relative positions the vessels will assume at their nearest point of approach will

be

be strikingly illustrated; it may be well to know in this manner what will be the longitudinal inclination of the ships towards each other, in any case where they will pass pretty near, especially in the night; but it is by no means necessary always to use the models, because they serve only to shew more familiarly that which the pins already indicate. The data employed for finding the ship's distance from an object whilst sailing or steaming along, is similar to that used for preventing collision, consisting of two bearings, and a measured interval of time between them; and the process of working the instrument for that purpose is as follows:—When the object to be approached or passed bears upon any angle exceeding three points with the line of the ship's course, the bearing of it is taken with the compass, and the time noted to the nearest minute only (disregarding seconds); a pin is then inserted on the outer extremity of the line corresponding to the bearing, to prevent its being forgotten, and another pin on the time circle to mark the time. After the direction of the object has altered not less than two points, another bearing is taken, and the time noted as before; then the distance run by the ship during the interval is taken out by a momentary inspection of the table, and marked off with a pin on the line representing her course; to that pin the second bearing is transferred, by means of the ruler (in the manner which has been already described), and whilst the ruler is in that position, a pin is inserted at that point where the edge of it crosses the line of the first bearing, and so fixes the position of the object in relation to both positions of the ship; at the same time, the distance of the ship at the second bearing is that shewn by the scale of miles on the edge of the ruler between the two pins, whilst her distance at the first bearing will obviously be that shewn between the last inserted pin and the centre.

Having thus described the nature of the invention, the objects of it, and the manner in which it is worked, your Petitioner prays that a Letter of Registration may be granted him, and, with the greatest respect, subscribes himself—

Your Excellency's
Very loyal and obedient Servant,
CHARLES JAMES CLOWES PERRY.

This is the paper writing marked A referred to in the annexed Letters of Registration granted to Charles James Clowes Perry, this third day of October, 1860.

W. DENISON.

REPORT.

Royal Mint, Sydney,
19 *September*, 1860.

SIR,

Having examined and considered the Petition of Mr. C. J. C. Perry, for Letters of Registration for an Anti-collision Dial and Shipwreck Preventer, of his invention, we have the honor to recommend that the prayer of the Petitioner be granted.

We have, &c.,
E. W. WARD.
H. H. BROWNE.

THE HONORABLE
THE COLONIAL SECRETARY.

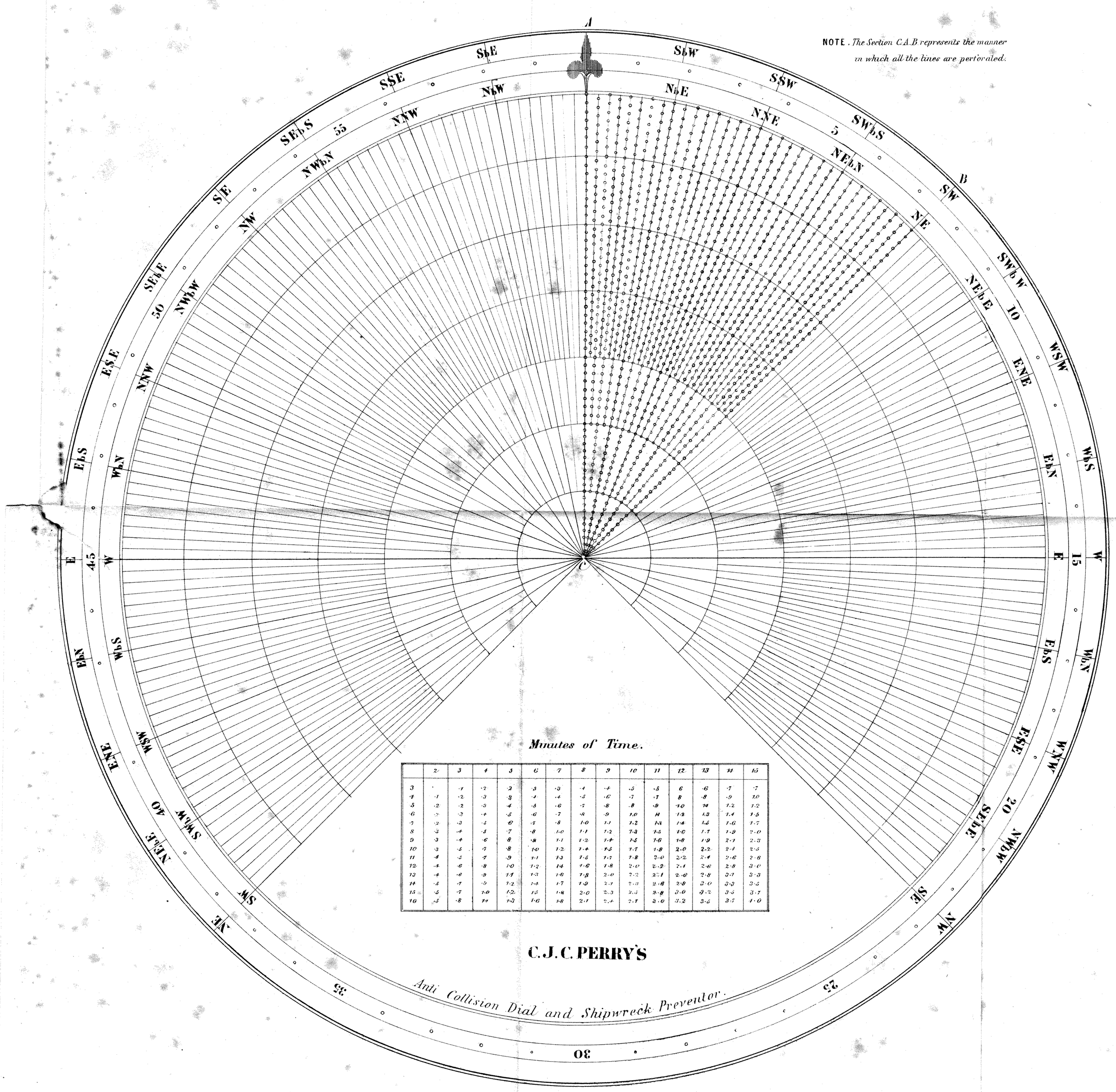
[Drawing—one sheet.]

Drawing of the

ANTI COLLISION DIAL AND SHIPWRECK PREVENTOR

accompanying C.J.Perry's petition for a Letter of Registration

Sydney September 10th
1860.



	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3	·	·1	·2	·2	·3	·3	·4	·4	·5	·5	6	·6	·7	·7
4	·1	·2	·3	·3	·4	·4	·5	·6	·7	·7	·8	·8	·9	1·0
5	·2	·2	·3	·4	·5	·6	·7	·8	·8	·9	1·0	1·1	1·2	1·2
6	·2	·3	·4	·5	·6	·7	·8	·9	1·0	1·1	1·2	1·3	1·4	1·5
7	·2	·3	·5	·6	·7	·8	1·0	1·1	1·2	1·3	1·4	1·5	1·6	1·7
8	·3	·4	·5	·7	·8	1·0	1·1	1·2	1·3	1·5	1·6	1·7	1·9	2·0
9	·3	·4	·6	·8	·8	1·1	1·2	1·4	1·5	1·6	1·8	1·9	2·1	2·3
10	·3	·5	·7	·8	1·0	1·2	1·4	1·5	1·7	1·8	2·0	2·2	2·4	2·5
11	·4	·5	·7	·9	1·1	1·3	1·5	1·7	1·8	2·0	2·2	2·4	2·6	2·8
12	·4	·6	·8	1·0	1·2	14	1·6	1·8	2·0	2·2	2·4	2·6	2·8	3·0
13	·4	·6	·9	1·1	1·3	1·6	1·8	2·0	2·2	2·4	2·6	2·8	3·0	3·3
14	·5	·7	·9	1·2	1·4	1·7	1·9	2·1	2·3	2·6	2·8	3·0	3·3	3·5
15	·5	·7	1·0	1·2	1·5	1·8	2·0	2·3	2·5	2·8	3·0	3·2	3·5	3·7
16	·5	·8	1·1	1·3	1·6	1·8	2·1	2·4	2·7	3·0	3·2	3·5	3·7	4·0

This is the Drawing marked C.A.B. referred to in the annexed Letters of Registration granted to Charles James Clowes Perry this third day of October 1860.

Signed W Denison

A.D. 1860, 22*nd November*. No. 36.

COLD-PRODUCING APPARATUS.

LETTERS OF REGISTRATION to James Harrison, for Cold-producing Apparatus.

[Registered on the 22nd day of November, 1860, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Harrison, of Geelong, in the Colony of Victoria, Esquire, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for refrigerating, by the co-operation of volatile liquids *in vacuo*, and the continuous condensation and re-co-operation of the same materials, which invention is more particularly described in the specification marked A, and the two drawings marked B and C respectively, all of which are annexed to these Letters of Registration; and that he, the said petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council 16 Victoria, No. 24; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years; and I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do by these Letters of Registration, grant unto the said James Harrison, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention, from the day of the date of these presents until the tenth day of September which will be in the year one thousand eight hundred and seventy-one; to have, hold, and exercise unto the said James Harrison, his executors, administrators, and

assigns,

assigns, the exclusive enjoyment and advantage thereof, from the day of the date of these presents until the tenth day of September which will be in the year one thousand eight hundred and seventy-one: Provided always, that if the said James Harrison shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-second day of November, in the year of our Lord one thousand eight hundred and sixty.

(L.S.) W. DENISON.

A.

SPECIFICATION.

My invention consists in producing cold by the evaporation of a liquid in one vessel, the withdrawal of the vapour formed, and the getting rid of the heat thus withdrawn by the condensation of the vapour in another vessel, such condensation being effected by pressure, and the heat given out during such condensation removed by the vessel being surrounded by water, the condensed liquid being again available for evaporation; the whole process being conducted *in vacuo*, that is to say, the liquid and vapour being isolated from the pressure of the atmosphere. The evaporating vessel may be of tinned copper, or any air-tight and water-tight material of good heat-conducting power, capable of resisting the atmospheric pressure, and not acted upon by the substances in contact with it, and of any shape, provided there be a sufficient surface of contact respectively to the liquid to be evaporated and the substance to be cooled. In like manner, the condensing vessel may be of any material and shape; the requisites of strength, conduction of heat, resistance to chemical action, and sufficient surface, being attended to.

The apparatus whereby the vapour is to be withdrawn from one vessel and forced into the other, may consist of a double-acting air pump, as shewn in the drawing; a double-acting air pump with a piston of a half drum or gasometer shape, working freely in an annular space filled with mercury; a blowing fan enclosed in an air-tight vessel, or a series of blowing fans; or, the vapour may be forced under a head of mercury, and delivered on the other side of a partition, where the mercury is kept at a lower level by the increased tension of the compressed vapour by means of a diving bell; a reversed archimedean screw, that is to say, a screw in which the spiral turns in the opposite direction to that in which it would raise water, so that it scoops in and carries down the vapour, and delivers it behind the partition, or by a reversed overshot wheel; or generally, the vapour may be depressed by reversing any of the ordinary means whereby liquids are raised.

As this my invention is applicable to the production of various degrees of cold by the evaporation of any volatile liquid, it is impossible to specify the dimensions of the various parts of the apparatus suitable for the endless variety of conditions under which it may be worked. I consider it sufficient to supply such data for the calculation of dimensions as may be a guide to persons conversant with the leading principles of heat, and the chemical and mechanical properties of the substances made use of or operated upon. The requisite surface of the evaporating vessel may be deduced from the ascertained fact that a surface of 10 square feet will evaporate fully 1lb. of water per minute with a difference of temperature of 30°; with a less difference, a proportionately larger surface will be required. The latent heat of other liquids being less than that of water, a less surface will suffice for their evaporation.

For instance, the latent heat of ether at (say) 24° is to that of steam at 212°, as 200 to 1,000 nearly; therefore, only one-fifth of the surface, or one-fifth of the difference of temperature, will suffice for the evaporation of ether. The same rule will apply to the condensing

condensing vessel; but as no loss, except of space, can accrue from having the vessels much larger than is by calculation necessary, it will be well to make them of ample capacity and surface.

The method of ascertaining the dimensions of a pump to withdraw and compress a given quantity of vapour in a given time, and at given temperatures, and of the power required to work such pumps (in addition to the loss accruing from friction, and the power required to overcome the weight of the valves, &c.) may be illustrated by the following calculations for an ether-evaporating apparatus. It has been ascertained by experiment, that 100 cubic inches of air weigh 31 grains, so that 1 lb. of air occupies 22,580 cubic inches. The vapour of ether at 96° is of specific gravity 2·56, so that 1 lb. of it occupies 8,820 cubic inches. The force or tension of ether vapour at (say) 24° is equal to 4·8 inches of mercury, and as the specific gravity is proportional to the tension, 1 lb. of vapour will occupy 55,125 cubic inches; but a condensation takes place on account of the lowness of the temperature, amounting to $\frac{1}{180}$ of the volume at 32° for each degree; corrected by this amount, 1 lb. of ether vapour at 24° occupies 47,935 cubic inches. To withdraw and condense this quantity per minute, a pump of (say) 500 cubic inches capacity, making 48 strokes, would be required. The power required to work such a pump, is the difference of tension between the vapour at the temperature of evaporation and its tension at the temperature of condensation; thus, the tension of ether vapour at (say) 24° being equivalent to 4·8 inches of mercury, and its tension at (say) 74° being equivalent to 16·1 inches, the power required to raise vapour at the former, and condense it at the latter temperature, will require to be sufficient to overcome a tension equal to 11·3 inches of mercury. As, however, the vapour of ether, under a pressure of 16·1 inches, occupies only ·3 of its volume at 24°, the full power will not be required until the vapour has acquired the full density, and only one half of the power will be required to reduce the volume of vapour at 24° to its volume at 74°. The power, therefore, required to raise 1 lb. of ether at 24° and condense it at 74°, is equal to the compression of 15,520 cubic inches (the bulk of the vapour at 74°) $+ \frac{47935-15520}{2} = 31,722{\cdot}5$ cubic inches, with a weight of 11·3 inches of mercury, or about 5·7 lbs. per square inch.

Having thus described generally the nature and mode of operation of my invention, I now proceed to describe minutely the machines which I have had constructed for producing cold, in the manner set forth in the title of my invention.

Fig. 1 is an elevation in section of an ice-making apparatus requiring a motive power of ten horses. The pump A is employed in withdrawing the vapour of ether from the tubular boiler B, and forcing the vapour into the condensers CC, where, by means of the pressure, aided by a stream of cool water, the vapour is reduce into the liquid state, and the resulting liquid returns through the vessel F into the boiler, where it again undergoes evaporation. The ether, in evaporating, carries off a large quantity of heat, or in other words, produces a great degree of cold. The cold thus produced is utilized by means of a stream of saline or alkaline solution passing in the vessel G, round the outside of the boiler, and through its tubes, and thence to the trough H, where it passes along the outer surfaces of the vessels or moulds containing the pure water intended to be frozen. The solution afterwards flows into the well of the pump I, by which it is raised to the top of the boiler, whence it again flows by its own gravity, through the tubes, &c., as before.

In Fig. 2 is a plan of that portion of the apparatus through which the solution circulates. The small pump D is employed in making a vacuum throughout the apparatus; and in case of any leak afterwards occurring in withdrawing the air which might get into the tubes or vessels, and recovering the ether with which such air would be mixed, by passing it through the small condenser E, under a pressure greater than that to which it had formerly been subjected. A partial vacuum may be formed by the large pump A, by removing the cap e^2, shutting the cock f^2, and opening all the other communications between the vessels; but to complete the vacuum, it will be necessary that a small quantity of ether should be introduced into the boiler, and the remaining air mixed with the vapour of the ether withdrawn by the small pump D.

After

Cold-producing Apparatus.

After working for a short time, it will be found that the whole of the air has been withdrawn, and that the vessels are occupied by ether vapour only. The boiler is then to be supplied through the funnel *n*, with the ether intended to form the permanent charge. The supply is continued so as to keep the boiler filled up to the level of the second or third row of tubes from the top, as indicated by the gauge *m*. After the pump A has been at work for a short time, the liquified ether will begin to return into the boiler, and thenceforward the quantity withdrawn and returned will become self-regulated and continuous. The inlet valve openings a^1 a^2 should be made as large as the ends of the cylinder will admit, because the vapour on entering the cylinder is much more rarefied than when passing through the outlet valves b^1 b^2.

All the valves, but especially the inlet ones, should be nearly balanced so as to move with delicacy, as well as certainty, or they may be worked with valve gearing. The piston C is segmental, with as few vacant spaces as possible, and the stroke is adjusted so that the piston shall work closely to the top and bottom of the cylinder, in order that the whole of the contained vapour may be expelled at each stroke. As ether is a solvent of oil, it is necessary, to prevent the oil used in lubricating the piston from reaching those portions of the apparatus containing the liquid ether, and for this purpose the vessels g^1 g^2 are provided. The oil, after escaping from the cylinder, will flow into copper bottles attached to those vessels, and the bottles may be disconnected when they are supposed to be full. In replacing these bottles care must be taken to expel the air from them, and this is accomplished by placing a small portion of ether in them and keeping them heated to 100° while they are being fixed. On the top of these vessels are fixed h^1 h^2, the pressure gauges.

The water required to assist in the condensation of the ether vapour is first delivered between the casing d^1 and the cylinder, where it serves to keep the pump cool; the water then flows along a pipe (not shewn in the drawing) to d^2, where it passes downwards, and then rises from below into the space d^3, containing the worms *i i*, from the top of which it is allowed to escape by overflow pipes. The quantity of this water will be regulated by the facilities for obtaining it. The more cool and the more plentiful it is, the less will be the power required to work the pump A.

The ether, condensed into a liquid state by the internal pressure and the external supply of water, will flow along the pipe j^1, and be forced into the boiler, the pressure there being much less than on the condensing side of the apparatus. The pipe j^2 is provided for the return of air or uncondensed vapour. The vessel F is fitted with a float valve *t*, which opens when a depth of fluid accumulates sufficient to raise the weight of the ball as well as to overcome the pressure of vapour.

In the case of repairs being required, or in order to clean out the boiler, the whole of the ether contained in the apparatus may be withdrawn in a perfectly pure state, by closing the stop-cocks *k*, and working the pump A, until the gauge *h* shews a nearly complete vacuum, then disconnecting the pipe j^1 from the condenser, and allowing the ether to flow into the vessels prepared for its reception. Should there be any foulness in the boiler, it may be cleansed out with hot water, and the impurities allowed to flow off by the tube proceeding from the bottom of the boiler.

All the stop-cocks must of course be accurately fitted, a leakage through the ways being, however, of less consequence than a leak between the interior and exterior. The use of white or red lead in securing the flanges must be avoided, as they are acted upon by ether. Gutta percha may be employed in the cold or rarefying portion of the apparatus, but for the pump and the condensation or warm portion, metallic lead or solder are the most sufficient. In order to test the soundness of the whole apparatus before commencing operations, a few pounds of pressure may be obtained by removing the cap e^1, shutting the cock f^1, and working the pump for a few strokes; a leak will thus be more easily detected than if a vacuum instead of a pressure had been first employed. Should the apparatus be perfectly air-tight, the small pump D will not require to be worked; but in case it cannot be dispensed with, the ether which collects in the small condenser E must be periodically removed; and the air outlet may be provided with a loaded valve, so

that

that the quantity of ether lost may be minimized to any degree. The surface of the boiler and tubes in a machine of the dimensions shewn in the drawings is equal to 270 square feet, and of the condensers to 260 square feet; but these surfaces may be varied, bearing in mind the rule that the larger the surface the less will be the power required. The same proportions will serve for machines of all sizes. The object of leaving two or more rows of the tubes in the boiler uncovered is, that the vapour, if charged with any of the liquid ether caused by its ebullition, may be dried, and that the evaporation of the spray coming in contact with the upper tubes may be utilized in absorbing heat as effectually as if the upper tubes were covered with liquid. If this precaution be not attended to, the particles of liquid carried up by the vapour would become aeriform on their way to or within the pump, without producing useful effect.

The condensers are of great capacity in proportion to their surface, but this is a necessary precaution in case of any leakage of air into the apparatus.

No air can accumulate on the evaporating side, but the whole would be carried to the condensers; and if the space were not large, a very small influx of air would materially increase the pressure against which the pump A would have to work. The whole of the vessels and tubes are of copper.

For the purpose of freezing or cooling water, the liquid intended to flow round the boiler, through the tubes, and over the exterior surfaces of the vessels containing the pure water, may be a nearly saturated solution of common salt. For chemical purposes, or where an intense degree of cold is required, a solution of potash, or a mixture of alcohol and water, or alcohol alone, will be preferable or requisite. The arrangement shewn in the drawing is for the manufacture of ice; for this purpose the speed of the pump I is regulated so that the solution shall flow from the vessel G into the trough H, at a uniform temperature of about 26° Fahrenheit.

The freezing trough must be at a sufficient inclination to allow of the free passage of the solution onwards. The overflow partition, p^2, is about an inch lower than p^1, and the latter is about the same below the maximum level in o^1. The solution flows in the course indicated by the arrows in the spaces between the partitions r^1, r^2, r^3, &c., and the ice moulds s^1, s^2, s^3, &c., until it passes r^{100}, and s^{100}, when it returns by a pipe to the pump I, when the same course is recommenced. The solution gradually abstracts heat from the ice moulds as it passes along. These moulds are of tinned copper, but may be of any other suitable metal; they are kept in their places by being let into notches at each end of the intervals between the partitions r, r, r, so that none of the solution can pass round the ends of the vessels; and that it must proceed regularly up one side and down the other, the mouths of the ice moulds are raised about an inch above the level of the current. The moulds are wedge-shaped, so that when their contained water has become ice, it may be easily detached and abstracted, by dipping the mould for a few seconds into water above the freezing point, and then inverting the mould. So soon as one vessel of ice has been removed, its place is immediately supplied by another containing water, so that the regular flow of the current may not be much interrupted. The reason for having so large a number of freezing moulds is because ice is a very slow conductor of heat, and in proportion to that slowness the cooling surface must be increased. To make ice cheaply, it must be made slowly. I have ascertained experimentally, with one of my machines, that in order to produce ice at the rate of an inch per hour, the following degrees of cold on the refrigerating surface were necessary:—

	Thickness of Ice formed, in inches.	Total thickness.	Temperature of refrigerating surfaces.
First ¼ hour	¼	—	23°
Second do.	¼	½	13°
Third do.	¼	¾	8°
Fourth do.	1	4	—
Fifth do.	1¼	2	—
Sixth do.	1½	0	—
Seventh do.	1¾	2	—

This

This thickness having been obtained, I found that to continue the formation at the rate of half an inch per hour required the following degrees of cold:—

	Ice formed.	Total thickness.	Temperature below zero.
Eighth ¼ hour	⅛	1⅞	2°
Ninth do.	⅛	2	2°
Tenth do.	⅛	2⅛	3°
Eleventh do.	⅛	2¼	4°
Twelfth do.	⅛	2⅜	5°
Thirteenth do.	⅛	2½	6°
Fourteenth do.	⅛	2⅝	6½°

I here stopped the machine for half an hour, in order to observe the process of the equalization of temperature, and the continued formation of ice from the surplus cold contained in the mass. The result was, that the temperature of the refrigerating surface rose 13½°, and the ice increased one-eighth of an inch in thickness, or at one-half the rate at which it had been formed while the machine was in action. I continued the experiment until the ice was 5 inches thick from each surface, or 10 inches in all, at which time the thermometer indicated 9° below zero. The machine with which I operated was capable of producing a degree of cold 20° below zero. The ice mould used was cylindrical in shape, and the freezing process was carried on from the circumference towards the centre; so that not only was a continually increasing degree of cold required to produce a diminishing thickness of ice, but the size of each concentric ring of ice became less and less.

I have been thus particular in describing this experiment, because, upon a due appreciation of the results, depends success in the economical manufacture of ice.

Time and surface, instead of increased intensity, are requisite. In the arrangement which I have figured, one hundred vessels, each containing 18 lbs. of water, are arranged in the trough H. The cakes of ice will be wedges of the average thickness of an inch and a half.

When the machine is set to work, the freezing process at first proceeds with considerable rapidity in the vessels nearest to the head of the stream, and the solution is raised to 32° long before it reaches to the lower end of the trough. As the process proceeds, the slow conducting power of the ice in the first vessels allows the solution to carry its cooling power lower down, and by the time the ice is solid in No. 1, the freezing process is going on throughout the whole range. When one of the vessels of ice is removed, and a vessel of water substituted, the new vessel, for a short time, abstracts a larger share of the cold than its neighbours, until a crust of ice has formed on its inner surface. The vessels in the upper part of the trough will require much more frequent removal than those at the lower end, but the ice in the lower vessels will be of a clearer and more uniform texture. The modifications of which this arrangement is capable are many.

If the thickness of the cakes of ice be diminished, the process will be much quicker, and a smaller number of moulds will be required, but the manual labour of removal will be increased, and the degree of thinness will be limited by the necessity of having a considerable difference between the thick and thin edge of the block of ice. If the thickness of the cakes be increased, the number of moulds would have to be increased also, while the labour of removal would be diminished. The upper part of the trough might be filled with moulds of greater thickness than those in the lower part. The moulds at the lower end might be carried upwards to supply the places of those removed from the upper, or the moulds might be fixed in movable sockets, in a framework made to advance progressively upwards; so that each mould would be shifted to a colder position in proportion to the thickness of ice formed within it. The plan which I have figured is that which is characterized by simplicity and economy. The temperature of the solution may be varied, but the nearer it is to 30° the less will be the power required to produce a given quantity of ice. The higher the temperature, however, the greater

will

will be the refrigerating surface required in the moulds; from 24° to 28° will be found to be a desirable medium, the power being the same; the lower the temperature the slower will be the circulation of the solution, and the higher the temperature the more rapidly will the pump I have to be worked. It is not necessary that any given apparatus should be worked at any fixed rate, because the relation between the parts can always be adjusted to varying circumstances. Thus, supposing that there should be a loss of power from any accidental cause, there will then be a surplus of refrigerating surface; this additional surface can be utilized by increasing the rapidity of the current of solution, so that a slower formation of ice will take place throughout the whole length of the trough; and supposing that it is found desirable to increase the power, and to work the pump A at a more rapid rate, the surplus power may be utilized by lowering the temperature of the solution, and thus forming the ice more rapidly, especially in the upper portion of the trough.

I have figured an arrangement for causing the solution to traverse the length of the boiler three times; the object of doing so is to insure a uniformity of temperature in the whole mass of solution. It is desirable that every particle should come in contact with the metallic surface; and if the current flowed only once through the tubes, the centre of each stream might be warmer than the sides, and could only get cooled by robbing the outside particles. The number of traverses may be advantageously increased, but should not be diminished. The whole of the vessels in the refrigerating half of the apparatus must of course be well surrounded by non-conducting materials, and the boiler, case, and trough, fitted with double lids, divided into convenient lengths. In a large manufactory a partition should be erected, so as to divide the condensing from the refrigerating apartment.

The trough H, instead of being in one continuous length, may with advantage be divided, and the lower half made to return; so that the last division, r^{100} and s^{100}, may be close to the pump I, and that the long pipe for the return of the solution may not be required.

In the construction of small machines for domestic use, the subsidiary pump D may be dispensed with, so also may the oil traps and the vacuum gauge; the number of flanges and connections may be diminished. Having supplied rules and proportions applicable to machines of all sizes, so far as relate to the more essential parts of the apparatus, I do not think it necessary to point out any of the endless variations of detail of which the subsidiary parts are capable.

For cooling worts, &c., no other modification will be required than the removal of the trough H and pump I. The wort will be allowed to cool down to 100°, or other convenient temperature, in the ordinary coolers, and will then be conveyed to the top of the boiler, at o^1; the rapidity of the stream will be regulated so that it shall flow into the fermenting vessels at 60°, or other desired temperature. As the ether vapour will pass off at a heat of 50° or upwards, the power for the pump A will be very much less than that required in the formation of ice, and the vapour being much more dense, a proportionally larger amount of cooling effect will be produced by each stroke of the pump. In the same manner, brine intended for the cooling of provisions may be cooled to the temperature requisite for success in the operation of salting.

Where the apparatus is intended for the cooling of air admitted to apartments in hospitals, &c., a very small machine will serve to cool a large quantity of air, the specific heat of that body, as compared with the latent heat of ether vapour, being very low; but the most satisfactory and uniform results will be obtained by making use of currents of pure water cooled by the apparatus. As the temperature would never require to be lower than 40°—the point of greatest density of water—the current might be made, as in the hot water apparatus, to circulate by the gravity of a cold column overcoming that of a warmer column; but the regulation of the heat would not thus be sufficiently under control, and the moving power would be so feeble as to render a stoppage probable. I therefore recommend the use of a pump to force the cooled water to the top of the house,

and

and by a regulating stop-cock, to allow the return current to fall upon the top of the boiler. Small gutters would have to be provided, where requisite, in order to carry off the moisture deposited on the cold water pipes.

When the supply and expulsion of the vapour are regulated by slide valves, the space between the piston and the valves must be as small as possible. The inlet valves must be open alternately during the whole of the stroke, and the outlet ones during the last fifth of the stroke, when the machine is used for ice-making; but when employed for other purposes, the time during which they remain open is regulated according to the temperature and consequent tension of the vapour. Each inlet slide is kept close by a spring exerting a force equal to 17 lbs. for every square inch of port, and the outlet slide does not require any weight beyond what is required to keep it in its place, irrespective of the pressure of the vapour.

My invention thus consists in the combination of a refrigerating process, by the continued and self-regulated circulation of a stream of ether or other volatile liquid with the continued circulation of a stream of uncongealable liquid, conveying and diffusing the frigorific effect over large surfaces, and in rendering the process subservient to the manufacture of ice, in an economical manner—to cooling worts, &c.—to regulating the temperature of rooms, and generally to any process in which a temperature below that of the season or climate is required.

This is the specification referred to in the annexed Letters of Registration granted to James Harrison, this twenty-second day of November, 1860, and marked A.

W. DENISON.

REPORT.

Royal Mint, Sydney,
29 October, 1860.

Sir,

Having examined and considered the matters stated in Mr. James Harrison's Petition (accompanied by plans) and specifications for Letters of Registration for an invention for refrigerating, by the co-operation of volatile liquids *in vacuo*, and the continuous condensation and re-co-operation of the same materials, we have the honor to report as follows:—

We have ascertained from Mr. Harrison (see copy of letter annexed) that his invention was secured to him in England by Letters Patent, on the 10th September, 1857, for a period of fourteen years.

As we conceive it to be foreign to the intention of the Act 16 Victoria, 24, that patents should exist in this Colony which have expired in the United Kingdom, we recommend that the patent now applied for be granted, to terminate on 10th September, 1871.

We have, &c.,
E. W. WARD.
J. SMITH.

The Honorable
The Colonial Secretary.

P.S.—The documents transmitted to us are herewith returned.

Melbourne, 24 *October*, 1860.

Dear Sirs,

In reply to Captain Ward's inquiries, I have to state that the first patent taken out by me for Cold-producing Apparatus was in the Colony of Victoria, in the month of February, 1856; the second was in England, in the month of March of the same year. These two patents, however, specified quite a different form of apparatus from that which I now use. My third patent was an English one, dated 10th September, 1857, and the specifications now submitted to Captain Ward is nearly a copy of it. All these patents are for fourteen years; all my other patents are of subsequent date, and therefore need not be enumerated. It follows that my patent rights, as regards the principle of my invention, will expire in fourteen years from the 1st of February, 1856; and, as regards the apparatus described, in fourteen years from 10th September, 1857.

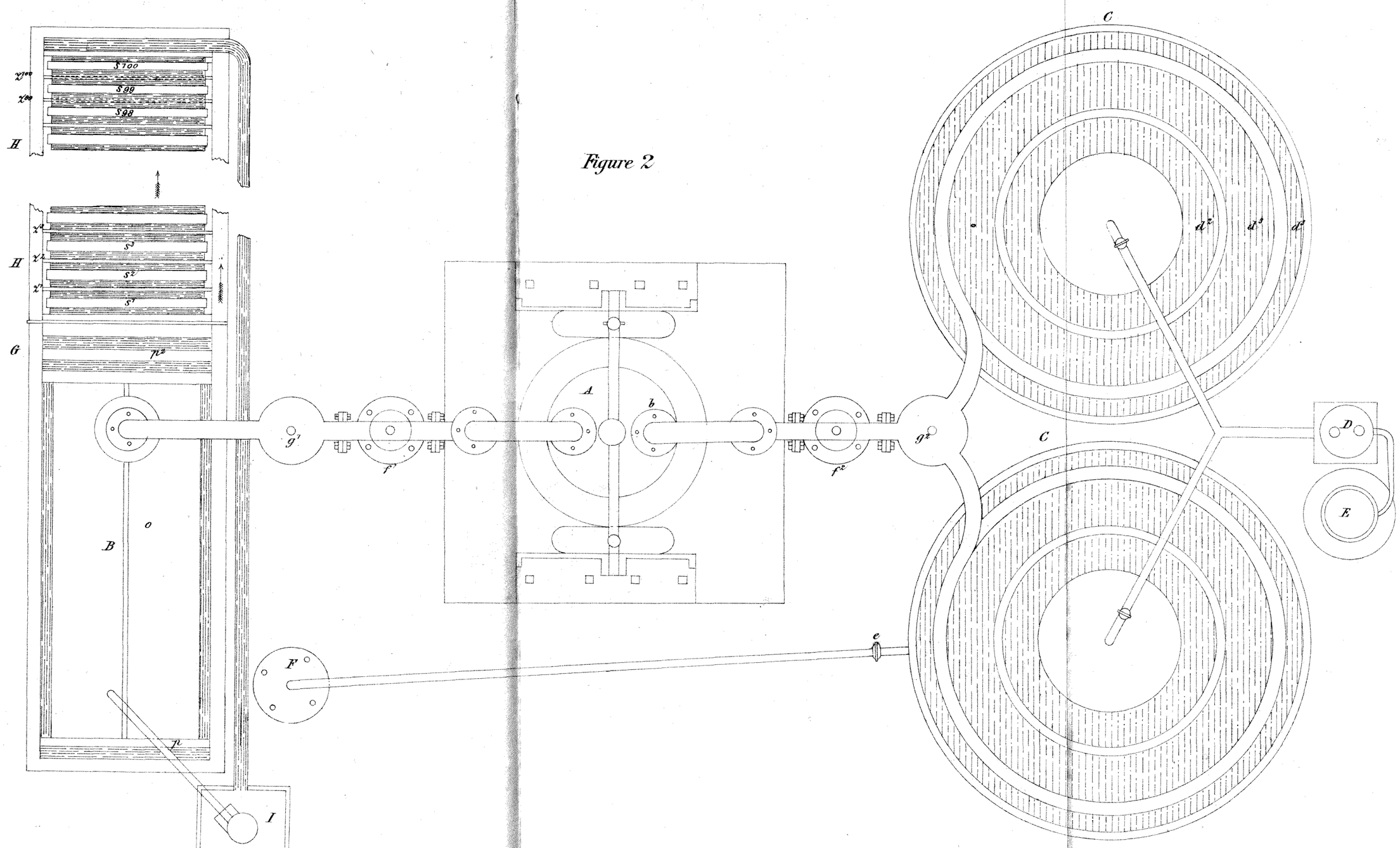
I am, &c.,
J. HARRISON.

Messrs. P. N. Russell & Co.

[Drawings—one sheet.]

(Copy) **C**

Figure 2



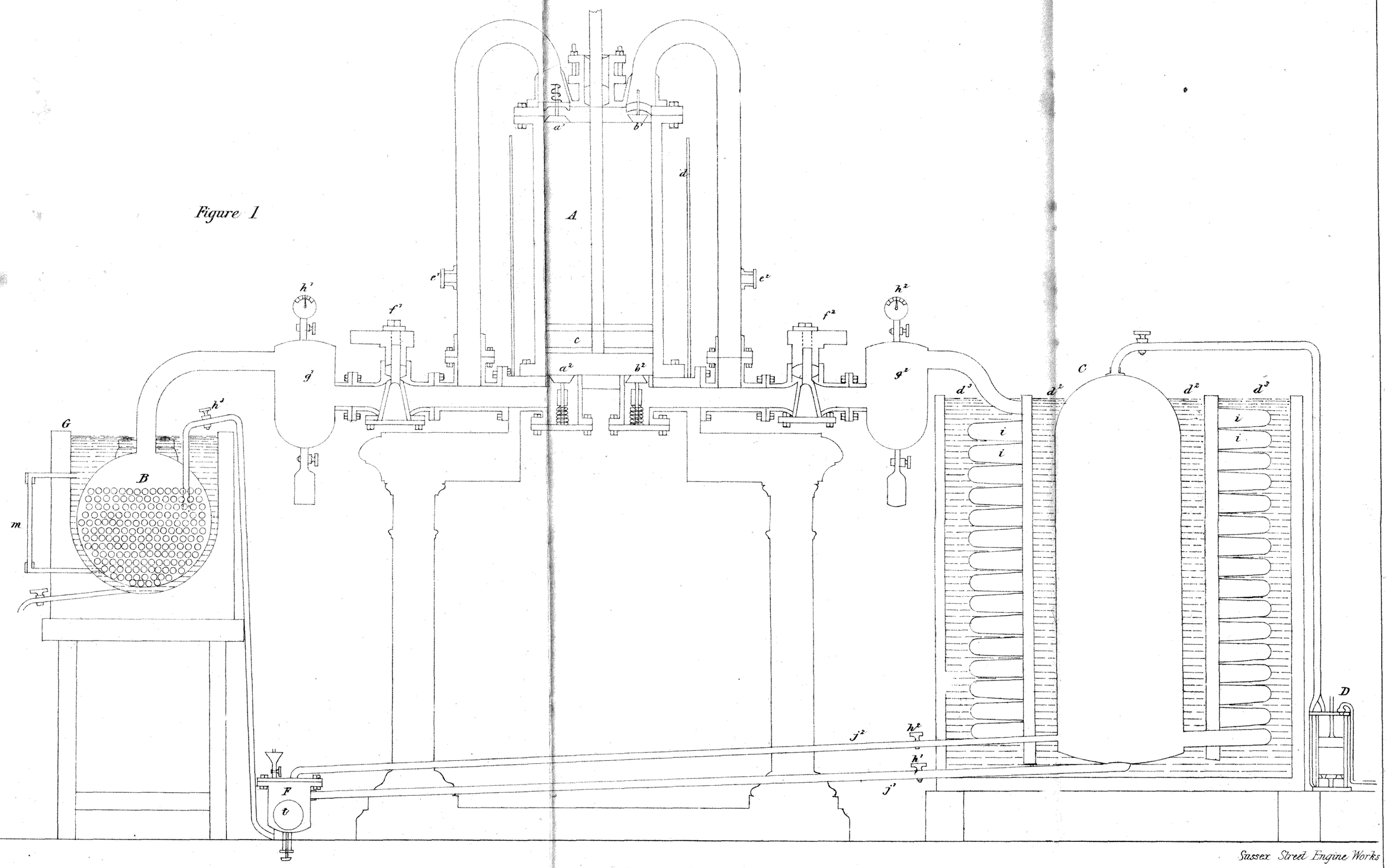
This is the Drawing marked C referred to in the annexed Letters of Registration granted to James Harrison this twenty second day of November 1860

Signed W. Denison

Sussex Street Works
Sydney, Sept. 11th 1860

(Copy) **B**

Figure 1



This is the Drawing referred to marked B in the annexed Letters of Registration granted to James Harrison this twenty second day of November 1860

Signed W. Denison

Sussex Street Engine Works
Sydney, Sept.r 11th 1860

A.D. 1861, 10*th January*. No. 37.

IMPROVEMENTS IN THE MANUFACTURE OF GAS.

LETTERS OF REGISTRATION to William Withers Ewbank, for Improvements in the Manufacture of Gas.

[Registered on the 11th day of January, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, Governor General in and over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and Captain General and Governor-in-Chief of the Territory of New South Wales and its Dependencies, and Vice-Admiral of the same.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS William Withers Ewbank, of Adelaide, in the Colony of South Australia, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the Manufacture of Gas, when oils and fatty matters are used, and in applying the refuse obtained in such manufacture to a useful purpose," which is more particularly described in the specification and drawing which are annexed hereunto; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine

and

and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said William Withers Ewbank, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said William Withers Ewbank, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said William Withers Ewbank shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this tenth day of January, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) W. DENISON.

SPECIFICATION for Patent in the name of WILLIAM WITHERS EWBANK, of Port Adelaide, South Australia. Improvements in the manufacture of Gas when oils and fatty matters are used, and in applying the refuse obtained in such manufacture to a useful purpose.

THESE improvements consist in constructing each of the retorts used with a projection at the bottom, convex inwards, and concave on the outside. This retort is of the form of a truncated cone, and the bottom is at the smaller end; it is heated at the bottom; the oil or fatty matter is supplied through a tube which descends through the inner perforated false bottom of the retort, and the oil or fat falls on the inner surface of the convex projection above mentioned, and is vaporized, and the vapours pass through the perforated false bottom and amongst the heated mass of charcoal and lime mixed together, and then out of the retort for use. The retort, in the place of being cast of ordinary cast iron, is cast of malleable cast iron and then annealed, by which it will be found that a retort will last longer and be found more effective when in use.

FIGURES IN THE DRAWING, AND WHAT THEY REFER TO.

1, oil cistern; 2, cock or tap for regulating the supply of oil; 3, syphon pipe for feeding the oil to the retort; 4 is the retort; 5, convex projection in bottom of the retort; 6, the grating to separate the vaporizing from the generating and purifying portion of the retort; 7, lime and charcoal; 8, man or hand hole, to allow the lime and charcoal to be changed and the retort cleaned out; 9, cast iron pipe for conducting the gas from the retort to the condensing box 10, which is made of cast iron; 11, the pipe for conducting the gas to the gas holder; 12, syphon pipe to keep the level of the water in the condensing-box; 13, the tap to let off any condensation that may take place in the pipe 11; 19, smoke pipe for furnace; 20, fire brick forming the fire box; 21, the ash pit; 22, the grate bars of the fire box; 23, the flue; 24, the outside case of the furnace, made of sheet iron; 25, lid of retort and furnace; 26, bolts to screw retort to lid; 27, tap to stop the gas between the machine and the gas holder; 28 is the pipe to supply the condensing pipe with water.

1 is the feeding cistern or hollow cylinder which contains the oil or carbonized liquid from which the gas is generated in the retort, and into which it is conducted by the syphon pipe; 3, the pipe from the cistern, is furnished with a stop-cock, 2, by which the quantity of fluid conveyed can be regulated or entirely suspended at pleasure; 4 is the retort or malleable cast iron hollow cylinder, of the form of a truncated cone; the

the bottom is at the smaller end; at the bottom I make a projection, 5, convex inwards and concave outwards. The retort contains suspended in its centre, from its cover, 25, a tube, 3, which feeds or deposits the oil in the heated convex projection of the retort 5, where it is instantly vaporized. Above this small convex projection, and separated from it by a horizontal iron grating, 6, is the general area of the retort, 4, which is filled around the central tube with small pieces of carbonate of lime, which become calcined into the protoxide by the heat of the furnace, and with animal or vegetable charcoal, 7, coarsely pulverized. This greater portion of the retort thus becomes a filter, and the vapour in passing through it becomes generated into gas, and is at the same time purified of any aqueous vapour or carbonic acid which may ascend with it. The filtering and purifying substance employed is relieved of these absorbed impurities, by the necessary heating of the retort before the oil is turned on. At the top of the retort is left a vacant space or chamber above the filtering material, to receive the gas thus purified, and supply the tube 9, which conducts it into the condensing box 10; this box is of cast iron, and has fitted into one side a syphon pipe, 12, to keep a uniform level of water inside; the tube 9 discharges the gas into the water in this box, from whence it arises, and passing through the tube 11, enters the gas holder 15; from the gas holder it is conveyed by the tube 16 to the burners, for consumption. The refuse oil, after the gas is extracted, is converted into grease for railway and other purposes.

I claim as the invention: First—Constructing retorts to be used in the manufacture of gas from oils or fatty matters, with a projection at the bottom, convex inwards and concave outwards, by which means I obtain a more reliable heat for vapourizing oil without the risk of coking or carbonizing it, and thus obtain a much larger quantity of gas from a given quantity of oil than can be obtained by any other process. Second—Causing the vapour to filter through a body of lime and charcoal under heat, for the purpose of converting it into gas and at the same time purifying it.

This is the specification referred to in the annexed Letters of Registration granted to William Withers Ewbank, this tenth day of January, 1861.

W. DENISON.

REPORT.

Royal Mint,
4 *December*, 1860.

Sir,

Having examined and considered the matter stated in Mr. William Withers Ewbank's Petition for Letters of Registration for an invention of "Improvements in the "manufacture of Gas when oils and fatty matters are used, and in applying the refuse "obtained in such manufacture to a useful purpose,"—we have the honor to report as follows:—

Mr. Ewbank claims as his invention—

First—Constructing retorts to be used in the manufacture of Gas from oils or fatty matters, with a projection at the bottom, convex inwards and concave outwards, by which means he obtains a more reliable heat for vaporizing oil without the risk of coking or carbonizing it, thus obtaining a much larger quantity of gas from a given quantity of oil than can be obtained by any other process.

Second—Causing the vapour to filter through a body of lime and charcoal, under heat, for the purpose of converting it into gas, and at the same time purifying it.

Third—Making the retorts of malleable cast iron, and then annealing them; by which he obtains them much more durable and effective.

Fourth—The refuse obtained in such manufacture for grease for railways, and for other purposes.

Of

Improvements in the Manufacture of Gas.

Of these claims, we consider the first and second only should be secured to the applicant by the Letters sought for.

The third is only admissible if referring to the retorts described in the specification, and in that case is embraced in the first, which includes retorts constructed of any material whatever. The fourth, besides being in vague terms, is inadmissible, except for refuse obtained in the retorts described, and will therefore be sufficiently protected by securing to the applicant the sole use of the retorts themselves.

The documents transmitted to us are herewith returned.

We have, &c.,

E. W. WARD.

J. SMITH.

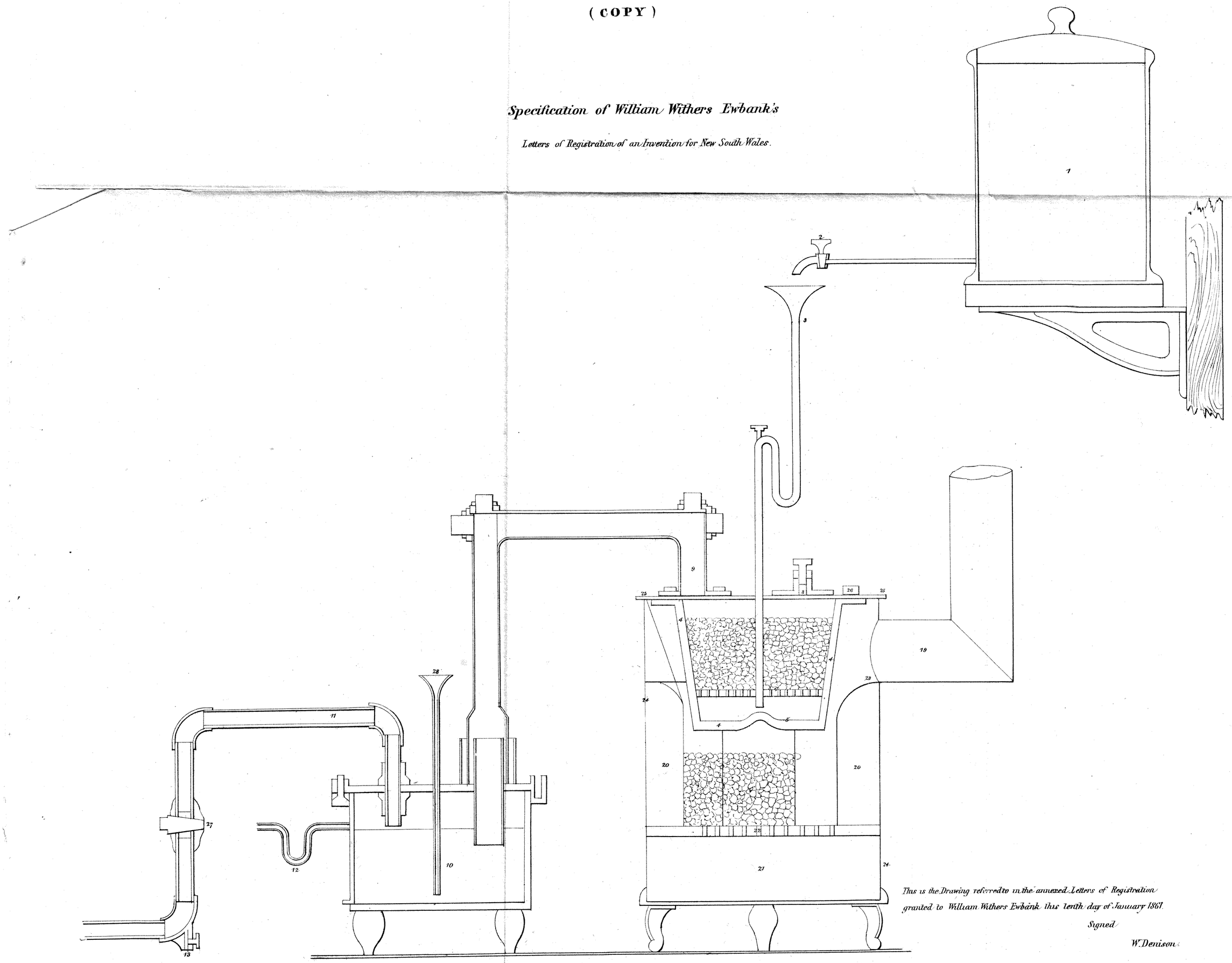
THE HONORABLE
THE COLONIAL SECRETARY.

[Drawing—one sheet.]

(COPY)

Specification of William Withers Ewbank's

Letters of Registration of an Invention for New South Wales.



This is the Drawing referred to in the annexed Letters of Registration granted to William Withers Ewbank this tenth day of January 1861.

Signed

W. Denison

A.D. 1861, 19*th February*. No. 38.

WHEELS FOR RAILWAYS AND TRAMWAYS.

LETTERS OF REGISTRATION to Edward Bell, for improvement in the construction of Wheels for Railways and Tramways.

[Registered on the 21st day of February, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency John Francis Kempt, Esquire, of Her Majesty's Twelfth Regiment, Lieutenant-Colonel in the Army, the Senior Military Officer for the time-being commanding Her Majesty's Land Forces in the Colony of New South Wales, Administrator of the Government thereof.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Edward Bell, of Sydney, in the Colony of New South Wales, civil engineer, hath by his Petition humbly represented to Sir William Thomas Denison, Knight Commander of the Most Honorable Order of the Bath, late Governor General over all Her Majesty's Colonies of New South Wales, Tasmania, Victoria, South Australia, and Western Australia, and late Captain General and Governor in Chief of the Territory of New South Wales, and late Vice-Admiral of the same, that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention or improvement in the construction of Wheels for Railways and Tramways, which is more particularly described in the statement or specification hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that the said Sir William Thomas Denison would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of

 fourteen

fourteen years; and whereas, under and by virtue of a certain warrant under Her Majesty's signet and sign manual, dated the third day of May, one thousand eight hundred and fifty-nine, and by a certain proclamation issued in pursuance thereof, dated the twenty-second day of January, one thousand eight hundred and sixty-one, and published in the New South Wales *Government Gazette* of the same date, the administration of the Government of the said Colony of New South Wales is now vested in me, the Senior Military Officer for the time-being commanding Her Majesty's Land Forces in the said Colony of New South Wales, under the style and title of Administrator of the Government thereof: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons duly appointed to examine and consider the matter stated in the said Petition, and to report thereon, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said Edward Bell, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof: to have, hold, and exercise unto the said Edward Bell, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Edward Bell shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government, House, Sydney, in New South Wales, this nineteenth day of February, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN FRAS. KEMPT.

SPECIFICATION.

THE wheels at present used for locomotive engines, tenders, and railway and tramway carriages, and rolling stock, are invariably made with their peripheries of metal, and so that they present a metal surface to the rail, plate, or way upon which they run; and such wheels are made to run upon and in contact with the rails, plates, or ways of railways or tramways; and the only means by which such railway engines, tenders, carriages, and other rolling stock, are supported, propelled, guided, and retarded, are by the use of such wheels upon such rails, plates, or ways.

The nature of my invention or improvement is as follows, namely:—To construct some (or all, if convenient) of the wheels to be used upon railways or tramways with wooden peripheries, and so that such wheels may present a wooden surface to the rails, plates, or ways on which they are to run. I use for this purpose ironbark or other suitable timber, thoroughly seasoned, baked, and shrunk into the smallest possible compass, but not so as to deteriorate its strength or destroy its nature. The wood is to be in segments so cut and placed as always to present its end or cross grain to the periphery of the wheel. The segments thus built together are to be securely bound in position by metal discs, plates, or rings, and the wooden rim of the wheel made to project slightly beyond the peripheries of the metal discs, plates, or rings, as the case may be, which bind and hold the wooden segments together. Metal flanges or rims may be attached to the sides of these wheels, to act as guides for giving them direction along the rails or ways, in which case the guiding rim may be made of larger diameter than the circumference of the wooden segments. I prefer to make the wooden peripheries of my wheels cylindrical, or nearly so, with the outer angle rounded or chamfered.

The manner of performing the said invention or improvement is as follows:—There is a much greater amount of adhesiveness to be derived from wood upon metal, and a still greater amount of adhesiveness from wood upon wood, than there is from metal upon metal, and I therefore propose running the wooden peripheries of my wheels in contact with and upon the rails, plates, or ways of railways and tramways, and using them as propelling wheels for locomotive engines, and as retarding wheels, and for stopping the same, and for the purpose of attaching them to the tenders of engines, and the carriages, trucks, and other railway and tramway rolling stock, and using the said wheels for retarding the motion of and stopping such carriages, trucks, and other railway and tramway rolling stock.

Having

Having thus described the nature of the invention or improvement, and the manner of performing the same, I would have it understood that I do not confine myself to any particular form of wheel or parts of the same, or to the precise detail; but what I claim as the invention or improvement for which I am desirous to receive Letters of Registration for New South Wales is, the construction of wheels, to be used on railways and tramways, with wooden peripheries, and so that the wood employed in constructing such wheels may present its end or cross grain to the periphery; and the application of such wheels to locomotive engines, tenders, carriages, and other rolling stock on railways or tramways; and the use of such wheels for propelling and retarding such engines, carriages, and other rolling stock as may be used on railways or tramways respectively, the same being equally applicable to tramways as to railways, whether the motive power on such tramways be steam or horse power, or otherwise.

This is the specification referred to in the annexed Letters of Registration granted to Edward Bell, this nineteenth day of February, 1861.

JOHN FRAS. KEMPT.

REPORT.

Royal Mint, Sydney,
7 January, 1861.

SIR,

Having examined and considered the matter stated in Mr. Edward Bell's Petition for Letters of Registration, for a certain "New and useful invention or improvement in the construction of Wheels for Railways and Tramways," &c., we have the honor to recommend that the prayer of the Petitioner be granted.

We have, &c.,

E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1861, 28*th February.* No. 39.

NEW MODE OF TRANSPORTING PASSENGERS THROUGH PUBLIC THOROUGHFARES, &c.

LETTERS OF REGISTRATION to William Randle, Thomas Loader, and William Elsdon.

[Registered on the 1st day of March, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency John Francis Kempt, Esquire, of Her Majesty's Twelfth Regiment, Lieutenant-Colonel in the Army, the Senior Military Officer for the time-being commanding Her Majesty's Land Forces in the Colony of New South Wales, Administrator of the Government thereof.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS William Randle, Thomas Loader, and William Elsdon, all of Melbourne, in the Colony of Victoria, have by their Petition humbly represented to His Excellency the Governor of New South Wales, that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of a new mode of transporting passengers through public thoroughfares, and in the apparatus connected therewith, which is more particularly described in the specification and drawing which are annexed to these Letters of Registration; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioners therefore humbly prayed that His Excellency the Governor of New South Wales would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years; and whereas, under and by virtue of a certain warrant under Her Majesty's royal signet and sign manual, dated the third day of May, one thousand eight hundred and fifty-nine, and of a certain proclamation issued in pursuance

 thereof,

thereof, dated the twenty-second day of January, one thousand eight hundred and sixty-one, and published in the New South Wales *Government Gazette* of the same date, the Administration of the Government of the said Colony of New South Wales is now vested in me, the Senior Military Officer for the time-being commanding Her Majesty's Land Forces in the said Colony of New South Wales, under the style and title of Administrator of the Government thereof: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said William Randle, Thomas Loader, and William Elsdon, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for the term of fourteen years from the date hereof; to have, hold, and exercise unto the said William Randle, Thomas Loader, and William Elsdon, their executors, administrators and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said William Randle, Thomas Loader, and William Elsdon shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-eighth day of February, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN FRAS. KEMPT.

SPECIFICATION.

THE invention consists of a mode of employing the power of horses for drawing carriages through the public streets, by which great economy is obtained, both in the cost of the construction of the carriages as well as the saving of time, by the increased speed or rate at which passengers can be transported from place to place; and the invention consists in working carriages on railways laid down in the public streets, such carriages being drawn and driven in the ordinary manner by horses; the rails are placed level or nearly so with the surface of the street, so as not to offer any obstruction to other carriages passing across the street. We prefer the rails placed in the centre of the street, and they are made about five inches wide, or any width or form which is most desirable, and placed upon longitudinal or other sleepers laid down in the ordinary manner, which, being well understood, needs no further description. The carriages have brakes applied to them, by which they may be so stopped at any particular point that passengers may disembark without danger. The improvements in the apparatus connected with the system above described are improvements in the wheels of the carriages used on the rails before described; also, in a peculiar form of rail, by which the upper part of the rail on which the wheel rests will correspond with the cone of the wheels, and the lower part will be nearly a straight line, by which they will be kept from clogging with dirt; and also in an arrangement by which the carriages can be readily turned off from one line to another, or on the road when used for street railways; and the peculiarity of the arrangement consists in curving the main tracks slightly from its main course, and placing the fixed switch points in the line produced, thus rendering it a certainty for a car coming from C to go upon the turn-out track, and a car coming from A keeps the main track; but in order that the invention may be more clearly understood, we will now describe the drawings which shew the mode by which we prefer to carry out the mode of giving the requisite motion to the flange upon the wheel, although we do not

not confine ourselves to that peculiar mode; and we would remark that in the drawings the nature of the different figures is written thereon, by which they need not be repeated here. In this mode, the flange is moved by means of an eccentric which is acted upon by a lever worked by the driver in the carriage; and it will be readily understood, by an examination of the drawing, that by turning this lever in one direction or the other, that the flange will be raised or lowered so as to suit either the position of the rail or common road. A is a lever, B is the eccentric, D is head of the wheel, C the flange, CC are the spaces in which the bolts work, *g* is the axis of the wheel, and F is the head of the bolts. By examining the drawing of the turn-out for street railways, the nature and character of it will easily be understood. We have also shewn in separate figures a section of a street railway, shewing the mode of laying down the rails and attaching it to the sleepers or block. We have also shewn a rail full size, with a portion of a wheel shewing the flange thereon acting upon it, by which the nature and advantages thereof will at once be seen. Having thus described the general character of the invention, we would have it understood that we are aware that carriages have been before drawn upon railways for the transport of earth and goods on private ways in the construction of public works; we do not therefore claim working carriages on railways generally, but what we claim is, the mode of transporting passengers through the public streets, on railways, by means of horse power substantially as herein described; and we also claim the construction of wheels with movable flanges for the purposes herein described. We also claim the peculiar form of rail, and also the arrangement of turn-out, by which the carriages can be readily turned off from one line to another or on to the road when used for street purposes.

This is the specification referred to in the annexed Letters of Registration granted to William Randle, Thomas Loader, and William Elsdon, this twenty-eighth day of February, 1861.

JOHN FRAS. KEMPT.

REPORT.

Royal Mint, Sydney,
15 *January*, 1861.

SIR,

Having examined and considered the matter stated in the Petition of Messrs. Randle, Loader, and Elsdon, for Letters of Registration "for a new mode of transporting "passengers through public thoroughfares, and certain improvements to the apparatus "connected therewith,"—we have the honor to recommend that the prayer of the Petitioners be granted.

We have, &c.,

E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

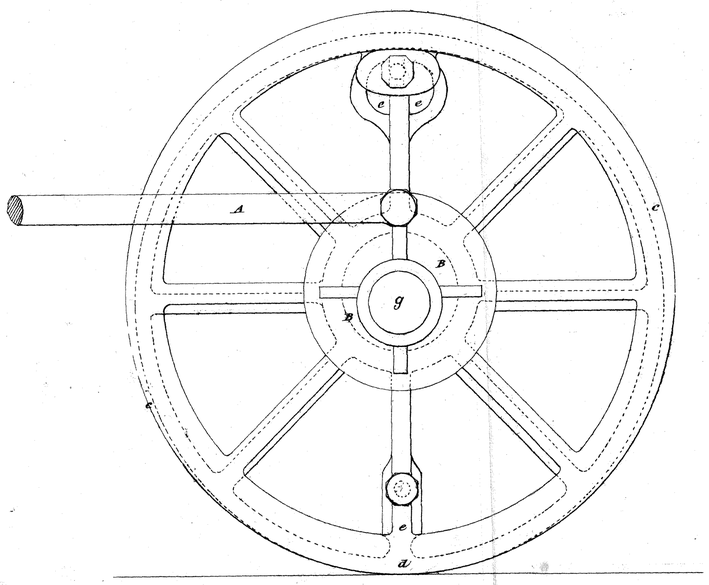
[Drawings—one sheet.]

(Copy)

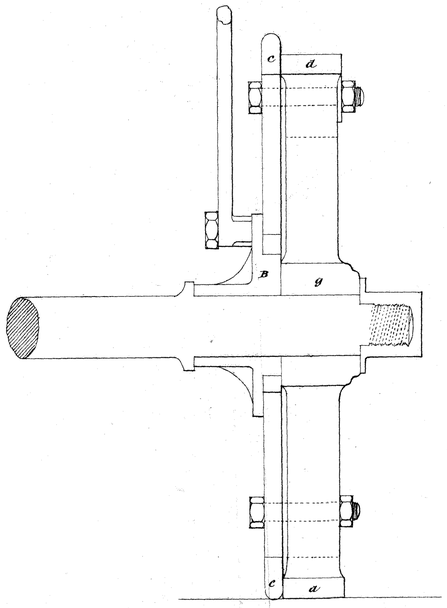
WHEEL WITH PATENT MOVEABLE FLANGE

¼ Full Size.

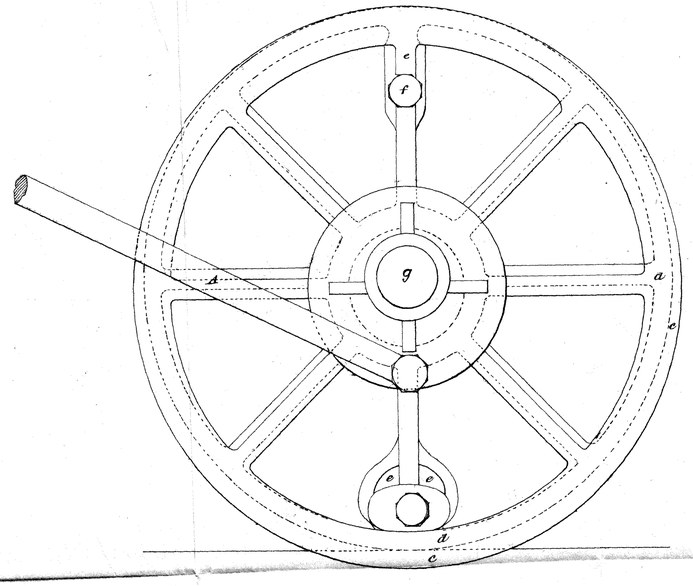
Drawings of Messrs. Randle, Loader. & Elsdon.



Inside Elevation of Flange when raised for Travelling on Common Road Surfaces.



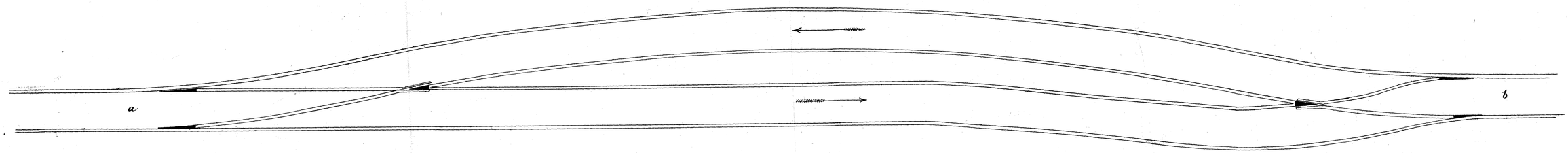
Section through Wheel. Flange. Eccentric &c.



Inside Elevation of Flange, when lowered for Travelling on Rails.

TURN-OUT FOR STREET RAILWAYS. *With fixed Switch points. suitable for any description of Rail.*

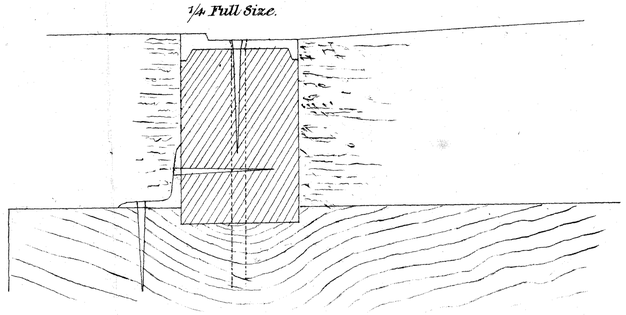
Scale, 8ft. to 1 inch.



RAIL &c

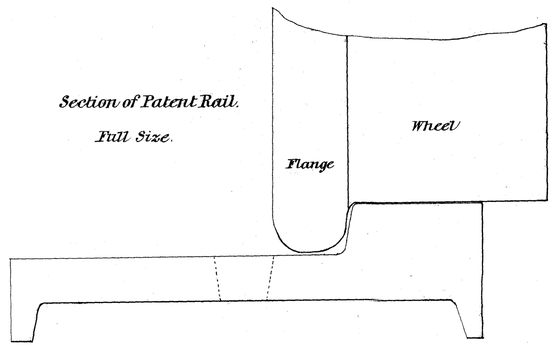
Part of Cross Section of Street Railway.

¼ Full Size.



Section of Patent Rail.

Full Size.



This is the drawing referred to in the annexed Letters of Registration, Granted, to Wm. Randle, Thos. Loader, and Wm. Elsdon, this twenty-eighth day of Feby. 1861.

Sy. John Fras. Kempt.

A.D. 1861, *9th April.* No. 40.

STONE-BREAKING MACHINE.

LETTERS OF REGISTRATION to Horatio Appleton, for a Stone-breaking Machine.

[Registered on the 10th day of April, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, The Administrator of the Government of New South Wales and its Dependencies.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Horatio Appleton, of the city of Melbourne, in the Colony of Victoria, gentleman, hath by his Petition humbly represented to His Excellency John Francis Kempt, Esquire, late Administrator of the Government of the Colony of New South Wales, that Eli W. Blake, of Newhaven, in the County of Newhaven and State of Connecticut, one of the United States of America, is the inventor of "a new and useful Machine for breaking Stones for roads, &c., and for other purposes," which is more particularly described in the specification and drawings hereunto annexed, for which he had obtained Letters Patent in the said United States, for the term of fourteen years from the fifteenth day of June, one thousand eight hundred and fifty-eight; and that by a deed poll dated the twenty-third day of February, one thousand eight hundred and sixty, under the hand and seal of the said Eli W. Blake, the said Eli W. Blake did, for the consideration therein mentioned, assign, sell, and set over unto him, the said Horatio Appleton, all the right, title, and interest which he, as the inventor of the said improvement and holder of the said Letters Patent, might have in the said invention, under the laws of the British Colonies of Australia, including the right to apply for and take out Letters of Registration and Letters Patent therein for the said invention, and to hold and enjoy the exclusive right thereby secured for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which such Letters may be granted; and

that

that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that the said John Francis Kempt would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years; and whereas, under and by virtue of a certain warrant under Her Majesty's Royal Signet and Sign Manual, dated the eighteenth day of January, one thousand eight hundred and sixty-one, and of a certain proclamation issued in pursuance thereof, dated the twenty-second day of March, one thousand eight hundred and sixty-one, and duly published in the New South Wales *Government Gazette*, the administration of the Government of the said Colony of New South Wales is now vested in me, under the style and title of Administrator of the Government thereof: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed to examine and consider the matters stated in the said Petition, and to report thereon, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said Horatio Appleton, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, from the day of the date of these presents until the fifteenth day of June which will be in the year one thousand eight hundred and seventy-two: to have, hold, and exercise unto the said Horatio Appleton, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, from the day of the date of these presents until the fifteenth day of June which will be in the year one thousand eight hundred and seventy-two: Provided always, that if the said Horatio Appleton shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this ninth day of April, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE Stone-breaker, so far as respects its principle or its essential characteristics, consists of a pair of jaws, one fixed, and the other movable, between which the stones are to be broken, having their acting faces nearly in an upright position, and convergent downwards, one towards the other, in such manner that, while the space between them at the top is such as to receive the stones that are to be broken, that at the bottom is only sufficient to allow the fragments to pass when broken to the required size, and giving to the movable jaw a short and powerful vibration through a small space, say one-fourth of an inch, more or less.

By means of this form and arrangement of the jaws, and this motion of the movable jaw, when a stone is dropped into the space between them, it falls down until its further descent is arrested between their convergent faces, the movable jaw advancing crushes it, then receding, liberates the fragments, and they again descend, and if too large, are again crushed, and so on, until all the fragments, having been sufficiently reduced, have passed out through the narrower space at the bottom.

The details of the structure of the machine than those already specified relating to the manner of supporting and maintaining the jaws in their proper relative position and giving motion with the required power to the movable jaw, may be varied indefinitely without affecting its principle of operation. I proceed to give a full description of all the parts of the machine as I have constructed it.

The machine may be made of any size, varying according to the size of the stones it is capable of receiving and the amount of work it is to accomplish; and its proportions having reference to strength may be varied according to the hardness of the material on which it is to operate.

The

Stone-breaking Machine.

The annexed drawings represent, on a scale of $\frac{3}{32}$ of an inch to the inch, a machine which I have constructed, that was designed to be capable of breaking blocks of trap-rock not exceeding three and a half inches thick and nine inches square, and which I have found fully competent to perform that work.

Fig. 1 is a perspective view of the machine shewn as resting upon two timbers, to which it is secured by bolts. In this figure, most of the parts of the machine are partially concealed from view by the main frame or casting which supports all the other parts.

Fig. 2 is an orthographic view of all the parts in place, as they would appear upon removing one side of the main frame.

Fig. 3, 4, 5, 6, 7, are transverse sections of the machine at the several points respectively indicated on fig. 2.

In fig. 2 the parts of the drawing which are shaded by diagonal lines are sections of those parts of the main frame or casting which run transversely from one side to the other, connecting the two sides together, and which are supposed to be cut asunder in order to remove one side.

A is the fixed jaw. This is placed against one end of the frame, to which it is secured at the bottom by a bolt, and at the top by lateral projections which fit into corresponding recesses or notches in the top of the frame, as shewn in fig. 1, and in section fig. 3. B is the movable jaw. This piece extends downwards to and enters a mortise in the lower transverse part of the main frame, by which means its lower end is prevented from moving in either direction horizontally.

To give it a vertical support, it is provided with shoulders, seen in section at *l l*, fig. 4, which rest upon the main casting at the ends of the mortise. These shoulders as also the post which enter the mortise are slightly rounded, as shewn in fig. 2, so as to allow the upper end to vibrate; *mn* is the space between the acting faces of the jaws, into which the stones are introduced. This space is sufficiently wide at *m*, to receive the largest pieces of stone which the machine is designed to break, and thence converges downwards to a width, at *n*, which is only sufficient to allow the fragments to pass when broken to the required size.

The acting faces of the jaws are not plane surfaces, but are corrugated; the corrugations running vertically, so that a section of the opening *n*, by a horizontal plane, would present the outlines shewn in fig. 8. These corrugations serve to diminish the strain to which large pieces of stone would otherwise subject the machine, and also to prevent thin fragments of large breadth from passing through the opening *n*.

The two pieces C and D, with the intervention of the piece F, constitute an elbow-joint, C and D articulating on F at their adjacent ends, and at their outer ends one of them on the cross-bar E of the main frame, and the other on the back of the movable jaw. The piece F at its lower end articulates on the lever G. This lever rests at one end on the fulcrum H, which forms a part of the main casting, and the other end is connected by the connecting rod or piece I with the crank K of the shaft L; on one end of the shaft L is placed a fly-wheel (not shewn in the drawings) four feet in diameter, and on the other end a pulley (not shewn in the drawings), to receive the belt which drives the machine. The spiral spring M, through the medium of the rod N, tends to hold the jaw back, thus keeping the pieces C and D in contact with their bearings, and securing the return motion of the jaw.

It is obvious that the revolution of the crank will vibrate the lever, and that this, through the medium of the pieces F, C, and D, will give a short and powerful vibration to the movable jaw B. The entire operation of the machine will be fully understood without further explanation.

In order that the pieces C and D, when raised to their highest elevation, may not be retained there by the friction of their bearings, they should, when thus elevated, deviate from a line with each other by an angle of not less than five degrees; and in order that stones may not be ejected from the jaws without being crushed, the angle of convergence of their acting faces should not exceed eighteen degrees.

In

Stone-breaking Machine.

In order that I may vary the size of the opening *n* so as to adjust the machine to produce fragments of any desired size, I provide several pieces, C, differing slightly in length; thus, by substituting a longer or shorter one, the size of that opening may be diminished or increased at pleasure; by the same means the opening may be restored to the proper size when enlarged by wear. To prevent the rapid wearing of the jaws, they should be made of hard iron, and be well chilled; and to prevent the wearing of the inside of the frame adjacent to the space where the stones are crushed, I contemplate casting the frame in such form as to receive chilled pieces which may be replaced when worn; I also contemplate making the movable jaw piece in such form as to receive a separate piece of chilled iron for its acting face.

I also contemplate combining with the machine a revolving screen to receive the fragments as they fall from it, and separate them into two or more sizes.

What I claim as my invention in the herein described machine, and desire to secure by Letters Patent or Letters of Registration is, the combination of the following features in the construction, arrangement, and movement of the jaws, to wit:—

1. Making the acting faces of the jaws upright, or so nearly so that stones will descend by their own gravity between them.
2. Making the acting faces of the jaws convergent in such manner that, while the space between them at the top is sufficient to receive the stones that are to be broken, that at the bottom shall be only sufficient to allow the fragments to pass when broken to the required size.
3. Giving a short vibratory movement to the movable jaw.

I disclaim the above three features *severally*, and limit my claim to their joint co-operation as herein described in a machine for breaking stones or other hard substances.

This is the specification referred to in the annexed Letters of Registration granted to Horatio Appleton, this ninth day of April, 1861.

JOHN YOUNG.

THIS Indenture, made the nineteenth day of September, in the year of our Lord one thousand eight hundred and sixty-four, between Horatio Appleton, of the city of Melbourne, in the Colony of Victoria, gentleman, of the one part, and John Russell, George Russell, and George Alexander Murray, of the city of Sydney, in the Colony aforesaid, engineers and ironfounders, carrying on business in Sydney aforesaid, in co-partnership, under and using the name, style, and firm of "P. N. Russell & Company," and who are hereinafter designated assignees, of the other part: Whereas, by Letters of Registration, bearing date on or about the ninth day of April, one thousand eight hundred and sixty-one, under the hand of His Excellency Sir John Young, Baronet, the Administrator of the Government of New South Wales and its Dependencies, and under the Seal of the Colony of New South Wales, after reciting that the said Horatio Appleton had, by his Petition, represented to His Excellency John Francis Kempt, Esquire, the late Administrator of the Government of the Colony of New South Wales, that one Eli W. Blake was the inventor of a new and useful machine for breaking stones for roads, &c., and for other purposes, which was more particularly described in the specifications and drawings thereto annexed, for which he had obtained Letters Patent in the United States of America, for the term of fourteen years from the fifteenth day of June, one thousand eight hundred and fifty-eight; and that by a deed poll dated the twenty-third day of February, one thousand eight hundred and sixty, under the hand and seal of the said Eli W. Blake, the said Eli W. Blake did, for the consideration therein mentioned, assign, sell, and set over unto him, the said Horatio Appleton, all the right, title, and interest which he, as the inventor of the said improvement and holder of the said Letters Patent might have had in the said invention, under the laws of the British Colonies of Australia, including the right to apply for and take out Letters of Registration and Letters Patent therein for the said invention, and hold and enjoy the exclusive right thereby secured for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said Letters might be granted; and that the said Petitioner had deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting the Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and that the Petitioner therefore prayed that the said John Francis Kempt would be pleased to grant Letters of Registration, whereby the

the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years; and reciting that, under and by virtue of a certain warrant under Her Majesty's Royal Signet and Sign Manual, dated the eighteenth day of January, one thousand eight hundred and sixty-one, and of a certain proclamation issued in pursuance thereof, dated the twenty-second March, one thousand eight hundred and sixty-one, and duly published in the New South Wales *Government Gazette*, the administration of the Government of the said Colony of New South Wales was then vested in the said Sir John Young, under the style and title of Administrator of the Government thereof; and that the said Sir John Young, being willing to give encouragement to all inventions and improvements in the arts and manufactures which might be for the public good, and having received a report favourable to the prayer of the Petition, from competent persons appointed to examine and consider the matters stated in the said Petition, and to report thereon, was pleased, with the advice of the Executive Council, and in exercise of the power and authority given to him by the said Act of Council, to grant, and did, by the now reciting Letters of Registration, grant unto the said Horatio Appleton, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, from the day of the date thereof until the fifteenth day of June which will be in the year one thousand eight hundred and seventy-two; to have, hold, and exercise unto the said Horatio Appleton, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, from the day of the date of the said Letters of Registration until the fifteenth day of June which will be in the year one thousand eight hundred and seventy-two; and whereas the said Letters of Registration were, within three days after the granting thereof, registered by the said Horatio Appleton in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, pursuant to the proviso in the said Letters contained, and of the provisions of the said recited Act of Council; and whereas the said Horatio Appleton has agreed with the said assignees for the absolute sale to them of the said invention or improvement, and the said Letters of Registration hereinbefore recited, and the several privileges and rights thereby granted, and of all benefit thereof, including any extension or renewals thereof, may be obtained, and free from incumbrances, at the price of two hundred and fifty pounds: Now, this indenture witnesseth that, in pursuance of the said agreement, and in consideration of the sum of two hundred and fifty pounds sterling, by the said assignees to the said Horatio Appleton paid immediately before the execution of these presents, the receipt whereof the said Horatio Appleton doth hereby acknowledge, and therefrom doth acquit, release, and discharge the said assignees, and each and every of them, their and each and every of their heirs, executors, administrators, and assigns, for ever, by these presents, he, the said Horatio Appleton, doth hereby grant, assign, and confirm unto the said assignees, their executors, administrators, and assigns, all that the invention and Letters of Registration hereinbefore mentioned, and all privileges and authorities by the said Letters of Registration granted, and the exclusive use and benefit of the said invention within the Colony of New South Wales aforesaid; and all rights, powers, authorities, privileges, advantages, profits, emoluments, and benefits to the said invention, Letters of Registration, and premises, in anywise appertaining or belonging, so far as concerns the use, exercise, and enjoyment of the said invention within the Colony aforesaid or otherwise, under or by virtue of the above recited Letters of Registration; and all the right, title, and interest whatsoever of him, the said Horatio Appleton, to and in respect of the said same Letters of Registration and premises respectively; to have, hold, use, exercise, and enjoy the said invention, Letters of Registration, and premises, unto and by the said assignees, their executors, administrators, licensees, and assignees, henceforth, for all the residue of the said term granted by the said Letters of Registration now unexpired, and also for and during any further term or terms for which any extension or extensions, renewal or renewals of the said Letters of Registration may be obtained, in as full, ample, and beneficial a manner as the said Horatio Appleton might have done if these presents had not been made: And the said Horatio Appleton, for himself, his heirs, executors, and administrators, doth hereby covenant with the said assignees, their executors, administrators, and assigns, that the said Horatio Appleton, at the time of the sealing of the said Letters of Registration, was the legal assignee of the true and first inventor of the said invention, and that the same was then new to the public use or knowledge thereof within the Colony of New South Wales; and also, that the said Horatio Appleton did particularly describe and ascertain the nature of the said invention, and in what manner the same is to be performed, by the specification and drawings annexed to the said recited Letters of Registration, and did cause the same to be in due time enrolled or registered as aforesaid; and that the said Letters of Registration expressed to be hereby assigned are good, valid, and effectual, for the said invention, and are in nowise invalidated, avoided, or voidable, and that the said Horatio Appleton now hath in himself good right and full power and authority by these presents to assign the said Letters of Registration, invention, and premises unto the said assignees, their executors, administrators, and assigns, in manner aforesaid, and according to the true intent and meaning of these presents, and that the said Letters of Registration, privileges, invention, and premises respectively, shall from henceforth be held, used, exercised, and enjoyed, during the term aforesaid, by the said assignees, their executors, administrators, or assigns, without any lawful denial, intervention, hindrance, prevention, or disturbance by any person or persons whomsoever; and lastly, that the said Horatio Appleton, his executors and administrators, and every other person having or lawfully claiming or to claim any right, title, interest

or authority whatsoever, either at law or in equity, to, in, or in respect of the said Letters of Registration and premises, will and shall, from time to time, and at all times hereafter, upon every reasonable request, and at the costs of the said assignees, their executors, administrators, or assigns, make, do, and execute all such further acts, deeds, applications, petitions, amendments, disclaimers, assurances, matters, and things whatsoever, for the better and more effectually assigning, assuring, confirming, renewing, or extending the said Letters of Registration, invention, privileges, term or terms of years, and premises, or any of them, or the enjoyment thereof, unto or for the benefit of the said assignees, their executors, administrators, or assigns, or for the enabling them, or any of them, to prevent or to commence, bring, or prosecute any actions, suits, or other proceedings, in respect of any infringement or infringements of the said privileges and premises, or otherwise to secure to them the sole and exclusive use and enjoyment of the said invention and premises as by the said assignees, their executors, administrators, or assigns, shall be devised and required.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year first above written.

HORATIO APPLETON. (L.S.)

By his Attorney—MARCELLUS AUGUSTUS VENNARD.

Signed, sealed, and delivered by the said Horatio Appleton, by his Attorney, Marcellus Augustus Vennard, duly constituted by letter of attorney, dated the second day of September, 1864.

R. HOLDSWORTH,
Solicitor, Sydney.

RECEIVED, on the day of the date of the within written indenture, from the within-named John Russell, George Russell, and George Alexander Murray, the sum of two hundred and fifty pounds, being the consideration therein mentioned to be paid by them to me.

HORATIO APPLETON,

By his Attorney—MARCELLUS AUGUSTUS VENNARD.

Witness—R. HOLDSWORTH.

ENTERED of record, in the office of the Supreme Court of New South Wales, this nineteenth day of September, A.D. 1864.

(For the Prothonotary,)

G. J. CROUCH, JUN.,
4th Clerk of the Supreme Court.

REPORT.

Royal Mint, Sydney,
27 February, 1861.

SIR,

Having examined and considered the matter stated in the Petition of Mr. Horatio Appleton, for Letters of Registration for "a new and useful Machine for breaking Stones for roads, &c., and other purposes,"—we have the honor to recommend that the required protection be granted, terminable on the expiration of the original Patent from the United States Patent Office, dated 15th June, 1858.

We have, &c.,

E. W. WARD.
JOHN WHITTON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(COPY)

DRAWINGS

FIG 1

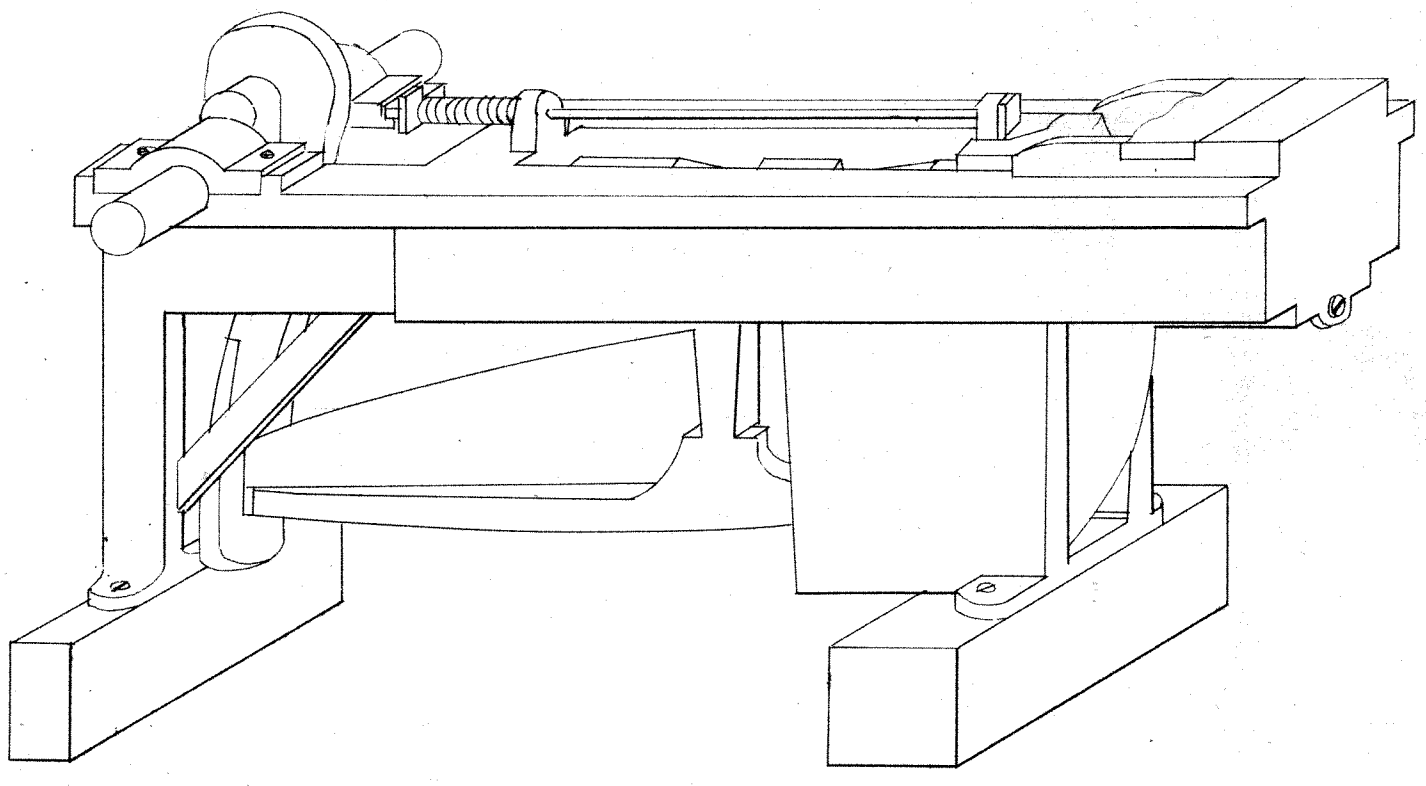


FIG 2

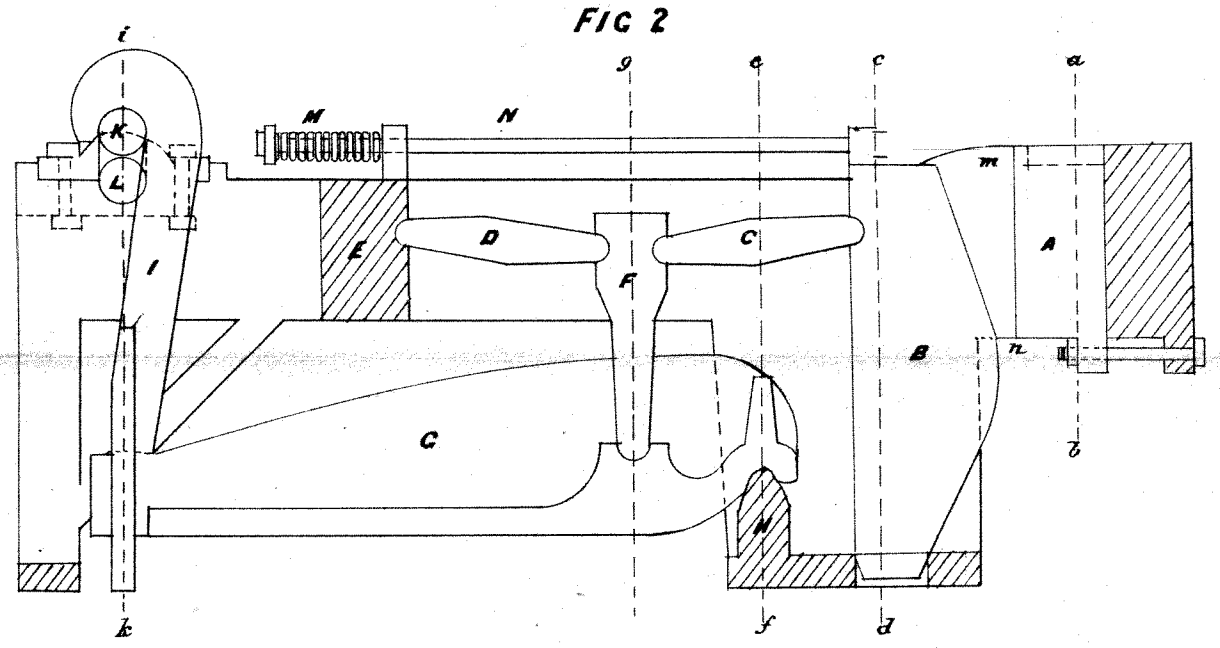


FIG 3

SECTION ON a ..... b

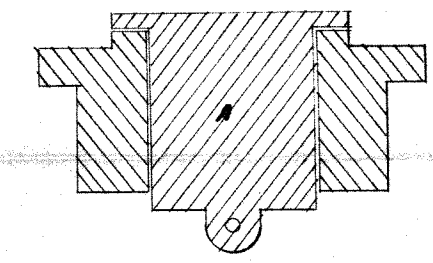


FIG 4

SECTION ON c ..... d

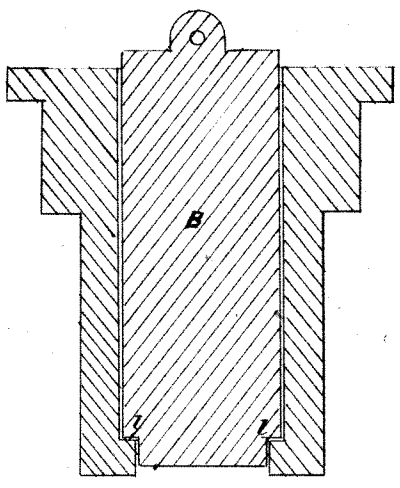


FIG 5

SECTION ON e ..... f

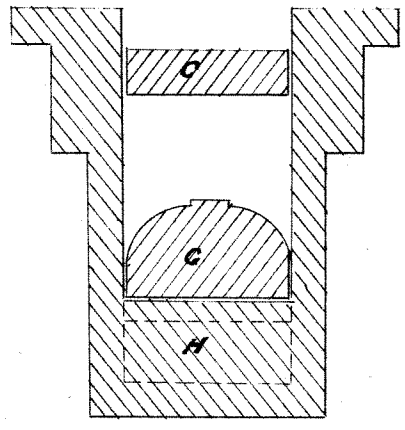


FIG 6

SECTION ON g ..... h

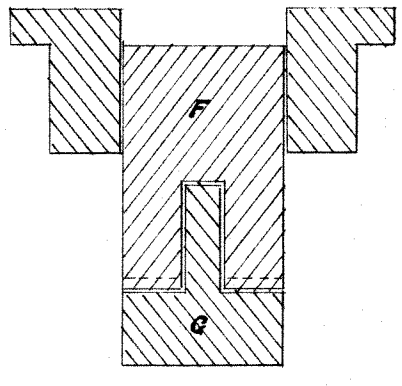


FIG 7

SECTION ON i ..... k

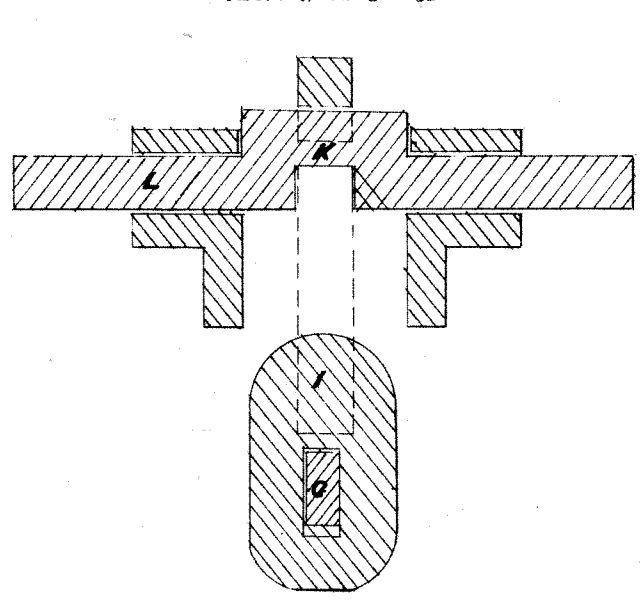


FIG 8

These are the Drawings referred to in the annexed Letters of Registration granted to Horatio Appleton this Ninth day of June 1841.

(Signed) John Young

A.D. 1861, 9*th May*. No. 41.

IMPROVED METHOD OF VESICULATING DOUGH.

LETTERS OF REGISTRATION to John Dauglish, for an improved method of vesiculating Dough.

[Registered on the 11th day of May, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, the Administrator of the Government of New South Wales and its Dependencies.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Henry William Dauglish hath by his Petition humbly represented to His Excellency John Francis Kempt, Esquire, late the Administrator of the Government of the Colony of New South Wales, that John Dauglish, of Reading, in the county of Berks, in England, is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in the method "of preparing and applying carbonic acid gas for the purpose of raising or vesiculating "Dough," whereof the particulars are fully described and set forth in the specification and drawing hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that the said John Francis Kempt would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to the said John Dauglish for a period of fourteen years: And whereas, under and by virtue of a certain warrant under Her Majesty's Royal Signet and Sign Manual, dated the eighteenth day of January, one thousand eight hundred and

sixty-one,

sixty-one, and of a certain Proclamation issued in pursuance thereof, dated the twenty-second day of March, one thousand eight hundred and sixty-one, and duly published in the New South Wales *Government Gazette*, the Administration of the Government of the said Colony of New South Wales is vested in me, under the style and title of Administrator of the Government thereof; and I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed to examine and consider the matters stated in the said Petition, and to report thereon, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said John Dauglish, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Dauglish, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Dauglish shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this ninth day of May, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

To all to whom it may concern. Be it known that I, John Dauglish, of Reading, in the county of Berks, England, have invented or discovered certain new and useful "Improve-"ments in the method of preparing and applying carbonic acid gas for the purpose of "raising or vesiculating Dough," and I, the said John Dauglish, do hereby declare that the nature of the invention and the manner of performing the same are fully described and ascertained in and by the following statement thereof, (that is to say):—

In the ordinary process of bread-making by fermentation, the vesicular or spongy structure of the dough is formed by the escape of carbonic acid gas from the particles of starch which undergo decomposition, by the action of the yeast or other ferment which has been incorporated along with the water and flour to form the dough; the minute bubbles of gas so escaping are caught or retained by the elastic but tenacious gluten which surrounds the starch particles, and a frothy or spongy structure is formed. Now, I avoid the evils of fermentation and decomposition of the flour, and secure the spongy structure of dough for making bread, by discontinuing the use of fermentation altogether, and I incorporate the necessary carbonic acid gas with the dough by mechanical means alone. For this purpose, I take advantage of a well-known law in physics, that water will absorb its own bulk of carbonic acid, whatever the density, and, by suitable mechanical contrivances, I cause the water which is to be used for mixing with the flour to form dough, to absorb a given quantity of carbonic acid gas, by placing it in a vessel into which the carbonic acid gas is condensed. I also place the flour in a closed mixing vessel, and render the atmosphere within this vessel as dense (or denser) as that which is within the water vessel. This being accomplished, the water is allowed to flow from the water vessel on the flour, with which it is afterwards thoroughly incorporated, whilst both are retained in the condensed atmosphere. By this means, the dough or paste is formed whilst the water is saturated with the carbonic acid gas, which will not escape from the water until the dough is released from the condensed or compressed atmosphere, but as soon as the dough is so released, the gas will escape from the water, and will be caught by the elastic particles of gluten, and form a spongy or vesicular texture of dough, as in the case of fermentation.

The

Improved method of vesiculating Dough.

The following is a description of the apparatus, and of the manner of working it:—

DESCRIPTION OF THE DRAWINGS.

Fig. 1 is a side elevation of the apparatus used in carrying out my invention. AA is the mixing vessel; it consists of a strong globular or spheroidal vessel; it is mounted and fixed on a suitable framing, BB; it is furnished with an opening, C, at the top, with a suitable cover and the means of fastening it, so as to render it air-tight, and at the bottom there is another opening, of a similar size, which is also closed air-tight by a suitable door, D (or it may be closed by any other suitable method).

Fig. 2 is a front elevation, in section, of this spheroidal vessel; through this vessel, at the stuffing boxes EE, a shaft or spindle, F, passes, and in this shaft are fixed the arms or agitators, fffff. To one end of the shaft F the toothed wheel G is fixed, and motion is given to this wheel by a smaller toothed wheel, which again receives its motion from a steam-engine or other motive power, by the drum H, fixed in the same shaft with it. I is a set of force pumps, the barrels and valves of which are surrounded by a cistern of cold water, for the purpose of keeping them cool. K is a gas-holder. L is a copper vessel, furnished with a glass water-gauge, and connected at the bottom with the mixing vessel, A, by the pipe a and the stop-cock b, and at the top with the mixing vessel by the pipe c and stop-cock d; a pressure-gauge is attached to the pipe c, above and below the stop-cock d, so as to indicate the pressure of gas used. The pipe e e connects the pumps I to the vessel L, and it terminates within that vessel by a valve and vase. From the pipe e e a small pipe, g, furnished with a stop-cock, passes to the bottom of the mixing vessel A. The pipe KK communicates with the mixing vessel A by the stop-cock b at one end, and with the gas-holder K at the other end. The apparatus is worked in the following manner:—Having drawn into the vessel L the proper quantity of water by the cock m, and placed within the mixing vessel A, the flour or other dry material, I proceed to remove from such flour or dry material all atmospheric air, and also injurious or unsuitable gas that may have been produced by the decomposition of the breadstuff, or otherwise mixed therewith. This I do by leaving the opening C open, and forcing through the pipe g, carbonic acid gas, pumped or otherwise permitted to flow from the gas-holder K, until the air or unsuitable gas has been displaced. The method of expelling the air or unsuitable gas from the flour or other dry material may be varied, (and in some instances I use a properly constructed pump for exhausting the mixing vessel *after* it has been closed); when this has been accomplished, and the mixing vessel closed air-tight, the pumps I are set to work, and they pump carbonic acid gas from the gas-holder K (which I prefer to be made of copper or brass), through the pipe e e, into the vessel L; part of the gas will rise through the water therein to the top, and, passing down the pipe c, will enter the mixing vessel A, and a part will be absorbed by the water. The pumping is continued until a sufficient pressure has been obtained in the vessel L and mixing vessel A, which will be ascertained by the pressure-gauge. I would state that the degree of pressure in the mixing vessel may be greatly varied, according to the degree of lightness desired to be obtained in the bread, biscuit, or other articles made from the dough. In making very light bread, I have used a pressure as high as 200 lbs. to the square inch, whilst in making dough for other articles I have used a pressure only a few pounds above the atmosphere. The water having absorbed the gas during the process of pumping, it will be ready to be drawn into the mixing vessel so soon as the requisite pressure has been obtained, so that by opening the stop-cock b (the stop-cock d being also open) the water will pass into the mixing vessel A, the gas rising through the pipe c into the vessel L, to take its place; the mixing arms are then set going until the dough is properly prepared; when this is accomplished, the dough is ready to be drawn from the mixer, and formed into loaves for baking. In order to avoid the necessity of moulding the dough into loaves by the hands, I attach a valve to the bottom of the mixing vessel, so constructed as to present several narrow slits or openings, about a quarter of an inch wide, for the passage of the dough; to each of these openings a small pipe or passage is attached, which gradually increases in size; these pipes are at a distance

distance of about three inches from the first opening, united together to form one, and then this one pipe slightly expands to any convenient length. By this means a constant stream of dough is forced, by the excess of pressure within the mixing vessel, slowly from it, and expanding as the passages increase, by the escape of gas which the water retained whilst under pressure, can be cut off to given lengths, to form loaves, which being received into proper troughs or baskets, can at once be placed on the oven bottom. When the dough has been properly discharged from the mixing vessel, there will remain behind, within the apparatus, a very large proportion of the carbonic acid gas which has been used in the operation; this gas, instead of discharging it into the air, and wasting it, I receive back into the gas-holder, for further use; this I do by opening the stop-cock *l*, and the gas passes into the gas-holder by its own elasticity. After the gas has ceased to flow into the gas-holder, there will still remain a considerable quantity occupying the apparatus at the pressure of the gas within the holder; this latter portion I exhaust by means of a pump, in the same manner as that which is sometimes followed for exhausting the air from the mixing vessel, after the flour, &c., has been placed within it, but in this case the gas exhausted is discharged into the gas-holder. By this means the utmost economy of gas is effected.

I would have it understood that I do not confine myself to the use of any particular form of gas-holder to receive the gas from the mixing vessel. I can, when it is desirable, receive the gas from the mixing vessel into a vessel which is capable of bearing an excess of pressure, and when the pressure has become equal between the two vessels, either expand the remainder from the mixer into a gas-holder, or pump it into the other vessel, which may also be a mixing vessel, or the whole may be pumped from one mixing vessel into another; indeed, the method may be greatly varied. In the above description I have used the word "water" simply for the fluid employed, but intend that such word should include whatever fluid may be used, such as milk, milk and water, and flavouring fluids. In order to obtain a cheap supply of carbonic acid gas, I follow the method generally adopted by the makers of aërated waters; that is, I act upon carbonate of lime, in the form of whiting (other carbonates of the alkaline earths suitable to the purpose may be used), or ground chalk, with sulphuric acid. The apparatus used for bringing the carbonate of lime and sulphuric acid into regulated and complete contact, is of a somewhat peculiar construction. It consists of a cylindrical vessel, made of wood or other suitable material, into which is fitted a horizontal shaft or axis, in which are fixed arms or paddles, forming an agitator; the circle which the extreme edge of this agitator describes is considerably less (about one-half) than the internal diameter of the cylinder, and the lower edge nearly touches the bottom of the cylinder, whilst the upper reaches about the centre. One end of the axis of the agitator rests on a bearing within the vessel, whilst the other passes through a stuffing box to the outside, and has a drum or wheel attached, whereby it can be kept rotating by a suitable driving power. Into this vessel is put the whiting, mixed with water to the consistency of thin soup, and the agitator being made to revolve, the mixture is made intimate and complete. When the vessel has been closed air-tight, sulphuric acid is made to enter it, and drop upon the mixture in a continuous but small stream, so that the carbonic acid gas comes off in a continuous and regular manner. The method by which a continuous and regular stream of sulphuric acid is made to enter the cylindrical vessel containing the chalk and water is as follows:—On a platform, about two feet above the cylindrical chalk vessel, is fitted a leaden vessel, or a wooden vessel lined with lead, having parallel sides and an open top, and capable of holding from one to two hundredweight of sulphuric acid. Into this vessel a second vessel or plunger is made to fit loosely, that is, when placed within it, it would fill the first vessel, allowing a space on every side of about a quarter of an inch; this plunger is covered on the outside carefully with lead, and it is made of a sufficient weight to enable it to sink in sulphuric acid. To the top of this plunger, in the centre, is fixed a long screw, corresponding in length to the depth of the leaden vessel, so that when the plunger is placed within the acid vessel this screw will project upwards to a height equal to the depth of the vessel. The upper end of this screw fits into a corresponding

ponding nut, which is so made to revolve in a suitable fixed frame that it will be capable of lifting the plunger upwards until the bottom of it is on a level with the top of the vessel into which it is fitted, or by a reverse movement allow it to drop again into the vessel. This nut is made to receive rotatory motion by means of suitable gearing attached to the spindle of the agitator within the chalk vessel; the movements of the screw and the agitator are thus made to correspond. It will be seen that if the plunger is drawn up by the screw until it is above the top of the acid vessel, the acid vessel can be filled with sulphuric acid, and this being done at the same time that the chalk vessel is charged with chalk and water, the apparatus will be ready for working; then, by setting the agitator to work in the chalk vessel, the nut which suspends the plunger will slowly revolve too, and the plunger will descend into the acid vessel; in doing so it would cause the acid to flow over the top of the acid vessel, but this is prevented by a lip or spout, which is fitted to the acid vessel a short distance below the top, so that the acid flows through this spout down a pipe which is fitted to receive it; the further end of this pipe enters the top of the chalk vessel, and terminates by dipping into a leaden cup within that vessel, which forms a trap to prevent the escape of gas as it is generated. By this arrangement it will be seen that the use of valves for stopping the acid is dispensed with, and the flow of sulphuric acid on to the chalk is exactly proportioned to the speed at which the mixture is being agitated. The gas generated by this method passes, by a suitable pipe, into the gas-holder, for use.

Another method of obtaining carbonic acid is by subjecting chalk, or other carbonates of the alkaline earths, to the action of heat in closed vessels or retorts similar to those used in gas works, and collecting the gas which is given off, in suitable gas-holders, for use.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I make no claim to any parts of the apparatus or machinery herein described, nor do I confine myself to its details; but what I claim is—

First—The combining of apparatus for the making of bread with water supersaturated with carbonic acid gas, in such a manner as that the spongy or vesicular character or structure shall be imparted to the dough by the escape of the gas from the water, after the flour and water, and other materials, have been completely incorporated.

Secondly—I claim the combining of apparatus for the preparation of dough in closed vessels, under a pressure of carbonic acid gas, in such manner that the excess of carbonic acid gas required in the mixing vessel may not be wasted after each operation of mixing, but saved for further use, by receiving the excess of gas from the mixing vessel into a gas-holder or other suitable vessel.

Thirdly—I claim the combining of apparatus for securing a continuous and regulated supply of carbonic acid from the action of sulphuric acid or other suitable acid, or carbonate of lime or other suitable carbonate of an alkaline earth, by a regulated continuous flow of sulphuric acid into a vessel containing the carbonate and water constantly agitated, which regulated flow being secured by causing the acid to overflow the vessel containing it by the descent of a plunger within the vessel, by the action of a screw receiving its motion from the spindle which agitates the carbonic and water.

JOHN DAUGLISH.

This is the specification referred to in the annexed Letters of Registration granted to John Dauglish, this ninth day of May, 1861.

JOHN YOUNG.

Improved method of vesiculating Dough.

REPORT.

Royal Mint, Sydney,
15 *April*, 1861.

Sir,

Having examined and considered the matter stated in the Petition of Mr. William Henry Dauglish, for Letters of Registration for improvements in the method of preparing carbonic acid gas, for the purpose of raising or vesiculating Dough, we have the honor to recommend that the prayer of the Petitioner be granted.

We have, &c.,

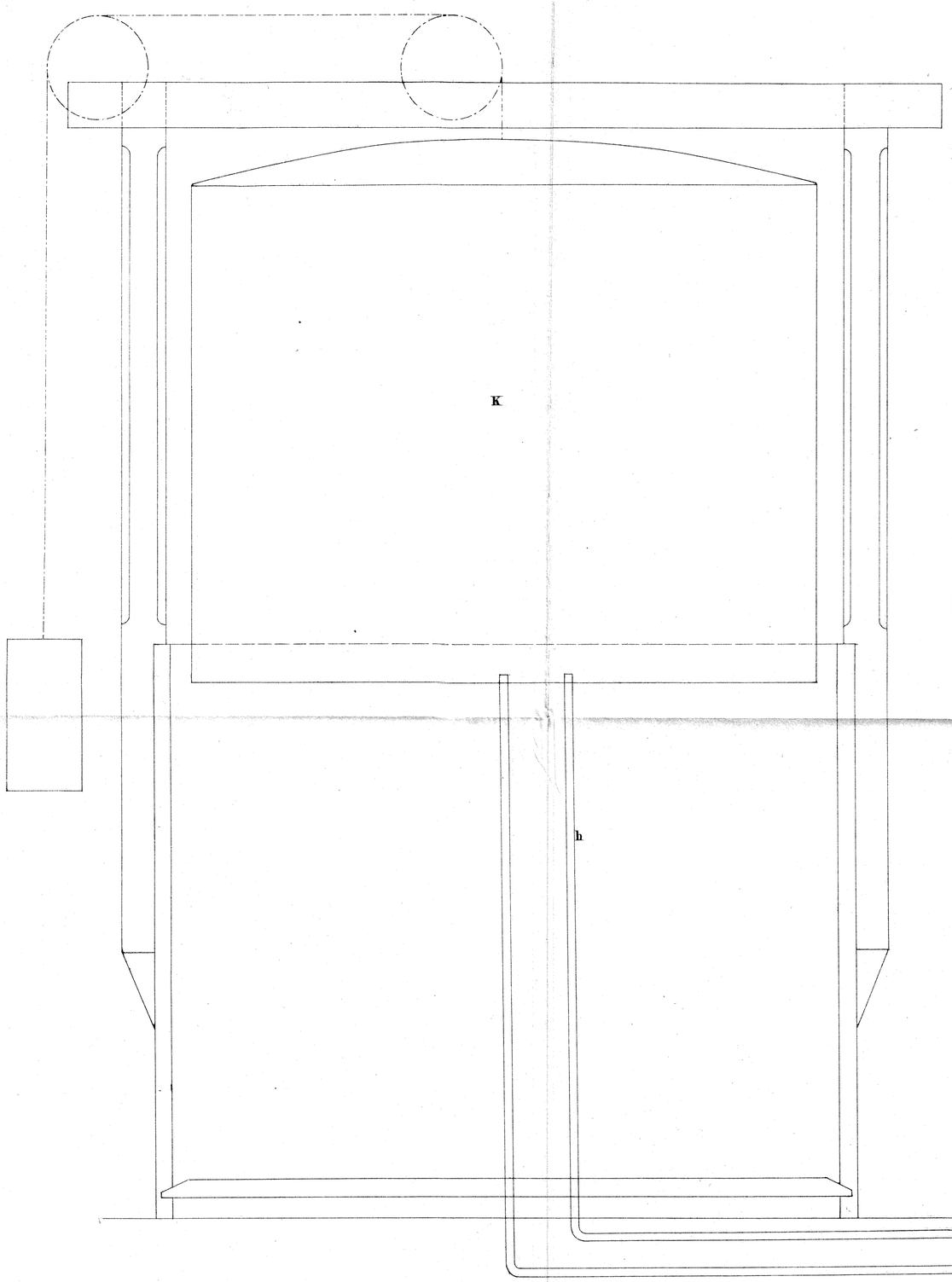
The Honorable
The Colonial Secretary.

E. W. WARD.
R. GREENUP.

[Drawings—one sheet.]

(Copy)

FIG. 1.



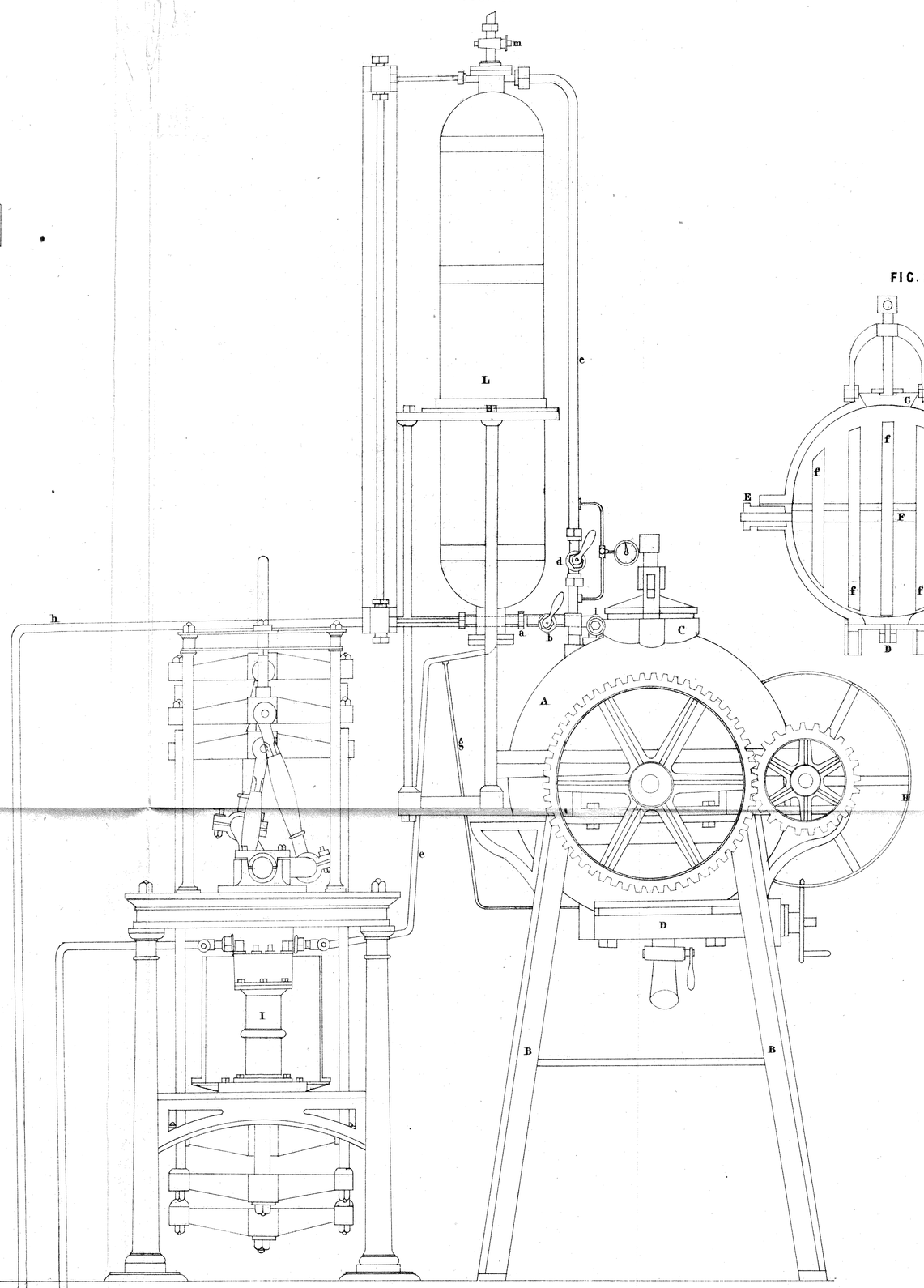
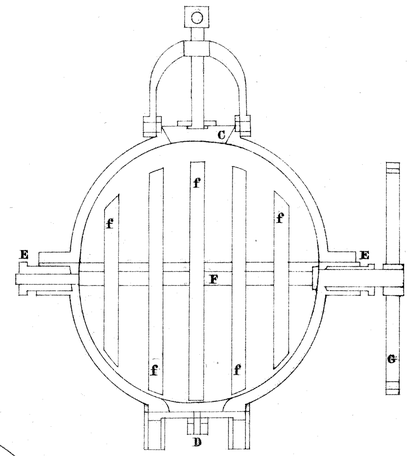


FIG. 2



This is the Drawing referred to in the annexed Letters of Registration granted to John Dauglish this Ninth day of May 1861.

(Signed) John Young

A.D. 1861, 19*th June*. No. 42.

WINCH.

LETTERS OF REGISTRATION to Thomas Chester, for a Winch.

[Registered on the 22nd day of June, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, the Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Thomas Chester, of the city of Sydney, in the Colony of New South Wales, hath by his Petition humbly represented to His Excellency Sir William Thomas Denison, Knight, late the Governor-in-Chief of the Colony of New South Wales, that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a Winch, which is more particularly described in the paper hereunto annexed; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that the said Sir William Thomas Denison would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And whereas Her Majesty has been graciously pleased, by Commission under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the fifth day of March, one thousand eight hundred and sixty-one, to constitute and appoint me Captain General and Governor-in-Chief of the Colony of New South Wales, and I have assumed the said office of Captain General and Governor-in-Chief accordingly: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the

public

public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed to examine and consider the matters stated in the said Petition, and to report thereon, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said Thomas Chester, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Thomas Chester, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Thomas Chester, shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this nineteenth day of June, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
21 *December*, 1860.

SIR,

Having examined and considered Mr. Thomas Chester's application for Letters of Registration, under Act of Council 16 Victoria, No. 24, for a Winch stated to be of his invention, we have the honor to report as follows:—

The only apparent novelty, as regards the Winch, is in the construction of the fittings for the axle, which consist of friction rollers intended to revolve on each other without studs or rings; whilst, however, the turning of the Winch would have a tendency to cause the rollers to revolve in one direction, the close contact of one roller with another would have an opposite tendency.

Friction rollers on this principle being therefore useless, we cannot recommend the issue of the letters sought for.

We have, &c.,
E. W. WARD.
E. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

Royal Mint, Sydney,
30 *May*, 1861.

SIR,

Referring to the application of Mr. Thomas Chester for Letters of Registration for a Winch of his invention, on which we reported by letter dated 21st December last, we have the honor to observe, that through the incomplete character of the drawing accompanying the application, and our inability to obtain an interview with the applicant, we were imperfectly informed as to the object of the machine, when we made our report.

Mr. Chester has now furnished a sufficient drawing, and has explained that his Winch is intended for use in cases in which the barrel of it would press against the upper surface of the chamber containing the friction rollers. As, under such circumstances, it may be found of some utility, we are of opinion that Letters of Registration may issue in its favour.

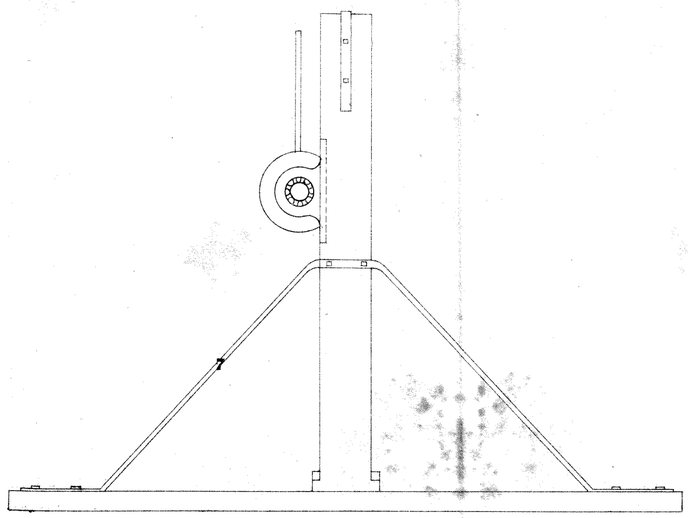
We have, &c.,
E. W. WARD.
E. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

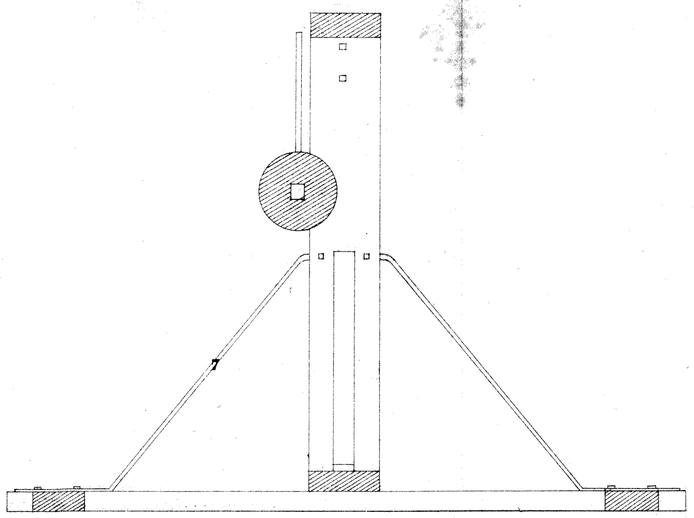
[Drawings—one sheet.]

Copy

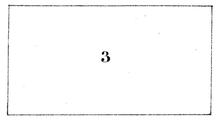
1 *Plumber Block*
2 *Chamber in Do.*
3 *Rollers in Do.*
4 *Spindle*
5 *Barrel*
6 *Handles*
7 *Slay Irons*
8 *Struts*
9 *Uprights*
10 *Frame*
11 *Bearer for Struts*
12 *Head piece*



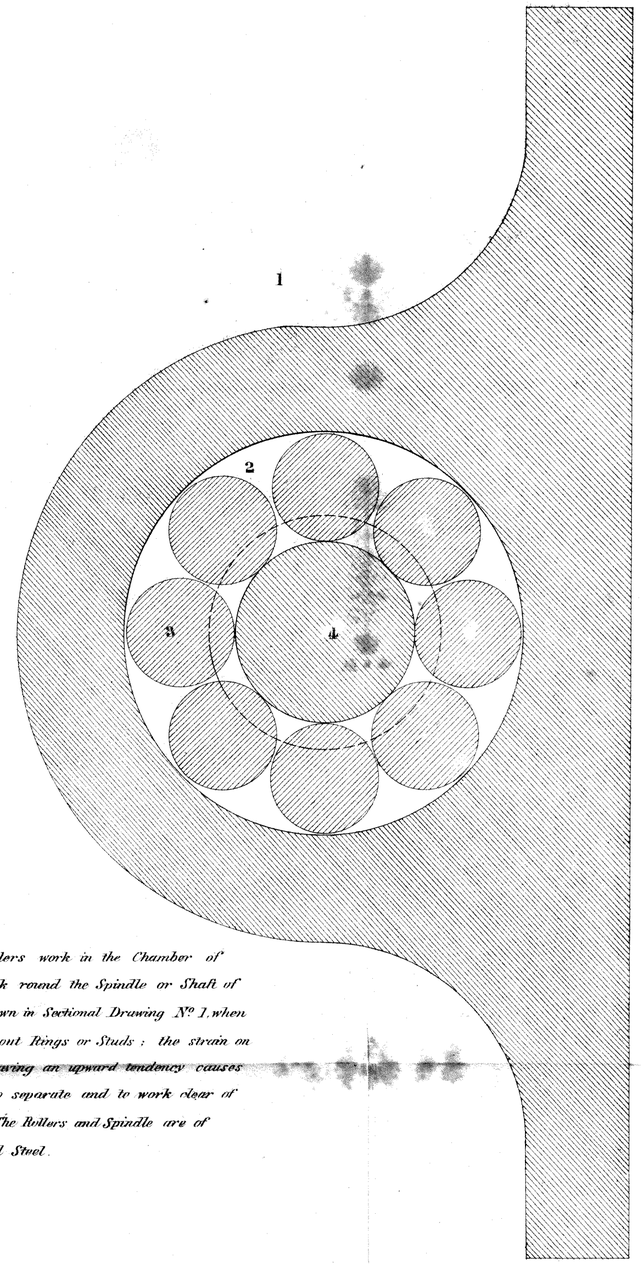
Side Elevation



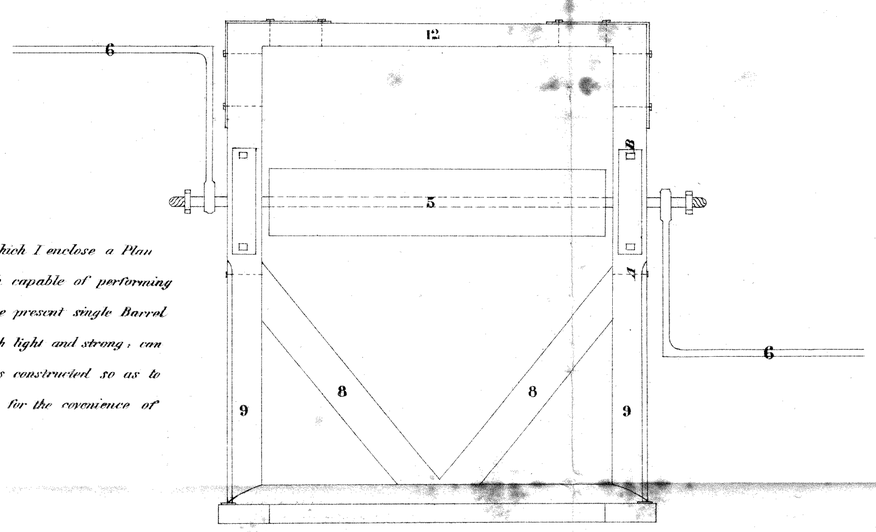
Section on line C. D.



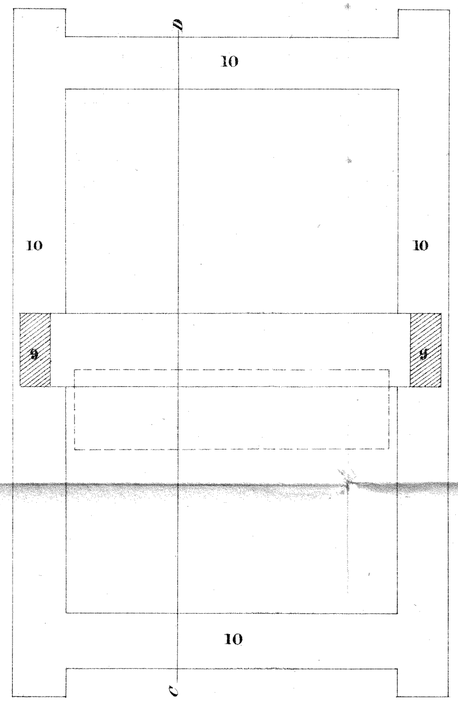
Elevation of Roller
(full size)



Section of Plumber Block on line A. B.
(full size)



The Lumpers Winch of which I enclose a Plan is a single Barrel Winch capable of performing 25 per cent more than the present single Barrel Winches. It is made both light and strong; can work a Ton weight; it is constructed so as to be easily taken to pieces for the convenience of use on board Ship &c.



SCALE 1 INCH TO A FOOT

The Rollers work in the Chamber of Plumber Block round the Spindle or Shaft of Winch as shown in Sectional Drawing No 1, when at work without Rings or Studs; the strain on Barrel of Winch having an upward tendency causes the Rollers to separate and to work clear of each other. The Rollers and Spindle are of casehardened Steel.

This is the Paper referred to in the annexed Letters of Registration granted to Thomas Chester this Nineteenth day of June, One thousand, Eight hundred and Sixty One

Signed John Young

Signed Thomas Chester

A.D. 1861, 21*st June*. No. 43.

IMPROVEMENTS IN ELECTRIC TELEGRAPHS, &c.

LETTERS OF REGISTRATION to William Hickling Burnett, for Improvements in Electric Telegraphs, &c.

[Registered on the 22nd day of June, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Randolph John Want, of the city of Sydney, in the Colony of New South Wales, solicitor, hath by his Petition humbly represented to His Excellency John Francis Kempt, Esquire, late the Administrator of the Government of the Colony of New South Wales, that William Hickling Burnett, of Margaret-street, in the county of Middlesex, in England, gentleman, is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of certain improvements in Electric Telegraphs, and in apparatus employed therewith, a part of which improvements is applicable to the winding of clockwork; the nature of which invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the specification and plans annexed hereunto; and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioner therefore humbly prayed that the said John Francis Kempt would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage

of the said invention or improvement might be secured to the said William Hickling Burnett for a period of fourteen years: And whereas Her Majesty the Queen has been graciously pleased, by Commission under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster the fifth day of March, one thousand eight hundred and sixty-one, to constitute and appoint me Captain General and Governor-in-Chief of the Colony of New South Wales, and I have assumed the said office of Captain General and Governor-in-Chief accordingly: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed to examine and consider the matters stated in the said Petition, and to report thereon, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to and do, by these Letters of Registration, grant unto the said William Hickling Burnett, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said William Hickling Burnett, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said William Hickling Burnett shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-first day of June, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

My improvements in Electric Telegraphs, and in apparatuses employed therewith, have reference to certain contrivances by which I am enabled to work several telegraphs simultaneously, or nearly so, and some periodically with (by preference) only one line of wire, although more may be used if desired; to improvements in the manipulators and the recorders or indicators of telegraphs, and in the mode of working the same by relays.

It is well known that the number of pulsations that can be produced in an electric current in a second of time is something enormous, as is its power of producing rapid mechanical movements and chemical decompositions; but hitherto only a very small portion of the pulsations which could be formed has been made available where the manipulation has been manual, owing to the comparatively small number needed to form a letter, and the time required by hand to transmit each signal. Hitherto, it has only been possible to send one despatch and receive another simultaneously with one wire circuit; but my invention enables me to send and receive a considerable number of distinct messages from and to any part of a line, simultaneously, or nearly so. The mode of doing this is to have a number of instruments at different parts of the line, having wheels or cylinders kept in a state of practically synchronous revolution, and to allot similar parts of the periphery of the revolving surface to each pair of stations that is in communication; and if it be desired to have the power of sending the same despatch to other stations at the same time, to allot a similar portion of surface to them also, as well as any portion that may be used in them in connection with other stations. Thus, the instruments being kept in practically synchronous movement, it is easy to draw off certain pulsations, and certain pulsations only, at each predetermined station, as will be more fully understood when I describe the drawings. Thus, supposing, for instance, that the wheels of all the instruments made three revolutions per second, and that they were so divided as to make 150 pulsations during each revolution,—by allotting three pulsations per

revolution

revolution to each station, fifty stations would each receive, three times per second, three pulsations; and as, in some of the improved indicating and recording instruments of my invention, which I shall hereafter describe, a letter can be formed by, at most, three pulsations, each of these fifty stations, by their use, would receive and indicate, or record, three letters per second. The mode in which messages are sent is to connect the wheels of the sending stations with the sources of electricity, whatever the nature of such sources may be, and to distribute pulsations into the manipulators, whence they are sent to line or earth fitted to form the letters or signals required; and they are drawn off at the corresponding receiving instruments, where they indicate a record, or set in action my improved system of relays, and by them cause the local current to indicate or record the message sent. There is no tendency to interference of currents as long as the instruments work synchronously, as, although distributed by the instruments I shall hereafter describe, they are not positively simultaneous, but are successive, although that succession is as rapid as the number of the pulsations per second; but in most descriptions of telegraph, the duration of the pulsations would, if they were very frequent, be too minute to properly indicate or record, and it is to enable the telegraphs at the different stations to be at work really simultaneously, and for any required duration of time, that I have invented my improved relays, by means of which the momentary flash sent is converted into a prolonged current. But when telegraph stations occurring at various distances are being worked simultaneously from distant parts of the line, an immense extra power also exists which my improved apparatus enables me to take advantage of, namely, the unemployed space in the wire which is caused by the currents of the nearer stations having done their work, and not travelling beyond those stations. These spaces or unoccupied intervals of time in the remainder of the wire, may be filled from batteries at intermediate stations, and currents may be conveyed to other following stations, and so on. Thus, for instance, the currents sent from station No. 1 to station No. 2 travel no further, and fresh currents may be sent in those intervals, and be made to communicate messages from station No. 2 to station No. 3, where they go no further, and a fresh message may be sent from station No. 3 to station No. 4 in the same interval, and so on. In like manner, the original current sent between station No. 1 and station No. 3 having done its work, the interval may be supplied to send a message from 3 to 5, 5 to 7, and so on, from all other stations the intervals may be filled up and rendered useful. By these means, an immense number of additional telegraphs can be worked without increasing the rapidity of the pulsations. Likewise, a portion of the pulsations may be made from one end of the line and a portion from the other, where two or more stations are in communication, so as to enable persons to receive as well as to send despatches simultaneously by means of these apparatuses. Indeed, by the improvements which I shall more particularly describe with reference to the drawings, the number of telegraphs that can be worked distinctly and simultaneously, but with one line wire, is only limited by the degree of perfection to which synchronous movements may be brought, and the same limit of duration at which a current can set a relay in action; but even this limit only applies to full worked telegraphs; as, by means of the distributing apparatus which enables me to supply constantly pulsations to these telegraphs, I can convey these pulsations at periodical intervals to any required number of telegraphs. Thus, for instance, if any person wished to have communication between two distant establishments, but was only likely to require it occasionally, my invention enables me to so arrange, by means which I shall hereafter describe, that the current could be let on for a few minutes every hour or half-hour, and then be supplied to other persons, to be again introduced for the use of the first party at the desired interval; thus multiplying the number of telegraphs by 10, 8, 6, or some other number.

Of course it is indispensable to the proper action of the system, that the various instruments should work in a practically synchronous manner. I say practically synchronous, because it is not necessary that the whole of the revolution of all the wheels should be maintained at a like speed, but only that those portions of the periphery which correspond with similar portions at another station or stations, should be sufficiently nearly alike in their movement, to prevent one current taking the place intended

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for another. Although I may use ordinary clockwork, regulated by the means now known and employed, and adjusted occasionally by hand, I have devised improved means for driving the wheels and making them self-regulating, as hereafter described. As the great object of my invention is to be able to work a large number of telegraphs simultaneously with one line wire, it is obvious that, in order to do so, it is desirable to employ chiefly instruments in which the smallest possible number of pulsations is used to indicate a certain number of letter or agreed signals. Thus, three pulsations, with the power to omit any of them, and to alternate the direction of the current, is the least number by which the 26 letters of the alphabet can be formed; with 4 currents employed in the same manner, 80 letters or signals may be formed, and so on; and as most of the telegraphs now employed require a much larger number of pulsations or intervals of time, I have invented various improved receiving instruments, which I shall describe with reference to the drawings. Amongst them is a type printing telegraph which prints, using the 26 letters, or if preferred, 24 or 25 letters, only one mark for *u* and *v* or *i* and *j*, or both, and reserving the combination or combinations saved, to ring an alarum or alarums, or perform any other required operation. By means of the power to use at most three pulsations to form all the letters which is given by these instruments, an immense saving of time is effected on all the printing telegraphs hitherto invented, which require either a large number of pulsations or of intervals during which pulsations might be made, to give the type-wheel the necessary time for revolving. Although, in my system, in each variety, the time in which three pulsations at least could be made is required, by forming the most frequently used letters with the smallest number of pulsations, on an average not much more than $1\frac{1}{4}$ pulsation in alternate directions would be required to form a letter, which therefore renders my instruments particularly well fitted for submarine and subterranean electric conductors. In order that messages may be transmitted with the greatest possible rapidity attainable by hand, I have also invented improved manipulators, which only require a key or stud to be pressed, in order to transmit the combination of currents required to form the letter or signal intended to be printed or indicated.

Although the revolving wheels which are required to move synchronously in the various distributing apparatuses, may be made to do so more or less perfectly by weights or springs, moving clockwork, and regulated by pendulums, vibratory springs, revolving pendulums, fly-wheels, fans, and other means, all or any of which I propose to use occasionally, as they do not form part of my invention, it is not necessary for me to describe them; I shall therefore only shew the wheels themselves, and the means I employ to distribute the currents through their instrumentality, as well as those arrangements for driving and regulating them which I have invented, and which enable me to maintain with more accuracy simultaneity in the movements.

The principle of my invention of apparatus for distributing pulsations, is by means of certain bodies kept in a constant state of synchronous revolution, to create a power to cause pulsations in electric currents of any required number that may be found capable of application in practice, for instance, 50, 100, 150, 200, &c. pulsations per second, and then to allot a portion of this power to different stations, when, by the action of the manipulators, pulsations are sent to line and earth as positives, negatives, or either, at pleasure, in the order and at the times requisite to form the various letters; and which pulsations are drawn off at certain other stations for which they are intended, but at no others, and where they operate upon the instruments. I am not aware that there is any species of telegraph to which my system could not be applied; but as the numbers of telegraphs that can be worked simultaneously depends upon the limit in duration of a pulsation which practice may shew to be capable of producing the required mechanical movement or chemical decomposition, it is far more advantageous to employ those instruments only which require the minimum number of pulsations to work them.

In figs. 1 and 2, sheet 1, I have shewn the simplest form in which my principle can be applied, namely, in working a number of stations (eleven are here shewn) situated on one line wire from one chief station, without relays, and with the simplest forms of instruments,

instruments, indicated in fig. 1 as single needles. Station 1 is supposed to be the chief station, corresponding with ten others, numbered 2 to 11. The position of the line wire and earth is indicated; PN, at station No. 1, is the battery which works all the telegraphs; W^1 to W^{11} are wheels of metal, one at each station, but all kept moving synchronously; W^1 is the wheel or cylinder at station No. 1 which is shewn in top view in fig. 2. All the wheels from W^2 to W^{11} are but the width of a tooth, and have each one tooth only upon them; but it will be perceived that wheel or cylinder W^1 has twenty teeth, t^1 to t^{20}, placed round its periphery spirally, in two rows of 10 each, insulated from each other by an ivory boss; one of these rows of teeth is connected metallically with the positive and the other with the negative end of the battery PN, by means of spring, *ps* and *ns*, and wires; springs, ms^1 to ms^{20}, are placed on the wheel in such manner that, during the revolution of the wheel, each tooth comes once in contact with a spring, and that a negative and positive tooth always touch their respective springs simultaneously, making ten pairs successively in contact. These springs, ms^1 &c., are the manipulator springs, and lead the currents into the manipulator, to be sent to line or earth as may be required for the signal; ms^1 and ms^{11} are pairs, so are ms^2 and ms^{12}, and so on; and as there are ten pairs, there must be ten manipulators which correspond with the ten different stations. In the drawings, I have only thought it necessary to shew one manipulator, corresponding with the pair of springs ms^1 ms^{11}, as all the other pairs will be connected in the same way with their various manipulators. M, in both figures, represents the manipulator arranged on the same principle as in that of the ordinary single needle telegraph. The positive spring ms^{11} is connected with the turning handle, and the negative spring ms^1 with the cross piece of metal against which the springs connected with line and earth press. It will be perceived, therefore, that if the handle of the manipulator is placed to the right before the occurrence of the pulsations, when they do occur, a positive pulsation will go to line and a negative to earth; and if placed to the left hand, *vice versâ*. As my system consists in breaking up the current into pulsations, and distributing them to the different manipulators, of course the manipulators cannot be worked at arbitrary times, as may be done where one wire is used between each pair of stations, but must be moved at proper times to catch the pulsations; and in my improved manipulators I describe plans of my invention to enable the operator to manipulate correctly. Of course, if the handle is not moved, no pulsation and no signal are formed. Having explained the mode of distributing the pulsations to the manipulators, and how they are sent thence to line and earth, it remains to shew how the particular pulsations intended for them are drawn off at given stations. This operation depends for its correctness upon keeping the wheels at the various stations in perfectly synchronous movement. In examining the drawings, it will be perceived that each wheel, from that of station No. 2 to that of station No. 11, has but one tooth; but that at each station, that tooth is in a different position, and in a corresponding position, in each case, with a pair of teeth on the cylinder W^1. At each station is a spring, ls^2 ls^3 &c., pressing on the boss of the revolving wheel, and connected with the line. There is also another spring, es^2 es^3 &c., connected with the earth-plates ep^2 ep^3 &c., through the receiving instruments, which are marked respectively R^2 R^3 &c., at the different stations, and which instruments are here supposed to be single needle ones. The springs ls^2 ls^3 &c. are in constant connection with the line and wheel, but the springs es^1 es^2 &c. at the different stations only come in contact with the wheel, and thereby form connection between earth and line when the tooth passes under it. By looking at fig. 1, it will be perceived that the manipulator springs ms^1 and ms^{11} are on the teeth t^1 and t^{11}, and at station No. 2 that the tooth tt^2 is in a corresponding position as respects its spring es^2, and that, therefore, the circuit is closed, and the pulsations free to pass and indicate at the receiver R^2; but as none of the springs at the other stations are in contact with a tooth, it is only through the receiver R^2 that those particular pulsations can pass. As the wheels continue to revolve, t^{10} and t^{20}, at station No. 1, next come in contact with the manipulator springs, ms^{10} and ms^{20}, which are connected with the manipulator of station No. 3, where the spring es^3 is also in contact with the tooth tt^3; and this pulsation will pass through the receiver of that station, viz. R^3, and no other, and so on in succession with all the stations to station No. 11, when the pulsations begin again at station No. 2. The

The number of pulsations per second sent to each station, will depend upon the speed with which the wheels revolve, and the number of teeth assigned to the first wheel. As in my instruments three pulsations is the number, I prefer to form a letter where they are used; nine revolutions per second given to the wheels would enable the operator at each station to receive three letters per second. Of course the revolutions may be arranged with more or less rapidity, according to the ability manifested by the operators.

It will also be easily understood that three or more teeth may be made at each revolution under the spring or springs at each station, and the mode of distribution of the teeth may be greatly varied, whilst still carrying out the same principle. If, for instance, the number of teeth were doubled, and each alternate tooth assigned to manipulators at station No. 1, the other teeth could be assigned to station No. 11; and by putting there a wheel similar to that at station No. 1, with twenty teeth, and having corresponding teeth at the other stations, we should be enabled to communicate from that station to all the other stations; but in this case, of course the number of pulsations per second would be doubled. In the mode of working shewn in these figures, no relays are used; but when I explain my new system of relays, it will be seen that they could easily be applied, and thus render quite simultaneous the working of these telegraphs which, as shewn, is only successive.

In cases where the power of sending the same message to various stations is required, say, for instance, the message sent to station No. 11 also to be communicated to station No. 7 and No. 9, all that is required is, to furnish stations No. 7 and No. 9 also with a tooth in the same position as station No. 11, and the springs could be removed with a switch, or otherwise, when it was not required to send the same message to the three stations.

I will now explain the second part of my invention, which consists in a mode of working between the intermediate stations, at the same time that I am working from one or more main stations to various stations along the line, in the manner I have already explained.

In figs. 1 and 2, sheet 1, I have supposed twenty teeth on the surface of the wheel W^1 to supply ten manipulators for ten stations, and could not work more stations from station No. 1 without altering the teeth of all the instruments; but I am enabled, by the contrivance I shall now explain, to work the immediate stations simultaneously.

In looking at fig. 1, it will be perceived that the pulsations which work station No. 2, after passing through the instrument, go to earth and return to the battery, in no way affecting the other part of the line. The consequence is, that from station 2 to station No. 11, only nine pulsations pass along the line to different points, and that the wire is left vacant at the tenth pulsation, which has done its work. By proper arrangements, I can therefore fill up that space with a pulsation from station No. 2 to station No. 3, and thereby gain a means of communication between those two stations simultaneously, by means of a local battery at station No. 2. This pulsation also returns by the earth to station No. 2, leaving the rest of the line free from station No. 3 to station No. 4. Thus another telegraph may be worked from a local battery at station No. 3, and so on to No. 5, and step by step to station No. 11. In like manner, the pulsation sent to station No. 3 from station No. 1 goes no further than station No. 3, and the blanks may be filled up in the same way from 3 to 5, 5 to 7, 7 to 9, &c.; also from 1 to 4, 4 to 8, &c., and so on.

I shall now point out by figs. 3, 4, and 5, sheet 1, the general principles of this part of my invention. To simplify my explanation, I have only shewn three stations intercommunicating simultaneously, with the simplest form of manipulator and the single needle telegraph without relays, which I shall afterwards describe, and with but one pulsation per revolution for each telegraph; although it is impossible to say to what extent the number both of stations and pulsations may be increased, but the principle will remain

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the same, whatever that number may be, it being only necessary to pre-arrange that number within the limits at which practically synchronous action in the instruments can be insured, and within which the minuteness of the pulsations is sufficient to set the relays in action.

In establishing a line or lines intended to work a set of telegraphs, by means of my pulsation-distributing apparatus, it will be necessary for the telegraphic engineer to estimate, before making his distributing instruments, the greatest number of stations that he is likely to require to serve simultaneously, and to divide the wheels and arrange their speeds accordingly, as, although it is not necessary at once to employ the full number contemplated, that number, whatever it may be, cannot be increased without an alteration in the instruments.

Fig. 3, sheet 1, is a plan of the revolving wheels or cylinders, with their adjuncts, at three stations intercommunicating simultaneously; fig. 4 is a side view of the revolving wheels or cylinders; and fig. 5 is a front view of the same. The wheels at each station are supposed to be moving synchronously at any required rate, say, for example, nine times per second, and are started with corresponding teeth in corresponding positions. In station No. 1, A, A^1, A^2, represent three metal wheels fixed on an ivory or vulcanite boss, so as to insulate them from one another, placed on the shaft A^4; the wheel A is in metallic connection by means of the wire and the spring *ps* pressing on its boss with the positive end of the battery PN; and the wheel A^1 is in similar metallic connection by means of the spring *ns* pressing on its boss and a wire with the negative end of the battery PN, as may be traced in the drawings. On each of these wheels are two teeth, one on the right hand and the other on the left hand side of the periphery, so placed that at each revolution each of the four teeth touches one of the springs *ms*, ms^1, ms^2, ms^3, in such manner that at each revolution the left hand teeth of the two wheels, which are respectively connected, as we have seen, with the positive and negative ends of the battery PN, come once in contact simultaneously, tooth *t* with the spring *ms*, and tooth t^2 with the spring ms^2; and that the right hand teeth come once simultaneously in contact, the tooth t^1 with the spring ms^1, and the tooth t^3 with the spring ms^3; but neither of these springs touches the wheel at any other time. By these means, the springs *ms*, ms^2, and ms^1, ms^3, are once in the revolution of the wheel, each pair at a time, in contact with the positive and negative ends of the battery. The springs *ms* and ms^2 are shewn connected by wires with the manipulator for station No. 2, as the positive and negative ends of the battery usually are, and the springs *l* and *e* of these manipulators are connected respectively with the line and the earth by the earth-plate *ep*. In like manner, the springs ms^1 and ms^3 are connected with the manipulator for station No. 3, and its springs l^1 e^1 respectively with the line and the earth by means of the earth-plate *ep*. The wheel A^2 is the receiving wheel of the currents sent from stations No. 2 and No. 3; and it will be perceived that the two teeth on this wheel are placed at different parts of the periphery to those already described on A and A^1, and they come alternately in contact, the tooth t^4 with the spring *rs*, and the tooth t^5 with the spring rs^1, and as will be shewn, at periods corresponding with those at which the pulsations are sent from the other transmitting stations through the line, which is connected with the spring *ls*, which presses on the boss of the wheel A^2, and thus keeps up metallic contact. The spring *rs* is connected with one end of the coil of the receiving instrument of the current from station No. 2, which I here suppose to be a single needle telegraph, whilst the other end of the coil is connected with the earth by means of the earth-plate ep^1, and the spring rs^1 is connected with one end of the coil of the receiving instrument, R^1, of the currents sent from station No. 3 in a similar manner. Let us now follow the pulsations produced by the manipulators at station No. 1, intended to correspond respectively with stations No. 2 and No. 3. At station No. 2 are shewn the wheels, B, B^1, B^2, fixed on the shaft, B^4, through a boss of ivory or vulcanite, B^3, to insulate the wheels from one another, and which shaft revolves at the same speed as that already shewn at station No. 1. The wheel B^2 is a receiving and transmitting wheel, its function being to receive and draw off into its proper receiving instruments the currents sent from stations No. 1 and No. 3, intended for station No. 2,

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and to carry on the pulsations to that part of the line which joins stations No. 2 and No. 3, which are intended for station No. 3 when sent from No. 1, and the pulsations to that part of the line which joins stations No. 1 and No. 2, which are intended for station No. 1 when sent from No. 3. It will be perceived that there are two teeth, tt^4 and tt^5, on this wheel, as seen in the drawing, one of which, tt^4, corresponds in position with those on the wheels AA^1, which communicate with the manipulator for station No. 2 at station No. 1, viz., t and t^2; and the other, tt^5, which corresponds with teeth on the wheels CC^1, viz., ttt and ttt^2, which pass the currents through the manipulator at station No. 3, which is intended to correspond with station No. 2. The spring ls^1 is connected with the line on the side of the station No. 1, and presses on the periphery of the wheel B^2 at all times, except where the sinking or cavity s, fig. 4, comes under it. The spring ls^2 is connected with the line on the side of the station No. 3, and presses constantly on the smooth periphery of the wheel B^2 at all times, except when the sinking or cavity s comes over it. This sinking or cavity in the wheel B^2 is to break the contact of the line, on either side, at points in its revolution corresponding with the teeth which draw off the currents into their proper receiving instruments. During all the other parts of the revolution, both the springs ls^1 and ls^2 press on the periphery of the wheel B^2, and thus connect the two parts of the line. This arrangement therefore insures the transmission of all pulsations along the line, except the two sent from stations No. 1 and No. 3 to station No. 2, which are drawn off alternately, each one during a revolution, by the two teeth on wheel B^2, and pass through their respective receivers to earth, as I have already described with respect to station No. 1. The wheels, manipulators, and receivers of station No. 3, correspond in all respects with those of station No. 1, excepting that the teeth of the wheels CC^1 are placed in a different part of the periphery to those on the wheels AA^1, whereas the teeth on the receiving wheel C^2 correspond with those on AA^1. Nevertheless, the only pulsations which are transmitted from station No. 1 that are received at station No. 3, are those which are passed through the manipulator intended to communicate with that station, and received by the tooth ttt^5. The currents which are received by the other tooth, ttt^4, are sent from station No. 2, and are received at station No. 3, at the same time that station No. 2 is receiving the pulsation from station No. 1. In like manner, the teeth on the receiving wheel A^2, at station No. 1, correspond in position with the teeth of the wheels CC^1, at station No. 3, but only those currents transmitted through the manipulator intended to communicate with station No. 1 come from station No. 3, the others coming from station No. 2. I will now point out how this takes place, and how I am enabled to work the six telegraphs in the time of but four pulsations. As I have already stated, the currents sent from stations Nos. 1 and 3 to station No. 2, after passing through the receiving instruments, go to earth and return to their respective batteries; the consequence is, that as the current sent from station No. 1 goes no further than station No. 2, that part of the wire which extends from station No. 2 to station No. 3 is at that time unemployed, and a current may therefore be sent from a battery at station No. 2 to station No. 3, at the same time that the other part of the wire is employed by a currrent sent from station No. 1 to station No. 2; and in like manner, the current sent from station No. 3 to station No. 2 going no further, the remainder of the wire may be occupied by a current sent from station No. 2 to station No. 1.

The wheels BB^1 of station No. 2, which are in all respects similar to the wheels AA^1 and CC^1, excepting as to the relative position of the teeth, are employed to convey the currents from the battery of station No. 2 to the manipulators for stations Nos. 1 and 3; the teeth intended to convey the currents to station No. 1 corresponding with those which sent the currents from station No. 3 to station No. 2, and the teeth intended to convey the currents to station No. 3 corresponding with those which sent the current from station No. 1 to station No. 2. As these wheels are insulated from the wheel B^2, already described, and from each other, their action will be easily understood, as it is in all respects similar to that I have described with regard to the wheels AA^1 and CC^1, only that the wire from the manipulator for station No. 1 is joined to the line on the side of that station, and the wire from the manipulator for station No. 3 is joined to the line on the side of that station. Upon the system last described, it may be stated, generally,

generally, that where there are several stations served at different parts of the line by a given number of pulsations, the remaining portion of the wire not occupied by the currents of either of these pulsations may be treated as a distinct wire during the period that the pulsation lasts, and thus an immense number of extra telegraphs may be employed without increasing the time required for making pulsations. This plan may be conveniently applied to private use, where it is desired to have telegraphic power applied between two houses or establishments anywhere near the line; but the number of telegraphs may be still further greatly increased where it is only wanted to have the use of one at intervals, say, for example, once or twice or thrice per hour for a few minutes. This is effected by causing a wheel attached to the instrument in which is the wheel the pulsations of which have to be periodically distributed, to revolve by means of a train of clockwork, driven from the pulsation wheel, or otherwise, at such a rate as may be required, for instance, once per hour. At figs. 6, 7 and 8, sheet 1, are shewn respectively, top view, front view, and side view of a receiving and transmitting wheel, and of a slow-moving wheel, without shewing the intermediate wheels, which is quite unnecessary. The wheel A is the pulsation receiving and transmitting wheel, and may have any number of teeth required, but I have only shewn one in the drawing; and as I have supposed these wheels to revolve nine times per second, the tooth would convey from the line, by means of a spring, c, that number of pulsations per second, to any instrument through which they were passed, as I have already explained. Instead of conveying the pulsations which come along the line, and are carried by the spring c to the boss of the metal wheel A, directly to any instrument, I put the spring c^1, which touches the tooth t once in each revolution, in metallic connection with the spring c^2, which presses on the boss of the slow-moving wheel B. This wheel, which is of metal, may be divided into any number of parts or teeth, placed on the periphery in such manner that one tooth only of that wheel is in contact at the same time, and that successively with a spring communicating with a station or instrument. Thus, if the wheel B is divided into six parts and have six teeth, t^1, t^2, t^3, t^4, t^5, t^6, set as shewn in fig. 8, and have six springs, c^3, c^4, c^5, c^6, c^7, c^8, set over them so as only to touch the wheel B when lifted by their particular tooth, these springs will each serve a given telegraph for one-sixth part of the line occupied in the revolution of the wheel, that is, for ten minutes per hour, conveying, during that time, all the pulsations which may come along the line and be drawn off by the tooth t of the wheel A to the instrument with which it is connected. If the slow wheel made one revolution in half an hour, these six telegraphs would be each served for five minutes, and in any other desired proportion; also, one might be served for ten minutes, another for five, and so on, as could easily be arranged by the length of the teeth. Of course the manipulators which work each of these telegraphs must be fed with their pulsations by a similar or equivalent contrivance, and at corresponding times, in case these manipulators are situated at distinct places; but if one person wishes to have the power of communicating for ten minutes per hour, or any other division of time, with six correspondents at different places, one manipulator will suffice for all the six, providing that their instruments are supplied with the slow movement, and that a particular tooth in this slow movement wheel be appropriated to each. Of course in those cases where more than one pulsation is used in combination, and where some of the letters are formed by suppressing particular pulsations altogether, as is the case in many of the improved recording or indicating instruments which I shall hereafter describe, as many springs will be required as the most pulsations used to form a letter or sign, three, four, or more, as the case may be, and a separate revolving slow-motion wheel will be required to correspond with each spring. This will be better understood after I have described these instruments. Before explaining the detailed drawings of one of the revolving apparatus, it may be as well to explain that the number of manipulators that any one of these instruments may serve conveniently with pulsations, as well as the number of telegraphs to which pulsations may be transmitted from one of them, will depend upon various circumstances; for instance, the nature of the telegraphs used, the number of manipulators or receiving instruments in one station or immediate neighbourhood, the necessity for economy, the position of branch lines, &c.; and in very many cases it may be found best to have a distinct

revolving apparatus in connection with each telegraphic instrument, and those pulsations only be formed and received which belong to that particular telegraph. All these points can only be settled in practice according to circumstances. Also, in cases where a number of houses grouped round a central office, belonging to the company of the line, have hired telegraphic power, it is not necessary for them all to have revolving apparatuses, especially where the pulsations from the line are used without relays to work the instruments, where the simplest forms of telegraph are employed, as it will be more economical to take off the pulsations from one instrument kept at the office, and to distribute them by small accessory wires to the different private instruments. The same system may be adopted with the prolonged relay currents, hereafter to be described, which may be brought into action at this central station and transmitted through the short wires instead of the line currents, and pulsations for the manipulators may be served in the same manner, so as to prevent in many cases the necessity of batteries and revolving apparatus being kept in such private houses.

In these figures I have supposed the contacts to be formed by the teeth of metal wheels coming, during the revolution of these wheels, for short intervals, into contact with metal springs; but the contacts may be made in any other convenient manner, without altering the principle of the invention; for instance, a spring may be made to travel, and the wheel be fixed, and the current be thus transmitted from different points of its periphery to different stations; or the wheel may be made of wood or ivory, and have teeth or cams upon it, which may move a spring or other piece of metal connected with the manipulators or receivers into temporary contact with another piece of metal joined to the poles of the battery or to the line; I have shewn this latter method in the detailed drawing of one of the revolving apparatuses; or mercury cups may be used to form the contacts. I have also spoken of the voltaic battery as the source of the electric current; but of course any other means of creating the required pulsation may be adopted instead. In order that the detailed drawings of the pulsations distributing apparatus may be more easily understood when I describe them, I will first give you a general idea, as I have already done with regard to the revolving wheels, of my improved modes of maintaining a practically synchronous movement in the revolving wheels. As I have already stated, this may be effected more or less perfectly by any of the well known means of pendulums, vibrating springs, fly wheels, fans, &c., as I sometimes use these means either alone or in combination with those which I am about to describe. In fig. 1, sheet 2, I have shewn revolving wheels at six different stations. These revolving wheels, before leaving the factory, are adjusted by means of a small fan attached to them, or a small fly wheel, a due relation of the power to the resistance of the springs, which remove the currents and other resistances to a speed as nearly as possible similar to that of a standard instrument kept for the purpose; but however perfectly they may be adjusted, it will be found impracticable to prevent minute differences in their velocities; and as these differences tend to accumulate, all correspondence in the movements of the wheels would soon cease unless such accumulation be prevented. This I prefer to do by one of the modes shewn by the drawings figs. 1 and 2, sheet 2. Fig. 1 shews wheels at six different stations, and in this drawing is a mode which may be conveniently adopted for maintaining synchronism in a limited number of wheels. At a corresponding point in each wheel is a pin or tooth, p^1, p^2, p^3, &c., under which is an electro-magnet, em^1, em^2, em^3, to the armature a^1 a^2 a^3 of which is attached a stud, s^1, s^2, &c., against which the pin impinges as the wheel revolves. This being the case, any wheel will be arrested until the armature is drawn down, when the wheel will escape, and recommence its course, and the stud of the armature be replaced by a recoil spring ready to meet the pin at the next revolution. By the following arrangement, that movement of the armature is intended to take place at precisely the same instant at each station, so that all the wheels will start afresh from the same point. At station No. 7 is a voltaic battery, PN, one pole of which is connected with the earth by means of earth-plate *ep*, and the other pole with one end of the coil of the electro-magnet of *em* of that station, the other end of which is connected metallically with the stud on the armature; the wheel is in contact with the line wire by means of a spring, *ls*, pressing on its

its boss, or other suitable contrivance. At station No. 2, the line wire which proceeds from station No. 1 is connected with one end of the coil of a similar electric magnet, em^2, to that shewn at station No. 1, and the other end of the coil is connected with the stud on the armature. The wheel of station No. 2 has also a spring, ls^2, pressing on its boss, or other suitable contact, which is in metallic connection with the line wire proceeding from station No. 2 to station No. 3; this, again, is connected in a similar manner to station No. 4, and so on to the most remote station, No. 6, where the wheel is metallically connected with the earth by means of the spring *ls* and the earth-plate *ep*. By this arrangement, none of the wheels can pass on beyond a certain point, and none of the electro-magnets can act until all the pins are in contact with their respective studs, when the electric current will be closed throughout, and a current will pass round all the electro-magnets, drawing down the armatures with their studs simultaneously, and allowing the wheels to pass and recommence their revolutions; of course the studs must be adjusted to descend an equal quantity, and be so formed as to maintain the contact until the wheels have escaped. As this will require very nice adjustment, it will perhaps be better in most cases to connect the line, in the manner shewn, with relay electro-magnets instead of with the stud electro-magnets; and for them to throw in action local currents through the coils of the electro-magnets em^1, em^2, &c., so that the studs may be drawn down together below the pins, and be kept there till all have fairly passed. Although I have shewn only one pin to each wheel, and therefore one adjustment for each revolution, it may be made more frequent if desired, or less so by putting the pins on wheels driven at a slower speed from the pulsation wheels. The number of adjustments will depend for its necessity upon the degree of perfection in synchronism which is attained in practice without the adjusting process. The openings between the different parts of the line wire are closed metallically, when this current is not passing, or other currents do not require any of them to be kept open, in the same manner that I have shewn how the current is transmitted along the line at intervals, in figures 3, 4, and 5, sheet 1. Another mode of effecting the same object is to have a governing wheel at one of the stations, say, for instance, at station No. 1, which wheel in its original adjustment is made to move somewhat slower than the others, so that whatever little inequalities may exist in the speed of the wheels at the various stations, they may all travel a trifle more quickly than the governor, and their pins abut against their respective studs rather before the governor wheel causes the current to circulate. By so arranging, it will be unnecessary that the formation of the current should depend upon any of the contacts at the studs, that made by the governor wheel being sufficient, the coils of each electro-magnet forming part of the line for the time-being by the arrangement of the wires of the coils, which I shall shew in the drawing fig. 2, sheet 2. In this case, also, the currents can be made of any duration that may be required effectually to draw and keep down the studs, without the necessity of using the relays. When the number of stations becomes very numerous, I modify these plans so as not to increase inconveniently the number of electro-magnets through which one current has to pass, without, however, departing from the principles I have described. Fig. 2, sheet 2, shews ten stations also regulated once during each revolution by a governor wheel; but it is easily applicable to the system I have already described; but each alternate station has its pin at the opposite end of the diameter; but the governor wheel has two contacts. Thus, the wheels are regulated five at a time; and by any other set of positions given to these pins, any other number may be regulated at one time; or, instead of only having one governor wheel, if one group, say of five, for example, is regulated together, each member of that group may regulate sub-groups, independently of a general governor, by means of a current from the local battery, and many other variations may be given to these arrangements. As in these revolving wheels, it is only important that synchronism should take place between the wheels in correspondence at the time that the teeth are in action, it is advisable to regulate them just before their teeth come into work, as it matters little (within certain limits) at what rate the plain parts of the wheel are travelling, providing the working parts move together. Of course, on either plan, no working pulsation can pass at the

same

same time as the regulating pulsation, and a certain space must be left blank in each wheel, to allow for the little irregularities, if only one line is used, with alternating pulsations; and it will be found convenient in many cases, especially where the adjustments are frequent, to employ one wire for the governing pulsations, and another, or more than one, for the working pulsations; or where instruments with only currents of one denomination are used, the currents of the other denomination may be used to regulate the armatures being permanent magnets. As most of my new recording and indicating instruments have their letters formed in the time required for three pulsations, one line might be employed for each pulsation, and the same governing wire would serve for all; of course, by employing three wires instead of one, at least three times as many telegraphs could be worked.

Fig. 2, sheet 2, shews the arrangement for governing ten stations, five at a time, by means of a governing wheel. Station No. 1 is that of the governing wheel W^1, which it will be perceived has two teeth, t^1 t^2, which touch the spring *bs* connected with one end of the battery PN, once each during a revolution; the other end of the battery is connected with the earth by means of earth-plate *ep*, so that each time that a tooth touches the spring, a current passes along the line. One of these currents passes through the electro-magnets em^2 em^4 em^6 em^8 em^{10}, or their relays, and the other through the electro-magnets em^3 em^5 em^7 em^9 em^{11}; and as each of these sets of five has its pins at opposite points of the diameter of the wheels, five will be regulated at one semi-revolution of the wheel, and five at another; of course the line will be made separate or continuous at each semi-revolution, by means of sinkings, as before explained, at the proper time. In the drawing, fig. 2, sheet 2, the line is shewn alternately open and closed at each station, so that the group stations 3, 5, 7, 9, 11, are just about to enter into action, and the other group will be brought into play at the other semi-revolution of the wheel. The description I have given of the connections and the details of fig. 1 applies equally to fig. 2. By means of the regulating system I have described, in those cases where any telegraph had ceased to act, from the driving power not having been properly kept up, or other causes, when again set in motion it will, by the action of the pin and stud, start in a correct relative position to that of its corresponding station, which it will then continue to maintain, so that the instruments are quite self-adjusting. In order to reduce the chances of stoppage of any part of the line, from accidental causes, as much as possible, the best plan will be, in all cases where many stations are worked simultaneously, to divide them into groups and sub-groups, in such manner that each sub-group shall be independent of the remainder, so that, at any rate, accidents or stoppages in private telegraphs, from negligence or other causes, may not cause derangement to other telegraphs composing the group. By making such arrangements, the maintenance of the regular working of the system will depend entirely upon the officers of the company to whom the line may belong. These men are placed at a few main stations, who of course will be chosen for steadiness and care, and whose duties will be to keep the batteries and instruments in complete working order, and to see that the weights or springs which are used to drive the revolving apparatus are regularly wound up, either by the electrical current or otherwise; of course, having once determined how often such duties require to be performed, it is easy to insure regularity in their performance, as is done in the Post Office, with gas and water companies, and in other similar cases. As the drawings for the pulsation-distributing apparatus are shewn as I arrange them for working the telegraphic instruments, by means of prolonged local currents brought into action by my relays throwing it on the revolving wheels, and thence through the instruments, in order that these drawings may be more easily understood, I will now, by reference to diagrams, explain the action of those relays in their simplest form, namely, as arranged to work with a single current. In sheet 2, fig. 3, is a side view of a local battery of a relay of a revolving wheel and of a needle instrument working together. Fig. 4 is a top view of the same. The action is as follows:—A B C D are four electro-magnets; between A and B is a permanent magnet, *n*, and between C and D another permanent magnet, n^1, with similar poles upwards, which vibrate on pointed screws at *g*, with a very minute motion limited by platinum points on the screws

h

h h^1 h^2 h^3. These points are connected with battery PN, the points h and h^1 being connected metallically by the wires and clip I, to the positive, and the points h^2 h^3 by the wires and clip N, to the negative pole of the battery PN. The permanent magnets n and n^1 are connected respectively, n by the means of the wires and the clip W, with a spring, SW, pressing on the boss of a metal wheel RW, which, together with two other metal wheels, RW and RW^2, is fixed on an ivory boss, *ib*, on the revolving shaft *rs*, which ivory boss serves to insulate them from each other, while n^1 is connected, by means of the clip I, with the wires and the clip C on the receiving instrument RI, which I have shewn as a single needle one, with one end of the coil of that instrument, the other end of which is connected through the clip C with the wire, and the spring sw^2 with the wheel RW. Whenever the tooth t^1 comes in contact with it during the revolution of the wheel RW, one end of the coils of the relay electro-magnets which are continuous, is connected with the line wire by the clip L^1, the wires and the spring ls^2, whenever the tooth t on the wheel RW^2 touches the spring ls^2, which it does at each revolution, and the other end of the coil is connected with the earth by means of the clip E and the wire. The reason that when the tooth t touches the spring ls^2 that this spring becomes metallically connected with the line is, that a spring, *ls*, connected by a wire with the line, presses permanently on the boss of the wheel RW^3. The coils are so wound that, when the electro-magnets A and D become south poles at the parts presented to the tops of the permanent magnets, the corresponding parts of the electro-magnets B and C become north poles, and *vice versa*, and will vary according to the direction of the current sent along the line. The permanent magnets having the same pole uppermost will therefore be atttracted one to the right and the other to the left, according to the direction of the line pulsation. If the magnet n is attracted to the left, it will come in contact with the platinum point of h^3, and therefore with the negative pole of the battery, and the magnet n^1 being attracted to the right, will come in contact with the platinum point h^1, and therefore with the positive pole of the battery. The magnet n^1 being connected with one end of the coil of the receiving instrument, and the magnet n with the boss of the metal revolving wheel RW, whilst the relay magnets are in these positions, whenever the tooth t^1, during the revolution, is in contact with the spring sw^2, the negative current will pass through the end of the coil of the instrument which is connected with the magnet n, and the positive through the wheel RW which is connected with the magnet n^1. When the magnets n n^1 are attracted in the opposite directions, the positive and negative currents from the local battery will also pass through the instruments in opposite directions; and as the duration of the current will depend upon the time that the tooth t^1 is in contact with the spring sw^1, it is obvious that this time may be adapted to any length that is required for the most efficient working of the instrument; and the current sent during only the minute fraction of a second causes the various instruments along the line to be fed with currents of the best possible practical duration, and thus work simultaneously.

As the tendency of gravity, from the mode which I have invented and applied to all my varieties of relay for supporting the permanent magnets below the centre of gravity, as well as the permanent magnetism and the residual magnetism of the electro-magnets, all tend to keep the permanent magnets in the position to which they have been attracted; and as the wheel is kept in a constant state of revolution, of course each time the wheel revolved a similar motion would take place in the needle of the instrument, until a contrary current was sent along the line, unless some means were adopted to prevent it. I accomplish this in two ways—one by passing a local current in the right direction through the whole or a portion of the coils through which the line current has passed, the other by a mechanical appliance. The wheel RW^1, mounted with the other metal wheels on the ivory boss on the shaft *rs*, is connected with a spring, *sp*, pressing on its boss, with the positive end of the local battery and the clip P, by means of wires. The wheel is sufficiently broad for the tooth t^2 to touch two springs, *sr* sr^1, at the same time; and as these springs do not touch the wheels, or communicate metallically between themselves at any other period of the revolution of the wheels, except when the springs and tooth are in contact, they may be connected with the coils

of

of the electro-magnets in any part, without interfering with the proper course intended to be taken by the line current. The tooth t^2 should be very short, so as to produce a minute pulsation similar in character to that of the line current. It is seen in side view, behind the wheel, in RW^2 in fig. 3, and comes into action after the currents passing through the instruments have ceased. One of the double springs *sr* sr^1 is connected with the aid of the coil of the electro-magnet A through the clip W, and the other with one end of the coil of the electro-magnet C, while the other ends of both coils are connected with the negation end of the local battery. Thus, when the springs touch the tooth t^2 a positive current passes from them, through the coils, in such manner that both of them attract the permanent magnets, and bring them both in contact with the negative end of the battery, so that no current can pass through the instrument until a pulsation along the line causes one of the magnets to move to the positive side. Instead of setting back the armatures, or permanent or movable electro-magnets used in my relays, in the manner I have just described, I sometimes do it mechanically, by a cam or other equivalent contrivance attached to the revolving apparatus acting against them at the proper time; as an example, I have shewn, in figs. 25 and 26, sheet 9, where I describe several varieties of my relays, this mode of setting back. Of course the particular method can be greatly varied without departing from the principle, which is that of replacing mechanically the moving parts in a position which allows no current from the local battery to pass through the instruments. The methods which I have just described are applicable to and intended to be used with all my varieties in the relay; so that it will not be necessary, when explaining the drawings of the different instruments, to again trace in all of them the directions of the currents, as any competent workman, with the description I have given, will be able to apply any of them correctly. It is thus that I make my telegraphs work simultaneously, for although the duration of the line pulsation may only be a minute fraction of a second, the local current substituted for it may be of any required duration; and it is thus also that I am enabled to work instruments which require long and strong currents, although those sent along the line may be weak and minute. Up to the present time, I have only described, with reference to the drawings, the pulsation distributing and receiving apparatus as acting with successive single pulsations, at each revolution of the wheel, on the different instruments and the different stations; but as my improved manipulators, relays, and indicating and recording telegraphs, are arranged to form a letter by one touch of the finger, out of three, four, or more pulsations, I will now explain and illustrate how this is effected, so that the detailed drawings will be more easily understood. There are two distinct methods shewn in the different instruments; one is to form the letter by successive movements in the same instrument, and the other to form it at once by the simultaneous operation of three or more instruments; or the two methods may be united. In the first case, the pulsations are made to succeed each other at considerable intervals; in the second, they are sent in groups. In figs. 5 and 6, sheet 2, is shewn, in side and top view, how the teeth of a pulsation wheel require to be arranged for the first plan; and in figs. 7 and 8, in side and top view, how they require to be arranged for the second. In figs. 5 and 6, W is the wheel, t t^1 t^2 the teeth, *ls* the spring connected with the line which presses on the boss, and *rs* the spring which conveys the pulsations to the instrument or relay. As a certain amount of time is required for the instruments to junction properly, especially where a relay is used, it will be perceived that the teeth t t^1 t^2 are at some distance apart, so as to enable me, in case of using relays, to prolong the currents that work the instruments, and reset the relay after each pulsation before the next pulsation arrives. The marks in this case which form the 26 combinations, any of which I appropriate to the different letters of the alphabet, are successive on the paper, as shewn in the alphabets. Fig. 9, sheet 2, Nos. 1, 7, and 8, in the second plan for the arrangement of the teeth shewn in figs. 7 and 8, sheet 2, the marks are made across the paper, and it is not each mark, but each letter, which is successive; alphabets on this plan are shewn in fig. 9, sheet 2, at Nos. 3, 4, 6, 9, 10. No. 5 is a mixed plan. In figs. 7 and 8 it will be perceived that the teeth t t^1 t^2 immediately following each other, but are on different parts of the periphery, sidewise, on which account the wheel W is made much broader than the wheel W, the

tooth

tooth t touching first in order the spring rs, then t, the spring rs, then the tooth t^2, the spring rs^2, each of which leads to a different relay which throw local currents through the revolving wheels to the required parts of the instruments; ib is the ivory boss, rs^4 the revolving shaft, as in figs. 3 and 4. I have not shewn the wheels which prolong the local currents, nor those which replace the relays after the pulsations have taken place and the local currents have done their work, as the plan has been fully described with regard to one pulsation in figs. 3 and 4, and is shewn as applied to three pulsations in the complete drawings of one of the pulsations distributing and receiving instruments. Three or more lines have already been used together to group a set of pulsations, which, by their combinations, form the different letters of the alphabet; but I have now explained how I produce the same effects with only one line, and thus how I am enabled, with the help of my relays and prolonging current wheels, to work simultaneously the different needles or other parts of a telegraph as perfectly with one as I could do with three line wires.

In sheet 3, figs. 1 to 10 inclusive, are drawings of one of my pulsation distributing instruments, of which the motive power shewn is a spring kept constantly wound to nearly the same degree of tension, by the action of an electro-magnet worked by the current from a local battery; instead of a spring a weight may be used, or a heavy weight acting through a train of clockwork substituted; but more frequent attention would be required than in the plan which I have shewn.

As I have observed in a former part of my specification, before arranging the pulsation distributors it is necessary for the telegraphic engineer to resolve how many stations he may require to work directly upon the line he is about to erect, and to arrange his instruments accordingly. In the drawings which I am about to describe I have done the same thing, and I have supposed fifty stations to be the number; all those fifty stations may be worked from one main station, or from several main stations, the pulsations being generated amongst them, or from some main stations each communicating with several stations, and other stations each only communicating with one or two stations; indeed, the arrangements may be infinitely varied according to circumstances. I have shewn in the drawings, fig. 1 to fig. 10, sheet 3, a distributing wheel arranged for communicating with ten of the fifty stations, supposing the pulsations for supplying the other forty telegraphs to be generated at other stations; but it will be obvious that instead of ten it would have been as easy to arrange for twenty, thirty, or any other number at this station, by merely lengthening the cylinder, and increasing the number of contacts at this station, and it is therefore obvious that the pulsations from the other stations must be on the other four-fifths. The mode of forming the contacts may of course be infinitely varied; I have shewn different plans in the different drawings. The distributing wheel may be adjusted to make one, two, three, or four revolutions per second, or even more, according to the facility acquired by the operators of working my manipulators; and as each revolution sends three pulsations to each telegraph, and consequently one letter, four revolutions would send four letters per second, which I imagine would be about the limit of velocity which the best operators would attain. Although I have made the original pulsations in this instrument only to work fifty telegraphs from the ends of the line, this number gives a very imperfect idea of the powers of the wire, under the circumstances, as the number that can be worked simultaneously, by the method I have already described, between the intermediate stations, without increasing the duration of the pulsations, is very much more considerable than the original number, and the same message may be repeated at several offices, as is done now, without interfering with the correspondence of other stations. My improved regulating plans, which I have already described with reference to the drawings, require a considerable amount of synchronism to be attained by the original adjustment, and a certain blank space to be allowed in the periphery of the wheel just before each regulating-pin comes into action if only one wire is used, unless the instrument is worked entirely with currents of one denomination, in which case the current of the other denomination could be employed exclusively for the adjustments; but for many reasons, it will be convenient

convenient to have another wire, for example, to distribute pulsations to private houses, for manipulating, to save them from keeping batteries to serve their manipulators, and to do any odd jobs on the line; and great convenience will be given for adjusting by its means, as in this case there will be no occasion for the wheels to move synchronously except at the working parts.

In these drawings I have supposed the use of an extra wire for adjusting. Fig. 1, sheet 3, is a top view of an instrument for distributing pulsations to ten manipulators on a line arranged to work fifty telegraphs from the main stations. Fig. 2 is a top view, with the springs and a part of the upper brass and wood work removed. Fig. 3 is a view of the base board, shewing the remounting electro-magnet. Fig. 4 is a transverse section taken just free of the adjusting electro-magnet. Fig. 5 is an end view. Fig. 6 is a side view. Fig. 7, a longitudinal section. The other figures are views in detail.

The motive power in this instrument is a spiral spring contained within a cylinder, and kept constantly rewound as it unwinds itself, and drives the wheelwork by means of the electro-magnet EM. A is the base board of the instrument, A^1 the sides and ends, and A^2 the top board. The whole of the working parts of the machine, excepting the rewinding electro-magnet and its armature, are supported chiefly on brass or other suitable framing screwed to the top board; B is a brass upright, screwed across the left hand end of the top board, by a flange formed on it, as is best seen in the longitudinal section fig. 7; B^1 is another brass upright screwed across the top board A^2, by flanges; B^2 is another brass upright fastened to the top board, and B^3 is a fourth upright, fastened across the right hand end in a similar manner; B^4 are open sides, as seen at fig. 6, screwed to the uprights B^1 and B^2 so as to enclose a rectangular space. On each side of the uprights B^4 are flanges B^5, which forms a sort of table to which are screwed plates of vulcanite, V, the uses of which will be hereafter explained. The cross pieces B^1 and B^2 have each pieces, B^6, the form of which is best seen in fig. 5, to carry across bar NB, which is screwed between them, but insulated from them by washers of vulcanite or ivory. The above description shews the arrangement of the framework of the machine. I will now explain the action, beginning with the driving power. This is a spiral spring seen in section at *ss* fig. 7, one end of which is attached to the cylinder *C* in which it is contained, and the other end to the shaft C^1. This shaft has a ratchet wheel, *d*, fixed to it, which is prevented from turning backwards by a spring-pan, *D*, figs. 1 and 5, which moves on a screwed pin fixed to the end upright B. This upright B forms the bearing of one end of the shaft c^1, the other end of which is inverted in a hole in B^1, as seen in fig. 7. To the brass cylinder *c* is fixed the tooth-wheel *f*, which gears into a pinion *g* fixed on the shaft of the pulsation cylinder PC, causing it to revolve at nine times the speed of the driving cylinder; supposing the pulsation wheel to revolve three times per second, which would send pulsations for three letters per second to each instrument, the driving cylinder would only revolve once in three seconds. The end of the shaft c^1 is made square, so as to allow the spring to be wound up by a key. After this operation has been performed, the wheelwork continues to revolve until the spring is unwound, which soon takes place when the cylinder makes a revolution once in three seconds. To drive an apparatus of this kind for any length of time by springs or weights, would require a train of clockwork, and very powerful springs or heavy weights, and needing frequent rewinding; I therefore content myself with a spring or weight of moderate power, being constantly rewound by the electrical current in the same proportion that it is unwound, so that as long as a sufficient battery current is supplied, the apparatus will continue to revolve; I prefer a spring to a weight, as it gives facilities in adjusting the instruments, which I will afterwards explain. A powerful electro-magnet, EM, is fixed to the base board, and partly let into it and into the top board. Whenever a current of electricity is passed round the coils of this electro-magnet, it attracts an armature, A^r, attached to a turning lever, *h*, and causes this lever to turn. As the power of a magnet or electro-magnet varies inversely as the square of the distance between itself and the object it attracts, whereas the resistance from increased leverage against it only

only varies as the lengths, I make the distance of attraction very small, and increase the counteracting leverage. In this I have only shewn a difference of three to one, but it may be considerably increased with great saving of power. The turning lever *h* is seen in back view, front view, and side view, respectively, in figs. 8, 9, and 10, sheet 3, where the form and position of the long arm is seen. It is supported in bearings, h^1, screwed to the top board. To the end of this long arm is attached, by a screwed pin, *i*, a piece of brass, *j*, the form of which is seen in the various figures; it is made to work up and down perpendicularly by having a piece of steel wire, i^1, screwed into its upper end, which works in a hole in a projecting piece on the frame B. The arrangement is best seen in fig. 5. To this upright *j* is attached a pall j^1 and spring j^2, which pall turns on a screwed pin, and when the piece j^2 is raised, falls between the teeth of the ratchet wheel *d*, and when the piece *j* is pulled down, causes the ratchet wheel to move round the distance of one tooth. The piece *j* is made to rise by a helical spring, *hs*, seen in figs. 3 and 7, which is forced against the armature by a screwed pin, *k*, on which the helical spring is placed. The armature is prevented being carried too far back by meeting the point of a screw, k^i, against which it abuts; these screws pass through pieces of brass screwed to the base board. The ratchet wheel shewn has thirty teeth; therefore, in order that the spring may be constantly wound as fast as it unwinds, it is necessary that the ratchet should be moved a distance equal to one tooth for every thirtieth of a revolution made by the spring cylinder; this is effected by the rotation of the cylinder itself, in the manner I shall now describe. A ring of vulcanite, ivory, or other suitable material, *l*, is turned and fixed on the cylinder *c*. This ring *l* is so cut as to admit on it a ring of brass, l^1, nearly one half of which is perfect, whilst the other half is cut into thirty divisions, with spaces between them equal to half the divisions, more or less, through which the ivory or vulcanite projects, making sixty divisions of the surface, which is made perfectly smooth alternately ivory and metal. A spring, l^2, shewn in fig. 11, is fixed to the base board in such manner that it presses at the horizontal diameter on the continuous metal l^1, and a similar spring, l^3, presses at the other side on the interrupted part of the metal l^1. The spring l^2 is connected with one pole of a battery, and the spring l^3 with one end of the coils of the electro-magnet EM, the other end of which is connected with the other pole of the battery. The consequence of this arrangement is, that thirty times during the revolution of the cylinder, the armature is attracted and turns the ratchet wheel a space equal to one tooth, and the spring is therefore constantly kept wound as nearly as possible at the same point. The advantage I mentioned in using a spring instead of a weight is, that by means of a key on the square part of the shaft c^1, I can vary the strength of the spring during the adjustment of the normal speed beyond the pulsation distributing cylinder PC, to the further end of the shaft of which is fixed a spur-wheel *m*, gearing into a pinion m^1, on a small shaft m^2, which is left thick in the end, and is an arrangement for varying the resistance. This is effected by a small fly-wheel, *x*, on the shaft m^2, which is made to rotate with considerable velocity. In the drawing, I have shewn the increase of velocity over the pulsation distributing cylinder to be ten to one. A hole is bored in the thick part of the shaft, through which the rounded stem of the fly-vanes passes, allowing the edge of the vanes to be turned in the direction of the motion, or at right angles to it, or in any intermediate position, where it is fixed by the screw x^1. Thus, by being able, on the one hand, to vary the driving power, and on the other, to vary the resistance, the speed may be very accurately arranged to equal that of a standard instrument; but as anything like perfection is impossible, I have devised, as already stated, means of making the instruments self-adjusting, either at very short intervals or at considerable ones. The pulsations are caused by pieces of metal coming successively in contact with the various springs, as I shall hereafter explain; but it will be observed, in examining the drawings, that although thirty pairs of springs are shewn, by forming the pulsations only one pair of springs is in contact at a time; therefore the resistance from pressure on one-fifth of the wheel would only be about equal to that of one pair of springs having constant pressure; the other four-fifths of the wheel would tend to move faster than the working fifth, were it not prevented by keeping a pair of springs, s^2 s^3, of similar force, in constant action on the unoccupied four-fifths, which I do, in order to keep the resistance as regular

as possible throughout the revolution. In this instrument I have shewn two adjustments during each revolution. As I have already stated, these adjustments are caused by a pin on the pulsation cylinder coming in contact with a stud on the armature of an electro-magnet. These pins are marked respectively *o* and o^1. The pin *o* has just arrived against the stud of the electro-magnet, and immediately that that stud becomes depressed by a similar contact at the corresponding stations, and the last sending station, the pulsation contacts for this fifth of the wheel, and the receiving contacts for the corresponding distance stations, commence. When the pin o^1 arrives against the stud, the pulsations on this fifth of the wheel have ceased, and the pulsations on the next fifth, or other division, commence; the pin o^1, therefore, corresponds with a pin on the wheel of the next division of the pulsation distributors, and with pins on the receiving wheels of the stations communicating with that division; in like manner, another pin at the termination of the pulsations of the second division communicates with a pin at the commencement of the third division and others at its receiving stations, until the pin is reached which terminates the last division, and which corresponds with the pin *o*. Supposing two lines to be used, the following is the method of connection:—EM^1 is the electro-magnet, having a platinum stud *p* fixed to its armature *Arr*; the parts of the pins $o\,o^1$, which come in contact with this stud are also of platinum. The boss to the left hand end of the vulcanite revolving pulsation cylinder is covered with metal, and united by strips of metal with the pins $o\,o^1$; a piece of vulcanite, v^2, is secured to the top of the upright framing B^1, and to it is screwed a spring, *g*, which communicates with one pole of the regulating battery, and therefore puts the pins $o\,o^1$ in contact with that pole; the other pole of the battery communicates with the earth. The stud on the armature communicates with one end of the coils of the electro-magnet of a relay, the other end of which communicates with the line which communicates with the pins of the next corresponding station, the stud of the armature of whose electro-magnet communicates with one end of the coils of a relay electro-magnet, whose other end is connected to the line, and so on to the further end of whose coil is connected with earth, whereby the currents return to the battery, the circuit being complete. When all the pins are touching the studs, a current passes round the coils of the relay electro-magnets, which, in their turn, send currents round the electro-magnets of the instruments EM^1, which cause all the armatures to be drawn down, and the cylinders to start together in their revolution. This relay current will last until the armatures of the relay instruments are replaced, which is made to take place very soon. A part of the soft iron of EM is sunk into the top board, to allow the long arm of the turning-frame *h* to pass freely over it. In case the same line is used for distributing and receiving the pulsations and for adjusting the instruments, the periphery of the wheel must be slightly extended—a blank space nearly equal to that required for the formation of one pulsation being left just before the space taken by the adjusting pin, and blank spaces gradually increasing from the commencement to that size, between the pulsations; and of course, in this case, the instruments must be so closely adjusted to one another, in their speed at starting them, that the difference of that speed, between each regulation, shall never be sufficient to allow one pulsation to overpass the other as much as that blank space, otherwise the pulsations intended for one station would run into another. Having fully described how the pulsations wheel is driven and regulated, it remains to shew how the pulsations are formed. For each pulsation, where instruments are used worked by the current running in alternate directions, both the positive and negative ends of the battery must be simultaneously in contact with their respective springs in the manipulators; and as I have supposed, in this case, all the instruments to be worked by three alternating pulsations per revolution, we require thirty negative and thirty positive springs to supply the ten manipulators; of course the negative and positive contacts must be simultaneous, and I will now shew how this is effected by each pair of springs. *s*, best seen in figs. 1 and 6, are thirty springs which form the positive contacts; s^1 are thirty springs which make the negative contacts, but they make these contacts simultaneously. On the vulcanite cylinder PC is fixed a helical projecting tooth of metal, *z* (I prefer platinum, where the contact takes place), extending over one-fifth of the circumference of the cylinder, and all the length occupied by the thirty pairs of springs. This helical tooth *z*

is

is best seen in fig. 2; in fig. 4 it is seen just coming under the first spring. The springs s are arranged with their ends in a perfectly straight line, parallel to the axis of the cylinder. The width of the helical tooth must be such that just after the contact with the first spring s is finished, that with the second spring s commences, and when that with the second spring s finishes, that with the third spring s commences, and so on to the end of the helical tooth, which embraces one-fifth of the circumference, and therefore is in action during one-fifth of the revolution. The boss at the right hand end of the cylinder is covered with metal, in the same way that I have stated regarding the left hand boss, and this metal is connected by a strip with the helical tooth. A piece of vulcanite, V^3, is screwed to the upright B^2, in order to carry a spring, g^1, which is screwed to it, and which presses constantly on the metal of the boss. This spring communicates through the clip P with the positive end of the pulsation battery; a clip-screw c is inserted in the bar NB, which crosses all the springs s^1, and is as near as possible to them without touching. This clip-screw bites the end of a wire, the other end of which is connected with the clip N and the negative end of the pulsation battery. The ends of the springs s^1 are inserted in small pieces of vulcanite, v, which prevent metallic contact between them and the springs s. The springs s^2 and s^3 are arranged in a similar manner, although they have nothing to do with the currents, but are raised by a tooth the height of the helical tooth, which extends round the unoccupied four-fifths of the wheel, and therefore causes a resistance during that four-fifths of the revolution, equal to that offered by the springs $s\,s^1$ during the other fifth. In looking at figs. 4 and 5 the action of the contacts will easily be seen. The wheel PC revolves in the direction of the arrows. The helical tooth z is about to insert itself under the spring s, which, in these drawings, is covered by the spring s^2. In doing so it raises the spring s, and with it, through the piece of vulcanite v, the spring s^1, until that spring touches the bar NB which is connected with the negative pole. The contacts are now complete, the spring s being connected with the positive pole, through the helical tooth z, and the spring s^1 through the bar NB with the negative pole. Of course the first three pairs of springs are connected by wires with the first manipulator, the second three pairs with the second manipulator, the third three with the third manipulator, and so on. The springs, which are rectangular in section, are partly inserted in grooves cut in the vulcanite v, which are covered by other pieces of vulcanite, v^1, screwed to them; but two screws, e, are shewn in this upper piece over each spring, which are screwed lightly down after the springs are adjusted, to keep them in place, but not strongly enough to strain the vulcanite v^1. A small local battery may be connected with the clip P, as well as the pulsation battery, and the last of every three pulsation spring wires may divide at the manipulator into two—one going to the positive spring of third pulsation in that manipulator, and the other being connected with one end of the coil of the small electro-magnet shewn in my fourth manipulator, the other end of which is connected with the negative end of this small battery. By this means this electro-magnet is brought into action at the time of the passage of the third pulsation, and indicates to the operator that he may press a fresh key. I have shewn this wheel as simply employed as a pulsation distributor, with the addition I have last named; but supposing that each station to which messages were sent had the power of sending other messages in return, an instrument in all respects similar might be used as a receiving instrument, excepting, of course, that the helical tooth z must be on another part of the periphery. In this case the spring g^1 must be connected with the line, and the springs s with the relays or receiving instruments, and through them with earth. The springs s^1 would not be required where relays having permanent magnets were used; but when the relays are formed entirely of electro-magnets, as in one of the varieties I shall shew, the springs s^1 could convey the positive currents from the local battery, which are supplied simultaneously with the line pulsations. In the case of making this a receiving instrument, teeth on the slow-moving wheel would be required to supply the local currents to the instruments, in the manner I have already explained by reference to the figures, and which will be more fully shewn in a subsequent drawing; but this same wheel may easily be arranged, both as the pulsation distributing and receiving wheel. Let us suppose we had to receive from ten stations; it would be convenient to allot the pulsations of those stations to a

portion

portion of the periphery exactly opposite to those sent. In this case, by fixing pieces of vulcanite similar to v and v^1 to the top board, having springs similar to $s\,s^1$ fastened between them at the proper level, the helical tooth z could be made to press them down precisely as it presses up the springs $s\,s^1$ during its revolution; in this case the metal on the right hand boss, on which the spring g^1 presses, would only extend over a portion of the boss, and be pressed upon only by the spring g^1 during the time the tooth z was in action in producing pulsations; and a spring similar to g^1 connected with the line would be made to press upwards against the metal of the boss, at that part of the revolution when it was required for the line to be in communication with the receiving instrument. In this case, also, a bar similar to NB would be connected with the positive end of the local battery, so as to send the simultaneous local currents through the springs which correspond with s^1.

Eight clips are shewn screwed to the top board marked respectively, N, AP, R, RM, RM^1, MM^1 P; N and P connect the bar NB and the helical tooth z with the poles of the pulsation battery; AP connects the positive end of the adjusting battery with the pins $o\,o^1$ and R the line, and relay with the armature stud; RM and RM^1 connect the coils of the electro-magnet EM^1 with the poles of the local battery; M and M^1 connect the coils of the electro-magnet EM with the poles of the driving battery. As I have before observed, the mode of forming the contacts which create and distribute the pulsations may be infinitely varied, still preserving the main principle of the invention, which is to create pulsations, and distribute them to various manipulators, by means of apparatus in synchronous rotation. In figs. 1 and 2, sheet 4, I have shewn a variety on the design I have already explained. Here, springs connected respectively with the positive end of the pulsation battery and with the line wire, are kept in a constant state of revolution; and during their movement, touch successively the spring connected with the battery, the wires which lead to the different manipulators, and the spring connected with the line the wires which lead to the different receiving instruments. In arranging the distributing and receiving wheels, of course it is necessary to determine beforehand what instruments are to be worked at the different stations, as some instruments are worked by three or more alternating currents, and others by five, six, or more pulsations, all of one denomination. In some cases the instruments are worked directly by the line currents, in others by means of relays; in some cases these relays are worked solely by the line current, in others by the line and local currents combined. In all these cases a different arrangement of the teeth on the pulsation wheel will have to be made; and when relays are used, provision must also be made for sending the prolonged local currents to the instruments, the currents for advancing the paper, &c., from a slow-moving wheel, an example of which I shall shew in the next drawing. I have supposed this instrument to be distributing pulsations to fifteen manipulators, to work instruments at distant stations, in which my five dot chemical alphabet is being printed without the assistance of relays; and at the same time, I suppose the instrument to be receiving the manipulated pulsations from fifteen different stations, and distributing them to as many receiving instruments of the same character. In these two figures I have not thought it necessary to shew the driving and adjusting gear, as it would be similar to that described in the last and next variety, although, of course, it might be driven by clockwork if desired.

Figure 1 is a section through the centre of the spring carrying arm A, shewing the manipulator connection wires $m\,w$ attached to a vulcanite fixed ring V. Figure 2 is a front view, shewing the battery spring b, forming a communication with the manipulator wires $m\,w$ on one side, and the line spring b^1 making communication with the wires $r^1\,w$ which lead to the receivers on the other. The instrument is constructed as follows:—V are two thick hollow cylinders of vulcanite, supported at little distances, one from the other, upon solid blocks of vulcanite, V^1, in which they are inserted as far as their horizontal diameter, and which are themselves fixed to the base board. The pieces V are held in place by pieces V^2 of the semicircular form shewn screwed to the pieces V^1; the axes of the hollow cylinders V are in the same straight line, and in the same line as the axis of a shaft, s, which passes through them, and is kept in a state of constant rotation synchronous

synchronous with the instruments of the various stations, by the means I have already described, or any other appropriate ones. To this shaft *s*, of which the bearings are not shewn, is fixed a vulcanite arm, A, which may have a sufficient counter balance weight, (for the sake of simplicity, not shewn in the drawing). This arm moves quite freely between the two vulcanite cylinders V, see fig. 2, but at its upper end it spreads out on each side partially over the cylinders, in order to carry two springs, *b* b^1, which make the connections; on the shaft *s*, to the left hand side, just after passing through the left hand vulcanite cylinder V, is fixed a boss of ivory or vulcanite, coated with metal, *d*; on this metal presses constantly a spring, *c*, connected with one pole of the pulsation battery, the other end of which is connected with earth. The metal covering of the boss is joined by a wire or otherwise with the spring *b*, so that during its revolution, every time it comes in contact with one of the manipulator wires *m w*, that wire is in metallic contact with the end of the battery. Five wires would be supplied to each manipulator, and as there are 75 wires, 15 manipulators would be supplied with pulsations; but it will be perceived, that between each two of the wires *m w*, which are bedded in the left hand vulcanite cylinder V, level with its surface, another wire might have been inserted, which would have doubled the number of pulsations; but as I have supposed those other pulsations to come from, and not go to, the distant station or stations, a similar spring or springs working synchronously, at the distant stations, will make contacts with manipulator wires placed in those intervals on vulcanite cylinders V at those stations. At this station, therefore, these intermediate spaces require to be fitted by wires connected with the receiving instruments, which wires, at the time of the passage of the pulsation intended to be connected with them, should be brought in contact with the line; this is done in the right hand cylinder V, where seventy-five wires, *v w*, are imbedded in a similar manner as the wires *m n* are imbedded in the left hand cylinder V; an ivory boss, d^1, covered with metal, is fixed on the shaft *s* to the right hand of the vulcanite V, in a manner similar to the boss *d* already described; on this boss presses a spring, c^1, connected with the line; the metal of the boss is joined with the spring b^1 by a wire or otherwise, so that each time a pulsation passes along the line, it will pass through the wire r^1 *w*, with which the spring b^1 is in contact, and through the coil of the receiving instrument to earth, with which the other end of that coil is connected. By means of the synchronous movement of the instruments, and the arrangement of the positions of the springs *b* b^1, and of the wires *mw rw*, *b* will be in contact with *mw*, and b^1 with *rw* alternately, during the revolution of the arm A.

The next instrument I shall describe is shewn on the same sheet, from fig. 3 to fig. 9 inclusive; it is arranged in all respects complete for working one of my three needle telegraphs, or any of my simultaneous telegraphs, to be hereafter described, by means of relays, or, by a slight change in the relative length of the teeth on the slow-moving wheel, which I will explain, to work one of my type printing telegraphs, also to be described hereafter. It is also arranged to furnish a manipulator with pulsations, so as to enable the two stations which are in correspondence to be communicating simultaneously, in which case a set of pulsations must be assigned to each station; but in many cases, especially where the line is used by private persons, it will not be necessary to have the power of communicating simultaneously, but merely successively; to do this, instead of the manipulator contacts and receiving contacts being both in action during the revolution of the wheel, as shewn in these drawings, one only at a time will be brought into play with the same set of pulsations, arrangeable at the pleasure of the operators. Fig. 3 is a top view of this instrument; fig. 4 is a top view, with the sides and pulsation wheel removed; fig. 5, a view of the base board, shewing the rewinding electro-magnet; fig. 6 is a side view; fig. 7, a longitudinal section; fig. 8, an end view; fig. 9, a transverse section taken close to the upright B^1. The arrangements of this machine are generally very similar to those of the machine I have shewn in sheet 3, and have placed similar letters to similar parts, so that in those parts, the description I have already given is applicable, and it only becomes necessary to explain those parts in which I have made additions or alterations.

It will be perceived that I have reversed the position of the rewinding of the electro-magnet; by so doing I have been enabled to work at a smaller distance between the poles and the armature, thereby getting considerably more power with an electro-magnet of the same dimensions. The turning lever h to which the armature A^r is attached, goes through the top board A^2, and is supported in bearings h^1; the arm h is only the same length as the distance from the centres on which h^1 moves to the centre of the poles of the electro-magnet, therefore, the end of the arm h has only a motion equal to that caused by the attraction of the armature; to the end of the arm h is attached, by a screwed pin, an upright piece, h^2, which descends towards the base board; and at the level of the centres of the cores of the electro-magnet EM is attached, by a screwed pin, to the short end of a turning lever, h^3, which moves on a screwed pin fixed in a bearing, h^4, fastened to the base board. The position and attachments of the turning lever h^3 are seen in fig. 5, and its form and position, as well as that of the bearing piece h^4 in side view, fig. 6, in dotted lines. The arms of the lever are to each other as 9 to 1, and as the end of its long arm is attached by a secured pin to the upright j, the uses of which I have described in the other machine, it is evident that that upright will rise and fall at each repulsion and attraction of the armature, a distance nine times greater than the distance of that attraction; I have therefore given the ratchet wheel d fewer and larger teeth, having reduced the number to eighteen, and consequently the number of attractions of the armature per second, to six. Also, as it is of great importance that the battery which excites the electro-magnet EM should be as little in use as possible, consistently with a due performance of its functions, I have greatly reduced the width of the metal strips l^1, and in practice, should reduce them to the minimum possible; it being clear, that when the pulsation produced by these contacts was of enough duration to draw the armature fairly home, any continuance of contact is a mere waste of battery power, which of course it is most necessary to avoid, so that it may not be necessary often to rechange or amalgamate the zincs of the battery; my great object in this rewinding system being to avoid the constant attention and supervision the use of weights and springs, unaided, entails. In this instrument I have shewn a different method of forming the contacts, which I will now describe. In the instrument on sheet 3 there were two similar sides, B^4, having flanges, B^5, to carry plates of vulcanite, V. In this instrument, this arrangement only exists on the right hand side; on the left hand side, the uprights B^1 and B^2 are nearly connected together by strips of brass, B^6; the upright B^4 is arranged with flanges, as in the other instrument, to which is affixed a plate of vulcanite, V; instead of the contacts being made by a helical tooth connected with the line, being brought in contact with springs connected with the receiving instruments, or connected with one end of the battery, and brought in contact with the manipulator springs, the helical tooth z, which also exists in this instrument, on the pulsation wheel, extending over a space that is occupied by three pulsations, acts only a mechanical part, its operation being to tilt successively three vulcanite levers n^1 n^2 n^3, which turn on a rod supported by bearings nb^1 nb^2, and by so doing, throw copper screw points r^1 to r^6 into cups of mercury, and thereby cause the contacts necessary for the formation of the connections with the pulsations, coming along the line and the receiving instruments. A fourth vulcanite lever, n^4, with but one copper screw, v^7, is shewn, but it is not tilted by the helical tooth z, but by a tooth or fillet, z^1, extending all round the pulsation cylinder, excepting at a space of the periphery equal to that of the helical tooth z, where it is cut away. The consequence is, that the point of the screw v^7 is always in the cup of mercury, excepting at the time when the tooth z comes into action, when it is lifted by a small recoil spring, one of which is attached to each lever so as to lift the copper points out of the mercury when the teeth are not in action. In figs. 8 and 9 the form of the levers, where acted upon by the teeth, is best seen. I will now explain how the contacts are formed, but I must first draw attention to the fact that, in addition to the clips I had in the instrument shewn in sheet 3, and which I here retain, in order to fulfil the same offices I have added twenty-two others, which are marked with distinct letters, to which I shall refer in explaining the contacts. The upper levers which I have been describing are entirely

entirely occupied in continuing the pulsations along the line, or in supplying the receiving instruments; *ss* are cups sunk in the vulcanite V, to contain mercury; the mercury in *s* is connected with the line wire, from the sending station, through the clip LD; and the copper screw v^7 is connected with the continuation of the line, through the clip LU; the copper screws $v\ r^2\ r^3$ are connected respectively with the clips $L^1\ L^2\ L^3$, which in their turn are connected to the proper parts of the relay; thus, when v^7 is in the mercury, the pulsations are continued along the line, but when it is removed, and $v^{1\ 2}$ and ^{3} are successively immersed, the pulsations are sent to the relay; the three other pointed screws, $v^4\ v^5\ v^6$, are simultaneously immersed with the copper screws on the same levers last described, in another cup of mercury which is connected with the positive pole of a local battery, and $v^4\ v^5\ v^6$ are united respectively with the clips $P^1\ P^2\ P^3$, and with the relay composed entirely of electro-magnets, and pulsations corresponding in time and duration with the line pulsations are sent, this being both a sending and receiving instrument. I will now explain how the manipulator pulsations are generated:—I suppose these pulsations to be formed at a part of the wheel exactly opposite to the received pulsation; they are caused in the same manner by the tooth *z*, after the wheel PC has performed a semi-revolution, acting successively on the vulcanite levers of the third order, which turn on a rod supported on bearings $nb^3\ nb^4$, screwed to the top board d^2; when not in action, the copper-pointed screws v^8 to ^{13} are lifted out of cups of mercury by recoil springs, as with the upper levers; here also there are two cups of mercury, $s^2\ s^3$, sunk in the board d^2; the mercury in s^2 is connected metallically with the positive, and the mercury in s^3 with the negative pole of the pulsation battery; the outer screws $v^8\ v^9\ v^{10}$, which dip in s^2, are connected respectively with the clips $MP^1\ MP^2\ MP^3$, and the copper screws $r^{11}\ r^{12}\ r^{13}$, which dip in s^3, with the clips $MN^1\ MN^2$ MN^3, and through them, with the manipulator springs, as well as with the recal coils of the relays, which they reset at the same time; other screw heads, tt^1, are seen on the levers, they are clip-screws to bite the ends of five wires which connect them with their proper clips, and the screws *t* are connected metallically with the outer, and the screws *t* with the inner row of copper pointed screws.

It now only remains for me to describe how the prolonged local current pulsations are sent to work the instruments; this is effected by teeth set on the cylinder *e*, which it will be perceived that I have prolonged in this instrument; as the pulsation wheel PC revolves nine times for one revolution made by the cylinder, it follows, that whatever local currents are sent to the instruments during one revolution of the pulsation wheel, and consequently during the formation of one letter, must be sent during one-ninth of the revolution of the cylinder, and that similar teeth must be repeated on each ninth of the periphery; the proportion which the tooth bears to that ninth portion of the periphery will determine the duration of the current. I have shewn what I consider a convenient length for working my improved needle or pricking telegraphs in the teeth *u*. In the type printing telegraph, as will be perceived when I describe that instrument, the prolonged pulsations require to act singly first and then together, which I accomplish by forming them in the shape of the dotted lines at u^1; these teeth also only act mechanically, by pressing springs, $w^1\ w^2\ w^3$, during their revolution, against the points of screws *y*, which pass through pieces of brass y^1 fixed to the board a^2; the body of the springs is insulated from the part which comes in contact with the teeth; the action that would take place when the teeth come in action, is best seen in fig. 8. The four pieces of brass, y^1, are connected respectively with the clips $LC^1\ LC^2\ LC^3$, which bring the local currents from the relay, and with the clip PC, which brings the positive current to the fourth spring w^4; this fourth spring is moved by other teeth, *v*, and conveys the currents which advance the paper; the springs $w^1\ w^2\ w^3\ w^4$, which are bent under the cylinder and screwed to A^2, are connected respectively with the clips $In^1\ In^2$ In^3 PA, so that when they come in contact with the screws *y*, the three first forward the currents to the instruments as prepared by the relays, and the fourth, the currents which advance the paper.

The

Improvements in Electric Telegraphs, &c.

The figures on sheets 5, 6, 7, and 8 are drawings of various manipulators constructed according to my invention. They are all intended to send, by one motion of the hand or finger, the pulsations required to form a letter properly manipulated to line and earth; and as sometimes it may be convenient to use pulsations always of the same denomination, and at other times both positive and negative currents, to form the letters, and as in some cases expense will not be so much an object as at others, I have modified these designs to meet these circumstances, and explained how they may be varied.

Fig. 1 to fig. 12, sheet 5, shew one of the simplest forms I have adopted, and this is equally applicable to currents all in one or in both directions, it only being necessary in each case to make a suitable arrangement of contacts. The number of keys may be more or less than that shewn, which is six. With six keys, as many currents of one denomination may be sent, or three of either denomination. Five currents in one direction is a convenient number, as with that number all the combinations required for the twenty-six letters can be formed, with a few to spare for other signals. In this case, five keys only would be required, instead of six. Four pulsations in either direction, or eight in one direction, would require eight keys, and would form as many as eighty combinations, and would require to be grouped in the manner which was found in practice to be most convenient for manipulating.

As the pulsations recur periodically, and as it is necessary that when a key is pressed down it should continue down until all the pulsations required to form a letter had passed through the manipulator, I have devised a means of effecting this object by an electro-magnet worked by a current from the local battery, sent by the revolving apparatus at the proper time, and which passes round the coils just before the working pulsations begin to pass through the manipulator, which causes an armature to be attracted and locks the turning plates or other equivalent parts, and which current continues to pass until all the pulsations have quite finished doing so. When the armature is attracted, the locking takes place in such a manner that the parts pressed down cannot rise, nor the others be depressed, until the armature is released, which takes place immediately that the current ceases to flow round the electro-magnet, an event that does not take place till all the pulsations are passed. It is also advisable, to enable the operator to work with rapidity and precision, that he should know when the parts are locked and when free, and therefore when he ought to raise his finger and when he ought to press the next letter to be sent. This is accomplished by the same electro-magnet, which is either made to cause a bell or bells or other bodies or to move a pointer to indicate when these operations are to be performed, or to perform both acts.

When the instruments used for receiving are of the character in which the different operations are performed simultaneously, the pulsations sent along the line succeed each other immediately. In this case, all the pulsations will pass, perhaps, in the hundredth part of a second, or less. In this case, two bells or two indicators, as well as the locking of the keys, becomes unnecessary, although still required to work the marking instruments properly, as in their case it takes a much longer time for the pulsations to pass through the manipulator than will be required in the first case. All, therefore, that will be required in the first case will be, an indication of the proper time for the operator to move the finger from the key he is pressing to the other key, which may be done by the revolving wheel causing something to be struck during each revolution at the proper time, or a very small electro-magnet may be caused to give a tap at the proper time.

Instead of bells, which in many cases would be considered too noisy, very slightly vibrating bodies, producing different sounds, may be struck.

The first instrument I shall describe is a six-keyed manipulator. This manipulator is intended to send any set of the currents required to form the twenty-six combinations which point or indicate the letters in my various telegraphs. Six of the letters are formed by merely pressing either of the six keys, and the other letters by pressing two or three in the manner indicated, and engraved on a piece of ivory let into the top of the machine. Fig. 1, sheet 5, is a top view of the instrument; fig. 2 is a plan view with the top removed; fig. 3 is a similar view with the springs also removed; fig. 4 is a view of the base board with the electro-magnet; fig. 5 is a transverse section

through

through the centre of the instrument; fig. 6 is an end view of the same instrument; fig. 7 is an end view with the end board removed; fig. 8 is a similar view, with the movable armature and swinging piece removed; fig. 9 is a longitudinal section through the centre; fig. 10 is a side view; fig. 11 is a front view of the turning frame; A^1 is the base board; A^2 the middle board; A^3 the top board; A^4 the sides and ends: M L P^1 N^1 P^2 N^2 P^3 N^3 EM^1 are binding screw pieces for forming the metallic connections for the currents; M and M^1 connect the ends of the battery with the coils of the electro-magnet, EM, through the revolving wheel; E is fixed to the piece of brass EP, and to the earth; L, to the piece of brass LP, and to the line; P^1 N^1 connect the ends of the battery with line and earth, according to the springs pressed against LP and EP for the first pulsation, and P^3 and N^3 for the third pulsation. The springs *d* are best seen in fig. 2, and in cross section in fig. 5. They are screwed at one end to a piece of wood, A^5, glued to the middle board, and at the other end in pairs to the ivory keys which are seen in longitudinal section at *e*, fig. 9, and in transverse section in fig. 12. The springs are made so as to keep these keys constantly pressed against the underside of the top board at their thickened parts, and to raise them again to that position after they have been pressed. It will be perceived, on examining fig. 2, that one spring in each pair is longer than the other, and is connected metallically by means of a pinching screw, *f*, with one end of the battery, at the time that the pulsation passes; it is also connected by a piece of wire soldered across with one of the other springs, so that each spring in a group of four is alternately connected with the positive and negative ends of the battery, and it depends upon the key pressed whether positive is sent to line and negative to earth, or *vice versâ*, by the keys pressing a pair of springs against the projections on LP and EP. The form of these pieces of metal to be pressed upon is shewn in fig. 9, where, it will be perceived, that there is no contact until a key is pressed. To manipulate the three pulsations, or two at one operation, more than one key must be pressed, in the manner engraved on the piece of ivory *g*. The objects of the electro-magnet EM, shewn best in fig. 4, are to inform the operator by sight and sound when the pulsations are about to pass, and when they have passed, as well as to lock the keys, so that those which may have been pressed down, and those which have not been pressed, may retain the same position until the whole of the pulsations forming a letter have passed through the manipulator. These objects are performed by the attraction of an armature, A^n, when the current is passed round the coils of the electro-magnet EM, which is made to take place immediately before the pulsations pass through the manipulator, and to continue during their passage, at the end of which time the current is made to cease, and the armature is thrown back by a spring. This armature, of which the cross section is shewn in fig. 9, is screwed to a brass swinging frame, *l*, hung upon pointed screws, *j*. On this brass swinging frame is a projection, l^1, the cross section of which is shewn in fig. 9, and the front view in fig. 8; the piece l^1 being below the pieces of brass of the keys that have not been pressed, and above those which have been pressed, thus preventing the former from being put down, and the others from rising. The pieces *k* are screwed to the ivories, as shewn; SB and LB are two bells with different tones, to the top of which are fastened pieces of brass, having the words "Cease to press key," and "Press fresh key," respectively engraved upon them. These bells are alternately struck by a clapper, *o*, when the armature is attracted or repelled, and indicate to the operator the proper time and mode of action. The clapper is moved in the following manner:—One end of the rod *p* is inserted loosely in the armature, and at its other end it is flattened out to receive a screw-pin which connects it as a joint to the small two-armed piece *q*, which vibrates on a similar screwed pin fixed into a piece of brass, *r*, which is fixed by wooden screws to the base board. As the armature is attracted or released, the forked arm of *q* is moved to the right or left; this is best seen in fig. 4. A vertical piece of brass, *s*, vibrates on a screwed pin, *t*, best seen in fig. 9. The form of this piece *s* is seen in dotted lines in fig. 5; and it will be perceived that, at its lower end, it takes the form of a round rod, which works in the forked arm of *q*, so that when *q* is moved to the right or left, the piece *s* is also made to vibrate. The clapper *o* is screwed to one end of a piece of round steel wire, the other end of which is screwed into the top of *s*, so that either the bell SB or the bell

LB is struck at each movement. In order to insure the recal of the armature, a piece of brass, *u*, is screwed to the base board, and a screw, *v*, on the prolongation of which is a helical spring, v^1, causes that spring to press with any desired force against the swinging piece *i*; a screw, *w*, through the end, serves as an abutment against the spring.

The next instrument I have to describe is also a six-key manipulator, and is shewn from fig. 13 to fig. 26 on the same sheet. Fig. 13 is a top view; fig. 14, a view with the top board removed; fig. 15 is a view of the base board; fig. 16 is a front view; fig. 17, a back view; fig. 18, a section through the recoil springs of the keys; fig. 19, a longitudinal section; fig. 20, a side view; fig. 21, a transverse section through the rod on which the keys turn; fig. 22, a transverse section close to the face of the contact pressure springs. The other figures are details. In this instrument the contacts are not made by pressing the springs, which are in connection with the poles of the battery, upon pieces of brass connected with line and earth, as in the instrument last described, but certain metal portions of the keys are in permanent connection with line and earth, and when the keys are depressed, these metallic portions are slid into contact with the springs connected with the poles of the battery. A is the base board of the machine; A^1, the sides and ends; A^2, the top board. There are ten clips, marked as in the instrument last described, and similar letters indicate similar connections. The clips P^1 N^1, P^2 N^2, P^3 N^3, are connected by wires held firmly under the flat-headed screws *c*, screwed into them with the springs s^1 to s^{12}, to which the other ends of the wires are soldered, in the manner best seen in fig. 15, and in suchwise that at the first pulsation s^1 and s^4 become connected with the positive, and s^2 and s^3 with the negative, pole of the battery. In like manner, at the second pulsation, s^5 and s^8 become connected with the positive, and s^6 and s^7 with the negative pole; and at the third pulsation, s^9 and s^{12} become connected with the positive, and s^{10} and s^{11} with the negative pole of the battery. These springs, of which one is seen in side view at fig. 25, are screwed to the base board A, into which they are sunk about an eighth of an inch, to prevent metallic contact being caused between them by the electro-magnet EM which crosses them. They are bent, as shewn in fig. 25, and forced back when in place to the perpendicular, as shewn in the dotted lines in fig. 25, which causes them always to press firmly on the keys. The keys K are shewn on top view in fig. 14, in side view in fig. 19, and in bottom view in fig. 26. They are conveniently made of vulcanite, with a veneer of ivory attached where the letters are engraved. Two pieces of brass, d^1 d^2, are screwed to the vulcanite, where shewn in figs. 19 and 26, care being taken that the screws from the two sides do not touch, so as to form metallic contact between the pieces d^1 d^2. Into each of these pieces is screwed a flat-headed clip screw, e^1 e^2, which, by means of wires, connect them with two strips of brass, LB EB, which are connected respectively by wires to the clips L and E, and through them with line and earth. Flat-headed screws, *g*, are fixed in these brasses, and seize the other ends of the wires attached, as I have described, to the keys. In looking at the side view of the keys in fig. 19, it will be perceived that, in their normal position, that shewn, the springs s^1 to s^{12} press upon the non-conducting part, but that when the keys are pressed upon, the brasses d^1 d^2 slide into contact with the springs, and form communication between the ends of the battery and line and earth, when the pulsations come round alternately, the key A positive to line negative to earth, the key B negative to line positive to earth, and so on. A square piece of brass, *h*, turned round at its ends, is inserted in each key, where shewn, and is bored to receive a rod, *i*, best seen in fig. 21, on which all the keys turn loosely. This rod has a square head at one end inserted in the wooden side, and is fastened in place with a nut at the other end. The keys are brought to their normal position after being depressed by helical springs, *h s*, slipped on pins, *j j*, screwed in the base board. This arrangement is best seen in figs. 18 and 19. In this manipulator I have made no arrangement for locking the keys, but I have placed a small electro-magnet, EM, at the back of the box which contains the working parts. It is seen in place in top view in figs. 13 and 14, and in side view in fig. 17; and fig. 23 is a section, and fig. 24 a back view. When a current passes round its coils, which is made to take place immediately after the passage of the pulsations,

pulsations, the armature, which is usually kept away from the coiled pole of the electro-magnet by a spring, is suddenly drawn down. To the end of the armature is screwed a wire topped with a brass ball, which is made to strike some body, so as to make a slight sound. In the drawings I have shewn a flat piece of hammered silver, *l*, which is bent at right angles, and screwed to the top board; when this is struck, the operator will know that he is to send a fresh letter, on which he must continue to press until the sound is repeated. The + is a blank key, which being pressed on between two sounds, causes an interval to take place between the pulsations; and as the paper in the recording instrument will still continue to be moved on, and causes the end of a word to be indicated.

Having described two of the simplest forms of manipulator, those in which 5, 6, or 8 letters of the alphabet are formed each by one key, and the other letters or signals by pressing simultaneously on different groups of those keys, I will explain my next variety of manipulator, *videlicet*, that which has a key for each letter, acting on turning plates, which bring the necessary pulsations into contact with line and earth in order to cause the required letter to be indicated or recorded at the distant station. Fig. 1, sheet 6, is a top view of this manipulator; fig. 2 is the middle board, shewing the brass-work on which the springs are pressed to make communication to line and earth, with the currents sent from the distributing wheel; fig. 3 shews the same middle board with the springs in place above the brass-work, but not touching it until pressed down by the turning plates; fig. 4 is the base board with the electro-magnet, which locks the turning plates, and indicates when the pulsations are passing; fig. 5 is a front view of the instrument; fig. 6 is a back view of the instrument; fig. 7 is a transverse view through the instrument at the first row of keys A to G; fig. 8 is a transverse section through the instrument at the second row of keys from H to N; fig. 9 is a transverse section through the instrument at the third row of keys from O to U; fig. 10 is a transverse section through the instrument at the fourth row of keys from V to blank; fig. 11 is a transverse section through the instrument on the line of the recoil openings, which bring up the turning plates after they have been pressed down; fig. 12 is a transverse section through the pieces of vulcanite which are screwed down to the under sides of the turning plates, and which press the springs against the brass-work connected with line and earth; figs. 13 to 24 are respectively side and front views of these pieces of vulcanite, the longest piece being screwed to the top plate, and the shortest to the bottom plate, as seen in fig. 12; figs. 25, 26, 27, and 28, sheet 6, and figs. 4 and 5, sheet 8, are respectively views of six turning plates; fig. 1, sheet 8, is a side view of the instrument; fig. 2 is a longitudinal section through the keys A H O V; fig. 3 is a view with the front end removed.

The principal works of this manipulator, which is arranged to send the combinations produced by three alternating currents, are enclosed in a box of mahogany or other suitable material, in two stories or divisions screwed together in the most convenient manner for taking to pieces and getting at the working parts; A is the base board, A^1, the sides and ends, and A, the top board. On the middle board, outside of the box, are ten clips, M and M^1, for communicating the current to the two ends of the coils of the electro-magnet EML and E to communicate with the line and earth respectively, and P^1 P^2 P^3 N^1 N^2 N^3 to communicate with the two ends of the battery at the times of the three pulsations.

In fig. 2, sheet 6, will be perceived strips of brass communicating respectively with the clips L E; on these strips of brass are pieces also of brass e^1 to e^6 and l^1 to l^6. The form of these brasses is best seen in side view in fig. 2, sheet 8. Springs s to s^{11} are screwed to a piece of wood, A^4, glued to the middle board in such manner that a spring comes over each piece of brass e^1 to e^6, l^1 to l^6, but without touching it, except where forced by pressure to do so. Each alternate spring communicates metallically with one of the clips P^1 to P^3 N^1 to N^3, and each one is joined by a wire, *w*, soldered to one of the intermediate springs in such manner that, when the pulsations occur, each pair of springs is connected, one with the positive and one with the negative ends of the battery, so as alternately to send, when pressed on the brass projections, currents to line and earth in

opposite

opposite directions. The springs and brasses are pressed into connection by pieces of vulcanite attached to the lower side of the turning plates, each plate operating on one pair of springs; thus, by pressing down the top plate, $t\,p^1$, the piece of vulcanite v^1 attached to it brings the spring s^{10} in connection with line and the spring s^{11} in connection with the earth; likewise, on pressing down the plate $t\,p^2$, the piece of vulcanite v^2 brings the spring s^8 in connection with line and s^9 in connection with earth; on pressing down the plate $t\,p^3$, the springs s^6 s^7 are brought in contact with line and earth respectively, and so on with regard to the other plates; so that, by means of the proper one of the six plates, if pressed down before the formation of the currents, any of the three pulsations may be sent to line and earth in the desired directions. As the plates are only required to press the springs and brasses into contact when a current has to be passed, those plates are recalled after the passage of a pulsation and kept constantly pressed upwards against screwed pins sp^1 to sp^6, best seen in fig. 9, sheet 6, by helical springs, hs^1 to hs^6, which fit loosely on pieces of vulcanite, i^1 to i^6, which are fixed to the middle board. A glance at fig. 11, sheet 6, will at once make this arrangement understood, and the holes shewn on the separate views of the turning plates shew how each helical spring acts on its respective turning plate without interfering with the others. The screws and dotted lines j^1 to j^6, in each view of the turning plates, shew where the pieces of vulcanite v^1 to v^6 are screwed to their lower sides. The turning plates tp^1 to tp^6 move on the points of screwed pins ps^1 to ps^6, which pass through pieces of brass fixed to the sides of the box, as may be seen in the various figures. The turning plates are themselves commanded by keys composed of stems or rods of vulcanite, d, on the tops of which are screwed pieces of ivory, on which are engraved the letters of the alphabet. These stems d are turned with flanges differently situated in each stem. They are twenty-six in number, besides two blanks screwed into the top board. On consulting the drawings of the six turning plates, it will be perceived that the five upper ones have each seven grooves of rather more than the diameter of the stems, and that the plate tp^6 has a number of holes instead. It will be perceived that the stems are slipped into place in all the turning plates except the bottom one, tp^6, where they fit loosely in the holes, as they also do in holes in the top board of the machine, whereby they are kept perpendicular, although they move freely. They must be put in place before the top is screwed on, and the ivory caps with the letters be screwed on last.

Of course the ivory caps can be screwed on any of the studs that may be desired; but I have shewn the alphabet in regular order in these drawings. In looking at figs. 7, 8, 9, and 10, sheet 6, it will be perceived that some of the studs have only one and some more flanges, and that these flanges come over particular plates which are pressed down and form the necessary contact when any key whose studs have flanges which command them is pressed upon by the finger. Thus, the stud of the letter A has one flange, which commands the top plate; so that when A is pressed, the positive of the through pulsation goes to earth, and negative to line; when B is pressed, the positive of the third pulsation goes to line and the negative to earth, and sends the positive of the second pulsation to earth and the negative to line; D, the positive of the second pulsation to line and the negative to earth; E and F manipulate the first pulsation in a similar manner. Thus, these six keys send six distinct signals along the line, which are made to indicate these six letters at the telegraphic instruments at the other end. The other letters are formed by combination of these six of two or three each; and in looking at figures 7 to 10, it will be perceived that some of the studs have two and some three flanges, but that all the combinations are different; and it is by these different combinations, which are assigned to different letters, and that the instrument to the other end shews what letter has been sent. The range of the turning plates is confined by the screwed pins p^1 to p^6. Fig. 12 is a transverse section through the vulcanite pressure pieces, and also shews the springs in cross section and their distance before compression from the brasses. A front and side view of each of these pressure pieces is seen in from fig. 13 to fig. 24, sheet 6, inclusive. It now only remains to explain about the electro-magnet. It is fixed in any convenient way to the base board A, in the position

best

best seen in fig. 4, sheet 6. Its functions are twofold; one is to cause the turning plates to be locked when any of them have been depressed before the passage of the pulsation, in such manner that those which have been lowered cannot rise, and those which have not been moved cannot be depressed, until the pulsations have passed. The second function of this electro-magnet is to work a rod, P, and make it point alternately at the proper times to the words "Cease to press key," or, "Press fresh key," engraved on the arch IA.

A turning frame, *tf*, to which is affixed an armature, A^r, oscillates on pointed screws kk^1 seen in fig. 3, sheet 8, where the form of the turning frame is also shewn. The screw *r* passes through a piece of brass, r^2, fixed to the side A^1, and the screw r^1 passes through the base board A. The armature A^r is hung at a little distance from the poles of the electro-magnet EM, as is best seen in fig. 4, sheet 6, and immediately that a current is passed round the coils is attracted, but when the current ceases, is thrown by a spring *ms* (the degree of whose pressure is regulated by a screw and nut, *as*) against the abutment screw *as*. To the turning piece *tf* is attached a notched rod, *ur*, the form of which is seen in fig. 2, sheet 8, the projections of which enter below pieces c^1 to ^{6} attached to the turning plates tp^1 to ^{6} when they have not been depressed, and below them when they have been. Then the current being made to pass during the time that the pulsations go through the manipulator, the turning plates are held in whatever position they may have been placed until the current ceases, when the notched rod is removed by the action of the spring, and the plates return to their normal position. To the turning frame *tf* is also affixed, by a hinge joint, the rod *r*, which is fixed by a screwed pin *r* to the bent lever *t*, which in its turn is connected by a screwed pin t^1 with the rod *u*, which is also connected by a screwed pin, u^1, with the lower end of the pointer P, which vibrates on a screwed pin, p^1, fixed to the brass p^2. Thus, the pointer is moved to the right or left when the armature is attracted or repelled, and the proper indications are made.

The last form of manipulator which I am about to describe forms the contacts and combinations of pulsations by means of turning frames. Fig. 1, sheet 7, is a top view of the machine. Fig. 2, sheet 7, is a view of the base board of the machine. Fig. 3 is a view with the top board removed. Fig. 4 is a view of the turning frames. Fig. 5 is a side view of the machine. Fig. 6 is a longitudinal section through the centre of the machine. Fig. 6, sheet 8, is a front view of the machine. Fig. 7, sheet 8, is a front view with the front removed. Fig. 8 is a view of the under side of the top board. Fig. 9 is a section taken just within the left side. Figs. 10 to 27 are details. The object of this manipulator, as of those I have already described, is to send to line and earth, by one touch of the finger, any of the 26 combinations producible from three pulsations, negative or positive, which cause the letter pressed upon to be indicated or recorded at a distant station; A is the base board of the machine, A^1 the sides, and A^2 the top board. The letters of the alphabet at figs. 1 and 3, sheet 7, are upon the keys, which are supported in position by springs, *c*, which keep them firmly against the underside of the top board when not depressed by the finger. These springs are screwed to the strip of wood A^3 glued to the under side of the top board at one end, and to the ivories of the keys at the other. Fig. 12, sheet 8, is a longitudinal, and fig. 13 a transverse section of the ivory portion of the outer row of keys, and fig. 14 is a longitudinal section, and fig. 15 a transverse section of the ivories of the inner keys. On examining fig. 8, sheet 8, it will be perceived that pins, *d*, the shape of which is seen in the other figures, are screwed through the springs *c* into the ivory portions of the keys in a particular order; and by means of these pins, when any key is depressed, particular combinations of the turning frames 1, 2, 3, 4, 5, 6, are also depressed. The pins bear on strips of brass, *e*, screwed to the fore part of the turning frames, which are cut away in front where necessary, to allow any turning frame to be depressed the necessary distance without touching the others; this is best seen in fig. 9, sheet 8. The keys cannot be too much depressed, as the front piece A^1 forms a stop at a certain point; see fig. 6, sheet 7, and fig. 6, sheet 8. The turning frames may be made of light wood. The strips *e* are turned up at right angles at the ends, as seen at fig. 11, sheet 8. The object of this

this I will now explain. *f f* are springs of the form shewn at fig. 10, sheet 8, screwed to the back bars of the turning frames, for the purpose of recalling them to their normal position after they have been depressed: their ends press against the under side of the top board and press down the back parts of the turning frames, pressing up the front parts until the turned up portions of the bars *e* touch the under side of the board, and form stops; by this means the turning frames are always kept level when not purposely depressed. The turning frames work on two rods, *g*, which pass through square pieces of brass inserted into the side bars of the turning frames, and these rods are supported by pieces of wood, A^4, two of which are fastened at the base board, and the other two to the sides, in such manner as not to interfere with the parts underneath; they have wooden caps screwed to them, to secure the rods *g* in place. The object of the turning frames is, when they are depressed, to cause round wire springs, which are connected during the period of the pulsations with the positive and negative ends of the battery, to touch pieces of brass connected respectively with line and earth. These springs *s* to s^{12} are seen in fig. 2, sheet 7, in place over the pieces of brass EB LB, the former connected by a wire to the clip E, and the latter to the clip L, and by them respectively with earth and line. The springs are made of only six pieces of wire bent as shewn, and held in place on a strip of boxwood, A^6 (fastened to the base board), in which are suitable grooves, and which are held firmly by a boxwood cap. The arrangement is best seen in fig. 9, sheet 8; s^1 s^3 are one piece of wire properly bent, as shewn, and brought to spring temper; s^2 s^4 are also one piece, and so on with the others. These springs are joined to the clips P^1 N^1 P^2 N^2 P^3 N^3 by wires, as shewn in fig. 2, sheet 7, so that each alternate spring is positive and negative when the pulsations pass; and the projections in the brass plates EB LB, seen in fig. 2, sheet 7, and in plan in fig. 28, sheet 8, are so arranged that, by pressing down the turning frames, negative and positive currents are sent to line and earth alternately by the alternate turning frames; pieces of vulcanite, *h*, seen in position in figs. 7 and 9, sheet 8, and in side view, bottom view, and back view, respectively, in figs. 16, 17, and 18, on the same sheet, are screwed, where shewn, to the under side of the turning frames, and press the springs into contact with the brasses. In this manipulator is a similar arrangement to that shewn in my other forms, for the purpose of locking the turning frames at the time the currents are passing, by means of an electro-magnet, EM, the ends of the coils of which are attached to the clips MM. This electro-magnet is partially let into the base board; its armature, A^r, is screwed to a turning arm, *j*, which works in a groove, A^7, sunk in the base board. This turning arm works on pointed screws, *k*, the lower one of which goes through the base board, and the upper one through a piece of brass fixed to the side pieces of brass, *l*, shewn in place in fig. 6, sheet 7, and in fig. 7, sheet 8, and in detail on the same sheet, in side view, top view, and end view, respectively, in figs. 19, 20, and 21, on the opposite side to the pressure pieces of vulcanite already described. A bar, *j*, forming part of the turning arm *j*, is so formed that when the armature is attracted it inserts itself between those of the pieces *e* which have been depressed and those which remain in place, in such wise that they cannot be moved until the armature is withdrawn from the electro-magnet, which happens when the current ceases to flow through the coils as the turning arm is drawn back by a helical spring, *hs*, fixed to it, and to a movable nut, which may be drawn back by an adjusting screw, *o*, and causes it to press against a screwed stud, *p*, which limits its range. This electro-magnet also serves to move a pointer, which indicates when the currents are passing, and passed, and to strike two bells alternately. This is done by a rod, *q*, moving a turning lever, *r*, fixed to a piece of brass, *s*, screwed to the base board. The piece of brass *s* is seen respectively in top view and side view in figs. 24 and 25, sheet 8. The long end of the turning lever *r* works through a piece of brass, *t*, screwed to the base board. This piece of brass, *t*, which is shewn in position in fig. 6, sheet 7, and in fig. 7, sheet 8, is also seen in the latter sheet in front view and top view respectively, in figs. 22 and 23, and is for the purpose of carrying a screwed pin, on which the clapper rod of the bell works in a slot in the arm of the turning lever *r*. This arm is continued through the end of the wooden box, and works

the

the pointer in a similar way on the screwed pin; *u x x* are the bells; figs. 1 to fig. 22, sheet 9, are drawings of various instruments constructed according to my invention, which, from the action of the pulsations sent into them along the line, serve to throw a current from the local battery of the proper denomination in a wheel revolving at the same or some proportionate speed as that of the pulsation distributing wheel, which current is then made to flow, in the manner I have already explained, for any required duration of time, through the indicating or recording instruments. In working my chemical decomposition dot telegraph, as well as my pricking dot telegraph, two modes may be adopted, namely, to make the dots which form a letter follow each other lengthwise of the paper, or to make them across the paper. These two plans, of which the first is cheaper and the second the more perfect, necessitate a difference in the arrangement of the relay instruments, and a difference also must exist in them when the pulsations sent are all of one denomination, or when of both denominations.

Figs. 1 to 7, sheet 9, is the first variety of these instruments. Fig. 1 is a top view; fig. 2, a side view; fig. 3, an end view; fig. 4, a transverse section through the centre of the instrument; fig. 5, a transverse section close to the poles of the electro-magnet EM^1 EM^3; fig. 6 and 7 are details; A is the general base board of the instrument; A^1 are minor base boards of the two divisions screwed to the general base boards; $EM^{1\,2\,3}$ and ^{4} are four electro-magnets, sunk to their semi-diameters in the upright pieces of wood A^2, and fixed thereon by the pieces of wood A^3, which are sunk down upon the other semi-diameter. Between the poles of the electro-magnets EM^1 and EM^2, a permanent magnet, PM^1, similar in character to a horse-shoe magnet, but of the exact form shewn in fig. 4, has power to vibrate a minute quantity on pointed screws, *b*, at its lower end; these screws *b* are inserted through pieces of brass, and screwed to the boards A; between the poles of the electro-magnet, EM^3, EM^4, a similar permanent magnet, PM, vibrates in like manner. The coils of the electro-magnet are so wound that when a current from the line passes round them, if EM attracts the permanent magnet PM^1, EM repels it, and, at the same time, EM^4 attracts PM^2, and EM^3 repels it. A current in the opposite direction of course produces opposite movements; but whichever way the current passes, one of the permanent magnets will be moved to the right and the other to the left. To the tops of the permanent magnets are screwed pieces of brass, *d*, the form of which is shewn in the various drawings, which abut at each vibration against the pointed wires e^1 e^4 or e^2 e^3. These pointed wires, which should be tipped with platinum, pass through pieces of brass, *f*, screwed to wood caps, A^3, and when adjusted are fixed by binding screws, *g*. The wires e^1 e^3 are connected with one pole of the local battery, and the wires e^2 e^4 with the other pole, so that when both the permanent magnets are on the same side, they are in connection with the same end of the battery; but when one is on one side and one on the other, they are connected one with one, and the other with the other pole of the battery, and with different poles, according to their position to right and left.

N, I, R, E, L, R^2, W, P, are clips to form the necessary connections for the current between the different instruments, N being the clip connected with the negative pole of the battery, I^r with the instrument, R^1 R^2 with the tooth of the wheel which sends the local current to replace the permanent magnets in connection with the same pole of the battery, E with the earth, L with the line, W with the revolving wheel, P with the positive end of the battery; the permanent magnets are connected by means of fine wires, clipped by the screws h^1 and h^2 with the clips W and I^r respectively. By referring to the description I have given of the course of the currents when explaining the diagrams of the relays, the action of this instrument will be perfectly understood. Fig. 6 is a top view of the iron-work of the electro-magnets, and fig. 7 an end view. In fig. 6 one of the iron cores is shewn with, and one without, the coils, which must be of the very finest wire.

The instrument I have just described is for a single pulsation only, and may be employed when the consecutive dot alphabets are being formed with negative and positive currents; or, with certain changes, it may be made to produce similar alphabets with

currents

currents all of one denomination, but of double the number; thus, instead of permanent magnets, pieces of soft iron, of the same or any other convenient form, must be substituted. In this case, the electro-magnets E M^1 E M^3 only serve to replace the armatures against a similar pole of the battery, and the coils of the electro-magnets E M^2 E M^4 are not connected, but are each separately connected with a spring belonging to a distinct tooth of the revolving wheel. Thus a pulsation sent through one tooth will only act on E M^2, and one through the other tooth only on E M^4, so that by only sending one of these pulsations properly selected, the same effect in the direction of the local currents can be produced by pulsations all of one denomination, as by pulsations alternately positive and negative, and thus the simple three dot alphabet be produced by six pulsations of one denomination. Three of these instruments may be grouped together to form the relays for three pulsations, but I have not thought it necessary to give a drawing of the combination, especially as, in another form of my improved relays, I have shewn the grouped instrument. The next form of my improved relays is shewn on the same sheet, from fig. 8 to fig. 12 inclusive. Fig. 8 is a front view, fig. 9 is a section through the coils and needles, fig. 10 a back view, fig. 11 a side view, and fig. 12 a top view of the instrument. This instrument works on the principle of the galvanometer or needle telegraph. A is the base board, A^1 an upright board to which are attached the pieces A^2, between which the coils are placed; L I^r W E P R^1 R^2 N, are clips which perform similar functions to the clips described in the last instrument; *c c* are the coils, and n^1 n^2 the magnetized needles. The coils are continuous for the line current, and are so arranged that when the needle n^1 tends to move to the right, the needle n^2 tends to move to the left, and *vice versâ*, but the relay current sent through them from the clips R^1 R^2 makes them both move to the right or left. The screws s^1 s^2 s^3 s^4 are of soft iron tipped with platina, and serve to a certain extent to aid gravity to keep the needles in the position in which they were last placed. I say aid gravity, for it will be perceived that the heaviest part of the needle is at the top. The screws s^1 s^3 which pass through ivory bosses so as to insulate them, are connected with one pole of the battery, and the screws s^2 s^4 which are insulated in a similar manner, are connected with the other pole of the battery. The needles n^1 n^2 are connected respectively with the wheel and instrument. It will thus be perceived, that when n and n^1 are both to the right or left, no current will pass through the instrument, but that when they are one to the right and the other to the left, a current will pass in different directions according to the position of the needles. This instrument is also arranged for a single pulsation in either direction, but it may be modified or grouped for more pulsations, as I have explained with regard to the instrument last described.

The next instrument I shall describe is different in principle from either of the others, having neither armatures nor permanent magnets, and yet being equally capable of being worked by currents alternating in direction, or by currents all of the same denomination. This instrument depends entirely on the action of electro-magnets upon one another, formed by the line current acting in conjunction with a current from the local battery, and in some cases, both currents passing along the line and round the electro-magnets which attract and repel each other. Fig. 13 to 20 on the same sheet represent this instrument arranged for one pulsation, and figures 21 to 24, the same instrument arranged for three pulsations. The peculiar form which I have given to the electro-magnets may of course be infinitely varied. The common horse-shoe or any other form may be employed, and the same principle be maintained, but I prefer the forms I have shewn, on account of the economy and compactness they admit of in the instruments. Fig. 13 is a top view of an instrument constructed in this manner; fig. 14 is a view with the top piece of wood removed; fig. 15 is an end view; fig. 16, a transverse section through the centre; figs. 17 to 20, details of the simple instrument; A is the base board, A^1 the side pieces which support A^2, into which the upper row of electro-magnets is partially embedded; A^3 is the top piece of wood let down on these electro-magnets to hold them in place, and screwed to A^2 by the wood screws *b*; light clips, L E R^1 R^2 N P I^r W, which perform the same functions as I have already described with regard to the other instruments, are screwed to the base board; M M^1 M^2 are electro-magnets,

screwed

screwed between A^2 and A^3. The iron core of the electro-magnets, which must be wound with the finest wire for the coils, is shewn in front view and top view in figs. 19 and 20 respectively; M^3 and M^4 are also electro-magnets, the iron-work of which is shewn in front view and side view in figs. 17 and 18 respectively. Instead of having square heads like the electro-magnets M M^1 M^2 it will be perceived that the heads are elongated on one side, and these electro-magnets instead of being fixed, are movable, and vibrate in pointed screws, *c*, which are inserted in pieces of brass, *d*, screwed to the base board. The elongated parts of the heads of M^3 M^4 are placed at a little distance between the square heads of the electro-magnets M and M^1 and M^1 and M^2, as best seen in fig. 15, so that if M^3 is attracted by M^1 and repelled by M, it moves to the right, and if *vice-versâ*, to the left; the same operation takes place in the case of M^4; M^3 and M^4 work in the free space between the sides A^1 and the boards A and A^2. The movable electro-magnets are connected by very fine wires with the clips W and I^r respectively. Flat-headed screws, *s*, are inserted in the clips, and other screws, s^1, in the elongated heads of the movable electro-magnets, to clip the ends of these fine wires and maintain the contacts. In the same way, flat-headed screws, s^2, are screwed into one of the square heads of the magnets M M^1 M^2 which clip these wires, one of which connects M and M^2 with the clip P, and the other connects M with the clip N; consequently, if the movable magnets M^3 M^4 are attracted both to the right or both to the left, they come in contact with both ends of the battery, and consequently, a current passes through the instrument, varying in direction according to their position to the right or left. When M^3 is against M, and M^4 against M^1, they will both be connected with one pole of the battery, and therefore no current will pass. The same thing happens if they are both against M^1.

The magnets M M^1 M^2 never alter their polarity when in action, M and M^2 being always of one denomination, and M^1 of the opposite; whereas the poles of M^3 and M^4 which are in the same direction are always of an opposite kind, and vary according to the direction of the line current, so that when the line current is in action (the local currents being always made to pass round M M^1 and M^2 at the same time, and the same time only, by means of teeth of the proper dimensions accurately set on the revolving wheels), the electro-magnets M^3 and M^4 are always both attracted to the right or left, but the replacing current is only made to flow round M and M^2, and consequently then M^3 and M^4 will be attracted to the right and left respectively, in which position no current can pass. The electro-magnets M M^1 M^2 may be exclusively worked by the local current, and the electro-magnets M^3 M^4 exclusively by the line currents, or the battery which sends the line current and the local battery can be combined, in which case, whenever two opposite currents meet, they will divide the line current through M^3 M^4, and the local current passing through M M^1 M^2; but when the two currents combine, they will both pass along the line and round all the electro-magnets, causing them to attract and repel each other properly.

Fig. 21 is a top view, fig. 22 a view with the top removed, fig. 23 a side view, and fig 24 a cross section of this instrument arranged for three pulsations. The same letters and figures apply to similar parts as in the simple instrument, so that it is unnecessary for me to give a detailed description of it. The chief difference is that the clips are less numerous in proportion, as the same clip answers for the earth and negative end of the local battery for all the pulsations.

The last of my relay instruments is shewn in side view at fig. 25, and in top view at fig. 26. It is for the purpose of working instruments which mark across the paper, or a type printing telegraph when required to be set in action by pulsations all of one denomination. I have shewn the instrument arranged for five pulsations, but it is obvious that it may be constructed for any number. I have also taken this opportunity of shewing how the currents may be broken mechanically:—A is the base board, A^1 an upright board, in which are sunk to the centre the coils of the electro-magnets, a piece of wood, A^3, being let down on their upper half and screwed to A^1. The electro-magnets may be of any required form, but those that I have shewn in this case appear to me the most convenient. The armature A^r is permanently connected with the electro-magnet by a joint at *b*, on which it turns. In the drawings the armatures are shewn thrown

back against adjusting screws, *c*, which pass through the upright piece A^2. When a current is passed round the coils of either of these electro-magnets, the armature A^r is attracted, and thereby brought in contact with one of the platina-tipped screws d^1 to d^5. These screws pass through a strip of brass and screwed to the wood A^3; this strip of brass is connected by means of the clip *p* with the positive pole of the battery. The armatures are connected by their wires as well as the clips $I^{r\,1\,2\,3\,4\,5}$ with the coils of the instruments, the other ends of which are connected with the negative end of the battery. Therefore, whenever an armature is attracted, a current is made to flow round that coil in the instrument with which it is connected. Of course the five teeth of the revolving apparatus must communicate with a distinct spring, which in its turn is connected with one of the five clips $L^{1\,2\,3\,4\,or\,5}$, which in their turn are connected with one end of the coils of the electro-magnets, the other ends of which are connected with the clip E and the earth. Thus, any pulsation sent through a particular tooth will cause the electro-magnet with which it is connected to attract its armature, and cause a local current to pass round that part of the receiving instrument for which it is intended. Both residuary magnetism and gravity will keep the armature where it has been placed until replaced against the studs *c*, and which may be done by an electro-magnet arranged for that purpose, or mechanically from a revolving wheel. Of course the relative positions of the relay and wheel will constantly alter the particular arrangements required, but I have here supposed the wheel behind the central electro-magnet. On this wheel W is a tooth, W^1, so placed as to come in action once during every revolution after all the currents have ceased to act; this tooth comes in contact and presses away from it a rod, *v*, to the end of which is affixed a cross bar, *c b*, kept horizontal by wire pins, *p*, working in holes in the upright A^1. The cross bar *c b* extends in front of all the armatures, and therefore it is pressed back with the rod, and throws all the armatures on their respective studs ready to be acted upon by a fresh current. Immediately the tooth *w* has passed, a helical spring on the rod *v*, shewn at *h s*, and which is between the back of the electro-magnet $E M^3$ and a flange on the rod *v*, throws back the bar from the armature out of the way of their action.

I will now describe my improved telegraph instruments. Either the single or double needle telegraph now generally in use, can be worked with precisely similar movements, by my improved manipulators, to those now used, by arranging the teeth at proper intervals on the periphery of the pulsation-distributing wheels, and even without relays, with a considerable number of telegraphs; and as the distances apart of the pulsations will be perfectly uniform, and a proper interval always allowed to distinguish the termination of a letter, it will be far easier for the experienced eye to distinguish the number and direction of the different beats, than can be the case when all depends on the dexterity of the sender and the quickness and perception of the receiver; and therefore the present instruments can be used, aided by my pulsation distributors and improved manipulators, with considerably more certainty and quickness than is now the case. Both the single and double needle telegraph will require the power of using four pulsations of either denomination per letter, but only one wire is required. But in order still more effectively to make use of the present needles, I have invented a combination of three needles, by which, especially with the aid of relays, a letter is at once indicated without any repetition of beats, and by which all the 26 combinations necessary to produce the letters of the alphabet, are formed with the use of three negative or positive pulsations. The 26 combinations required to form the alphabet are shewn in fig. 9, sheet 2, alphabet No. 11, and one touch of the finger on the key of the letter to be sent, in either of my improved manipulators, will display the corresponding combination of the needles as shewn in this figure. As I prefer working this telegraph by relays, all the needles may be moved simultaneously, and the letter kept in form for any time found most convenient in practice, and thus the receiver relieved from the painful labour of counting beats. Fig. 10, sheet 4, is a front view of the instrument arranged with 3 needles; fig. 11 is a back view, fig. 12 is a side view, fig. 13 is a top view. A reference to these figures and the combinations formed in fig. 9, sheet 1, is sufficient, as there is nothing new or different

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from what is in general use in the details of the arrangement. I shall now describe the drawings of an improved recording telegraphic instrument, in which the marks are made by prickers passing through the paper from either side. Fig. 1 to fig. 6, sheet 10, and fig. 1 to fig. 10, sheet 11, are drawings of two varieties of my improved pricking telegraph. These instruments may be arranged to work by pulsations all of one denomination, or by both positive and negative currents, and they may form the pricks either consecutively and lengthwise of the paper, or together and across the paper.

The alphabets for both varieties are shewn in sheet 2, fig. 9, Nos. 1 and 3. The pricks are represented by black marks of different shapes, as the prickers pierce the paper from different sides, according to the denomination of the current sent; if in both cases I used ordinary needles, the different position of the burr would form sufficient distinction to indicate what current was sent; but to make it still plainer, I prefer making one needle circular in section, and the other larger and of a lozenge form, as indicated by the drawings of the alphabets. As, of course, it is an immense advantage that the alphabets should be extremely simple, and that each letter should be easily and unmistakably recognized, I have added in both varieties an additional help; in the case of the consecutive alphabet No. 1, by dividing the paper into spaces by the action of the instrument itself, in such a manner that a letter is contained in each space. The mode of making these marks or corrugations, which are indicated by cross lines in the drawing of the alphabet, I shall point out when describing the instrument. In the case of the alphabet No. 3, pricked across the paper, I draw three continuous lines where shewn upon the paper strip, before introducing it into the instrument. Fig. 1, sheet 10, is a longitudinal section through the instrument; fig. 2 is a view of the left hand end; fig. 3 is a section through the centre of the rollers; fig. 4 is a side view; fig. 5 is a transverse section through the centre of the machine; fig. 6 is a view of the right hand end of the instrument. Fig. 1, sheet 11, is a top view; fig. 2 is a view of the base board, with the electro-magnet which drives the rollers; A is the base board; A^1, the sides and ends; A^2, the top board; P R^1 W R^2 M M^1 are clips which connect the wires of the electro-magnets with the revolving apparatus; and the relays b b^1 b^2 are brass uprights, screwed to the top board A^2, and held together by the cross top piece b^3.

To these brass uprights the principal working parts of the instruments are fixed. The electro-magnet EM is screwed at the cross end to the upright b^1, and the electro-magnet EM^1 to the upright b^2; and at the ends of their poles they are supported by pieces of brass, *cc*, secured by the screws *d* to the under side of the top brass piece b^3. Between the poles of these horizontal electro-magnets is a vertical electro-magnet, EM^2, which according to the direction of the currents sent through the coils, is alternately attracted by EM or EM^1. This electro-magnet vibrates on pointed screws, *e*, which pass through pieces of brass, e^1, screwed to the top board, and is formed with square heads at the poles; to these heads is screwed a cross-piece of brass *f*. In the centre of the top of this piece of brass is screwed a thin steel wire, brought to spring temper, which serves to bring the electro-magnet EM^2 to the centre between EM and EM^1, when the electric current is not acting, by passing through a hole in b^3, and then into a slot in the screwed nut *g*, fixed in the sliding frame g^1, which is screwed to the piece b^3. This nut and frame serve to adjust the strength of the spring, which is weakened by raising, and strengthened by lowering the nut. The piece *f* also serves to carry beneath it a rod, *h*. This rod *h*, through the turning lever *i*, best seen in fig. 1, sheet 10, gives motion to the pricker frame *j*, and causes the prickers to puncture the paper from either side, according to whether the electro-magnet EM^2 is attracted by EM or EM^1. The pricker frame is seen in front view at *j*, fig. 1, sheet 10, and in cross section at fig. 3, sheet 10. The main upright *j* is attached at the top by a screwed pin to the turning lever *i*, and at the bottom has a piece of steel wire inserted into it, which slides in a hole in the piece of brass, k^1, screwed to the frame b^1, and which serves to guide it and maintain its perpendicularity. The prickers perforate the paper through a hole in the paper-holder *l*, which is screwed to the frame b^1, and is seen in section in fig. 1, sheet 10, and in cross section in fig. 3, sheet 10. This paper-holder is made of two thin pieces of brass, which will only just

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admit the paper between them until the point where the puncture takes place; but as it is important that the burr should not be laid at the centre of the paper-holder after puncture, a sinking is filed away in each piece of brass to allow the burr to pass freely, but at the sides of the puncture the paper is still left but just free to move easily so as to be held firmly when pricked. The paper to be pricked is formed into a long ribbon of the required breadth, and is wound on the boxwood roller n, from which it passes over the boxwood roller s, through the paper-holder l, when it is operated upon, and thence between the brass driving rollers p and q. These driving rollers have also a groove sunk in their centres, to allow the burr of the paper room to pass, while the bite of the rollers, which pulls the paper forward, occurs only at the edges. The driving rollers are made to run at the same speed by means of toothed wheels r, r^1, fixed on their shafts. On the shaft of the roller p is also fixed a ratchet wheel, s, which drives the rollers. This ratchet wheel is turned at proper intervals by the electro-magnet EM^3, which is fixed to the base board A. This electro-magnet acts as follows:—Pieces of brass, t, are screwed to the upright b^1, and through them pass pointed screws t^1, between which vibrates the rocking frame u. To this rocking frame is attached the left iron armature A^2, by means of screws, and it is attracted by the electro-magnet EM^3 whenever the current passes through its coils; but on the cessation of the current, the rocking frame with the armature is driven back against the screw top v by a helical spring, v^1, fixed on the smooth part of a screwed pin, v^2, which passes through a piece of brass, v^3, screwed to the top board. At the back of the rocking frame u is an arm, u^1, which is fixed by means of a screwed pin, u^2, to a piece of brass, W, best seen in fig. 2, sheet 10, and which it causes to rise and fall at each repulsion and attraction of the armature. The perpendicularity of this piece W is maintained by a piece of wire, x, screwed into its upper end, which slides freely in a hole in the piece of brass x^1, in which is one of the bearings of the upper roller q. To the piece W is screwed a spring, y, bent at its upper end to catch into the teeth of the ratchet wheel, which it causes to turn one tooth each time that the armature is attracted, and consequently to move the paper a distance equal to one tooth. The currents which pass round the coils of the electro-magnet EM^3 are so arranged that after each of the two first or first positive movements (for the pulsations may be suppressed to form the letter) of the prickers, the paper is advanced the space of one tooth, and after the third movement, or positive movement, of the prickers, the paper is advanced by two teeth, in which extra space the division between the letters is made; but to shew still more plainly the termination of the letter than by mere distance, the rollers p and q make a mark or corrugation across the paper, which is indicated in the alphabet, sheet 2, fig. 9, No. 1; across the upper roller q are inserted eleven knife edges, and in the roller p are formed eleven narrow sinkings in which the knife edges fall during the revolution of the two rollers, and the effect is to produce a line or corrugation across the paper each time that this takes place. Four movements of the rocking frame advance the paper exactly the distance of one letter, so that the marks are always made to recur between letter and letter, and thus properly to divide them. The space between the centre of the rollers p q, and the centre of the prickers, must be in this machine exactly equal to twelve teeth of the ratchet wheel. In order to prevent the paper roller u from turning by the elasticity of the paper, a friction spring z is made to press on its periphery with any required force. The spring is fixed to the brass upright z^1, and is regulated in its pressure by the screw z^2. In fig. 2, sheet 10, is also shewn, at rs, in dotted lines, the position of a piece of brass which is screwed to the inside of the frame b, and which carries a spring that falls into the teeth of the ratchet wheel and prevents it from turning backward. The ratchet wheel is to have forty-four teeth; the upper roller q is kept upon the lower roller p, with an elastic pressure caused by springs, x^3, over each shaft, bent into a wedge shape and driven through holes in the bearing, and according to the firmness with which the wedge-shaped spring is driven will be the pressure. The spring is seen in fig. 2, sheet 10. The clips MM^1 unite the two ends of the coils of the electro-magnet EM^3 at the proper times, through the revolving wheel, with the poles of the local battery. The clip P is constantly connected with the positive end of the battery and one end of the coils of the electro-magnet EM and EM^1; the other end of these coils is

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united by the clip R^1 to the relay whence the positive current is sent to the revolving wheel and thence to the clip W, and through the coils of the electro-magnet EM^2 to the clip R^2, the relay and the negative end of the battery, or to R^2, the other way through the coils of EM^2 to the clip W; the wheel, the relay, and the negative end of the battery thus causing a right or left movement in EM^2; of course the opposite poles of EM EM^1 are always of an opposite character.

The variety of the pricking telegraph which I shall now describe is intended to make the pricks which form the letter simultaneously across the paper, instead of consecutively lengthwise of the paper, as in the variety I have just explained.

Fig. 3, sheet 11, is a top view of the instrument; fig. 4 is a plan view through the paper and driving rollers; fig. 5, a plan view just above the fixed electro-magnets; fig. 6, a front view of the machine; fig. 7, a longitudinal section close to the back; fig. 8, a transverse section through the centre movable electro-magnet which causes the pricks; fig. 9, an end view in the upper story, and a transverse section through the last square-headed electro-magnet; in the lower figs., 10 to 20 are details to be hereafter described. A is the base board, A^1 the ends, A^2 the middle board, A^3 the top board, A^4 a plate of brass which covers all.

To the base board are screwed 12 clips, marked respectively, the ten at the back side, P, RW, RR, R^2, W^2, RR^2, R^3, W^3, RR^3, and the two on the front side, M, M^1 (see fig. 5); pieces of brass, a, through which pass pointed screws, a^1, on which the movable electro-magnets swing, are also screwed to the base board; the lower end pieces A^1 are fixed to the base board A, and support the middle board A^2, on which the fixed electro-magnets lay. The upper end pieces A^1 are fixed to A^2. The top board A^3 is then put in place, and the whole of these portions of wood-work is secured in proper position by four long bolts, b, the square heads of which are seen let into the top board in fig. 3, and their form is indicated in dotted lines in fig. 7; the board A^3 is hollowed out on the under side, to allow room for the junction of the wires of the coils of the fixed electro-magnets. The upper plate of brass A^4 is supported from the upper board by six upright pieces, c^1 to ^{6}, c^1 and c^2 being in front, and c^3 to c^6, which serve also another purpose, to be hereafter mentioned, being at the back. The way in which they are screwed together is seen in the drawing; EM^1 to EM^{11} are electro-magnets, of which, four, EM^2, EM^5, EM^8, and EM^{11}, are movable, vibrating on the pointed screws a^1 already described; the others are fixed. The three first-named of these movable electro-magnets give motion to the pricker frames, and cause the prickers to perforate the paper from the right or left. The fourth, EM^{11}, drives the ratchet-wheel fixed to the shaft of one of the rollers which impel the paper. I will first describe the motion of these electro-magnets which occupy the wooden portion of the machine, and afterwards shew what useful purpose these motions have. The electro-magnets EM^1, EM^2, EM^3, form a distinct group, the current passed round the coils being from a local battery set in action at the relay by the first line pulsation; EM^4, EM^5, EM^6, form a second group, governed in a similar way by the second line pulsation; and EM^7, EM^8, EM^9, a third group, governed by the third pulsation. The electro-magnet EM^{11} is caused to be attracted by EM^{10}, at proper intervals, by pulsations from the local battery, sent from the revolving wheel, in order to advance the paper properly after the pricking of each letter and the end of each word. I will describe the action of the first group, the two next being precisely similar. The clip P is connected with the positive pole of the local battery, and with one end of the coils of the fixed magnets of the three groups; the coils of EM^1 and ^{3} are continuous, and are so wound that, when a current is passed through them, similar ends have dissimilar poles. Therefore, if alternate positive and negative currents are made to pass at the same time through EM^2, it will move alternately to the right or left. The other end of the coil which passes round EM^1 and EM^3 is fixed to the clip R, which is connected with that part of the relay, several varieties of which I have shewn in another sheet, which connects the positive end of the battery with the moving parts for the first pulsation of that relay, according to the direction which has been given by the line current to this moving part of the relay; the positive current which has been sent from the clip P, round the coils of EM^1 EM^3,

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will be sent back to the instrument, and round the coil of the electro-magnet EM^2, either from left to right or right to left, while a corresponding negative current in the opposite direction comes from the relay through the revolving wheel; and the duration of the current will depend upon the length of the tooth on the revolving wheel, whilst its direction round EM^1 EM^3 is always the same, but round EM^2 depends upon the manner in which the movable parts of the relay had been placed by the line current. The action of the other two groups, EM^4 EM^5 and EM^6 and EM^7 EM^8 EM^9, which are connected each with their own portion of the compound relay, is precisely similar; the three movable magnets are each connected with a pricker holder, and according to whether they are attracted to the right or left, cause each a perforation to be made in the paper from right to left. The prickers which prick from the right are of one form, and those which prick from the left of another; and in consulting the alphabet, No. 5, fig. 9, sheet 2, it will be seen that the letters are formed by a combination of three pricks in alternate directions across the paper. The electro-magnet EM^2 causes the top prick to the right or left; the electro-magnet EM^5, the middle; and the electro-magnet EM^8, the bottom ones. Before explaining how the electro-magnets are connected with the pricker frames, I will shew how the paper is brought between the prickers, and held there while being operated upon, and when the letter has been formed, advanced the necessary space between letter and letter. The whole of the works connected with this part of the machine are included between the top board A^3 and the brass top A^4; *d* is the roller of boxwood on which the paper strip is coiled, and, like all the other rollers connected with the paper, moves on pointed screws, which go through A^3 and A^4. The paper is first drawn from the roller *d*, over a small boxwood roller *e*, having a flange at its lower side to support the edge of the paper; it then passes through the paper-holder *f*, seen separately in side view in fig. 19, and in front view in fig. 20. In the side view will be seen a rectangular opening formed in the sides of the paper-holder, through which the prickers pass while the paper is elsewhere firmly held. The slit through which the paper is drawn only just allows it to pass freely, but not loosely, until the punctures are made, when the brass on both sides, a little wider than the width from the lower to the upper prick, is cut away to allow the burr to pass freely. After being punctured, the paper passes over another boxwood roller *g*, having also a flange at its lower edge. One face of the roller *g*, and one of the roller *e*, and the route through the paper-holder, are in a straight line. From the roller *g* the paper bends round, and is caught between the driving rollers *h* and *i*, which are of metal. The roller *h* has also a flange to guide the edge of the paper. The rollers *g h i* have all of them a sinking the width of the extreme parts of the pricks sunk in them, to prevent the burr being smashed, and they bite only on the edges of the paper. The roller *g* also turns on pointed screws passing through brass brackets, g^1, attached to A^3 and A^4. A spring, *j*, is attached to a piece of brass, j^1, fixed to A^3; this spring presses on the flange of the paper roller with a degree of force regulated by a screw, and prevents the roller being turned by the elasticity of the paper. On the shafts of the driving rollers *h i* are toothed wheels, *kk*, of the same dimensions, which cause the rollers to move synchronously. On the shaft of the roller *i* is also a ratchet-wheel, *e*, the turning of which causes the driving wheel rollers to revolve, and advances the paper. The motive power in this case is a mutual attraction between EM^{10} and EM^{11} which takes place, and causes EM^{11} to move whenever a current passes round their coils. This is made to take place once, twice, or thrice, after the letter has been formed, according to the distance that is desired between the letters; each attraction carries the wheel *e* round one tooth. To the inside of the arm of EM^{11} is screwed an upright piece of brass, rather higher than the top of the ratchet-wheel. To the top of this arm is attached, by a screwed pin, a piece of steel, spring temper, bent so as to fall between the teeth of the ratchet wheel, and rendered perfectly horizontal in its movement by being made like a round wire at its back, and as seen at *m*, and passing through a piece of brass, m^1, screwed to A^3. Thus, every time an attraction takes place between EM^{11} and EM^{10}, which is as often as required by pulsations arranged to be sent at the proper intervals from the pulsation wheel, the ratchet is moved on one tooth; to prevent it turning backward, a spring, m^2, fixed to a piece of brass, m^3, is also so formed as to fall between

between the teeth of the ratchet-wheel, and prevent it from turning backwards. When EM^{11} has been attracted by EM^{10}, and the current has ceased, EM^{11} is brought back to its normal position by a spring. This spring *n* is a steel wire properly tempered, screwed into the further arm of EM^{11}; it rises nearly to A^4, passing through a slot in the screwed nut *o*, which slides, and can be fixed at any point in *c*, and its strength be thereby regulated. A similar spring is screwed in EM^2 EM^5 and EM^8, and keeps them perfectly central between their pair of fixed magnets when not attracted to either side; and when that attraction has ceased, again bringing them to the centre. We have now only to see how the motions of EM^2 EM^5 and EM^8 govern the motion of the pricker frames, to fully understand the action of the machine. To the inner side of the front arm of EM^2 is screwed a brass upright, shewn at fig. 6 in dotted lines, and in detail at figs. 10, 11, and 12, in top view, side view, and front view, respectively. The horizontal bar *g* of this frame is joined to the vertical piece by a screwed pin, and is caused to move horizontally by a steel pin, g^1, fixed to its further side, and sliding loosely in a hole in a piece of brass, g^1, screwed to A^3. It will be perceived that, when in their normal situation, the paper passes exactly between the two pricker holders, so that when the prickers are in place, and their points near the paper, an attraction to the right or left causes them to puncture the paper from one side or the other. The middle electro-magnet EM^5 works the middle pricker frames in a similar manner. These pricker frames are seen at figs. 16, 17, and 18, in top view, front view, and side view, respectively. The electro-magnet EM^8 works the lower frames in a similar manner, and they are seen in figs. 13, 14, and 15, in top view, side view, and front view, respectively. It is obvious, by what I have already explained, that these prickers can be worked either all together, two together, or any one alone, in either direction, according to the pulsations sent, so as to prick a letter at one operation. The consecutive pricking instruments might have been arranged with electro-magnets of a similar form and character to those of the variety I have just described; and in general I prefer doing so, but I thought it better to shew how the common horseshoe form could be applied as well, because after reading this last description, and with the aid of the drawings, any one would be able to arrange it to work with those forms.

I will now describe the drawings of my Chemical Decomposition Type Printing Telegraph.

Fig. 1, sheet 12, is a longitudinal section through the centre of the instrument; fig. 2 is a top view; fig. 3 is an end view from the right-hand; fig. 4 is a front elevation; fig. 5 is a top view of the base board, with the lower series of electro-magnets; fig. 6, a transverse section through the centre of the instrument; and fig. 7 is an end view from the left hand. All the other figures in this sheet, and in sheet 13, appertaining to this instrument, are details which will be described hereafter; A is the base board of the instrument; A^1, the sides; and A^2, the top board, which is screwed to the sides with wood screws, so that it may be removed at pleasure. This top board has a rectangular opening across the centre part, as shewn in fig. 2. Below this top board are the electro-magnets which work the instrument, and fixed to it is the chemical decomposition printing machinery. Into the base board are inserted 16 clips, *aa*, which establish the connections of the currents. The action of the instrument is as follows:—Instead of a type-wheel, which is usually employed in printing telegraphs, I use a type-block, *d*, shewn in top view at fig. 14, sheet 13, with the letters arranged in the required order; and by means of not more than three pulsations of the current sent by any of my patent manipulators, by touching one of the studs of that manipulator, the relay will set the local battery in action, and the letter required to be printed will be brought under the striker *e*, which, acting upon it, will impress the character by chemical decomposition, if arranged for that mode, or by manifold copying-paper. The type-block is fixed to the top of a rod d^1, which is fixed to the centre of the core of the electro-magnet EM^1 by a binding screw, d^2. This electro-magnet EM^1 vibrates on pointed screws, *f* (in the pieces of brass *h* and h^1, which form part of the lower rocking-frame *j*), between the electro-magnets EM^2 and EM^3. Before starting the instrument, the striker *e* is exactly over the centre of the blank space in the types, where an ivory block in the shape of the type is placed; but

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when EM^1 is attracted by EM^2, the letter E, the third letter to the left of the blank, would be printed, if no other pulsations were sent to form the letter. In like manner, if EM^1 were attracted by EM^3, the letter B, the third letter to the right of the blank, would be brought under the striker; EM^4 is another electro-magnet, screwed to the under side of the rocking-frame *g*, above and to which the electro-magnets EM^2 and EM^3 are also screwed. This rocking frame *g* is shewn separately in different views, in figs. 20 to 24: fig. 20 being a transverse section, fig. 21 an end view, fig. 22 a bottom view, fig. 23 a top view, fig. 24 a side view. This rocking-frame vibrates on the pointed screws *i*, also in the pieces of brass *h* and h^1, which form part of the lower rocking-frame *j*. The electro-magnet EM^4 is placed between electro-magnets, EM^5 and EM^6, screwed to the top surface of the rocking-frame *j*, and it is attracted to the right or left by either of them; it moves the rocking-frame *g*, and through it, in a manner I shall hereafter describe, the type-block. If, therefore, no current is passed through EM^1 EM^2 EM^3, but only through EM^4 EM^5 EM^6, if attracted to the right hand, the letter A will be brought under the striker and printed, if attracted to the left, the letter D will be printed. By a combination of currents round all the six electro-magnets, all the other letters on the middle row of the type-block can be brought under the striker. Thus, by making both attractions move the tpye-block to the right, the letter O will be placed there, and by making both attractions move it to the left, M will be printed. In like manner, by making the electro-magnet EM^1 move B or E under the striker, and then, before the stroke, making the electro-magnet EM^4 move it backwards one division, the letters G and J respectively will come under the striker, and thus any letter in the middle row may be printed. In order to print any letter in the other two rows, the block must be moved a space equal to one type to the right or left, in a direction at right angles to that caused by the electro-magnets already described. This is effected by the vibration to one side or the other of the rocking-frame *j*, which is shewn in different views in figs. 15 and 16, sheet 12, and figs. 4, 12, and 13, sheet 13. This rocking-frame vibrates on pointed screws, *k*, which are screwed through the brass standards k^1 and k^2, which in their turn are screwed to the base board. It will thus be perceived that the whole of the electro-magnets I have already described, as well as the type-block, are supported and move on these screws *k*, and that when the rocking-frame is caused to move to either side, the type-block *d* is also moved; an electro-magnet, EM^1, is screwed to the under side of the rocking-frame, and is placed between two other electro-magnets, EM^8 and EM^9, which move the whole mass to either side, but only through a distance, at the surface of the type-block, equal to that from centre to centre of the types. If these electro-magnets, EM^7 EM^8 and EM^9, are alone brought into action, the letters C or F will be brought under the striker, but by combining the currents of the other electro-magnets already described, all the other letters of the two outer rows can, when desired, be brought under the striker, and thus any of the twenty-six letters be printed by different combinations of the currents sent. The electro-magnets EM^8 and EM^9 are screwed together by two strips of brass, one of which is shewn in figs. 25, 26, and 27, sheet 12—fig. 25 being a top view, fig. 26 a longitudinal section, and fig. 27 a bottom view; they are then screwed to the base board by two wood screws passing through their centres. The striker is worked by the electro-magnet EM^{10}, which is also used to cause the paper to move forward the space of a letter after each printing or each stroke of the striker on the blank. This electro-magnet is partially let into the base board, as is best seen in fig. 6, sheet 12; and it is screwed to the side by a screw shewn at *b* in fig. 3. The armature of this electro-magnet A^r is fixed to a turning lever, *n*, which is shewn in detail, with the armature A^r attached, in figs. 12 and 13, sheet 12, and in fig. 5 sheet 13. This turning lever moves on pointed screws, *o*, which pass through pieces of brass, o^1, screwed to the wooden side A^1. This turning lever *n* is furnished with two arms, n^1 n^2, the former of which carries a perpendicular rod, r^3, to which is screwed a spring which pulls round the ratchet-wheel on the roller shaft which moves the paper; and the other, n^2, which, by means of rods and joints—which I shall describe with reference to the detailed drawings—pulls down the striker. It is the attraction of the armature, however, which pulls down the striker; and when the letter is printed, and the current ceases to flow round

round the electro-magnet EM[10], the paper is advanced by means of the recal spring of the armature. Having now described generally the functions of the electro-magnets, I will explain the machinery for printing. The whole of this is fixed on the top board A^2, and can be removed with it, leaving the electro-magnets in place. GP is a gutta percha trough, for containing the chemical which is to be decomposed, fixed by screws through four lugs to the top board. Into this trough is fitted easily a frame-work of hard wood, p^1, and which is screwed to the gutta percha by one screw that enables the frame-work to be removed easily when requisite, and in this frame-work the paper roller p^2 and the compressing rollers p^3 and p^4 work. The former being constantly immersed in the liquid, is made altogether of boxwood, and works in pieces of glass tube, and is fixed in place by a wooden wedge, as shewn in dotted lines in fig. 1. The rollers p^3 and p^4, the latter of which has flanges to guide the paper, turn upon pointed screws which pass through the sides of the wooden frame. They must be so arranged that when screwed up tight, the surfaces of the rollers are just in contact; so that, by easing the screws, the paper may be passed through the rollers, and the superfluous moisture be pressed out. The paper, after passing these rollers, goes between the striker *e* and the type-block *d*, but without touching them, and then over the boxwood roller p^5, which is also flanged and works on pointed screws, and then between the rollers p^6 and p^7. The latter, which is also flanged, is the roller which is driven by the recal spring of the armature of the electro-magnet EM[10], and the other is a pressure roller. Between them the paper is passed with sufficient bite to be drawn along as they revolve. The roller p^7 on the shaft of the wheel p^8, which gears into p^9 on the shaft of p^6, causing the two rollers to revolve at the same speed, and the ratchet-wheel p^{10}, are shewn in section at fig. 1, sheet 13. The bearing of this shaft must be passed into holes in the brass side frames *r*, before the top piece, r^1, which tie them together, is screwed on, and before they are screwed to the top board by the lugs r^2, seen best in fig. 2; and it will be perceived that a piece of it, r^3, projects as far as the rod of the striker, which slides up and down in a hole pierced through it, whereby its steadiness and perpendicularity is preserved. The ratchet-wheel p^{10} is fastened on when all is in place. A small piece of brass, r^4, best seen in fig. 4, and which carries a spring to prevent the return of the roller p^7, is screwed to the side of the frame *r*. The roller p^6, a section of which, with its shaft and the wheel p^9, is seen at fig. 2, sheet 13, revolves in the rocking-frame r^5, which is there also seen in section, moving upon pointed screws in pieces of brass, r^6, screwed to the top board.

This rocking-frame is seen in side view in fig. 4, sheet 13, and in top view in fig. 2; it is pressed upon by means of a screw acting through a fine helical spring, and fixed in a piece of brass, r^7, screwed to the top board, and seen in figs. 1, 2, and 4. The roller p^5, and its section, is shewn at fig. 3, sheet 13. I shall now more particularly describe the turning lever *n*, and the parts connected with it. In the longitudinal section, fig. 1, it will be perceived, that when the armature is at the distance of about one-sixth of an inch from the poles of the electro-magnet EM[10], that the arms n^1 n^2 are horizontal, and that the effect of the armature being attracted would be to throw the further ends of the arms upwards about one-tenth of an inch; this is nearly the space between the teeth of the ratchet-wheel, which must have twenty-four teeth. The rod n^3, which is joined to n^4 by a screwed pin shewn in section at fig. 8, sheet 13, and which slides up and down in a slot in the lug of the side frame *r*, to maintain its perpendicularity, has the hooked spring n^4 attached to it, which by its up-and-down motion causes the ratchet-wheel p^{10} to revolve, the upward motion causing it to slip from tooth to tooth, the spring n^5 preventing the wheel from turning backwards, and by its downward motion the wheel being made to revolve the space of one tooth on the surface of the roller, about double which is the space required between the centres of two letters. The form of the rod n^3 is best seen in fig. 12, sheet 12, and in fig. 5, sheet 13. Referring particularly to these figures, and to fig. 13, sheet 12, it will be perceived that another perpendicular rod, n^6, is attached in the same manner to n^2, and goes through the top board, above which it is attached in the same manner to a cross piece, n^7, which turns upon a similar screwed pin fixed to the side frame *r*, not quite in its centre, as best seen in fig. 5, sheet 13. Its further end will

 therefore

therefore be depressed when the armature is attracted, and will carry down with it the striker e which is attached to the rod n^8, best seen in fig. 5, sheet 13. This is the manner in which the striker is brought down on the type-block: it remains to be shewn how the chemical decomposition is effected. The chemical decomposition striker is seen in the different views of the machine, but particularly in figs. 5, 6, 9, 10, 11, sheet 13. The striker e, of which a top view is shewn at fig. 11, and a side view at fig. 10, sheet 13, is made of platinum; the square part is exactly the size of a type, so that when brought down it may touch every part of the letter, but not extend beyond it. It is supported by a spring, e^1, which is shewn in top view, fig. 9, sheet 13, and which slides in a throat in it, so as to prevent it turning round and thus getting out of square with the type. The spring e^1 is screwed to the under part of the ivory e^2, which combined with the brass e^4 which forms part of the rod n^8, constitutes the compound striker holder. It will be seen particularly at fig. 6, sheet 13, how the ivory is screwed to the under part of the brass e^4 The striker e goes through a hole in the ivory loosely, in which it slides and rises when pressed upon the type. On the top of the ivory is screwed another spring, e^5, which passes over the end of the striker, at a little distance from it, and rests on a platinum pin, e^6, fixed in the brass e^4. By referring to fig. 6, sheet 12, the action of the instrument can be understood. The wire from P, shewn in dotted lines, is connected with one end of the battery, and the other end is soldered to the spring e^5, which by means of its connection with the platinum pin e^6 and the brass r^3, at the end of which is a flat-headed screw, to connect a wire which is a continuation of one end of the coils of the electro-magnet EM^{10}, the other end of which is united to the other end of the battery. When these connections are made, the electro-magnet EM^{10} will attract the armature, and draw down the striker sufficiently, by compressing the spring e^1, to force the end of the striker through the ivory until it lifts the spring e^5 off the platinum pin e^6, and to cut off the current in the direction of the wire fixed to r^3. It will be perceived, however, that this wire, a short way down, is divided into two, and that the other end is fixed by a flat-headed screw, e^7, to the rod d of the type-block. The current therefore still continues to flow round the electro-magnet EM^{10}, but its course is altered, as it now goes from the spring e^5 to the top of the striker, then through the chemically prepared paper to the type-block, and thence to the wire through the coils to the battery. Thus a letter is printed by chemical decomposition, after which the current ceases, and the striker rises to be ready for the next printing. But for printing by blacked paper, a solid striker, armed with leather or india rubber at the striking surface, must be used, and the current be passed directly round the coils of EM^{10}. The springs e and e^5 must not be very strong, in order not to compress the moisture out of the paper. When the current ceases, the recal spring s lifts the striker, and moves the paper, by means of the hooked spring moving the ratchet-wheel, the required quantity. This spring s is screwed to the support k^2, through which passes one of the pointed screws k, on which the lower rocking frame j vibrates. The piece k^2 is seen in fig. 1 in section; in fig. 3, sheet 13, in side view; in fig. 7 on the same sheet, in front view; and in fig. 13, sheet 12, in top view; it is screwed to the base board with two wooden screws. The spring s is screwed to it, and is of the shape shewn in these figures, and must be as strong as possible, within the necessary limit of its yielding to the action of the electro-magnet EM^{10}. This spring acts upon the turning shaft n by pressing against a brass, s^1, which passes through the arm of the turning shaft n, to which the armature is screwed. In order to restrain its motion, another screw, s^2, passes through the piece of brass s^3, which is screwed to the wooden side, and presses against the armature. Two small brass screws, s^4, are screwed through the armature, opposite the poles of the electro-magnet EM^{10}, so as to prevent contact and the undue effect of residuary magnetism. All these screws can be adjusted from the outside, by boring holes in the wooden side, as seen at fig. 7, sheet 12. The other brass support k^1, for the other screw k on which the piece n turns, is shewn in section in fig. 1, in top view at fig. 5, sheet 12, and in back view at fig. 28. This support is also screwed to the base board, but it has a slot down it, in which fits a screw clip k^3, through which passes a wire spring, s^5, seen at fig. 1, and in the details of the rocking frame j, which are,—fig. 15 a top view, fig. 16 a side view, sheet 12; fig. 4, sheet 13, a bottom view, fig. 12 an end view, and

and fig. 13 a transverse section. The object of this spring is to cause the rocking frame j to come to its normal position, after it has been drawn aside by a current passing through the electro-magnets EM^7, EM^8, EM^9. A similar arrangement is made for the electro-magnets EM^1, EM^2, EM^3, and for the electro-magnets EM^5, EM^1, EM^6, which I will now explain. To the electro-magnet EM^1 is screwed a small piece of brass, t, seen in fig. 6 in section, and in front view at fig. 17, in side view at fig. 18, and in top view at fig. 19, sheet 12. Into this brass is screwed the wire spring s^6, the lower part of which is inserted in a slot, at the bottom of the arm g^1 of the rocking-frame g—the shape of the slot is best seen in fig. 22, sheet 12—the rocking-frame g being held stationary, as I shall presently explain, whilst the movement is taking place in the type-block through the attraction of EM^1, this spring is bent, and when the current brings the type-block back to its normal position. It is evident that, as action and reaction are equal, if the rocking-frame g were free to move when the current is passed round the electro-magnets EM^1, EM^2, EM^3, there would be an equal tendency for the magnet EM^2 or EM^3 to go towards EM^1, as for EM^1 to go to either of them. It is therefore necessary to fix the rocking-frame g, during the time that EM^1 is being operated on. This is effected by a small accessory armature, u, shewn in cross section in fig. 1, and together with the electro-magnet EM^6, shewn in side view at fig. 8, in top view at fig. 9, and in the two end views in figs. 10 and 11, sheet 12. In fig. 23, attached to the rocking-frame g is a small piece of brass, g^2, with a conical hole drilled into it. This is also seen in figs. 8, 9, 10. Into the small armature u is fixed a brass conical pin, g^3, which is forced into the hole in g^2 by the recal spring g^4, when the armature u is not attracted by the magnetization of EM^6; and when this is the case, no movement of the rocking-frame g can take place; and when EM^1, EM^2, EM^3 become electro-magnets, EM^1 alone is at liberty to move to either side. This current, when employed in the formation of a letter, always passes before EM^2, EM^5, EM^6, are brought into action, although it is continued during that action, should that action also take place; but the moment the current passes round EM^6, u is attracted, and the rocking-frame g liberated, so that it can move with EM^4 towards EM^5 or EM^6. It will be perceived, figs. 10 and 11, that the ends of the electro-magnet EM^6 are not a square, but a parallelogram, in order to make room for the armature u; and on this account the screws ff are not in the centre of the flat part of the rocking-frame j, as will be seen at fig. 15. The armature u works on a pin passed through the sides of the bent piece of brass g^5, which is screwed to one end of EM^6, and the form of which is seen at fig. 11. At the other end the piece u plays between a brass pin screwed into the iron of EM^6, and a piece of brass g^6 screwed to the other side, to prevent side strain. When EM^4, EM^5, EM^6, are brought into action alone, the rocking-frame g, by means of the spring s^6, moves the type-block one division; when both combine, four divisions; and when both are opposed, two divisions. At the other end of the rocking-frame g is a recal spring, s^7, of a similar character, which passes through a slot in the piece j, and which brings the rocking-frame g to its normal position.

The next telegraphic instrument I shall describe is also a recording one, the letters being formed by dots produced on a strip of paper by chemical decomposition. Like the pricking telegraph I have already described, this admits of considerable variation. The dots may be made of different forms, or of different colours, according to the direction of the current; or they may be made successively and lengthwise of the paper, or across the paper; or they may be made by currents all of one denomination, lengthwise of, or across the paper. As the utmost possible legibility, simplicity, and concentration of space in a telegraphic alphabet are great desiderata, I have paid considerable attention to improvements in this direction. Nos. 2, 4, 5, 6, 7, 8, 9, and 10, in fig. 9, sheet 2, and Nos. 1 and 2, in fig. 31, in sheet 13, are specimens of the different forms I can give to this dot alphabet. Nos. 2 and 4, in fig. 9, sheet 2, are the first, which is a consecutive alphabet lengthwise of the paper; the second, with the marks for the letters across the paper, where chemical compounds are used in which a current in one direction produces one colour, and in the other direction another colour. I have signified the two colours by black dots, or open circles, in these figures. Fig. 5 is an alphabet for five dots made from currents, one denomination, partly across the paper and partly successive. The top and bottom dots

are

are two in succession, whilst the number across the paper is three. No. 6 is formed in two rows of three across the paper, and, like several other of the alphabets, has marks made across the paper to divide the letters in the manner I shall hereafter describe. It will be perceived that the difference in A and B is that one is to the right, the other is to the left of the paper space. The same is the case with C and D, and E and F, and the same remark applies to the differences in the compound letters. But to make the distinction still more complete, different forms may be given to the dots, as in the pricking telegraph, and I have shewn that arrangement in No. 2, fig. 31, sheet 13. This alphabet is formed by three alternating currents, and it is rendered still more legible by preparing the paper with lines before it is put in the instrument. The chemical used only indicates when the current is in one direction, and it is made to flow from A through the paper to B, or *vice versâ*, by one of the markers being connected with the line, and the other with the earth; in the first case making the mark only at A, and in the second only at B. The same takes place between C and D, and between E and F, and of course in a similar way in the compound letters.

The alphabet No. 7 is made with five consecutive dots, and the paper is divided, in the manner I shall describe, into letter spaces. The five simple letters are known by their position, more or less, to the right or left of the letter space. The other letters appear to be made with lines and dots, but they are really formed by dots; but after one dot is made the paper is only advanced a space equal to the width of another dot, and as the form of the markers is square, if another dot is then made, the two combine and form a line. This line may be of the length of two, three, four, or even five dots, or a short line may form the letter with a dot and a blank between, or in any possible combination.

This arrangement will be understood at once by examining this alphabet. No. 8 is produced by three consecutive alternating currents, in which two markers are used for each pulsation, one being above and the other below the centre of the paper. The paper is divided by the instruments into letter spaces, and the marks are distinguished by being in the centre or to the right and left of the letter space, and above or below the centre. Of course, when a pulsation makes a mark below the centre, it does not do so above it, and *vice versâ*. In this alphabet the dots combine to form lines where intended, and thereby render it very simple. No. 9 is also formed by three alternate currents with two markers, but in this case the three pulsations mark across the paper to the right and left of the letter space which is here formed by the instrument, but the paper is also rilled, in the manner shewn, before its introduction into the machine. The dots also compose lines across the paper, so that this forms a very legible and compact alphabet.

But the most compact alphabet of all is that shewn in No. 10, which is produced with five dots across the paper, which is previously ruled. The letters, though produced by dots, are composed chiefly of lines, and the alphabet is accordingly simple; and by making the dots narrow instead of square, could be reduced into the space occupied by moderately small writing.

An alphabet, partly of the same character, but formed with only three alternating pulsations, and two markers for each pulsation, is shewn at No. 1, fig. 31, sheet 13. Here the top and fourth markers, the second and fifth, the third and sixth, are alternately connected with line and earth, and it depends upon the direction of the current which marker comes into operation, but of course the pair connected can never mark at the same time. Here I have made the markers rectangular in section, to shew how the letters may be condensed. This is the alphabet which occupies least space with fewest pulsations. No. 2, fig. 31, sheet 13, is an alphabet formed like No. 6, fig. 9, sheet 2, excepting that is made more distinctive by the markers being of different forms. Figs. 15 to 29, sheet 13, are views and details of this chemical decomposition dot telegraph. Fig. 15 is a side view of the instrument, fig. 16 a longitudinal section, fig. 17 an end view looking from the right hand side, fig. 18 an end view looking from the left hand side, fig. 19 a top view, fig. 20 a view of the base board, fig. 21 a view of the top board with the framing and rollers removed, fig. 22 a cross section through the paper roller. A is the base board, A^1 the sides and ends, A^2 the top board of the machine, forming a box inclosing

EM,

EM, an electro-magnet which drives the rollers which carry forward the strip of paper on which the signals are made. The trough containing the chemical mixture with the paper roller immersed in it, and the framework which supports the driving and pressure rollers and marking apparatus, are fixed on the top board A^2. To this board are also screwed eight clips which form the necessary contacts. B are upright brass frames with flanges at the bottom by which they are screwed to the top board A^2; they are held together by a cross rod, *c*, with screws and nuts. D is a trough of gutta percha—it slides into place between small fillets, *d*, on the top board A^2, and when home in place, a small projection, *e*, on the trough, is caught by a piece of brass, e^1, screwed to the board A^2; at the other end of the trough is a lug, *f*, with a hole in it, through which a thumb-screw, *g*, passes, which fixes the trough to the top board. When it is required to refill the trough or the paper roller, by unscrewing *g* the trough is at once removed.

The paper roller *h*, which is of boxwood, and is seen in section in fig. 22, is supported in a framework of boxwood, *i*, which is placed with it in, and removed with it from, the gutta percha trough. It is constructed with small pieces of glass tube for bearings, held in place by wooden wedges, as, the whole being immersed in the chemical compound, metal could not conveniently be used; pieces of this framing *i* project above the top of the trough, by which the framing *i* may be lifted out. It will be seen by the drawings that when the trough D is in place, it comes under the roller *j*, and partly under the roller *k*; *j k l* are three rollers, *j* and *l* being of boxwood, and *k* of metal. I will now explain the functions of these rollers:—*k* is the decomposition roller, connected, in certain arrangements which I shall hereafter point out, permanently with the earth, although not so in the present drawings; *j* and *e* are both presser rollers, the object of the former being sufficiently to compress the paper, which is led between it and the roller *k* from the paper roller *h*, to squeeze out the superabundant moisture, so as to render it in the fittest state for being acted upon by the electrical current through the markers; on the shafts of the rollers *k* and *l* are corresponding spin wheels, *m*, which cause the rollers to move synchronously—when the drawing roller *k* is moved, the pressure on *l* is made just sufficient to bite and propel forward the paper without causing too much resistance. The mode in which this pressure is obtained is best seen in fig. 15. The mode is applied equally to the rollers *j* and *l*. In the standards B, slots are cut to admit the bearings of these roller shafts, and wedge-shaped holes are cut in the brass where shewn, in which bent springs, l^1, are introduced; and by drawing them more or less tight, and by having them originally weaker or stronger, the pressure is regulated. I have said that the roller *k* is the driving roller. I will now explain its action. An armature of soft iron, A^r, is screwed to a turning frame, *n*, which vibrates on pointed screws, *o*, which pass through pieces of brass, o^1, screwed to the top A^2. This turning-frame *n* goes through a slot hole in the board A^2, and is suspended with the armature A^r at a little distance from the poles of the electro-magnet EM. The consequence of this arrangement is that, whenever a current of electricity is passed round the coils of EM, the armature is attracted, and the end of an arm, n^1, attached to the back of the turning frame *n* is raised. When the current has ceased, the armature is recalled to its normal position by a helical spring, as in similar cases I have described with regard to other instruments. The arrangement is seen in fig. 20. To the end of n^1 is attached, by a hinge-joint, to an upright rod, n^2, to which is screwed a spring which takes into a ratchet-wheel, *q*, fixed on the shaft of the roller *k*. The upright n^2 maintains its perpendicularity by a steel wire passing through a hole in a projection from the frame B, as I have before explained in similar cases. The parts are so arranged that each attraction of the armature shall turn the ratchet one tooth, and as the ratchet has forty teeth, advance the paper a quantity or equal to one-fortieth of the circumference of the roller, which in the alphabet No. 1, fig. 31, on this sheet, is the distance required between letter and letter. Having described how the paper is caused to advance, it remains to be shewn how the marking takes place. This is effected differently, according to whether I am operating with pulsations all of one denomination, or with alternating currents; whether the markings to form a letter are successive and lengthwise of the paper, or across the paper; whether we are using chemicals by which

two colours are produced by alternating currents, or chemicals which leave a mark only when the current is in one direction. The arrangement shewn is for the purpose of forming the alphabet No. 1 on this sheet, by three alternating currents which cause a mark to be made only when that current passes in one direction through the marker. This part of the arrangement, which I have shewn full size in the various figures, in order to render the description more clear, I have shewn to an increased scale in figs. 23, 24, and 25; in fig. 23 in front view, in fig. 24 in side view, and in fig. 25 in top view. In order to prevent smearing, and render the marks more clear, an arrangement is made by which the markers are lifted at each movement of the paper, and are brought again into contact when that movement has ceased. The markers r^1 to r^6 are fixed in a slab of ivory, s. This slab of ivory is suspended on pointed screws, s^1, which go through brass arms, B^1, cast on the inside faces of the standards, B, of the forms shewn in the figures, in such manner that its weight causes the markers to rest on the roller k, as will be seen at once in looking at either fig. 15 or 16. If the roller k were now turned, and that the paper had previously been carried between j and k, and then between k and l, it would be carried forward, and any mark recently formed would have a tendency to smear. To avoid this, at the same time that the motion of the roller commences the markers are lifted from the paper; this is effected by a toothed wheel, t, fixed on the shaft of the roller l, whose teeth correspond in number with the teeth of the ratchet-wheel. The wheel t is placed under the further side of the ivory slab s^1, so that each tooth may touch in its revolution a piece of t^1 let into the side of the slab. The whole of this arrangement will be best seen and understood by referring to the enlarged figs. 23, 24, 25. I have there shewn part of the ratchet-wheel g fixed on the shaft of the roller k, and part of the toothed wheel t placed in the shaft of the roller l. When the spring n^3, which is screwed to the vertical rod n^2, is raised by the attraction of the armature, it turns the ratchet-wheel g one tooth, as the rollers k and l are connected by the the toothed wheels, and wheel t will revolve an equal quantity at the same time. In looking at the position of these teeth as regards the piece of brass t^1 let into the ivory slab s, it will be perceived that in revolving the tooth touching t^1 raises it, and with it the ivory slab s, and the markers which it carries, and continues to raise it until the tooth escapes, which takes place about the same time that the rod n^2 has ceased to rise. When the slab s falls, the piece t^1 is caught by the next tooth, and the markers again repose on the ——. This operation is repeated at each advance of the paper, and it is of course when all is in repose, and the marker in contact with the paper, that the pulsation or pulsations takes place. The markers r^1 to ^{6} are perfectly insulated from each other, and each of them is joined metallically and respectively to square pieces of brass, in which are flat-headed clip screws, u^1 to ^{6}, which bite the ends of wires, the other ends of which are held by similar flat-headed screws, v^1 to ^{6}, in the clips L^1 to ^{3}, E^1 to ^{3}; r^1 and r^4 are connected at the time of the same and first pulsation, r^1 to line, r^4 to earth; likewise, at the time of the third pulsation, r^3 to line, r^6 to earth. Thus, if the positive current comes through the line in the first pulsation, it will pass from the marker r^1 through the moistened paper to the metal k, from that again through the paper in the different direction to the marker r^4, leaving the mark of r^1. If the current is in the opposite direction, it will leave the mark of r^4, and so for the other two pairs at the time of the other pulsations. The shape of the markers, where they touch the paper, is rectangular, and thus forms the alphabet No. 1, the slight distance between mark and mark being filled by the ruled lines. In the consecutive alphabets, where the same principle of marking is used as at No. 3, fig. 9, sheet 2, only two markers are used, one connected with line, and the other with earth, and arranged as shewn side by side in fig. 29, sheet 13. When the alphabet similar to No. 6, sheet 2, or No. 2, sheet 13, is required to be formed, the pairs are placed one behind the other, as shewn in fig. 30, sheet 13. When pulsations all of one denomination are used, the marker or markers are connected with the line, and the roller k with the earth. I have now only to describe how the marks across the paper, for the purpose of dividing it into letter spaces, as seen in the alphabets Nos. 2, 5, 6, 7, 8, and 9, fig. 9, sheet 2, and No. 2, fig. 31, sheet 13, are made. This is shewn in fig. 26 in side view, and fig. 27 in front view; and the metal blades I shall describe in fig. 28, sheet 13. In the boxwood roller l are inserted strips of metal, w,

at

at the proper distances for the letter spaces, of the form shewn at fig. 28. The most projecting portion at *w* is level with the surface of the boss; a spring, *x*, which presses on the boss is connected with one pole of a local battery, and the metal roller *k* with the other pole. When either of the metal pieces next the roller *k* is horizontal, it is in contact with the paper between *k* and *l*, and at that moment the spring *x* also comes in contact with the metal strip, and therefore a current will pass through the paper, and make a mark with the projecting portion *w* across the paper; of course, care must be taken in the original adjustment of the machine, as in the similar arrangement described in the successive pricking telegraph, that the spacing, is made at the correct times, and care must also be taken to prevent any interference with the line current.

All my improved instruments are drawn to the full size, but of course the dimensions must be greatly varied according to circumstances. For instance, the size and amount of coil of the electro-magnets in the relays will depend on the force of current usually employed on the line; the size, amount of coil, and thickness of wire, of the electro-magnets of the instruments, on the nature of the local battery used, whether one of intensity or quantity; the distance of the keys in the manipulators from one another, on the feelings of convenience of the operators, and similar circumstances; but all these changes in no way affect the principles of my invention. I have also thought that the description of the different instruments would be more easily comprehended by giving it in detail, and with the different parts separate. Thus, I have described the pulsation distributors and receivers as one instrument, the manipulators as another, the relays as another, the indicating or recording telegraphs as another—only shewing them as united by clips and wires; but it is obvious that in practice these different parts may often be conveniently united into one whole, and the wires in many cases wound from one part to another, avoiding the necessity of numerous clips, as I have shewn, and condensing the whole apparatus. But these arrangements, with the separate drawings before them, of course, are within the competence of an intelligent workman. Having now described the nature of my said inventions, and the means and manner which I consider to be the best for using and carrying the same into effect, I declare that I do not confine or restrict myself to the details or particular arrangements described, as many variations may be made therefrom without altering the peculiar or essential character of the different parts of my invention; but what I especially consider as novel and original, and therefore claim as the subject matter protected and secured to me by the hereinbefore recited letters patent, is—

Firstly—With reference to the pulsation distributing and receiving apparatus—the use of wheels or cylinders, springs, and other bodies, kept at the different stations, in a state of practically synchronous complete revolution with the corresponding wheels or other bodies at other stations; by suitable means for the purpose of distributing pulsations of the electric current to manipulators and receiving instruments, for telegraphic purposes, whether such pulsations are caused in one or more wires, and whatever may be the source of electricity employed.

Secondly—I claim the methods shewn, by means of double simultaneous contacts, for putting both ends of the battery simultaneously in connection with springs of a manipulator, so as to enable me to work the current in either direction at pleasure, and thus form the necessary signals required for the alphabet with only three pulsations; and whereby, also, I am enabled to work a larger number of telegraphs simultaneously than could be done with pulsations all in one direction.

Thirdly—I claim the various kinds of contact shewn in the drawings, as applied to these apparatus, and particularly the use of teeth on the revolving wheel, acting mechanically as cams to tilt turning levers into mercury, or otherwise cause them to make metallic contacts, whereby the particular currents intended to flow round particular instruments are caused to do so.

Fourthly—I claim the use of these revolving bodies, or of others working at the same or some proportionate speed, for the purpose of distributing currents from local batteries

batteries by means of relays, causing currents of any required duration to work, or assist in working, the telegraphic instruments and the manipulators.

Fifthly—I claim the methods described for working several telegraphs *at intervals*, with one set of pulsations.

Sixthly—I claim the method described of working between the intermediate stations, or other stations situated in the intermediate distances, at the same time that these stations are communicating, or have the power of communicating, with other points along the line.

Seventhly—I claim the various forms of relay which I have described, whether simple or compound, for the purpose of throwing the local current on the revolving wheels, and thence through the instruments, for any required period.

Eighthly—I claim the plan of setting the relay in an inactive position, by a pulsation from the local battery, proceeding from the revolving wheel, or by an equivalent mechanical means, after every passage of a line current through it; so that the revolving wheel may not again put the relay battery in action until it is caused to do so by a fresh pulsation from the distant station.

Ninthly—I claim the methods described of insuring practically synchronous movements in several revolving apparatus by resetting them at a similar starting point at regular intervals by means of the current.

Tenthly—I claim generally the various manipulators described, and particularly the use of turning plates or turning frames acted upon by keys to complete the required contacts, thereby forming those combinations of the pulsations which are required to print or indicate the letter; also, the modes described of grouping five, six, or more keys; so that, with one movement of the hand, the necessary combination of pulsations for framing a letter with one line wire may be sent by any person acquainted with the sets which form each letter of the alphabet.

Eleventhly—I claim the use of an electro-magnet in the manipulator, worked by the local current from the revolving wheel, which locks all the turning plates or frames when any of them has been depressed, so that they cannot move during the passage of the pulsations, and which may also cause a pointer to move, or a bell, or bells, or other body to be struck, to indicate to the operator the proper time to make each movement of the finger; and I also claim the use of the revolving wheel to cause the bell or body to be struck mechanically.

Twelfthly—I claim the mode described of forming the alphabet, by a combination of the movements of three needles, caused by pulsations sent along one line wire, as shewn, or by currents from a relay battery set in action by these line pulsations.

Thirteenthly—I claim generally the arrangements described for the chemical dot telegraph, whether fitted for a single pulsation marker or markers acting with a succession of pulsations, or for a combination of markers printing across the paper. I also claim the methods shewn of combining the dots of successive pulsations to form lines where required; also, the preparation of the paper with lines before introducing it into the instrument; also, the method described of making marks across the paper to form letter spaces; also, the arrangements described of distinguishing the direction of the current, and the arrangement for raising the markers during the movement of the paper.

Fourteenthly—I claim generally the arrangements shewn for a dot pricking telegraph, whether the particular form of electro-magnet which I have designed or any other convenient form be used, and whether a single pair of prickers be employed to produce the letters, or whether a number of pairs equal to that of the pulsations is employed; and I particularly claim the plan described of pricking from the back or front of the paper according to the direction of the current.

Fifteenthly—

Fifteenthly.—I claim generally the arrangements shewn for a type printing telegraph, whether such printing be caused by chemical decomposition, as shewn in the drawings, or by a strip of the blacked paper placed between the type and the strip on which the despatch is printed, and whether any mode of giving a surface of printing ink to the type is employed, also whether the forms of the electro-magnets be similar or different to those shewn, or whether a portion of the magnets be permanent ones, or an armature only be attracted instead of another electro-magnet. I also especially claim the use of the type-block in printing telegraphs, instead of a type-wheel, for the purpose of bringing each letter more quickly and by fewer pulsations under the striker; and the method shewn by which the same current is used to form the electro-magnet which pulls down the striker, and to cause the chemical decomposition.

REPORT.

Royal Mint,
Sydney, 17 *April*, 1861.

Sir,

Having examined and considered the matters stated in the Petition of Randolph John Want, for Letters of Registration in favour of William Hickling Burnett, "in respect of an invention for improvements in Electric Telegraphs, &c.," we have the honor to recommend that the protection prayed for be granted.

We have, &c.,

E. W. WARD.
EDWD. CHAS. CRACKNELL.

The Honorable
The Colonial Secretary.

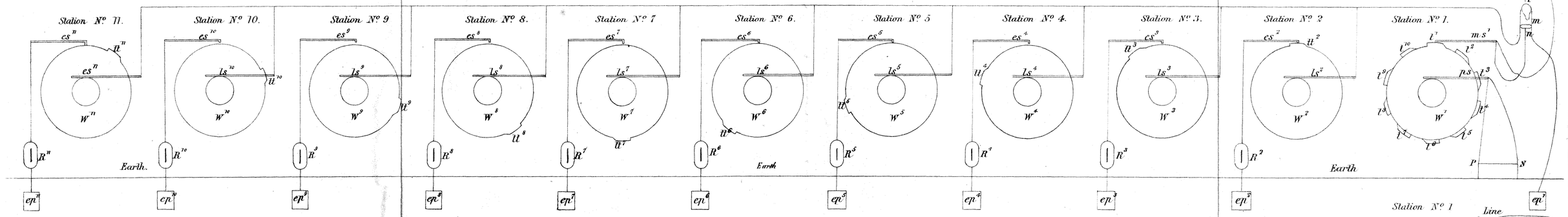
P.S.—The documents transmitted to us are herewith returned.

[Drawings—thirteen sheets.]

Copy

(13 SHEETS)
SHEET 1

FIG. 1.
Line Wire



Line wire from Station Nº 2 to Station Nº 3.

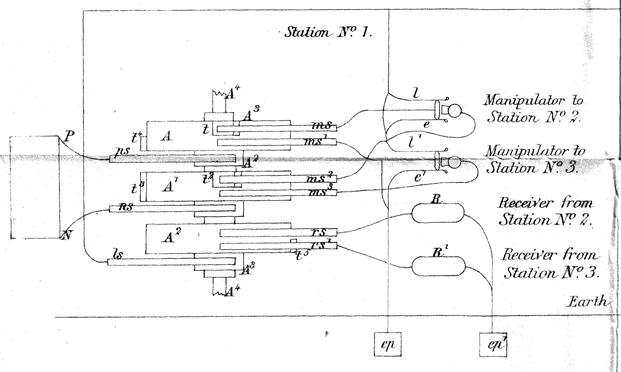
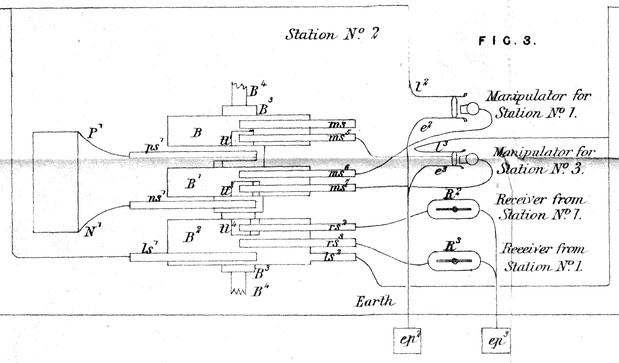


FIG. 3.



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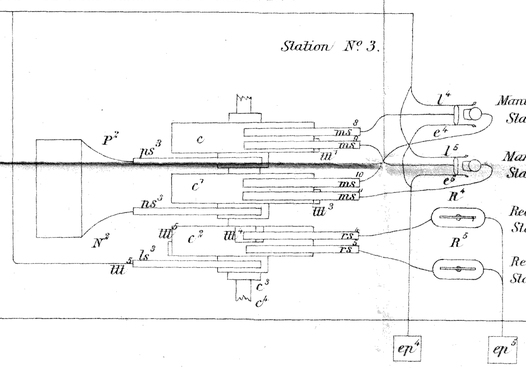
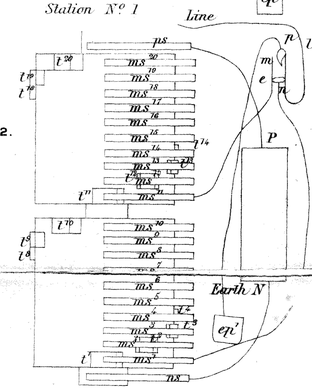


FIG. 2.



Line wire from Station Nº 1 to Station Nº 2.

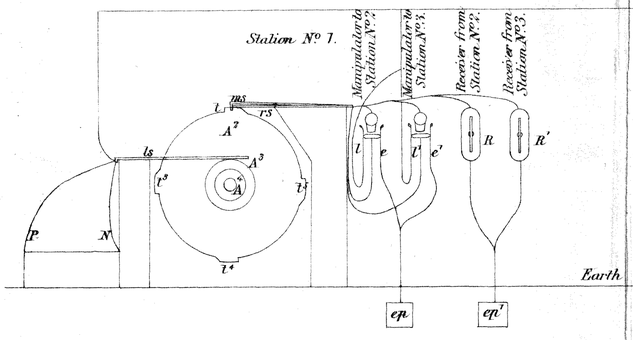
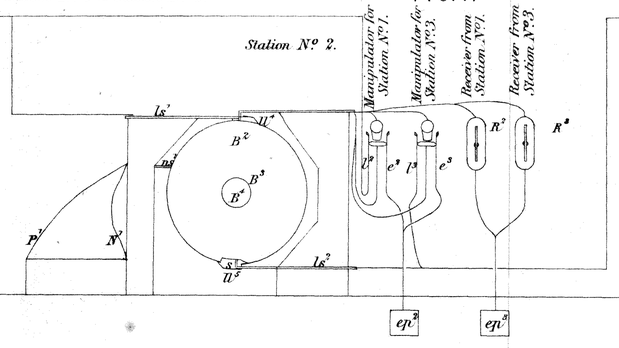
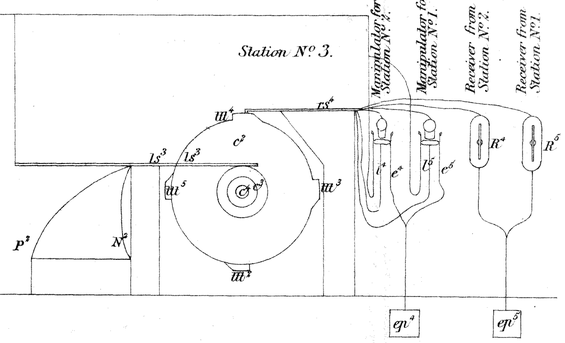


FIG. 4.



Line wire from Station Nº 2 to Station Nº 3.



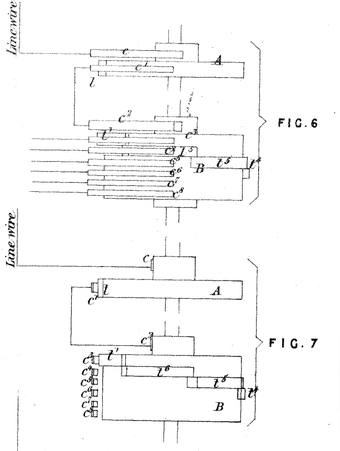


FIG. 6

FIG. 7

Line wire from Station Nº 1 to Station Nº 2.

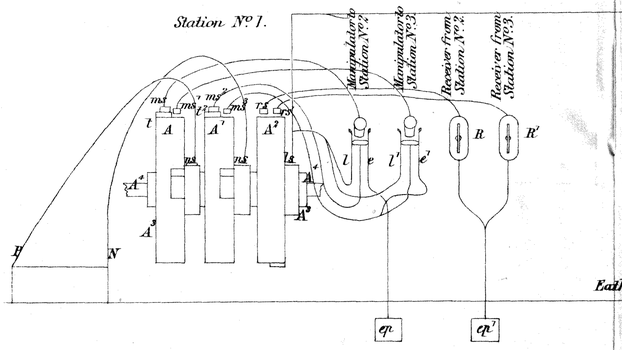
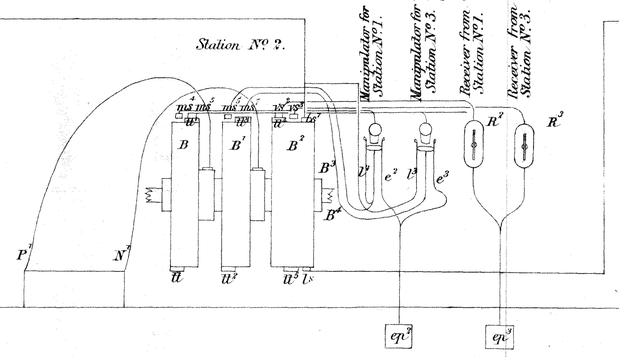
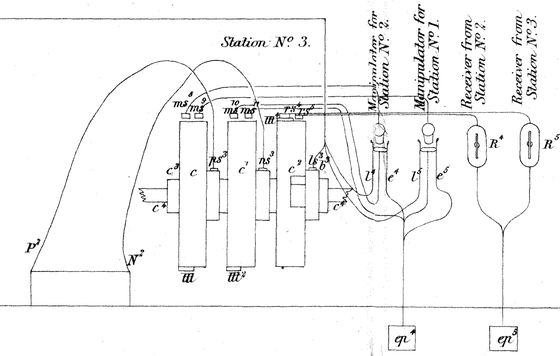


FIG. 5.



Line wire from Station Nº 2 to Nº 3.



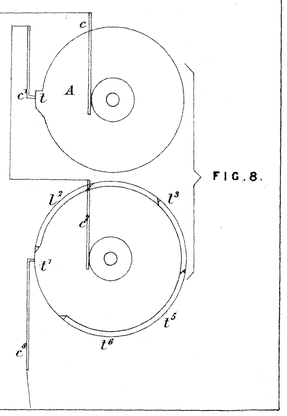


FIG. 8.

Signed:
John Young

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(13 SHEETS)
SHEET 2

FIG. 1.

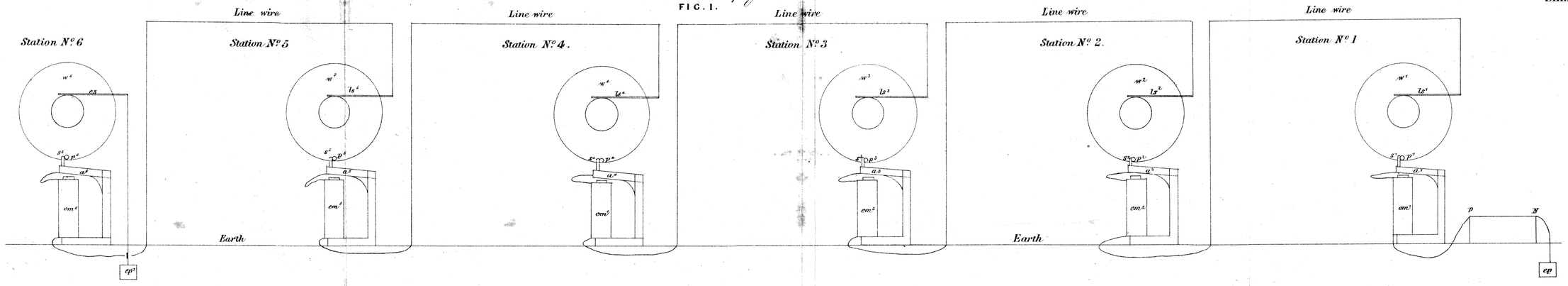


FIG. 2

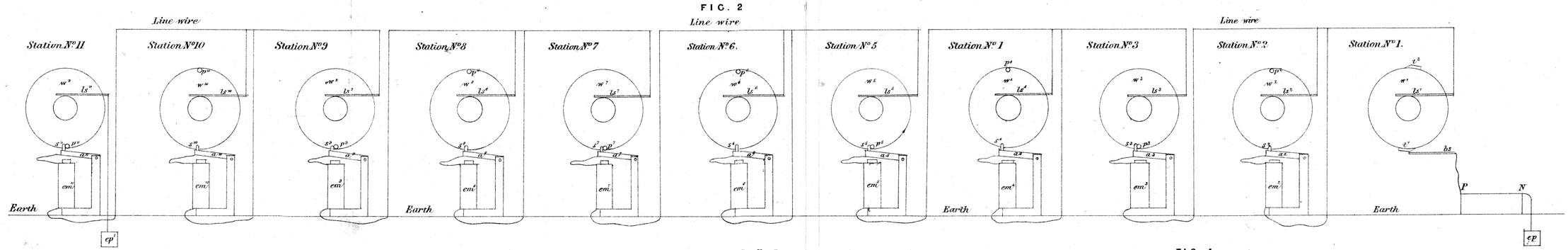


FIG. 3.

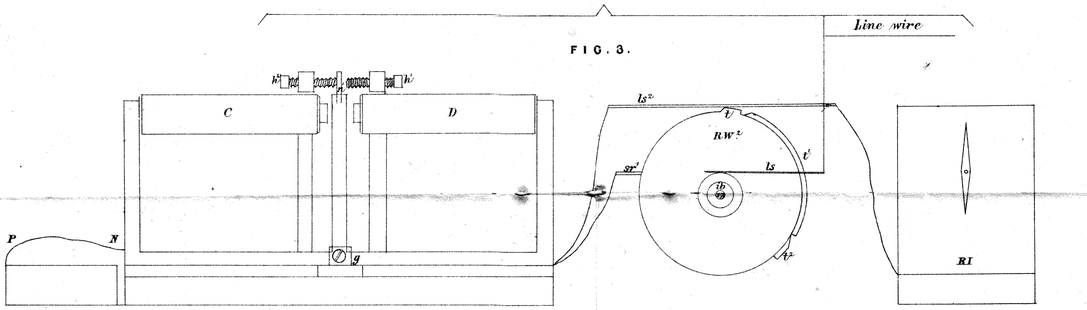


FIG. 4.

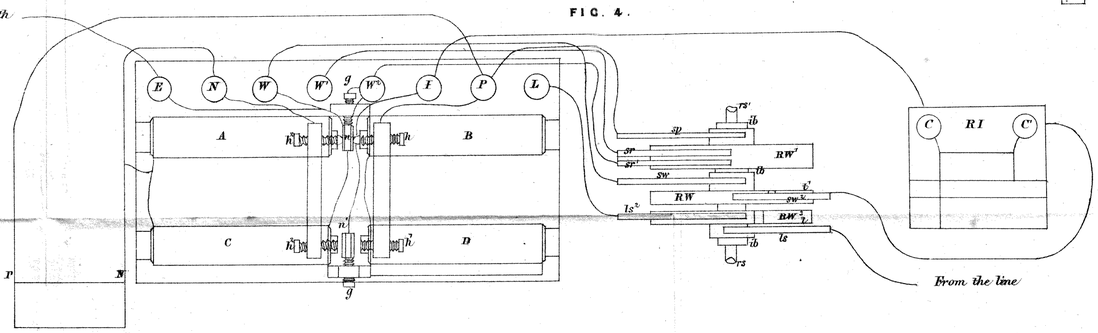


FIG. 5.

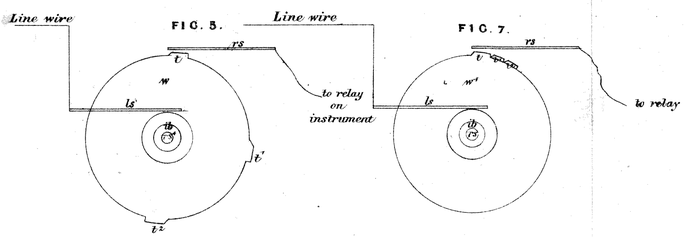


FIG. 7.

FIG 6

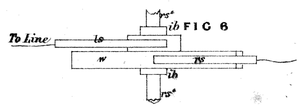
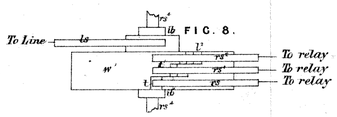
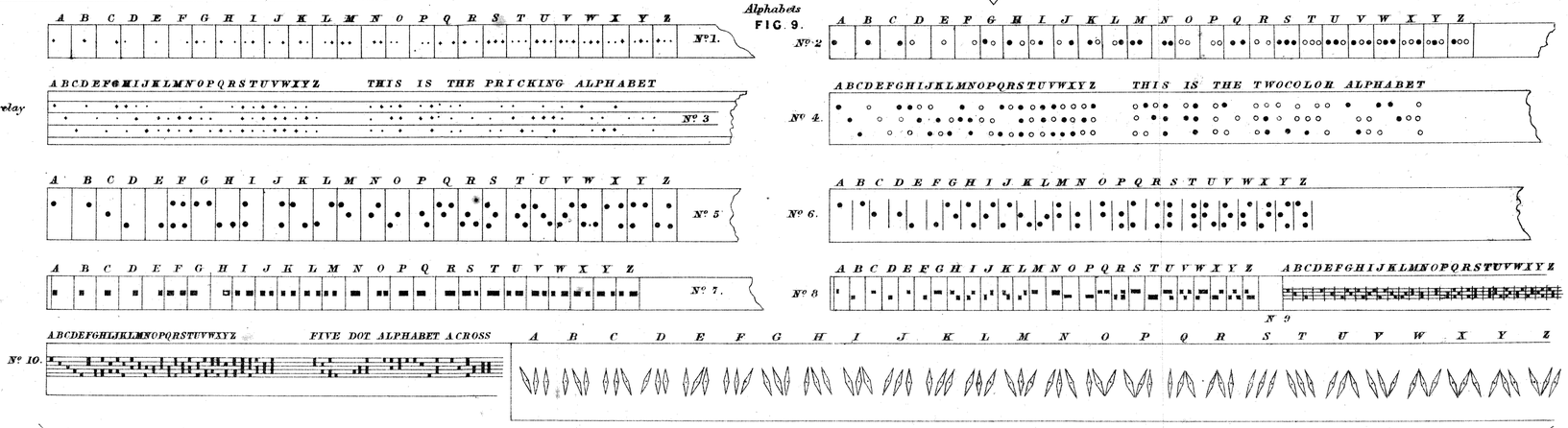


FIG. 8.



Alphabets
FIG. 9.



(Signed) John Young

FIG. 1.

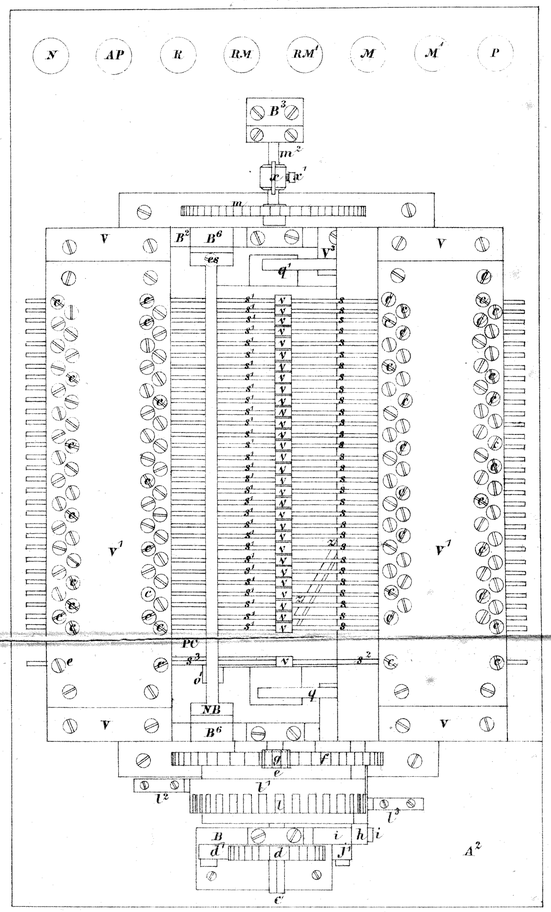


FIG. 2.

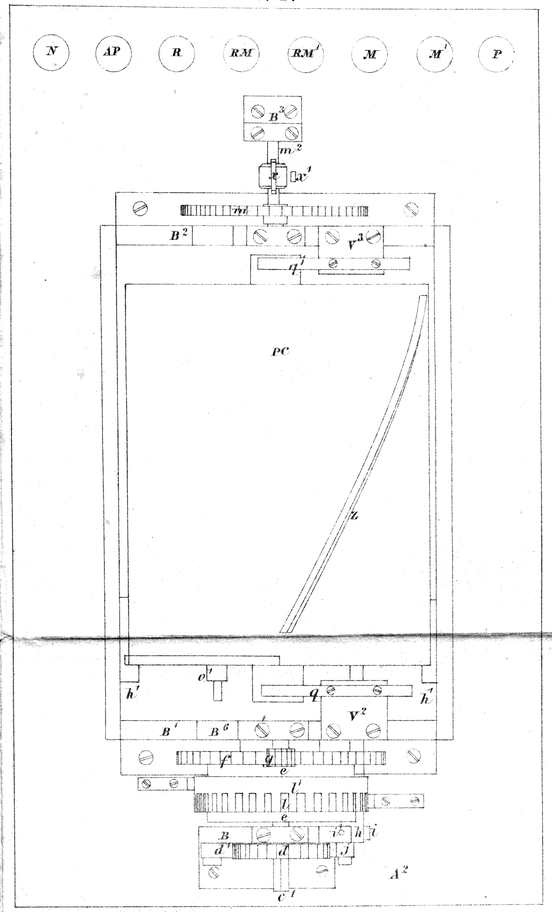


FIG. 3.

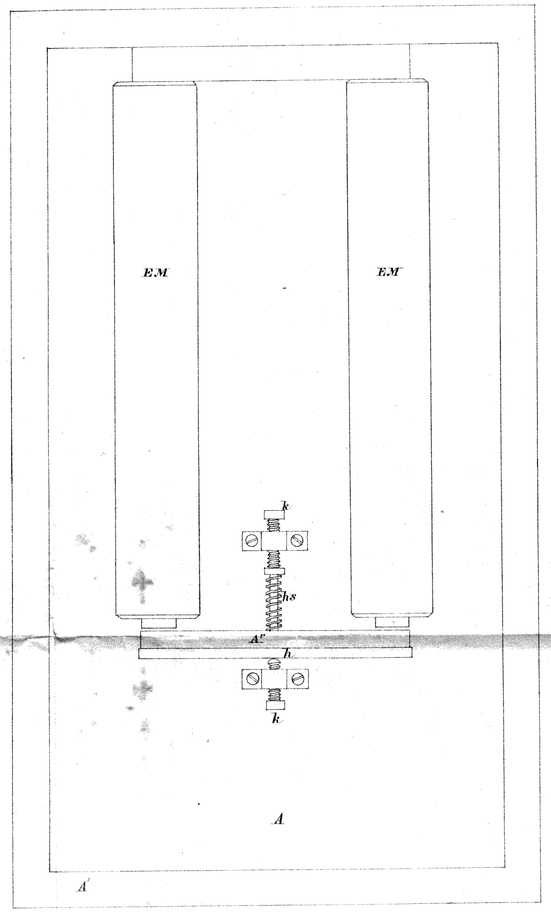


FIG. 4.

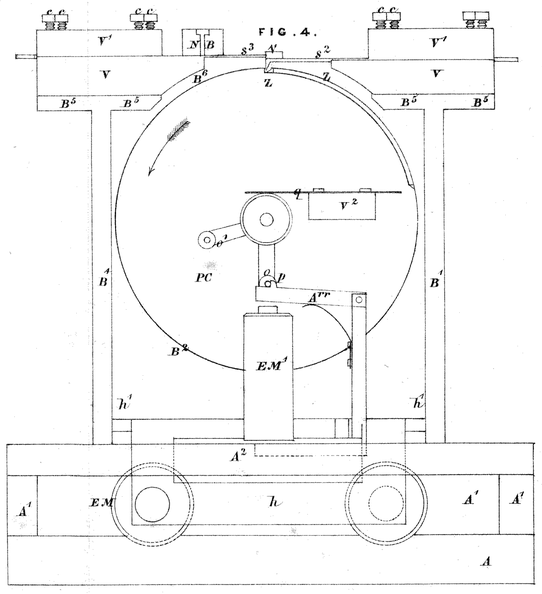


FIG. 5.

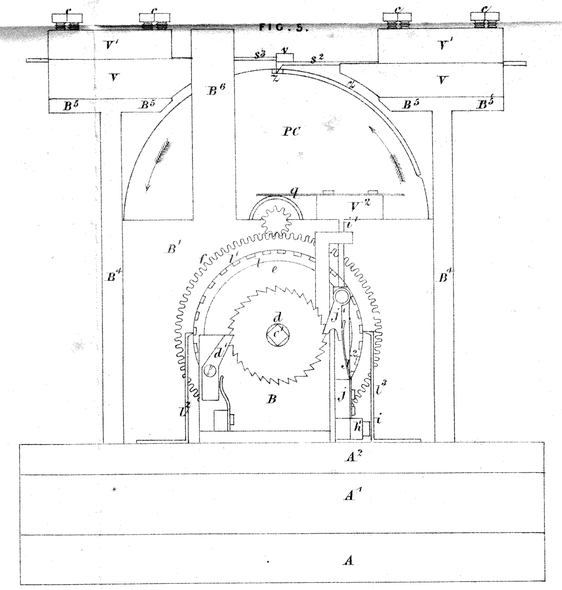


FIG. 6.

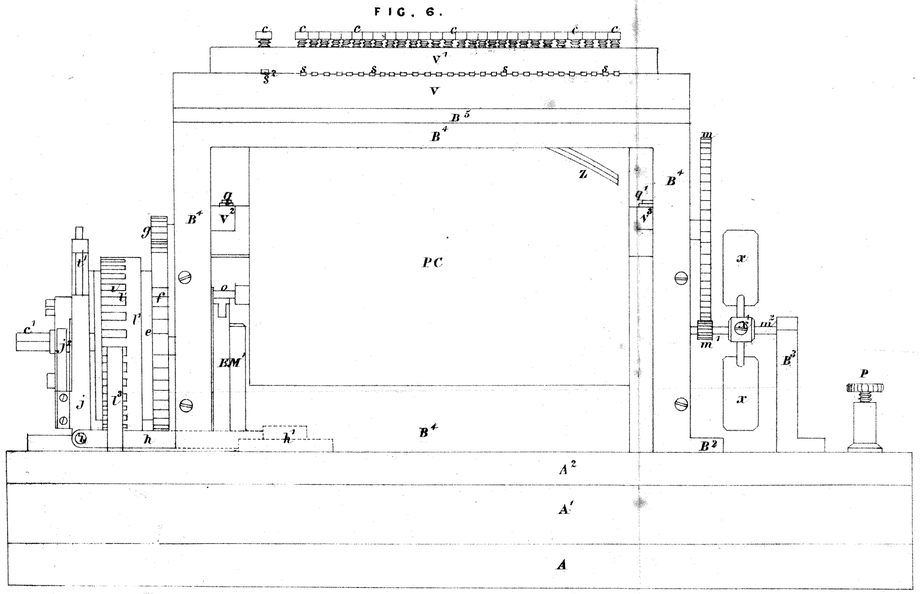
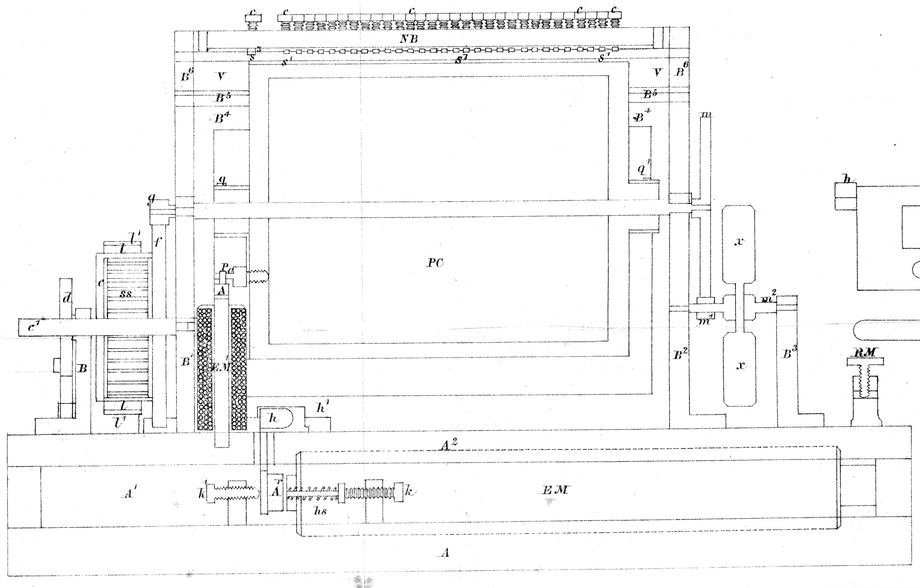


FIG. 7.



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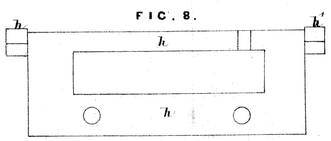

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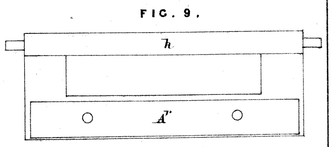

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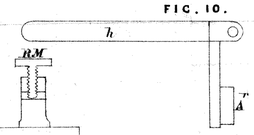

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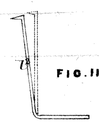

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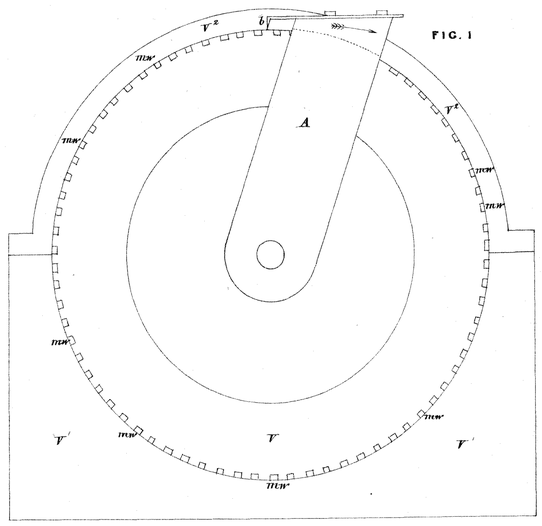
13 SHEETS
SHEET 4

FIG. 1



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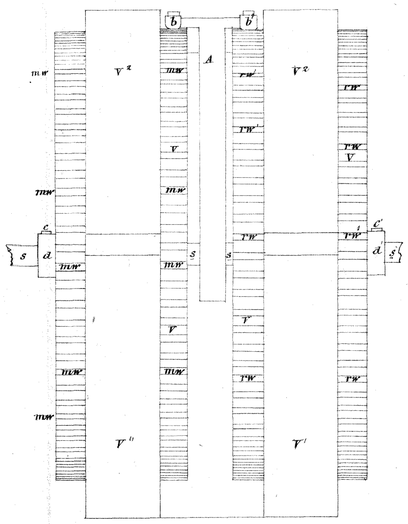

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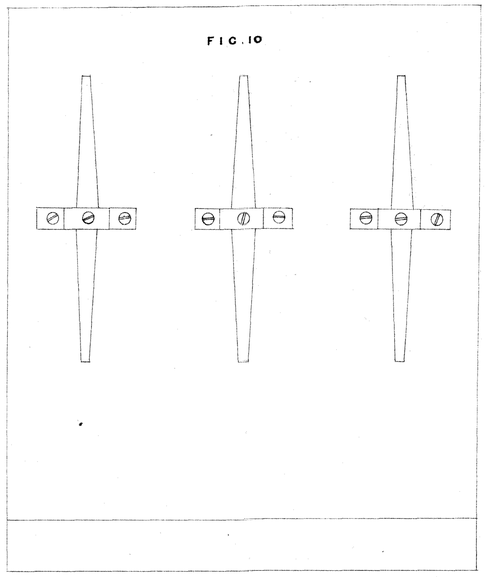
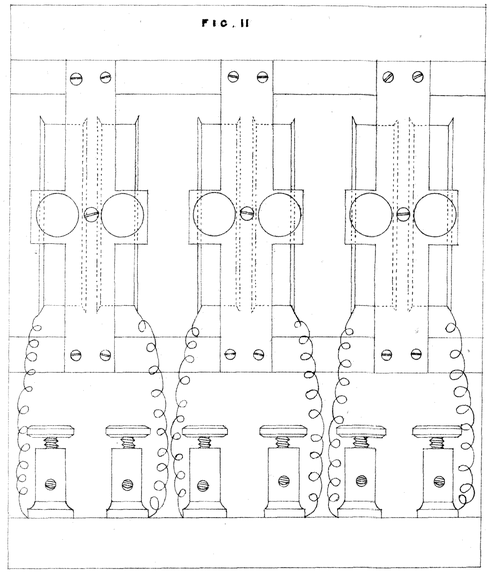


FIG. 11



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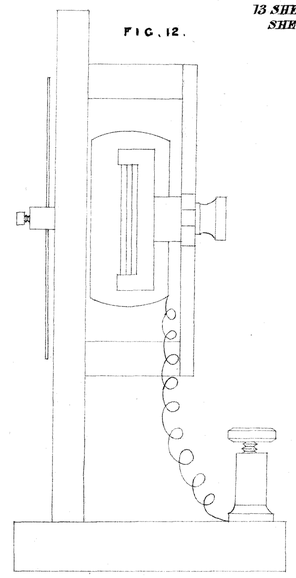


FIG. 3

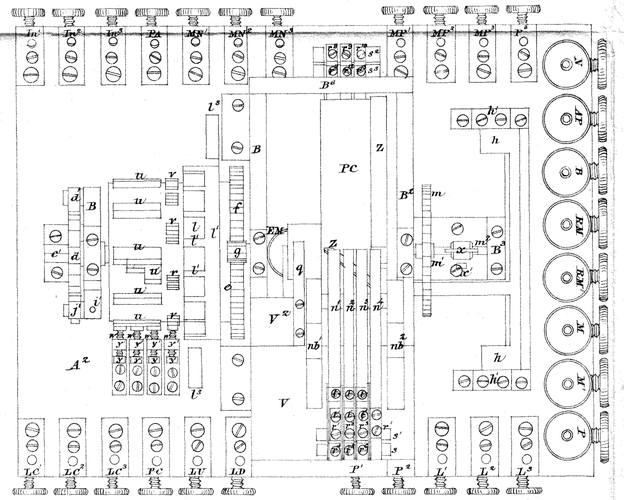
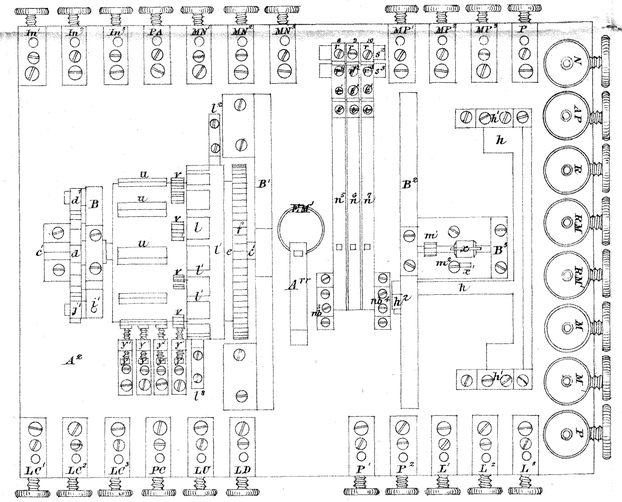


FIG. 4



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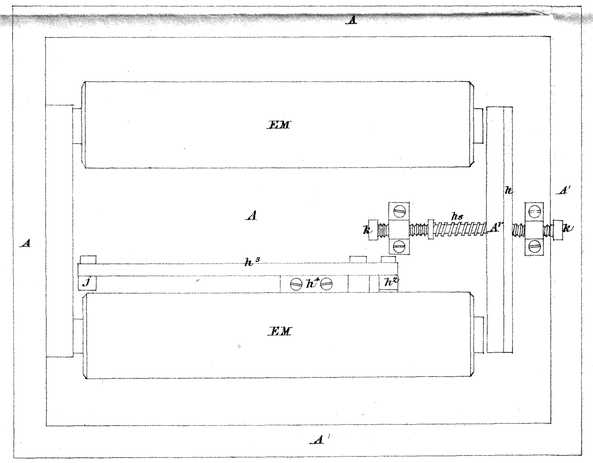


FIG. 13

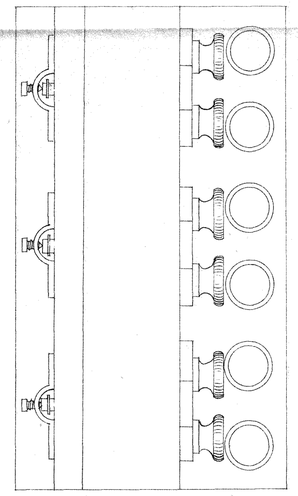


FIG. 6

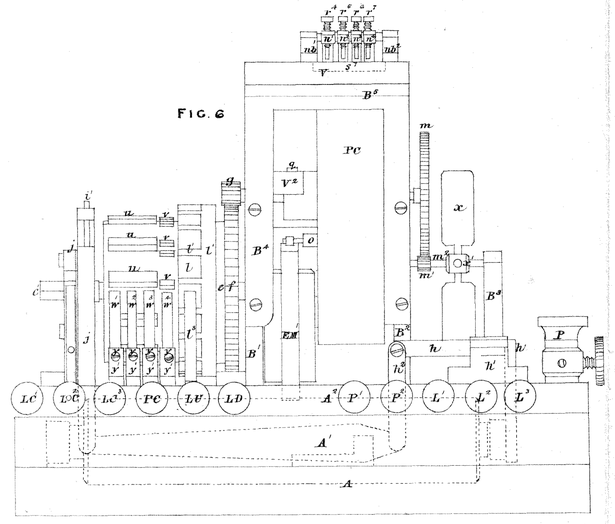


FIG. 7

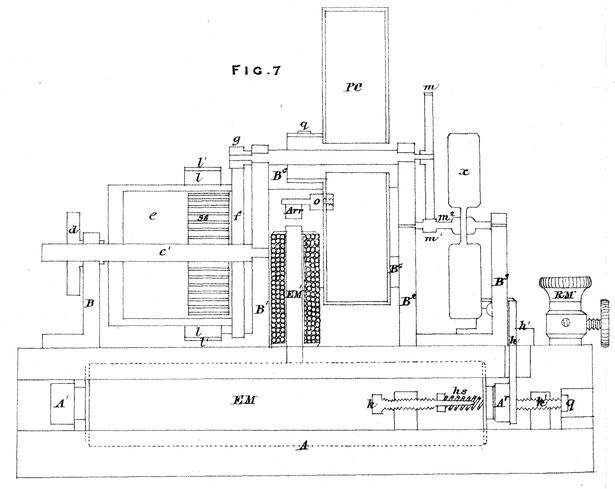
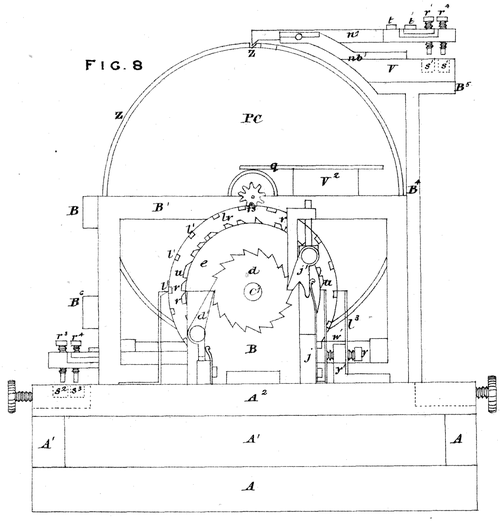


FIG. 8



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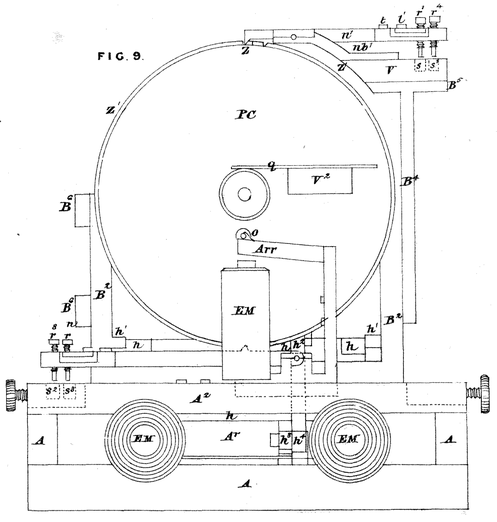

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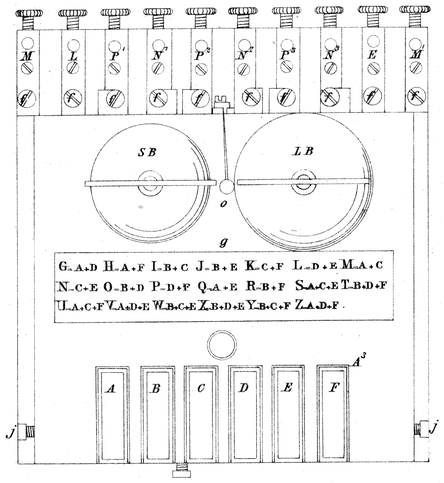
13 SHEETS)
SHEET 5.

FIG. 1.



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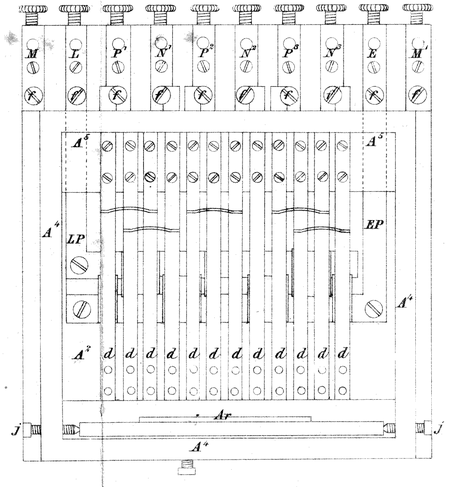


FIG. 3.

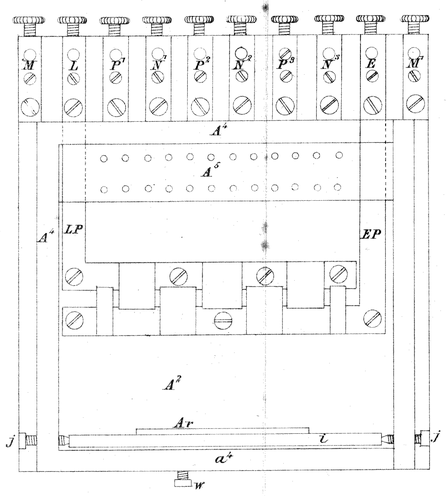


FIG. 4.

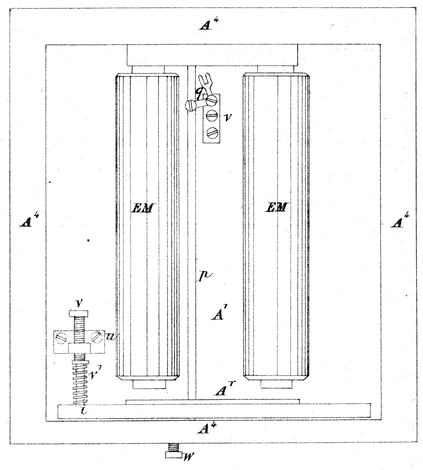
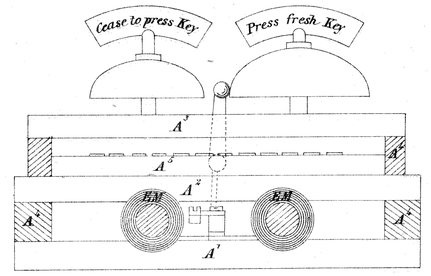


FIG. 5.



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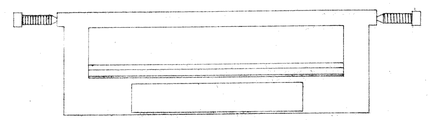


FIG. 12

FIG. 6.

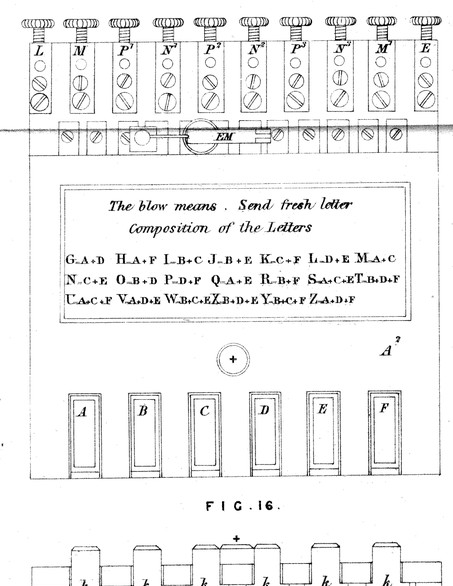


FIG. 7.

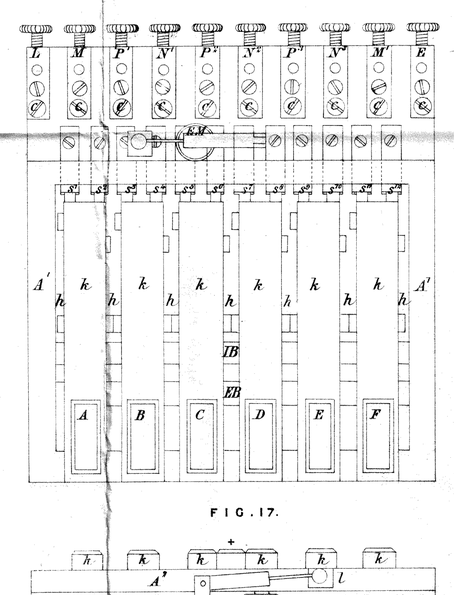
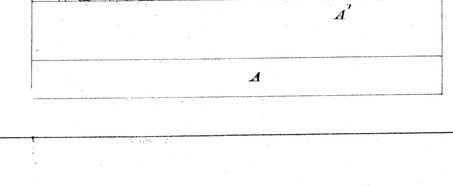


FIG. 7.

FIG. 13.



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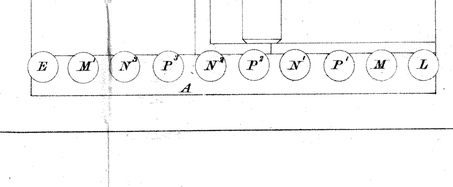

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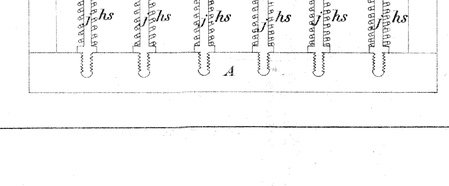

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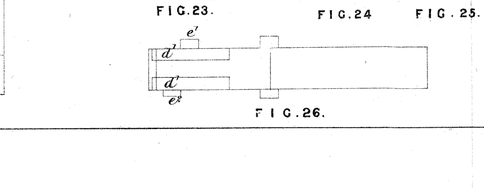

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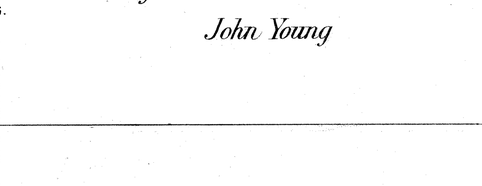

FIG. 16.

FIG. 17.

FIG. 18.

FIG. 21.

FIG. 22.

FIG. 23.

FIG. 24

FIG. 25.

FIG. 26.

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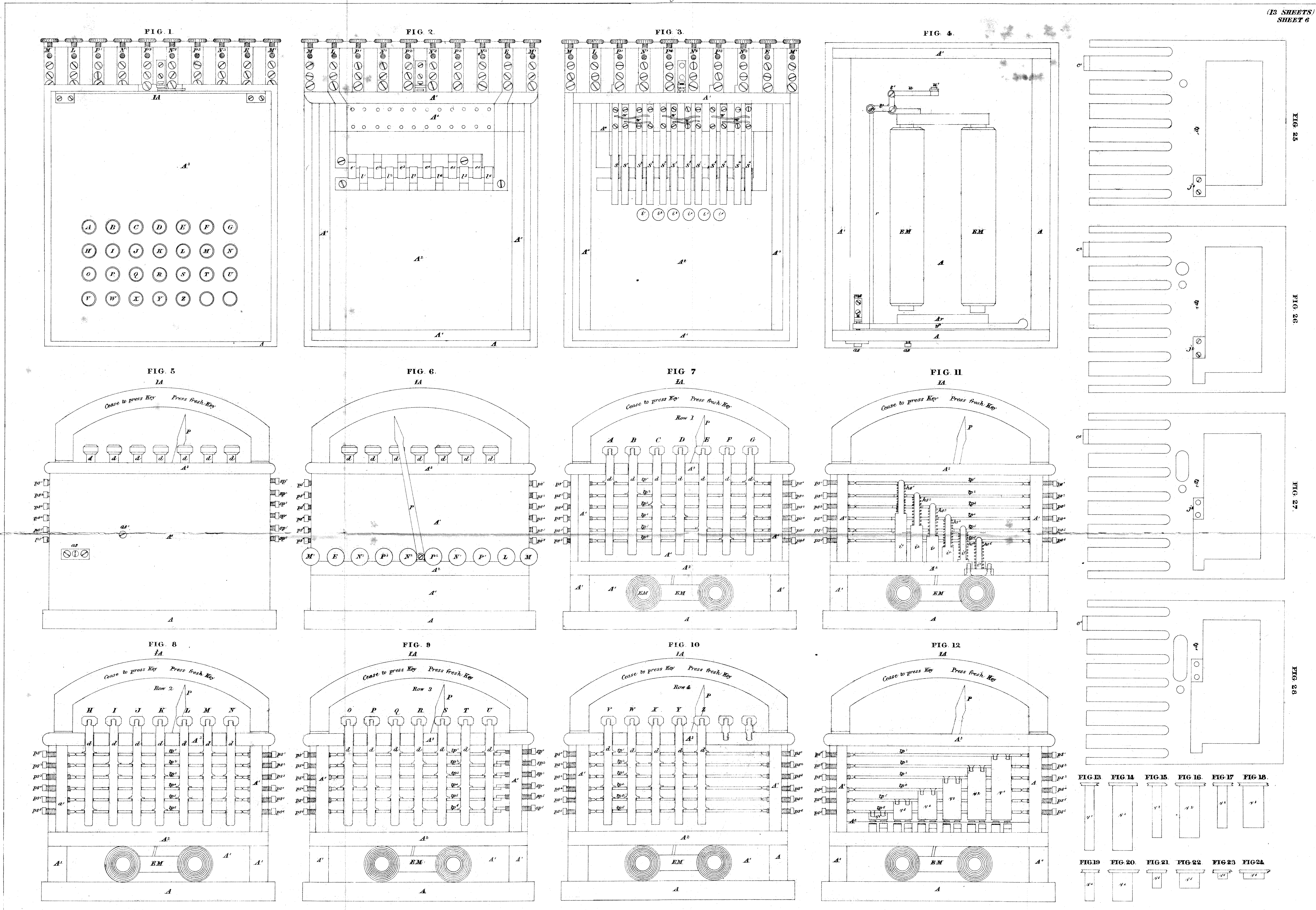

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13 SHEETS
SHEET 7.

FIG. 1.

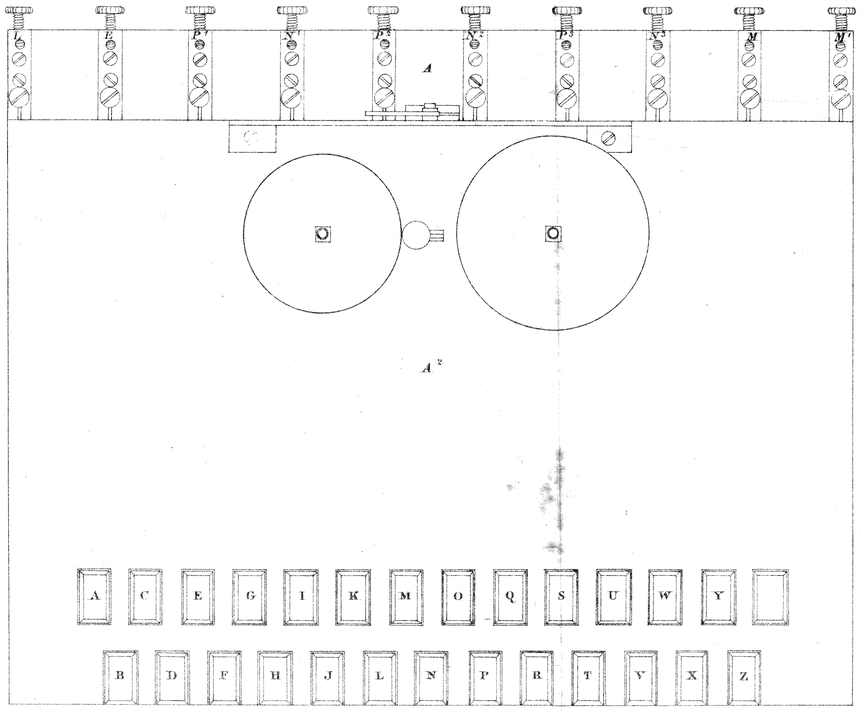


FIG. 2.

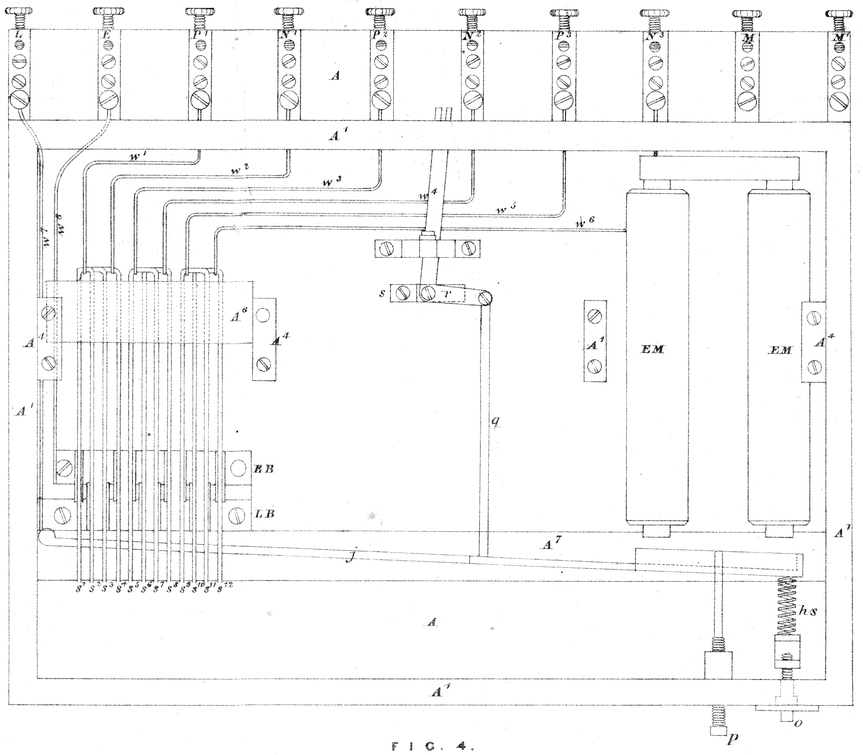


FIG. 6.

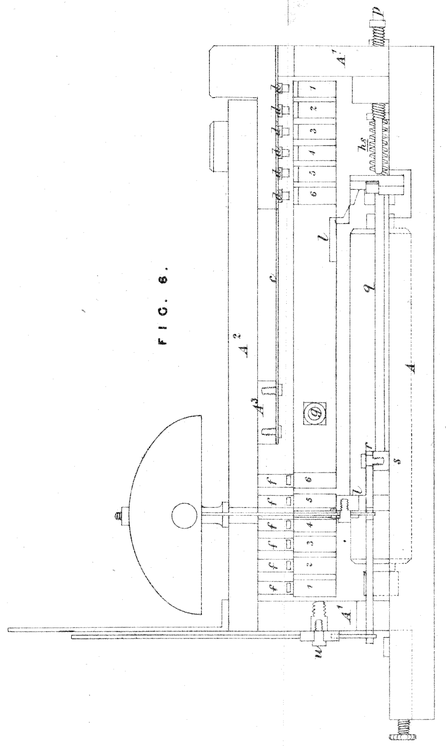


FIG. 3.

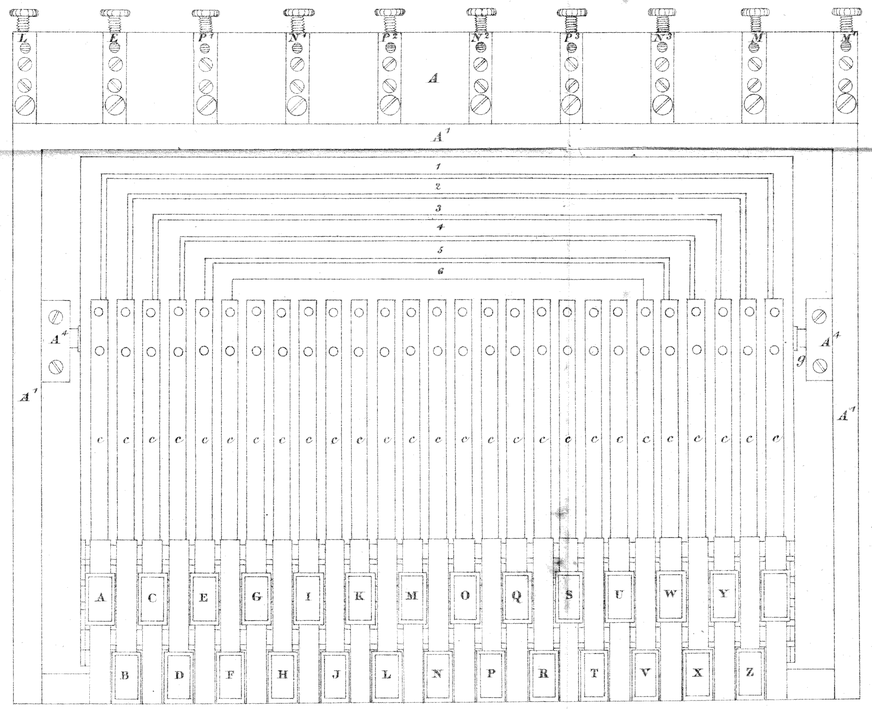
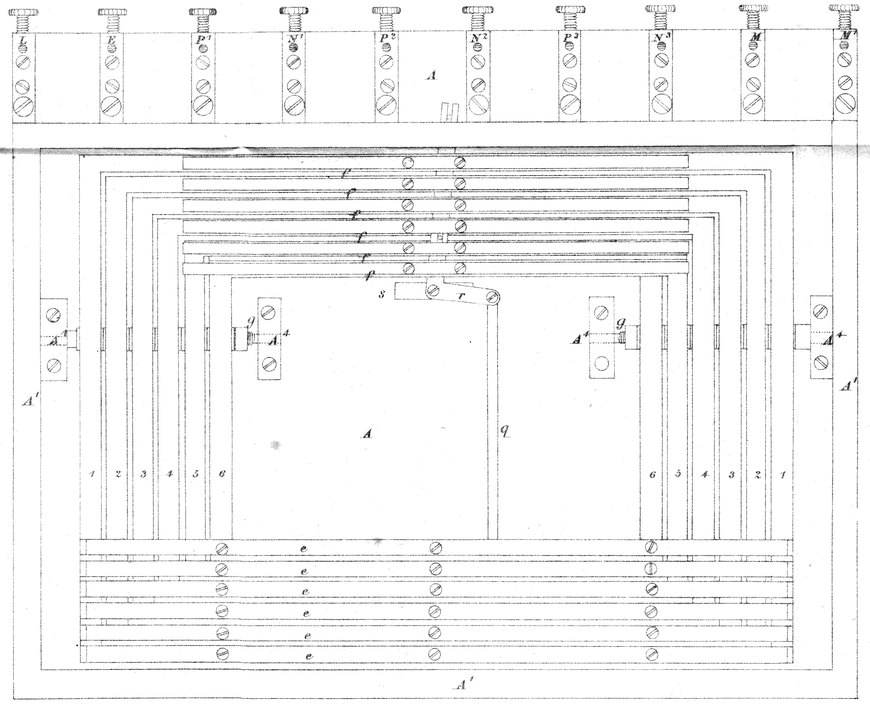


FIG. 4.



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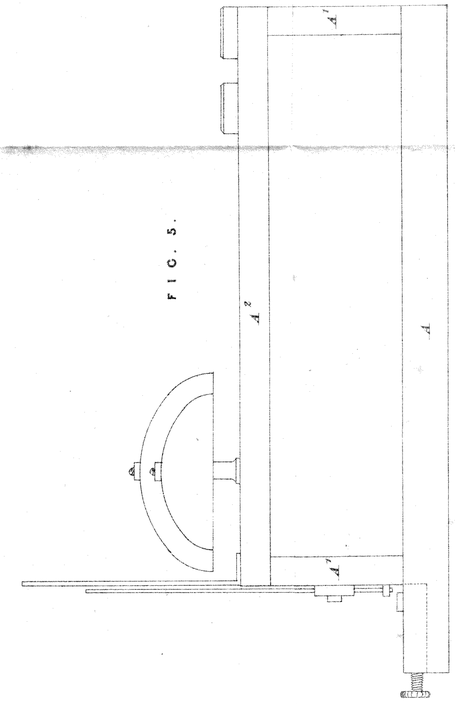

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Sheet 8.

Fig 1

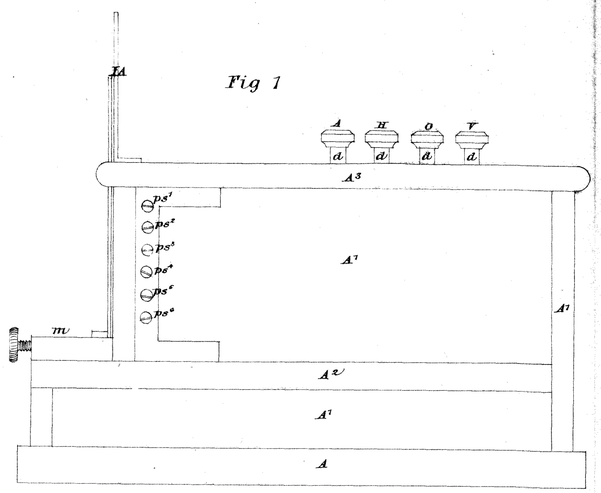
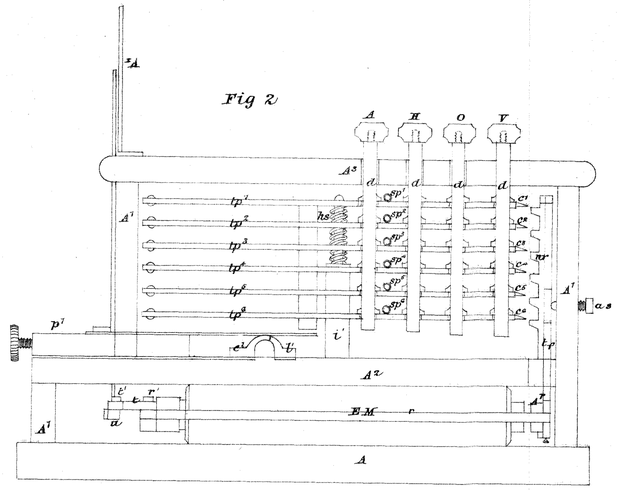


Fig 2



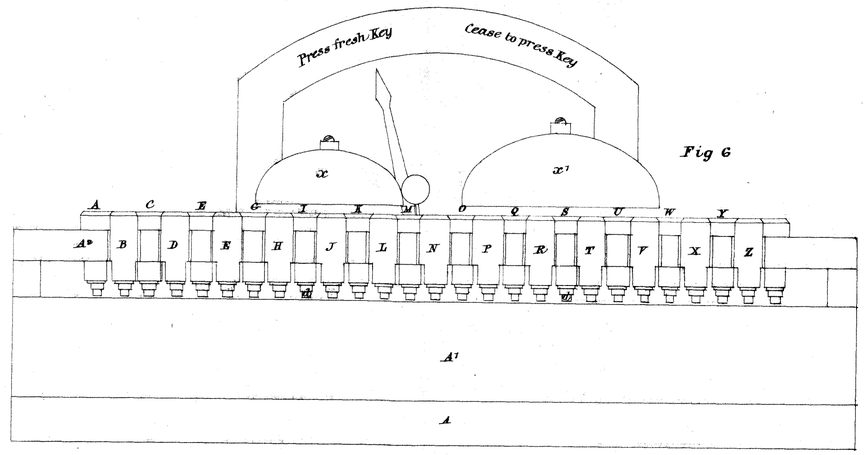


Fig 6

1A Fig 3

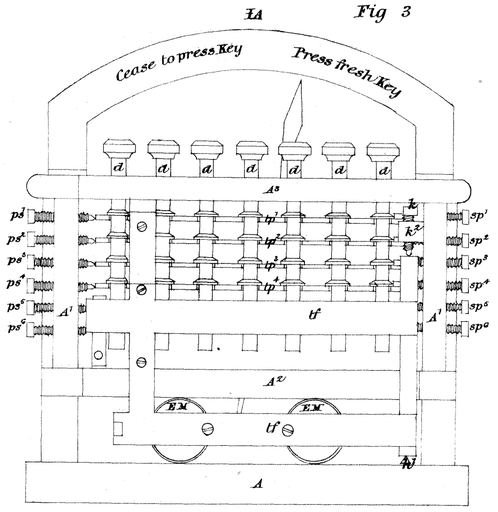


Fig 4

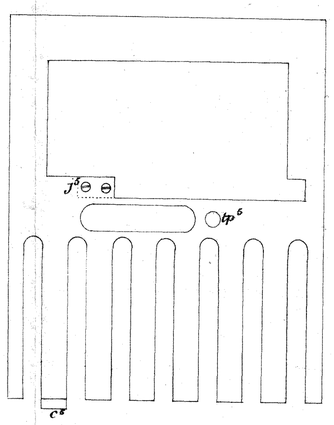


Fig 5

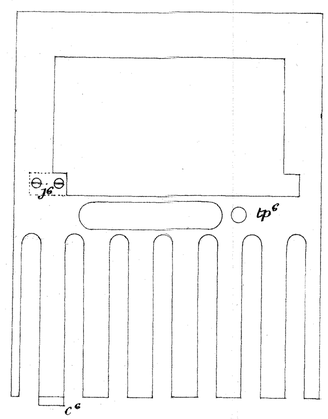
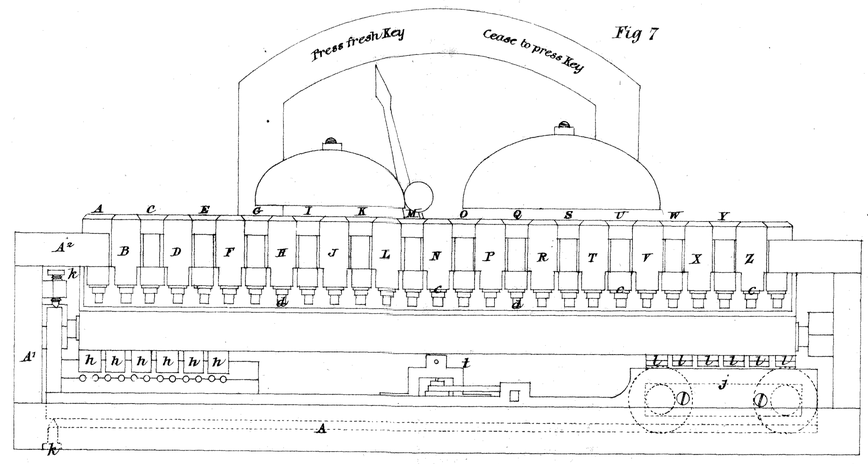


Fig 7



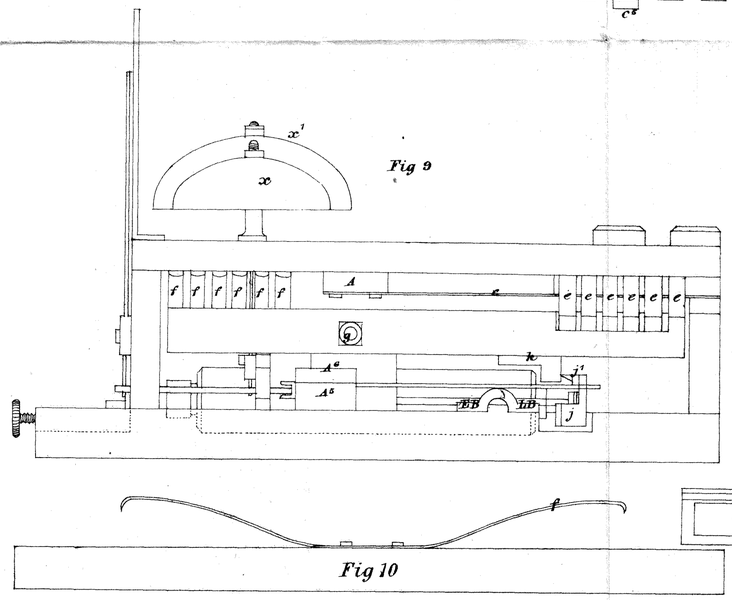


Fig 9

Fig 10

Fig 11

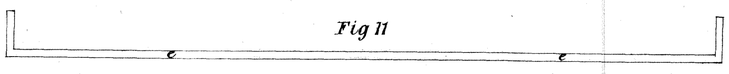


Fig 12

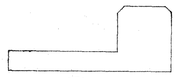


Fig 13

Fig 14

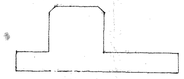


Fig 15

Fig 16

Fig 17

Fig 18

Fig 19

Fig 20

Fig 21

Fig 27

Fig 22

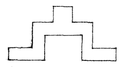


Fig 23

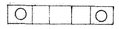


Fig 24

Fig 25

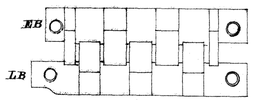


Fig 28

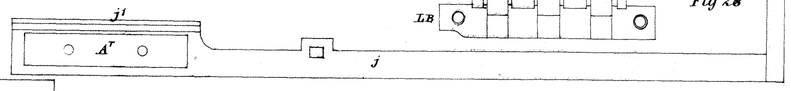
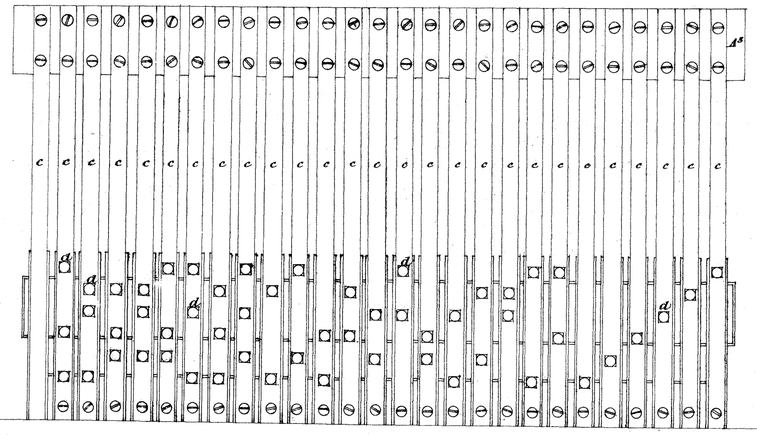


Fig 26

A2

Fig 8



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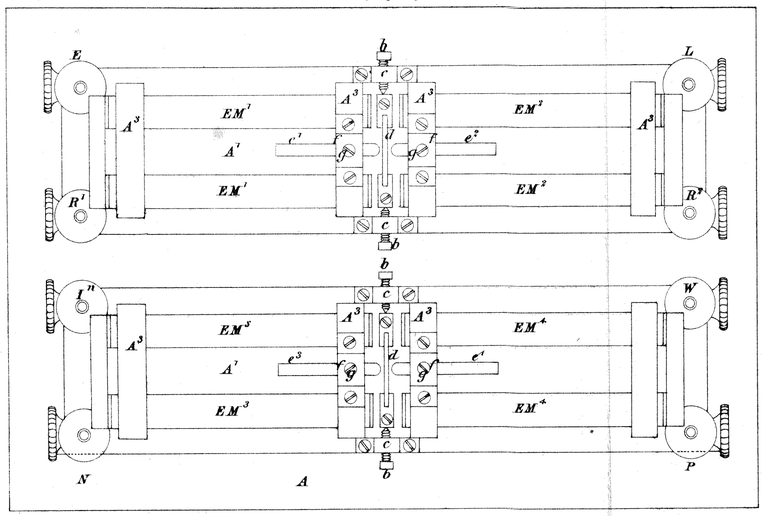

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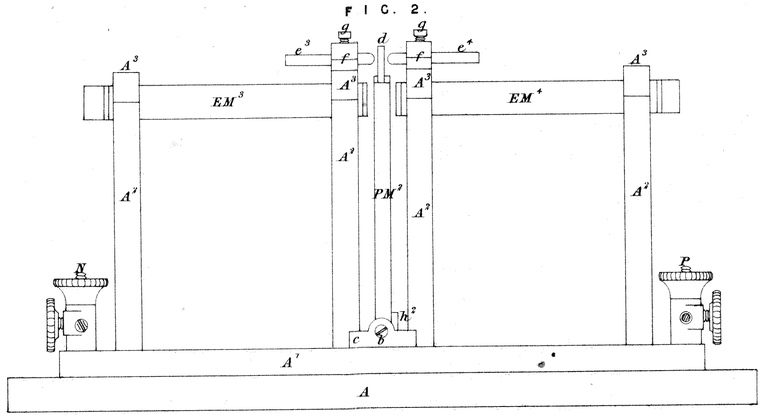

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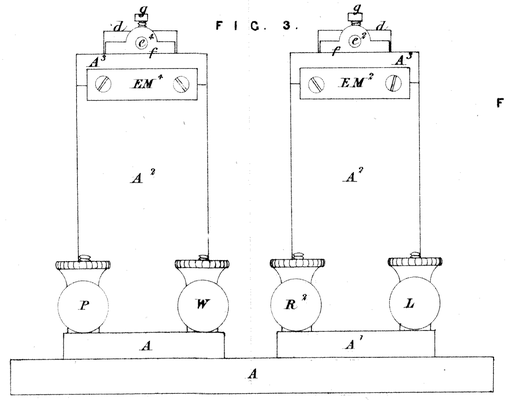


FIG. 6.

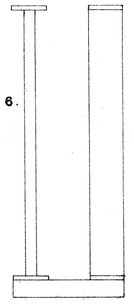
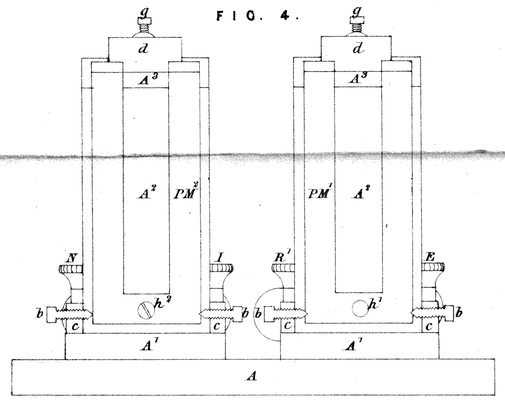


FIG. 7.

FIG. 4.



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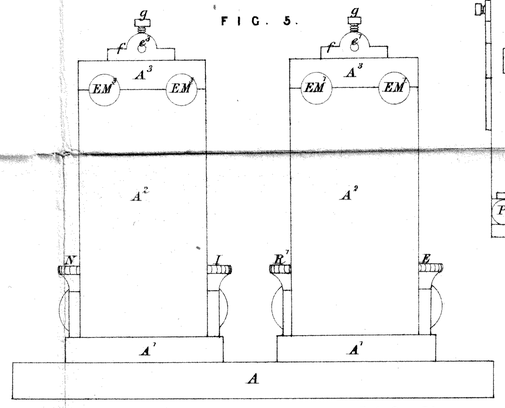
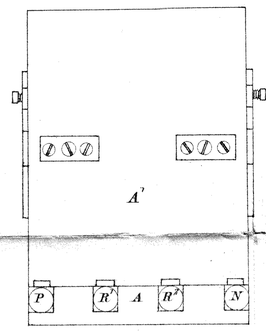


FIG. 8



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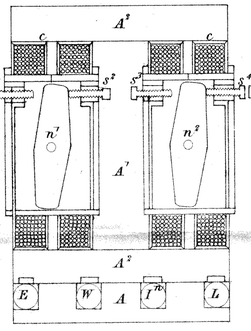

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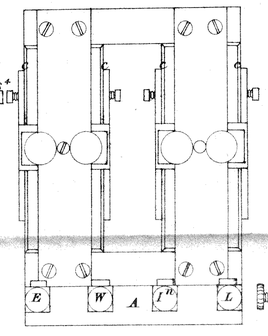

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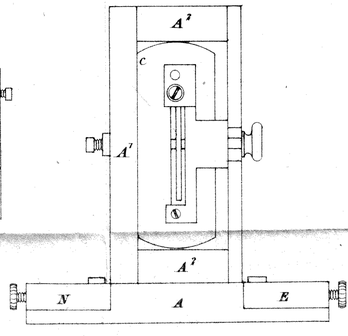

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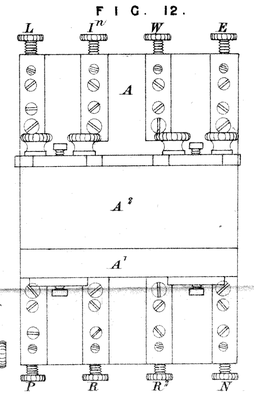

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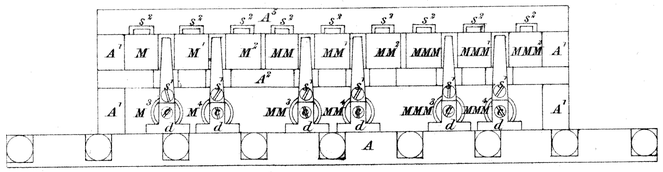

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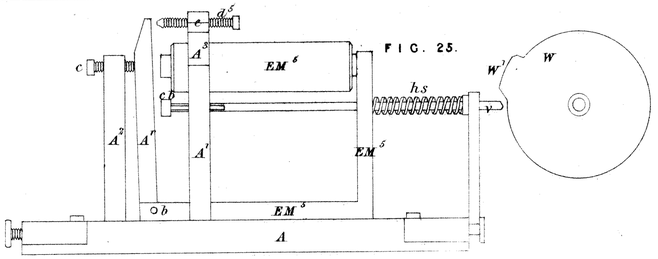

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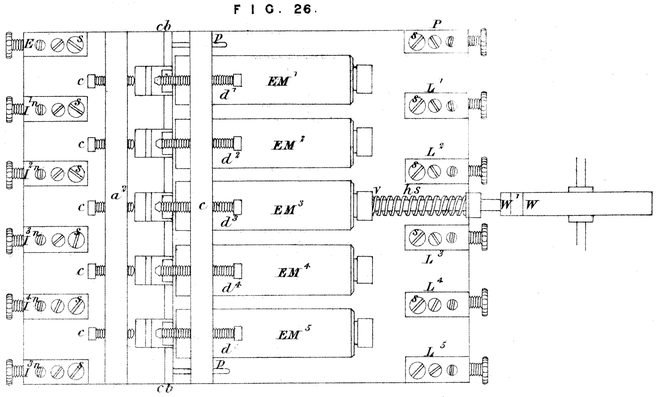

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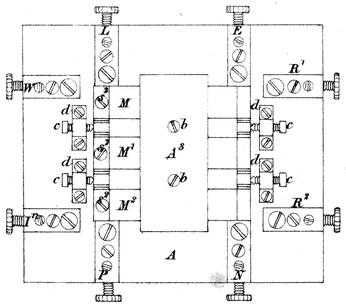

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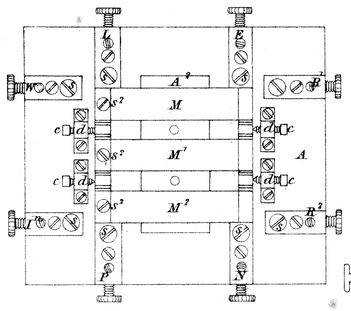

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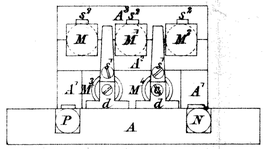

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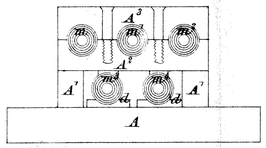

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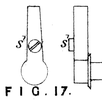

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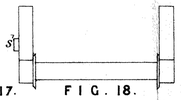

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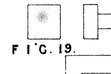

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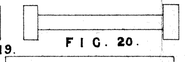

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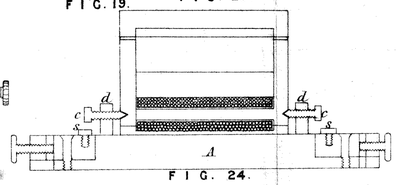

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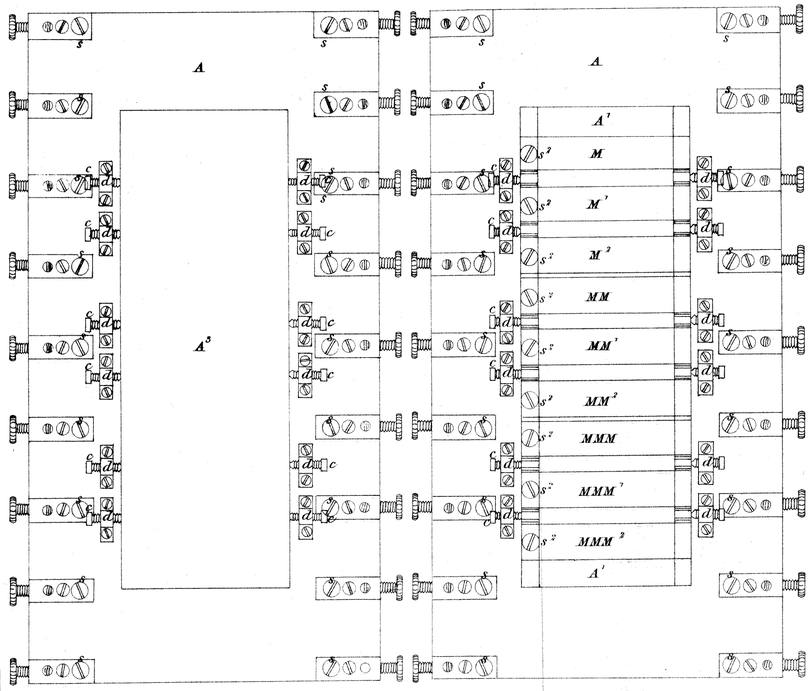

FIG. 22.

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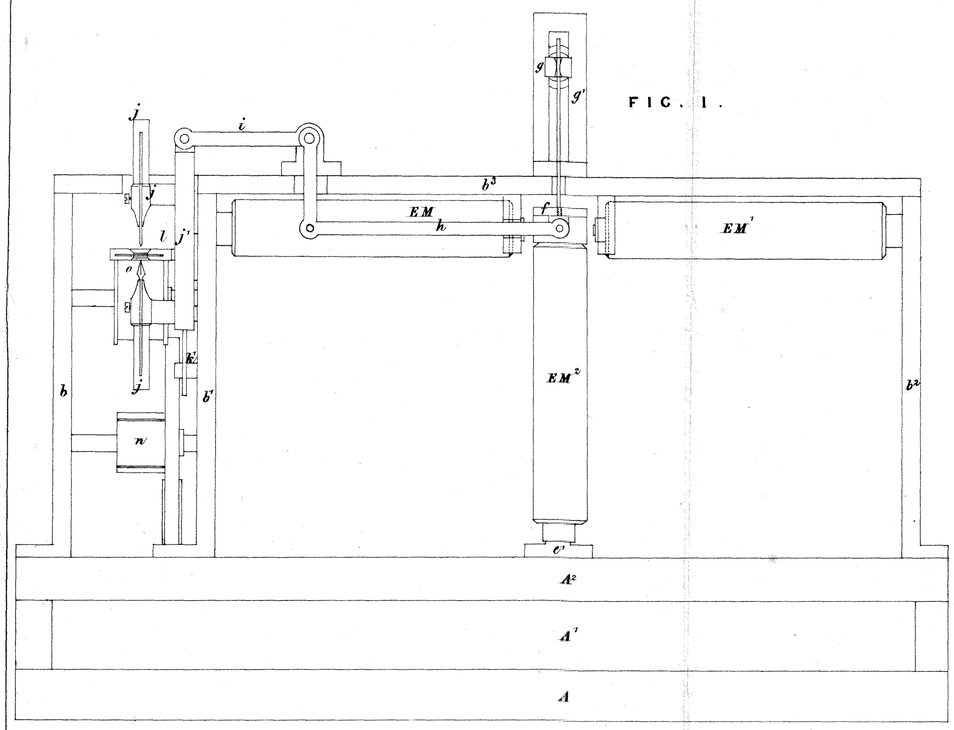
FIG. 1.



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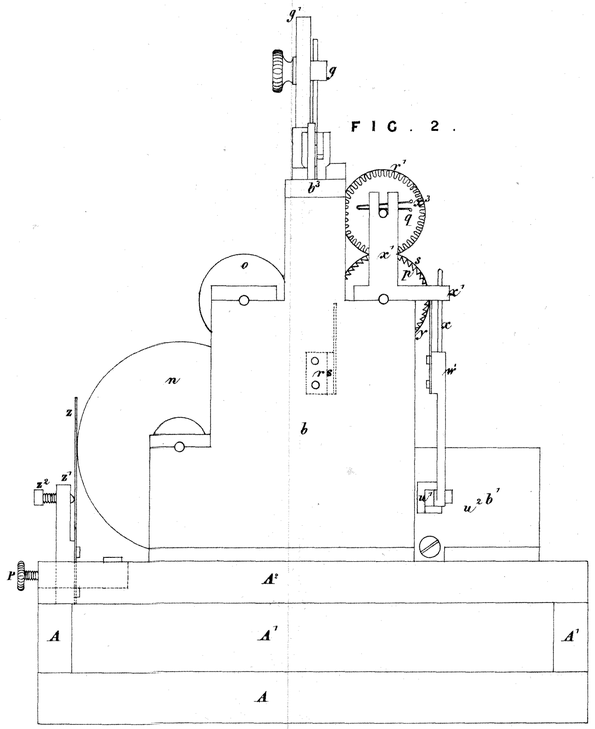

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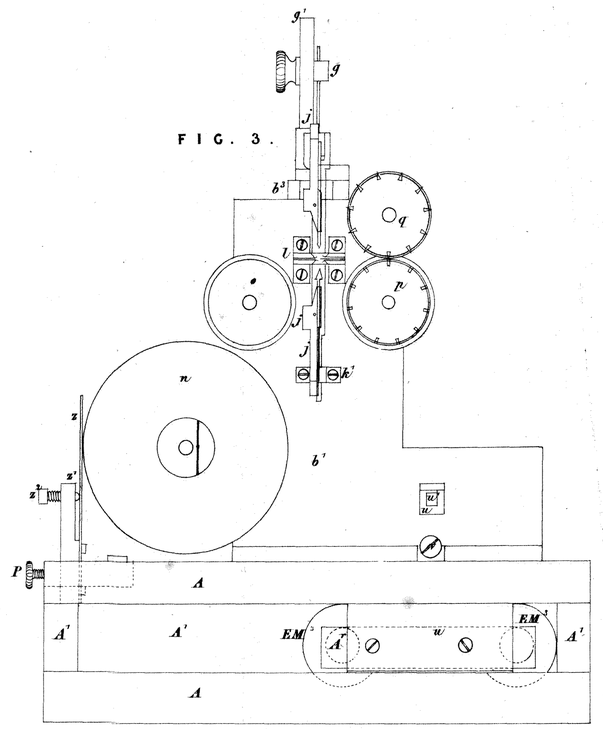

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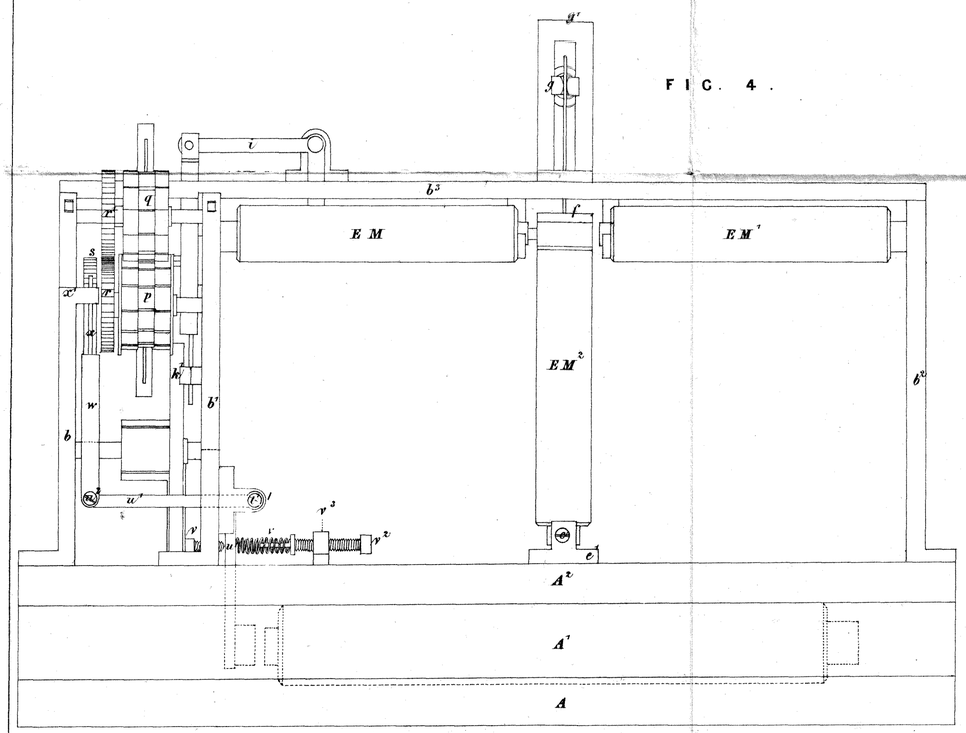

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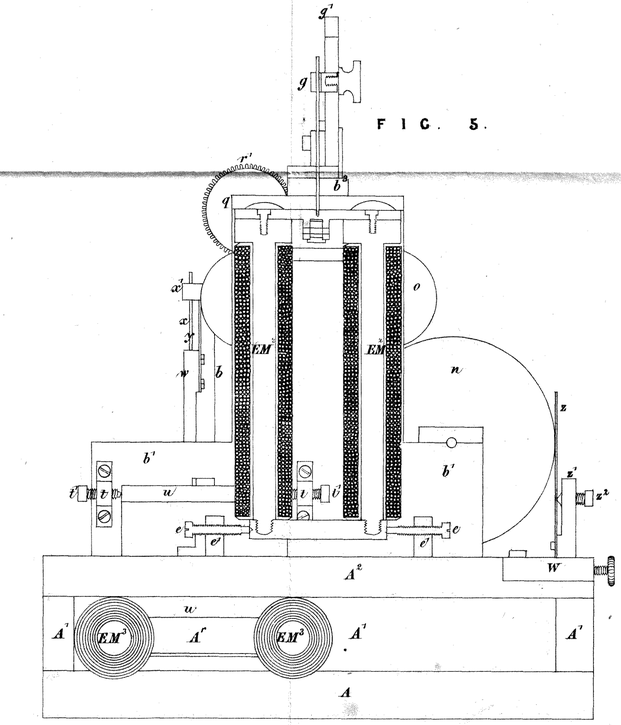

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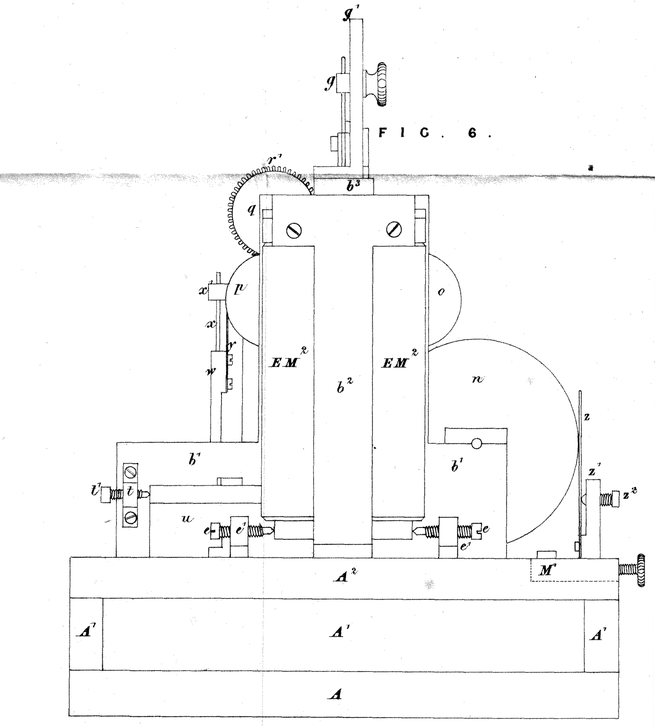

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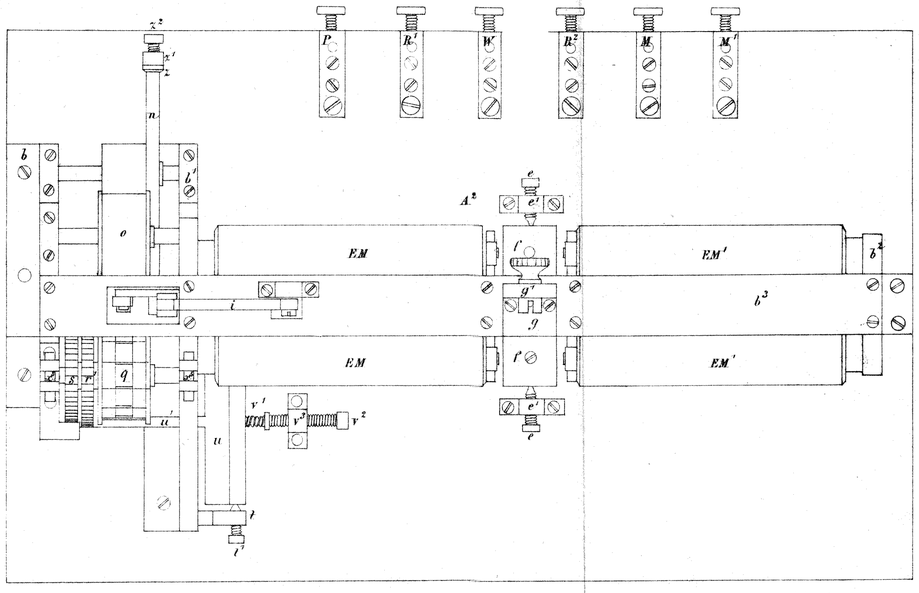
SHEET II.

FIG. 1.



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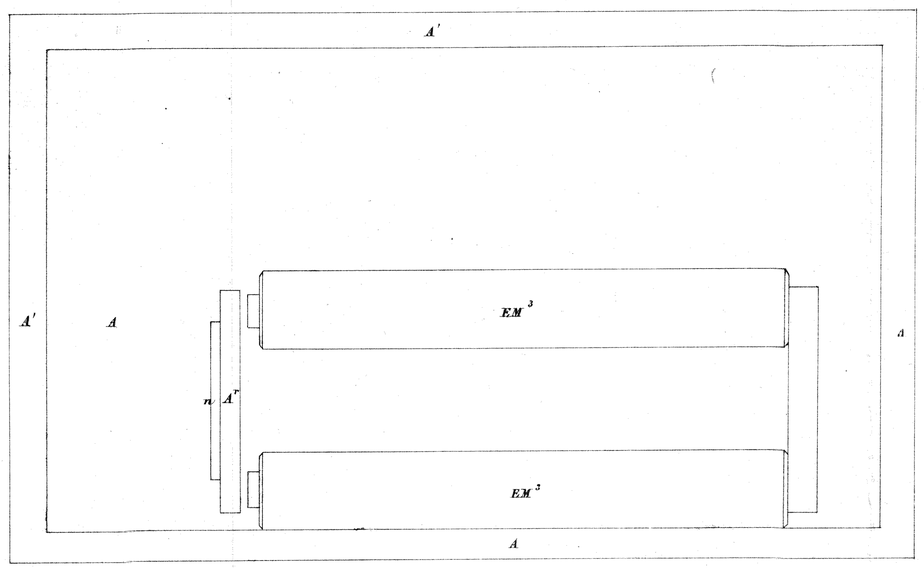

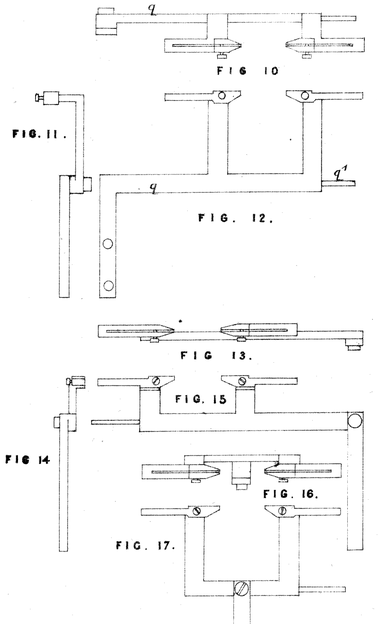

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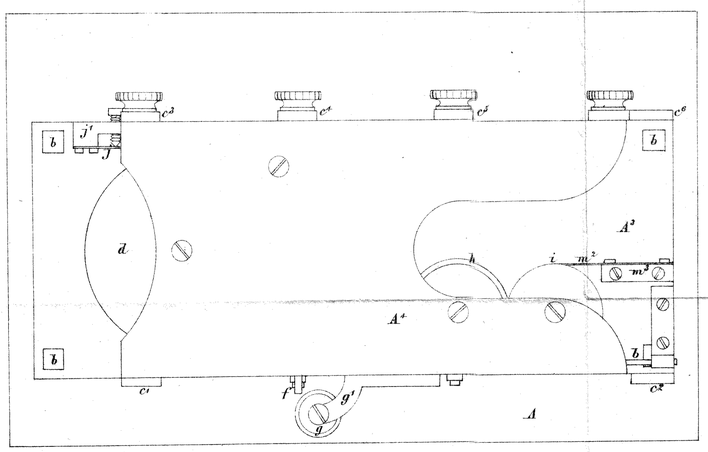

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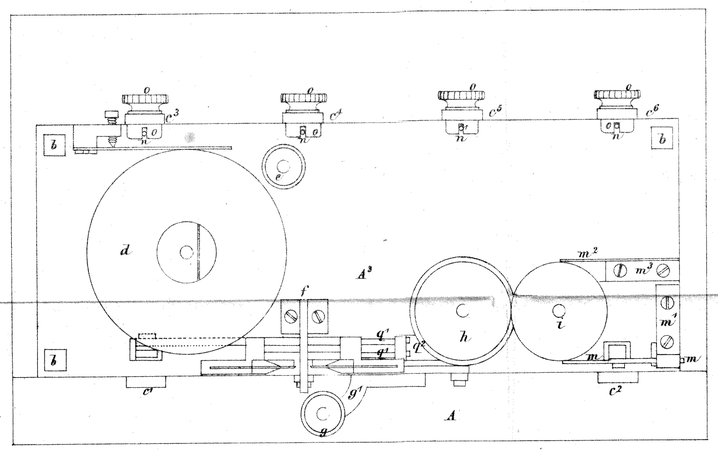

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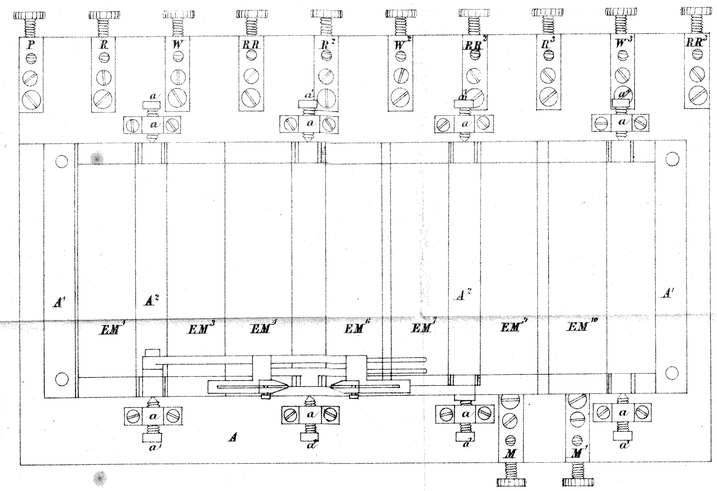

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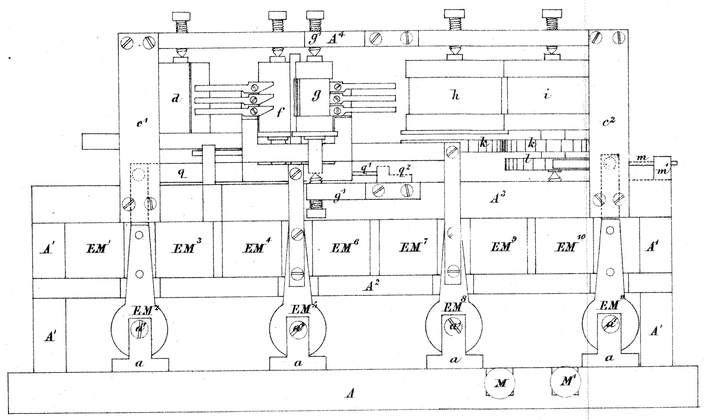
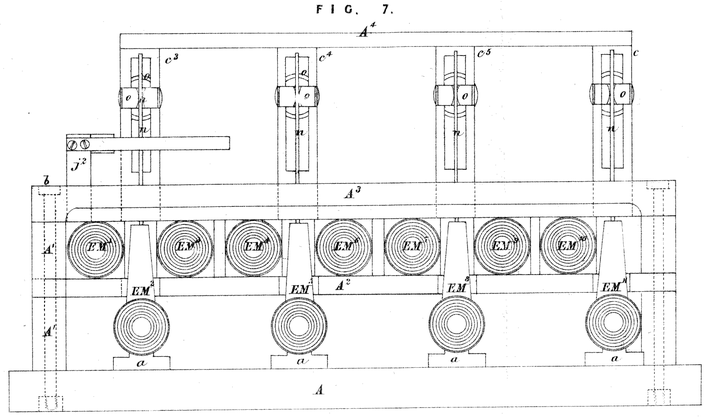


FIG. 7.



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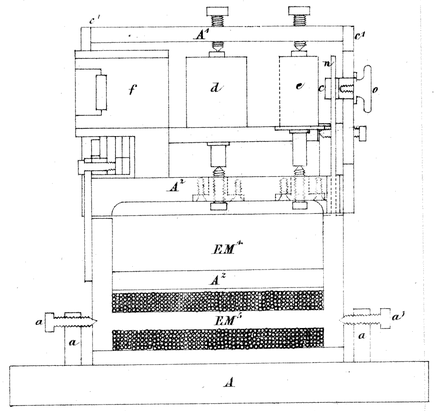
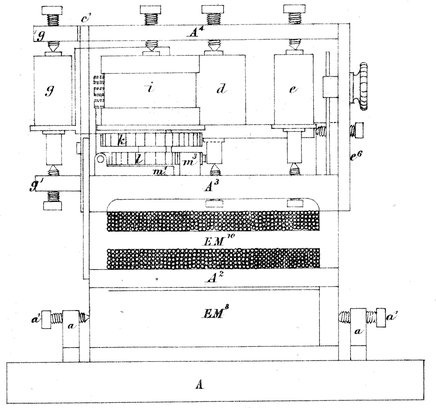


FIG. 9.



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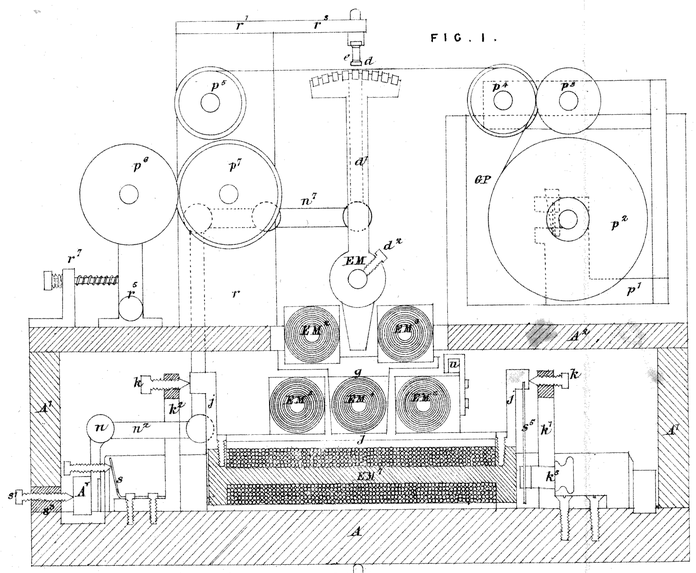
SHEET 12.

FIG. 1.



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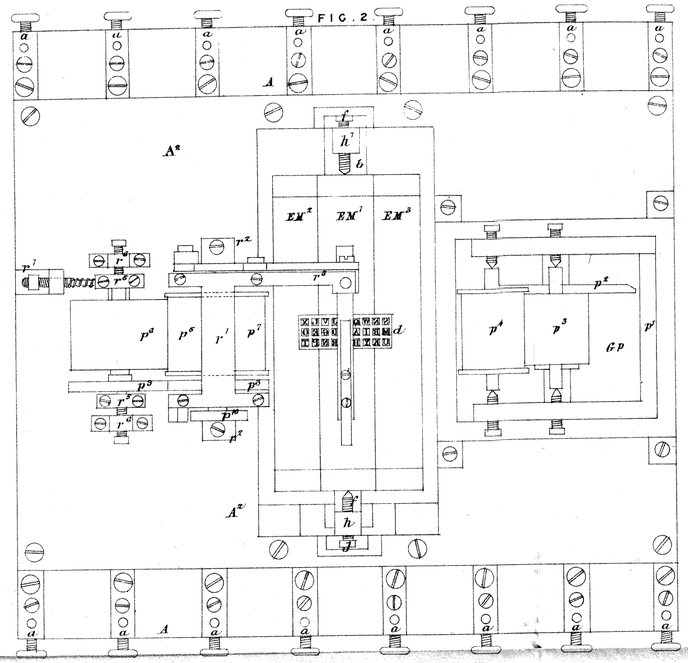

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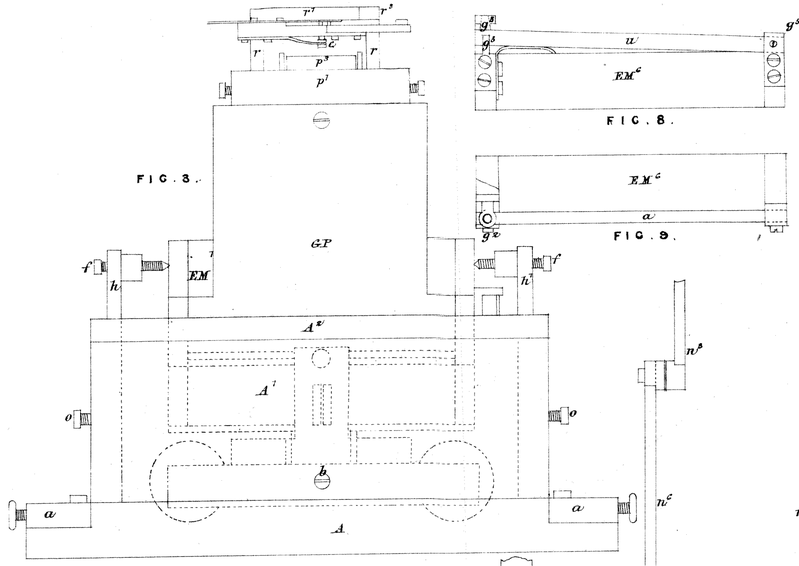


FIG. 8.

FIG. 10.

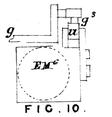
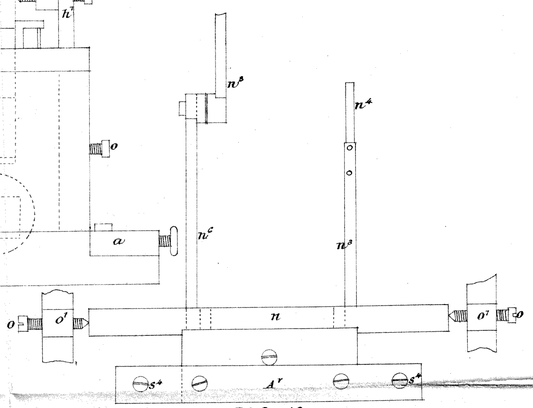


FIG. 9.

FIG. 11.

FIG. 12.



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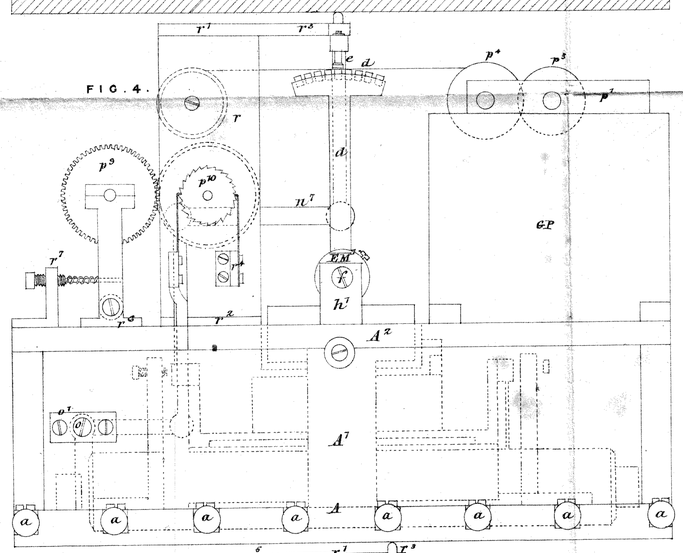

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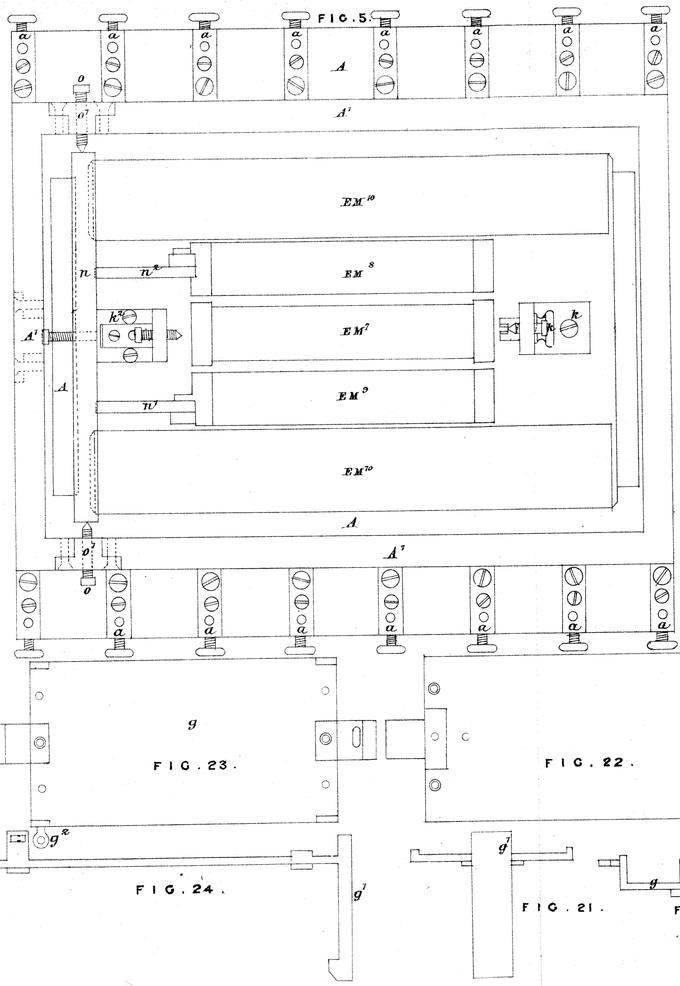

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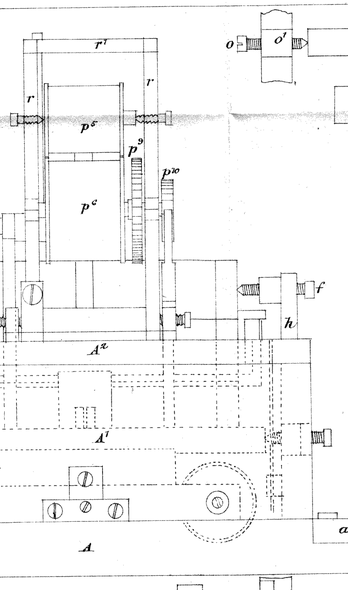

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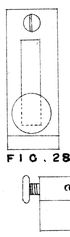

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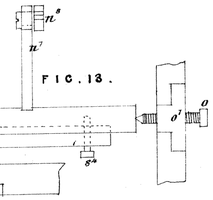


FIG. 14.

FIG. 25.

FIG. 26.

FIG. 27.

FIG. 6.

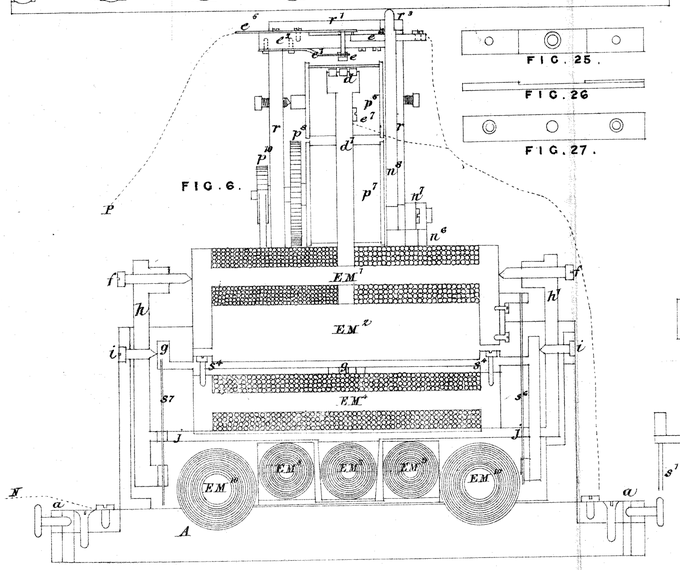


FIG. 23.

FIG. 22.

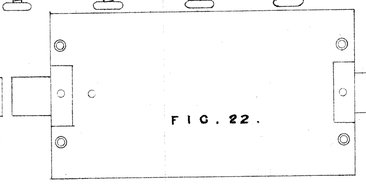


FIG. 24.

FIG. 21.

FIG. 20.

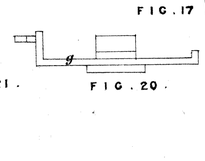


FIG. 17

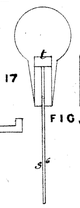


FIG. 18

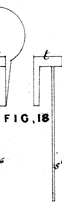
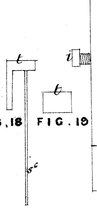


FIG. 19



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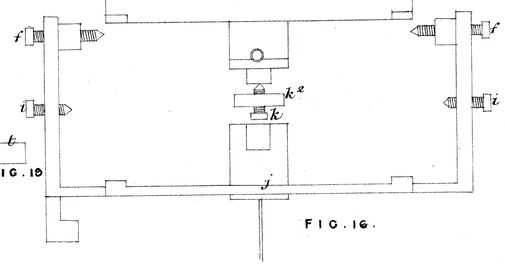

FIG. 16.

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SHEET 13

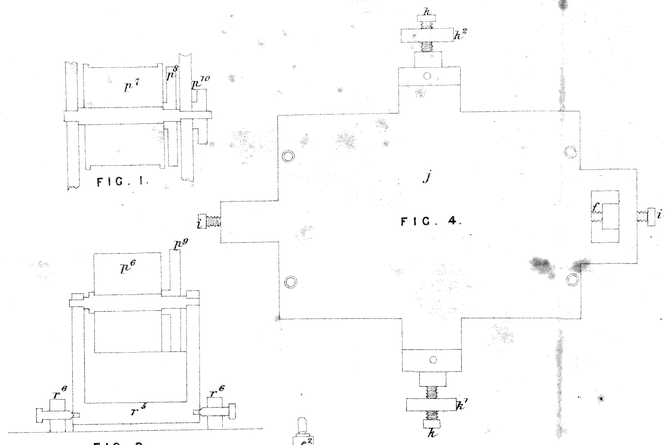

FIG. 1.

FIG. 4.

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FIG. 11.

FIG. 8.

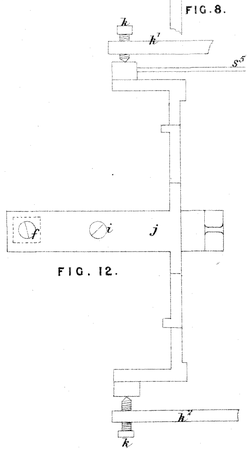


FIG. 12.

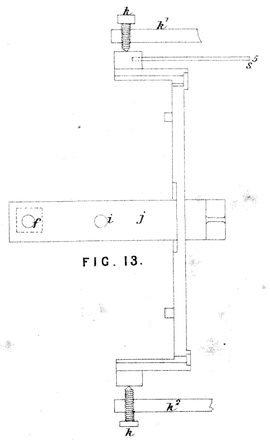


FIG. 13.

FIG. 14.

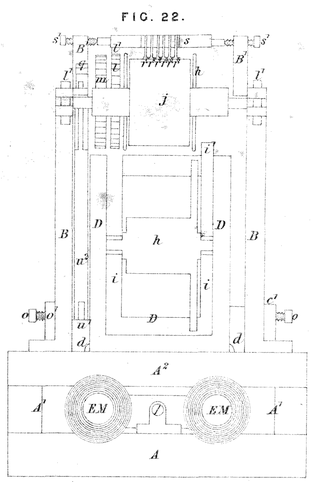


FIG. 22.

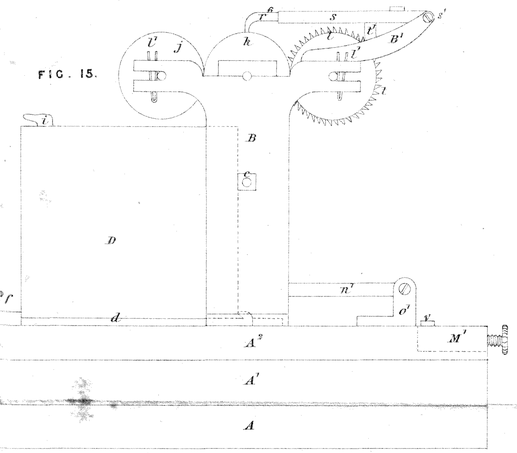


FIG. 15.

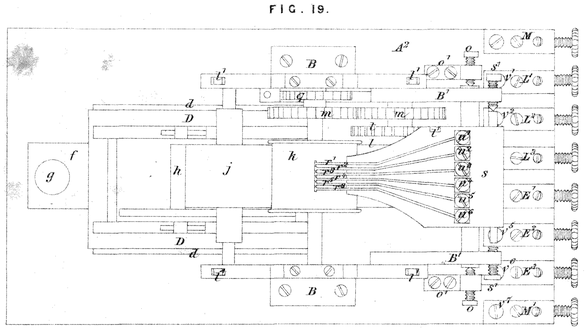


FIG. 19.

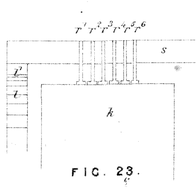


FIG. 23.

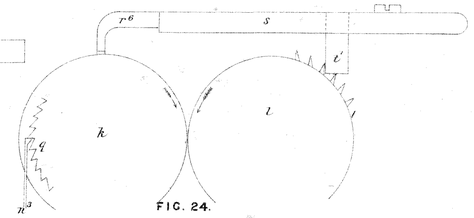


FIG. 24.

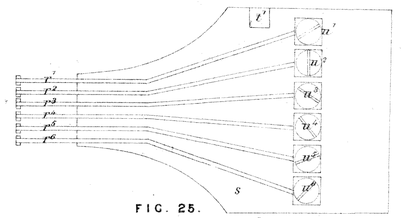


FIG. 25.

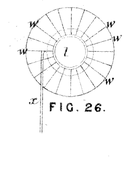


FIG. 26.

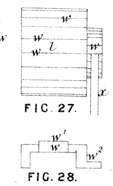


FIG. 27.

FIG. 28.

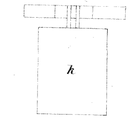


FIG. 29.

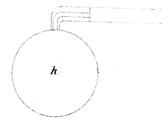


FIG. 30.

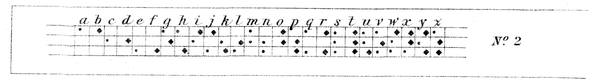


FIG. 31.

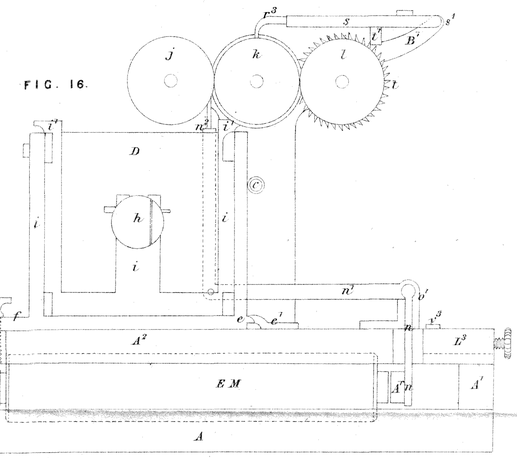


FIG. 16.

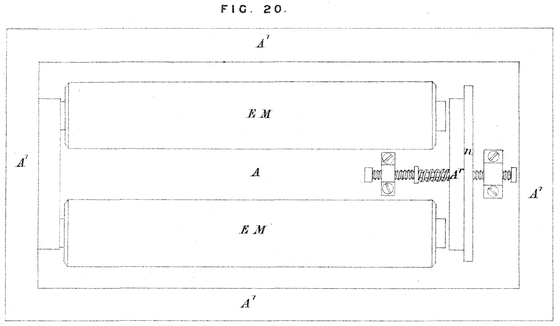


FIG. 20.

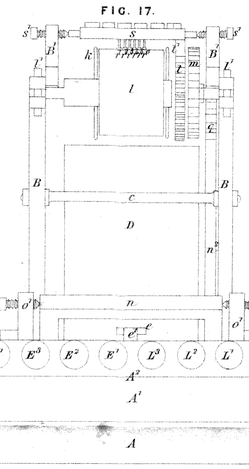


FIG. 17.

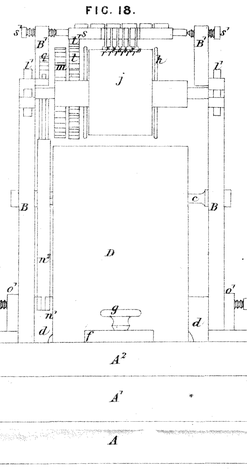


FIG. 18.

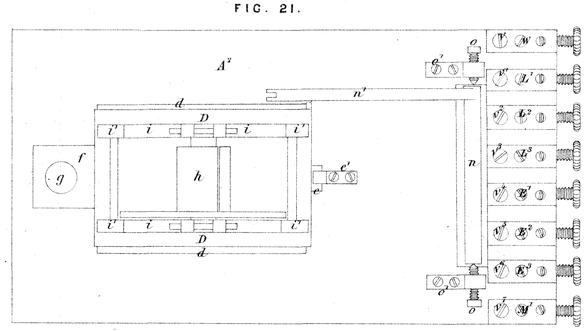


FIG. 21.

Signed:

John Young

A.D. 1861, 10*th July*. No. 44.

IMPROVEMENTS IN EXTRACTING GOLD AND SILVER, &c.

LETTERS OF REGISTRATION to Richard Goulding and Amos Downes Shepard, for Improvements in extracting Gold and Silver and other Metals from their ores and matrices.

[Registered on the 12th day of July, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Richard Goulding and Amos Downes Shepard, both of the city of Melbourne, in the Colony of Victoria, gentlemen, have by their Petition humbly represented to me that they are the authors or designers of certain inventions or improvements in manufactures, that is to say, of certain Improvements in extracting Gold and Silver and other Metals from their ores and matrices, which are more particularly described in the specification and paper of drawings hereunto annexed, and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioners therefore humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said inventions or improvements might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition and to report thereon for my information, am pleased, with the advice of the Executive Council,

and

and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said Richard Goulding and Amos Downes Shepard, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said inventions or improvements, for and during the term of fourteen years from the date hereof: to have, hold, and exercise, unto the said Richard Goulding and Amos Downes Shepard, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Richard Goulding and Amos Downes Shepard shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this tenth day of July, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

We, Richard Goulding and Amos Downes Shepard, do hereby particularly describe and ascertain the nature of our invention and the manner of performing the same as follows, that is to say:—It is well known that a large portion of gold is contained in quartz in the various forms of compound sulphur ores, and that it requires a most perfect calcination to drive off the sulphur and decompose the other minerals, otherwise the subsequent process of amalgamation cannot be perfect, as, enclosed in the form of sulphurets, arseniurets, pyrites, mundics, &c., &c., the gold will not amalgamate with the quicksilver; therefore, the object of our invention is to treat quartz and its variously associated minerals, such as sulphurets, arseniurets, pyrites, mundics, and the copper ores, with combustible materials, in such manner that when burnt the most perfect calcination may take place, and the whole of the sulphur be driven off, and decomposition of the baser minerals effected, leaving the gold or silver in a state to ensure perfect amalgamation when brought in contact with mercury; or, in the case of copper ore, its final extraction after calcination may be effected by dissolving it in water, it being converted by the above-mentioned process of combustion into a soluble sulphate of copper, which being taken up in solution by the water, may be precipitated in the metallic state, by galvanic or chemical action, upon inclined iron plates placed therein. But in order that the invention may be more clearly understood, we describe the process pursued by us (although we do not confine ourselves to the precise proportions of the different ingredients) as follows:—We take a quantity of quartz or other metalliferous material that has been previously reduced to a pulverized state, and mix with it sawdust and powdered charcoal, in the proportions of fifty parts by measure of quartz or other metalliferous material, twenty-five parts of sawdust or any other carbonaceous material, twenty-five parts of ground charcoal, and a sufficient quantity of clay to bring the mass into the form of blocks, bricks, or cakes. These blocks are then to be stacked into a kiln similar to an ordinary brick kiln, and burnt off; care being taken not to slag or fuse the brick except when the character of the ore may render it necessary to use a smelting furnace for final reduction. The combustible materials contained in the composition of the brick or cake will facilitate a perfect combustion, and the result be that the block will be brought into such a friable state that the slightest pressure will reduce it to a powder; and the sulphur being driven off, and oxidation of the other minerals or metals effected, the gold will be liberated and rendered susceptible of amalgamation with the mercury; or, in the case of copper ore, after the blocks are pulverized, the final extraction and conversion effected by solution in water, and precipitation upon sheets of iron placed at an incline of about 20 or 30 degrees, as above described. The bricks or cakes can be reduced to powder by any of the well-known means, but we claim to use an arrangement of machinery of the following description,

description, which we call a Triturating Amalgamating Machine, and which consists of a circular trough or dish of cast iron, stone, marble, or any other suitable material. This trough or dish may be cast in segments, for convenience of carriage (reference being had to the drawings hereunto annexed, in which the same letters are used to indicate the same parts wherever they occur). Figure 1 presents a top view of the known basin of a Chilian mill, or of the Mexican arastra or common puddling machine; AA, the basin or trough; B, the vertical shaft, from which the motive power may be applied, either animal or mechanical; CCCC, the arms, at the outer ends of which are connected, by any method deemed most suitable, the drags or sledges; DD, the sledges, which it will be observed, are so made as to fit closely to the bottom and sides of the basin or trough, and conform to that part of the circle where their services are required. The circular motion given to the shaft causes necessarily a rotatory action of the drags or sledges. It may be well here to remark, that the sieve here shewn and marked E must only be used during the process of pulverizing; previous to amalgamation, the sieve must be removed, and a slide of metal or other material substituted in its place, so as to perfect the basin or trough. These machines may be placed above each other, to facilitate the process. Figure 2 shews a divided section of same, in which the same letters are used to indicate the same parts wherever they occur. Having thus described the nature of the invention and the mechanical details, we would have it clearly understood that we do not confine ourselves to the particular details (so long as the character of the invention and process in combination be understood), more especially the size, form, or materials of which the said mechanical arrangement may be made or manufactured; but what we do claim is—First—Combining with the pulverized materials or ore containing gold, silver, or other metals, combustible materials, which, when burnt, a perfect calcination is effected, the sulphur driven off, and the other metals or minerals oxidized, thus facilitating the amalgamation of the gold and other materials with the mercury. Secondly—The mechanical arrangement as herein substantially described. Thirdly—The reduction of the ores and the amalgamation of the metals, by the rubbing or friction of the drags or sledges, as above described, against the sides and bottom of the basin or trough. Fourthly—The peculiar form of the drags or sledges, by which means the mass of ore when reduced to a pulp in the process of amalgamation, is allowed to pass over the drags and stream upon the quicksilver in the bottom of the basin or trough; the drags or sledges, or the bottom of the basin, being grooved in the bottom, to permit the mercury to flow freely through and under them. And, fifthly—we claim to use the calcination process as previously more particularly described, either separately or in combination with the mechanical arrangement here detailed, reference being to the drawing hereunto annexed.

This is the specification referred to in the annexed Letters of Registration granted to Richard Goulding and Amos Downes Shepard, this tenth day of July, 1861.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, 7 June, 1861.

Sir,

Having examined and considered the matter stated in the Petition of Mr. Richard Goulding and Mr. Amos Downes Shepard, for Letters of Registration for certain improvements in extracting Gold and Silver and other Metals from their ores and matrices, we have the honor to recommend that the necessary Letters be granted.

We have, &c.,
E. W. WARD.
R. GREENUP.

The Honorable
The Colonial Secretary.

P.S.—The documents transmitted to us are herewith returned.

[Drawings—one sheet.]

Copy

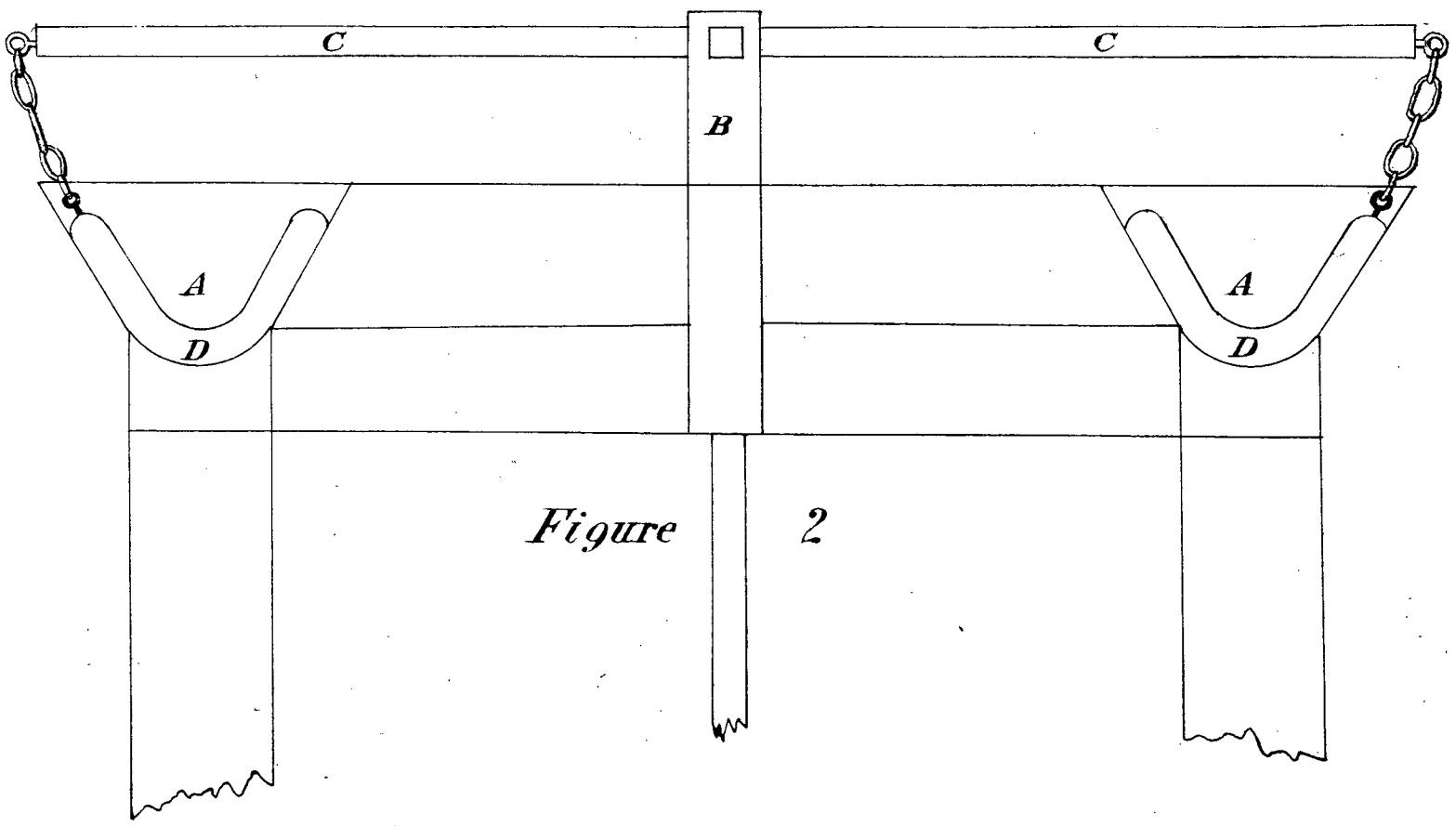
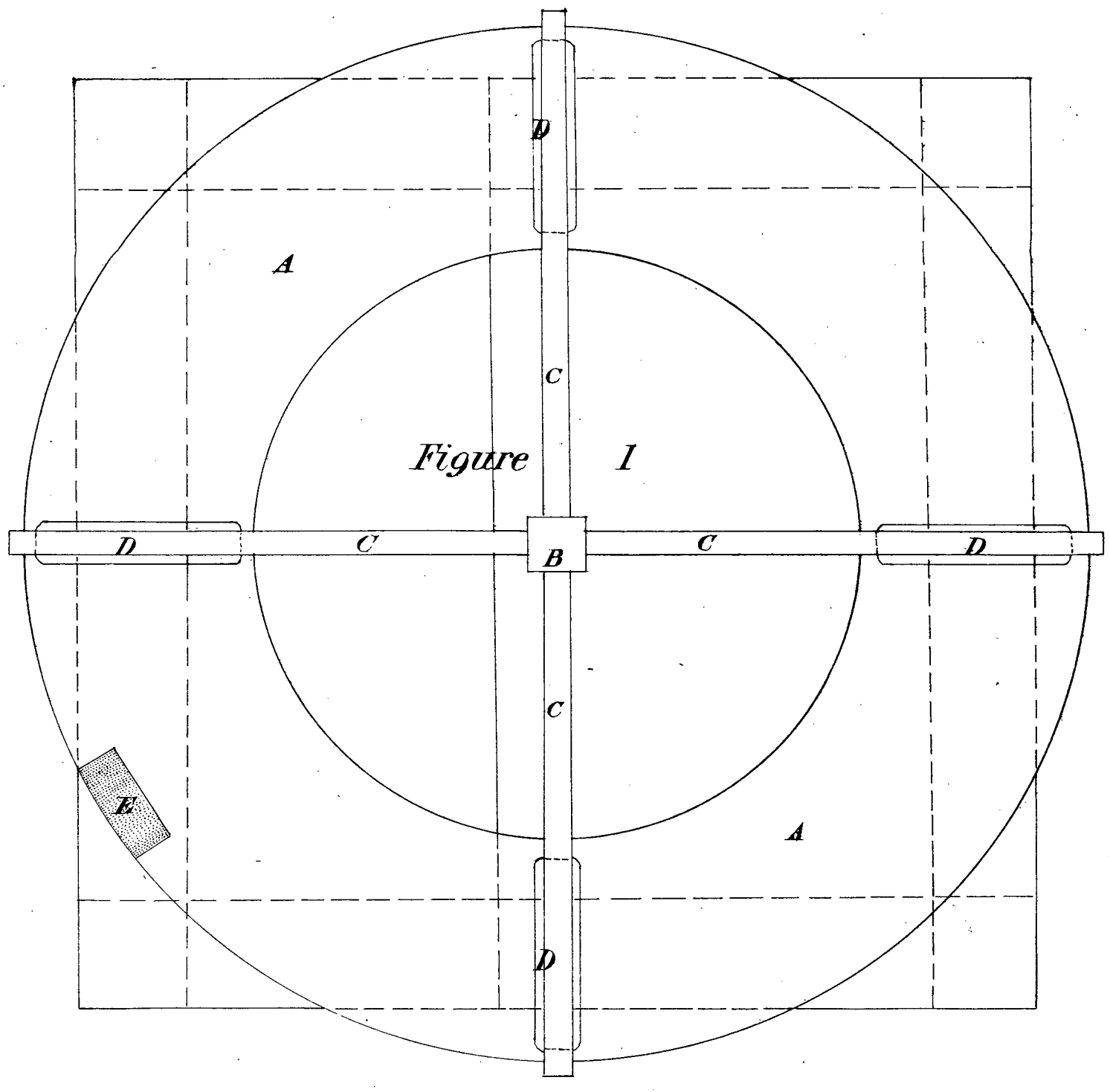


Figure 2



This is the Paper of Drawings referred to in the annexed Letters of Registration granted to Richard Goulding and Amos Downes Shephard this Tenth Day of July 1861

(Sd) John Young

A.D. 1861, *6th August.* No. 45.

BISMUTHOGRAPHY.

LETTERS OF REGISTRATION to Messrs. Grosse and Jenny, for Bismuthography.

[Registered on the 7th day of August, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Randolph John Want, of the city of Sydney, in the Colony of New South Wales, Esquire, has by his Petition humbly represented to me that Frederick Grosse and Rodolph Jenny, of Collins-street, in the city of Melbourne, in the Colony of Victoria, engravers, are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of a certain process termed Bismuthography for producing and drawing on metal in relief to print from in the type printing-press, the particulars of which are fully set forth and described in the specification hereunto annexed, and that he, the said Petitioner, has deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and has humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to the said Frederick Grosse and Rodolph Jenny, for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and

consider

consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said Frederick Grosse and Rodolph Jenny, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Frederick Grosse and Rodolph Jenny, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Frederick Grosse and Rodolph Jenny shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixth day of August, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

BISMUTHOGRAPHY is the process to produce any drawing on metal in relief to print from by the type printing-press. Any drawing to be done is etched in the same manner as is known to and practised by engravers and etchers, into a thin zinc plate, which is mounted on a plate of lead.

The lines of the drawing thus etched out of the zinc are raised in the following manner:—

The zinc plate is heated, and bismuth, or a composition of bismuth, tin, and lead, bismuth being the principal part of it, is in a melted state rubbed over the plate into the etched lines; and to combine the zinc and bismuth, muriatic acid is applied. By the combination of the two metals, a certain portion of bismuth remains on the surface of the zinc plate, from which the same has to be removed, so as to be left only in the etched lines in a level with the surface of the zinc. All those endings and other parts of the lines which have to be lowered, are now driven down by the use of a punch. A wall of wax is then made around the margin of the plate, and in the inclosure so formed, nitrous acid is poured, and the zinc not being protected by a varnish is etched down, whilst the bismuth forming the lines of the drawing resists the action of the acid, and becomes thus the elevated part of the plate, so much so, that if the drawing being shaded all over, the plate, after being mounted on wood to the proper type height, is ready to be printed from. Outlines, or less shaded drawings, where the lines require a greater elevation, the latter have to be covered with venetian turpentine, to protect them from being undermined by the action of the acid when the zinc is etched to a greater depth. By any drawing where a certain effect by dark and graduated tints shall be given, which cannot be produced well by the bismuth only, the zinc itself is brought into use so as to form the lines of the drawing in conjunction with the bismuth.

When the outline and all the shading of the drawing, excepting the tint, is made, etched in, and filled up with bismuth, the plate is covered with varnish, and the required tint drawn either by hand or a ruling machine, and then etched in; the spaces between these etched lines which were untouched by the acid, form now the raised lines of the tint. Graduation of tints is produced by more or less etching with acid.

We claim as our invention the method of producing raised lines, figures, or letters, in the etched lines, by the use of bismuth, together with the graduated tints as described, so as to permit an impression to be taken therefrom by means of the common process of printing from raised types as from a stereotype plate, commonly called letter-press printing.

FREDERICK GROSSE.
Melbourne, May 23rd, 1861. RODOLPH JENNY.

This is the specification referred to in the annexed Letters of Registration granted to Frederick Grosse and Rodolph Jenny, this sixth day of August, 1861.

JOHN YOUNG.

REPORT

Bismuthography.

REPORT.

Royal Mint, Sydney,
11 *July*, 1861.

Sir,

Having examined and considered the matter stated in the Petition of Mr. Randolph John Want, on behalf of Messrs. Frederick Grosse and Rodolph Jenny, for Letters of Registration for their invention or discovery of a certain process called "Bismuthography, for producing any drawing on metal in relief to print from in the type printing-press," we have the honor to recommend that the protection prayed for be granted.

We have, &c.,
E. W. WARD.
R. GREENUP.

The Honorable
The Colonial Secretary.

A.D. 1861, 12*th August.* No. 46.

IMPROVED THREE-WHEELED VEHICLE.

LETTERS OF REGISTRATION to James M'Leery, for an improved Three-wheeled Vehicle.

[Registered on the 14th day of August, 1861, in pursuance of the Act 16 Vict., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James M'Leery, of the city of Sydney, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an improvement in the manufacture of a Three-wheeled Vehicle, which is more particularly described in the specification and drawing hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of

Council,

Improved Three-wheeled Vehicle.

Council, to grant, and do, by these Letters of Registration, grant unto the said James M'Leery, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James M'Leery, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James M'Leery shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twelfth day of August, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION

Of an improvement in the manufacture of a Three-wheeled Vehicle, by James M'Leery, who claims to be the designer and inventor of the braces A, which attach the third wheel with the axle, and to the body or perch, with bolts, which being secured in this manner, gives the wheel liberty of turning either side with far greater advantage than the vehicles now in use of such a class. This invention also gives the wheel greater power, the draught coming from the centre of the wheel, instead of the top, as may be seen in the generality of wheels. And who also claims the axle made as a bolt with the head and nut, one end longer than the other, so as to allow the bolts which take the upright prop B and braces A to pass through the outside of the axle, instead of through the centre. And who further claims a transom or wheel-plate in the form or shape of a cone, giving the wheel full liberty of turning almost straight on each side; this plate works above the wheel.

This is the specification referred to in the annexed Letters of Registration granted to James M'Leery, this twelfth day of August, 1861.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
19 *July*, 1861.

SIR,

Having examined and considered the matters stated in the Petition of Mr. James M'Leery, for Letters of Registration for "an improvement in the manufacture of a Three-wheeled Vehicle," &c.,—we have the honor to recommend that the protection prayed for be granted.

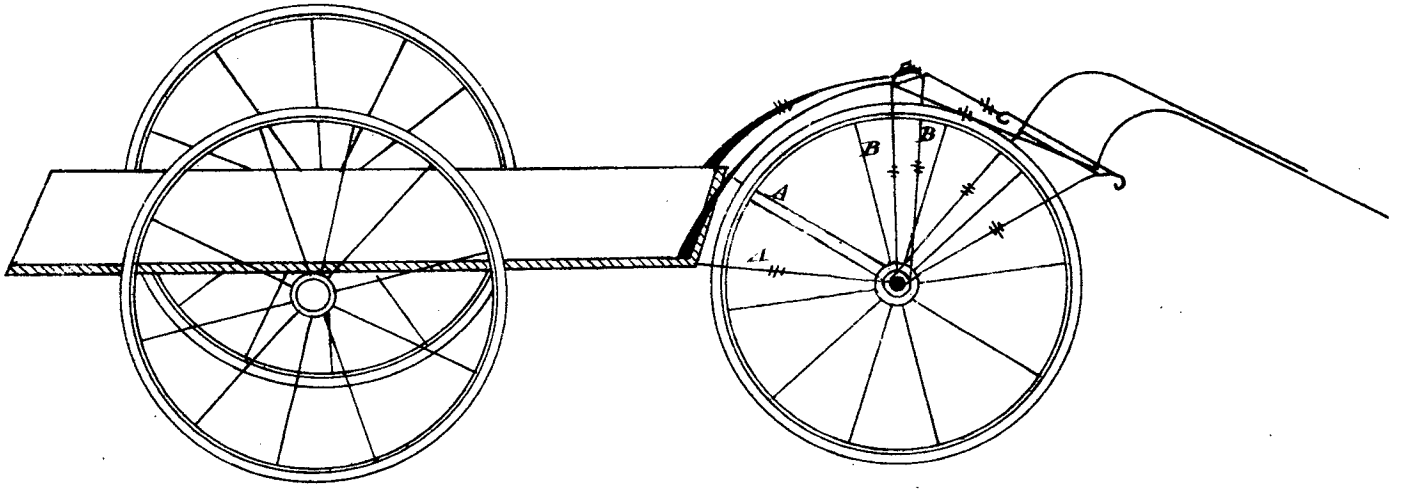
We have, &c.,
E. W. WARD.
SYDNEY C. BURT.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents transmitted to us are herewith returned.

[Drawing—one sheet.]

(Copy)



This is the Drawing referred to in the annexed Letters of Registration granted to James McLeery, this twelfth day of August. 1861.

Sgd. John Young.

A.D. 1861, *7th November.* No. 47.

IMPROVED METHOD OF MANUFACTURING ICE.

LETTERS OF REGISTRATION to Messrs. Nicolle and Dawson, for an Improved Method of manufacturing Ice.

[Registered on the 9th day of November, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Eugene Dominique Nicolle, of Marlbro'-terrace, Strawberry Hills, in the Colony of New South Wales, and Richard Dawson, of George-street North, in Sydney aforesaid, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of a certain new and improved method of manufacturing Ice, which is more particularly described in the specification and drawing hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am

pleased,

pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant, unto the said Eugene Dominique Nicolle and Richard Dawson, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof, to have, hold, and exercise unto the said Eugene Dominique Nicolle and Richard Dawson, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Eugene Dominique Nicolle and Richard Dawson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this seventh day of November, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

OUR invention consists in the employment of gases susceptible of liquefaction by pressure and of resuming the gaseous state by the removal of such pressure, obtaining thereby temperature sufficiently low to freeze water in large quantities, reduce the temperature of wort during the preparation of beer, the preservation of articles of food, and other useful purposes.

The gases which we employ are the following:—Sulphureous acid gas, deutoxide of azote gas, ammonia gas, hydrochloric acid gas.

A fluid capable of dissolving one of these gases, such as water, is saturated with the gas, and placed in one or more boilers, which must be perfectly gas-tight. The liquid should only occupy three-fourths of the capacity of the boiler or boilers; if more than one boiler is used, a strong pipe unites the boilers at the bottom; this pipe is perforated with small holes inside of the boilers; at the middle of the pipe, and between the boilers, an ascending pipe is placed, which connects this pipe with a bent pipe passing from the top of each boiler, above the stop-cocks, and then passes upwards to the refrigerator. These boilers are provided with a pressure-gauge and a thermometer, and fixed in brick-work, with a furnace and flues surrounding them, but not with fire directly under them, as will be seen in the plan; a damper is also attached to the end of the fire-grate, to regulate the heat.

The next part of the apparatus is the refrigerator, which is composed of four or more pipes, according to the gas used, firmly fixed at each end to an iron semispherical box, which is fixed at the bottom to the ascending pipe, and forms connection with each spherical box.

A water-tight vessel is fixed outside, and is provided with a water-supplying pipe which leads to the bottom of the vessel; also a let-off pipe regulates the level of water admitted.

The last part of the apparatus is the freezing cistern, which is connected with the refrigerator by an inclined pipe provided with a double stop-cock, and forms connection with the gas receiver by a bent pipe. The gas receiver is made annular shape, so as to offer a large surface, combined with strength.

A number of tinned-iron moulds, filled with either boiled or plain water, are hooked on the top of the gas receiver, and resting against the outer and inner circles. The whole is enclosed in a wooden vat, which is to be filled with water strongly saturated with salt, or with alcohol diluted in water, or other fluids not subject to congeal but at very low temperature.

Having

Improved Method of manufacturing Ice.

Having thus described the apparatus, we now proceed to describe the working of it, which is as follows:—

The boilers having been filled, as before described, with a gaseous solution, the two stop-cocks on the boilers are to be open, also the cock of the refrigerator and the double stop-cock of the gas receiver; the fire is then lit, and the heat gradually raised to the boiling point of the solution; the pressure of the gas internally is allowed to reach the point at which the gas liquifies; when all the gas contained in the solution is supposed to be liquified in the gas receiver, the double stop-cock is to be closed. The refrigerator, thus placed between the boiler and freezing cistern, has its object in preventing any part of the solution to gain admittance in the gas receiver by condensing it in passing through it, and falling by its gravity to the boilers again, thus enabling the gas to reach the receivers perfectly dry.

The supply pipe of the refrigerator is now to be closed, and the boilers are allowed to cool to neutralize the pressure.

If the apparatus is required to operate immediately, cold water is to be applied externally, until the temperature within the boilers is reduced to within 50° to 60° Fahrenheit; the double stop-cock must now be slightly open, and immediately the liquified gas reassumes the state of gas and rushes to the boilers, but finding the passages closed at the tops of the boilers, it is compelled to descend through the middle pipe, and to divide itself in the fluid by the perforated pipe, where it is immediately dissolved.

The enormous quantity of latent heat required by the liquified gas to resume the state of gas, reduces the temperature of the gas receiver and of the liquid surrounding it. The water contained in the tinned moulds is soon converted into solid blocks of ice, but the salt water or alcoholized water is but partly frozen, and allows the moulds to be removed and others to be put in their place.

If larger quantities of ice be required, two more boilers are set on the opposite side of the former boilers, and connected with the same refrigerator; the gas contained in the boilers is liquified in a manner similar, as before described, with the exception of being received in a cylindrical vessel placed above the freezing cistern and connected with the gas receiver by a pipe and a stop-cock.

When the gas receiver contained in the wooden vat is empty, the cylindrical vessel is allowed to supply its contents of liquified gas to the gas receiver, and that gas is made to return to the boilers where it came from, thus enabling the cistern to freeze more than double the quantity of water, as the gas receiver is constantly kept freezing.

Fig. No. 1 is a sectional elevation through the middle of the apparatus.

Fig. No. 2, a plan of the freezing cistern.

A, furnace; B, damper; C C, boilers; D, perforated pipe; E, ascending pipe; F F, bent pipes; G G, stop-cocks; H, pressure gauge; I, thermometer; J J, screwed plugs for filling boilers; K, brickwork; L L L L, upright pipes connecting the semi-spherical boxes; M M, semispherical boxes; N, water vessel; O, supplying water pipe; P, regulating cock; Q, let-off pipe; R, inclined pipe; S, double stop-cock; T, bent pipe forming connection with gas receiver; Y, gas receiver; Z, wooden vat.

Letters *a a a a* are tinned iron moulds filled with water to be frozen, and touching against the outer and inner circles of the gas receiver.

Letter *b*, space filled with water strongly saturated with salt or alcoholized water.

This is the specification referred to in the annexed Letters of Registration, granted to Eugene Dominique Nicolle and Richard Dawson, this seventh day of November, 1861.

JOHN YOUNG.

REPORT.

A.D. 1861. No. 47.

Improved Method of manufacturing Ice.

REPORT.

Royal Mint, Sydney,
4 October, 1861.

SIR,

Having examined and considered the matter stated in Messrs. Nicolle and Dawson's Petition for Letters of Registration for "a certain new and improved method of manufacturing Ice," we have the honor to recommend that the protection sought be granted.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents transmitted to us are herewith returned.

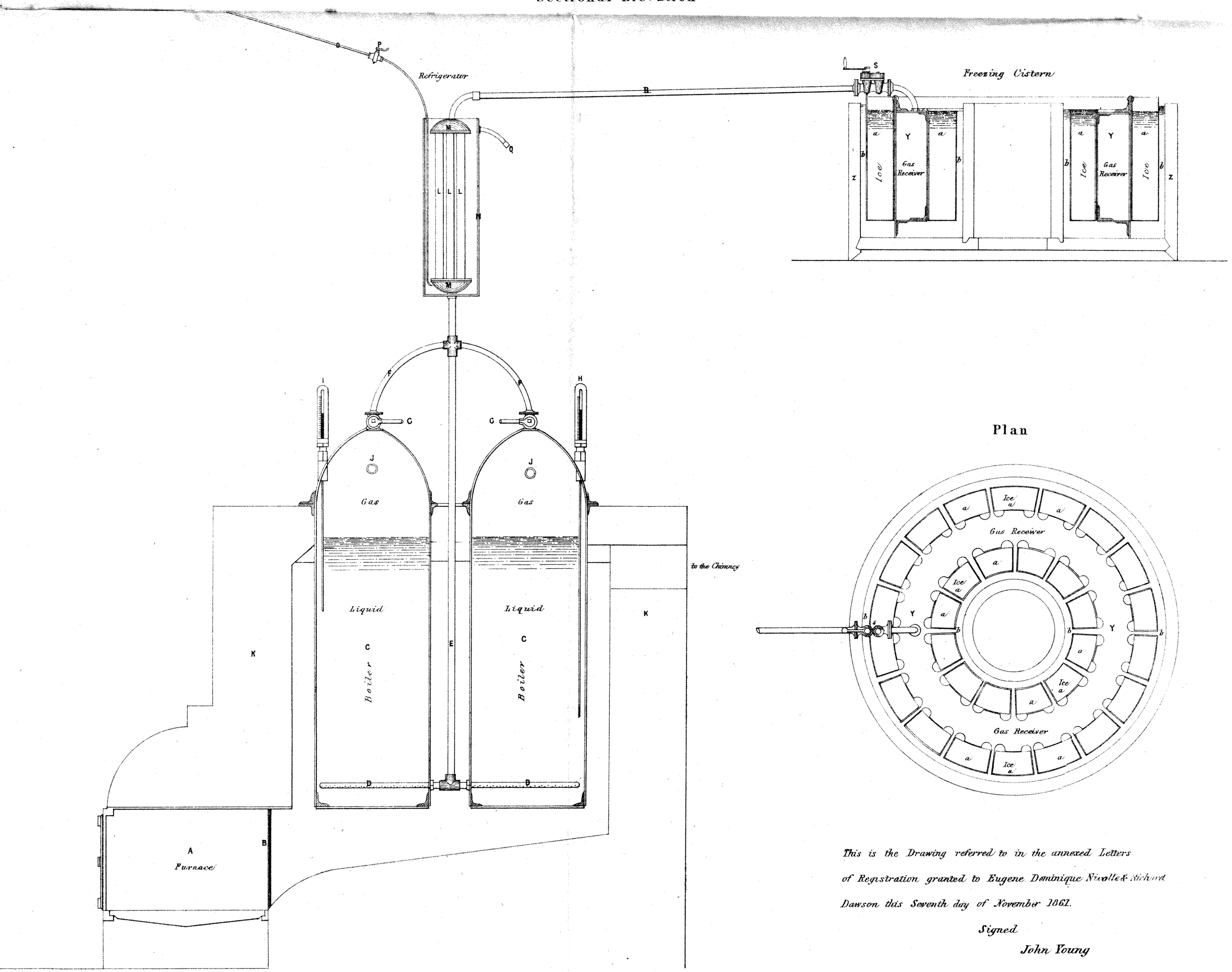
[Drawings—one sheet.]

(COPY)

PATENT ICE APPARATUS

SCALE AN INCH TO A FOOT

Sectional Elevation



Plan

This is the Drawing referred to in the annexed Letters of Registration granted to Eugene Dominique Nivolle & Richard Dawson this Seventh day of November 1861.

Signed

John Young

A.D. 1861, 14*th November*. No. 48.

IMPROVED MODE OF AND APPARATUS FOR TREATING, MIXING, AND MOULDING MATERIALS FOR THE MANUFACTURE OF FUEL, &c.

LETTERS OF REGISTRATION to Messrs. Mazeline and Couillard, for an improved mode of and apparatus for treating, mixing, and moulding materials for the manufacture of Fuel, &c.

[Registered on the 16th day of November, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Jean Baptiste François Mazeline, engineer, and Gustave Adrian Couillard, merchant, both of Havre, in the Empire of France, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an improved mode of and apparatus for treating, mixing, and moulding materials for the manufacture of fuel, parts of which apparatus are applicable to moulding bricks and other analogous articles, the particulars of which are fully set forth and described in the specification and drawings hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement

might

might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report in part favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said of Council, to grant, and do by these Letters of Registration grant unto the said Jean Baptiste François Mazeline, and Gustave Adrian Couillard, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the special apparatus set out and described in the said specification and drawings, as applicable to the softening, mixing, and moulding materials for the manufacture of artificial fuel, bricks, and other analogous articles—but not to the sole use of the ingredients they enumerate, or of super-heated or other steam for the manufacture of such fuel, bricks, and other analogous articles—for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Jean Baptiste François Mazeline and Gustave Adrian Couillard, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Jean Baptiste François Mazeline and Gustave Adrian Couillard shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourteenth day of November, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, We, Jean Baptiste François Mazeline, engineer, and Gustave Adrian Couillard, merchant, both of Havre, in the Empire of France, send greeting:

WHEREAS we are in possession of an invention for "An improved mode of and apparatus for treating, mixing, and moulding materials for the manufacture of fuel, parts of which apparatus are applicable to moulding bricks and other analogous articles," and have petitioned His Excellency the Governor General of New South Wales to grant unto us, our executors, administrators, and assigns, Letters of Registration for the same: Now know ye, that we, the said Jean Baptiste François Mazeline and Gustave Adrian Couillard, do hereby declare that the following specification fully describes and ascertains the nature of the said invention, and the manner in which the same is to be performed, that is to say:—

This invention of an improved mode of and apparatus for treating, mixing, and moulding materials for the manufacture of fuel, relates in the first place to a mode of treating coal-dust, or small coal, peat, turf, lignite, resin, pitch, tar, and other resinous, carbonaceous, or combustible matters or substances, so as to cause them to agglomerate or combine together, in order to produce a solid mass which may be moulded into any convenient form and used as artificial fuel.

The invention consists in stirring and mixing the pulverized, carbonaceous, or combustible materials together, and while they are in motion, causing a jet or current of hot air, steam, or vapour, to pass through the mass, so as to soften the particles and allow them to agglomerate or stick together, when they are discharged from the pug-mill, or mixing apparatus, and conducted to the moulding apparatus. The hot air, steam, or vapour, must be passed continuously through the mass while the materials are being stirred, otherwise the mass will become too stiff to be worked with facility. If desired, the hot air or steam may be made to operate upon the small coal or coal-dust alone in the first instance, so as to heat or soften it; after which, the heated or softened coal may be passed into another apparatus, in order to be mixed with the resinous and other matters

of

of which the artificial fuel is composed; but it is preferred that the steam, hot air, or vapour, should be made to pass through the mass while the ingredients are being stirred in the mixing machine. Some coals will be found to be so highly bituminous as not to require the addition of pitch or resinous matter to assist in agglomerating the particles; in such cases it will be necessary to raise the temperature of the steam, hot air, or vapours, to such a degree as will effectually soften the particles, so as to admit of the mass being moulded into any required form. Either natural or super-heated steam may be used, according to the nature of the materials to be used, according to the nature of the materials to be operated upon; and the steam, hot air, or vapours, must be under pressure sufficient to cause it to force its passage through the mass of materials while they are in motion.

The passage of the steam, hot air, or gases, should be continued until the materials are well mixed, and have apparently agglomerated, when the mass may be discharged or removed from the mixing vessel and moulded if required, after which the lumps may be allowed to cool. I would observe, that I have not thought it necessary to state any precise proportions in which the ingredients are to be mixed, as they must necessarily vary to a considerable extent, according to the nature of the materials employed. For instance, a dry smokeless coal, or anthracite coal, will require a larger proportion of pitch, or resinous, or bituminous matter, than an equal quantity of highly bituminous coal, which latter substance may in fact be effectually operated upon and moulded without the presence of any additional or extraneous bituminous matter such as pitch or tar. The principal use of the pitch, tar, or resinous or bituminous matter, being to assist in agglomerating the other particles, the exact proportion thereof to be added must be left to the discretion of the manufacturer.

A modification of the process consists in forcing hot air, steam, or gases, through a mass of melted pitch, resin, tar, or other analogous matters, until the mass is worked up into a froth, when the dry pulverized ingredients may be added and well mixed, until the proper consistence is obtained; after which, the mass may be removed from the pug-mill or mixing apparatus, and moulded into any required form, and after being allowed to cool, will be ready for use.

The next part of the invention relates to certain arrangements of apparatus whereby the softening, mixing, and moulding of the ingredients can be conveniently effected. The apparatus consists principally of,—first, a mixing apparatus, in which the ingredients to be operated upon are softened by the heat of the steam, and then intimately mixed together; and second, a moulding and pressing apparatus, whereby the ingredients when intimately mixed may be moulded into any convenient form. In the mixing apparatus, the various ingredients composing the fuel are intimately combined by means of a rotating stirrer, which is kept constantly in motion while the ingredients are fed into the upper part from a hopper or hoppers, which are kept constantly supplied by an archimedean screw, or endless series of buckets, or other convenient and suitable mechanical contrivance. Before supplying the materials to the stirring or mixing apparatus, they are to be first pulverized or ground, either in a separate apparatus, or in a mill adapted to and forming part of the mixing chamber. Steam either common or super-heated, or hot air or gas, is admitted to the lower part of the mixing chamber; and, by the mass of ingredients in this chamber being kept in constant motion by means of the rotating stirrer, the hot vapour will be brought into intimate contact with the carbonaceous matters, and will consequently soften them and cause them to agglomerate. By the continued rotation of the stirrer, the mixed ingredients are (when in a soft state) forced out of an aperture at the bottom of the mixing chamber into a series of moulds which are brought in succession under the aperture. For this purpose the moulds are adapted to or formed in a horizontal wheel or frame, to which an intermittent rotary motion is communicated by means of suitable gearing. In these moulds are fitted movable pistons, which are worked by a vibrating lever below. This lever is provided with bowls or rollers, which act against the under side of the pistons, and force them up in the moulds at the proper time to perform the several operations of forming, compressing, and forcing

out

out the bricks or blocks from the moulds. This vibrating lever is actuated by means of a piston working in a steam cylinder, the valves of which are worked by cam pieces or other contrivances connected with the movable horizontal mould frame, or some other convenient moving of the apparatus.

In one of the arrangements shewn in the accompanying drawings, there are four moulds in the rotating frame; but it will be found convenient to employ a larger number, as shewn in the other figures.

The figures in the accompanying drawings represent various views of two arrangements of apparatus for carrying out the objects of the present invention, similar letters being placed upon corresponding parts in all these figures. Fig. 1, sheet I, is a sectional elevation of the apparatus in its most complete form. Fig. 2 is a vertical section, taken at right angles to fig. 1, and shewing the moulding wheel and apparatus, and the means of working the same. Fig. 3, sheet II, is a plan or bird's-eye view of the same. Fig. 4 is a sectional plan view. Fig. 4ª, sheet III, is a vertical section of another arrangement of the mixing and compressing or moulding apparatus. Fig. 5 is a horizontal section of the same. Fig. 6 is a detached sectional view of the moulding or compressing apparatus, with its accessories and the steam apparatus adapted thereto.

The operation of the apparatus is as follows:—The coal intended to be mixed with the other ingredients for the production of fuel, is thrown into a hopper, not shewn in the drawings, and is fed forward by an archimedean screw or endless chain of buckets, by which it is raised and thrown on to the rollers of a crushing mill, to which the bituminous or resinous material (if any be required) is at the same time supplied from another hopper. The ingredients thus combined fall into the steam mixing apparatus or pug-mill A, seen in vertical section, and drawn on an enlarged scale at figures 1 and 4ª, and which consists of a vertical cylinder in which works a shaft provided with toothed beaters or arms, *a'*. In fig. 4ª these arms work between stationary or projecting arms, *b'*, which are also furnished with teeth, and are secured or fixed to the sides of the pug-mill *A*. Steam is supplied to the cylinder of the mill *A* at the orifices *K*, figures 1 and 4ª, and also through the arms *a'* in fig. 3, which are made hollow for the purpose, and are perforated at their ends with small holes, as seen in the drawing. The ingredients when well mixed and softened will fall through or are discharged from the orifice *L*, fig. 4ª, into one of the moulds, say No. 1, of the moulding or compressing apparatus *B*, fig. 5. This apparatus is composed of a horizontal movable plate, *M*, carrying any convenient number of movable moulds. In fig. 5 there are four moulds, 1, 2, 3, 4, mounted upon a circular framing, *N*, which is hollow in the middle, and is provided at *a* (figures 1, 2, 4, and 6) with a steam cylinder, *O*, the position of which communicates motion to the double-acting lever *P*, whereby the block of fuel in the mould 2 (figures 5 and 6) is compressed against the fixed plate *x*, fig. 6, and at the same time another block is forced out from the mould 4. The mould plate *M* has an intermittent rotary motion imparted to it by means of the wheel *Q* and the pinion *R* (fig. 4ª), until the plunger *b*, moving upon the lower horizontal plane *c* of the frame *N*, arrives at the point of descent *y* of the upper plane *d*, thereby arresting the motion of the mould plate. This intermittent motion may be produced by any other suitable means, as, for instance, in the manner shewn in figures 1, 2, 3, and 4, and hereafter more particularly described. At this period of the revolution of the moulded plate, the rod *e* of the steam-valve *f* will fall into the nick *g* of the mould No. 2, by the action of the counter weight *h* (see fig. 6). The steam will act upon and raise the piston *i*, and with it the double-acting lever *P*, up to the point when the tail of this lever raises the steam-valve by acting against the rod or lever *k*; this movement being of course regulated according to the nature of the material to be operated upon and the degree of compression required. The steam will then escape above the piston, by raising the valve *l* from its seat *m*, and the block of fuel No. 4, which has been driven from its mould, will be pushed by the levers *n* and *o* on to the endless band *p*, by which it will be conducted away from the machine. During this time, the plunger *b'* having been freed from the pressure of the lever *P*, and merely sliding upon the upper horizontal

horizontal plane *d*, will allow the mould plate *M* to continue its rotation for another quarter of a revolution, during which movement the plunger *b'''* will in its turn fall upon the lower plane *c*, when the movement will be again stopped by the plunger *b*. The plunger *b''* will then be again forced up, so as to discharge its block from the mould, and so on—the machine continuing to form or mould press and discharge four blocks for each revolution of the mould plate *M*. Motion may be communicated to the apparatus by a steam-engine or any other suitable motive power, the same being transmitted to the various parts by means of bands, pulleys, and gearing, as will be well understood.

The machine shewn in sheets I and II is constructed on the same principle as that shewn in sheet III, and just described, but some of the mechanical arrangements are somewhat different, and the machine will, on the whole, be found more convenient in use. In the machine shewn in sheets I and II it will be seen that a larger number of moulds are contained in the rotating mould wheel *M*; and the construction of the pug-mill and its stirrer is different to that shewn in figs. 4[a], 5 and 6; and the mixed ingredients, instead of being delivered direct into the moulds, are discharged from the pug-mill or mixing apparatus into a vessel, *U*, which we denominate the filling vessel. In this vessel is mounted the vertical shaft *g*, which is provided with the horizontal stirring arms *g' g'*, whereby the mixed materials are pushed into the moulds of the horizontal mould plate *M*. It will now be understood that the machine shewn in sheets I and II is composed of three principal parts, consisting of,—first, the mixing apparatus or pug-mill *A*; second, the filler *U*; and third, the moulding apparatus *M*. All these parts are driven from one main shaft *I**. The stirring shaft of the mixing apparatus or pug-mill is driven by the pinion *q*, which gears into the horizontal wheel *q** at the lower end of the pug mill shaft. A spur wheel, *r*, on this latter shaft may be thrown into gear with a clutch, r^x, and by means of an intermediate wheel, *r'*, it will then drive another toothed wheel, r^2, on the lower end of the vertical shaft *g* of the filler. The horizontal rotary moulding wheel *M* is provided with a number of ratchet teeth, *s s* (see plan view, fig. 4), corresponding to the number of moulds, and is driven by means of a lever, *t*, which is actuated by a pin or crank, *t'*, connected with the intermediate wheel *r'*, figs. 1 and 4. At the same time, the shafts *u u'* and wheels u^2 u^2 act on the valves for the supply of steam to the cylinder *O* is actuated therein. By the ascent of the piston *i* in its cylinder, the lever *P* is made to act on and raise the mould piston *b''*, and thereby compress the material in the mould. The eccentric *o* will also, by means of the rod *m*, act on the upper end of the lever *n*, and cause the lower end of the lever to push the newly discharged brick *o'* on to the travelling endless band o^2, whereby it will be conveyed away from the moulding wheel, as in the former instance. The travelling endless band o^2 is driven by the vertical shaft *g* of the filler, through the intervention of the gearing *p p' q q'*, and band, wheel, or drum *r*, as seen best in fig. 4.

The improvements shewn in figures 1, 2, 3, and 4, sheets I and II, therefore consist principally of the mechanical arrangements shewn in the drawings, forming a complete and perfect apparatus, consisting of three main parts or divisions, viz.:—1st—the mixing apparatus, in which the steam is admitted through four or more pipes or apertures, and also through the perforated hollow arms *a'* of the stirring or mixing shaft. By this means the steam is conveyed and made to penetrate into the centre of the mass, and the materials are more thoroughly heated, and the amalgamation of the ingredients is facilitated. It will also be seen, on referring to fig. 1, that the mixing vessel is made with a conical bottom, in order to facilitate the delivery or exit of the pasty mass. For the same purpose, cross arms, a^3, are employed, which will push forward the mass towards the circumference, and ultimately discharge it through the exit aperture. 2nd—the filler is so arranged as to fill two moulds at the same time; and, as every mould must pass twice under the arms of the stirrer, it will be evident that the filling operation will be performed more perfectly than in the former arrangement. It will also be seen that the stirrer consists of a series of hollow naves fixed on the driving shaft, so that any arm *a'*, upon being broken or damaged, may be removed and replaced by a new one. 3rd—in the moulding apparatus. By increasing the number

of moulds, the latter are brought nearer together, and the filling operation is therefore much facilitated. The mould wheel *M* is supported upon a system of anti-friction rollers and it receives an intermittent motion which allows each brick or block to remain under the pressure of the steam, and thereby receive a perfect compression. The sides of the moulds are also provided with sheet steel, so that they may be easily changed when they become worn.

Having now described our invention of an improved mode of and apparatus for treating, mixing, and moulding materials for the manufacture of fuel, and having explained the manner of carrying the same into effect, we would observe, that parts of the apparatus above described are applicable and may be used for moulding bricks and other analogous articles; we therefore intend to claim the use of them for such purposes. In conclusion, we claim as our invention, softening and mixing the ingredients for artificial fuel, by the use of steam or hot air admitted into the mass and distributed among the ingredients while the mass is in motion. We also claim the use of the apparatus herein set forth for any of the purposes above mentioned.

In witness whereof, we, the said Jean Baptiste François Mazeline and Gustave Adrian Couillard, have hereunto set our hands and seals, this thirty-first day of July, in the year of our Lord one thousand eight hundred and sixty.

F. MAZELINE. (L.S.)
G. COUILLARD. (L.S.)

This is the specification referred to in the annexed Letters of Registration granted to Jean Baptiste François Mazeline, and Gustave Adrian Couillard, this fourteenth day of November, 1861.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
29 *August*, 1861.

SIR,

Having examined and considered the matter stated in the Petition of Messrs. Jean Baptiste François Mazeline and Gustave Adrian Couillard, for Letters of Registration for "an improved mode of and apparatus for treating, mixing, and moulding materials for the manufacture of fuel, &c., &c.," we have the honor to report that we consider the Petitioners are entitled to have secured to them the sole use of the special apparatus set out in their specifications and drawings, as applicable to the softening, mixing, and moulding materials for the manufacture of artificial fuel, bricks, and other analogous articles; but not to the sole use of the ingredients they enumerate, or of superheated or other steam, for the manufacture of such fuel—these having been already used in the manufacture of similar material.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—The documents transmitted to us are herewith returned.

[Drawings—three sheets.]

(COPY)

Fig 1

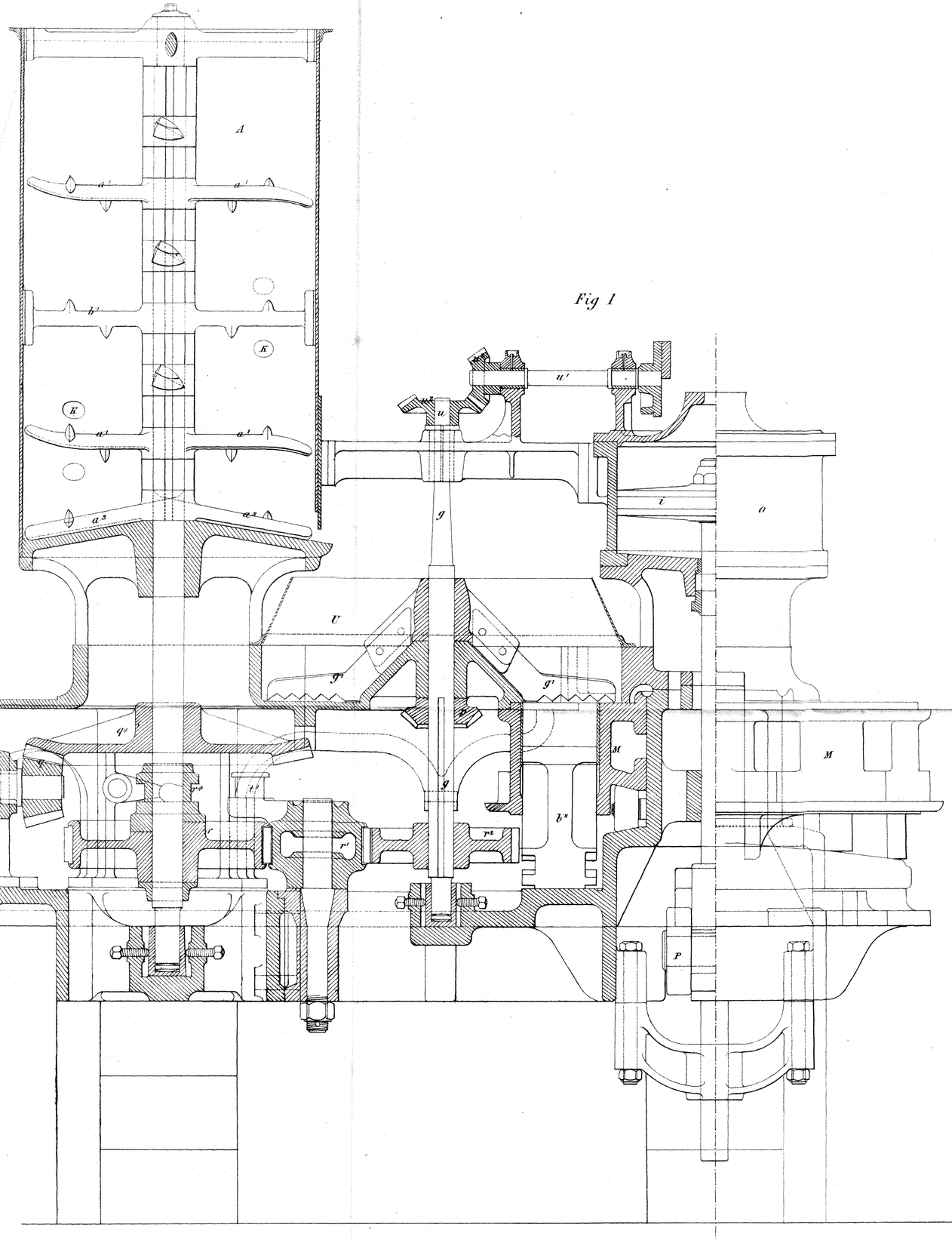
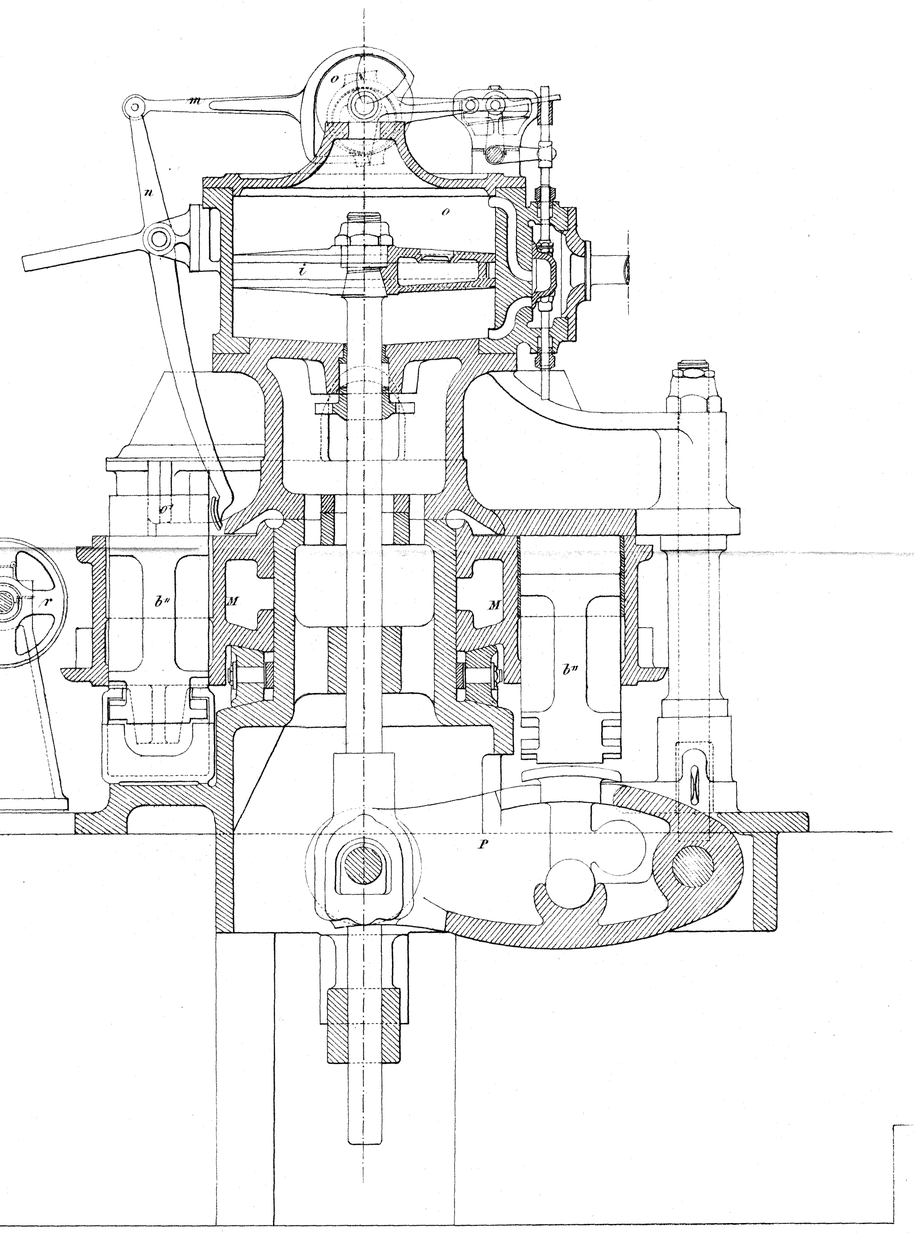


Fig. 2



This is one of the Drawings referred to in the annexed Letters of Registration granted to Jean Baptiste Francois Mazeline and Gustave Adrian Couillard this Fourteenth day of November 1861

Signed John Young

FIG. 4

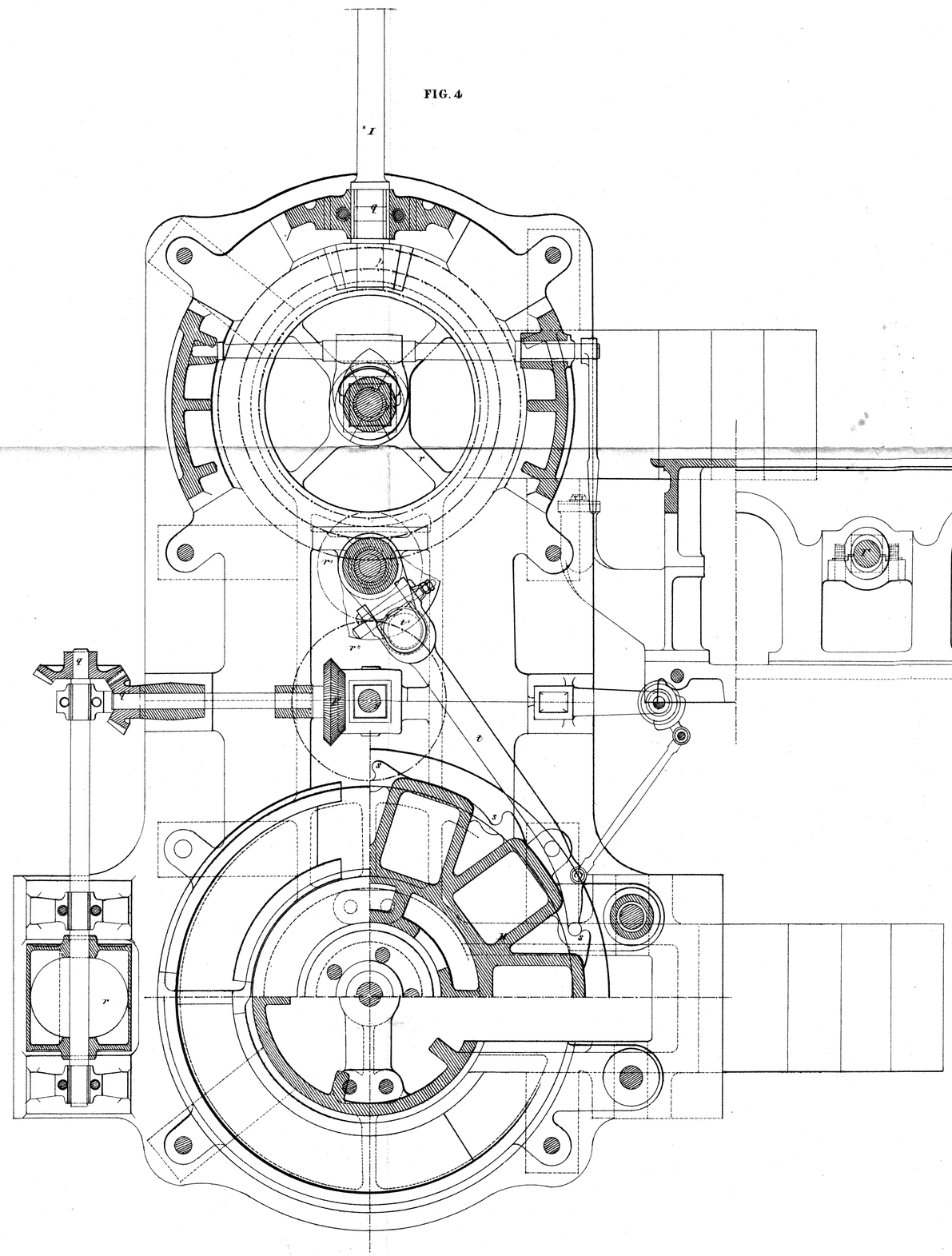
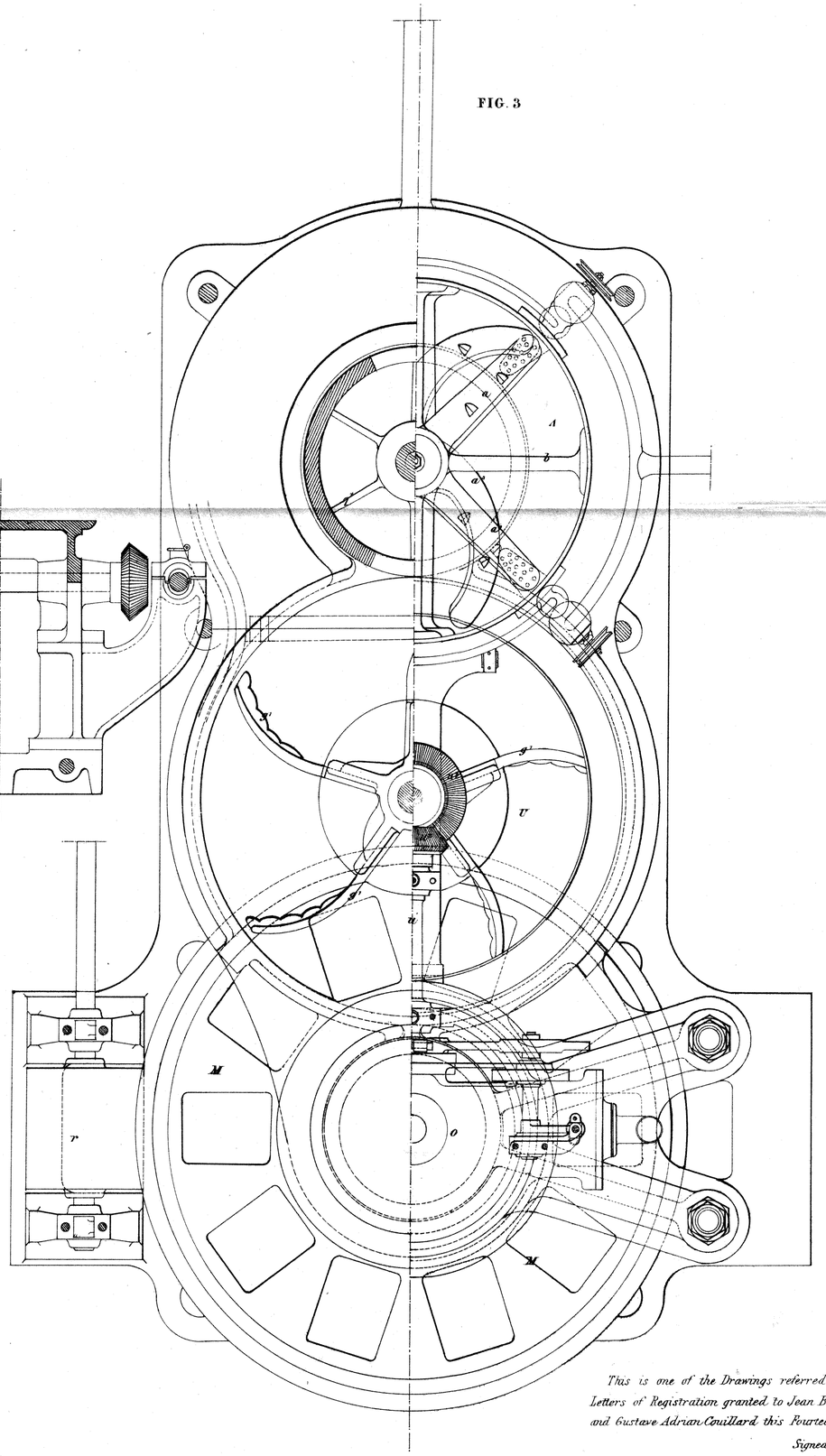


FIG. 3



This is one of the Drawings referred to in the annexed Letters of Registration granted to Jean Baptiste Francois Maxeline and Gustave Adrian Couillard this Fourteenth day of November 1861

Signed John Young

(COPY)

FIG. 4.

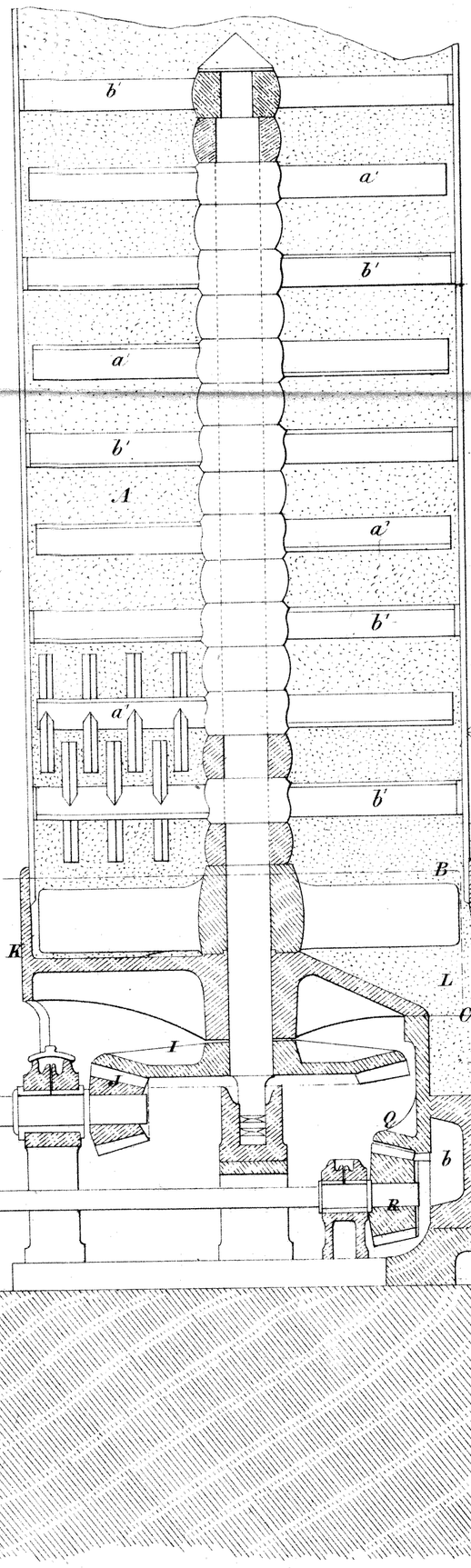


FIG. 5.

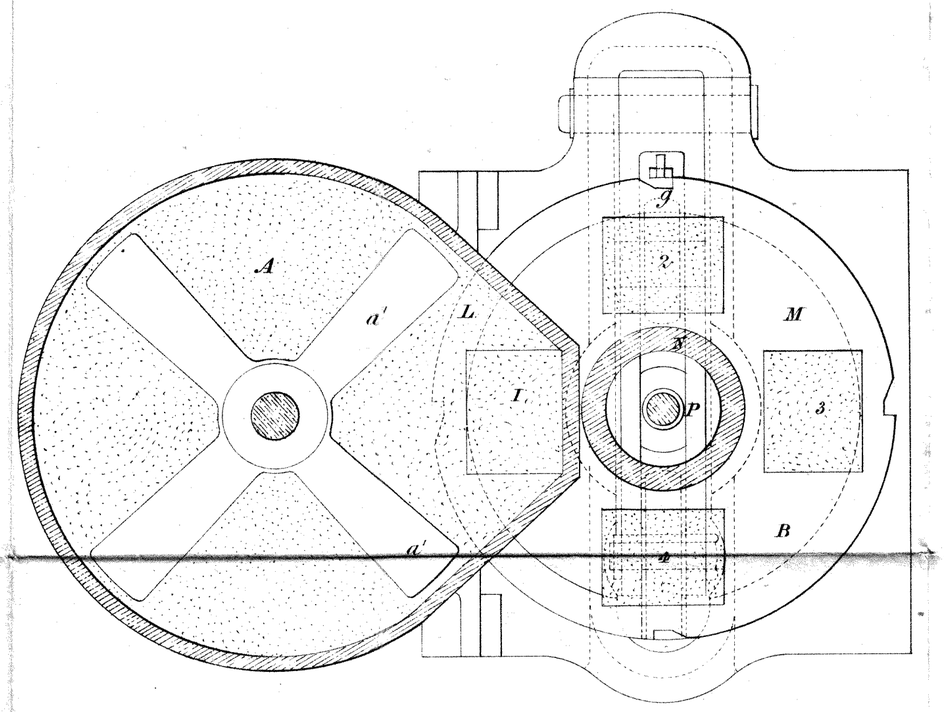
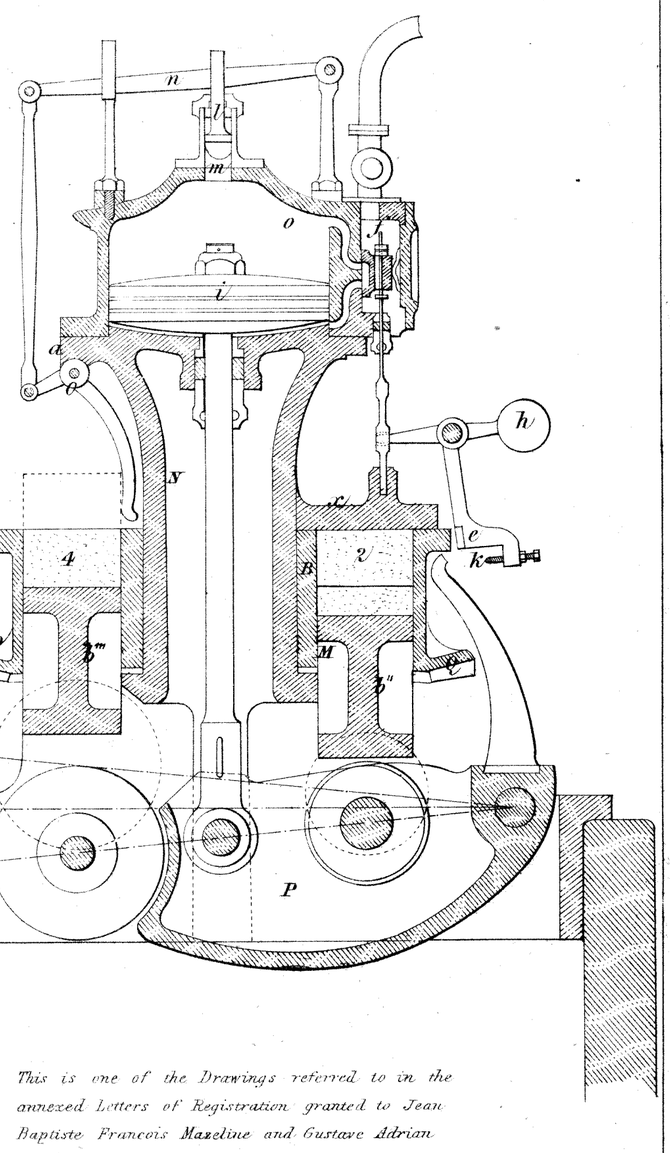


FIG. 6



This is one of the Drawings referred to in the annexed Letters of Registration granted to Jean Baptiste Francois Maxeline and Gustave Adrian Cuillard, this Fourteenth day of November 1861

(Signed) John Young

A.D. 1861, *9th December.* No. 49.

INVENTION FOR PLANING STONE.

LETTERS OF REGISTRATION to Samuel Rentsch and John Riegg, for an Invention for planing Stone.

[Registered on the 11th day of December, 1861, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General, and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Samuel Rentsch, of Melbourne, in the Colony of Victoria, importer, and John Riegg, late of Melbourne aforesaid, but now of Allstaedten, Canton St. Gall, Switzerland, gentleman, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an Invention for Planing Stone, which is more particularly described in the specification, and the drawings marked A and B, respectively, which are hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent

persons

persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said Samuel Rentsch and John Riegg, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Samuel Rentsch and John Riegg, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Samuel Rentsch and John Riegg shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this ninth day of December, in the year of our Lord one thousand eight hundred and sixty-one.

(L.S.) JOHN YOUNG.

SPECIFICATION of Samuel Rentsch, of Melbourne, in the Colony of Victoria, importer, and John Riegg, late of Melbourne, but now of Allstaedten, Canton St. Gall, Switzerland, gentleman, for "An Invention for Planing Stone."

THE nature of the invention, and the manner of performing same, is particularly described and ascertained in and by the following statement, reference being had to the drawings hereto annexed, and to the letters marked thereon (that is to say):—Fig. 1 of the accompanying drawings represents a front view, and fig. 2 a side view of this stone-dressing machine; F M represents the main frame of the upright part of the machine, and S^1 S^1 is a railway on which the carriage or carriages (supporting the stone or stones to be dressed) travel. This railway, as well as the whole machinery, rests on a foundation represented in the drawings. P is the shaft, to which power is applied by means of band T^1 and by pulley R. Motion is communicated from shaft P to the vertical shaft A, by means of bevel gearing O N. Shaft A is provided with a longitudinal slot, into which a key is secured to the hub of bevel wheel N, so as to allow the shaft to be adjusted higher or lower (by means hereafter to be described) while it turns together with the bevel wheel. Said shaft A passes through a guide-bearing in the upper part, M, of the frame of the machine, and is held in another bearing in the cross-head D. This latter bearing, which can be tightened and properly adjusted by means of a nut C, and washers, B, serves to keep the shaft A suspended. Three arms, U^1 U^1 U^1, extend from the lower end of shaft A below the cross-head D, each of the said arms supporting a revolving cutter, Z^1, in a manner now to be described. Each of the cutters has a shaft, which has its bearings in a box, Y^1 Y^1, so as to be free to revolve in said bearings. The box is hung to the end of arm U^1 at V^1, the point V^1 serving as a fulcrum for the adjustment of the cutter, in relation to the stone on the surface on which it is intended to operate. Pivots, W^1, extending from the upper part of the box Y^1, pass through curved slots, X^1, the fulcrum V^1 forming the centre of the curvature of said slots. The outer ends of the pivots are screw-threaded, so that, by means of nuts screwed to the ends of said pivots, the boxes Y^1, and consequently the cutters Z^1, can be adjusted, and secured in a position of greater or less obliquity in relation to the surface of the stone. By this means the cutters, even when more or less worn, can be set so as to operate equally on the stone. As the shaft A revolves, the arms U revolve with it, and thus the cutters are caused to revolve in a circle the centre of which is shaft A; while they (the cutters) revolve at the same

Invention for planing Stone.

same time around their own shafts, held in the boxes Y^1. The revolution of the cutters around shaft A produces the necessary sweep of the cutters, and their revolution around their own shafts causes an equal wear of the whole circumference of each cutter. The cross-head D moves on vertical guideways, J^1, projecting from the main frame of the machine. Two vertical screw shafts, E, are attached, one to each end of the cross-head, so that the shafts are free to turn in the ends of the cross-head. The lower part of each of these two shafts E^1 is provided with a worm-wheel, H, while the upper and screw-headed part works through a female screw in the cross-bar G of the main frame of the machine. A worm-shaft, I, operated by a handwheel, J, serves to turn the worm-wheels H, whenever it is desired to adjust the cross-head D higher or lower, so as to adapt the cutter to the height of the stone to be dressed. It will be understood that, on revolving the worm-wheels and screwshaft one way or the other, the screwshafts working through the female screws as described will raise or lower the cross-head D accordingly. The weight of the cross-head and appurtenances is balanced by weights attached to chains K passing over pulleys L. The cross-head D can in any position be clamped to the main-frame, by depressing a lever, A^{11}, operating on two clamp pieces B^{11} B^{11}, so as to relieve the screwthreads of the shafts E from undue pressure while the machine is in operation. One or more carriages, consisting each of a platform, G^1, and wheels, H^1, run on the railway S^1 S^1, and are moved forward or backward by a gear-wheel, E^1, taking into a rack, F^1, secured to the bottom of the carriage platform. Motion is transmitted to the said gear-wheel E from shaft A, by means of band and pulleys O^1 M^1 L^1, vertical shaft K^1, worm P^1, worm-wheel B^1, and bevel gearing C^1 D^1. In this manner the slow motion of the carriage necessary while the stone is being dressed is produced. However, when the carriage is empty, or the stone has been ready dressed, and it is desired to move the carriage rapidly along for the purpose of unloading or reloading, the worm-wheel P^1 is moved out of gear with the wheel B^1, by operating the hand lever R^1, and the hand lever V is moved so as to bring either one of the pulleys on the shafts W X (one for moving the carriage forward, the other for moving it backward) in contact with the driving belt T^1, and thereby imparting motion to the pulley. As the two pulleys are in contact with each other, motion will be communicated from one to the other, and to the pulley Y upon the outer end of shaft X, and from pulley Y to pulley A, by means of band Z. Rapid motion will thus be imparted to the shaft of gear-wheel C^1, to the outer end of which shaft the pulley A is secured, and in this manner the carriage can be driven along with much greater velocity than by means of the worm-gear P^1 B^1. Q is a loose pulley, to which the driving belt T^1 can be shifted by operating hand lever S, whenever it is desired to stop the operation of the machine. Having thus described the nature of the invention and the manner of performing the same, we would have it understood that we do not confine ourselves to the precise details, so long as the nature of the invention be retained and understood; but what we do claim as the principal novelty of the invention is the combination of circular cutters, Z^1, revolving on their own axes, with adjustable boxes, Y^1 Y^1, hung at the arms U^1, revolving around a common central axis, A, either vertically or at any angle, substantially as herein described.

In witness whereof, we, the said Samuel Rentsch and John Riegg have hereto set our hands and seals, this fourth day of October, one thousand eight hundred and sixty-one.

S. RENTSCH.
JOHN RIEGG. (L.S.)
(By his Attorney),
S. RENTSCH.

This is the specification referred to in the annexed Letters of Registration granted to Samuel Rentsch and John Riegg, this ninth day of December, 1861.

JOHN YOUNG.

REPORT.

A.D. 1861. No. 49.

Invention for planing Stone.

REPORT.

Royal Mint, Sydney,
12 *November*, 1861.

SIR,

Having examined and considered the matter stated in the Petition of Messrs. Rentsch and Riegg, for Letters of Registration for an "Invention for planing Stone," we have the honor to recommend that the protection sought be granted.

We have, &c.,

E. W. WARD.
JNO. F. HILLY.

THE HONORABLE
THE COLONIAL SECRETARY.

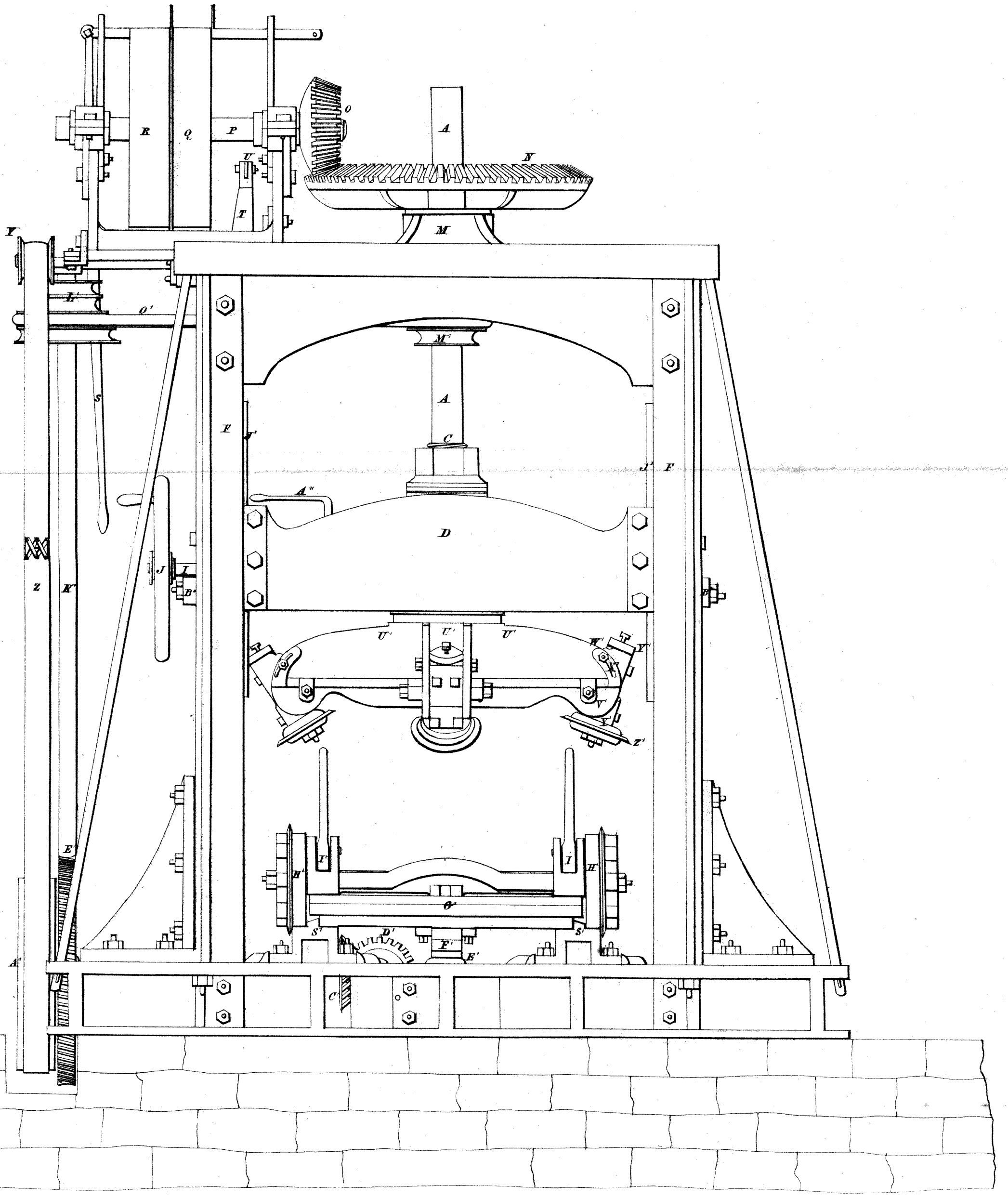
P.S.—The documents transmitted to us are herewith returned.

[Drawings—two sheets.]

(COPY)

A

FIG 1.



FRONT VIEW

HART & WATERS
Patent Agents
65 Little Collins St East
MELBOURNE

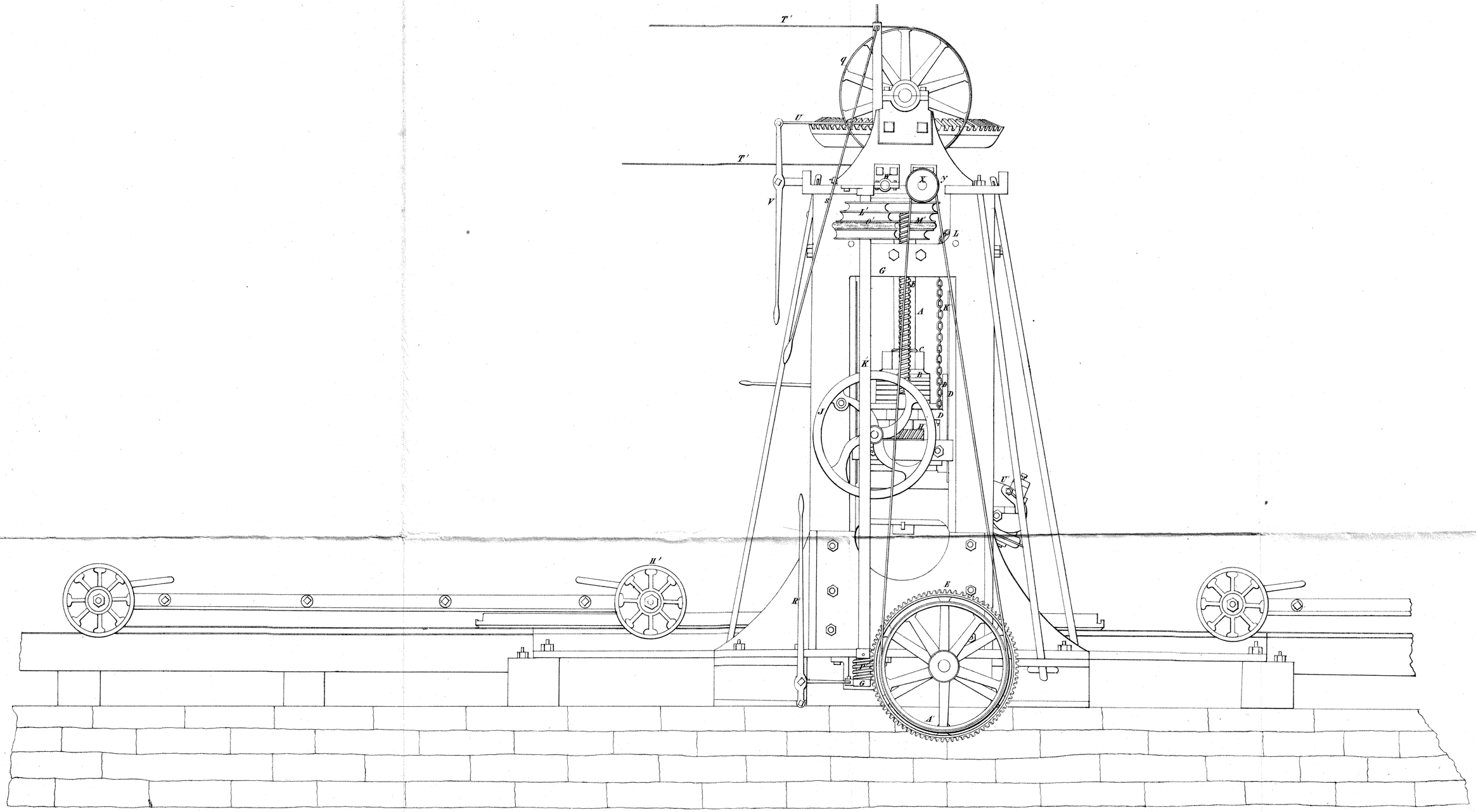
This is the Drawing marked A referred to in the annexed Letters of Registration granted to Samuel Reutsch and John Rigg this Ninth day of December 1861.

(Signed) John Young

(COPY)

B

FIG. 2



SIDE VIEW

HART & WATERS,
Patent Agents,
65, Little Collins St. East,
MELBOURNE.

This is the Drawing marked B referred to in the annexed Letters of Registration granted to Samuel Reutsch & John Riegg this Ninth day of December 1861.

(Signed) *John Young*

A.D. 1862, 14*th January.* No. 50.

SHIP FIRE MAIN AND REVOLVING BRANCH.

LETTERS OF REGISTRATION to John Korff, for a Ship Fire Main and Revolving Branch, for extinguishing Fires.

[Registered on the 17th day of January, 1862, in pursuance of the Act 16 Vict., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Korff, of the Glebe, near Sydney, in the Colony of New South Wales, shipbuilder and marine surveyor, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a Ship Fire Main and Revolving Branch for extinguishing fires on board ships, which is more particularly described in the description and drawing hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive

Council,

Ship Fire Main and Revolving Branch.

Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said John Korff, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Korff, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Korff shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourteenth day of January, in the year of our Lord one thousand eight hundred and sixty-two.

JOHN YOUNG.

DESCRIPTION of Korff's Patent Fire Main and Revolving Branch for extinguishing Fires on board Ships and in Warehouses, &c.

THE machine consists of a main pipe and revolving branch, stancheon, pointer or index, and an endless chain (passing over two pinions or rollers) connected by rods, with a flange for resting it on the deck of a ship, or floor of a house or warehouse, &c., &c. A hole about seven or eight inches being cut through the ship's deck or otherwise, you drop the main and branch through it until it rests on the deck flange, the water hose is attached to the main in the usual way, and the force pump or engine set in motion, when a heavy stream of water may be conducted and thrown to any angle or place on the underside of the deck or decks, or floor or floors, &c., &c., or may be thrown out of the hole through which the main and branch have been passed. A man is stationed on deck (or otherwise) with the index in his hand, an officer on deck points to the place over where the fire is raging below, the man directs the index to the spot, the water is immediately brought to bear on the underside of the deck, &c., which is on fire. One of the most essential points in this fire branch is, that all the hatches must be kept on, and all openings closed. This assists to extinguish the fire, by shutting off the current of air, at the same time generating an amount of steam by the water being conducted to that part of the ship, &c., on fire, by the branch working in any required direction below the decks, &c. Another advantage attending this fire branch is, that the orifice in the "nozzle" (several designs are fitted) may be much larger than those generally used on the ordinary fire branch, and thereby conduct a much more powerful stream of water on the devouring element. For the purpose of reaching the fire in the lower hold of a ship that has two or more decks, the branch is unscrewed from the main, one or two lengths of the main, as required, are attached, and the branch replaced as before, and the connecting rods or chains lengthened in the same proportion; this reaches the fire below any number of decks or floors.

JOHN KORFF,
Shipbuilder and Marine Surveyor.

Orchard Lodge, Glebe Point Road,
December, 1861.

This is the description referred to in the annexed Letters of Registration granted to John Korff, this fourteenth day of January, 1862.

JOHN YOUNG.

REPORT.

Ship Fire Main and Revolving Branch.

REPORT.

Royal Mint, Sydney,
17 *December*, 1861.

Sir,

Having examined and considered the matter stated in the Petition of Mr. John Korff, for Letters of Registration, for his invention of a Ship Fire Main and Revolving Branch for extinguishing fires on board ships, we have the honor to recommend that the protection prayed for be granted.

We have obtained from Mr. Korff a drawing and specification in further elucidation of his invention; these are enclosed, together with the original document transmitted to us.

We have, &c.,
E. W. WARD.
E. O. MORIARTY.

The Honorable
The Colonial Secretary.

[Drawing—one sheet.]

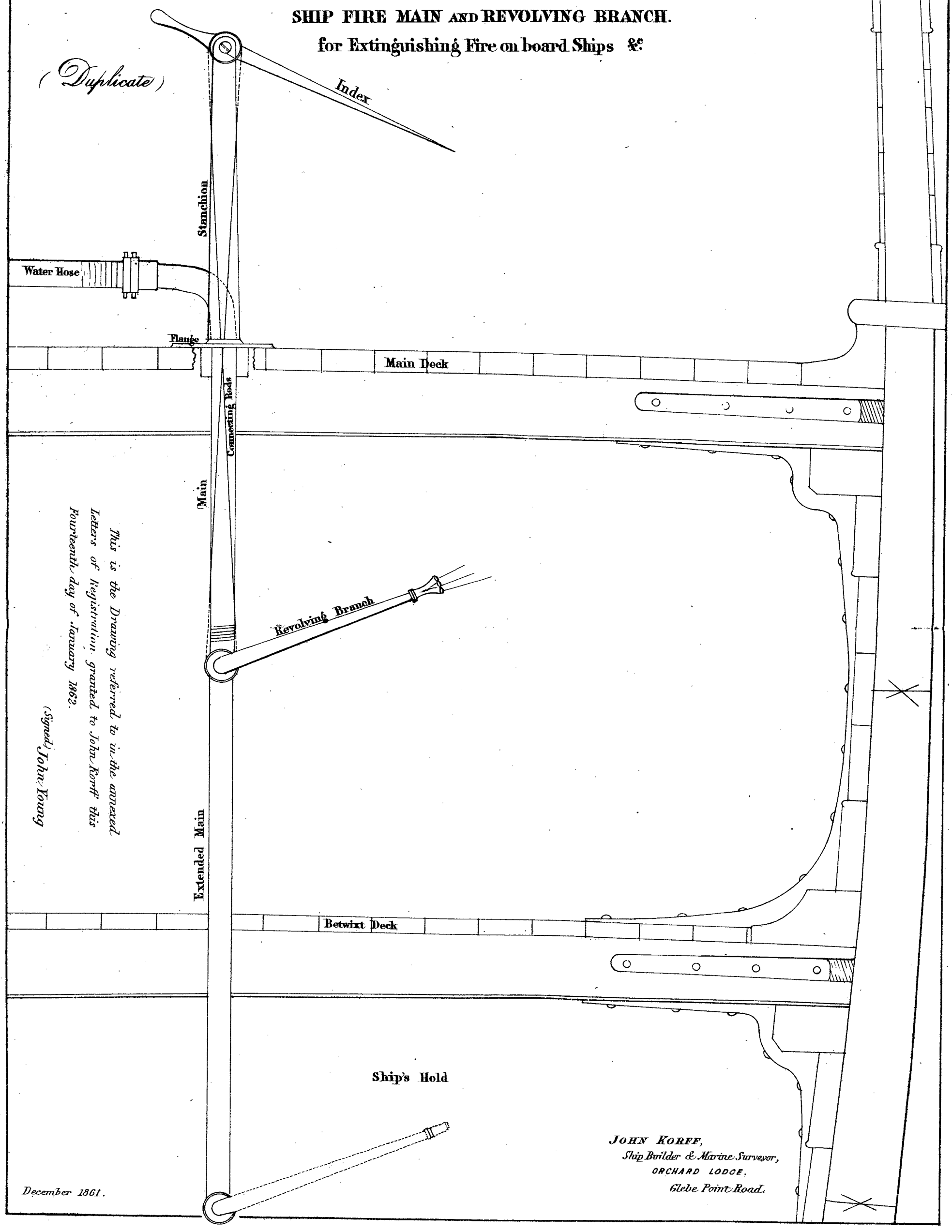
COPY

KORFF'S PATENT

SHIP FIRE MAIN AND REVOLVING BRANCH.

for Extinguishing Fire on board Ships &c

(Duplicate)



This is the Drawing referred to in the annexed Letters of Registration granted to John Korff this Fourteenth day of January 1862.

(Signed) John Young

JOHN KORFF,
Ship Builder & Marine Surveyor,
ORCHARD LODGE,
Glebe Point Road.

December 1861.

A.D. 1862, 12*th May*. No. 51.

IMPROVED RAILWAY ENGINES, CARRIAGES, &c.

LETTERS OF REGISTRATION to James Richard Davies, for Improved Railway Engines, Carriages, &c.

[Registered on the 13th day of May, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Richard Davies, of Melbourne, in the Colony of Victoria, engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an "Invention "of improvements in the construction and working of Engines, Carriages, Trucks, "Waggons, or other Vehicles, propelled or drawn on any line of Rail," which is more particularly described in the specification and paper of drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures, which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed

by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council to grant, and do by these Letters of Registration grant unto the said James Richard Davies, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Richard Davies, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Richard Davies shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twelfth day of May, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION of James Richard Davies, of Melbourne, in the Colony of Victoria, engineer, for an invention of "Improvements in the construction and working of "Engines, Carriages, Trucks, Waggons, or other Vehicles propelled or drawn on "any line of Rail."

Now the nature of my invention, and the manner of performing the same, is particularly described and ascertained in and by the following statement and description, reference being had to the drawings hereto annexed, and to the letters and figures marked thereon, which letters indicate the same parts wherever they occur—that is to say, I am aware that it has been proposed to run engines and carriages on lines of rail, with angular guide-wheels, in combination with long axles and loose bearing and driving wheels, and it has been admitted that the proposition is open to many and serious objections. I have lately personally tested the matter, and fully indorse the prevailing opinion, for the following reasons:—1st. That in the event of the long axle breaking, it was proposed that the guide-wheels should take the weight. This is a fallacy, inasmuch as the guide-wheels, being set at an angle of forty-five degrees, could not possibly be expected to carry the same weight as a vertical wheel of larger dimensions, independently of the shock sustained in transferring the weight to the guide-wheels. Again, it was proposed to fix the guide-wheels on to the frame of engine or carriage, which wheels would have no bearing on the rail. The error of this is obvious, as the guide-wheels would be subjected to severe shocks when called into play on the rail, especially where the sleepers had given or embankments settled. I also find by test, that the guide-wheels should have an elastic pressure on the rail, not only with the view of preserving a grip on the rail, but also in permitting and regulating the shocks and concussions which must of necessity occur on any line of rail. I would also observe, that the long axle with loose wheels are open to objection, namely, undue friction and liability of breakage. Now my invention has for its object the removal of these objections, the advantages of which may be thus classified:—1st. The introduction of fixed wheels on short axles, by which means I am enabled to lessen friction, and ensure safety in passing sudden and abrupt curves at a high rate of speed; 2nd. A certain arrangement (shewn in figure 2 of the accompanying drawings) by which means I am enabled to obtain and sustain an elastic bearing on the rail, the advantages of which are, absorption of concussions, and safety in transit. The accompanying drawings represent (in figure 2) a series of layers of India rubber, by which means I am enabled to absorb concussions, and withstand violent pitchings of the

engines

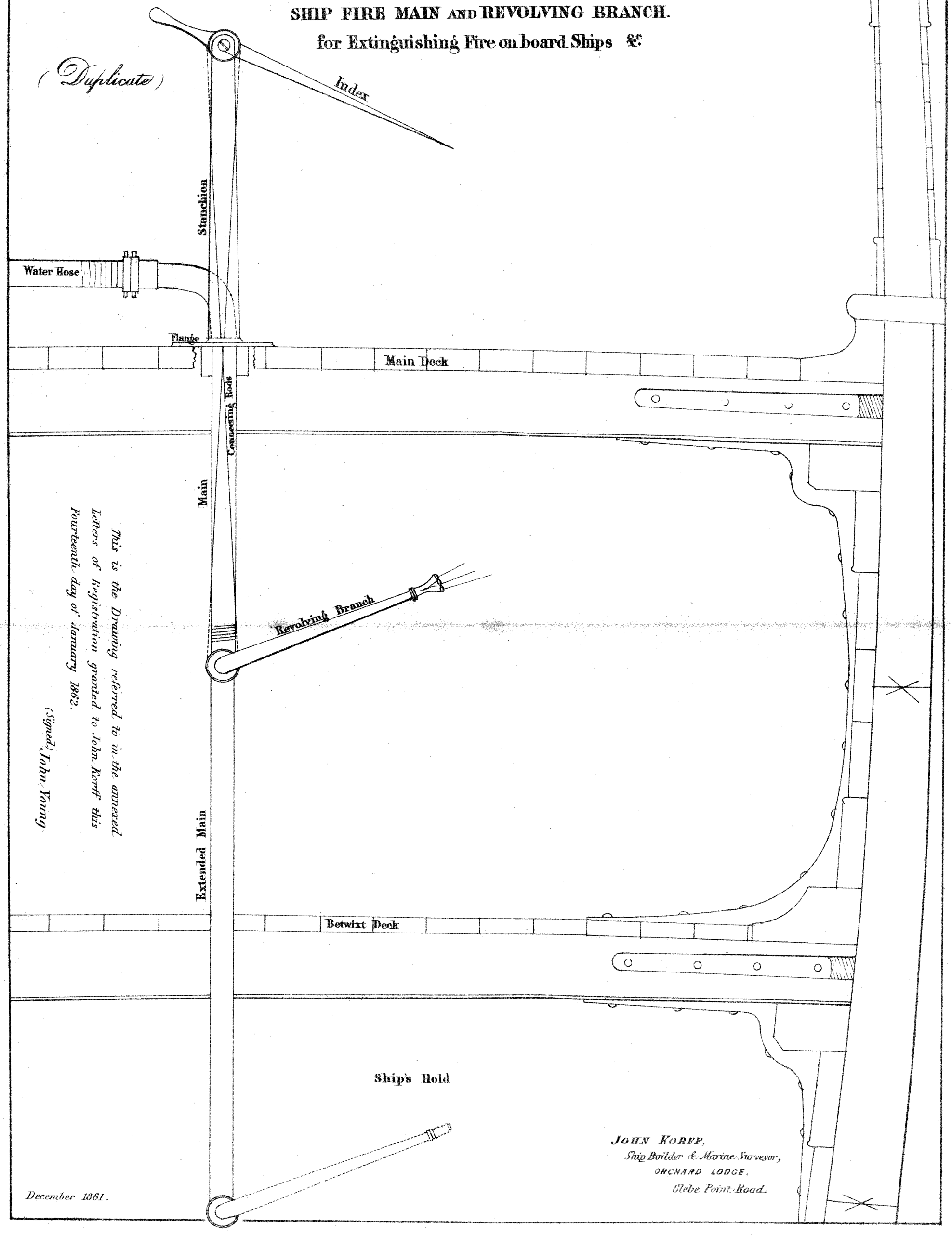
COPY

KORFF'S PATENT

SHIP FIRE MAIN AND REVOLVING BRANCH.

for Extinguishing Fire on board Ships &c.

(Duplicate)



This is the Drawing referred to in the annexed Letters of Registration granted to John Korff this Fourteenth day of January 1862.

(Signed) John Young

JOHN KORFF,
Ship Builder & Marine Surveyor,
ORCHARD LODGE,
Glebe Point Road.

December 1861.

engines or other vehicles, &c., whilst in transit. I would have it understood, that I do not specially claim the elastic springs there shewn and described, as I deem steel or other springs may be here used with advantage; and although I have adapted my invention (in putting it to a practical test) to a wooden rail, I would particularly remark that I do not confine myself to that material, as I apprehend that wood, iron, or a combination of both, or other material, would attain the same beneficial results. My invention is particularly designed for running on and traversing lines of rail where sudden and abrupt curves occur, with flangeless bearing wheels. The guide-wheels may be used otherwise in connection with flanged wheels; but as economy is the motto of my invention, I purpose running on wooden rails. Should it be deemed necessary or advisable to extend the railways in the interior, the districts through which the railways would pass (no matter how stunted the timber) would be available for the purpose.

I will now proceed to describe the drawings. Fig. 1 shews an end elevation of a railway carriage; fig. 2, a side view of same, with the elastic spring figured 9; fig. 3, section of wheel, with short axle and angular guide-wheel; fig. 4, angular guide-wheel on a reversible rail; fig. 5, horizontal guide-wheel. A, the section; B, regulating, directing, or guide-wheel. These wheels may be made or manufactured of any suitable material, and may be fixed or fastened angularly, vertically, horizontally, or otherwise as its adaptation may require or be deemed most beneficial. The guide-wheel may be fitted so as to bear on the outside of the rail with similar success. I merely remark this, as the drawings represent the guide-wheels running and bearing on the inside of the rail. C, C, short axles. The angle I have adopted for the guide-wheels is forty-five degrees, the flanges of which wheels should be fitted to the top and sides of the rail according to the position in which they are placed; they are fitted at the ends of the engine, carriage, or vehicle used for transit, and may be mitred, bevelled, or double flanged. The extreme simplicity of the invention, I deem, requires no further description.

Having thus described the nature of the invention, and the manner of performing same, I feel it incumbent on myself (after entailing considerable expense), in order to protect my invention, to make the following observations:—I would have it clearly understood that I do not specially claim the precise details, so long as the character of the invention or improvement be retained and understood; neither do I claim rails made or manufactured of wood or iron, as I am of opinion that a combination of metal and timber or other material, might, under certain circumstances, be beneficially introduced. Again, I would particularly observe, that I do not claim specially the guide-wheels as here shewn angularly, as I believe they may be introduced and used with great advantage horizontally, vertically, or otherwise in combination with the short axles and fixed wheels; neither do I claim the materials of which they may be made or manufactured; but what I do claim is,—First, the use of the regulating, directing, or guide-wheels, whether fitted angularly, vertically, horizontally, or otherwise, in conjunction with the short axle and fixed wheels; second, the application of the spring to these guide-wheels, as shewn in fig. 2 of the accompanying drawings, by the aid of which the guide-wheels are retained and kept on the rail by elastic pressure—it also admits of the absorption of concussions; thirdly, the introduction, in the manner shewn in the drawing, figs. 1, 2, and 3, of the short axle to the carriages, or other vehicles now in use on the ordinary lines of iron rail; and lastly, the general arrangements and improvements, as herein substantially described.

This is the specification referred to in the annexed Letters of Registration granted to James Richard Davies, this twelfth day of May, 1862.

JOHN YOUNG.

REPORT.

Improved Railway Engines, Carriages, &c.

REPORT.

Royal Mint,
Sydney, 11 *March,* 1862.

SIR,

Having examined and considered Mr. Davies' application for Letters of Registration, under Act of Council 16 Vict., No. 24, for "improvements in the construction and working of Engines, Carriages, Trucks, Waggons, and other Vehicles," we have the honor to report that we see no objection to the necessary protection being granted, if confined within the limits of the Specification as amended by us.

We have, &c.,
E. W. WARD.
JOHN WHITTON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(Copy)

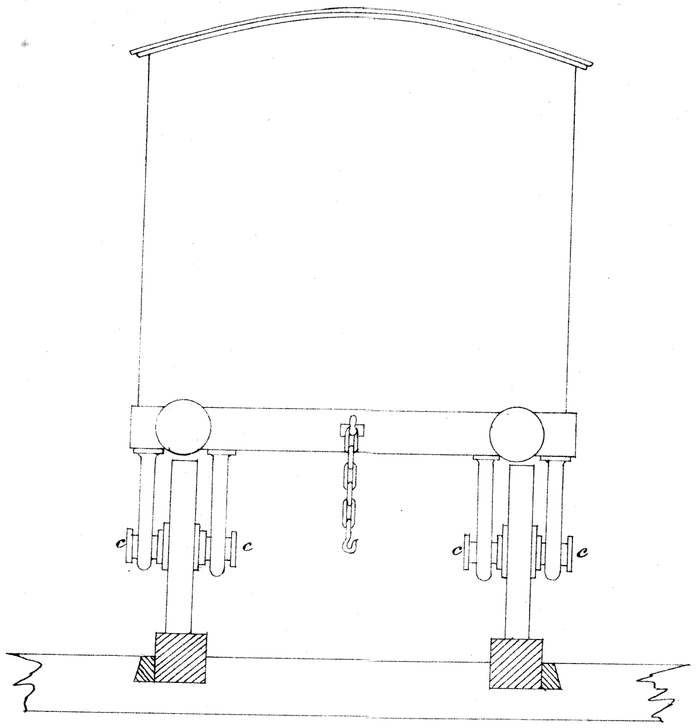


Fig 1.

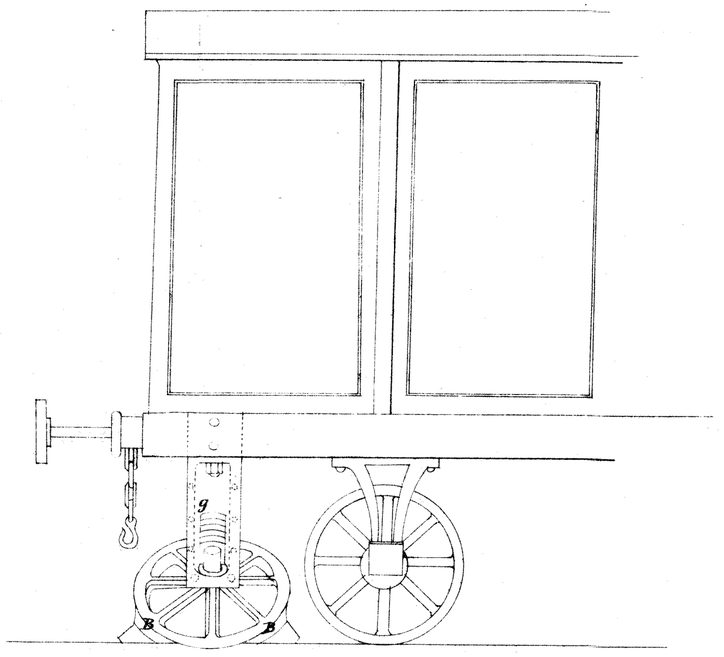


Fig 2

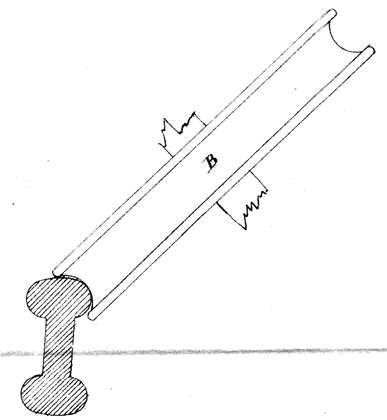


Fig 4.

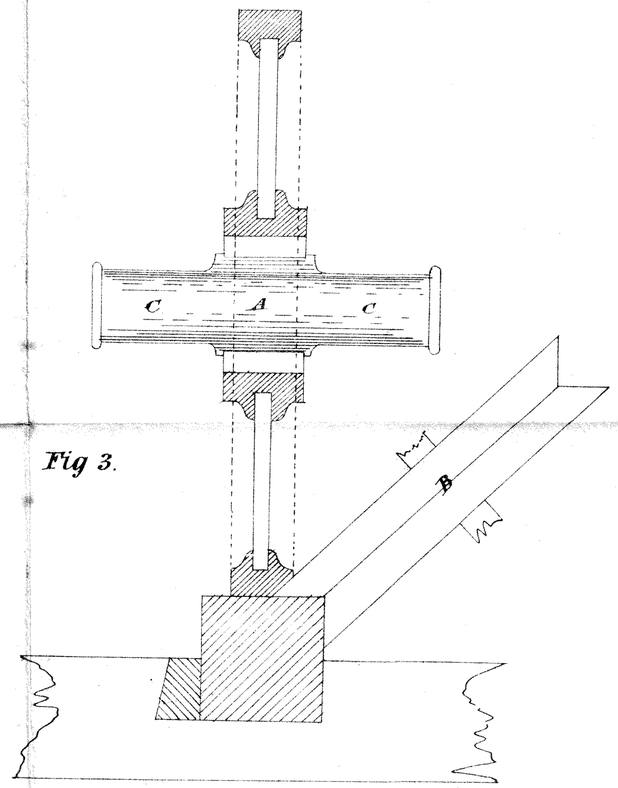


Fig 3.

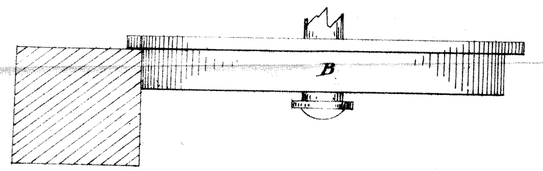


Fig 5.

This is the Paper of Drawings referred to in the annexed Letters of Registration granted to James Richard Davies this twelfth day of May. 1862.

Sgd. John Young.

A.D. 1862, *4th June.* No. 52.

IMPROVED HATS, CAPS, OR OTHER HEAD COVERS.

LETTERS OF REGISTRATION to Richard Day Ford, for improved Hats, Caps, or other Head Covers.

[Registered on the 5th day of June, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Richard Day Ford, of Melbourne, in the Colony of Victoria, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of "an invention for making "Hats, Caps, or other Head Covers of extreme durability and lightness, which are pecu- "liarly adapted for resisting the rays of the sun and carrying off the moisture of the "head occasioned by heat, which may be washed with the greatest facility, as occasion "may require, without sustaining any injury, and which are therefore particularly "suitable for summer wear," which said invention is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent

persons

persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Richard Day Ford, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Richard Day Ford, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Richard Day Ford shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourth day of June, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION of an Invention for making Hats, Caps, or other Head Covers of extreme durability and lightness, which are peculiarly adapted for resisting the rays of the sun and carrying off the moisture of the head occasioned by heat, which may be washed with the greatest facility, as occasion may require, without sustaining any injury, and which are therefore particularly suitable for summer wear.

The nature of this invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement, that is to say:—

The exterior portion of the hat, cap, or other head cover, consists entirely of silk, cotton, or linen fabric, or a material consisting of a mixture or union of silk and linen, or silk and cotton, or linen and cotton, or of any light washing fabric. The internal part consists of a woollen or cotton fabric, or wool or cotton in the fleece, and is lined throughout with a cotton or linen fabric, or a material consisting of a mixture or union of linen and cotton.

The materials thus composing the hat, cap, or other head cover, are to be quilted together by machine sewing; the parts are to be sewed together by machine sewing or hand sewing, or both; and a head lining of silk, cotton, or linen fabric, or a material consisting of a mixture or union of silk and linen, or silk and cotton, or linen and cotton, is inserted.

The article thus manufactured is to be washed and stiffened in the ordinary mode used for washing and stiffening linen, and when partially dry is to be drawn over and dried upon a zinc block, the size and shape of the interior of such article. The brim, leaf, or peak, is to be pulled or pressed into shape, whilst the article is damp.

When a more than ordinary protection from heat is required, a current of air over the head may be obtained by dispensing with the head lining already referred to above, and substituting one made of a stiffer material, such as that of which the hat, cap, or other head cover is composed, or of some other suitable material, which can be easily detached from the hat, cap, or other head cover, in order that after such hat, cap, or other head cover has been washed, it may be drawn over and dried upon the block in the manner above explained.

This head lining is to be attached to the hat in the following manner, that is to say:—It is to have affixed to its outer circumference a number of studs or buffers, made of a similar material to that of which the hat, cap, or other head cover is composed, or of other suitable material, into each of which is to be inserted a metal eye. The eyes are to be passed through the hat just above the brim, and fastened to the hat by metal springs, placed through the eyes. This head lining, when fixed, will leave a space between it and the body of the hat, cap, or other head cover. Buttons and button-holes may be employed in the place of the eyes and springs, if thought desirable. The springs or buttons are to be then covered by a narrow band round the exterior of the hat.

This is the specification referred to in the annexed Letters of Registration granted to Richard Day Ford, this fourth day of June, 1862.

JOHN YOUNG.

REPORT.

Improved Hats, Caps, or other Head Covers.

REPORT.

Royal Mint,
Sydney, 10 *May*, 1862.

Sir,

Having examined and considered the application of Mr. R. D. Ford, for Letters of Registration, under Act of Council 16 Victoria, No. 24, for an invention for making Hats, Caps, or other Head Covers,—we have the honor to report that we see no objection to the necessary protection being granted.

We have, &c.,

E. W. WARD.
R. GREENUP.

The Honorable
The Colonial Secretary.

A.D. 1862, *4th August.* No. 53.

HYDRAULIC PULVERIZER.

LETTERS OF REGISTRATION to Enoch Chambers, for an Hydraulic Pulverizer.

[Registered on the 5th day of August, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency The Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Enoch Chambers, of the City of Melbourne, in the Colony of Victoria, Engineer and Ironfounder, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention which he has named improvements in "the use of hydraulic power for the breaking, crushing, or pulverizing of quartz, blue-stone, or other stone or mineral, of any description; and the use of a wrought iron lever or jaw in machines for crushing quartz or any other mineral; and the use of steel teeth and steel shield pieces for the levers or jaws in such machines," which said invention is more particularly described in the specification and paper of drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of twenty pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improve-

ment

ment might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration, grant unto the said Enoch Chambers, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Enoch Chambers, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Enoch Chambers shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fourth day of August, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

As a means of gaining power, I propose to apply an hydraulic machine, as shewn in drawing, figure 1, with the rams acting direct on a compound lever or jaw, and to attach to the frame of the machine a cylinder (to be worked either by steam, water, or other agent) with the plunger rod of an hydraulic ram continued, as shewn in drawings of cylinder, figure 2, whereby the machine is not encumbered with any revolving shafts or gearing of any description, and therefore friction is done away with, as also the expense of gearing and bearings, and which always entail much wear and tear. I do not confine myself to any particular mode of fixing the rams or connecting them with the machinery, but the mode shewn in the drawings is a practicable mode, and I consider it a good one, as it allows the material to be broken, crushed, or pulverized, to fall of its own gravity from one point to the other, and then into the receptacle underneath the machine; neither do I confine myself to two or any other number of rams. The movable lever or jaw I propose to make of wrought iron (and I claim as part of my invention the making it of this material), but it may also be made of any other material that may be found suitable, and it may be so made (if required) as to allow angular pieces made of steel (and I claim as part of my invention the making them of steel), or of iron with a portion of steel, or of other metal or metals that may be found better adapted, to fit into it, so that the angular pieces can at any time be removed for repairs or renewal, should such be found necessary. The lever or jaw made and placed as shewn in drawing, figure 1, will allow the larger portions of materials to be taken in at the top, which, when being crushed, broken, or pulverized, will fall by their own gravity down to the lower part of the lever or jaw; and it can be easily seen by the inspection of the drawing, figure 1, that the lever or jaw acts both ways—that is, both upper and lower portions work backwards and forwards—and by this means the inconvenient weight required in other machines is saved. For the purpose of reducing extra large pieces of materials, I propose to make the stationary back plate of the machine of wrought iron, but it may also be made of any other material that may be found suitable, and it may be so constructed (if required) as to allow the fitting in of pieces of different shapes made of steel, or iron with a portion of steel, or of other metal

or

or metals that may be found adapted, as shewn in drawing 4; so that on the upper portion of the movable or compound lever or jaw, coarser or larger pieces can be fitted, and smaller pieces on the lower portion, to suit the materials requiring to be broken or crushed. According as it is required to break, crush, or pulverize the materials more or more finely, the space at the bottom of the lever or jaw may be reduced to a smaller gauge, by admitting water into the lower water chamber and discharging the same quantity from the upper one. This can be accomplished by opening the safety valve on the top of the upper chamber, which will permit the water to run through the waste pipe; and by allowing the suction pipe of the lower chamber to do its duty, which it will do if the machine is put into a slow motion. When the space has been sufficiently reduced, the safety valve can be replaced and the machine set to its proper work. For the enlargement of the space at the bottom of the lever or jaw, the reverse operation must be performed. The suction pipes of the water chambers will serve to keep up a supply of water, should there be any waste through leakage, condensation, or from other causes.

Figure 2 in the drawings shews another method, in which a cylinder, worked by steam, water, or other agent, may be connected with the hydraulic ram.

Figure 3 shews how certain other agents may be employed to work the cylinder.

Figure 4 shews several forms of jaws, and back plates to correspond, which may be used, particularly for more finely breaking up or pulverizing the materials. Teeth may be used when required, but it is in many cases not necessary to use them. In other cases shield pieces may be used.

Figures 5 and 6 shew cross sections of lever or jaw, and back plate, respectively, with teeth.

What I claim as my invention is, first,—the application of hydraulic power, in such a machine as that described in the specification and drawing, to the breaking, crushing, and pulverizing of quartz, blue-stone, and other minerals (including metals) of every description; and also, the use of wrought iron for the construction of any such levers or jaws (single or compound) as aforesaid, or any similar lever or jaw, either single or compound, to be used in the machine already described, for the purpose of breaking, crushing, or pulverizing any such minerals as aforesaid; and also, the use of steel for the construction of teeth and of shield pieces, to be fitted in or on any such levers or jaws as aforesaid, either single or compound, and of whatever metal made, to be used for the purposes aforesaid, or to be fitted in or on such back plate as aforesaid. I do not however bind myself to any particular form or shape of lever or jaw, as it can be either straight, angular, half round, or in two pieces with joint in centre, or any other shape or form that may be found better adapted. Neither do I bind myself to corrugated, diamond-pointed, or smooth faces, or partly smooth, as any shape or face can be used, so as to break or crush the materials to suit any particular work, as for instance, cubing stones for road metal and so forth, or crushing them into small particles, or for pulverizing for the extraction of gold or other metals. Neither do I bind myself to any particular mode of fitting or placing the teeth or shield pieces.

This is the specification referred to in the annexed Letters of Registration granted to Enoch Chambers, this fourth day of August, 1862.

JOHN YOUNG.

REPORT.

A.D. 1862. No. 53.

Hydraulic Pulverizer.

REPORT.

Royal Mint,
Sydney, 2 July, 1862.

SIR,

Having examined and considered the application of Mr. Enoch Chambers, for Letters of Registration under Act of Council 16 Victoria, No. 24, for an invention for "Improvements in the use of hydraulic power for crushing Quartz, &c.," we have the honor to report that we have, with the consent of the solicitors for the applicant, amended the specification so as to limit the protection sought to that which Mr. Chambers may have invented. We are of opinion that the Letters of Registration should be issued subject to such limitation.

We have, &c.,

E. W. WARD.
JOHN WHITTON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

Enoch Chambers.

FIG 1

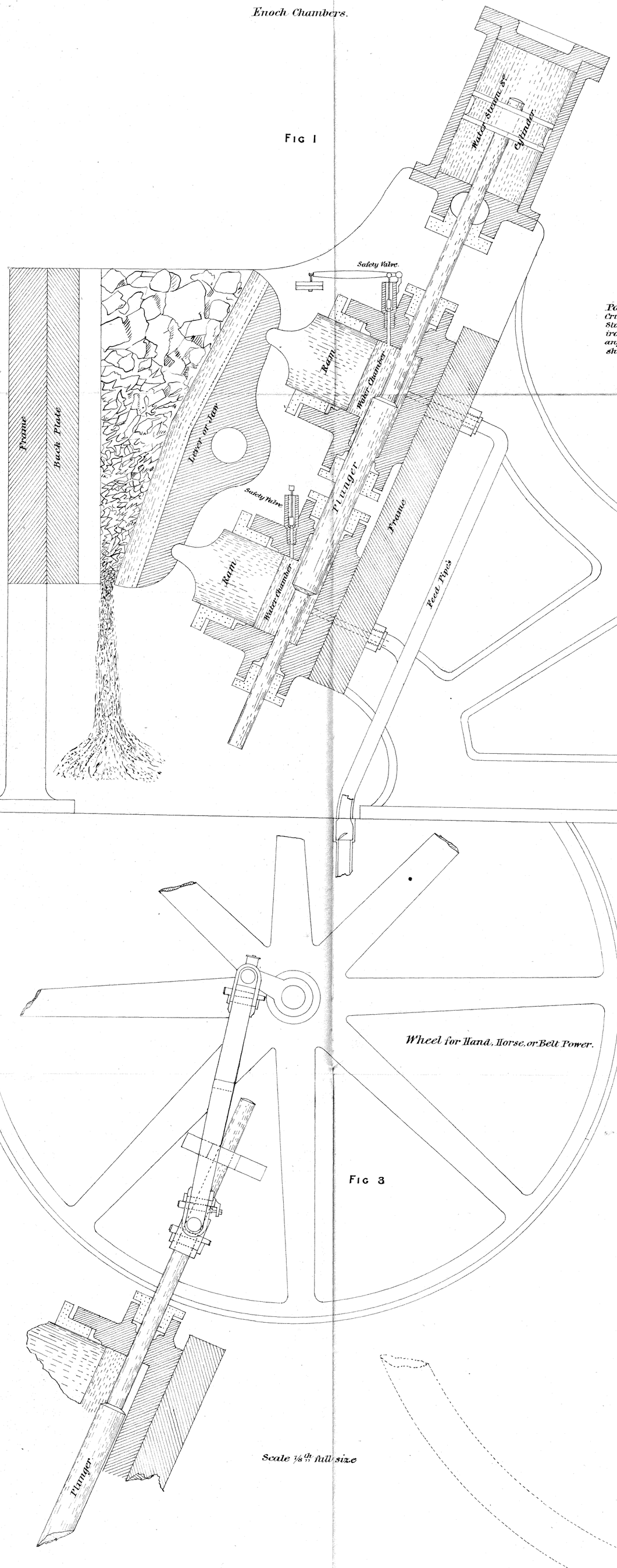


FIG 3

Scale 1/8th full size

FIG 6

Cross Section of Back Plate. with steel teeth

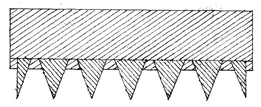


FIG 5

Cross Section of Lever or Jaw with steel teeth.

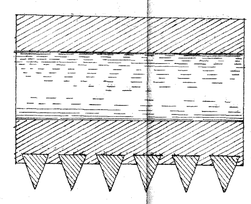
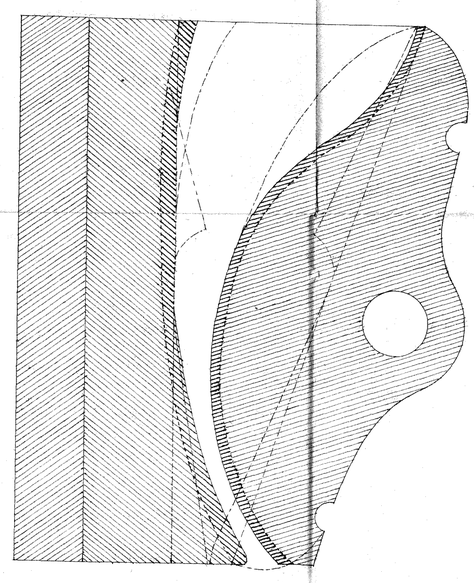


FIG 4

Vertical Section of Back Plate & Lever or Jaw.



NB - the lines drawn thus ——— shew some of the different forms of Jaws, and back plates to correspond which may be used with or without teeth.

Patent for the use of Hydraulic Power for the Breaking, Crushing, or Pulverizing of Quartz, Bluestone, or other Stone or Mineral, of any description, and the use of a wrought iron Lever or Jaw in machines for crushing quartz or any other mineral, and the use of Steel teeth, and steel shield pieces, for the Levers or Jaws of such machines.

This is the Paper of Drawings referred to in the annexed Letters of Registration, Granted to Enoch Chambers, this Fourth day of August, 186x.

Sg. John Young.

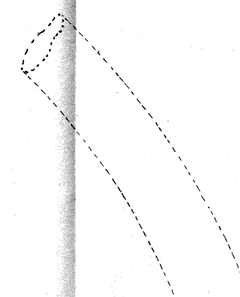
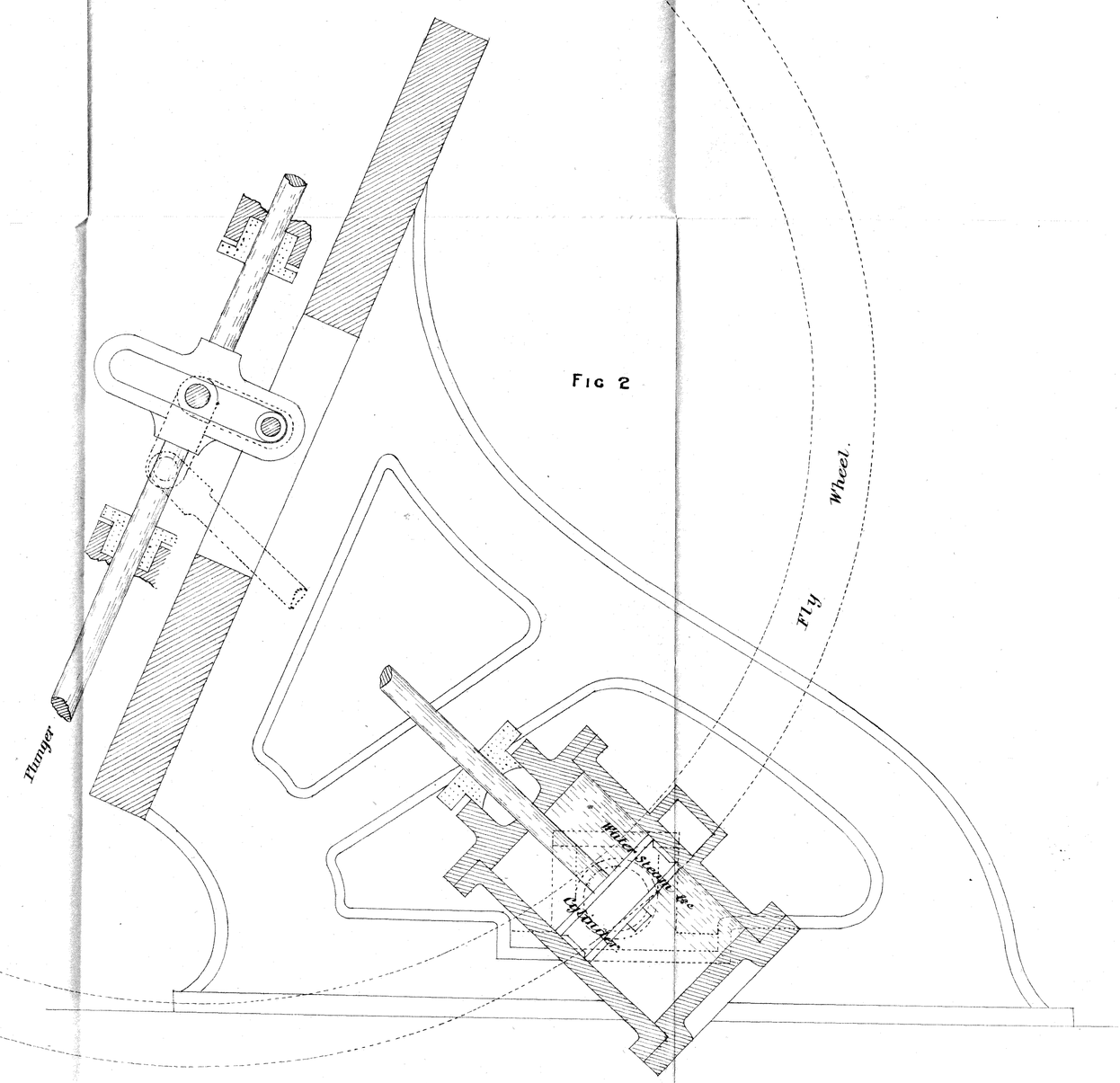


FIG 2



A.D. 1862, 30*th September*. No. 54.

SAFEGUARD IN THE BURNING AND USE OF KEROSENE AND OTHER INFLAMMABLE FLUIDS.

LETTERS OF REGISTRATION to William Johnson and John Downes Owens, for a Safeguard in the burning and use of Kerosene and other Inflammable Fluids.

[Registered on the 3rd day of October, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency The Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS William Johnson, of Saint Kilda, in the Colony of Victoria, Analytical Chemist, and John Downes Owens, of the same place, Esquire, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for a Safeguard in the burning and use of Kerosene and other inflammable fluids, which is more particularly described in the specification and drawings hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; the Petitioners humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen

years:

years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated in the said Petition, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said William Johnson and John Downes Owens, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said William Johnson and John Downes Owens, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said William Johnson and John Downes Owens shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirtieth day of September, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

WE, William Johnson, of Saint Kilda, analytical chemist, and John Downes Owens, of the same place, gentleman, declare that we are in possession of an invention which we believe will be of great use and public utility, and that we are the true and first inventors thereof, and that the same is not in use by any other person or persons, to the best of our knowledge and belief; and we do hereby declare the nature of the said invention to be for a Safeguard in the burning and use of Kerosene Oils, and of any and all inflammable fluids, by providing for the complete protection of the Kerosene or fluid used in burning, from ignition or explosion by contact with the flame of the lamp or any light used during the filling or replenishing of the lamp. We claim in this our invention the use of a metallic tube, of any shape, the sides perforated or solid, and either open or closed below, or the use of a metallic gauze covering, of any shape, for the entire reception and enclosure of the whole of the wick of the lamp, leaving the passage of the fluid to the wick unimpeded, but at the same time completely preventing the return of flame and communication of ignition to the oil contained in the reservoir of the lamp, and so protecting the contents of the reservoir from explosion. We also claim the use of a metallic perforated sheet or screen of wire-gauze, for preventing accidents and explosion by fire, inserted permanently into the apertures of all lamps and of all vessels used for filling lamps or for storing inflammable liquids, to be as a fixed safeguard against accident during the replenishing of the lamps with any such liquids, according to the drawings annexed hereto. This invention permits the most dangerous oils or spirits being used for domestic or other purposes with perfect safety. The arrangement of the safeguard is self-acting, and incapable of derangement or accident in ordinary use.

This is the specification referred to in the annexed Letters of Registration granted to William Johnson and John Downes Owens, this thirtieth day of September, 1862.

JOHN YOUNG.

REPORT.

Safeguard in the use of Kerosene, &c.

REPORT.

Royal Mint,
Sydney, 5 September, 1862.

SIR,

In reply to your reference of Messrs. Johnson and Owens' application for Letters of Registration for an invention in a "Safeguard in the burning and use of Kerosene and other inflammable fluids," we have the honor to report that, as far as we are informed, the arrangement in question is new, and therefore of a character capable of being protected by Letters of Registration; we therefore recommend that the prayer of the Petitioners be granted.

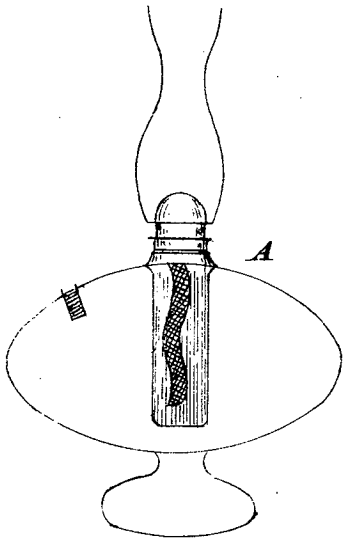
We have, &c.,

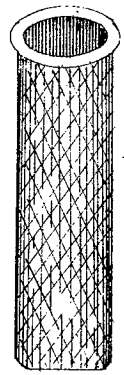
E. W. WARD.
J. SMITH.

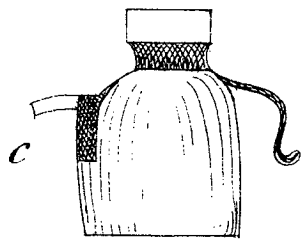
THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(Copy)







A . Lamp containing safety guard.
B . Safety guard.
C . Can for holding Kerosene.

These are the Drawings referred to in the annexed Letters of Registration granted to William Johnson and John Downes Owens. this thirtieth day of September. 1862.

Sg. John Young.

A.D. 1862, 2*nd October*. No. 55.

IMPROVEMENTS IN METALLIZING AND FUSING ORES.

LETTERS OF REGISTRATION to Rowland Vounder Rodda, for Improvements in metallizing and fusing Ores.

[Registered on the 4th day of October, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Rowland Vounder Rodda, of Peurice, in the Province of South Australia, gentleman, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for metallizing and fusing Ores, which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council,

and

and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Rowland Vounder Rodda, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Rowland Vounder Rodda, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Rowland Vounder Rodda shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this second day of October, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION

Of an invention by Rowland Vounder Rodda, of Peurice, in the Province of South Australia, gentleman, for reducing ores, by submitting such ores or minerals (after having been deprived of sulphur, arsenic, antimony, or any other volatile substance) to heat—in connection with carbonaceous fuels, or other substance containing carbon, as coals, wood, charcoal, oils, smoke, or carburetted gases, hydrogen gas, or other gases or substances having a strong affinity to oxygen—in vessels from which all atmospheric air is excluded; also, for fusing the metal thus metallized by raising it to the heat required for that purpose, but without raising it to the heat required for fusing the stony portion or gangue; also, for separating the metal so fused from the stony or other foreign substance with which it may be associated, by crushing and washing.

I, the said Rowland Vounder Rodda, hereby describe the nature of my said invention, and the manner in which the same is to be performed:—

The ores to be operated upon are, if necessary, first freed from sulphur, arsenic, antimony, or other substance of a like kind, by calcination; the ores then broken to a convenient size—an inch gauge would, in most cases, be suitable—are mixed with about an equal bulk of charcoal or other carbonaceous substance, and are subjected to a moderate heat in a close vessel. In the arrangement of furnace hereinafter described, the heat, which in ordinary smelting processes is wasted up the chimney stack, is economized, and suffices for the above purpose. The heated charcoal, or other substance having a strong affinity for oxygen, acts upon oxides or carbonates, or other ores having oxygen or carbonic acid in their composition, and by expelling or partially these gases from the ores in which they are combined, metallizes or partially metallizes the ores. The metallized or partially metallized ores, still mixed with the charcoal as previously described, are then passed into a second receptacle, and subjected to a higher degree of heat—such as that of an ordinary reverberatory furnace. Here the heat has to be so regulated as to cause the fusion of the metal within the gangue or stony portion of the ore, without the fusion of the stony portion or gangue itself; hence the formation of slag is avoided. By the influence of molecular attraction the fused metal runs together within the pores or substance of the stone or gangue, and is found embedded within the same. A sufficient degree of heat to accomplish this having been obtained, the charge is withdrawn and thrown into water, to separate the unexpended portion of the charcoal by flotation. The ores are then crushed to powder by hand or suitable machinery, and the granulated metal separated by washing. Though in the foregoing description, and in a description of my furnace which follows, I have assumed the employment of carbonaceous substances to be mixed with the ore, this is not necessary. Another method is by forcing a stream of hydrogen, or other gas having an affinity for oxygen, through the heated ore; and this gas may either be generated within the vessel containing the ore, or made at a distance therefrom, and passed into the vessel containing the ore, by aid of pipes, gasometers, or other convenient apparatus.

In carrying out the above described process, I claim no particularly constructed furnace, but the one of which the following is a description is preferred for working on a large scale where carbonaceous substances are to be used:—

A furnace with three soles or bottoms one over the other. The heat is made to pass under the second or middle sole, and over the roof of the second and under the first sole. The raw ores, with charcoal or other fuel containing a large portion of carbon, are first placed on the first sole, which may be either closed at the top, leaving holes in different places, or left quite open. The heat from the flues passing under this sole (which

may

may be made of iron tiles or other suitable substances) deprives the ore of its water and very volatile gases. They are then let down through the roof into the middle furnace, which is hotter than the first. This chamber or furnace has no flues running through it, but under it, over it, and by the sides, having one or more openings near a door or doors at one end, for the escape of the gases. In this chamber or furnace the metallization of the ores is nearly completed. The contents are then raked through holes in the roof of the third sole, which, having had the whole heat passing through it, is hot enough to fuse the metal, but not to fuse any stony matter associated with the ores. This third sole may be formed into three distinct furnaces, running the whole length from the bridge to the opposite end. As soon as the heat is raised to a sufficient intensity, the ash-pit and fire-doors are closed, and all atmospheric air is kept from entering; previous to closing the fire-door, a few shovelfuls of charcoal or anthracite coals may be thrown on the fire. A gas arises from those substances, after all hydrogen and sulphur have been allowed to escape, which I call the gas of carbon, because it has no oxygen in its combination, as is the case with carbonic acid gas. This gas of carbon assists the operation, and prevents the ores from oxidization. Sufficient heat may be kept in a furnace, by the means I have described, for several hours, to melt copper without adding one particle of fuel. Whilst the ores are undergoing the last part of the process in the bottom sole, a second charge is being operated upon in the middle, and another in the upper sole, so that three different charges of ores are undergoing certain parts of the process at the same moment, and by the heat from the same fire-place. When it is found that the charge in the lower furnace is sufficiently operated upon, it is drawn through holes at each doorway, connected with cubs or vaults underneath the furnace, and when sufficiently cool taken to the washing place, deprived of the charcoal, and then crushed and washed. The charcoal, which by each operation loses about 20 per cent. only in weight, may be used again when dry. When ores of very rich quality, say from 25 per cent. and upwards, are to be subjected to my process, I use a furnace which has a sole made similar to common reverberating flowing furnaces, with a well either at one end or at the side, for either lading or tapping the metal out of the furnace. When rich ores are operated on by my plans, a larger portion of the metal percolates through the hollows formed by the lumps of ore and charcoal, and falls to the bottom of the furnace; the other portion is raked off in the usual way. The charcoal ought to be about the same size as the ore. The great object in metallizing is to keep each lump of ore separate by means of some carbonaceous fuel, so that the volatile gases from the ores may the more easily escape, and the gas of carbon take the place of those gases, and mix with any remaining portions of oxygen forming carbonic oxide.

Ores which contain sulphur, arsenic, antimony, or bismuth, are first roasted in a furnace of a peculiar construction, of which I claim to be the inventor. This furnace may be made of any length, breadth, or height, and consists of three permanent walls made of bricks, stone, or clay, with air-holes passing through these walls, having sliding dampers or any other contrivance connected with these holes, for the regulating the admission of atmospheric air. There are also gratings of iron, or tiles or bricks, in the bottom of this furnace, connected with draught-holes on each side at the bottom or surface of the ground. The front part of this furnace may have a temporary and movable front of iron with holes perforated in it; or when the furnace is charged, it may be built up of loose bricks or with bricks and mortar, leaving openings in various places. This furnace may be connected with flues for collecting and condensing the sulphurous vapours. The ores are placed with wood or any other fuel in alternate layers, and when the furnace is charged it is to be lighted from underneath. Care is to be taken that too much air is not admitted at the commencement of the process. The width of such a furnace must be very small compared with its length, because the object is to submit as much of the ore as possible to the action of the atmospheric air while red hot. 1,000 tons of ore can be as easily roasted by this process as one ton, if proper care be taken. The whole of the sulphur will not be expelled by this method. The ores are afterwards recalcined in a common calcining furnace.

By my process, the chlorides, which under ordinary processes of smelting are evaporated, and escape into the atmosphere, are saved. The means by which I collect such metallic vapours are as follows:—I cause the said metallic vapours either to pass through pipes or flues leading from the furnace into water, or through a flue, chamber, or chimney, filled with coarsely ground charcoal, coke, or other substance on which the chlorides or vapours of metals may be precipitated, and by throwing a stream of water from the top of such flue, chamber, or chimney, I dissolve such chlorides, the metal from such solutions being precipitated by the usual means.

Having thus explained the nature of my invention, and the manner in which it is to be performed, I would state that I do not confine myself to the precise method herein described, nor do I claim to be the inventor of every portion of the process herein described; but what I claim as my invention is the reduction of ores by fusion of the metallic portions within the substance of the gangue or stony portion of the ores, and without the fusion of the gangue or stony portion themselves, together with the subsequent separation of the metallic and stony portions by crushing and washing in the manner herein described. I also claim the exclusive right to employ, in the manner herein described, gases having an affinity for oxygen, for the purpose of metallizing the metallic portions of ores within their gangue, by bringing such gases or other substances and the ores in contact within closed and heated vessels.

Improvements in metallizing and fusing Ores.

I also claim the exclusive right of closing, in the manner herein described, all doors, ash-pits, or other openings, at certain periods of the operation, so as to prevent the admission of atmospheric air into the furnace during the fusion of the metal.

I also claim the right of collecting, by my processes, as herein described, the chlorides of metals, which, under ordinary processes of smelting, are evaporated, and escape into the atmosphere.

This is the specification referred to in the annexed Letters of Registration granted to Rowland Vounder Rodda, this second day of October, 1862.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
28 *January*, 1862.

Sir,

In reply to your reference of Mr. Rowland V. Rodda's application for Letters of Registration for an invention for metallizing and fusing Ores, we have the honor to report that we consider the protection desired under Act of Council 16 Victoria, No. 24, should be confined to the apparatus described by Mr. Rodda, and should not be allowed to extend to the *general* use of reducing gases, to the closing of the furnace doors, or to the collection, by washing, of metallic chlorides; these being processes or appliances which are not novel.

We have therefore amended the specification, so as to limit the application in accordance with our view, and in this shape we beg to recommend it for approval.

We have, &c.,
E. W. WARD.
R. GREENUP.

The Honorable
The Colonial Secretary.

Royal Mint, Sydney,
28 *March*, 1862.

Sir,

In reply to your reference of Mr. Rodda's further application, dated 6th instant, for Letters of Registration for an invention "for metallizing and fusing Ores," we have the honor to report as follows:—

Mr. Rodda, through his agent, says:—"The principle of reducing ores by metal-"lizing and granulating the metallic portions within the stone, and then separating them "by crushing and washing, is new, and it is this that it is desired to protect."

It is to be regretted that Mr. Rodda did not, in the first instance, confine his claim to this process, instead of introducing into his specification claims for many of more important character, which have been applied, for years past, to the reduction of iron, lead, and tin from their ores, and to the condensation and collection of volatile products.

The principle now claimed as new is, however, not so; Mr. Wilkinson, of Melbourne, has applied it to the separation of gold from quartz, and such metals and their oxides as are sometimes found in connection with it. His plan is to submit auriferous quartz to the action of a stream of ignited hydrogen (a reducing gas), combined with heated air, by which process he obtains the following results:—

1st—The reduction and granulation of metallic oxides within the quartz.
2nd—The granulation of the gold and other metals.
3rd—The calcination without the fusion of the quartz or gangue.

For a description of Mr. Wilkinson's process, we beg to refer Mr. Rodda to the Colonial Mining Journal of Melbourne, dated July, 1860. The principle involved in it is precisely the same as that now claimed by Mr. Rodda. Even, therefore, on the supposition that an *abstract* principle can be patented, which we believe it cannot, Mr. Rodda has no claim to the reservation of it for his sole use. As, however, the *process* or *machinery* by which the principle is applied by Mr. Wilkinson is not the same as that described by Mr. Rodda, we have recommended that Mr. Rodda's process, as described by him, be protected by Letters in his favour. To this we still consider the protection should be confined.

We have, &c.,
E. W. WARD.
R. GREENUP.

The Honorable
The Colonial Secretary.

Royal

Improvements in metallizing and fusing Ores.

Royal Mint, Sydney,
14 *June,* 1862.

SIR,

In reply to your further reference, dated 3rd instant, of Mr. Rodda's claims, we have the honor to state that we adhere to our former report, for the reasons already stated, viz. :—

1stly—That the principle involved is not new.
2ndly—That a principle cannot, under any circumstances, be patented.

Mr. Rodda asserts "that an abstract principle can be patented in association with some described method of carrying it out," or in other words, that the first inventor of *a* machine, say for making boots, has a claim to have secured to him the sole privilege of making boots by machinery; a position we submit altogether untenable.

We do not feel called upon to account for the alleged fact that Mr. Rodda has already received, in England, Victoria, and Queensland, the protection he requires in New South Wales, as we are unaware of the circumstances under which such protection has been obtained.

It may perhaps, however, be desirable to submit Mr. Rodda's claim for the opinion of the Crown Law Officers, before replying to his last letter.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1862, *8th October*. No. 56.

IMPROVED LINING FOR HATS, CAPS, &c.

LETTERS OF REGISTRATION to Smith Wallworth, for an improved Lining for Hats, Caps, and other Head Coverings.

[Registered on the 9th day of October, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Smith Wallworth, of Melbourne, in the Colony of Victoria, hatter, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a new Lining for Hats, Caps, and other Head Coverings, which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me

by

Improved Lining for Hats, Caps, &c.

by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Smith Wallworth, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Smith Wallworth, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Smith Wallworth shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of October, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE invention consists of a Lining for Hats, Caps, and all descriptions of Head Coverings, made upon a block in such a manner that, upon being doubled, the inner circumference shall be smaller than the outer one, which may vary from one sixteenth of an inch to any width; or it may be made in two separate pieces and joined at the top. It is then perforated with holes, the outside circumference of the lining is fastened to the hat, cap, or other head covering, while the head of the wearer fits the inner one, which allows a free current of air to pass between the two circumferences to the top of the head.

The invention has the further merit of preventing the perspiration or grease from passing from the head to the outside of the head covering.

The invention may be made of linen, cotton, wool, hair, leather, skin, gutta-percha, caoutchouc, or wire, and can be fitted to any head covering, including the hats of soldiers, sailors, policemen—in fact, any hat.

This is the specification referred to in the annexed Letters of Registration granted to Smith Wallworth, this eighth day of October, 1862.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
9 September, 1862.

SIR,

Having examined and considered the application of Mr. Smith Wallworth, for Letters of Registration for "Improvements in Lining of Hats, Caps, and all descriptions of Head Coverings," we have the honor to recommend that the protection prayed for may be granted.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

The Petition of Mr. Wallworth is herewith returned.

A.D. 1862, *5th November.* No. 57.

PULVERIZER.

LETTERS OF REGISTRATION to Hayden Hezekiah Hall, for a Pulverizer.

[Registered on the 6th day of November, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Hayden Hezekiah Hall, of West Maitland, in the Colony of New South Wales, engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention called a Pulverizer, which is more particularly described in the specification and the drawings hereunto annexed, and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the

said

said Act of Council, to grant, and do by these Letters of Registration grant, unto the said Hayden Hezekiah Hall, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Hayden Hezekiah Hall, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Hayden Hezekiah Hall shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fifth day of November, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

TO WHOM IT MAY CONCERN:

I, HAYDEN HEZEKIAH HALL, at present residing in West Maitland, in the Colony of New South Wales, claim the capabilities of my Universal Pulverizer to be as follows:—

It is capable of crushing a larger amount of material with a less expenditure of power than any other mill now in use. It is as well adapted to the grinding of all kinds of grain as it is to the manipulation of gold, quartz, and other substances.

The shell is shewn in drawing to be 3 feet diameter and 5 inches wide, which is the ordinary size; it is however made either larger or smaller to suit the power applied. A steel shaft passes through the centre, armed with six projections or arms reaching nearly to periphery or rim, which is corrugated on its inner side. The arms are either curved, straightly faced, or corrugated. The curved arms are as shewn and described in drawing. The straightly faced arm differs from the curved, inasmuch as it is flanged upon the point with a rib at back, for strength. Between the boss and the flange the thickness of metal is less, for the purpose of giving room for material to be pulverized. The corrugated differs from the straightly faced arm only in having corrugations upon the faced side.

The straight and corrugated arm can be only driven one way; the curved arm can be driven either way.

The periphery or rim can be cast in sections or in a piece. The covering over periphery or rim is sometimes cast with a hand hole at bottom, for the purpose of abstracting any substance that may lie on the bottom of the rim.

The material to be crushed is thrown in alongside the shaft, and has its exit on the opposite side through a pipe. Each piece of ore or other material as received is stricken by the arms, and immediately rendered dust fine, in which condition it is thrown out at the tube on the opposite side, by their action as a centrifugal blower. The fineness of the product, and the efficiency of the mill, depend entirely upon the velocity with which it is moved and the position of the pipe for the exit of the ground material. At low velocities it is an excellent grain mill, and at high velocities the hardest gold quartz can be ground to an impalpable powder. The exit pipe should pass into a room of sufficient length to enable the different products, as in the grinding of wheat, to settle by their difference of gravity in various portions of the room, thus doing away with the necessity of bolting, bran dusting, &c.

It may be used for various purposes other than those enumerated, such as preparing facing for foundries, disintegrating short pieces of old rope in place of picking oakum, preparing linseed prior to its being pressed, crushing poppy and other oil-yielding seeds, preparing dye woods after being sawed into blocks previously to separating the extract, crushing bones, grinding corn, oats, &c. as horse feed, beating cut cornstalks into the loose fibre after having been passed through the cutting box, grinding wheat without the flour being rubbed as in other mills, and cleanly separating by difference of gravity the bran, &c., dividing bark for tanners' use into a fibre instead of compressed particles, so as the more readily to admit of the extraction of the tannic acid, grinding loaf sugar; also for the preparation of zinc and other ores previously to their use in furnaces, preparation of bone-black for blacking, printing-ink, &c., the division of fur preparatory to felting, grinding drugs, grinding white lead in the dry state, arsenic, baryta, &c., grinding of old fire-brick in the manufacture of clay retorts, preparation of plumbago

Pulverizer.

plumbago for black-lead pots, division of the coarser kinds of paper stock into fibre, such as beech wood shavings, cut straw, &c., grinding of many kinds of snuff, and for purposes of disintegration generally.

Weight from 600 lbs. to 1,800 lbs.

H. H. HALL.

This is the specification referred to in the annexed Letters of Registration granted to Hayden Hezekiah Hall, this fifth day of November, 1862.

JOHN YOUNG.

(No. 68.)

THIS Indenture, made the sixth day of November, in the year of our Lord one thousand eight hundred and sixty-two, between Hayden Hezekiah Hall, of West Maitland, in the Colony of New South Wales, hereinafter designated assignor for himself, his heirs, executors, and administrators, of the one part, and Samuel Hebblewhite, of Sydney, in the Colony aforesaid, merchant, hereinafter designated assignee for himself, his executors, administrators, and assigns, of the other part: Whereas the said assignor hath invented a certain machine for the purpose of pulverizing or crushing Quartz, and hath applied for, and is about to obtain Letters of Registration or Patent for such invention, to be called or known as "Hall's Pulverizer," and hath agreed with him, the said assignee, for the sale to him of the whole interest to arise in the Colony of New South Wales in such patent or invention, for the sum of sixty pounds: Now this indenture witnesseth that, in consideration of the sum of sixty pounds sterling, paid by the said assignee to the said assignor (the receipt whereof is hereby acknowledged), he, the said assignor, doth sell, assign, and transfer unto the said assignee, all the whole interest in and to the said Letters of Registration (Patent) or invention in the Colony aforesaid, but not elsewhere, and all the estate and interest of him, the said assignor, in and to such whole interest; to hold the same, with all benefit and advantage to arise therefrom, unto the said assignee absolutely, in as full, ample, and beneficial manner as he, the said assignor, could have held the same, during all the residue or remainder of the term of years granted by such Letters of Registration or Patent: And the said assignor covenants with the assignee that the whole interest hereby assigned is not in any way encumbered, and that the said assignee shall and may, by virtue of these presents, receive and take the whole of the profits and advantages whatsoever that shall or will arise from the said whole interest, without any hinderance or interruption by the said assignor or any person claiming under him; and further, that the said assignor will, at the request and costs of the said assignee, execute and perfect any other assignment of the said whole interest in the Colony aforesaid, of and in such invention as aforesaid, as by the said assignee shall be required.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year first above written.

Signed, sealed, and delivered,—

H. H. HALL. (L.S.)

Witness to the signature—J. HINWOOD.

RECEIVED, of and from the within named Samuel Hebblewhite, the full sum of sixty pounds, being the consideration within expressed to be paid by him to me—

H. H. HALL.

Witness to the signature—J. HINWOOD.

In the Supreme Court of New South Wales.

On this sixth day of November, in the year of our Lord one thousand eight hundred and sixty-two, John Hinwood, of Sydney, in the Colony of New South Wales, maketh oath and says,—

1. The paper writing hereto annexed and marked —— is a true copy of the original bill of sale, and of every attestation of the execution thereof of which it purports to be a copy. The said original bill of sale was given on the day of the date thereof.
2. I was present, and did see H. H. Hall, on the said bill of sale mentioned, and whose name is signed thereto, sign and execute the same on the said date thereof. The said H. H. Hall resides at West Maitland, in the Colony aforesaid.
3. I am the attesting witness to the execution of the said bill of sale by the said H. H. Hall.

Sworn by the deponent, on the day and year first above mentioned, at Sydney, before me,— J. HINWOOD.

F. H. STEPHEN,
A Commissioner for Affidavits.

REPORT.

Pulverizer.

REPORT.

Royal Mint,
Sydney, 5 *September*, 1862.

SIR,

Having examined and considered the application of Mr. H. H. Hall for Letters of Registration, for an Invention of a Quartz-pulverizing Machine, we have the honor to report that we see no objection to the necessary protection being granted to the applicant.

The documents as per margin are returned herewith.

We have, &c.,
E. W. WARD.
JOHN WHITTON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

H. H. HALL'S PULVERIZER

(Copy)

FIG. 1

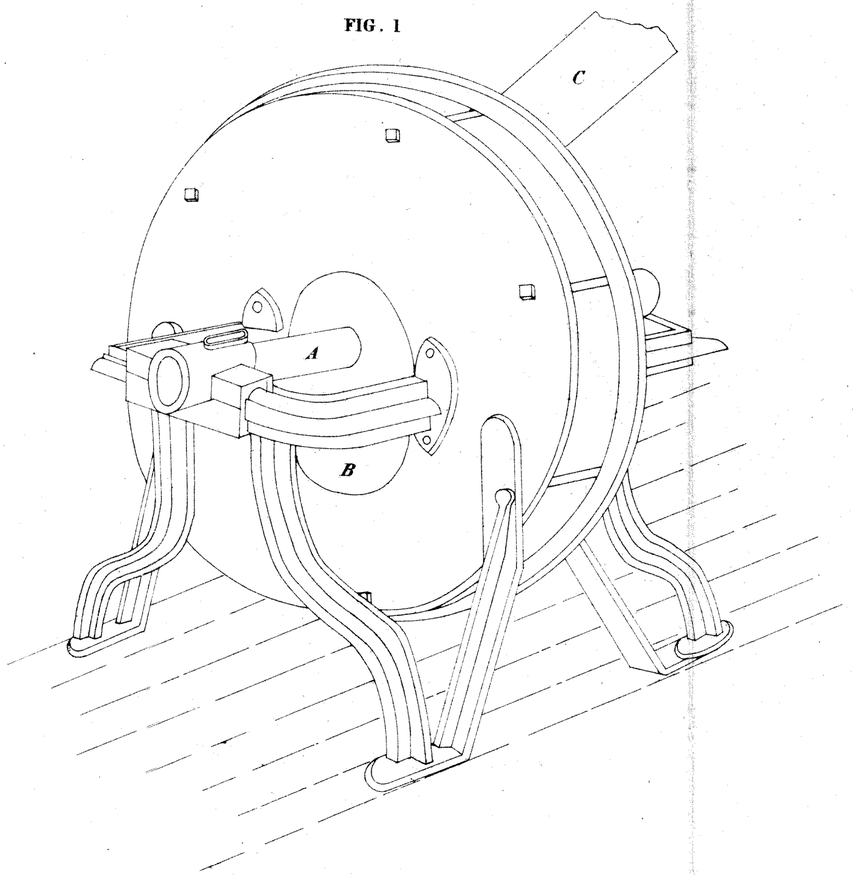


FIG. 2

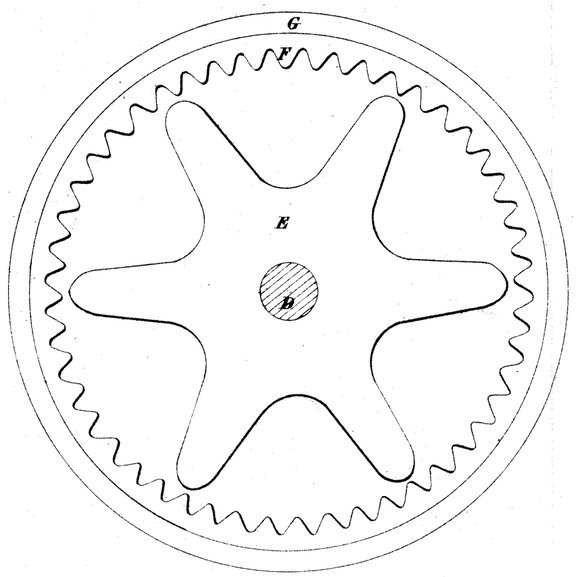


FIG. 1 *Represents the Machine & all its parts. The Shell is here shewn 3 feet in diameter & 5 inches wide*

A Shews the Steel Shaft which is 4 inches diameter

B " the Feeding Trough which receives Materials to be pulverized. The Material passes into the Machine when the concave part of each Arm passes the bottom of Trough

C " the Delivery Pipe for Materials pulverized

FIG. 2 *D " Steel Shaft*

E " Plan of Arms which are of solid metal 5 inches thick & reaching nearly to Periphery

F " Periphery of solid metal 5 inches thick corrugated on inner side

G " Projection of Flange which is 14 inches thick

The Power is applied to a small pulley placed on steel Shaft & on opposite side to Feeding Trough

The Weight of machine varies from 600lbs to 1800lbs.

The efficiency of Mill depends entirely on the Velocity with which it is moved

These are the "Drawings" referred to in the annexed Letters of Registration granted to Heydon Herchiah Hall this Fifth day of November, 1862

(Signed) John Young

(Signed) H. H. Hall

A.D. 1862, 18*th November*. No. 58.

IMPROVEMENTS IN ROASTING COFFEE, &c.

LETTERS OF REGISTRATION to James Farquharson McKenzie, for Improvements in roasting Coffee, &c.

[Registered on the 18th day of November, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain Goneral and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Farquharson McKenzie, of Melbourne, in the Colony of Victoria, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in roasting Coffee and other seeds and roots, also in drying Grain," which is more particularly described in the specification and drawings which are hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and

improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said James Farquharson McKenzie, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Farquharson McKenzie, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Farquharson McKenzie shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighteenth day of November, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION of James Farquharson McKenzie, of Melbourne, in the Colony of Victoria, coffee roaster, for an invention of "Improvements in roasting Coffee and other seeds and roots, also in drying Grain."

My invention consists, first, of a new method of roasting coffee, whereby it is more evenly roasted; and secondly, my invention consists of a mode of delivering the coffee when roasted from the vessels in which it is roasted. Heretofore, in roasting coffee it has been generally the practice to roast coffee in close vessels, and the moisture evolved in the operation passes away through holes perforated in such vessels in which the coffee is roasted, by which it is subjected to the injurious influence of the watery vapour for a time; another inconvenience in the use of close vessels is, that they have constantly to be opened to ascertain its condition, and the coffee does not become roasted evenly throughout the mass, owing to the fire not acting equally upon the length of the cylinder. Now, my invention is intended to obviate these inconveniences; and it consists, first, in roasting the coffee in cylindrical or other shaped vessels, open at the front end, and being set at an inclined angle, and revolving upon an axis, by which the vapour as it arises from the coffee in the process of roasting immediately escapes; and the whole of the berries of the coffee, owing to its being constantly kept in motion from one end to the other, become equally affected by the heat, and are in consequence evenly roasted throughout. The angle at which I prefer to set the vessel is from 20° to 30°, although I do not confine myself to that angle. In some cases, the end of the vessel may be closed, but the angle of the vessel will still be inclined, there being holes perforated for the escape of steam; in that case the coffee will be delivered according to the ordinary plan, but this mode is not so beneficial as when the vessel is open in the front. I will now describe the second part of the invention, by which the vessel in which the coffee is roasted is made to deliver itself of the coffee when it has been roasted to the proper degree. It is well known that coffee contains a certain amount of moisture, which it is necessary to drive off before it is properly roasted; this quantity varies according to the nature

nature of the berry; thus, with plantation coffee it is one-sixth. Now, this part of my invention consists in so arranging and adjusting the vessel in which the coffee is placed to be roasted, that as the moisture is driven off and the coffee roasted, the decreased weight acts against the cylinder and causes the lower end of it to rise up, so that the coffee will be delivered in front into any suitable receiver; thus, if I put into the vessel 100 lbs. of plantation coffee, and the moisture to be drawn off is one-sixth, the cylinder will be kept in its working position by a pressure of about 17 lbs.; then when the moisture to that extent is driven off, the lower end will rise up and the coffee will be delivered into the receiver below, the rotary motion being continued; thus the operation will be carried on without the attention of the workman, after the coffee has once been placed in the vessels. The mechanical arrangements for effecting this, together with the mode of giving motion to the vessels in which the roasting takes place, will be hereafter more particularly detailed. Malt may be dried and roasted by this process. Chicory and other roots and seeds may be beneficially treated by this process. The drawings in which are shewn the mechanical arrangements that I prefer to use for giving motion to the cylinder, and also to shew how it acts to empty itself when the coffee is roasted. Figure 1 is a longitudinal section of the apparatus; figure 2 is a front view; and figure 3 a back end view; and figure 4 is a plan with a portion of the plate broken, to shew the interior. In all these figures the same letters are used to indicate the same parts wherever they occur. AA is the brickwork in which the cylinder B is set; CC are the bars of the fire-place into which the fuel is placed to heat the cylinder; D is the axis of the cylinder, one end of which turns in bearings in the framing. The rotary motion is given to the cylinder in the following manner:—FF are pulleys, which receive motion by means of a band or strap from a steam-engine or other power; they are placed upon a shaft, G, and give motion to it; this shaft is placed across, and is attached to, the framing of the apparatus; on this shaft is a bevel wheel, H, which takes into and drives another wheel, H^1, upon the shaft D of the cylinder, by which the motion is communicated to the cylinder; II are arms which are placed upon the axis of the cylinder for the purpose of strengthening it; J is a wire cloth which covers the whole of the inner surface of the cylinder; the use of this cloth forms an important feature in my invention, and is specially claimed to all cylinders used for roasting coffee, as by the use of it the coffee cannot be burnt, owing to its not being in contact with the heated metal of which the cylinder is constructed. The cylinder is suspended from the lever K, by means of the rod L, which is hooked to the end of the shaft D, as shewn at M, and the shaft is connected to the framing M^1, which is hinged to the shaft G at M^2. This lever K moves upon a pin joint at K^1, attached to the upright frame piece K^2, and at the other end of this lever K is a weight, N, and a graduated scale by the regulation of which the cylinder is kept in a state of equilibrium, and it will easily be understood that this can be adjusted with the greatest nicety by means of this graduated scale and weight. The cylinder is caused to empty itself as follows:—Bearing upon the lever K is a hook, O, which is kept in that position by a weighted lever, P, it being adjusted to the ascertained weight of the moisture in the coffee under operation, and it will be readily understood by examining the drawing, that as the cylinder becomes lighter, owing to that moisture being driven off, that the hook will be drawn back, when the cylinder and the frame M^1 will be released, and rise up into the position shewn by the dotted lines in the drawing, and the coffee will be delivered down the spout *a* into a receiver which may be placed underneath for that purpose. The hook O is kept bearing against the lever K, by whatever weight of moisture is required to be driven from the coffee. R is a metal plate placed over the top of the cylinder and brickwork, to retain the heat therein. Having thus described the nature of the invention and the manner of performing the same, I would have it understood that I do not confine myself to the precise details, so long as the character of the invention be retained; and I would remark, that I do not claim roasting coffee in cylinders which are caused to revolve, generally, nor do I confine myself to the shape of the vessels; as, in place of using the vessel at an incline spoken of, a conical vessel may be used, with a straight shaft: but I prefer the arrangement before described; and what I claim as the

invention

invention for which I am desirous to secure Letters of Registration is,—First, roasting coffee and other seeds and roots, and drying grain, in open and close vessels at an incline, which are caused to revolve during the operation of roasting; and secondly, I claim the so adjusting these open vessels that as the coffee becomes roasted, its decreased weight acts upon the cylinder in such manner as to facilitate the delivery thereof, substantially as herein described.

In witness whereof, I, the said James Farquharson McKenzie, have hereto set my hand and seal, this eleventh day of February, one thousand eight hundred and sixty-two.

JAS. F. McKENZIE. (L.S.)
By his Attorney,
WM. ADAMSON.

Signed and sealed by the said James Farquharson McKenzie, by his Attorney, William Adamson, in the presence of—

E. HART,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to James Farquharson McKenzie, this eighteenth day of November, 1862.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
21 *February*, 1862.

SIR,

Having examined and considered the matter stated in the Petition of Mr. James F. McKenzie for Letters of Registration for his invention for "Improvements in roasting Coffee and other seeds, and also in drying Grain," we have the honor to recommend that the protection prayed for may be granted.

The original documents forwarded to us are herewith enclosed.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(COPY)

FIG. 1

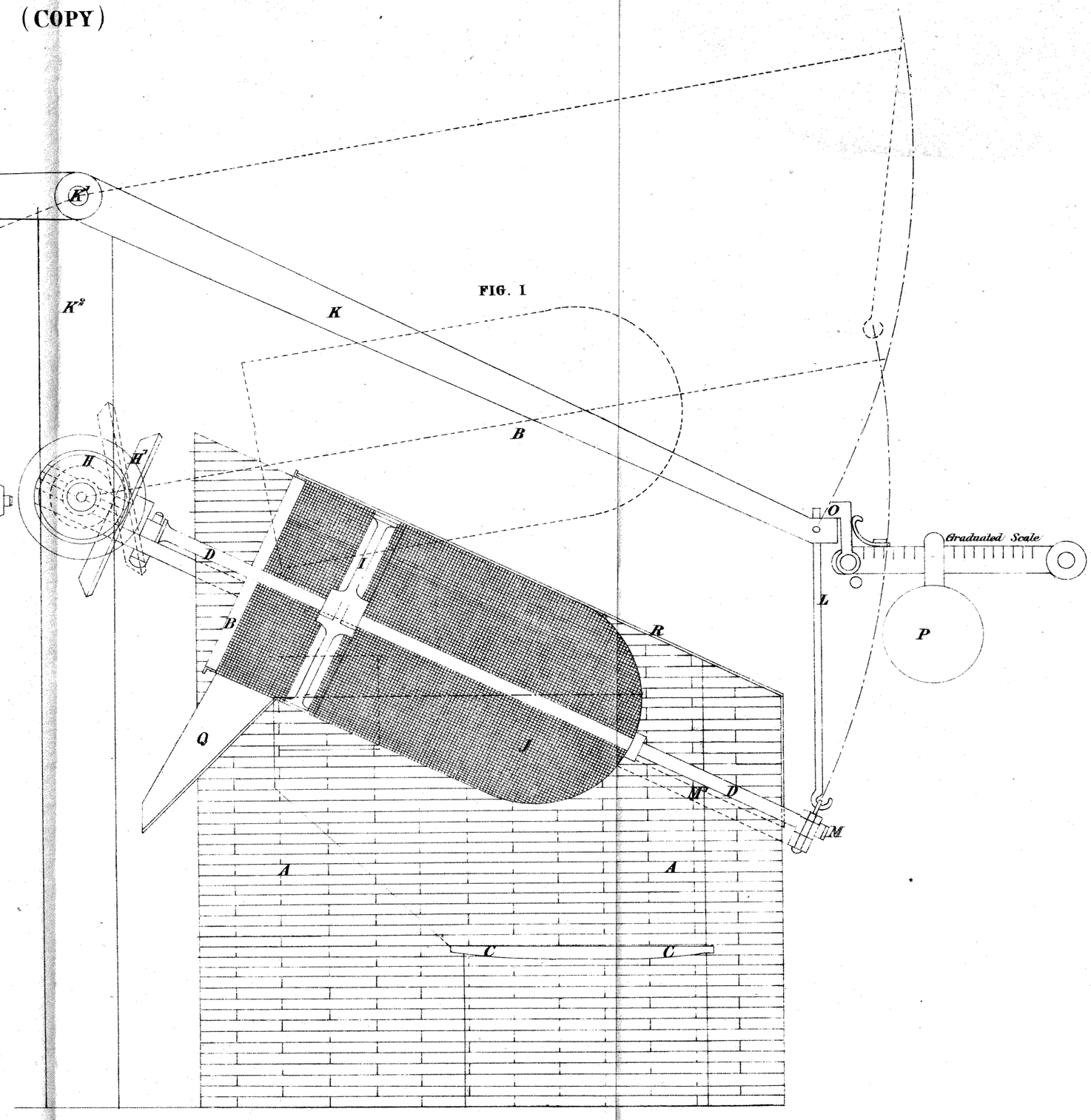


FIG. 2

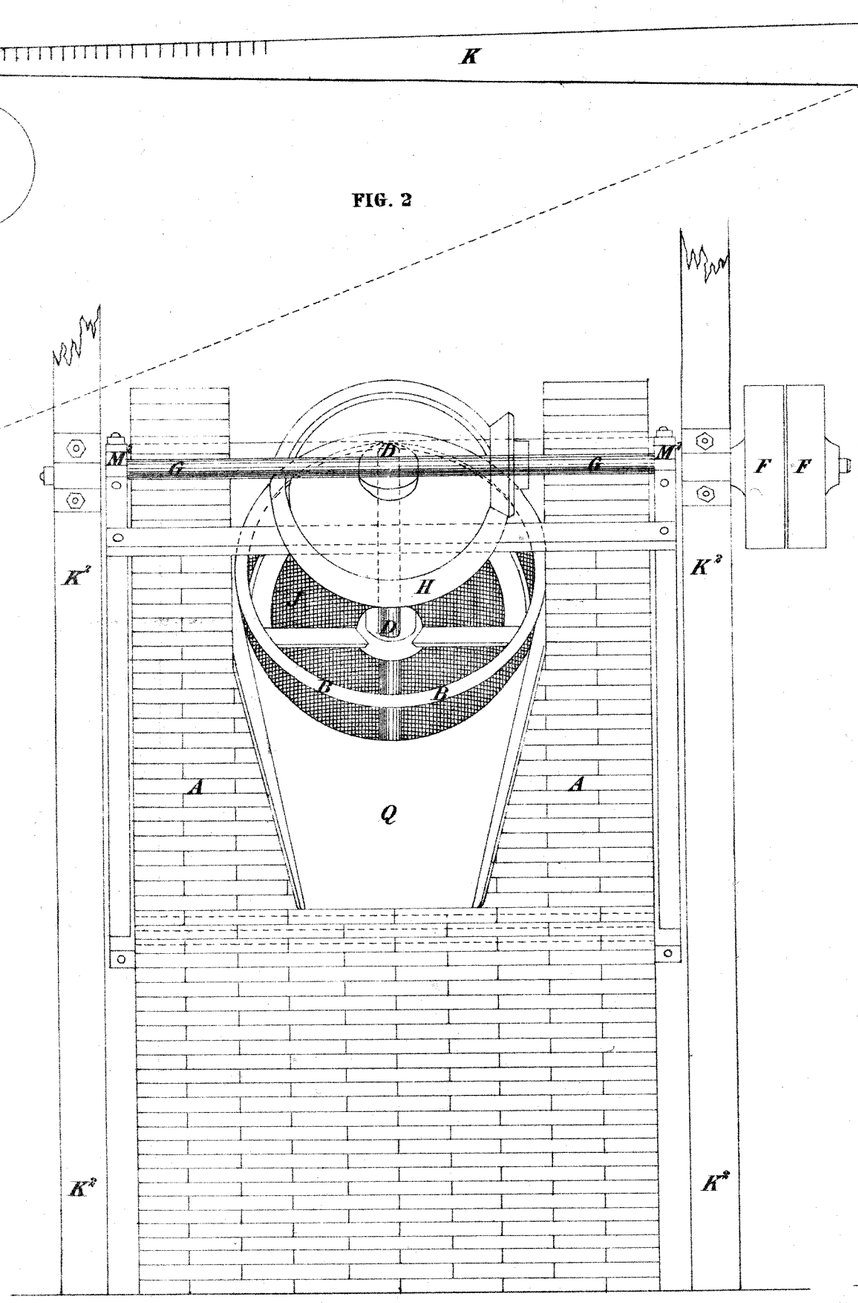


FIG. 3

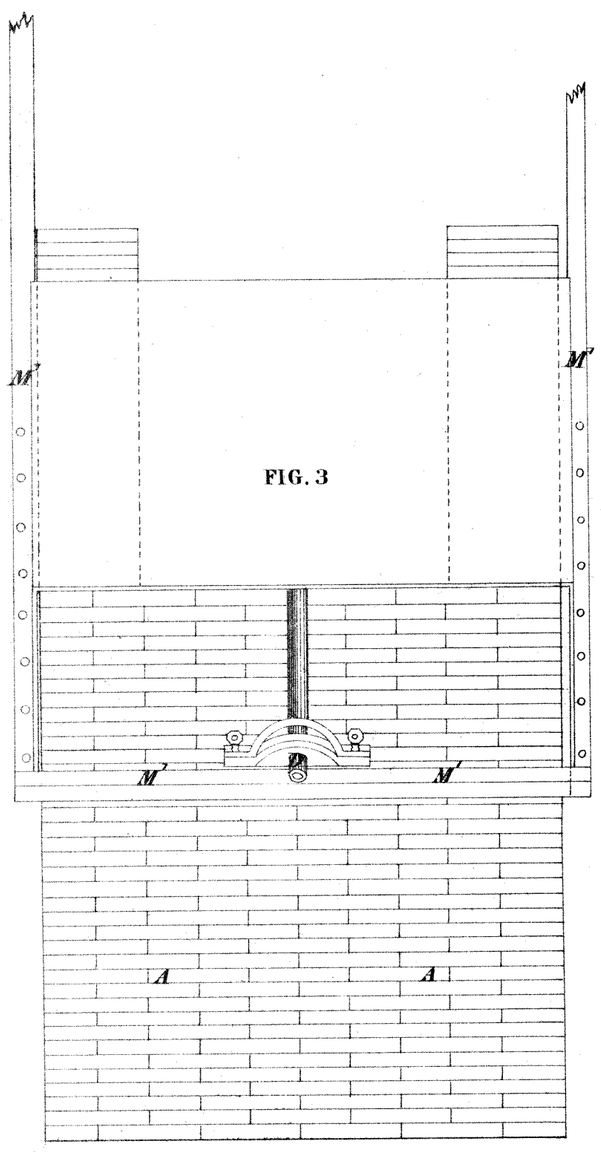
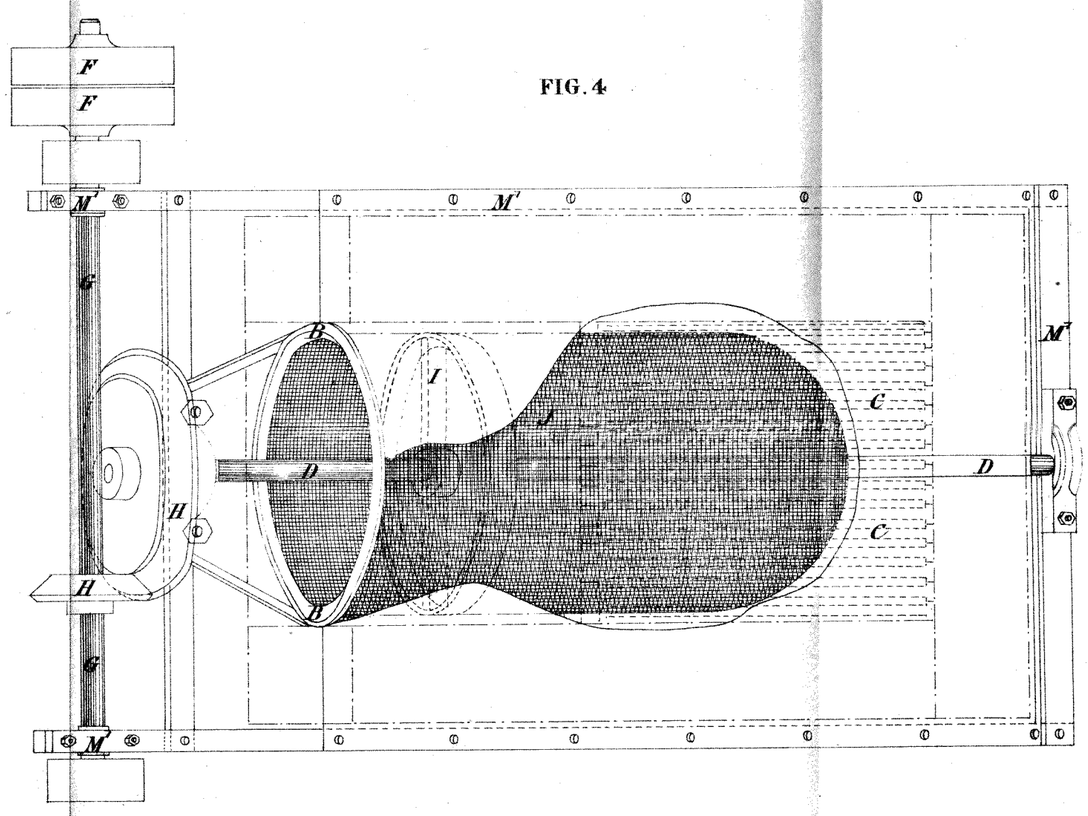


FIG. 4



These are the Drawings referred to in the annexed Letters of Registration granted to James Farquharson Mc. Kenzie this Eighteenth day of November, 1862.

Signed: John Young

(Hart & Waters, Patent Agents,
58, Little Collins St, East, Melbourne)

A.D. 1862, 27*th November*. No. 59.

MEAT-CUTTING MACHINE.

LETTERS OF REGISTRATION to Edward James Blaxland, for a Meat-cutting Machine.

[Registered on the 28th day of November, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Edward James Blaxland,, of Liverpool, in the Colony of New South Wales, gentleman, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention or improvement in the art of preserving animal food, which is more particularly described in the specification and the three drawings marked respectively A, B, and C, hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in

exercise

exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Edward James Blaxland, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Edward James Blaxland, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Edward James Blaxland shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-seventh day of November, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION of Meat-cutting Machine invented by MR. EDWARD JAMES BLAXLAND.

THE Meat-cutting Machine which the accompanying views (three in number) represent, is described as follows, viz.:—

The frame marked 1 is made of hardwood, and is securely bolted together with nuts and bolts.

The meat intended to be cut, when freed from the bone, is placed in a strong sheet-iron box, marked 2, and which is provided with a movable lid, which is fastened down while at work by two levers and catches; the meat then is forced forward to the cutting knives by a rack piston, marked 3.

The rack spindle and pinion is connected with main driving crank shaft marked 4, by means of an eccentric driving cross shaft below, with double wiper attached to double pawl ratchet, on end of rack piston spindle before mentioned. Each revolution of main driving shaft causes the piston to move a quarter of an inch forward to the knives.

The machine is provided with two sets of knives—one of thirteen, marked 7, and one seven, marked 8, respectively—set at half an inch apart, in a wrought iron frame bolted together with division pieces, and may be tightened by means of nuts and screws. One set is driven vertically, and the other horizontally, but the former going double the speed of the latter. There is also another set of two knives, marked 5, which have a rotary motion and cut the meat into square pieces, after having been cut by the two sets named.

The machine is provided with suitable pulleys, marked 6, for the purpose of being driven by steam or other power; and two men can cut into half-inch cubes from five to six thousand pounds of meat per day.

This is the specification referred to in the annexed Letters of Registration granted to Edward James Blaxland, this twenty-seventh day of November, 1862.

JOHN YOUNG.

REPORT.

Meat-cutting Machine.

REPORT.

Royal Mint,
Sydney, 30 *October*, 1862.

SIR,

Having examined and considered the application of Edward James Blaxland, for Letters of Registration for an "Invention for preserving Animal Food," we have the honor to report that, in our opinion, any protection under 16 Victoria, No. 24, should be limited to the Machine employed to effect the purpose described in the Petition.

Having, therefore, obtained from Mr. Blaxland three drawings and a specification of the machine referred to, we beg to recommend it for the protection which the law permits.

We have, &c.,

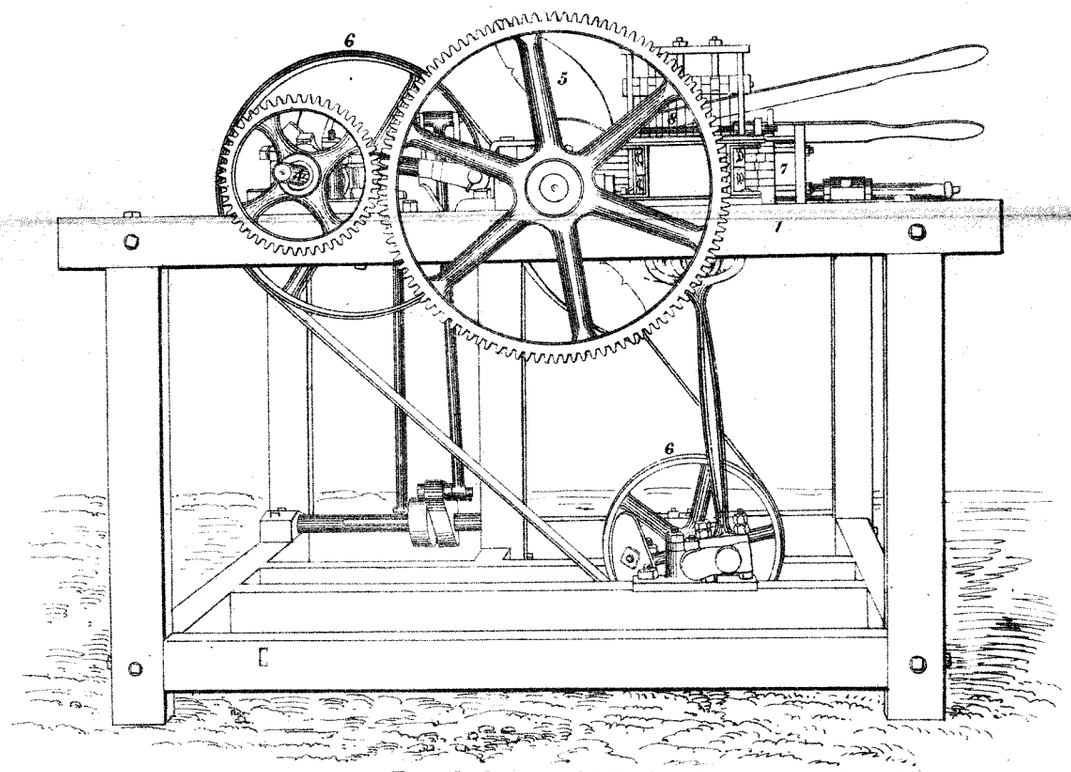
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY

[Drawings—one sheet.]

(COPY)

B

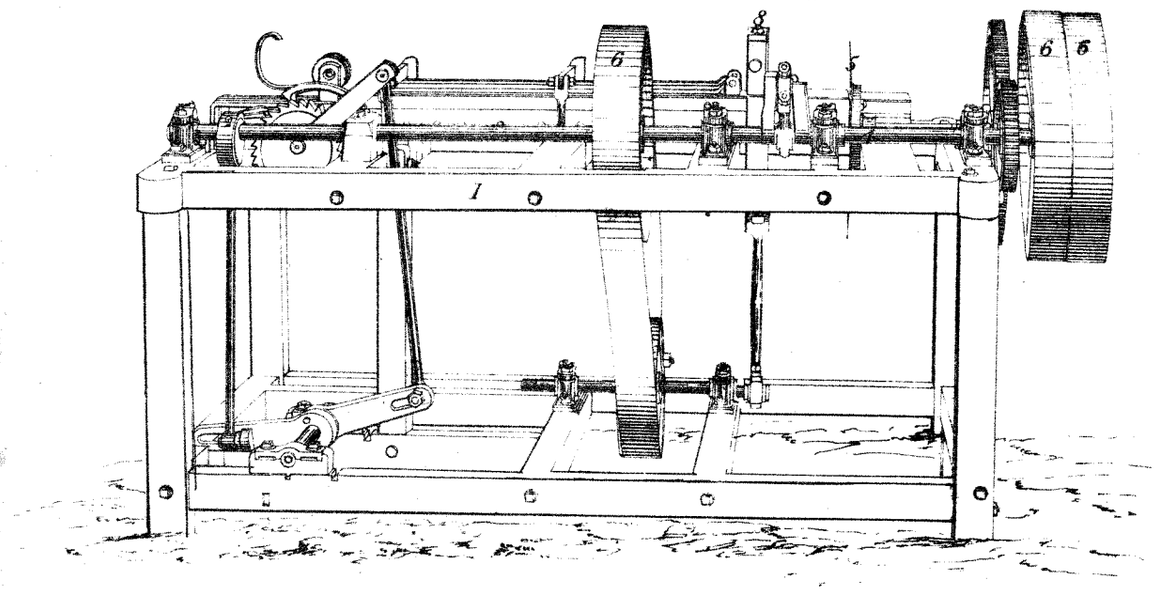


This is the Drawing marked B *referred to in the annexed Letters of Registration granted to Edward James Blaxland this Twenty seventh day of November. 1862*

Signed: John Young

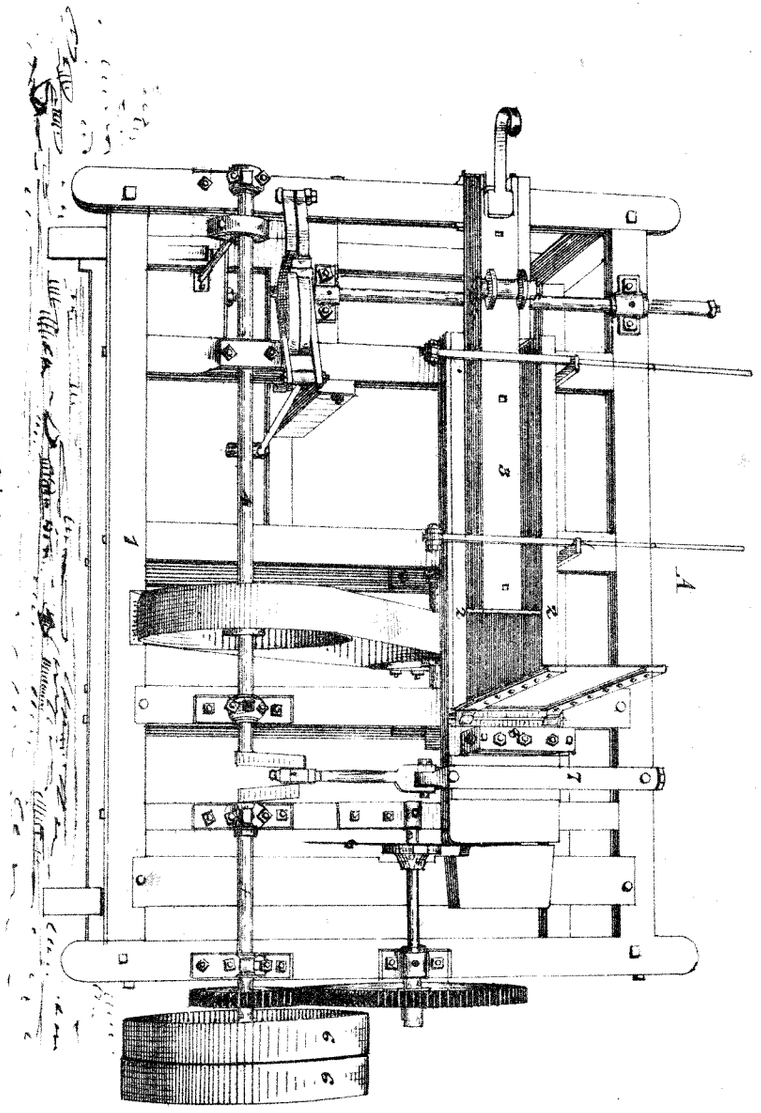
(COPY)

_C_



This is the Drawing marked C referred to in the annexed Letters of Registration granted to Edward James Blaxland this Twenty seventh day of November. 1862

Signed: John Young



A

Copy

This is the Drawing marked A. referred to in the annexed Letters of Registration granted to Edward James Blaxland, this twenty-seventh day of November 1862.

Sg John Young.

A.D. 1862, 3*rd December*. No. 60.

INVENTION FOR PRESERVING LIFE AND PROPERTY FROM FIRE.

LETTERS OF REGISTRATION to James Partridge, for an Invention for preserving Life and Property from Fire.

[Registered on the 4th day of December, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Partridge, of Sydney, in the Colony of New South Wales, galvanized-iron worker, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an apparatus for the preservation of life and property in buildings, houses, and ships, from destruction by fire, which is more fully described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the

power

power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said James Partridge, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Partridge, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Partridge shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this third day of December, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

WROUGHT-IRON gun-barrel tubing of 2 or 3 inches diameter, but varying according to the size of the building, to be firmly fixed on the outside of the wall up to the roof, bending through the wall, and to be carried along the tie-beam to the king-post, and from thence to the other end of the roof; this pipe to be plain, and stopped at the end with a screw-stop. From this same pipe, branches of plain pipe should proceed from the king-posts up the struts (say 1½-inch pipe), and from thence should branch off and be fixed to the purlins; 1¼-inch pipe, perforated with three or four rows of holes in a zigzag direction, being one on each side, going from one end of the roof to the other; each end of the pipes to have perforated bends screwed to the same, and brought across and connected with the pipes opposite, which are also to be perforated. For a small roof, one perforated pipe in the centre will be sufficient. For public buildings or places of worship with galleries of one or more tiers, 1-inch pipe should descend through the ceiling, and turn round the cornice on the outside of the flowers, and be perforated with three or four rows of holes, having two inlets from the large pipe above. Branches of plain pipe to be connected with the main pipe in roof, and to descend through the ceiling, and be attached to perforated pipes fixed above the gallery on the ceiling; this pipe may be classed as a member of the cornice, playing its water upon the galleries underneath. The next pipe should be perforated also, and fixed to and under the front of the galleries, to play its water upon the body of the building or the gallery (if any) underneath, or both. The pipes for quenching the fire in the staircases should be connected by branches with the pipe above, and be fixed on the wall above the hand-rail of the staircase, and be perforated as before described. For each room of a house, a small ring of perforated tubing fixed on the ceiling with the water brought from above will be sufficient to thoroughly saturate a room in a few seconds. For small buildings, force-pumps with from 2½ to 3½-inch barrels will be required; while for large buildings more powerful pumps will be necessary. Stop-cocks can be placed in different parts of the apparatus, so as to prevent a waste of water, but which should always be kept open in case of emergency. Domestic water-tanks, placed high in the buildings, will be found available for supplying water to the perforated pipes in the lower parts of the building, and which can be worked with valves. In buildings where the water is laid on, and the force is sufficiently strong to rise a few feet above the building, water may enter from the city main to the ascending pipe on the wall.

The particulars of the invention to be used in ships is as follows:—Portable lift and force pumps to be placed on the main deck, to draw water from the sea, and force the same through 2 or 3-inch wrought-iron gun-barrel tubing, as may be requisite for the size of the ship, into smaller (say 1¼-inch) pipes, which are perforated with three or four rows of holes in a zigzag direction, and fixed in a line from stem to stern in different pieces—one line being under the centre of each deck, except where the masts or hatchways will prevent it, and round which the pipes may be bent; also, to fix the same kind of perforated pipes along the sides of the under part of the deck, about 2 feet from the sides of the vessel, in different lengths—each side-length to be connected with cross-pieces of perforated pipe with easy bends. The top of the feed-pipes to have a brass flange fixed to the deck with screws, and to be connected with pumps, for which there should be cap-screws when pumps are not required, branching off with an easy bend to the perforated pipes. The feed pipes which descend to the lower decks or hold should be separate from those described above—arranged, perforated, and connected in the same way

way as those described, between decks—to fit the same pumps, so that when fire may be discovered, the water may be played directly upon it, without disturbing the hatches or port-holes. The poop decks to be fitted the same way, but with one length of plain pipe passing through each row of cabins, with a short piece of perforated pipe to each cabin, branched on to the plain pipe, with perforated ends. The saloons should be fitted with one length of perforated pipe, passing up the centre, on the underneath part of the ceiling or deck above. For small vessels, one perforated pipe on each side of the deck will be sufficient.

This is the specification referred to in the annexed Letters of Registration granted to James Partridge, this third day of December, 1862.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
21 *October*, 1862.

SIR,

Having examined and considered, in accordance with Act of Council 16 Victoria, No. 24, Mr. Partridge's application for Letters of Registration, for an invention for preserving Life and Property from Fire, we have the honor to recommend that the required protection be granted.

The papers as per margin are returned herewith.

Petition to His Excellency the Governor.
Treasury receipt for £20.

We have, &c.,

E. W. WARD.
EDMUND T. BLACKETT.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1862, *3rd December.* No. 61.

IMPROVEMENTS IN THE MANUFACTURE AND REFINING OF SUGAR.

LETTERS OF REGISTRATION to Richard Wright, for Improvements in the manufacture and refining of Sugar.

[Registered on the 6th day of December, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY HIS EXCELLENCY THE RIGHT HONORABLE SIR JOHN YOUNG, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS RICHARD WRIGHT, of Grosvenor-street, Camberwell, in the county of Surrey, in England, sugar refiner, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the manufacture and refining of Sugar, and in apparatus employed therein," which is more particularly described in the specification and drawing which are hereunto annexed, and that the said Petitioner hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four, and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council,

and

and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Richard Wright, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Richard Wright, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Richard Wright shall not within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this third day of December, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME: Be it known, that I, RICHARD WRIGHT, of Grosvenor-street, Camberwell, in the county of Surrey, sugar refiner, have invented or discovered new and useful "Improvements in the manufacture and refining of Sugar, and in apparatus employed therein"; and I, the said RICHARD WRIGHT, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:—

HERETOFORE, in evaporating cane juice and saccharine solutions, when manufacturing and refining sugar, it has been usual in some cases to employ fire heat directly to the pans or vessels used, in other cases to employ steam, and in other cases to employ hot water baths in which the vessels containing the juice or solution have been immersed. In most, but not in all cases, the heating medium in contact with the pan or vessel containing the juice or solution of sugar has been at the least 212° of Fahrenheit, and in some cases it has been the practice to employ discs to move or rotate when partly immersed in the saccharine fluid, so that the parts of such discs have, when in use, moved into and out of the saccharine fluid, so as to cause the fluid adhering to the surface to be raised out of the vessel and into contact with the atmosphere. In all such cases, when using revolving discs, the medium employed to heat the evaporating vessel has been above 212° Fahrenheit. Now, I have discovered that the juice of the sugar cane, and saccharine solutions generally, are, when rising on revolving discs, prejudicially acted on by being evaporated by a heating medium if it be above 212° of Fahrenheit; and my invention consists in so arranging apparatus, when using rotating discs in the process of evaporating cane juice and other saccharine solutions in the manufacture and refining of sugar, that the vapour of water may be used as the heating medium in contact with the evaporating vessel employed, in such manner that the vapour so in contact with the vessel shall at all times be below 212°. I would state that, separately, I make no claim to the employment of revolving discs partly immersed in the fluid, their use being well known and understood when using a heating medium at temperatures at and above 212° Fahrenheit; neither do I claim separately the employment of the vapour of water maintained at a temperature below 212°, such vapour having before been used for evaporating saccharine solutions. The peculiarity of my invention consists in the combined use in apparatus of revolving discs and the vapour of water below 212° Fahrenheit.

In carrying out my invention, I employ the following construction and arrangement of apparatus, though the forms thereof may be modified without departing from my invention:—

DESCRIPTION

Improvements in the manufacture and refining of Sugar.

DESCRIPTION OF THE DRAWING, which represents a transverse section of the apparatus used by me.

a is the open evaporating vessel in which the cane juice or other solution of sugar to be evaporated is placed. In this vessel several discs or moving surfaces are caused to dip, as shewn in the drawing—these discs are, by preference, of copper, but they may be of any suitable material; *bb* is an external vessel of such dimensions as to admit of its containing a quantity of water below the bottom of the vessel *a*, and in such manner as to prevent the water level rising to such a height as to come in contact with the bottom of the vessel *a*, or any part of it. *c* is an overflow pipe below the level of the bottom of the vessel *a*. The vessel *b* is open to the outer atmosphere, by means of one or more open pipes, *d*. By these arrangements, the water in the vessel *b* can never be raised to a higher degree of temperature than that of boiling water, or 212° Fahrenheit; the vapour above the water, which alone is the heating medium in contact with the vessel, being thus constantly below that temperature, which I find of very great importance in practice when using in combination therewith revolving discs.

The water in the vessel *b* may be heated in any convenient manner, but I prefer that it should be heated by means of free steam generated in a separate vessel, and introduced near the bottom of the vessel *b*, and below the surface of the water therein, by which the temperature of the incoming steam will be at once reduced, and the level of the water in the vessel *b* will be maintained by the condensation of such steam, and any excess of water thereby produced will be carried off by the overflow pipe.

I wish it to be understood that I do not claim the employment of rotating discs in open vessels separately, neither do I claim the employment of the vapour of water kept below 212°, but what I claim is the combination of rotating discs, with a vesssel *a* and vessel *b*, so arranged that the water in the vessel *b* cannot rise up to the vessel *a*, or the water in the vessel *b* be raised to a higher heat than boiling water (212° Fahrenheit), substantially as above described.

In witness whereof, I, the said Richard Wright, have hereunto set my hand and seal, this fourteenth day of July, in the year of our Lord one thousand eight hundred and sixty-two.

RICHARD WRIGHT. (L.S.)

This is the specification referred to in the annexed Letters of Registration granted to Richard Wright, this third day of December, 1862.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
11 *November*, 1862.

SIR,

Having examined and considered the application of Mr. Richard Wright for Letters of Registration, under the Act of Council 16 Victoria, No. 24, for improvements in the manufacture and refining of Sugar, we have the honor to recommend that the required protection be granted.

We have, &c.,

E. W. WARD.
J. SMITH.

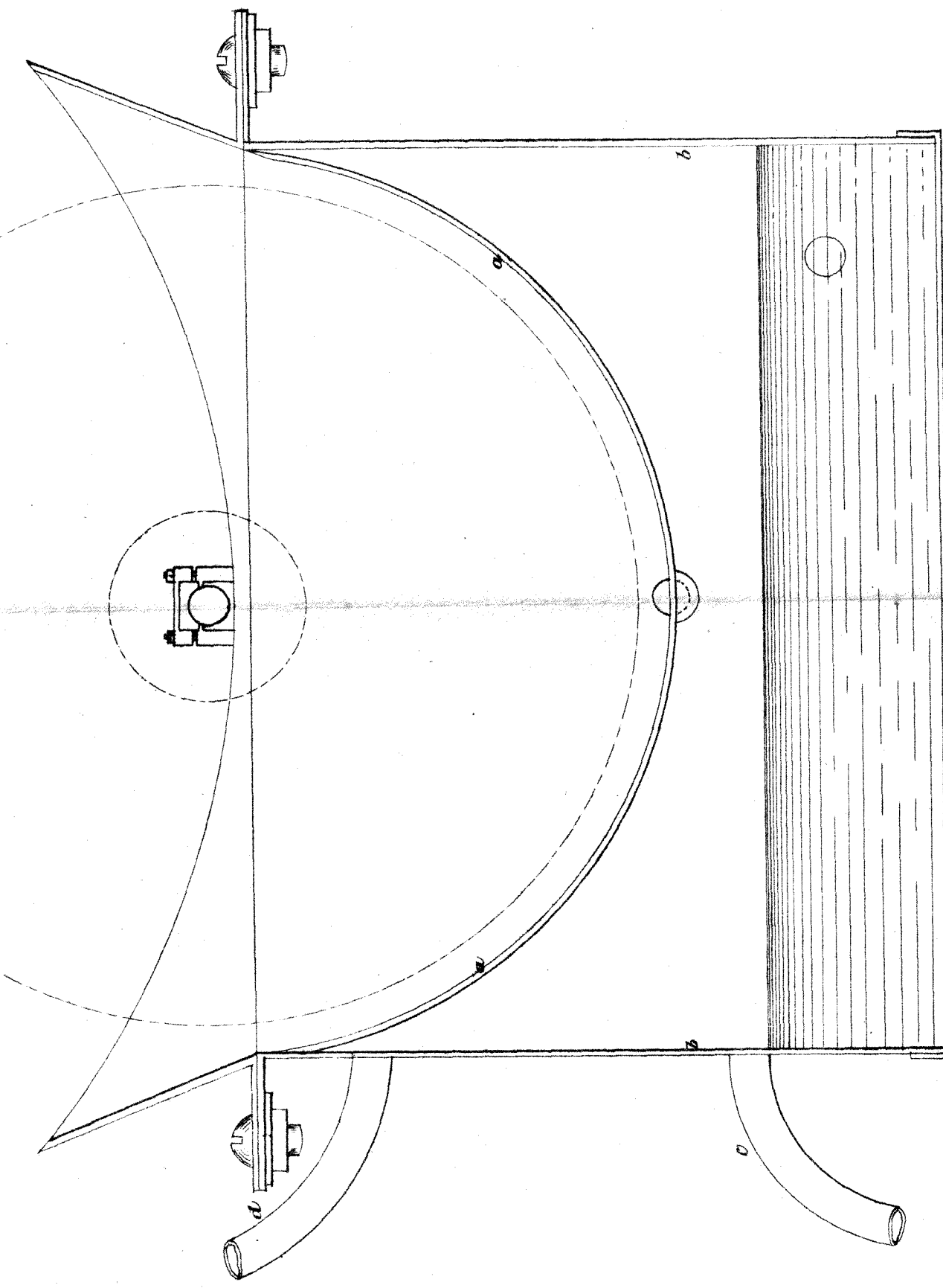
THE HONORABLE
THE COLONIAL SECRETARY.

Documents returned herewith, viz.:—Petition to Governor, drawing, explanatory description of invention, Treasury receipt.

[Drawing—one sheet.]

(copy)

Drawing.



This is the Drawing referred to in the annexed Letters of Registration, granted to Richard Wright. this third day of December. 1862.

John Young.

A.D. 1862, 16*th December*. No. 62.

IMPROVED METHOD OF EXTRACTING GOLD FROM ITS ORES.

LETTERS OF REGISTRATION to Samuel Bradford Birkbeck and Morris Birkbeck Pell, for an Improved Method of extracting Gold from its Ores.

[Registered on the 17th day of December, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Samuel Bradford Birkbeck, of Glemnore, near Rockhampton, in the Colony of Queensland, grazier, and Morris Birkbeck Pell, of Sydney, in the Colony of New South Wales, Esquire, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of an "improved method of extracting Gold from its Ores as found in the Colony of New South Wales," which is more particularly described in the specification and drawings which are hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and

consider

consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Samuel Bradford Birkbeck and Morris Birkbeck Pell, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Samuel Bradford Birkbeck and Morris Birkbeck Pell, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Samuel Bradford Birkbeck and Morris Birkbeck Pell shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, in New South Wales, this sixteenth day of December, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE ore, after being reduced to a state of powder by means of stamping, or by any other known process, until it will pass through a screen made of wires about one-sixth of an inch apart, is to be placed in a machine which may be called a drag mill, and is constructed as follows:—In a level piece of ground a circular hole is dug, three yards in diameter and eighteen inches deep. This hole is filled with stones of the hardest kind that can be obtained, eighteen inches long, and about nine inches square at the end, placed on their ends, forming a close level pavement, and is surrounded by a rim about two feet high made of stone or boards, closely fitted together somewhat like the staves of a cask. At the centre of the pavement is placed a sort of pedestal of stone or wood, firmly fixed, about two feet high, upon which works a vertical shaft with four horizontal arms at about two and a half feet from the ground. From these arms, four heavy stones of the hardest kind procurable are attached by means of ropes or chains, so that when the arms are made to revolve about the vertical shaft, the stones are dragged over the surface of the pavement. These stones or mullers should be about three feet long and eighteen inches square at the ends, weighing about ten hundredweight (10 cwt.) each. In using this machine, one or two of the four stones should be so placed that the forward edge of the side next the pavement may, when in motion, be a little off the pavement, so that the coarser part of the ore may pass under and become reduced. Care should be taken also that the stones be arranged at different distances from the vertical shaft, so that every part of the pavement may be subject to the action of at least one of them. In laying the pavement, which may be made of stones roughly hewn, care should be taken to fill up any spaces which may occur between the paving stones with smaller stones and sand, and that the surface be as nearly smooth and level as possible. After the pavement has been laid, and the rim and shaft with the arms and mullers arranged as above described, hard gravel and sand with a little water should be ground in by means of the mullers, in order more completely to smooth the surface and to fill up the interstices between the paving stones. It is necessary that these interstices should be so completely filled that no bubbles of air rise when water is poured upon the pavement. It will not do to fill up these interstices with cement, or any substance which becomes hard. The machine thus described may be worked by one powerful horse attached to one of the horizontal arms, or by any other motive power. The mill when thus completed may be charged with about ten hundredweight (10 cwt.) of ore, which has already to a certain extent been reduced by stamping or crushing as above described. The machine is put in motion, and water added gradually until the whole of the ore is reduced to a state resembling coarse mud, which will be the case in one or two hours. About three pounds (3 lbs.) of a dry amalgam of silver must be then introduced, from which as much as possible of the mercury has been squeezed out through a bag of canvas or chamois leather. The amalgam should be introduced gradually whilst the machine is in motion, being distributed as evenly as possible over the surface of the ore. The grinding should then be continued, as much water being added occasionally as may seem to be required to facilitate the grinding, until the ore has been under the operation for from six to twenty-four hours, according to circumstances which we will presently describe. In all cases, the operations should be continued for six hours at least, and until the ore is so finely ground that there is no feeling of grittiness when a small portion of it is rubbed between the finger and thumb. Towards the end of the operation more water is added, and when the grinding is considered complete, the exhausted ore is drawn off by means of a plug-

hole,

Improved Method of extracting Gold from its Ores.

hole, its gold having been taken up by the silver amalgam which remains between the stones forming the bottom of the mill. A small portion of the amalgam containing both gold and silver may go away with the refuse ore, but it may be recovered by washing with mercury and water by any known method. A small portion of the amalgam should now he taken out from between the stones of the pavement, and washed from sand and dirt, for examination, as on its appearance the subsequent operations in some degree depend. The mill may be now charged with a fresh supply of ore, and the operation continued as before, except that no more amalgam of silver need be added. If the specimen of the amalgam taken from the bottom of the mill after the first operation be found to be much dryer and harder than when introduced, it is an indication that it has taken up gold, or native silver, or some other metal, from the ore. In such case, during the operation upon the second charge of ore, about four ounces (4 ozs.) of mercury should be added at the same stage of the operation, and in the same manner as the silver amalgam was added in the first. If after the completion of the second operation, the amalgam at the bottom of the mill be still found to be very dry, then during the third operation a larger quantity, about six ounces (6 ozs.), of mercury may be similarly added, and so on, gradually increasing the quantity of mercury, so long as the amalgam is found to continue dry and hard. If, however, at the end of any operation, the amalgam at the bottom of the mill is found to be softer than before, then at the next operation no mercury need be added. The process is in the nature of the case tentative, the principle being that with every charge of ore, just enough mercury should be added to take up the gold, and no more. If too little mercury is added, the amalgam will become too hard to take up all the gold, a part of which will be thus lost; but if too much mercury be added, the amalgam will become too soft, and a portion of it, containing both gold and silver, will become so comminuted as to be irrevocably lost. The quantity of mercury to be added depends upon the quantity of silver and of other metals capable of amalgamation which may exist in a native state in the ore, as well as upon the quantity of gold. When the operations have been continued until it is found that the interstices between the paving stones are becoming quite filled up with amalgam, it will be necessary to remove some of the amalgam. The greater part may be recovered by scraping between the stones with an iron hook, and after being washed with water and mercury, the gold and silver may be obtained by distilling off the mercury in the usual way. The spaces between the paving stones must now be filled up as at first, and the whole operation repeated as from the beginning, a fresh supply of silver amalgam being introduced as at the commencement. By the continued grinding, the stone pavement is of course gradually worn away. To provide against its being worn out too soon, it is made as described, of hard long stones placed on their ends. When the pavement has become so far worn down as to be no longer useful, the whole should be taken up, and the stones and sand carefully washed, to recover any amalgam which may remain clinging about any part of the machine. The length of time during which a charge of ore should be subjected to the grinding process, will depend (1) upon the hardness of the ore, (2) upon the degree of fineness of the ore when introduced into the mill, (3) upon the character of the ore. If the ore be of a refractory character, that is, if it be much impregnated with the baser metals or their compounds, it will require to remain a longer time under the operation, in order to complete the amalgamation, than would ores containing less metallic matter. This can only be tested by assaying the tailings, or by observing whether, on the whole, the quantity of gold extracted is as much as the ore has been ascertained to contain. If (the details of the process having been carefully attended to) it is found that gold is lost, it may be inferred that the grinding process has not been continued long enough. The exact dimensions and quantities specified above are not of course essential—we have introduced specific dimensions and quantities merely to give an idea of the requisite proportions. The mill may be made of any convenient size suitable to the motive power to be employed. Many steps in the whole process above described are not new. We claim nothing as new but the following:—The use of an amalgam of silver, or of gold, or of any other metal, in the process of extracting gold from its ores, as found in the Colony of New South Wales, instead of, or partly instead of, pure mercury, or the mercury of commerce; whether such amalgam be used in the manner indicated by us, or in any other manner whatever, for the same purpose, and whether such amalgam be directly introduced, or whether it be in any way produced during the process. We disclaim, however, the use of the amalgam of lead, with or without other metals often sold as mercury. We disclaim also, the liquid amalgam of gold, with or without other metals, which is formed during any of the common amalgamating processes. The principal point in our process is the prevention of the comminution of the mercury, and consequent loss of gold and of mercury, by the use of a dry amalgam instead of mercury. We claim, therefore, any use of any amalgam, with the exception of the liquid amalgams above disclaimed, for the purpose of extracting gold from its ores, as found in the Colony of New South Wales. We recommend, however, the use of silver amalgam in all cases; and we have described the most efficient method known to us of using it.

This is the specification referred to in the annexed Letters of Registration granted to Samuel Bradford Birkbeck and Morris Birkbeck Pell, this sixteenth day of December, 1862.

JOHN YOUNG.

REPORT.

A.D. 1862. No. 62.

Improved Method of extracting Gold from its Ores.

REPORT.

Royal Mint,
Sydney, 13 *October*, 1862.

SIR,

Having examined and considered the application of Messrs. Birkbeck and Pell, for Letters of Registration for "An improved method of extracting gold from its ores," we have the honor to report that we see no objection to the necessary protection being granted to the applicants.

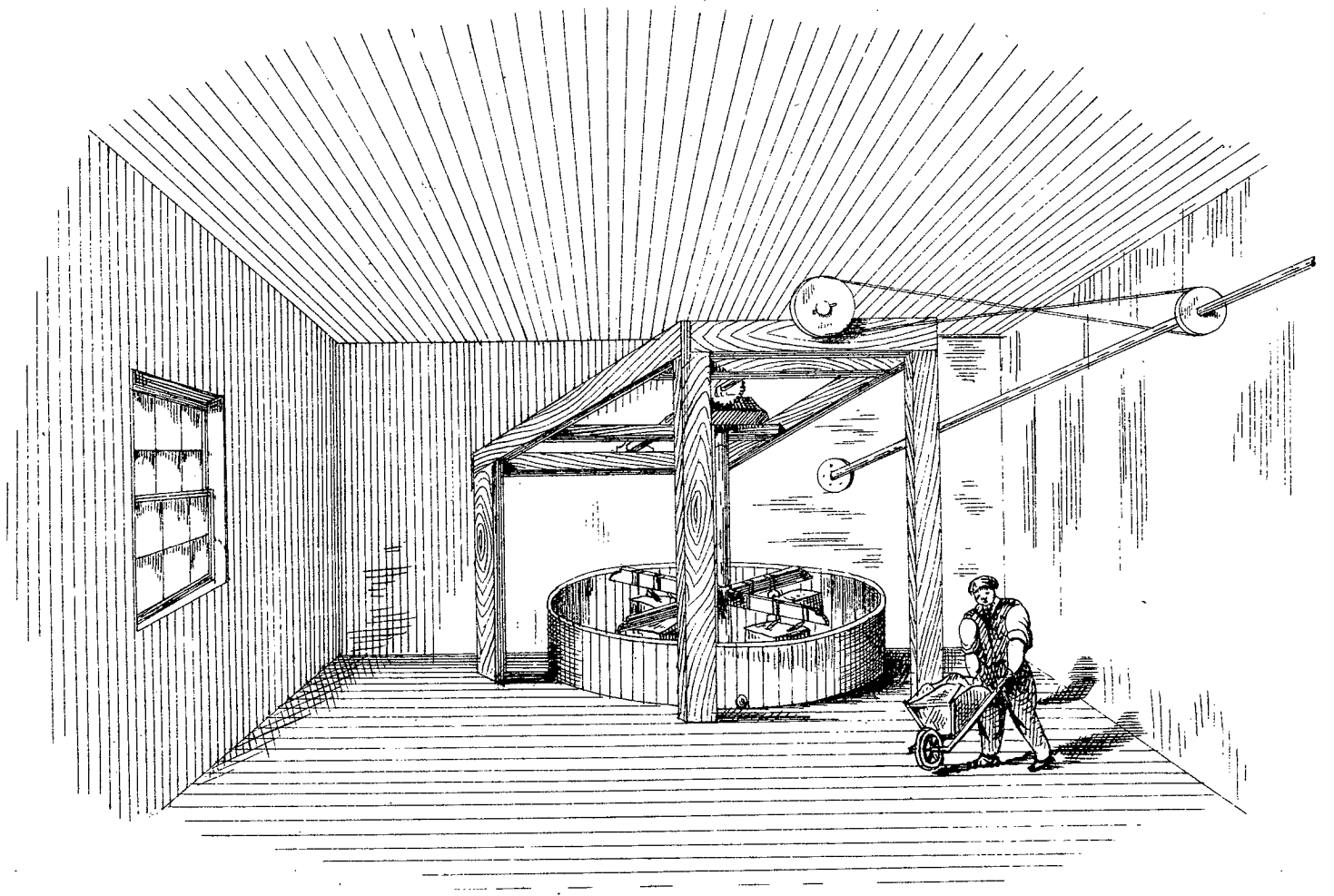
Petition to H. E. Sir John Young.
Letter from Allen and Bowden.
Diagram of apparatus.
Treasury receipt for £20.

The documents as per margin are returned herewith.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]



These are the Drawings referred to in the annexed Letters of Registration, granted to Samuel Bradford Birkbeck and Morris Birkbeck Pell. this sixteenth day of December. 1862.

*Sg^d^*

John Young.

Sam^l^ B. Birkbeck

M B Pell

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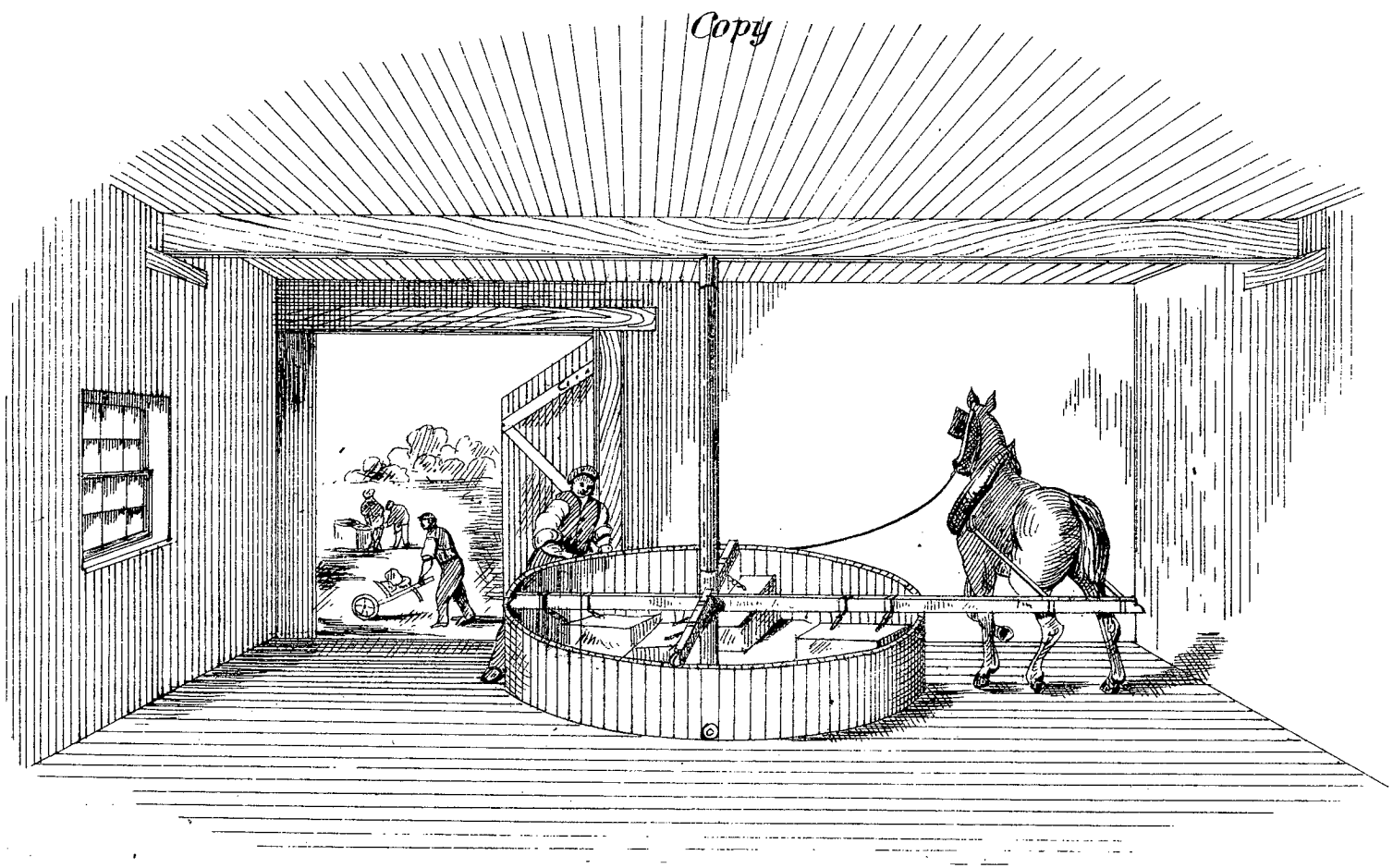


A.D. 1862, 18*th December*. No. 63.

IMPROVEMENTS IN THE METHOD OF PREPARING PAINTS.

LETTERS OF REGISTRATION to Alexander Borthwick, for Improvements in the Method of preparing Paints.

[Registered on the 20th day of December, 1862, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Alexander Borthwick, of Melbourne, in the Colony of Victoria, ship painter, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the method of preparing Paints for certain purposes," which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four, and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me

by

Improvements in the Method of preparing Paints.

by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Alexander Borthwick, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Alexander Borthwick, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Alexander Borthwick shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighteenth day of December, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN YOUNG.

SPECIFICATION of ALEXANDER BORTHWICK, of Melbourne, in the Colony of Victoria, Ship Painter, for an invention entitled "Improvements in the method of preparing Paints for certain purposes."

MY invention is designed for the purpose of dispensing with the use of copper, and preserving ships' bottoms, buoys, or piles, or other material subjected to the action of either salt or fresh water; and when my paint is mixed and applied in the manner hereinafter mentioned, the material to which it is so applied becomes thoroughly impervious to the action of the water, and it will be found to prevent any marine insect or vegetable matter from boring into or fastening on to it. My paint may be also applied to that part of any post sunk into the ground, and will be found to prevent any rotting. Now the materials I prefer to use are as follows:—I first take (say) one hundredweight of fine yellow soap, which must be prepared from palm oil instead of tallow, and place it in a copper vessel, when, after softening it by steam, I add half a hundreweight of blue vitriol, also in a liquid state; and it will be found after mixing them well together, and evaporating the water, that a chemical decomposition will ensue, and the liberated elements will form a fresh compound insoluble in water, and so poisonous as to prevent any animal or vegetable matter adhering to it. There are other materials which may be used for the same purpose; for instance, a similar amount of common clean tallow might be substituted for the fine yellow soap, or a similar amount of linseed oil would also answer the same purpose, or palm oil might be used if about twelve and a half per cent. of clean rosin be added to it. Again, the fine yellow soap, or its substitutes as before-mentioned, might be mixed with arsenic instead of, and in the same proportions as, the blue vitriol; but in that case, about twelve and a half per cent. of clean rosin would require to be added, except when it (arsenic) was mixed with the fine yellow soap, in which instance no rosin would be needed. There is still another material which may be used in the place of the blue vitriol or arsenic, but the proportions differ somewhat; thus, to one hundredweight of fine yellow soap (after softening by steam, as before stated) add twenty-eight pounds of corrosive sublimate of mercury, or if clean tallow, or linseed oil, or palm oil, is used instead of the soap, add a similar amount of the sublimate of mercury, together with about fourteen pounds of rosin. Having thus mentioned the different articles which may be used in preparing the composition I propose using, I will now proceed to describe the manner in which it is to be applied, premising that I believe the best composition, and the one which I prefer using, is that which is firstly herein described, containing only fine yellow soap and blue vitriol. If the vessel operated upon be made of wood, the only preparation required is to well scrape it, and if the vessel have iron fastenings, the exposed portion of the fastenings must be painted with two coats of japan paint or japanner's gold size previous to applying my mixture; after this has been done, my mixture must be applied hot with a stiff brush, and the vessel put into the water as soon afterwards as possible; or if posts are being subjected to the operation, they should be sunk in the ground immediately. I believe one coat of my mixture would be sufficient on all wooden vessels, but I should prefer giving them two coats, as the expense would be very trifling, especially if compared with copper, which this invention is intended to dispense with. Supposing, however, that the vessels be made of iron, they must be first well scraped and cleaned, and must be painted with three good coats of good oil paint; but if time should be an object, the vessel should be painted instead with two good coats of japan paint, as it will dry and become hard in a very much shorter space of time; and indeed I prefer using the japan paint under any circumstances; after which, the vessel may be subjected to my process, and then inserted in the water as soon as possible. I would here remark that, if the protection afforded by my mixture is required for a short period, its consistency may be modified by the addition of mineral or vegetable oil. Having thus described

Improvements in the Method of preparing Paints.

described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that I do not confine myself to the precise proportions of the different component parts of my mixture, as they may be slightly altered or varied without materially affecting the nature of the composition; but what I do claim is, the use of the several combinations of the various materials, and the application of such combinations or mixtures, for the purpose of protecting wood or iron vessels from the decay consequent upon contact with either earth or water, substantially as herein described.

In witness whereof, I, the said Alexander Borthwick, have hereto set my hand and seal, this ninth day of October, one thousand eight hundred and sixty-two.

Signed and sealed by the said Alexander Borthwick, in the presence of— ALEXR. BORTHWICK. (L.S.)

EDWD. WATERS,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to Alexander Borthwick, this eighteenth day of December, 1862.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
26 *November*, 1862.

SIR,

Having examined and considered the application of Mr. Alexander Borthwick, for Letters of Registration, under Act of Council 16 Victoria, No. 24, for "Improvements in the method of preparing Paints for certain purposes,"—we have the honor to recommend that the protection sought for be granted.

Petition to the Governor.
Specification (in duplicate).
Letter from M. Bayley to Colonial Secretary.
Memo. respecting fee.

The papers as per margin are herewith returned.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1863, 19*th February*. No. 64.

IMPROVEMENTS IN MANUFACTURING ARTIFICIAL ICE.

LETTERS OF REGISTRATION to Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, for Improvements in manufacturing Artificial Ice.

Registered on the 20th day of February, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Eugene Dominique Nicolle, of Sydney, in the Colony of New South Wales, engineer, and William Henry Wilkinson, and James Hartwell Williams, of the same place, merchants, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in manufacturing Artificial Ice," which is more particularly described in the specification and paper of drawings which are hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to

report

report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this nineteenth day of February, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

TO ALL TO WHOM THESE PRESENTS COME, We, Eugene Dominique Nicolle, of Sydney, in the Colony of New South Wales, engineer, William Henry Wilkinson, and James Hartwell Williams, of the same place, merchants, send greeting:

WHEREAS we are desirous of obtaining Letters Patent, for securing unto us Her Majesty's special license, that we, our executors, administrators, and assigns, or such others as we or they should or may at any time agree with, and no others, should and lawfully might, from time to time, and at all times, during the term of fourteen years, to be computed from the day on which this instrument is left at the office of the Colonial Secretary at Sydney, make, use, exercise, and send within the Colony of New South Wales, an invention for "Improvements in manufacturing Artificial Ice," the said invention being an improvement upon a Patent granted to the said Eugene Dominique Nicolle and one Richard Dawson, and registered at Sydney aforesaid, on the seventh day of November, 1861, for "An invention for improvements for manufacturing Artificial Ice, and other useful purposes"; and in order to obtain the said Letters Patent, we must, by an instrument in writing under our hands and seals, particularly describe and ascertain the nature of the said invention, and in what manner the same is to be performed: Now know ye, that we, Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, do hereby declare the nature of the said invention and the manner performed to be particularly described and ascertained in and by the following statement and description, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon, which indicate the parts there referred to, and here particularly explained (that is to say):—

The invention has for its object the introduction of certain mechanical arrangements, in combination with the employment of certain gases and vapours susceptible of liquefaction by pressure, and of resuming their gaseous state by the removal of such pressure, by which means we are enabled to obtain a temperature sufficiently low to freeze water in large quantities.

We will now proceed to describe the mechanical arrangements.

Figure No. 1 represents a sectional elevation through the middle of the apparatus. The right wing which is only indicated in the plan is fitted with the same number of boilers, refrigerator piping, &c., &c., in a similar manner as the left wing which is represented fully in the drawing. Figure

Improvements in manufacturing Artificial Ice.

Figure No. 2 represents a sectional plan of the apparatus which shews the internal arrangement of the boilers. It is sufficient to describe only one boiler, as the others are constructed in a similar manner, the performance of each being exactly the same. The number of boilers represent the power of the apparatus, and are to be used separately or conjointly two or more and increased beyond the number of twelve according to the power required.

A A A A A A six boilers on each side of the ice house, containing the concentrated solution. (For description see No. 5 boiler, *sectional elevation*, and also the *sectional plan* of the same.)

a steam-cock, *b* steam-worm, *c* discharge-pipe with stop-cock, *d* drain-pipe, *e* cold water supply-pipe with stop-cock, *f* main water pipe, *g* return gas pipe, *h* stop-cock, *i* perforated pipe, *j* smaller perforated pipe with stop-cock marked *k*, *l* a mercurial bath in which floats a thermometer, *m* level gauge, *n* stop-cock.

B steam boiler, C main steam pipe, D stop-cock, E rectifying pipe, F ascending gas pipe, G returning liquid pipe, H multitubular refrigerator with superposed worm, I cold water supply pipe, J overflow pipe, K wooden box containing water, L rectifying cock, M stop-cock, N multitubular refrigerator similar to H, O connecting pipe from the main gas pipe to the refrigerator (N), P water pipe with regulating cock, Q overflow pipe, R worm connected with refrigerator (N) and with annular gas receiver, S annular gas receiver, T level gauge, U feeding pipe, V wooden vat, X water box, Y discharge water pipe.

1 and 2 gas receivers superposed, 8 feet square, with a space of 2 inches between each plate, 3 revolving stand, 4 4 4, &c., tin moulds containing water to be frozen, 5^1 5 water-tight spaces, 6 purge pipes, 7 wooden box surrounding the gas receivers, 8 space filled non-conductor of heat such as charcoal ashes, 9 pivot shaft, 10 worm, 11 wheel, 12 12 12 12 gasifying pipes, 13^1 13 feeding pipes, 14 purge pipe, 15^1 15 regulating cocks for gasifying, 16 worm shaft, 17 water wheel, 18 trap-door, 19 ice house.

Having thus described the mechanical application, we will now proceed to describe the chemical one. We purpose to employ sulphurous acid gas, deutoxide of azote gas, ammoniacal gas, ethalamine gas, methalamine gas, hydrochloric gas, and all such other gases and vapours as will liquefy and return to their gaseous state in a similar manner. A fluid capable of dissolving these before-named gases, such as water (or chloride of calcium, for ammonical gas, diluted in water), is saturated with the gas and placed in the boilers A A A A A A, which must be perfectly gas-tight. The solution should only occupy three-fourths of the capacity of the boilers, a strong return gas pipe, marked *g*, unites the boilers at the bottom by a branch pipe to each, marked *i*, and fitted with stop-cocks, marked *n*, as before described. These stop-cocks render the boilers dependent or independent according as they are either shut or opened. At the middle of the boilers, a steam pipe unites them by a branch pipe, on which is fitted a steam cock, marked *a*, which connects the internal worm *b*. A cold water pipe, *e*, is fixed on the branch pipe close to the boilers, and fitted with a stop-cock. The top of each boiler is fitted with a stop-cock, marked *h*, which is connected by an intermediate pipe to the main ascending pipe F, leading to the refrigerator H, and from there to the liquefying apparatus N and S, where a feed pipe, U, branching into two pipes 13^1 13 each fitted with a stop-cock. One of these branch pipes is fixed on the surface of the top gas receiver 1, and the other on the surface of the bottom gas receiver 2, passing through the top gas receiver in a gas-tight ferule. A pipe, 12, is fixed at each corner of the gas receivers on their upper surfaces, a set of which passes through the top gas receiver in ferules similar to that of the feed pipe 13^1.

The four pipes of the top gas receiver are united to form one outlet through the cock 15^1, and also the other four pipes of the bottom gas receiver are united in a similar manner to form one outlet through the cock 15, these connections leading to the main returning gas pipe *g*, which unites the boilers near the bottom. Each gas receiver is provided with a purge pipe, 6 and 14, reaching the bottom of each, and fitted with stop-cocks. These purge pipes lead to the rectifying pipe E fixed at the back of the boilers. In the centre, and between the superposed gas receivers, a revolving stand, 3, made in compartments to receive the tin moulds, is caused to revolve on a pivot by a water wheel, 17, which is fed

Improvements in manufacturing Artificial Ice.

fed with the water overflowing in the vat V and the box X. A rotatory motion is transmitted slowly by a worm and wheel, 10 and 11. The spaces 5 and 5^1 are partly filled with alcoholized water, or with a strong solution of salt water, or any other liquid which does not congeal but at a very low temperature. The tin moulds $4^1 4^1 4^1 4^1$, &c., when filled with water to be frozen are bathing in the above named solution and placed in the compartments of the revolving stand, in which they are supported at each corner. The opening left in the top gas receiver enables the person attending the apparatus to take out the moulds when the water they contain is frozen, and replace them with others filled with water. The space 5^1 of the top gas receiver is also filled with moulds bathing also in the solution, the only difference from the other is that these are stationery. The top of the box 7 is fitted with loose panels by which the tin moulds are changed when frozen, the spaces 8 8 8 being filled with a non-conductor of heat, retain the cold produced in the apparatus.

Having thus described the nature of the improvements, there only remains to describe the mode of working the apparatus, which is thus :—

All the boilers A A A A A A being charged with a concentrated solution of ammonia, or any other gas or vapour susceptible of liquefaction by pressure, as before described, the steam boiler B is heated until a pressure of steam equal to 40 lbs. per square inch is obtained, the stop-cock *h* of one of the boilers is to be opened, all the other boilers remaining closed (see for illustration, boiler marked No. 5). The cock K, at the back of the same boiler, is to be opened, the rectifying cock L closed, the stop-cock M to be opened and M^1 to be closed, the cocks fitted on the feed pipes 13 and 13^1 are to be both shut. Cold water is admitted, by suitable pipes above described, in the refrigerators H N, and vat V, a current of steam from the boiler B is then admitted by the steam-cock *a* into the worm *b*, the condensed water being allowed to escape through the pipe *c* by a regulating cock attached to it and leading in the drain pipe *d*. The temperature of the solution is gradually raised by the current of steam to 245° Fahrenheit ascertained by the thermometer placed in the mercurial bath *l*. During this process the gas separates itself from the solution, ascending through the pipe F to the refrigerator H, where by the low temperature kept there by a current of cold water constantly flowing, the aqueous vapour raised with the gas is separated by condensation, and returns to the boiler by the cock K. The dried gas travels onwards to the refrigerator N surrounded also with cold water 5° Fahrenheit lower than the refrigerator H ; a large cooling surface is there exposed in the refrigerator N, worm R, and also by the annular gas receiver S, all which are surrounded with cold water. As the temperature increases in the boiler A, the pressure of the gas upon itself increases also, and soon reaches its liquefying point of pressure ; the level gauge *m* indicates when the liquefaction begins, which shews through the glass the liquid gradually sinking when the solution is sufficiently weakened, and is ascertained by the solution disappearing below the glass tube. The stop-cock M must now be closed, and the rectifying cock L be opened, having previously shut the cock K of the boiler now liquefied, also the stop-cock of the return pipe G. The gas still remaining in the weak solution is now transmitted through the ascending pipe F, passing by the refrigerator H and its worm through the rectifying cock L, descending in the pipe E, and entering into the boiler which is next to be liquefied ; then it escapes through the small perforated pipe *j* and is absorbed in the solution under pressure. The stop-cock *h* is now closed, also the rectifying cock L, and the steam cock *a*, the stop-cock attached to the cold water pipe *e* is to be opened, and also the regulating cock fitted close to the boiler, to let the current of cold water pass in the worm *b*, and escape by the pipe *c* to the drain *d*; the solution is then cooled, which causes a vacuum in the boiler A. Steam is admitted to the next boiler, and the cocks *h* and *k* are open in a similar manner as before described. When the temperature of the solution has attained 135° Fahrenheit the stop L is to be opened and the liquefaction of the gas performed as before described, until all the boilers have been liquefied.

During the liquefaction in the refrigerator N, worm R, and annular vessel S, the water surrounding this part of the apparatus is constantly heated by the latent heat of the gas becoming sensible heat. During the transformation from the gaseous state to that of liquid,

liquid, this heat is removed by the overflow pipe Q, and cold water constantly admitted. When the annular vessel of liquefied gas is filled, which is ascertained by the level gauge T, the feed pipes 13 and 13^1 are opened successively, and the liquefied gas introduced into the gas receivers 1 and 2, until the space of two inches left between the top and bottom plates is charged. These gas receivers are made very strong, and fitted with stays on the whole of the surface, placed six inches apart, being screwed and rivetted. When the gas receivers 1 and 2 are full, and the boilers A A A A A A liquefied and cold, also the feed pipes 13 and 13^1 closed, and the stop-cocks M M^1, the process of freezing is extremely simple.

The tin moulds 4^1 4^1 4^1 4^1, &c., and 4 4 4 4, &c., having been filled with water, and placed in the apparatus as before described, the stop-cocks 15 and 15^1 are to be opened, also the stop-cock *n* uniting the boilers at the bottom is to be partly opened. Now begins the production of cold.

On opening the cock *n* the liquefied gas in the gas receivers 1 and 2 resumes its gaseous state, ascending through the pipes 12 12, &c., and passing through the cocks 15 and 15^1, entering into the returning main gas pipe *g*, which leads into the boiler A, by the perforated pipe *i*, where it is dissolved in the solution, and thereby recharges the boiler ready to be liquefied again; but during the absorption of gas, heat is generated in the solution, and the cold water pipe *e* is again used, the water being allowed to circulate through the worm *b*, by which means the solution is kept cold and the absorption of gas is more rapid.

The enormous amount of latent heat required by the liquefied gas to resume the state of gas reduces the temperature of the gas receivers, and also of the liquid surrounding it; the water contained in the tin moulds is soon converted into solid blocks of ice, but the alcoholized (or salt) water is not frozen, and allows of the moulds being removed and others put in their places; the tin moulds 4^1 4^1 4^1 4^1, &c., are constantly changing their places in the bathing solution, which accelerates the congelation of the water; this motion is imparted from the water wheel 17, as before described.

During the gasification in the receivers 1 and 2 at such reduced temperature, a small quantity of moisture still mixed with the gas is deposited on the bottom plates of the receivers, and by the continual gasification a large quantity would accumulate. The purge pipes 6 and 7 are provided for the purpose of blowing off into the boilers A, &c., from time to time, this accumulated moisture; the apparatus as it is seen is constantly freezing by liquefying and gasifying alternately.

Having thus described the performance of the apparatus, we now claim as the improvements on the former patent—1st, the application of steam in the liquefying boilers, combined with the internal application of cold water simultaneously, as described; 2nd, the mode of rectifying the boilers before liquefaction, by applying the remaining gas of the weak solution after liquefaction; 3rd, the arrangement of the liquefying apparatus; 4th, the mode of freezing on horizontal surfaces, combined with the travelling motion given to the tin moulds during the process of freezing; 5th, the mode of charging the gas receivers; 6th, the mode of purging the gas receivers; 7th, the right of using all gases and vapours which liquefy under pressure and return to their gaseous state when the pressure is removed.

E. D. NICOLLE. (L.S.)
W. H. WILKINSON. (L.S.)
J. H. WILLIAMS. (L.S.)

Witness—HENRY DEAN.

This is the specification referred to in the annexed Letters of Registration granted to Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, this nineteenth day of February, 1863.

JOHN YOUNG.

A.D. 1863. No. 64.

Improvements in manufacturing Artificial Ice.

REPORT.

Royal Mint, Sydney,
13 *February*, 1863.

SIR,

Having examined and considered the application of Messrs. Nicolle, Wilkinson, and Williams, for Letters of Registration for an invention for "Improvements in the manufacture of Ice," we have the honor to report that we see no objection to the necessary protection being granted.

Petition to Governor.
Specification, in duplicate.
Letter from J. H. Williams to Col. Sec., 13 Feb.
Drawing of machinery.

The documents, as per margin, are herewith returned.

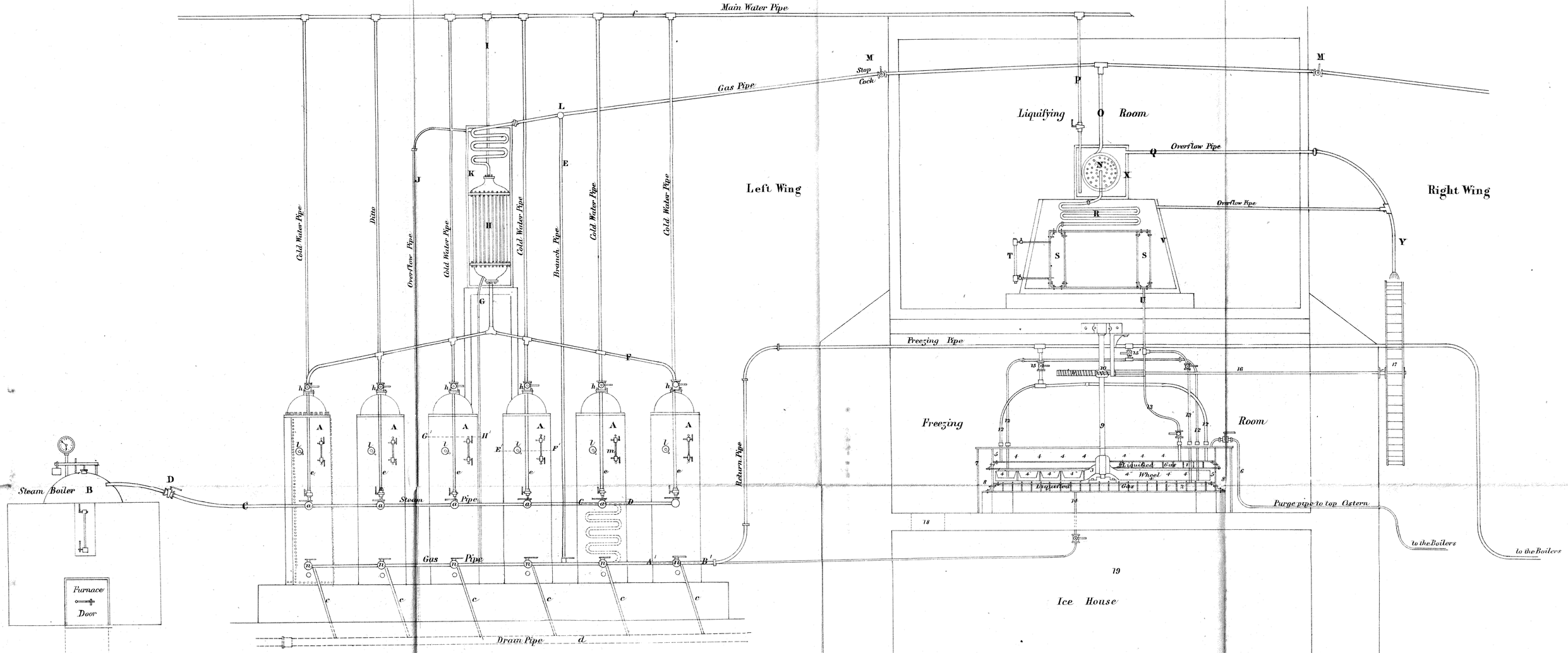
We have, &c.,

E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

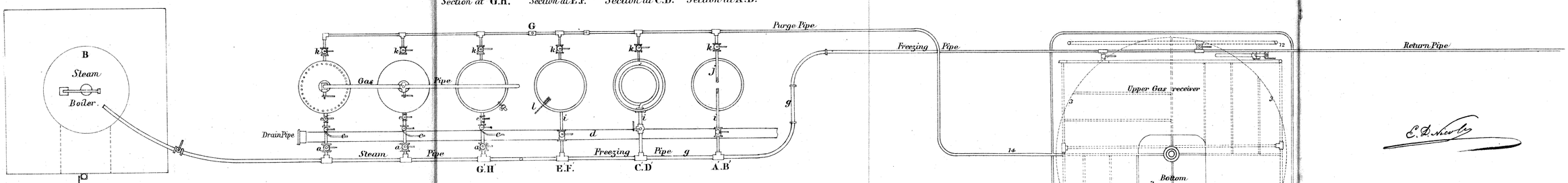
[Drawings—one sheet.]

(COPY)



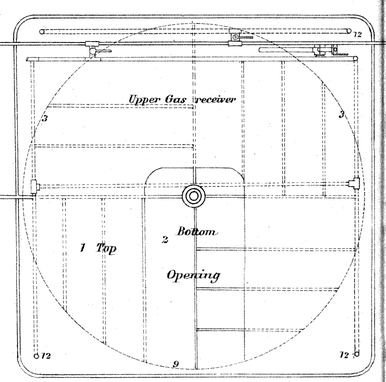
Elevation of one Set of Boilers

Section at G.H. Section at E.F. Section at C.D. Section at A.B.



Section of these places on Elevation

Plan of one Set of Boilers



Plan of upper Gas receiver
The dotted lines show wheel.

This is the Paper of Drawings referred to in the annexed Letters of Registration granted to Eugene Dominique Nicolle, William Henry Wilkinson, and James Hartwell Williams, this nineteenth day of February. 1863.

Signed. John Young.

A.D. 1863, 23*rd February*. No. 65.

HAYES'S CONCENTRATED SPECIFIC.

LETTERS OF REGISTRATION to Patrick Hayes, for Concentrated Specific for the cure of Scab and Foot-rot in Sheep, &c.

[Registered on the 24th day of February, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Patrick Hayes, of Footscray, near Melbourne, in the Colony of Victoria, chemical manufacturer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention called "Hayes's Concentrated Specific for the cure of Scab and Foot-rot in Sheep, &c.," which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of

Hayes's Concentrated Specific.

Registration grant unto the said Patrick Hayes, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Patrick Hayes, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Patrick Hayes shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-third day of February, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME: Be it known that I, PATRICK HAYES, of Footscray, near Melbourne, in the Colony of Victoria, chemical manufacturer, have invented a new and useful invention, called "Hayes's Concentrated Specific, for the cure of Scab and Foot-rot in Sheep, &c.," and I, the said PATRICK HAYES, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, that is to say:—

I take any of the following ingredients which are readiest at hand, viz.:—Oil of tar, fat of tar, spirits of tar, oil of coal, the oil or gum of the grass tree, the tar or oil obtained from the blue, red, and white gum trees, Stockholm tar, pitch, resin, or tallow. I make any of these soluble in or mixed with water, so as to be diluted to the extent which the circumstances of the case, and the particular stage of the disorder, may require; that is, when sheep or cattle are strongly affected with disease, a stronger solution is necessary, and *vice versâ*. Then I take the waste meat or waste carcasses from boiling-down establishments, with the bones, and cut them into pieces. I place these into suitable air-tight vessels, capable of resisting considerable pressure; to which I apply heat by fire, or super-heated steam. I add two hundredweight, more or less, of caustic soda (or potash, soda ash, or soda made caustic, and very strongly prepared in the same way as soapmakers' lees are) to every twenty hundredweight of this meat, fat, bones, &c., which I then boil for several hours, until the whole is dissolved and formed into a glycerine or soap. To every three hundredweight of this I then add one hundredweight of the solution before mentioned as made from any of the ingredients above enumerated. I then boil this mixture until the whole is thoroughly saponified, and it assumes the appearance of a soft black soap. I then add one hundredweight of sulphur, more or less, to every ton of this specific; it is then allowed to cool, the sulphur being well mixed therewith during the process of cooling; and when it is sufficiently cool, it can be drawn off and casked, as may be convenient. One hundred pounds, more or less, of this specific, dissolved in one hundred gallons of boiling water, adding four hundred gallons of cold water, making in all five hundred gallons, well stirred up, will be sufficient for (say) two thousand sheep, which should be thoroughly immersed, and allowed to swim through and remain under its influence for about half a minute. My specific thus used will be found not only to cure the scab and foot-rot in sheep, cattle, &c., but will stimulate and increase the growth of the wool in sheep, and improve the health of the animal. The process should be repeated in most cases after an interval of eight days.

In witness whereof, I, the said Patrick Hayes, have hereunto set my hand and seal, this twenty-fourth day of January, in the year of our Lord one thousand eight hundred and sixty-three.

PATRICK HAYES. (L.S.)

Witness to the signature of Patrick Hayes,—
JOHNSON HICKS,
Melbourne.

This is the specification referred to in the annexed Letters of Registration granted to Patrick Hayes, this twenty-third day of February, 1863.

JOHN YOUNG.

REPORT.

Hayes's Concentrated Specific.

REPORT.

Royal Mint, Sydney,
30 *January*, 1863.

SIR,

Having examined and considered the application of Mr. Patrick Hayes for Letters of Registration, under Act of Council 16 Vic., No. 24, for an invention called "Hayes's Concentrated Specific for the cure of Scab and Foot-rot in Sheep," &c., we have the honor to report, that we see no objection to the necessary protection being granted.

The documents as per margin are herewith returned.

Petition to H. E. the Governor.
Description of invention.
Treasury receipt.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

No. 66.

[Assignment of No. 13. See page 59 of this Return.]

No. 67.

[Assignment of No. 15. See page 71 of this Return.]

No. 68.

[Assignment of No. 57. See page 301 of this Return.]

A.D. 1863, 31*st March.* No. 69.

IMPROVEMENTS IN THE MANUFACTURE OF ARTIFICIAL STONE, &c., AND THE PRESERVATION OF TIMBER.

LETTERS OF REGISTRATION to Frederick Ransome, for Improvements in the manufacture of Artificial Stone and Cement or Plaster, and the Preservation of Timber.

[Registered on the 2nd day of April, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Frederick Ransome, of Ipswich, in the county of Suffolk, in England, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the manufacture of Artificial Stone and Cement or Plaster, and in treating Timber for the purpose of preserving the same," which is more particularly described in the specification hereunto annexed; and that he, the said petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having

received

received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Frederick Ransome, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Frederick Ransome, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Frederick Ransome shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirty-first day of March, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THIS invention has for its object improvements in the manufacture of artificial stone and cement or plaster, and in treating timber for the purpose of preserving the same. For the purpose of manufacturing artificial stone, I mix broken or powdered chalk with the silicates of soda or other alkali, and I mould the compound into blocks or shapes afterwards. When the blocks or shapes are dry and hard, I wash over the surface with a solution of chloride of calcium, or other soluble salt of an alkaline earth, or with a solution of chloride of aluminum, or iron, in order to insure, as far as possible, the conversion of the soluble silicate into an insoluble silicate of lime or other alkaline earth, or of aluminum, or iron.

It is preferred, in producing artificial stone in this manner, that the chalk should be in a finely powdered state, and that it should be mixed with a solution of silicate of soda, so as to produce a plastic mass—the silicate of soda being such as is now commonly employed in the manufacture of artificial stone, and by preference of a specific gravity of 1·700. The plastic mass produced is moulded to the form required in any convenient manner, and the articles produced are usually, although not necessarily, dried in the air until they become hard, which will usually be in from two to three days, according to the thickness of the article and the state of the weather (or the articles may be dried in a stove). They are then washed over, by preference, with a solution of chloride of calcium of specific gravity 1·200, or thereabouts. This solution may be applied with a brush so as thoroughly to wet every part of the surface, or if convenient, the article may be dipped into the solution. In place of chloride of calcium, as before mentioned, other soluble salts of alkaline earths may be employed, as may also the chlorides of aluminum and of iron. If any of these salts are employed, the strength of the solution should be such as to contain about as much salt per gallon as the prescribed solution of chloride of calcium, but, within certain limits, the strength of these solutions is not of great importance; silicate of potash may be substituted for silicate of soda, but it is more expensive, and the result obtained will not be improved. In this manner I obtain blocks or shapes which absorb little or no moisture, and which are hard and of great durability.

Broken or powdered chalk thus manufactured produces an artificial stone which, for many purposes, is superior in texture to the artificial stones heretofore made; besides which, it is believed that it is not only the soluble silicate at or near the surface of the article which, by the application of chloride of calcium or other salt is converted into silicate of lime or insoluble silicate, but that throughout the whole mass the soluble silicate becomes slowly converted into insoluble silicate of lime, a portion of the chalk being decomposed to supply the lime to the silica. I also employ a mixture of broken powdered chalk and soluble silicate as a plaster or cement to coat walls and other surfaces, and when the same is sufficiently dry and hard, I wash over the surface with the solution of a salt of an alkaline earth, or of aluminum, or iron as before. The pulverized chalk is, for this purpose, mixed to the consistency of plaster with a solution of soluble silica, but as it works more conveniently if not made so stiff as when for moulding, the soluble silica employed is preferred for this purpose to be of a less specific gravity, viz., 1·500 or thereabouts. The solution of chloride of calcium or other solution is applied by a brush, as before, and is of similar strength. In the manufacture of artificial stone, and also as a cement for plastering and other uses, I sometimes employ a mixture of chalk, quicklime, and soluble silicate. When quicklime is added to the other ingredients, it is not so

necessary

necessary to wash the surface over afterwards with the solution of a salt of an alkaline earth, or of aluminum, or iron, as the quicklime immediately converts a portion of the soluble silicate into an insoluble silicate of lime. Still I prefer to wash over the surface as before, in case the soluble silicate should be in excess. In addition to or in place of chalk in this compound, sand, clay, and other similar substances may be employed, as the chalk in this case is not itself necessarily chemically acted on, but it serves to give substance to the composition and makes it durable when moulded into a mass, or applied as a plaster to a surface, which a composition consisting wholly of quicklime and soluble silicate is not.

Very useful compositions of this description are the following :—

For Artificial Stones.

Chalk	5	parts by weight.
Quicklime	1	,,
Solution of silicate of soda, sp. gr., 1·700	1	,,

diluted with water to work to the consistence required.

Or, Chalk	2	parts by weight.
Slaked lime	1	,,
Sand	8	,,
Clay	1	,,
Silicate of soda, sp. gr., 1·700	2	,,
Or, Sand	8	parts by weight.
Clay	1	,,
Quicklime	1	,,
Solution of soluble silica, sp. gr., 1·700	2	,,

If the mixtures are required for use as cements or plasters, they should be mixed thinner, and the solution of soluble silicate should be of less specific gravity. These compositions should be moulded or applied as soon as they are mixed, as they set rapidly. In some cases I make a composition consisting of chalk, sand, or other suitable mineral in a powdered state, soluble silicate, and a soluble salt of an alkaline earth or of aluminum or iron. I mix this compound so as to bring it to a plastic state, and then immediately mould it, or apply it to the surface to be coated when it is to be used as a plaster; this moulding or spreading must be done rapidly, as the compound sets hard almost immediately it is mixed.

The following is the composition of a very good artificial stone of this description,—

Powdered chalk	6	parts.
Solution of silicate of soda, sp. gr., 1·200	1	part.
Solution of chloride of calcium, sp. gr., 1·200	1	part.

In mixing these materials, I prefer first to knead together the chalk and silicate of soda, and afterwards add to it, and mix as rapidly as possible, the solution of chloride of calcium, and when the materials are properly mixed, the composition is at once moulded or applied as may be required. When the composition is required for use as a cement or plaster, the quantity of silicate of soda and of chloride of calcium is advantageously increased, the specific gravities of the solutions being reduced in proportion.

Artificial stone may also be produced by mixing the silicate of soda, or other alkali, with sand, clay, or other substance, and then in place of burning the blocks, as heretofore practised, when such blocks have been made, treating them with a solution of chloride of calcium or other soluble salt of an alkaline earth, or with a solution of chloride of aluminum or iron; or a composition of this description may be applied to surfaces as a plaster or cement, and afterwards treated with a solution of chloride of calcium or otherwise as above mentioned. The ingredients used in this case, and the proportions employed, will vary as heretofore, according to the purposes to which the said artificial stone is to be applied. In making stone for building purposes, the following proportions will be found suitable:—

6 cwt. clean, dry sand,
1 ,, dry, ground pipeclay,
7 gallons silicate of soda, sp. gr., 1·750 or thereabouts.

Or, for making rubbers or grinding surfaces, the following ingredients may be used:—

1 cwt. of ground glass or ground pumice-stone or emery,
1 gallon of silicate of soda.

The specific gravity of the silicate in the last mixture will depend upon the purposes for which the rubbers, &c., are required, the strength and hardness thereof being in proportion to the quality and specific gravity of the silicate employed. In either case, the sand, clay, pumice-stone, glass, or whatever be the substances employed, should be intimately mixed and incorporated with the silicate of soda or other alkali, in such manner as to render the mixture convenient to be worked into moulds or shapes; and when used for coating walls and surfaces, the sand or ground glass, or other material, is mixed with such a proportion of silicate, and of such a specific gravity, as may be found best suited to the circumstances of the case; but as a general rule for practice, the ingredients may in the first instance be mixed in the same manner, and in the same proportions employed in the manufacture of artificial stone, as given above, and afterwards

Improvements in the Manufacture of Artificial Stone, &c.

wards may be reduced to the consistence most convenient by the addition of water, soft or rain water being preferred. The compound may be applied in the same way as ordinary cement or plaster, by means of a trowel or otherwise, or may be brushed on as in the case of colour or paint. The artificial stone and cement or plaster, after being prepared as above and allowed to dry, is then treated with a solution of chloride of calcium or other soluble salt of an alkaline earth, or of aluminum, or iron, and for this purpose I generally employ a solution of chloride of calcium, of specific gravity about 1·200 or 1·300, which is applied either by means of a common brush to the surface, or by simply immersing the stone in the solution, or where convenient by forcing the solution into the pores and interstices of the stone, &c., by means of hydraulic pumps or otherwise.

In treating wood for the purpose of preserving the same, I apply to it a solution of silicate of soda or other alkali by preference, forcing the said solution into the pores of the wood, and afterwards apply a solution of chloride of calcium or other soluble salt of an alkaline earth or chloride of aluminum or iron by preference, forcing the same into the pores of the wood as before. In carrying out this process, I brush over the surface of the wood first with a solution of soluble silicate, the specific gravity of which may conveniently be from 1·100 to 1·200, or I immerse the wood in such solution; or, where practicable, I prefer to place the wood to be operated upon in a suitable air-tight vessel, capable of sustaining considerable pressure, and after exhausting the air from the vessel and from the cells of the wood by means of an air-pump, or otherwise, I admit the solution of silicate, and by means of a force-pump connected with the vessel, I drive the silicate into the pores or cells of the wood. When the silicate has become dry, I brush freely over the surface of the wood, so treated with a solution of chloride of calcium or other soluble salt of an alkaline earth, or with a solution of chloride of aluminum or iron of specific gravity of from 1·100 to 1·200, or I immerse the timber in such solution; or where practicable, I prefer, as before, to place the timber in a suitable air-tight vessel, and after exhausting the air by means of an air-pump or otherwise, to force in a solution of chloride of calcium or other soluble salt of an alkaline earth, or a solution of chloride of aluminum or iron, by means of an hydraulic or other pump, the object being in all these cases, by aid of the solution of chloride of calcium or other salt, to convert the soluble silicate of soda or other alkali into an insoluble silicate, either of lime or other base.

This is the specification referred to in the annexed Letters of Registration granted this thirty-first day of March, 1863.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, 11 *February,* 1863.

Sir,

Having examined and considered the application of Mr. Frederick Ransome for Letters of Registration, under Act of Council, 16 Vic., No. 24, for Improvements in the manufacture of Artificial Stone and the preservation of Timber, we have the honor to report that we see no objection to the necessary protection being granted.

Petition to the Governor.
Treasury receipt.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
JAMES BARNET,
Actg. Col. Archt.

The Honorable
The Colonial Secretary.

A.D. 1863, 31*st March*. No. 70.

IMPROVEMENTS IN THE MODE OF PRESERVING ANIMAL AND VEGETABLE SUBSTANCES.

LETTERS OF REGISTRATION to Messrs. Lorimer, Marwood, and Rome, for Improvements in the mode of preserving Animal and Vegetable Substances.

[Registered on the 2nd day of April, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Lorimer, Matthew Marwood, and Robert Rome, all of Melbourne, in the Colony of Victoria, merchants, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the mode of preserving Animal and Vegetable Substances," which is more particularly described in the specification hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public

good,

good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said James Lorimer, Matthew Marwood, and Robert Rome, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Lorimer, Matthew Marwood, and Robert Rome, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Lorimer, Matthew Marwood, and Robert Rome shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirty-first day of March, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION of JAMES LORIMER, MATTHEW MARWOOD, and ROBERT ROME, all of Melbourne, in the Colony of Victoria, Merchants, for an invention intituled, "Improvements in the mode of preserving Animal and Vegetable Substances."

THE animal matters most generally used in commerce are hides, skins, wool with or without the skin washed or in the grease, furs, hairs, feathers, suet and tallow, oil, grease, bones, horns, hoofs, &c. All these substances bear within themselves the germs of deterioration inherent to each article, and are liable in addition to damage in transit and in warehouses, by which their value is materially diminished, and they are sometimes rendered totally unfit for industrial purposes. Many methods have been put forward and tried in order to remedy this evil, but without giving any real satisfaction. To preserve is nothing; the means are numerous, and most of them well known, but the great point was to do it with matters of little value, of easy manipulation, and offering no danger. It was important also to be able to operate in the open air, in the fields—in fact, not only must the goods be made to defy all climates, rain, sea water, insects, and putrid fermentation, but at the same time they must not lose any of the conditions and qualities, either physical or chemical, required by the various trades which employ them. The importer must also, after reckoning all expenses, find in the treatment of the goods a real pecuniary advantage, and the buyer as well. The great object in fact, was to realize all that has been sought up to the present day by commerce and the trades which use these products. To obtain these results was to bring about a change really useful in a commercial point of view. What has been accomplished gives a right to say that this aim has been attained. Without altering anything in the commercial habits, the hides and skins of all animals without exception, whether they live on land, in water, or in the air, can be brought in green, salted, or dry. They can be shipped or warehoused quite fresh, from whatever country they come. Whatever external influences they may have been subjected to, they will remain as sound as they were when taken off the animal, and this for an indefinite period All furs will be in the same condition, the hair will become more lustrous and softer. Hair will not be required to be boiled previous to its being shipped or warehoused to remain free from any liability to damage, and without having to fear the presence of insects. Wool can be piled up, either in grease or after a mere washing, and shipped from all countries without fear of fermentation, slow combustion, insects, or any damage whatever; it will give a superior yield when bleached, and will have acquired more strength, elasticity, and softness. Suet can be shipped from any country without being packed and without any previous melting; it will have acquired a greater whiteness and value, and will be perfectly free from smell. Melted tallow will become hard, very white, and for ever free from fermentation, waste, or damage. Animal oils become bright without acidification, and the casks in which they are contained will never be liable to explosions, as no formation of gas can take place; they remain also free from smell. All the hard parts of the animal skeleton can be shipped or warehoused perfectly fresh, as they are detached from the animal, without fear of alteration to any of the various parts of which they are composed. Whether the preservation be effected on fresh, salted, or dry substances, its results are the same. To obtain the above-mentioned results, we use the various compounds of chlorine and magnesium, such as chloride

chloride of magnesium, hypochloride, chlorate of magnesia, &c. The salts are used alone, or in a state of double chlorides, or mixed with the metallic alkaline or earthy chlorides. I call the attention in this last case on the double magnesia, zincic chlorides, double magnesio-aluminic chlorides, double magnesio-sodic chlorides, double magnesio-calcic chlorides. Any solution giving, by double decomposition, the products we have just mentioned will give the same results ; for instance, a mixture of sulphate of magnesium and of chloride of sodium or calcium will produce sulphate of soda or of lime, and a chloride of magnesium, and so on. These salts are used dissolved in water, the quantity varying from five to ten per cent. of the weight of the animal matter to be immersed, according to the climate, and the length of time for which the preservation is required. The duration of the immersion varies from fifteen minutes to twenty-four hours, according to the thickness of the substance to be preserved, and the time for which it is to be preserved. The preserving matters are applied either by immersion, aspersion, friction with a brush or otherwise, or incorporation. If a hide is to remain fresh, it should be immersed for twenty-four hours in a bath containing from six to ten per cent. of the weight of the hides of preserving salts. When taken out it is ready for shipment or for warehousing as soon as the liquid has drained off. The hides and skins must not in any case be rinsed in water after coming out of the preserving bath. Should a well salted hide be required, it must be salted directly it comes out of the preserving bath mentioned for fresh hides. If dry hides (not salted) are required, they must be dried in the usual way on their coming out of the preserving bath, without paying any attention either to rain or dampness. When green hides are treated which have been previously salted, they are placed in the bath, as if they had just been taken off the animal, and on their coming out they must be treated as above, according to whether wet salted or dry salted hides are required. When dry salted hides are treated, they must be watered with a solution containing from fifteen to twenty per cent. of salts in dissolution. This watering should be done with watering pots, the rose of which should have holes as small and as near each other as possible. It is important that the liquid should not run off the hides—it must be absorbed by both sides of the hides, and not go beyond. After this the hides should be dried as usual. When dry hides are treated, they must be left for three or four hours in a preserving bath containing from ten to twelve per cent. of dissolved salts, according to the weight of the hides to be immersed. They must be dried on coming out of the bath. In no case are the hides or skins to be rinsed in water after being taken out of the preserving bath. For wool, hair, and furs, we recommend immersion for twenty-four hours in a bath containing from five to ten per cent. of salts in dissolution according to the weight of the matters to be immersed. For wool, the operation can be done by watering; the wool to be preserved is spread on the ground in layers not exceeding two inches in thickness, the preserving liquid is sprinkled over it, the wool is then collected together and left piled up for three or four hours before drying or bleaching. Suet must be left for two or three days in a bath containing ten per cent. of its weight of preserving salts. Tallow, animal oils, and grease must be warmed up until they become liquid, and then six per cent. of their weight of preserving salts, previously dissolved in water, is poured out into the vessels containing the matters to be preserved. Animal grease and oils thus treated will not require acidification to become bright, and the barrels containing the same will not be liable to burst. Bones, horns, hoofs, fish bones, &c., and all other solid animal substances, must be placed for two or three days in a bath containing the preserving salts, dissolved in the proportion of twenty per cent. of their weight. Palm oil, cocoa-nut oil, &c., and all vegetable matters liable to decomposition, will be rendered proof against its effects by the use of the above-mentioned agents. Having thus described the nature of the invention and the manner of performing same, we would have it understood that what we claim as our invention, is the several methods of preserving the various articles herein detailed, substantially as herein described.

In witness whereof, we, the said James Lorimer, Matthew Marwood, and Robert Rome, have hereto set our hands and seals, this seventeenth day of January, one thousand eight hundred and sixty-three.

Signed and sealed by the said James Lorimer, Matthew Marwood, and Robert Rome, in the presence of—

JAMES LORIMER. (L.S.)
MATTHEW MARWOOD. (L.S.)
ROBT. ROME. (L.S.)

E. HART,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to James Lorimer, Matthew Marwood, and Robert Rome, this thirty-first day of March, 1863.

JOHN YOUNG.

REPORT.

A.D. 1863. No. 70.

Improvements in preserving Animal and Vegetable Substances.

REPORT.

Royal Mint, Sydney,
26 *February*, 1863.

SIR,

Having examined and considered the application of James Lorimer, Matthew Marwood, and Robert Rome, for Letters of Registration under Act of Council 16 Victoria, No. 24, for an invention entitled "Improvements in the mode of preserving Animal and Vegetable Substances," we have the honor to report that we see no objection to the necessary protection being granted.

Petition to Governor.
Specification in duplicate.
Treasury memo.

The documents as per margin are herewith returned.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1863, 22*nd April.* No. 71.

DIFFERENTIAL BREAK.

LETTERS OF REGISTRATION to Robert Napier, for several Modifications of a Differential Break.

[Registered on the 24th day of April, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Robert Napier hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Several Modifications of a Differential Break," which is more particularly described in the specification and paper of drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of

Differential Break.

Registration grant unto the said Robert Napier, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Robert Napier, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Robert Napier shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-second day of April, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

(1.) The inventions herein referred to are several modifications and applications of what I call the Differential Break, and are based on an improved system of creating pressure between two surfaces, or of increasing its intensity, for the purpose of producing sufficient friction to prevent or limit the rate of the rotation of a wheel in a given direction.

(2.) In these inventions the friction between two surfaces is employed to tighten the surfaces together, so that what is effected by the ordinary break by means of a powerful lever or screw, is wholly or in part performed by my improvements in a self-acting manner, by means of the friction itself.

(3.) In one modification of the Differential Break as represented in figure 1 of accompanying sketch, both ends of a break-strap are jointed to one lever, both connections being on one side of, but at different distances from, the fulcrum or fixed centre.

(4.) By this arrangement there arises a differential action between the two ends of the break-strap, such that by turning the wheel in the direction of the arrows, the friction on the strap tends to slacken it, and *vice versâ;* for in the first case, the friction would cause both A and B to travel in the direction of the arrows, but as A moves faster than B, the effect is to open the strap; in the other case, the strain caused by the friction on the strap is accumulated and communicated to B, which acting through the lever, causes A to move faster than B, thus tightening the strap, thereby increases the friction which again acts on B, and so on, increasing the friction to any desired extent.

(5.) In applying these improvements to apparatus for raising and lowering weights, the parts are arranged so that the descent of the weight causes the tightening action to come into play.

(6.) The proportionate distances between the fulcrum and joints may be such as to prevent the backward motion, either by the differential action alone, or by the assistance of a small weight at the outer end of the lever L.

(7.) In either case when the weight is required to be lowered, the lever must be slightly at the outer end and held up so long as the lowering is desired, as in letting go the lever the lowering is stopped.

(8.) This arrangement may be beneficially substituted for the ordinary pawls and ratchet gear for preventing the backward motion of winches, windlasses, cranes, &c., and would frequently prevent the loss of life, by the power which it gives of holding and safely slacking back under great strain.

(9.)

(9.) Another modification is shewn in figure 2, where the two ends of a break segment are connected by links to a lever or bell-crank whose arms are of unequal length. In this arrangement, if the wheel is moved as indicated by the arrows, the friction will tend to remove the break from the wheel, and a contrary motion the reverse.

(10.) The principle of action is here the same as in the other arrangement, and it can be similarly regulated and applied, by paying proper attention to the lengths of the arms and the angular position of the links.

(11.) The slacking back or lowering must be done by moving the handle so as to make the shorter end of the lever approach the wheel.

(12.) This plan is better adapted for railway carriages, but for this purpose some alterations would be advisable, such for instance, as the balancing the segment by a weight on the outer end of one of the links continued outwards.

(13.) An arrangement might also be made for shifting the lever on its fulcrum for the purpose of making the break act either way, and it might be advisable to cross the links to the opposite ends of the lever or bell-crank.

(14.) It is advisable for the purpose of maintaining regularity in the holding power, that the links be as nearly as convenient at right angles to the arms of the lever, also as nearly as practicable tangent to the wheel at their connection with the strap or segment.

(15.) Figures 3, 4, 5, and 6, represent other arrangements of the Differential Break.

(16.) This arrangement of break may also be used with very great advantage as a substitute for friction-cones or for clutches, where heavy machinery is suddenly thrown into gear, as from its frictional action it would do away with the shock necessarily accompanying the ordinary clutch, and from its self-acting principle its holding power may be increased *ad libitum*.

Figure 7 represents one method of its application as a clutch.

I claim as my invention—

First—Employing the friction arising from the contact of a wheel and strap, or wheel and segments, to tighten the respective surfaces together for the purpose of increasing such friction in such a way that when one of the surfaces slides along the other, the friction of every portion in contact tends to increase the intensity of pressure between every portion of these surfaces, and at the same time in such a way that the amount of friction can be easily regulated by a lever or other mechanical arrangement.

Secondly—The connecting the two ends of a break strap or segment to a lever, or bell-crank, or differential-pulley, either directly or by means of links or other appliances, in such a way that by turning the lever or its substitute on its centre of motion, both ends of the break-strap or segment will move in the same direction relatively to the break-wheel, but at different rates.

Thirdly—The making use of the above as a self-acting appliance for preventing the backward motion of windlasses and other hoisting machines, either as a substitute for or along with pawls, and with or without arrangements for regulating the amount of friction.

Fourthly—The employing the differential arrangements similar in principle to those described as a substitute for friction-cones or for clutches.

DESCRIPTION OF THE FIGURES.

Figures 1 to 6 are various modifications of the Differential Break, in its application to cranes, windlasses, &c., and require no further explanation.

Figure 7 is a sketch of an arrangement that might be adopted for a clutch or friction-cone. The motion is here supposed to be communicated from the friction-wheel A to B through the intervention of a strap C C C. The lever D may be pressed in direction

direction of arrow by a spring fixed on B, causing the strap to hold and B to revolve with A. B may be thrown out of gear by means of a small break-wheel, E, working loose on shaft, having a slit in which a pin F slides which is attached to the end of lever D; this wheel being held by means of a strap causes the end of the lever to move contrary to that of the arrow, thereby opening the strap C C C and forcing B.

Instead of A driving B, B might be the driver, in which case two small break-wheels might be employed, by the holding of one or other of which A would be thrown in or out of gear; in this case no spring would be required.

In employing it simply as a friction-cone, there is no necessity for any arrangement for throwing in and out of gear, but simply a stop, G, to regulate the holding power.

This is the specification referred to in the annexed Letters of Registration granted to Robert Napier, this twenty-second day of April, 1863.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
26 *February*, 1863.

Sir,

Having examined and considered Mr. Robert Napier's Petition for Letters of Registration, under the Act of Council 16 Victoria, No. 24, for several modifications of a Differential Break, as described in the specification attached to his Petition, we have the honor to recommend that the prayer of the Petition be granted.

We have, &c.,

E. W. WARD.
E. O. MORIARTY.

The Honorable
The Colonial Secretary.

[Drawings—one sheet.]

(COPY)

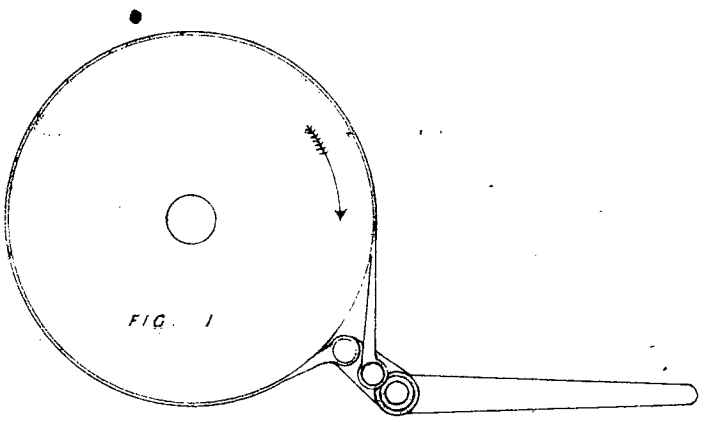


FIG. 1

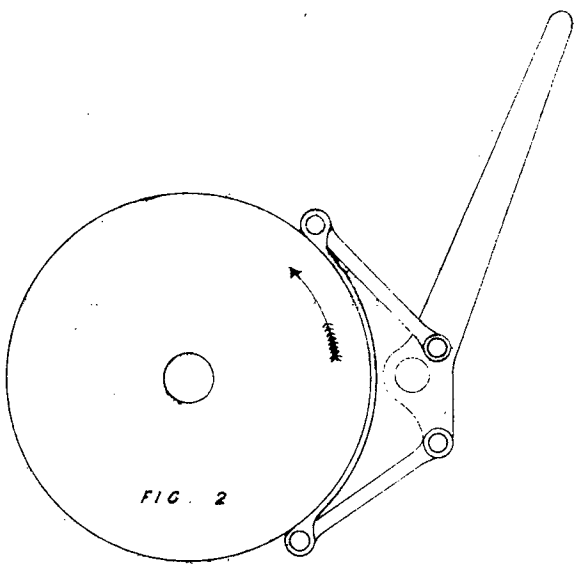


FIG. 2

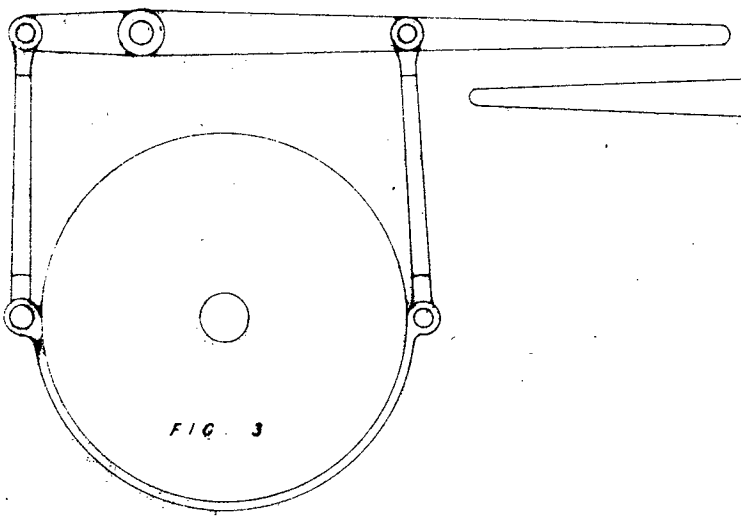


FIG. 3

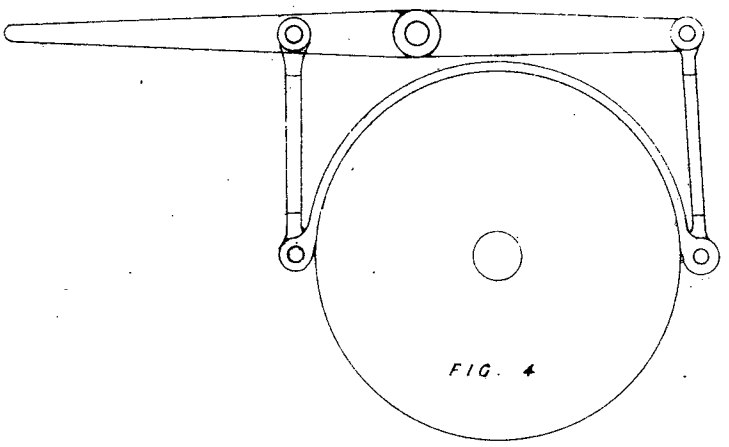


FIG. 4

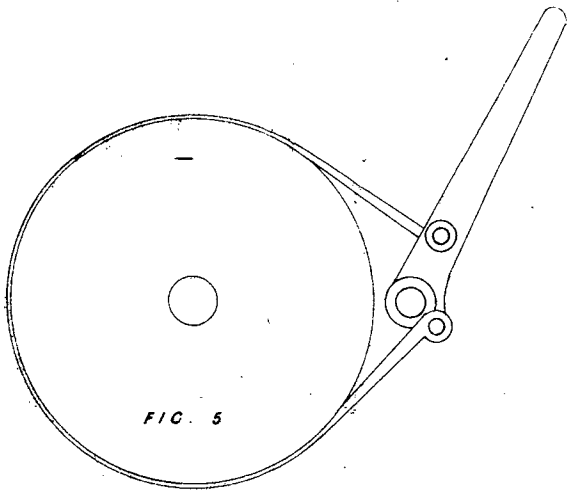


FIG. 5

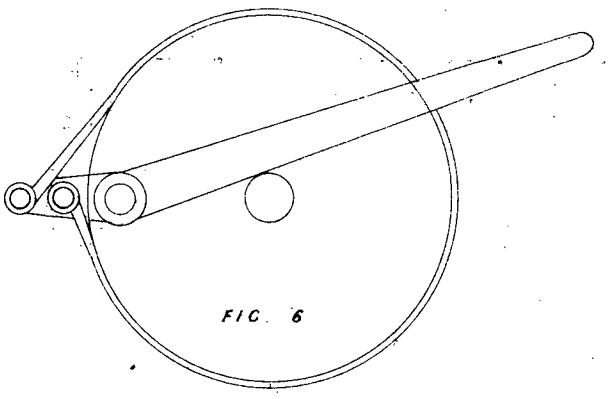
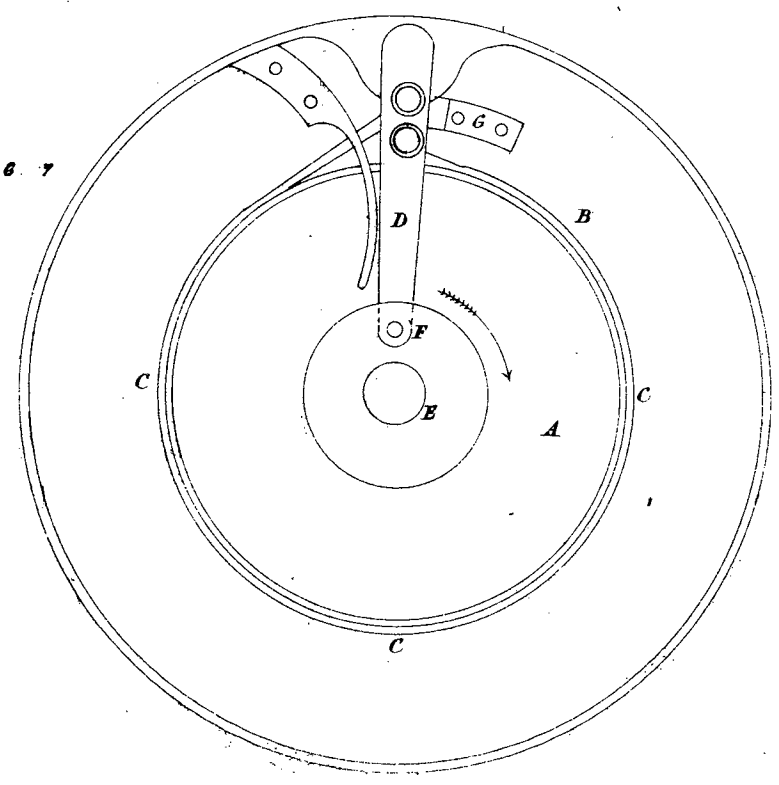


FIG. 6

FIG. 7



This is the Paper of Drawings referred to in the annexed Letters of Registration granted to Robert Napier this twenty second day of April 1863

(Signed) John Young

A.D. 1863, 6*th May*. No. 72.

IMPROVEMENTS IN CARRIAGE WHEELS, LABOUR-SAVING MACHINES, &c.

LETTERS OF REGISTRATION to Henry Hollinshed, for Improvements in Carriage Wheels, for various labour-saving Machines used in the manufacture of the same, and their application to other purposes.

[Registered on the 8th day of May, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Henry Hollinshed, of Botany, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of certain machines, which are more particularly described in the specification and drawings hereunto annexed, and marked with the letters A, B, C, D, E, F, and G, respectively; and that he, the said petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment aud advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to thc prayer of the said Petition, from competent persons appointed by me

to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Henry Hollinshed, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Henry Hollinshed, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Henry Hollinshed shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixth day of May, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

A.

SPECIFICATION

For improvements in carriage wheels, for various labour-saving machines used in the manufacture of the same, and their application for other purposes.

THE improvement in carriage wheels consists in forming the centre or nave of cast iron, in two parts, for the purpose of counteracting the shrinking of the spokes; the back portion to contain the box to fit the axle-tree, and three sides of the mortises to receive the spokes, the other portion being a plane flange, and forming the fourth side of the mortises, and making the nave complete. The two pieces are held together by bolts which pass through between the mortises. By this arrangement the bolts can be tightened up as the wood shrinks, or one or more new spokes can be inserted without disturbing the felloe or tire. Also, in the use of angle-iron for tiring carriage wheels, particularly mountain drays, which require great strength; it will afford, also, additional surface for a break, in descending hills.

No. 1.

The cross-cutting machine consists of a circular saw, mounted on the frame of a table with a travelling top, for the purpose of cross-cutting the rough junks of trees out of which the naves of ordinary cart wheels are made. The table-top has a broad slot down its centre, and about nine inches of the saw projects through the slot; on this top is fixed a sort of lathe-bed, parallel to the saw-spindle, carrying two puppet-heads, one having a fixed centre, the other a screw or movable one. The fixed centre carries on it a cast-iron disc, twelve inches diameter, having on its edge ratchet-teeth with a pawl working in them allowing it to revolve the way of the saw only, the heads being capable of being extended so as to take in the various lengths of the junks to be cross-cut. They are held on the table-top by side dove-tail fillets, bolted through the top, between which they slide or are held fast. The junk to be cut has a rough centre punched in each end, and is placed on the centres, between the heads, on which it will revolve, its axis being at right angles with the plane of the saw, one end of it coming nearly close to the ratchet-wheel on the fixed centre. Through the hole in this wheel E a pin is driven into the end of the junk, which acts the part of a carrier in a common lathe. It is now ready to be brought against the saw, which is done by pushing the table-top towards it; it is allowed to cut to within one inch of the centre of the junk, which is turned round by hand

hand until the cut is complete, leaving two inches of wood uncut in its centre, just sufficient to prevent its falling in half until removed from the table, when it is cut in two by hand, and is ready to go to the boring machine. A, the circular-saw; B, the ratchet-wheel and fixed centre; C, the pawl; D, the puppet-head, with screw centre; E, the hole for the carrier; F, the sliding table-top, on which the lathe heads are held; G, the driving pulley.

No. 3

Is a machine to deprive the junks or blocks of the irregularities on their circumference, and reduce them to a cylinder. It is fixed on the table, No. 1, the saw-spindle being removed, and two uprights with bearings bolted on to the framing, to carry the spindle about ten inches above its former position; the two lathe heads are removed, and two others take their place; the back one has a ratchet-wheel with a collar on it working through the head, the collar having an inch and a quarter square hole through its centre; the other head has a sort of loop in place of a centre; in this loop or half-nut is a thread to match a screw on the mandrel to be used. The mandrel is composed of three parts, each part being about three inches longer than the junks to be reduced; one portion is one and one-eighth of an inch square, which works in and through the square hole in the ratchet-wheel; the middle portion is a cylinder, two inches diameter; the other end has a screw on it, two-inch pitch, which fits the thread in the loop-nut on the puppet-head, in which it is dropped when in its working position. The saw-spindle can receive any number of saws equal to making a cut two inches wide, but I prefer three only, half an inch apart, which make three cuts at half-inch intervals. A block being keyed on to the centre part of the mandrel, the square end inserted into the hole in the ratchet-wheel, the screw end being laid in the loop-nut on the puppet-head, which is close to an end of the block when the cutting commences, the saws beginning at the other end of the block, which is turned round by hand, the screw causing it to travel two inches at one revolution, thus giving three spiral cuts on the periphery of the block by every revolution of the mandrel throughout its whole length; the fillets between the saw cuts are readily knocked off by hand, or in the lathe. It is now ready for the turner.

The saw-spindle and the mandrel stand nearly the same height above the table-top, but their horizontal line varies in proportion to the size of the block to be reduced; the half-nut which carries one end of the mandrel is therefore made to rise and fall in a slot, so as to bring the intended saw-cut as near as possible within the plane of the saws; for a block twelve inches diameter, this would be about five degrees.

No. 4.

The Mortising or Slotting Machine.

This machine is a sort of lathe, the bed of which is mounted on a slide-rest movement, by which means it can reciprocate at right angles with the mandrel to any extent required; the mandrel of the lathe in which the cutter is fixed is made parallel, so that it can advance and retire to a given distance; it is about eighteen inches long, working through a puppet-head in front, like a common lathe. The drawing pulley is not fast on the mandrel, but is fixed on a tube, through which the mandrel slides, the tube also having a pair of heads, in which it works, and having a stud in its inside, fitting in a slot in the mandrel, by means of which circular motion is given to the mandrel; behind the tube and the heads on the mandrel is a coarse square-thread screw for about five inches of its length; this screw works a pinion on a short shaft at right angles to the mandrel. On the other end of this shaft is another screw, working another pinion on a shaft lying parallel to the mandrel; this is the crank-shaft, the motion being reduced on this shaft from about 120 to 1 by means of the two screws and pinions; on it are two universal cranks, the throw of which can vary from half-inch to two inches, carrying two crank rods, which cross beneath the mandrel, and are attached to the lower fixed bed, on which the upper one vibrates, with the whole of the machinery on it. The throw of those cranks regulate the length of the mortise to be cut; an inch throw of the crank would,

with

with a half-inch cutter, make a two and a half inch mortise. The advancing motion on the cutter is given by a fine-thread screw and nut at the back end of the mandrel, the motion being conveyed from the crank-shaft by a wheel fixed thereon, having teeth on two portions of its periphery only, and which take effect just when the cranks pass their centres, on a pinion, with a collar working in bearings, this collar being the nut through which the fine-thread screw passes and works, and laying in the axis of the mandrel; the end of this screw is attached thereto by a fillet-joint, which allows the mandrel to revolve but not advance without the screw, the screw not being allowed to revolve, by means of a crank-handle at its back end, and thus finally controls the advancing of the mandrel. By this arrangement the cutter advances only when the cranks are on the throw, taking about ten revolutions, when it again travels on, parallel to the bottom of the cut, until about to return, when it again advances, and so on until the mortise is deep enough, when a cam on the mandrel throws the first pinion out of gear. The mandrel is now detached from the cranks and tooth gear, and is drawn back to the starting point by removing the stops of the handle, and turning it by hand; the stop is re-applied to the handle, and the pinion is again thrown into gear, when it proceeds with the next mortise. The advantage of this machine is that it delivers its core out as it proceeds.

A, the mandrel, with the coarse square-thread screw, and cam on it; B, driving pulley, fixed on a tube or socket, which works in two heads, *b b*, and gives motion to the mandrel which passes through it; C, the first-motion pinion and screw shaft, at right angles with the mandrel; D, crank shaft, with the second pinion working in the screw on C; E, partly toothed wheel, which turns the pinion nut F, on the fine-thread screw, to advance the cutter; F, pinion nut and harbour, working in bearings having a contrivance to prevent its moving, except by the wheel; G, fine-thread screw, which controls the advancing motion of the mandrel, and the handle by which the mandrel is drawn back to the starting point; H, two plates, which carry the crank pins; I, pawl, which drops the first pinion out of gear when the cam J strikes it; J, the cam; K, the lever, to replace the first pinion in gear; L, fillets, which hold the stop to prevent the handle G turning; M, slide motion, on which the whole machine vibrates; N, the bench, to which it is attached; O, a coupling link, connecting the two portions of the crank-shaft; P, the crank rods attached to the bench N.

No. 5.

THE SPOKE-SHAPING MACHINE

Is a series of circular saws, of various diameters, on a spindle capable of holding as many as would make a cut the width of the spoke to be shaped; the saws are detached from each other by washers; they stand at an acute angle with the plane of their orbit (about two degrees); they are so arranged in their respective places that their cutting edges form the reverse of the cross section outline of one side of the spoke. The saw spindle is mounted on a bench with a sliding top, working in rebates in the sides of the bench, the top having a broad slot down its centre, through which the saws project, and over which the spoke to be shaped is clamped; the rebates in the sides of the bench in which the top works may be straight or depressed, as the shape of the spoke is required; its thickness is regulated by stops and clamps, that hold it fast on the sliding frame or top; when made fast it is passed along over the saws to the stop at the tenon end of the spoke, the frame is drawn back to its starting place, is lifted up by the lever F, the spoke is turned over, and the other side cut as before. It is now shaped, but rough; the finishing is done by a similar machine, but with two saws only having much finer teeth, and set on the spindle at a much greater angle, the angle being sufficient to make the two saws touch the whole width of the spoke.

Description of the Sketch No. 5.

A, the bench of saws; B, the spoke; C, the clamp to hold it; D, centre which holds the pin end of the spoke; E, the sliding frame carrying the spoke; F, lever by which the frame is lifted whilst inserting or removing a spoke—this is done when the frame is brought to its starting point, and the centre D is over the saws; G, the driving pulley.

No. 6.

Improvements in Carriage Wheels, Labour-saving Machines, &c.

No. 6.

A Machine for cutting the Pins on the end of Spokes of Wheels.

This machine consists of about sixteen circular saws, all of the same diameter, on a spindle, with washers between them—about four saws to the inch being sufficient to cut the length of the pin required. The saws are not set at right angles to the spindle, but about two degrees from the line of their orbit; the saw spindle is mounted on two heads, about nine inches above the top of the bench; on the bench is a sort of lathe, consisting of a bed, a mandrel working in heads, and a back centre on a head fixed to the bed; the mandrel is parallel, having a face plate fixed on it with its screw-clamps like a universal chuck; the mandrel is connected to the back screw by a fillet-joint, by which it is controlled; on the periphery of the face-plate are ratchet-teeth with a pawl working in them.

The axis of the lathe is parallel with the saw spindle, and the same height from the top of the bench. The whole of the lathe bed is mounted on a slide motion acting at right angles with the axis of the saws, so that the lathe can be withdrawn from the saws during the fixing the spoke to be cut; when fixed, the whole lathe is forced towards the saws, and the ratchet-chuck turned once round by hand, and the pin is complete. The process is just the reverse of turning in a common lathe; the tool revolves instead of the work, and the mandrel is drawn back to introduce the work, instead of the back centre.

Description of the Sketch No. 6.

A, the saws; B, saw spindle; C, driving pulley; E, ratchet-wheel; F, the pawl; G, lathe heads; H, the slide motion; I, back head and centre; J, the bench.

No. 7

Is also a machine for cutting the pins on the ends of spokes of heavy cart and dray wheels, after the spoke has been driven home in the nave. It consists of a series of circular saws, as in No. 5; but which travel round the spoke, independent of their revolving motion, like a sun and planet wheel, with the motions reversed; the saw spindle being attached to and through a cylinder which revolves in an iron frame, the spoke to be cut lies in the axis of the cylinder, and is fixed there by a cramp, when the saws, by making one revolution round the spoke, cut the wood away to the desired shape, the diameter of which is regulated by the bearings of the saw spindle; the driving strap is kept tight by means of a drum on a swinging frame, with a weight attached; the cylinder with the saws, &c., are worked round by means of the endless screw and tooth wheel marked E F in the sketch; the nave of the wheel is dropped on to the iron pin J, which fits the two-inch hole in the nave, and the spokes brought in succession to the saws.

Description of Sketch No. 7.

A, the saws; B, the saw-spindle; C, driving pulley; D, the spoke under the saws; E, the toothed wheel on the cylinder which carries the saws round the spoke; F, endless screw, and handle to work it and the wheel E; G, the cylinder with the saw-spindle attached; H, standards forming the bearings in which the cylinder revolves; I, the cramp to hold the spoke whilst being cut; J, iron pin on which the nave is kept in its place.

No. 8.

Felloe-cutting Machine.

This machine consists of a concave circular saw, mounted on a spindle in the usual way, and having a semi-circular revolving top to the bench, the periphery of which passes close to the teeth of the saw.

The saw is a true section of a sphere, whose diameter is equal to the circle of the segments required to be cut; its concave side is next the work, and the plank to be cut lies in the radii of that portion of the saw which is covered by the cut.

No. 9.

Improvements in Carriage Wheels, Labour-saving Machines, &c.

No. 9.

ROUNDING MACHINE.

This machine is constructed on a sort of face plate of a hollow mandrel lathe, and the cutters are a series of steel plates with saw-teeth on one end, having two slots in each like the slot in a common plane-iron; those plates are arranged and fixed on the face plates in a position not easily described; they form a conical helix. If a helical line be drawn round about a cone from its base to its apex, and the apex be inserted in the mandrel of the lathe, the lines upon the cone would be the respective places for the tooth ends of the plates to touch and fit, forming a sort of vortex; they rest upon narrow fillets radiating from the centre of the face plates, two bolts to each to keep them in their places. The sketches are the working size for a machine to round one and one half inch treenails of ironbark for shipwrights; the pieces of wood are controlled on a sort of rest, and lie in the axis of the lathe, when they are pushed into the vortex of cutters, which reduces them to the size of the hole in the mandrel, through which they pass round and straight, the centrifugal force carrying the sawdust out between the plates and the cast iron face plate.

A, the face plate of the lathe on which the saw plates are fixed; B, steel saw plates; C, the bore through the mandrel; D, the front bearing of the mandrel; E, radiating fillets which support the saws shewn on the ground plan by dotted lines, three to each plate. The red dotted lines in the cross section shew the shape of the piece of wood as it enters the machine.

No. 10.

ANNULAR SAW MACHINE.

This machine is for cutting sections of circles on wood, the reverse way to the concave disc saw; it consists of a rigid detached hoop saw, supported and held in its place by rollers on which it travels; the saw being about five or six inches wide, and made as rigid as possible; the motion is given to it by a belt acting on its periphery. It will make a cut about one-fifth of its diameter. Its periphery may be either concave or convex, according to the character of the work required; when concave it will cut the top yoke of chairbacks to the two circles, when convex it will cut the stave of a cask to their two circles.

THE SMOOTHING OR GLASS-PAPERING MACHINE

Is an endless belt of any suitable material, coated on one side with tempered glue and pounded glass, running over two drums to keep it tight, and of any suitable length, having an intervening drum under the part on which the work to be smoothed is applied; this drum may be concave, convex, or cylindrical on its periphery to suit the shape of the work.

What I claim in the before described specifications is the exclusive use of the concave or dished saw used in machine No. 7 for all purposes to which it can be applied.

Also, the annular or rigid hoop saw, No. 10, for all purposes to which it can be applied.

Also, the improvement in tiring of wheels and the cast iron naves for same.

Also, the peculiar arrangement of the parts of all the other machines for the purposes therein set forth.

This is the specification, marked A, referred to in the annexed Letters of Registration, granted to Henry Hollinshed, this sixth day of May, 1863.

JOHN YOUNG.

REPORT.

Improvements in Carriage Wheels, Labour-saving Machines, &c.

REPORT.

Royal Mint, Sydney,
10 *March*, 1863.

SIR,

Having examined and considered Mr. Hollinshed's application for Letters of Registration under Act of Council 16 Vic., No. 24, and having, with the consent of the applicant, amended the specification attached to the Petition, we have the honor to recommend that the protection sought be granted to the machines described in the amended specification. Petition to the Governor. Specification and drawing.

We have, &c.,

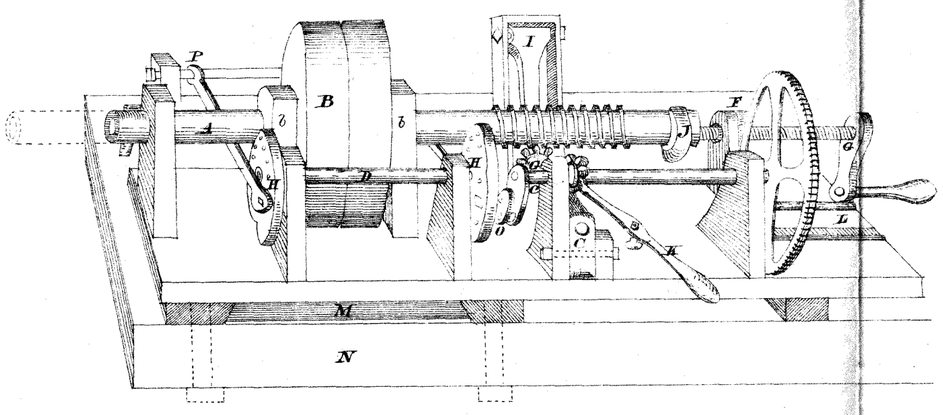
E. W. WARD.
EDMUND T. BLACKETT.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

Nº 4.

Morticing or Slotting Machine. C

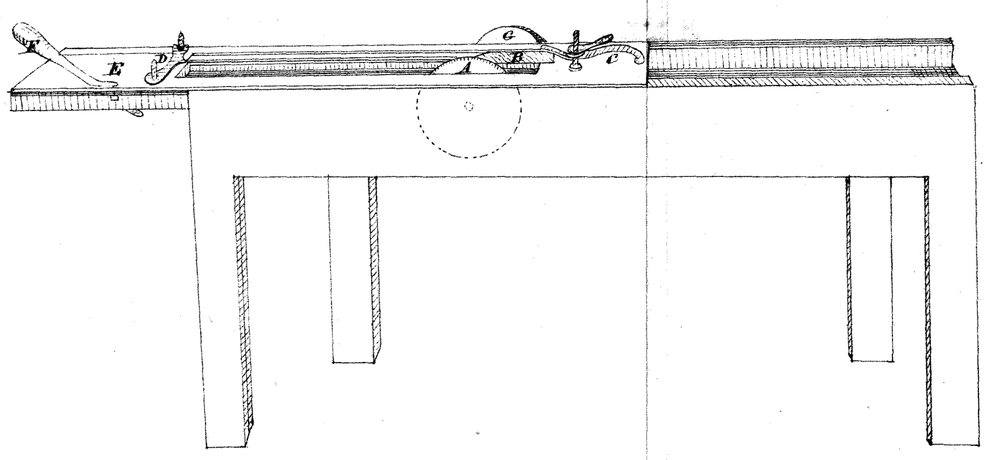


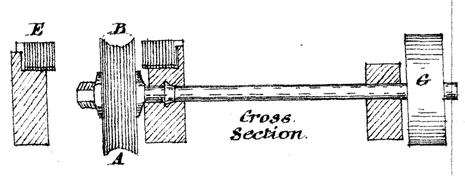
This is the Drawing marked C. referred to in the annexed Letters of Registration, granted to Henry Hollinshed this Sixth day of May. 1863.

Sgd John Young.

Nº 5.

Spoke Shaping Machine. D.

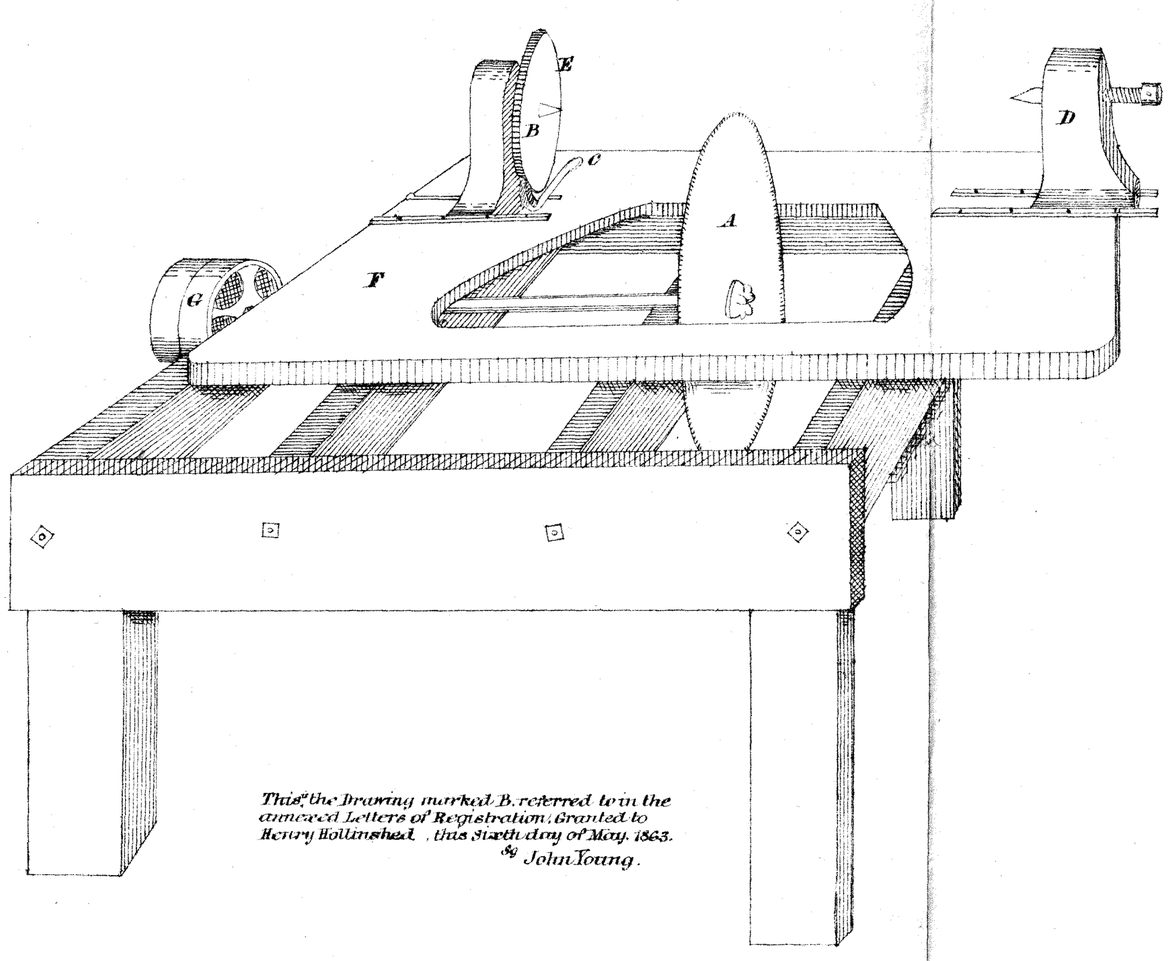




This is the Drawing marked D. referred to in the annexed Letters of Registration, granted to Henry Hollinshed. this sixth day of May. 1863.

Sgd John Young.

Cross Cutting Machine. Nos 1 and 2. B.

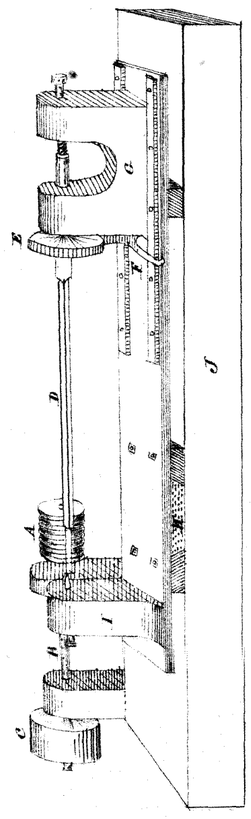


This the Drawing marked B. referred to in the annexed Letters of Registration; Granted to Henry Hollinshed, this Sixth day of May. 1863.

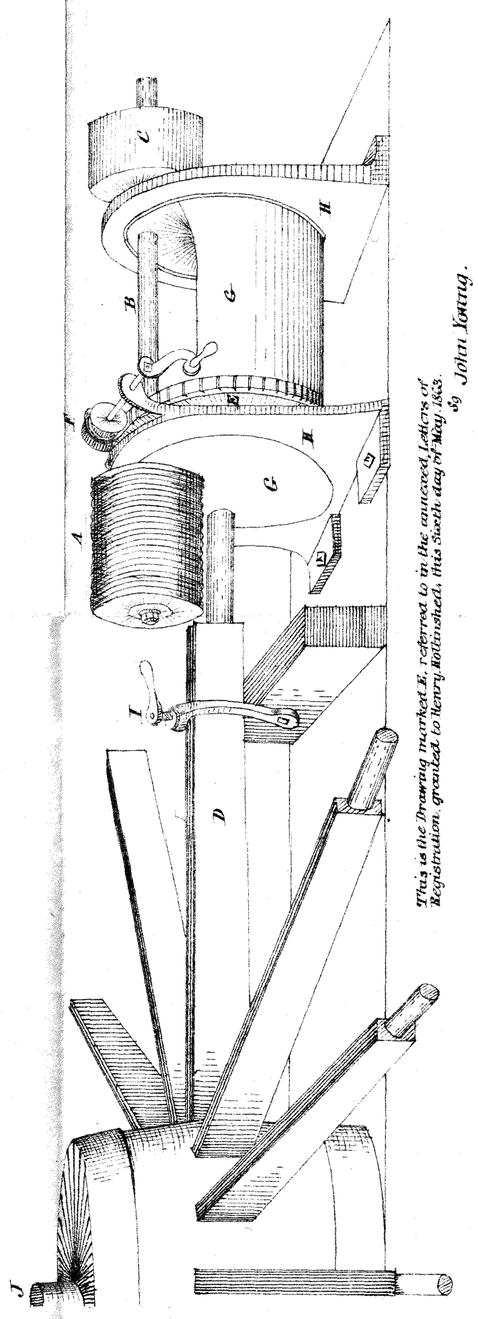
Sg John Young.

Nº 6.

Machine for Cutting Pins on Spokes for Wheels. E.



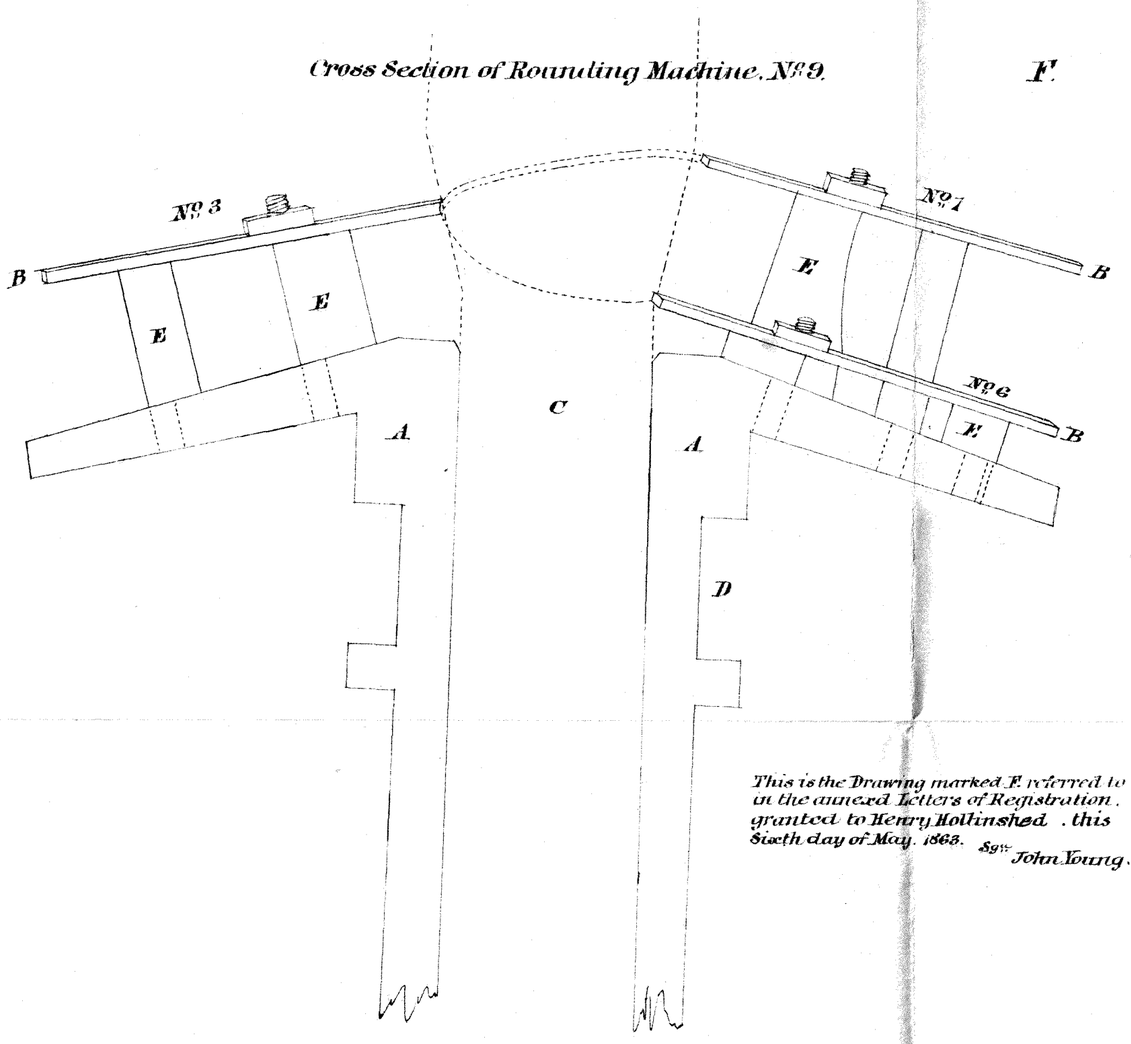
Nº 7.



This is the Drawing marked E. referred to in the annexed Letters of Registration, granted to Henry Hollinshed, this Sixth day of May. 1863.

Sg John Young.

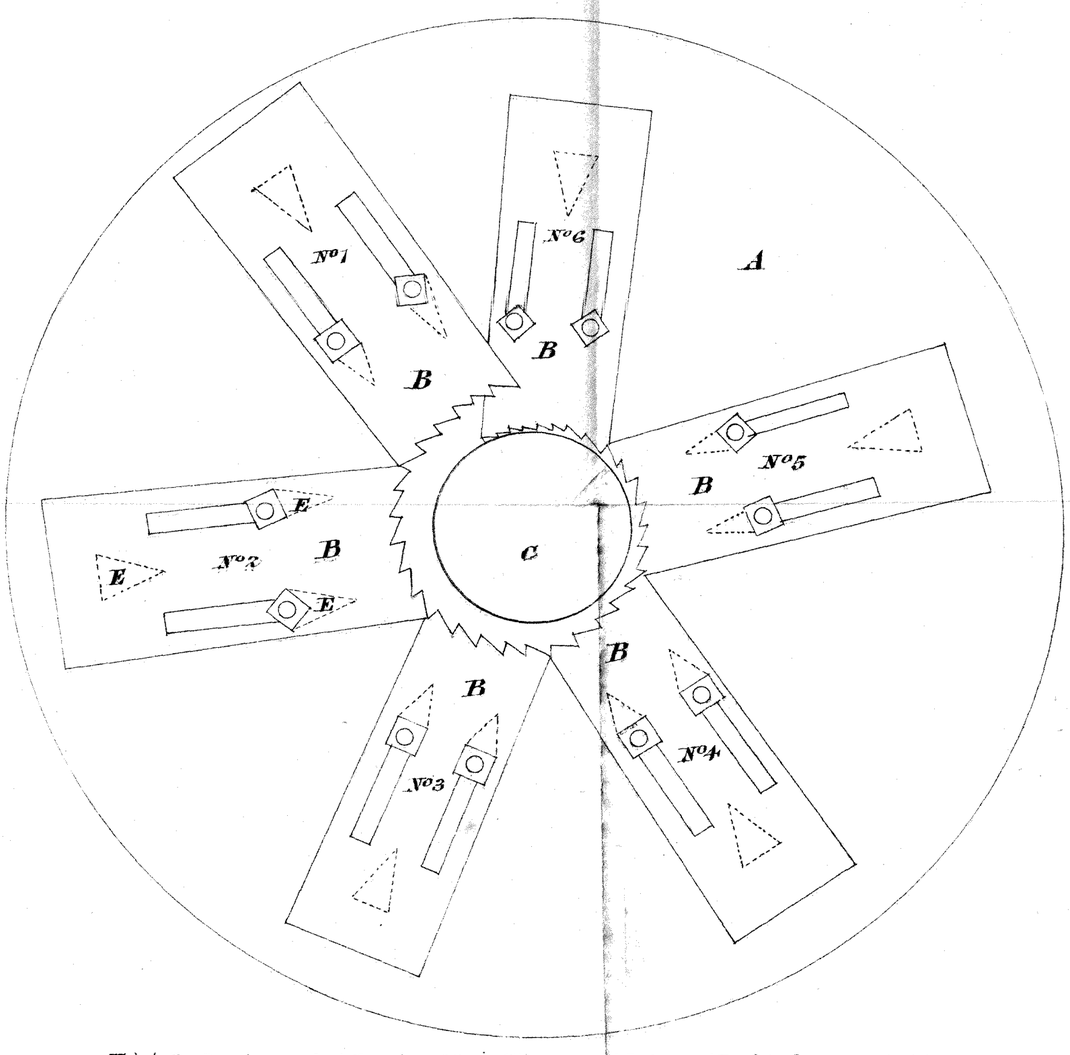
Cross Section of Rounding Machine. Nº 9. F



This is the Drawing marked F. referred to in the annexed Letters of Registration, granted to Henry Hollinshed, this Sixth day of May. 1863.

Sgd John Young.

Rounding Machine. Nº 9. G



This is the Drawing marked G. referred to in the annexed Letters of Registration, granted to Henry Hollinshed, this Sixth day of May. 1863.

Sgd John Young.

A.D. 1863, 3*rd June*. No. 73.

IMPROVEMENTS IN BREAK GEARING APPLICABLE TO ROLLING STOCK FOR RAILWAYS.

LETTERS OF REGISTRATION to Frederick Collier Christy, for Improvements in Break Gearing applicable to Rolling Stock for Railways.

[Registered on the 4th day of June, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency The Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:—

WHEREAS Frederick Collier Christy, of Williamstown, in the Colony of Victoria, civil engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in Break Gearing applicable to Rolling Stock for Railways," which is more particularly described in the specification and paper of drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein,

and

and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Frederick Collier Christy, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Frederick Collier Christy, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Frederick Collier Christy shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this third day of June, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION of FREDERICK COLLIER CHRISTY, of Williamstown, in the Colony of Victoria, Civil Engineer, for an Invention entitled, "Improvements in Break Gearing applicable to Rolling Stock for Railways."

THE invention has for its object the introduction of an improved break applicable to railway rolling stock, the advantages of which may be thus enumerated:—First and primary,—Safety in descending steep inclines, the train being in perfect command; also the facility of bringing up a train in an extremely limited distance, on an incline or level, as compared with the present mode. Secondly,—Economy of motive power. Thirdly,—General effectiveness for the purposes for which the invention is designed. Having enumerated the advantages, I will now proceed to compare the relative merits of the invention, in juxta-position to the breaks now in ordinary use. Under extraordinary circumstances, such as prevention of collisions, the engine is reversed. Little is gained by such a course in checking speed, independent of the danger by breakage; consequently, the only reliable safeguard is the break. It is well known that, to ensure safety when a heavy train is required to descend an incline, it is necessary (according to the weight of the train) to attach one or more break waggons, in order to offer a corresponding resisting power to the weight of the train. This in itself necessitates a cost of about sixpence per mile, as the train must of necessity ascend as well as descend inclines, thus necessitating the excessive motive power required to drag these vans on a level running, all of which are dispensed with by my invention. The expense is further enhanced by the necessity of having a man in each break van, which vans are not used as a carrying or transport medium. I apprehend (always surmising that the principle of the invention is correct) that a great public benefit is attained, as humane as I presume effective. In the event of any portion of the train becoming detached, the chain or medium which keeps the break blocks of the wheels will be broken, and the springs will immediately force the blocks on to the wheels and bring up the detached portion of the train.

Having dwelt thus long on the merits and advantages of my invention, I will now proceed to describe the mode by which it is effected, reference being had to the drawings hereto annexed, and to the letters and figures marked thereon, which letters and figures indicate the parts there referred to, and here particularly explained. On reference to the drawings, it will be seen that fig. 1 represents an elevation; it also shews an attachment of the break. Fig. 2 is an end elevation of the van, and fig. 3 is a plan. I would here observe, that although I purpose hereinafter to explain the particular parts of the invention as they act and re-act on each other, still I anticipate, that until the invention is introduced to its practical adaptation, that the relative parts may be necessarily

necessarily strengthened or otherwise altered in detail, as may be advisable or consistent, for the purpose for which the invention is designed, without departing from the principle of the invention. The invention will be thus understood:—The drawings represent generally and particularly the application of the break to a carriage and break-van, which may be modified according to circumstances. A is a vertical spring which forces the break-blocks C against the wheels E of the carriage by means of the tension-rods D, which rods are attached to the vertical spring by the pin F; the force or acting power of the spring is adjusted by the tightening or adjusting screw B; G is an eccentric and lever connected to the tension-rods D by the connecting rod H, which, when in the position shewn, allows the spring A to draw the break-blocks upon the wheels, but when the lever I is horizontal it draws the break-blocks from off the wheels and keeps the break out of gear. J is a toothed wheel working into the screw K, as will be more clearly understood on reference to the plan of elevation shewn in the drawings; when the screw K is forced or propelled round it necessitates the revolution of the wheel M, and on the same spindle as the wheel are two loose drums, M (shewn particularly in the end view), either of which may be attached or detached at pleasure to the screw wheel J, and thus made to revolve with it by means of the coupling-jaws O, also particularly defined in the end view. To the drums M are attached chains leading in the direction of the attachment of the carriage break, those not in use being wound up. The chain L in use is attached to the drum M, and to the tension-rod D (shewn in the elevation of accompanying drawings). When the screw K is set in motion by means of the wheel P (as shewn in the plan of the drawings), the wheel J and drum M (as shewn on the elevation) revolve and wind the chain L upon the drum M, causing the tension-rods D to pull or drag the spring A back, and release the break-blocks C from the wheels E, and thereby allowing the wheels to revolve freely. When it is required to throw the break on suddenly (to form a more accurate idea how this is accomplished, reference may be made to the representation of elevation of drawings annexed); thus, the drum M is drawn out of the coupling O attached to the screw wheel J, and the drum being loose on the axle is set free and revolves on the shaft, thus permitting the chain to run out, and of necessity to release the spring which forces on the break-blocks against the wheels of the carriage, and by these means the train is broke, or in other words, speed is checked and controlled. The couplings are released by the lever Q, which is carried up into the guard's box and worked by him—the lower end of the levers having two forked ends, which fit on the necks of the drums and draw them to and from the screw wheel, thus throwing them in or out of gear. Having thus described the nature of the invention and the manner of performing same, I would here particularly observe that I do not claim precise details, so long as the character or principle of the invention be retained and understood, nor the materials of which the component parts of my invention may be made or manufactured; but what I do claim is, the application of the break, as herein substantially described and explained, applicable to railway rolling stock; also, the mode of using the spring to force the break on the carriage, which springs may be used or applied horizontally or vertically, by which means the speed of the train is checked.

In witness whereof, I, the said FREDERICK COLLIER CHRISTY, have hereto set my hand and seal, this second day of April, one thousand eight hundred and sixty-three.

Signed and sealed by the said Frederick Collier Christy, in the presence of— F. C. CHRISTY. (L.S.)

E. HART,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to Frederick Collier Christy, this third day of June, 1863.

JOHN YOUNG.

REPORT.

A.D. 1863. No. 73.

Improvements in Break Gearing for Railways.

REPORT.

Royal Mint, Sydney,
5 *May*, 1863.

SIR,

Petition to the Government.
Specification in duplicate.
Drawing in duplicate.
Memo. for £20 (initialled J. W.).

Having examined and considered the application of Frederick Collier Christy, for Letters of Registration under Act of Council 16 Victoria, No. 24, for "Improvements in Break Gearing applicable to rolling stock for Railways," we have the honor to report that we see no objection to the necessary protection being granted.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
JOHN WHITTON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(COPY)

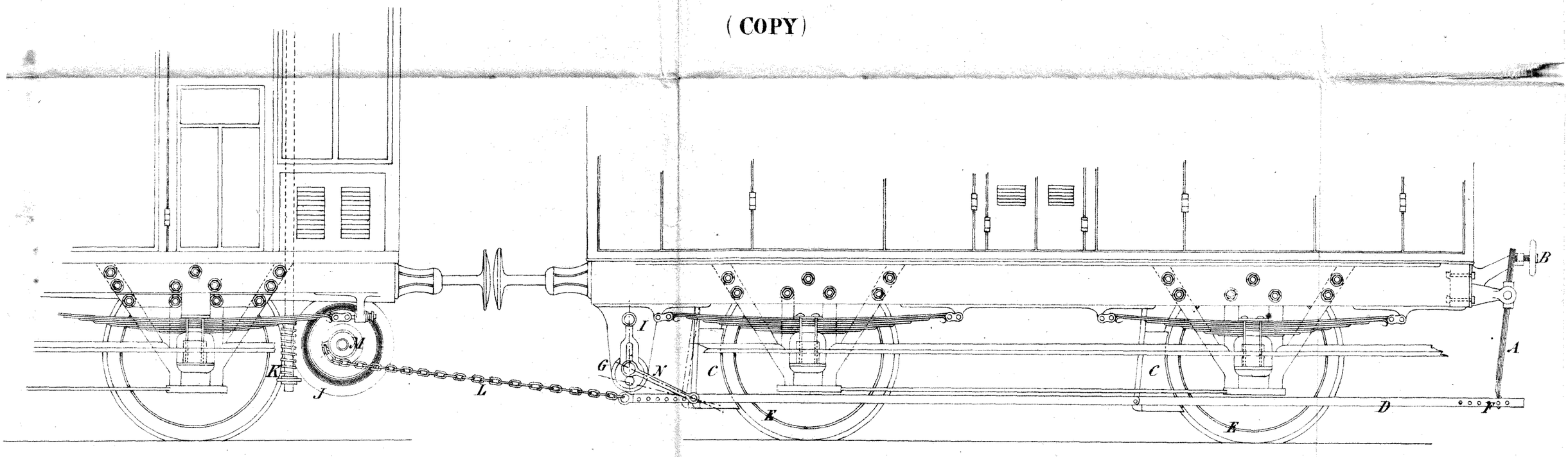


FIG. 1_ELEVATION

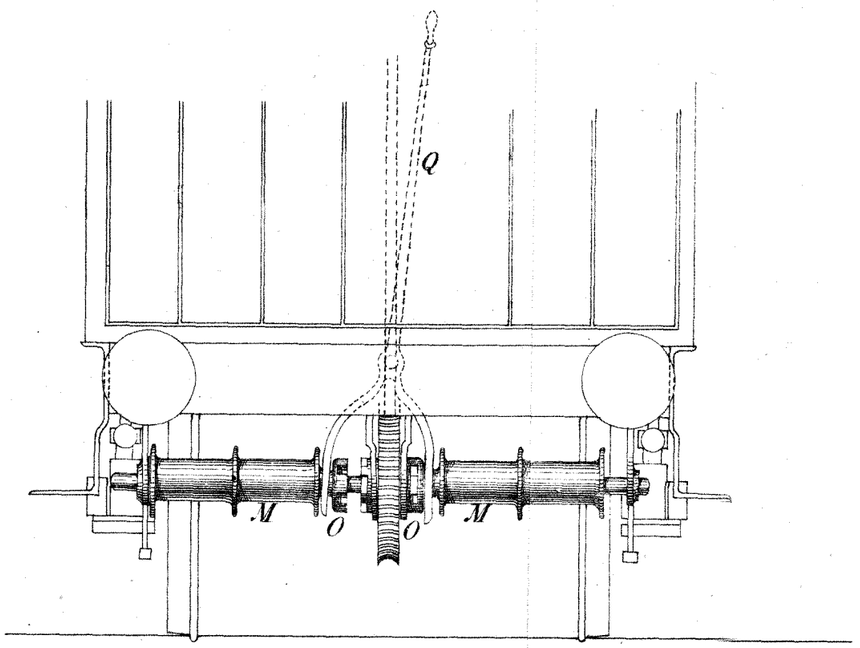


FIG. 2_END VIEW OF VAN

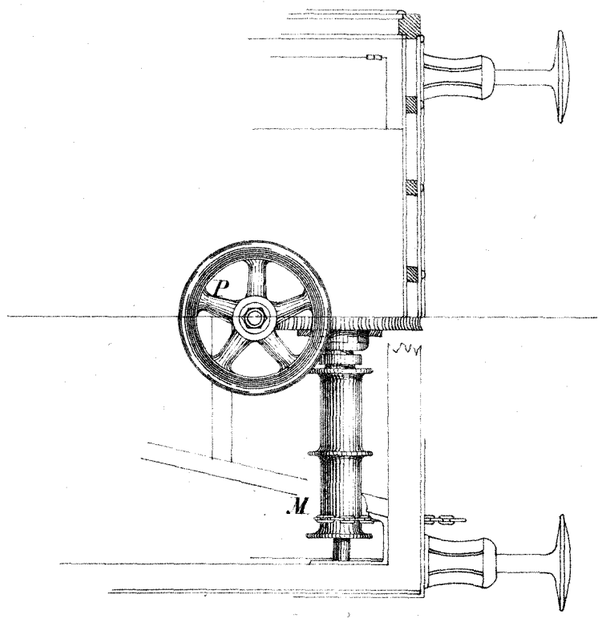


FIG. 3_ PLAN

This is the "Paper of Drawings" referred to in the annexed Letters of Registration granted to Frederick Collier Christy this Third day of June, 1863

Signed: John Young

Hart & Waters, Patent Agents,
58, Little Collins St. East, Melbourne

A.D. 1863, 9*th July*. No. 74.

IMPROVEMENTS IN REFLECTORS.

LETTERS OF REGISTRATION to James Schwartz, for Improvements in Reflectors.

[Registered on the 10th day of July, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Isaac Schwartz, of Melbourne, in the Colony of Victoria, reflector manufacturer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in Reflectors," which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four, and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Isaac Schwartz, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from

the

the date hereof; to have, hold, and exercise unto the said Isaac Schwartz, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Isaac Schwartz shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this ninth day of July, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION of ISAAC SCHWARTZ, of Melbourne, in the Colony of Victoria, Reflector Manufacturer, for an invention intituled, "Improvements in Reflectors."

MY invention consists of a novel combination of materials, manufactured in an entirely new form, for reflectors for gas or other lights. Thus, the materials I propose to use are corrugated or fluted glass, backed with tin or other metals, corrugated or plain, and made in the form of a hollow truncated pyramid or cone, the sides of which may be rectangular, polygonal, or perfectly circular, and the faces of which sides or circle (that is, that portion of the reflector which is exposed to and reflects the light) may be either convex or concave, although I prefer to have them perfectly flat; and in order that my invention may be more distinctly understood, I will suppose that a reflector is about to be made on my principle, with four sides:—I first take four pieces of corrugated or fluted glass, which must be of an irregular shape in order to manufacture a reflector having a pyramidal form, each piece being (say) seventy-two inches at its greatest length, and fifty-seven inches at its least length, and nine or ten inches in breadth (or several pieces may be used to form this shape), the narrowest portion lengthwise forming the upper part of the pyramidal-shaped reflector, and the wide portion forming the base thereof, or that portion nearest to the flame. These dimensions may of course be varied indefinitely according to the size and nature of the reflector required. I then take a sheet of tin or other suitable metal and place it at the back of the glass, thus forming the outside of the reflector, and I fasten the glass to the tin by lapping the tin over the glass at the top and bottom; I then affix a bead at the top and bottom, also on the outside, for the purpose of strengthening the reflector; or the reflector may be made of fluted tin or other suitable metal alone, and the fluted glass dispensed with. This portion of the reflector being then completed, may be swung over the gas or other light, the widest portion being downwards. Over this, but not necessarily connected with it, I place a cover made of the same materials as the other parts of my reflector, that is to say, fluted glass backed with tin or other metal, or tin or other suitable metal alone, which must be made slightly concave in order to hold the smoke and prevent the flame reaching the ceiling; it will also throw that portion of the light which passes upwards through the pyramidal-shaped reflector perpendicularly downwards. It will be understood that if the reflector is required to be of an octagonal shape, there will have to be eight or more pieces of fluted glass; or if circular, in as many pieces as convenient. I would here remark that, although I have stated that my reflectors may be backed with or manufactured solely from tin or other metals, I believe highly polished tin to be most suitable for the purpose. Having thus described the nature of the invention, and the manner in which the same is to be performed, I would have it understood that I do not confine myself to precise details, so long as the nature of my invention be retained and understood; but what I do claim is, the manufacture of reflectors either with fluted tin or other suitable metal alone, or having a face of fluted or corrugated glass with a backing of tin or other metal, and I specially claim the manufacture of reflectors in the shape of a hollow truncated pyramid or cone, from the materials and in the manner substantially as herein described.

In witness whereof, I, the said Isaac Schwartz, have hereto set my hand and seal, this twenty-third day of April, one thousand eight hundred and sixty-three.

Signed and sealed by the said Isaac Schwartz, in the presence of— } I. SCHWARTZ. (L.S.)

EDWD. WATERS,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to Isaac Schwartz, this ninth day of July, 1863.

JOHN YOUNG.

Improvements in Reflectors.

(No. 94.)

ASSIGNMENT.

THIS Indenture, made the seventh day of July, one thousand eight hundred and sixty-four, between ISAAC SCHWARTZ, of Melbourne, in the Colony of Victoria, Reflector Manufacturer, of the one part, and ANDREW DEMPSTER, of the same place, Plumber, of the other part: Whereas Letters of Registration, under the hand of the Governor and Seal of the Colony of New South Wales, were granted to the said Isaac Schwartz, dated ninth day of July, one thousand eight hundred and sixty-three, whereby the exclusive enjoyment and advantage in the said Colony of New South Wales, of an invention entitled "Improvements in Reflectors," was granted unto the said Isaac Schwartz, his executors, administrators, and assigns, during the term of fourteen years from the date of the said Letters of Registration: Now this Indenture witnesseth that, in consideration of the sum of one hundred pounds of lawful money of Great Britain, in hand well and truly received by the said Isaac Schwartz from the said Andrew Dempster, at or before the signing and sealing of these presents, the receipt whereof the said Isaac Schwartz doth hereby acknowledge, he, the said Isaac Schwartz hath bargained, sold, transferred, and set over unto the said Andrew Dempster, his executors, administrators, and assigns, all those the said Letters of Registration hereinbefore mentioned, and all benefit, profit, and advantage whatsoever thereof and therefrom, and all right, title, property, claim, and demand whatsoever, both at law and in equity, of him the said Isaac Schwartz, his executors, administrators, and assigns, in or to the said Letters of Registration, including the right of obtaining whatsoever prolongation or extension can or may be obtained of the same; to have and to hold the said Letters of Registration, and all and singular other the premises hereby assigned or intended so to be, unto the said Andrew Dempster, his executors, administrators, and assigns, for his and their absolute benefit, in as ample and beneficial a manner, to all intents and purposes, as the said Isaac Schwartz might or could have held and enjoyed the same if these presents had not been made: And the said Isaac Schwartz doth, for himself, his heirs, executors, and administrators, covenant, agree, and declare to and with the said Andrew Dempster, his executors, administrators, and assigns, in manner following, that is to say,—that he, the said Isaac Schwartz, now hath in himself good right and full power and authority to assign the said Letters of Registration, and premises hereby assigned or intended so to be, unto the said Andrew Dempster, his executors, administrators, and assigns, in manner aforesaid, according to the true intent and meaning of these presents, and that the said Letters of Registration and premises shall and may be lawfully held and enjoyed accordingly, and that free and clear and freely and clearly acquitted, exonerated, and discharged or otherwise by the said Isaac Schwartz, his heirs, executors, or administrators, being at all times well and sufficiently defended and kept harmless and indemnified from and against all charges and incumbrances whatsoever made, done, or willingly suffered by him the said Isaac Schwartz, his heirs, executors, and administrators: And moreover, the said Isaac Schwartz, his heirs, executors, and administrators lawfully claiming or to claim through or under him, them, or any of them, shall and will, from time to time, and at all times hereafter, upon the request and at the cost and charges of the said Andrew Dempster, his executors, administrators, and assigns, make, do, and execute all such lawful acts, deeds, and things in law whatsoever, and for more effectually assigning and assuring the said premises in manner aforesaid, and according to the true intent and meaning of these presents, as by the said Andrew Dempster, his executors, administrators, and assigns, or his or their counsel in the law shall or may be advised and required.

In witness whereof, the said parties to these presents have hereto set their hands and seals, this seventh day of July, one thousand eight hundred and sixty-four.

Signed in the name, sealed with the seal, and delivered as the act and deed of the said Isaac Schwartz, by his Attorney, John Beynon Jackson, duly authorized by Power of Attorney, dated the twenty-eighth day of June, 1864, in the presence of Maurice Reynolds, Solicitor, Sydney.

ISAAC SCHWARTZ. (L.S.)
By his Attorney,
JNO. BEYNON JACKSON.

RECEIVED, the day and year first within written, of and from the within-named Andrew Dempster, the sum of one hundred pounds, being the consideration money before mentioned.

ISAAC SCHWARTZ.
By his Attorney,
JNO. BEYNON JACKSON.

Witness—MAURICE REYNOLDS.

REGISTERED and entered of record in the office of the Supreme Court of New South Wales, this eighth day of July, A.D. 1864, in pursuance of the Act 16 Vic., No. 24, sec. 3. No. 94, book A, fol. 19.

(For the Prothonotary),
G. J. CROUCH, Junior,
Fourth Clerk of the Supreme Court.

REPORT.

A.D. 1863. No. 74.

Improvements in Reflectors.

REPORT.

Royal Mint,
Sydney, 1 *June*, 1863.

SIR,

Petition to Governor.
Specification in duplicate.
Memo. of Treasury.

Having examined and considered the application of Mr. Isaac Schwartz for Letters of Registration, under Act of Council 16 Victoria, No. 24, for improvements in Reflectors, we have the honor to report that we see no objection to the necessary protection being granted.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.

JAMES BARNET,
Actg. Col. Archt.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1863, *9th July.* No. 75.

IMPROVEMENTS IN MACHINERY FOR CLEANING WOOL, &c.

LETTERS OF REGISTRATION to John Platt and William Richardson, for Improvements in Machinery for cleaning Wool, &c.

[Registered on the 11th day of July, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Platt and William Richardson, both of Oldham, in the county of Lancaster, in England, mechanical engineers, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention of improvements in machinery or apparatus for cleaning wool and other hairs of animals from burs and other extraneous matters, which is more particularly described in the specification and the three paper drawings hereunto annexed, and marked A, B, and C, respectively; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given

to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said John Platt and William Richardson, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Platt and William Richardson, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Platt and William Richardson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this ninth day of July, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, We, John Platt, of Oldham, in the county of Lancaster, mechanical engineer, and William Richardson, of the same place, mechanical engineer, send greeting:

WHEREAS we are in possession of an invention of "Improvements in machinery or apparatus for cleaning wool and other hairs of animals from burs and other extraneous matters," and have petitioned His Excellency the Governor General of New South Wales to grant unto us, our executors, administrators, and assigns, Letters of Registration for the same: Now know ye, that we, the said John Platt and William Richardson, do hereby declare that the following specification fully describes and ascertains the nature of the said invention, and the manner in which the same is to be performed—that is to say:—

In our arrangement of machinery or apparatus we employ a roller, against which is placed a fixed blade, between which and a reciprocating blade the wool or other such material to be cleaned is introduced. Another feature of our invention consists in the adaptation of mechanism to the above described machinery, for opening out the material previously to its being presented to the rollers and blades. For this purpose, we adapt spiked rollers, or other such opening or carding apparatus, working in a dish, and we employ a transferring comb, in conjunction with the said spiked roller and fixed spikes, which draws off the material in detached tufts, and presents it to the said rollers and blades. These constitute the main features of our invention, and we will now proceed to describe how the same may be carried into practical operation, reference being had to the accompanying drawings, in which fig. 1 is a longitudinal section of the machine, fig. 2 a plan or top view, and fig. 3 a detached plan view of certain of the parts. The frame-work of the machine is at *a*, upon which are mounted two rollers, *b b**, carrying an endless apron, formed of transverse strips of wood, *c*, adapted to leather or other bands. A few only of these strips are shewn in the drawing, their continuation being denoted by dotted lines. At the inward end of the endless apron is a fluted roller, *d*, and beyond this, a roller, *e*, provided with a number of spikes. This roller is situate above a dish, *g*, and below a shield, *f*; and extending downward from the former is a plate, *h*, the inward extremity of which at *i* is formed as a grating. At *k* is a revolving roller, covered with leather or other such material, against the periphery of which is placed a blade, *l*, carried by a transverse rail, *m*, and pressed against the roller by a spring, *n*. The reciprocating blade is at *o*, mounted upon a centre pin, which is carried by rods, *p*, connected at their lower ends to cranks, 8, formed upon a shaft, *r* (see the detached plan view, fig. 3). The blade *o* is also carried by levers, *s*, which are jointed to centres at *t*, which therefore guide the blade so as to cause it to scrape lightly against the periphery of the roller, *k*, when it is moved upwards

upwards by the cranks 8, the rod *p* turning upon the centre *u*. Upon the shaft *r* is a pinion, *v*, taking into another *w*, upon a shaft, *x*; the latter pinion carries a crank pin, *y*, to which is adapted a connecting rod, *z*. This rod (see the detached fig. 4) is formed in two parts, 1, 2, and the lower is constructed as a cylinder within which the upper part is capable of sliding, but the two portions are kept apart by means of a spring, 3, placed within the cylinder 1. Through the medium of this spring, 3, therefore, a vibratory motion may be communicated by the crank *y* to the lever 4, but in case of any obstruction arising, the said spring will collapse so as to impart a modified motion only. The lever 4 is fixed to a shaft, 6, to which is adapted a series of springs or combs, 7, caused, therefore, to vibrate so as to pass through the teeth of the roller *e*, and through the teeth of a row of fixed prongs, 9*, downward along the plate and grating *h i*, and to approach the periphery of the roller *k*, between the fixed blade *l* and vibrating blade *o*. Upon the shaft *r* is a second pair of cranks, 9, which operate by means of connecting rods, 29, upon bell-crank levers, 10, turning upon a centre at 11. The vertical parts of these bell-crank levers carry a plate, 12, which being thus caused to vibrate, scrapes lightly against the periphery of the roller *k*. At 13 14 are partitions constituting shields, and extending from one side framing to the other. The roller *k* is indented upon its surface with right and left handed spiral grooves, which therefore cross each other in the detached view of the said roller at fig. 5. Having pointed out the general arrangement and construction of the machine, we will proceed to explain how the several moving parts may be driven. The fast and loose pulleys for communicating the motive power are, at 14, adapted to the shaft *r*, and the cranks 8 8 9 9 are therefore driven direct. Upon the shaft *r* is a pinion, *v*, taking into another, *w*, upon a shaft, *x*, and the said pinion *w* carries the crank-pin *y*, to which the rod *z* is connected, and thus the vibratory motion is communicated to the lever 4 and comb 7. Upon the shaft *x* is a pulley, 16, over which a band passes, and from thence to another pulley, 17, upon the shaft 18 of the roller *k*. This shaft 18 carries a pulley, 19, which communicates motion by means of a pulley, 20, to a shaft, 21, and upon this is a toothed pinion, 22, gearing into another upon the axis of the spiked roller *e*, and from thence motion is communicated to the roller *b** of the feed apron by the pinion 23, and to the fluted roller *d* by the wheel 24.

The operation of the machine is as follows:—The wool, or other such material to be cleaned, is placed upon the apron *c*, which carries it forward beneath the roller *d* and delivers it to the spiked roller *e*, which, by revolving in the direction of the arrow, opens it out from its entangled mass. The comb 7, being caused as above described to vibrate, removes the material from the teeth of the spiked roller *e*, and through the prongs 9*, in detached tufts, thus effecting a further disentanglement; and its continued vibratory motion conveys the tufts along the plate *h*, and presents them to edge of the blade *l*, where the levers or other extraneous matters are detained. Here they are acted upon by the vibrating blade *o*, thrusting them against the said fixed blade *l*, which operation causes the bur and other extraneous matters to be separated and fall downwards through the grating *i*, while the cleaned wool or other such material is carried upward between the roller *k* and blade *l*, the grooves upon the surface of the said roller assisting their passage. A portion of the wool will fall from the roller, and the remainder is detached and caused also to fall by the scraping action of the vibrating blade 12. The use of the elastic connecting rod formed by the spring 3 will now be perceived; for should the transferring comb remove an unusual quantity of material, an obstruction would be caused to its full vibration, and a derangement of the parts would follow, if the said rod were rigid.

In witness whereof, we, the said John Platt and William Richardson, have hereunto set our hands and seals, the second day of September, in the year of our Lord one thousand eight hundred and sixty-two.

(L.S.) JOHN PLATT.

(L.S.) WILLIAM RICHARDSON.

This is the specification referred to in the annexed Letters of Registration granted to John Platt and William Richardson, this ninth day of July, 1863.

JOHN YOUNG.

REPORT.

A.D. 1863. No. 75.

Improvements in Machinery for cleaning Wool, &c.

REPORT.

Royal Mint,
Sydney, 22 May, 1864.

SIR,

Having examined and considered the application of Messrs. Platt and Richardson for Letters of Registration, under Act of Council 16 Vic., No. 24, for Improvements in Machinery for cleaning Wool, &c., we have the honor to report that we see no objection to the necessary protection being granted.

Petition to Governor.
Specification.
Six drawings.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
JOHN WHITTON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—two sheets.]

A

Fig 1

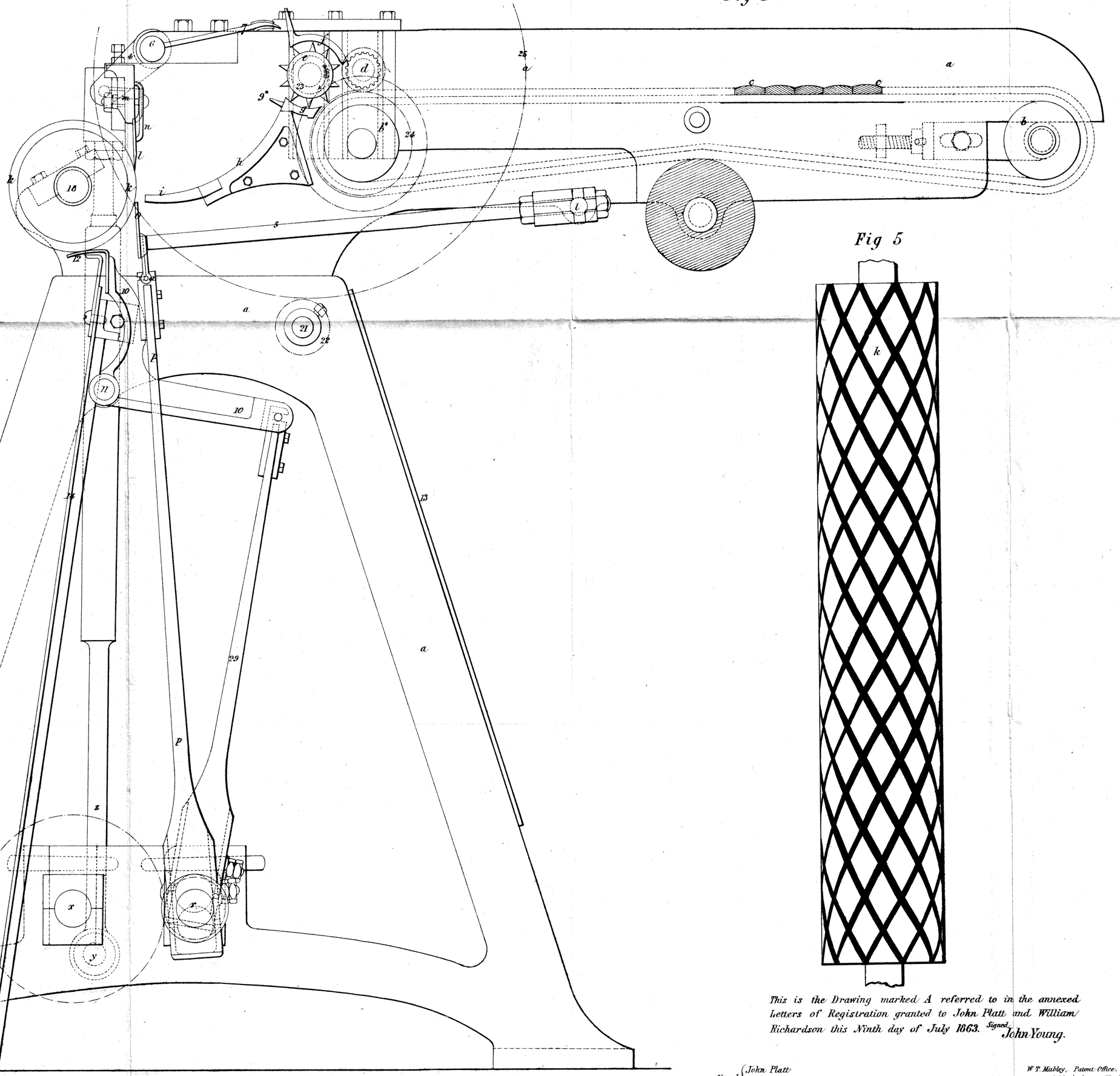


Fig 4

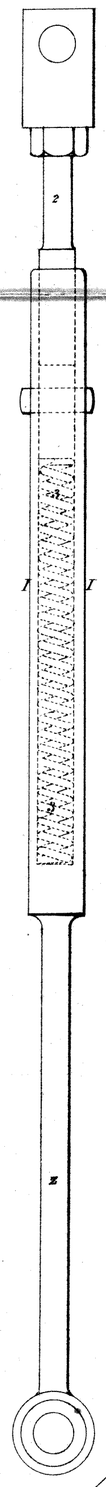


Fig 5

This is the Drawing marked A referred to in the annexed Letters of Registration granted to John Platt and William Richardson this Ninth day of July 1863. Signed *John Young.*

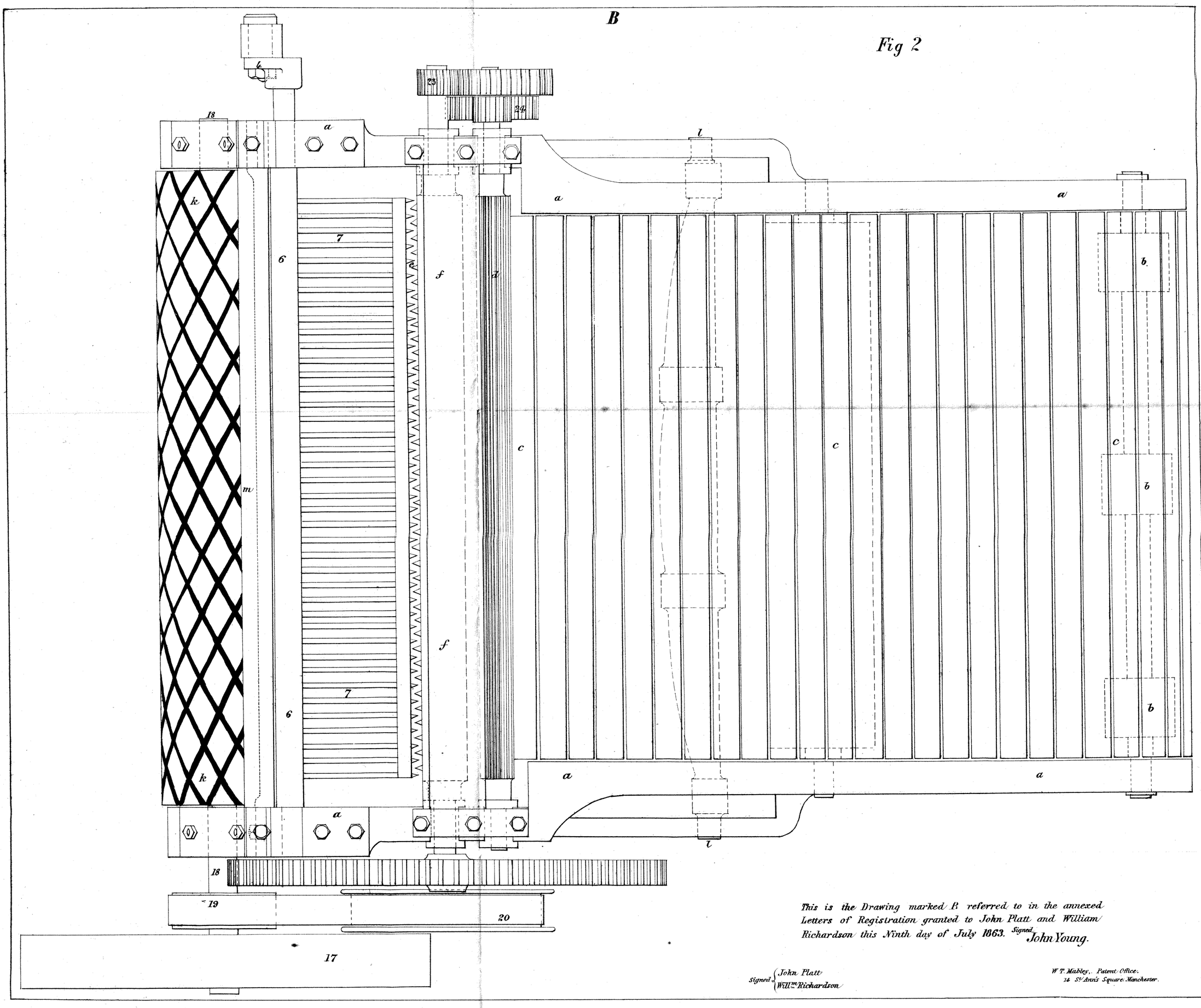
Signed { *John Platt* / *Willm Richardson* }

W T. Mabley, Patent Office, 14 St Ann's Square Manchester.

(Copy)

B

Fig 2



This is the Drawing marked B referred to in the annexed Letters of Registration granted to John Platt and William Richardson this Ninth day of July 1863. Signed *John Young.*

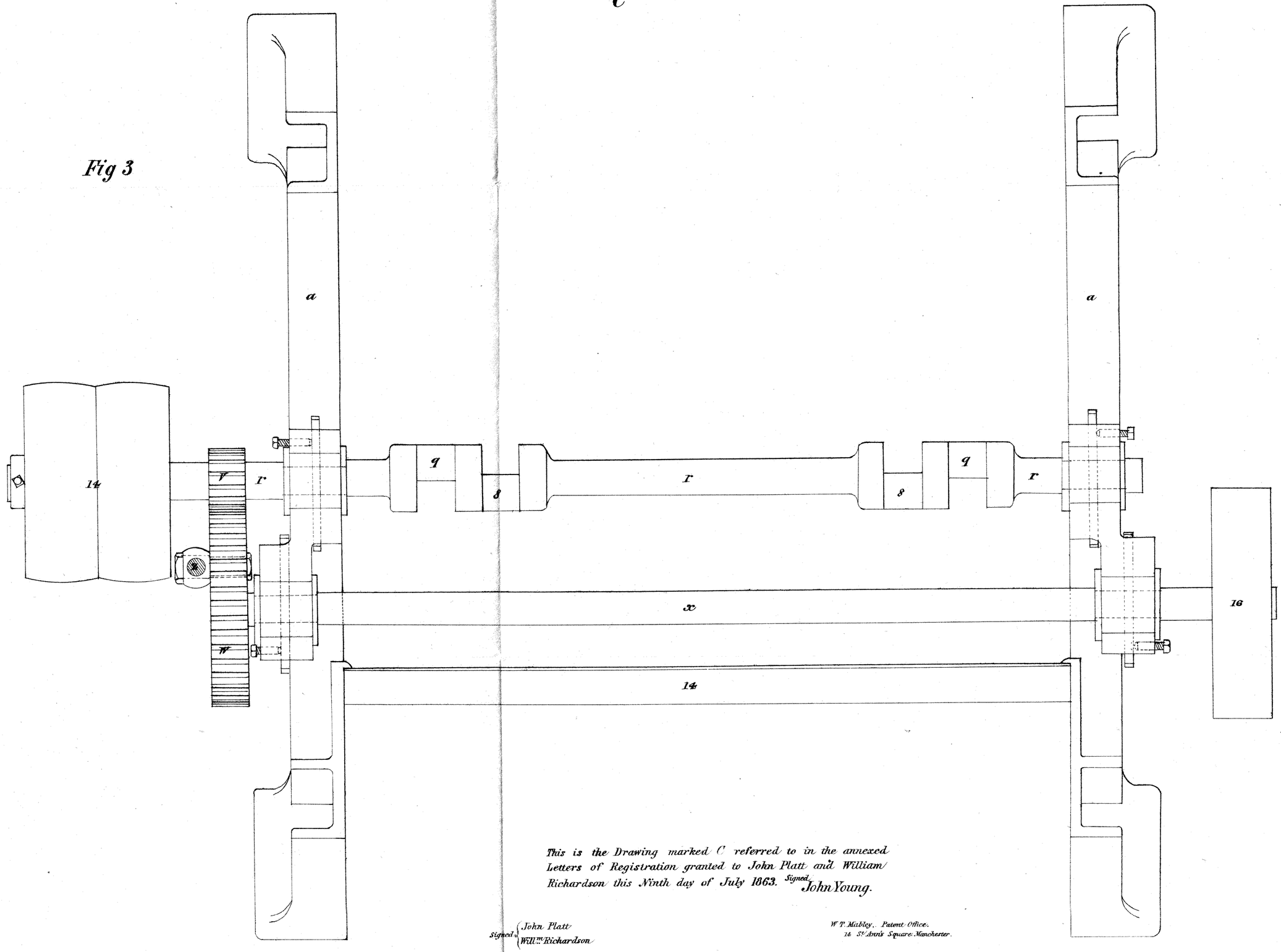
Signed { *John Platt* / *Will.m Richardson*

W T Mabley, Patent Office, 14 St Ann's Square Manchester.

(Copy)

C

Fig 3



This is the Drawing marked C referred to in the annexed Letters of Registration granted to John Platt and William Richardson this Ninth day of July 1863. Signed *John Young.*

Signed { *John Platt* / *Will.m Richardson*

W T Mabley, Patent Office, 14 St Ann's Square Manchester.

A.D. 1863, 25*th August.* No. 76.

PARAFFINE AND PARAFFINE OIL.

LETTERS OF REGISTRATION to George Lough, for an improvement in the manufacture of Paraffine and Paraffine Oil.

[Registered on the 27th day of August, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:—

WHEREAS George Lough, of Newcastle, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of an improvement in the manufacture of Paraffine and Paraffine Oil from coal, shale, resin, pitch, and tar, which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and

authority

authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said George Lough, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said George Lough, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said George Lough shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-fifth day of August, in the year of our Lord one thousand eight hundred and sixty-three.

JOHN YOUNG.

SPECIFICATION.

THIS improvement is effected by superheating or decomposing steam, until its component parts lose their affinity for each other, and unite with the carbon, hydrogen, ammonia, and creosote contained by the coal. These meeting each other in the condensor, are combined in due proportions, according to their own fixed laws, and form the materials called paraffine and paraffine oil. These I rectify in the usual way, which fits them for burning in the form of paraffine candles and paraffine oil.

I only claim the application of superheated or decomposed steam to coal, to shale, to pitch, to resin, or to tar, in order to produce paraffine oil. I claim both the decomposed steam and the things to which it is applied. I claim the application of superheated steam in whatever way it may be decomposed, whether by red hot iron pipes, the galvanic battery, or by chemical ingredients.

The following is the process employed by me, by which I extract paraffine and paraffine oil from coal, from shale, resin, pitch or tar, or turf.

I employ any number of retorts set up in the usual way for manufacturing gas, having this only difference,—each retort has got two exits, one in the usual place, the other is just over the back end of the fire-bars, and ascends to a refrigerator in which all the easily volatile gases are first received and gradually condensed; they then run down to the retort, where they drop upon the hottest part. By the time that the whole or most of these gases are in a volatile or in a liquid state, running down to the place of their origin, the retorts have reached a blood-red state of heat. I then turn on the decomposed steam, which has been decomposed by passing through vertical cast iron pipes and horizontal cast iron pipes. The vertical pipes stand like so many letters A, so connected with each other that the steam from the boiler passes through them all, and from them passes through a series of horizontal serpentine pipes. These pipes are laid upon the top of the retorts, so as to support the roof of the furnace in which both the retorts and the vertical pipes are all heated. The same furnace heats the whole.

The decomposed steam is conducted through the under part of the mouth-piece of each retort, to the end, and is distributed all over the bottom by a perforated iron pipe.

The exit-tap which leads to the finishing condensor is then opened, and the mingled gases of the coal, the decomposed steam, and of the easily volatile substances, which were forced into the refrigerator by keeping the exit-tap shut, are allowed simultaneously to escape through the exit main pipe to the condensor. Here the oxygen of the steam combines with the carbon, the ammonia, the hydrogen, and the easily volatile substances of the coal, &c., and are condensed in the form of paraffine and paraffine oil. The retorts must not be heated beyond a blood-red heat, or else fixed hydrogen and carbonic acid gases will be generated and escape into the atmosphere. As it is, there will be more hydrogen than can be incorporated by the oil and paraffine.

I only claim the application of superheated and decomposed steam to coal, to shale, to resin, to pitch, to tar, or to turf, in order to produce paraffine and paraffine oil.

This is the specification referred to in the annexed Letters of Registration granted to George Lough, this 25th day of August, 1863.

JOHN YOUNG.

REPORT.

Paraffine and Paraffine Oil.

REPORT.

Royal Mint, Sydney,
23 *July*, 1863.

Sir,

Having examined and considered the application of Mr. George Lough, for Letters of Registration, under Act of Council 16 Victoria, No. 24, for improvements by which he extracts Paraffine and Paraffine Oil from coal, from shale, resin, pitch or tar, or turf,—we have the honor to report that we see no objection to the necessary protection being granted.

Petition to His Excellency the Governor.
Specifications—two.
Memo. of Treasury.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
J. SMITH.

The Honorable
The Colonial Secretary.

A.D. 1863, 1st *September.* No. 77.

IMPROVEMENTS IN MAKING ICE, &c.

LETTERS OF REGISTRATION to Henry Francis, for Improvements in making Ice, &c.

[Registered on the 3rd day of September, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Henry Francis, of Union-street, Pyrmont, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for improvements in making Ice and cooling Fluids, which is more particularly described in the specification and drawing hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to

me

me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Henry Francis, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Henry Francis, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Henry Francis shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this first day of September, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION of Improvements in making Ice and Refrigerating Apparatus.

THIS invention for improvements in making Ice and cooling Fluids, consists in causing the water or other fluid to be divided into fine sprays, droppings, or streams, to fall into enclosed or open refrigerating vessels or chambers, so that the fluid will be cooled by the act of falling into such vessels or chambers, and that Ice will be formed by the gradual accumulation of water flowing from fine sprays or droppings, forming thin streams or films, continually giving fresh extended surfaces of water exposed to the action of cold, produced as hereinafter described. Heretofore, artificial Ice has been made in metal vessels, filled with water immersed in refrigerating fluids; the consequence is, by the expansion of the water in freezing, the Ice so formed is so porous that it soon thaws on exposure; and the more rapidly it is frozen, the more porous it is found to be; and Ice being a bad conductor, when the exterior surfaces of the water are frozen, it so retards the congealing of the centre as to render the solidifying of large cubical masses of Ice almost impracticable.

The improved apparatus for making Ice and cooling Fluids is of the following description. Take a large, strong, cylindrical air-tight vessel, which will withstand the pressure of the atmosphere. One end of it is fitted with an air-tight cover, made so as to be easily removed, for the purpose of taking out the contents. In the inside of the cylinder, at the upper part, there is a tube, or tubes, made with fine perforations, through which the fluid to be cooled or water to be frozen is to be supplied. There is also a series of tubes fixed above or near the supply-tube, in which tubes intense cold is produced by partly filling them with ether, and evaporating it in vacuum, or by the liquefaction and expansion of ammoniacal gas, or by such other materials as are equally well known and in general use, for the purpose of condensing gases and refrigeration. Also, the cylinder may be made double, wholly or in part; and in the space formed between the cylinders, the refrigerating materials can be employed in addition to, or instead of, using the series of tubes inside the cylinder. The intense cold produced by the refrigerating materials is also for the purpose of condensing the vapour arising from the evaporation of the spray and films of water, which is caused to rise rapidly by the vacuum formed in the cylinder by means of air-pumps worked by steam or other power. The latent heat of the water to be frozen or cooled is by this means carried off by its own vapour, in addition to the low temperature produced by the refrigerating materials, by which means Ice can be made more solid, and in larger masses, than has been hitherto done.

The above process for making Ice artificially by the flowing of water, in sprays or films, gradually into refrigerating vessels or chambers, as described, may be performed either with or without the assistance of vacuum—also for cooling Fluids, by sprays or droppings falling into refrigerating vessels or chambers.

HENRY FRANCIS.

Sydney, 29 April, 1863.

This is the specification referred to in the annexed Letters of Registration granted to Henry Francis, this first day of September, 1863.

JOHN YOUNG.

REPORT.

Improvements in making Ice, &c.

REPORT.

Royal Mint, Sydney,
23 *May*, 1863.

SIR,

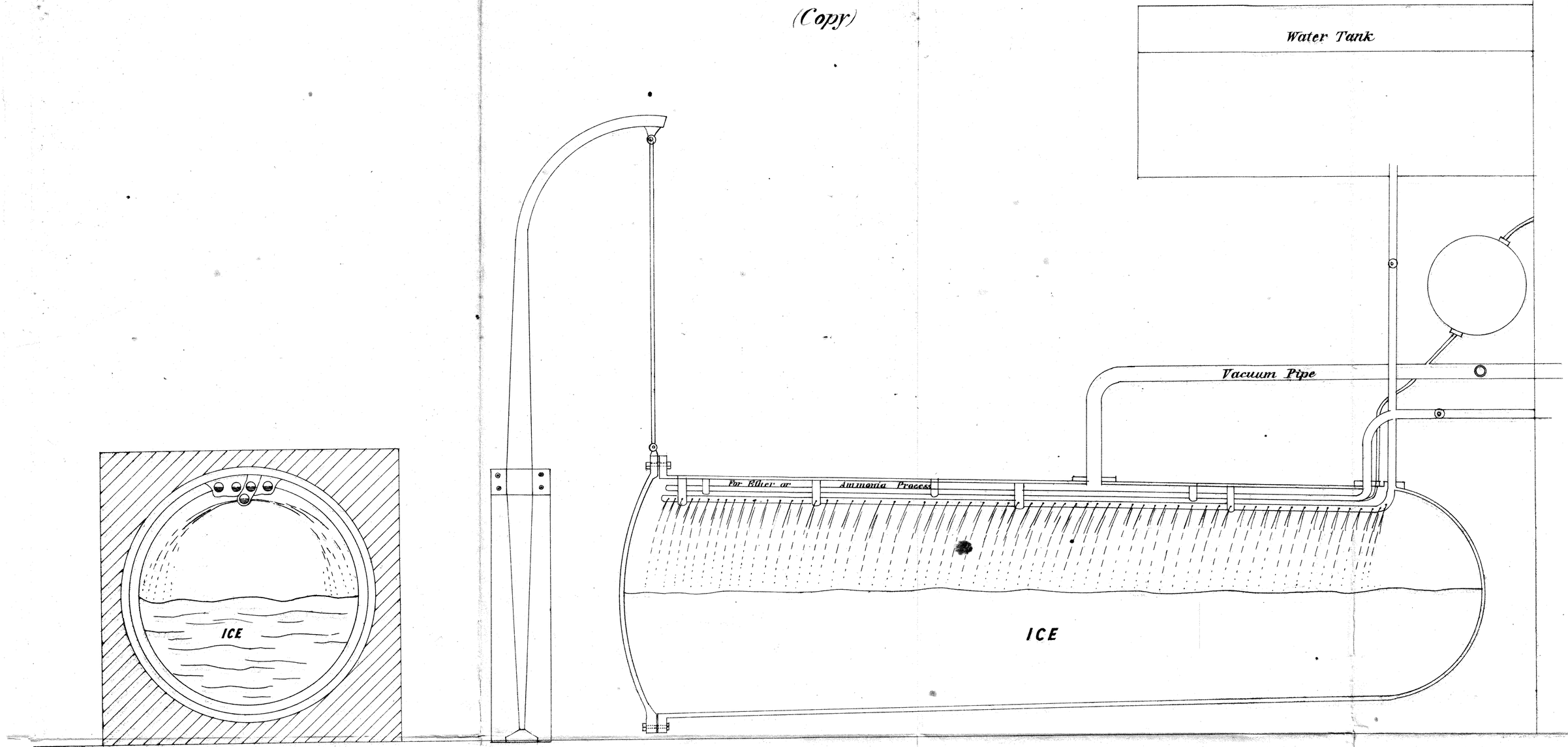
We have examined and considered the application of Mr. Henry Francis for Letters of Registration, under Act of Council 16th Vic., No. 24, for improvements in making Ice and Refrigerating Apparatus. We have also obtained from that gentleman a drawing of one of the arrangements which may be used for carrying out his specification. This we enclose, and recommend to be attached to the specification. We also recommend that the Petitioner's prayer be granted.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawing—one sheet.]

(Copy)



This is one of the arrangements that may be used to carry out the accompanying Specification of Patent for making Ice
(Sgd) Henry Francis.

This is the Drawing referred to in the annexed Letters of Registration granted to
Henry Francis
this 1st day of September 1863.
(Signed) John Young

A.D. 1863, *2nd September.* No. 78.

IMPROVEMENTS IN THE PREPARATION OF CLAY FOR THE MANUFACTURE OF BRICKS, &c.

LETTERS OF REGISTRATION to Messrs. Platt and Richardson, for Improvements in the preparation of Clay for the manufacture of Bricks, &c.

[Registered on the 4th day of September, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY HIS EXCELLENCY THE RIGHT HONORABLE SIR JOHN YOUNG, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS JOHN PLATT AND WILLIAM RICHARDSON, both of Oldham, in the county of Lancaster, in England, mechanical engineers, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for improvements in the preparation of Clay for the manufacture of Bricks, Tiles, and other articles which may be made of such material, which is more particularly described in the specification marked A, and the drawings marked B, C, and D, respectively, hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years:

And

Improvements in the preparation of Clay for Bricks, &c.

And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council to grant, and do by these Letters of Registration grant unto the said John Platt and William Richardson, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Platt and William Richardson, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Platt and William Richardson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this second day of September, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

TO ALL TO WHOM THESE PRESENTS SHALL COME, We, John Platt, of Oldham, in the County of Lancaster, mechanical engineer, and William Richardson, of the same place, mechanical engineer, send greeting:

WHEREAS we are in possession of an invention for improvements in the preparation of Clay for manufacture of Bricks, Tiles, and other articles which may be made of such material, and have petitioned His Excellency the Governor General of New South Wales to grant us, our executors, administrators, and assigns, Letters of Registration for the same: Now know ye, that we, the said John Platt and William Richardson, do hereby declare that the following specification fully describes and ascertains the nature of the said invention, and the manner in which the same is to be performed—that is say:—

Our invention relates to processes whereby crude or untempered clay is brought into a state of division, and into a condition suitable for being compressed in moulds of any desired form. The first operation consists in partially drying the clay and reducing it into comparatively small particles, whereby also stones are separated therefrom. The apparatus we employ for carrying out this part of our invention is shewn at figs. 1 2 and 3 of the accompanying drawings, in which fig. 1 is a longitudinal section with an end broken off, fig. 2 a cross section in line A B, and fig. 3 a similar section in line C D. At 1 is a hopper supported by framing, 2, beneath which hopper are two screws, 3 4, the axes, 5 6, of which are geared together by pinions of unequal numbers of teeth. Upon the axis 6 is a toothed wheel, 9, taking into gear with a wheel, 10, mounted upon a shaft, 11; this shaft 11 is provided also with a worm-wheel, 12, driven by a worm, 13, to which the motive power is applied, and thus the two screws 3 4 are caused to revolve at a slow speed, and in opposite directions. Between these two screws is a block or partition, 14, which follows the lower portions of their peripheries, and extends upwards at 15, so as to constitute a fin or ridge between them. Adjoining the hopper is a chamber, 16, constituting a flue, for the purpose hereafter to be mentioned, which chamber is continued by a tube, 17, shewn in the drawing as broken off, it being of considerable length; this tube is provided with annular projections, one of which is shewn

at

at 18, resting upon a roller, 19, mounted upon the shaft 11; when therefore the said shaft is, by the before-mentioned means, caused to revolve, rotatory motion will be communicated to the tube 17, by the friction surfaces 18 19; and at 20 are rollers which serve to support the tube in a lateral direction, at any convenient position in the length of the tube. The friction surfaces 18 19 are made with flanges, so as to prevent the tube from slipping forward. At 21 are vanes projecting inward from the circumference of the tube 17, and extending throughout the length thereof. The clay to be prepared is fed into the hopper 1, and it falls therefore upon the upper portions of and between the screws 3 4, resting upon the fin or ridge 15. Upon motive power being applied to the shaft of the worm 13, a slow rotatory motion will, as before described, be communicated to the two screws 3 4, and in the direction of the arrows to be seen in fig. 2; the effect of this will be a tendency to press the clay downward upon the ridge or fin 15, while it will at the same time be severed or broken up by the blades constituting the screws, and caused to travel forward towards the tube 17; but in addition to this, the masses of material operated upon are further broken up and reduced into small particles by the relative action of the screw being at a greater speed than that of the other. Owing to this arrangement, the one will act as a comparative retarding surface, so as to cause the material to be acted upon in two directions, while being carried forward by the joint action of the two screws. The material therefore is continually and gradually delivered to the tube 17, which being placed at an angle as shewn, causes it by its revolution to pass onward and to be discharged at the end thereof, during which transference from one end to the other, it is continually raised and allowed to fall by the projecting vanes 21. During this operation we cause a current of heated air to be blown by a fan or other apparatus into the tube 17, from whence it passes by the flue 16, so that the material during its passage, and while it is being constantly agitated and separated, is partially dried and rendered more capable of being broken up by falling from the vanes 21.

The degree to which the clay is to be dried will be easily regulated by any person familiar with the process of manufacture. We prefer that the clay, as it issues from the end of the tube, should be to such an extent disintegrated, and deprived of so much of its moisture, that the material is in such a condition that it will easily pass through the meshes or bars of an ordinary sifter, or other apparatus of a similar character. We find it advantageous that the drying process should be so regulated that the material in this stage will be found, when squeezed in the hand, to cohere and form a lump.

The apparatus for sifting which we prefer to employ consists of a screen, in which we place the material in the first instance. By means of this screen, the larger stones are separated from the plastic material. We then pass the sifted material between rollers, which pulverize the stones which are too small to be screened. These rollers then leave the clay in such a state that some of the particles cohere in a leafy condition.

The material is then passed on to the apparatus constituting the next part of our invention, and shewn in two views at figs. 4 and 5, the former being a vertical section thereof, and the latter a plan view in section, the driving wheels being shewn by the pitch lines in red colour. At *a* is the casing of the operating parts supported by a suitable number of rollers, *b*; within the casing is a plate, *c*, carried by a shaft, *d*, which turns in bearings, *e f*; projecting upward from the plate *c* are rods, *g*, which are bound together at their upper ends by a second plate, *h*, which plate and the casing *a* also are provided with central apertures, *i k*. The clay after having been operated upon by the machine described in reference to figs. 1, 2, and 3, and having been sifted or otherwise treated so as to have been brought into a suitable condition, is fed gradually through the apertures *i k*, so as to fall upon the plate *c*; this plate is caused to revolve rapidly and the material is thoroughly agitated, and at the same time is thrown outward by centrifugal force against the first series of projecting rods *g*, by which means it is in a certain degree broken up. As the material continues in its outward course, it is projected successively against, and passes between each series of rods *g*, which as they rotate in the same direction, strike it successively and break it up until it escapes into the case *a*, and falls out through the open bottom thereof.

The

Improvements in the preparation of Clay for Bricks, &c.

The material is then prepared by being reduced to the required disintegrated state, suitable for being pressed in moulds into the desired forms, such as bricks or other moulded articles, by any of the well known machines which are suitable for moulding crude or untempered clay. During the above described operation, the case *a* is caused to revolve slowly, so as to cause its interior surface to rub against a fixed scraper, 1, in such a manner that all the clay, as it sticks to the case and accumulates thereon, is removed, and thus an accumulation of adhering clay is prevented. It will be observed that the rods *g* are closer together as they extend outward; and this variation, and also the number of rings of rods *g*, may be more or less, according to the degree of disintegration required. The parts above described may be caused to revolve by any suitable arrangement of gearing, but we will point out a method which may be employed. Upon the shaft *d* is a pulley, *m*, round which a band passes twice, and from thence over pulleys, *n*, one of which is connected with the motive power. On the shaft *d* is also another pulley, *o*, from whence a band passes to a pulley, *p*, fixed upon a shaft, *q*; this shaft carries a toothed pinion, *r*, taking into a wheel, *s*, carried by a shaft, *t*, which shaft at its lower end has a pinion, *u*, in gear with a wheel, *v*, formed upon the casing *a*, which is thus caused to revolve slowly upon the supporting rollers *b*. We have above alluded to a scraper which cleans the material from the casing by the revolution thereof, but if desired, the said scraper may be caused to revolve and the casing to remain stationary, or both may be arranged to revolve. We make no claim to the apparatus referred to in our provisional specification, and intended to be used in connection with the processes above described, for the purpose of separating the clay into pieces of different sizes by submitting it to a current of air, as we have found the same is not of sufficient practicable utility to enable it to be used with advantage.

Having thus described and ascertained the nature of our said invention, and the manner of carrying the same into effect, we desire it to be understood that we do not limit ourselves to the precise arrangements and constructions shewn and described, but we claim as our invention, firstly, the apparatus described by reference to figs. 1, 2, and 3, whereby the clay is passed through a tube or cylinder which conveys it forward, at the same time raising it and allowing it to fall. Also, the use of a current of heated air passing over the clay as it is conveyed forward by the tube or cylinder. Also we claim the combination of parts forming the apparatus described, reference to the said figs. 1, 2, and 3, and its application in the manner and for the purposes described. Also, the combination of parts forming the apparatus described, in reference to figs. 4 and 5 in sheet 2, and the application thereof in the manner and for the purposes described. Also, the use of a revolving casing in connection with a stationary or moving cleansing instrument or scraper, or a revolving scraper acting upon stationary casing. Also, the application and use of the different sets of apparatus used in combination, in the manner and for the purposes as described and shewn in the drawings.

In witness whereof, we, the said John Platt and William Richardson, have hereunto set our hands and seals, this twentieth day of March, in the year of our Lord one thousand eight hundred and sixty-three.

JNO. PLATT. (L.S.)
WILLIAM RICHARDSON. (L.S.)

This is the specification referred to in the annexed Letters of Registration granted to John Platt and William Richardson, this second day of September, 1863.

JOHN YOUNG.

REPORT.

Improvements in the preparation of Clay for Bricks, &c.

REPORT.

Royal Mint,
Sydney, 7 August, 1863.

SIR,

Having examined and considered the application of Messrs. Platt and Richardson for Letters of Registration, under Act of Council 16 Victoria, No. 24, for improvements in the preparation of Clay for the manufacture of Bricks, &c., we have the honor to report that we see no objection to the necessary protection being granted.

The documents as per margin are herewith returned.

Petition to the Governor.
Specification.
Six drawings.
Printed copy of specification for patent in England.

We have, &c.,

E. W. WARD.
JAMES BARNET,
Actg. Col. Archt.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—three sheets.]

№ 78.

(Copy)

B

Fig 1.

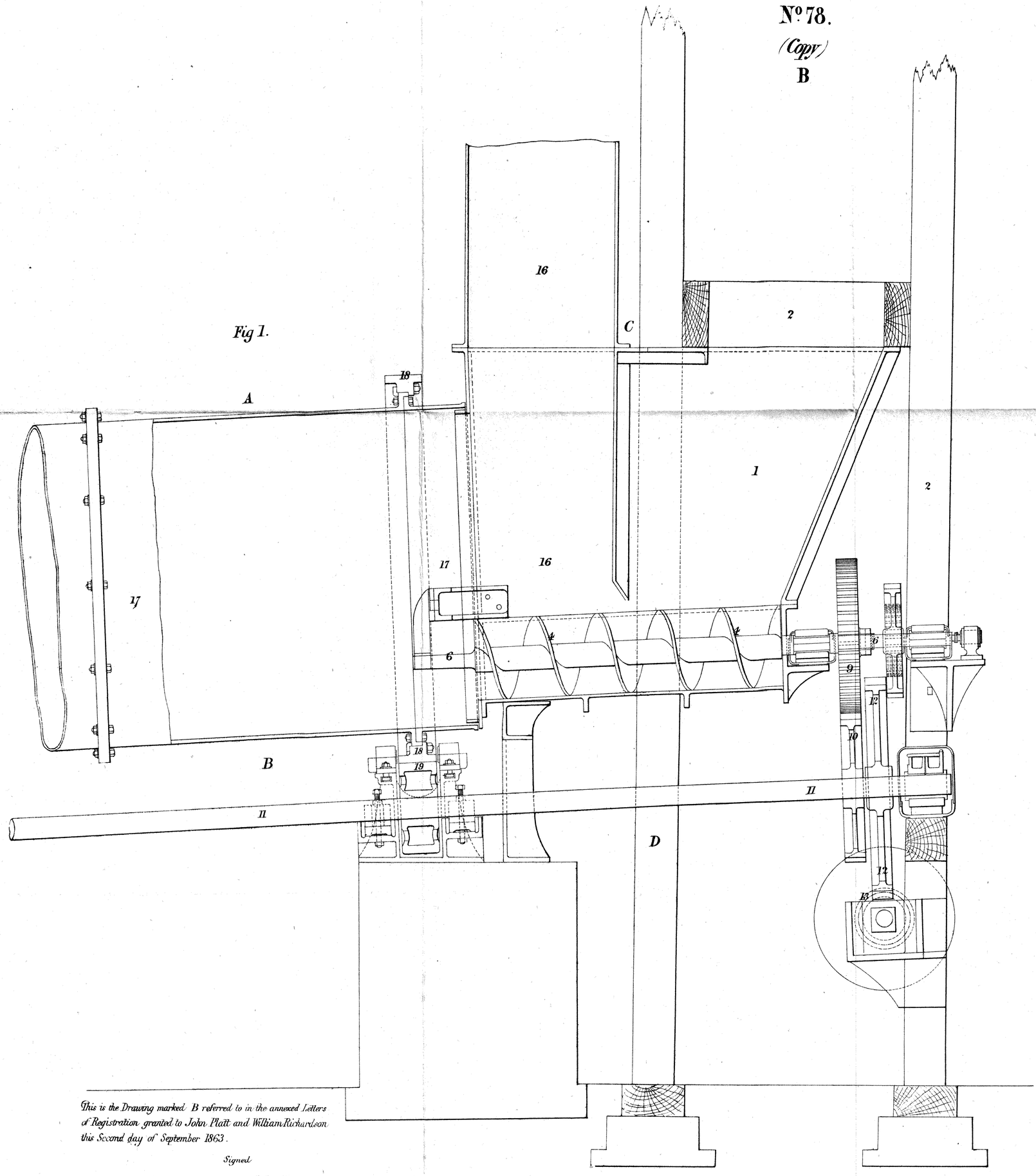
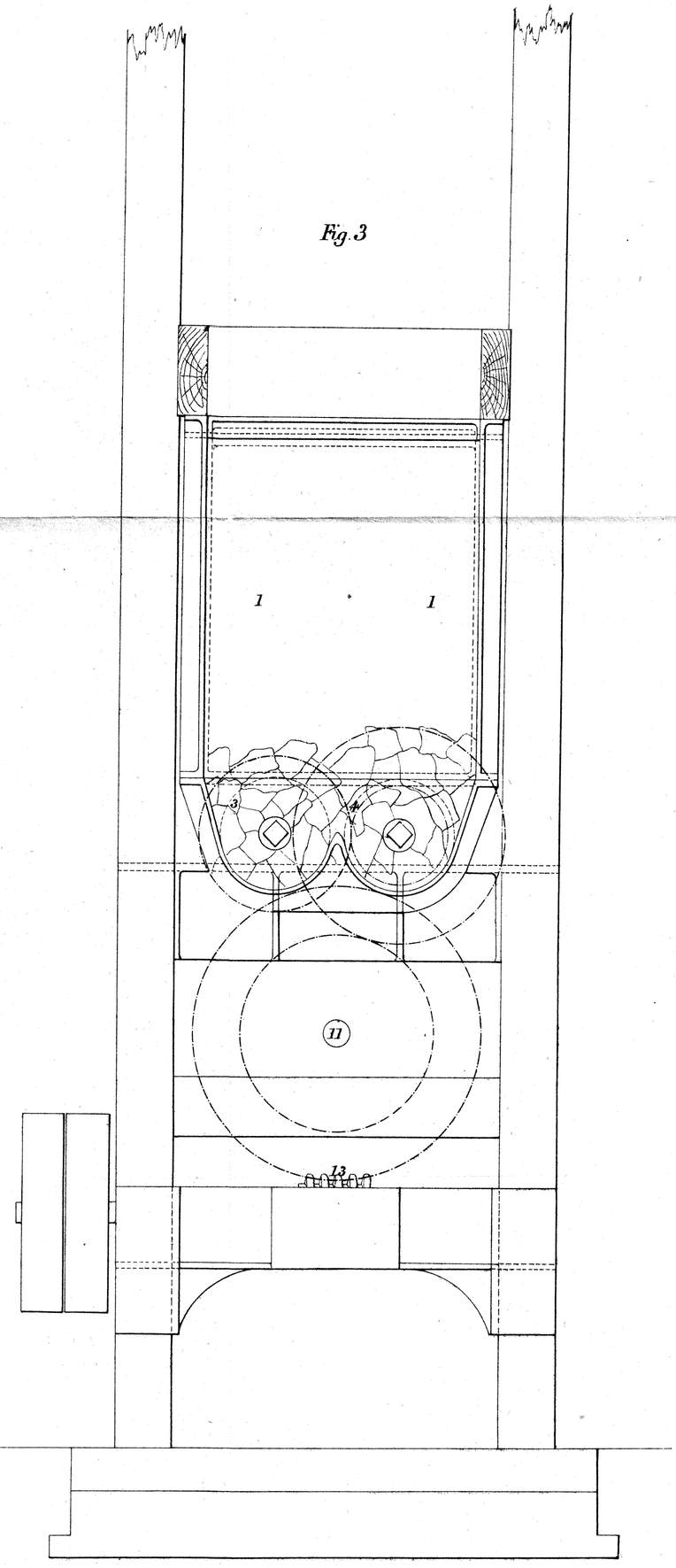


Fig 3.



This is the Drawing marked B referred to in the annexed Letters of Registration granted to John Platt and William Richardson this Second day of September 1863.

Signed

John Young

N°78.

(Copy)

C.

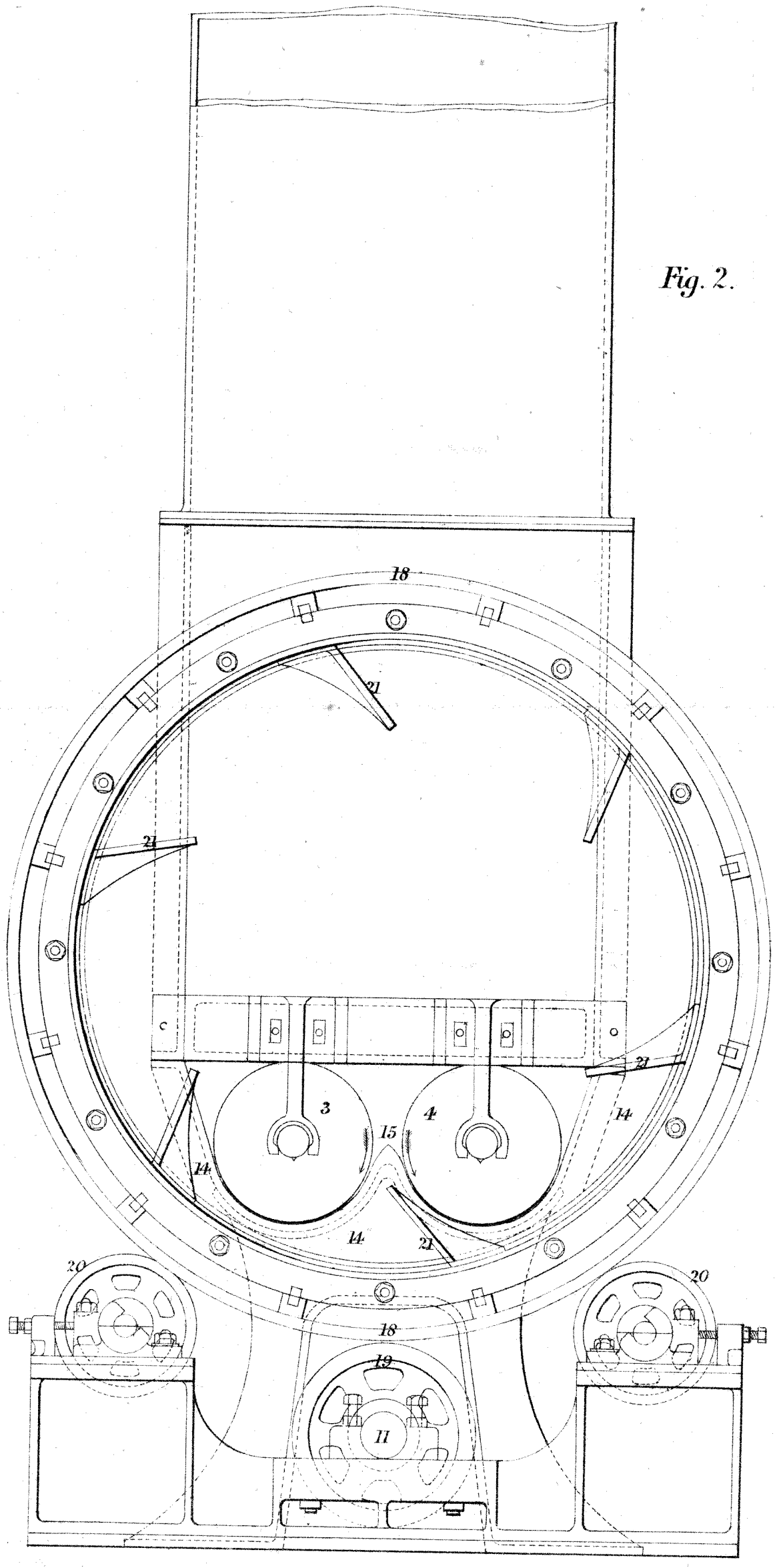


Fig. 2.

This is the Drawing marked **C** *referred to in the annexed Letters of Registration granted to John Platt and William Richardson this Second day of September 1863.*

(Signed)

John Young.

N°78.

(Copy)

D.

Fig 4.

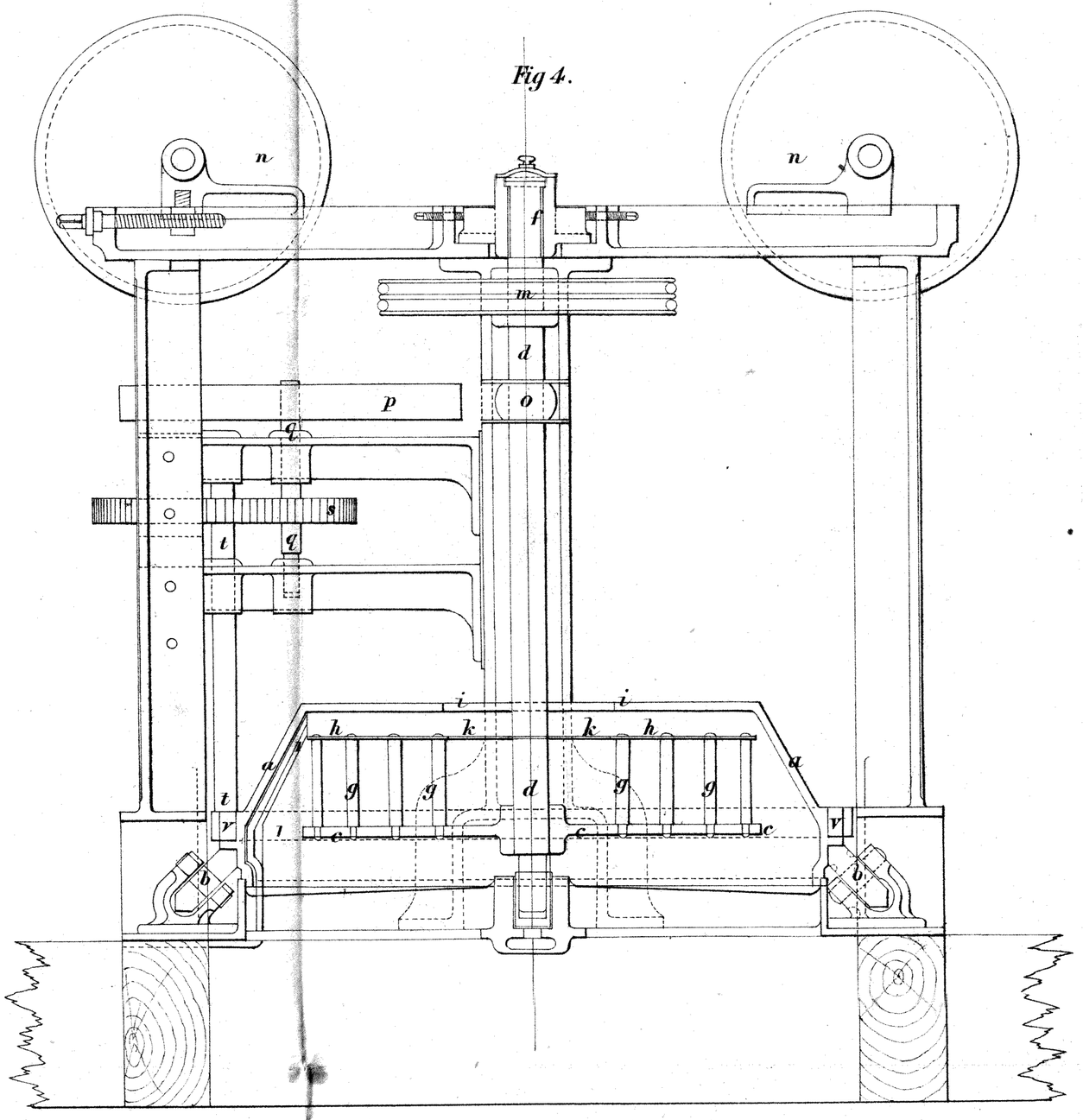
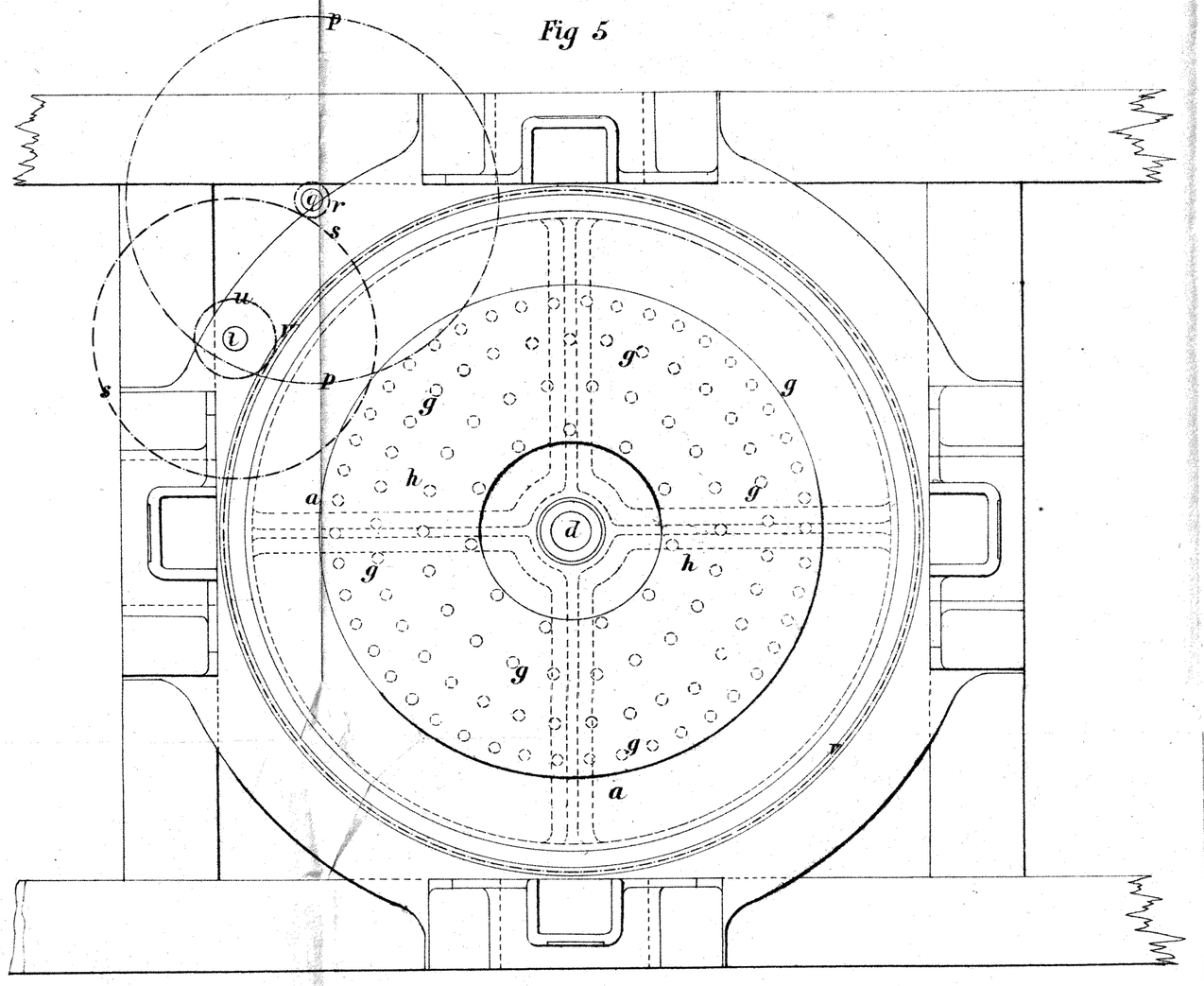


Fig 5



This is the Drawing marked D referred to in the annexed Letters of Registration granted to John Platt and William Richardson this Second day of September 1863.

Signed

John Young

A.D. 1863, *5th September.* No. 79.

IMPROVEMENTS IN THE METHOD OF PRODUCING SPECTRAL ILLUSIONS.

LETTERS OF REGISTRATION to Messrs. Mason and Martin, for Improvements in the Method of producing Spectral Illusions.

[Registered on the 5th day of September, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:—

WHEREAS Cyrus Mason and William Robert Martin, both of Melbourne, in the Colony of Victoria, gentlemen, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for improvements in the method of producing spectral illusions, which is more particularly described in the specification hereunto annexed, and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of

Registration

Improvements in the Method of producing Spectral Illusions.

Registration grant unto the said Cyrus Mason and William Robert Martin, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Cyrus Mason and William Robert Martin, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Cyrus Mason and William Robert Martin shall not, within three days from the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this fifth day of September, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION of Cyrus Mason and William Robert Martin, both of Melbourne, in the Colony of Victoria, gentlemen, for an invention entitled "Improvements in the Method of producing Spectral Illusions."

OUR invention consists of a new way of producing spectral illusions, by the reflection of figures, persons, or scenes, when illuminated by a powerful light, from or in a plate of clear glass, and will be comprehended by the following description:—

On the general stage, and facing the spectators, a sheet of perfectly clear glass is placed at such an angle as to produce to the spectators, by means of reflection, an illusion of the object required to be shewn, which is placed out of sight of the spectators, either in the centre or any other part of the stage, or at the sides, or above or below the level of the stage, according to circumstances, and upon which the concentrated rays of a lime or other similarly powerful light are thrown. By this means, the exact counterpart of any object may be made to appear to the spectators, either perfectly still, or in motion amongst the actors, yet impalpable, because only reflections, and may be caused to appear, disappear, and re-appear, gradually or instantaneously, at the will of the operator, by varying the shades of light thrown on the object, or extinguishing it altogether, suddenly or by degrees. The operation may be varied by the introduction of a mirror, to be placed behind the object to be reflected, and at such an angle as to produce its reflection on the sheet of glass placed on the stage, and by turning the mirror on its axis, the reflection may be made to glide away gradually, or at once, as before described, or a transparency may be placed between the light and the glass, when the illusion will be also produced. Having thus described the nature of the invention, and the manner of performing same, we would have it understood that we do not confine ourselves to precise details, so long as the nature of the invention be retained and understood; but what we do claim is, the improved methods of producing spectral illusions, substantially as herein described.

In witness whereof, we, the said Cyrus Mason and William Robert Martin, have hereto set our hands and seals, this sixth day of August, one thousand eight hundred and sixty-three.

Signed and sealed by the said Cyrus Mason and William Robert Martin, in the presence of—

CYRUS MASON. (L.S.)
W. R. MARTIN. (L.S.)

E. HART,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to Cyrus Mason and William Robert Martin, this fifth day of September, 1863.

JOHN YOUNG.

REPORT.

Improvements in the Method of producing Spectral Illusions.

REPORT.

Royal Mint, Sydney,
1 *September*, 1863.

SIR,

In reference to the application of Messrs. Mason and Martin, for Letters of Registration for Improvements in the Method of producing Spectral Illusions, we have the honor to enclose a copy of a letter addressed by us to the agent of those gentlemen, and the affidavit sent by them in reply.

The only objection, as far as we are aware, that can be made to the issue of the Letters prayed for, is, that an invention for a similar purpose has been already patented in England.

As, however, the applicants have by affidavit declared that they are the true inventors of the process described by them, it may be assumed that the respective methods for producing the same effect do in some degree differ. We therefore recommend that the prayer of the Petition be granted.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

The documents as per margin are herewith returned.

Petition to Governor.
Specification in duplicate.
Treasury memo. for £20.

Royal Mint, Sydney,
17 *August*, 1863.

SIR,

The application of Messrs Mason and Martin, for Letters of Registration for "Improvements in the Method of producing Spectral Illusions," having been referred to Professor Smith and myself for report, I have the honor to inform you, that it is necessary for the applicants to state whether they apply for protection under Act of Council 16 Vict., No. 24, as inventors or as assignees of inventors. It should also be shewn in what respect the process differs from that used at the Polytechnic Institution in London, and already patented by Messrs. Dircks and Pepper.

I have, &c.,
E. W. WARD.

M. Bayly, Esq.,
Agent for Messrs. Mason and Martin,
Circular Quay.

DECLARATION.

WE, Cyrus Mason and William Robert Martin, both of Melbourne, in the Colony of Victoria, do solemnly and sincerely declare that, in or about the month of July last, we discovered an invention respecting "Improvements in the Method of producing Spectral Illusions," and that we placed same under the protection of the Patent Laws of the Colony of Victoria, on the twenty-second day of July last. That we thereupon had a trial of our invention, and having demonstrated that it was practically successful, we directed our agents to apply for Letters of Registration in the Colony of New South Wales. That we discovered the said invention solely by our own ingenuity, and without any suggestion from any person, and without reference to any printed or other matter. That although we have diligently endeavoured to obtain a copy of the specification, or some reliable account of the invention of Messieurs Dircks and Pepper, we have hitherto failed in obtaining same.

And we make this solemn declaration, conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the ninth year of the reign of Her present Majesty, intituled "*An Act for the more effectual abolition of Oaths "and Affirmations taken and made in various Departments of the Government of New "South Wales and to establish Declarations in lieu thereof and for the suppression of "voluntary and extra-judicial Oaths and Affidavits.*"

CYRUS MASON.
W. R. MARTIN.

Declared before me, at Melbourne, this 26th day of August, 1863—

G. NICHOLSON, J.P.

A.D. 1863, 20*th October*. No. 80.

IMPROVEMENTS IN THE CONSTRUCTION OF RAIL AND ROAD CARRIAGES, &c.

LETTERS OF REGISTRATION to William Elsdon, for Improvements in the construction of Rail and Road Carriages, &c.

[Registered on the 21st day of October, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS William Elsdon, of Sandridge, in the county of Burke, in the Colony of Victoria, engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for the construction of Rail and Road Carriages, and improved Wheel Tires, and an improvement in Railway Crossings, adapting to them such Carriages, which is more particularly described in the specification and drawing hereunto annexed, and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report

favourable

favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said William Elsdon, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said William Elsdon, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said William Elsdon shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twentieth day of October, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE invention consists partly in the introduction of certain improvements, presently to be mentioned, in the construction of any kind of carriage, engine, car, van, waggon, trolly, lorry, truck, or other vehicle intended to run or capable of running on the lines of rails of railways, so as to render the same fit to run also on ordinary streets or roads; and partly in the adaptation of railway-crossings, in the manner presently to be explained, to the use of such carriages—which term "carriage" will, in the following description, be understood to include not merely carriages commonly so called, but also every kind of engine, car, van, waggon, truck, trolly, lorry, or other vehicle whatsoever.

The benefit to be derived from the invention will be, that it will enable goods to be conveyed along the railway, and the streets or the road, in the same carriage, without being unloaded, and will likewise similarly enable passengers to travel, first by rail and then by road, or *vice versâ*, without changing their seats.

In the first place, the inventor proposes to use, for the wheels of carriages intended for railway travelling, tires or hoops of the form shewn in plans A and B on the accompanying drawing, and of sufficient width and thickness. The two portions of the running surface of the tire or hoop must bear such proportion in width, one to the other, that one portion can be used for running on the surface of streets and roads, and the other for running on the rails of railways, while the portion of the tire used for running on streets and roads acts as a flange for the other portion while running on the rail. The whole running surface may be about seven inches wide, and the thickness of the hoop may be about one and a quarter inches, and it is better that the two portions of the running surface should be of about equal width, but such sizes may be varied according to circumstances.

The tread of that portion of the tire or hoop which is to be used for running on the rail had better suit the cant or inclination of the rail, and that of the other portion to be used when off the railway, for running on the streets or roads, had better suit the ordinary form of top of cross section of streets and roads; but the tread of either portion may be flat, or more or less bevelled or rounded, according to circumstances.

The tires or hoops may be made of rolled iron or steel, or of both, or of any other suitable material, and they may be made in one piece or of several pieces.

The tires or hoops may be manufactured in the same manner as other tires or hoops at present used for the wheels of railway carriages, and may be fastened on to the wheels in a similar way.

The

The inner surface of the tires or hoops may be of the forms or shapes shewn in plan B on the said drawing, and therein marked respectively *a*, *b*, and *c*, or of any other suitable form or shape, but the inventor recommends the one marked *b* in preference to the others, it being in his opinion the lightest and best.

The inventor does not bind himself to the width or thickness of tire or hoop, or of any part thereof, or to the proportionate width of the portions of the running surface, or to the description of materials, or the number of pieces, whether one or more in the length or the width, of which the tire may be composed, or to the particular mode in which it or they may be manufactured, nor as to whether that portion of the tire or hoop for running on or over streets and roads be placed on the inside of the wheels, as in plan A on said drawing, or on the outside as in plan C thereon, or as to whether the wheels be fast or loose on the axles.

In the first place, what the inventor claims is, the general form of a tire, having a double running surface, adapted for wheels intended to be used either for railway or road purposes, as shewn in the said plans A, B, and C, and in which the side of that portion of the tire intended to be used for running on streets or roads will act, when the wheel is on the rail, as a flange to the portion intended to be used for running on the rail, and further, the application of such tires or hoops to wheels for carriages intended both for rail or road.

Secondly, the inventor proposes to make carriages intended to run on railways with the frame of the forewheels movable, as shewn in plans A and D on the said drawing, but capable of being locked in the manner shewn in plan A thereon, or in any other suitable manner.

When the carriage is on the rails, the frame of the forewheels may be locked by bolts, as shewn in the said plan A, which bolts can be removed when it is intended that the carriage should be taken off the rails, so that the frame of the fore or leading wheels can then turn properly for travelling along the streets or roads.

The said frame may be locked by any other means suitable for the purpose, provided that it shall be capable of being unlocked when required.

The wheels of the carriage may be made of iron, or any other suitable material, and may be of the form or shape shewn in plan D, or of any other suitable form or shape.

Any sort of frame may be used which is suitable for the wheels of a carriage intended for travelling on streets or roads, and which if locked could be used for the fore-wheels of carriages intended for travelling on railways.

The frame tinted yellow in plan D may be made of wood or of any other suitable material or materials, while the other portion of the carriage tinted blue may be made of iron or steel, or other suitable material or materials.

The carriage may be made with shafts capable of being taken off and put on at pleasure, but this is not indispensable, for the carriage may be made with any other contrivance for fastening the draught horses or cattle thereto when running on the streets or roads, so as that such contrivance be capable of being removed at pleasure; or it may be made with shafts, or any other such contrivance as aforesaid, so made, or capable of being so disposed, as not to interfere with the running of the carriage on a railway.

The inventor does not confine himself to any particular size or shape of carriage, or to the materials of which the same may be composed, or as to whether the wheels are fast or loose on the axles, or as to whether springs of any kind be attached thereto or not.

Whenever it is desired to shift the carriages from rail to road, and *vice versâ*, this may be done by means of an inclined plane raised at the higher end to the level of the rails.

What the inventor claims, secondly, is the adaptation of means of locking and unlocking the frame of the fore-wheels to carriages intended for travelling both on railways and on streets or roads.

Thirdly,

Thirdly, the inventor proposes to use a crossing, as shewn in plan E on the said drawing, so that it will either suit the flanges and treads of wheels of carriages such as are now commonly used on railways, or that portion of his tire or hoop which is used for running on streets and roads, and the side of which acts as a flange when on the railway, as well as that portion of his said tire or hoop which is used for running on the rails. Such crossing may be formed out of the ordinary rail commonly used for the making of crossings.

The explanation next following shews the manner in which the crossing, as shewn in plan E, is adapted to wheels having the inventor's tire or hoop affixed, when the portion of the tire intended for running on streets or roads is on the inside of the tire, as it is in plan A. The inventor proposes that, when any pair of such wheels is going over the crossing, the portion of the wheel intended for running on streets and roads shall on the one side of the line run on the ordinary wing-rail and tongue, and on the other side, on the ordinary guard or check-rail; and that after passing the crossing, that part of the tread of either wheel which is intended for running on the line of rails shall again be used, and run on the regular line on both sides.

The ends of the ordinary guard or check-rail, one end of the ordinary wing-rail, and the base or thick end of the additional tongue, must be sloped, as shewn in plans F and G on the said drawing, so as to allow that portion of the tread of the wheels which is intended to be used for running on roads and streets to rise gradually to its proper height for running on the aforesaid guard or check and wing-rails and tongue respectively during the crossing, and again to fall and act as a flange when the crossing is past.

An additional and inner guard or check-rail, and an additional and inner wing-rail to each line of rails, and an additional tongue, all as shewn in plans E, H, and J on the said drawing, must be used at the crossing, to keep the wheels in position while passing.

The crossing may be made of the ordinary rails or materials used by railway companies for making crossings, or it may be made of cast iron, or of cast iron and plated, or of any other material which may be suitable; and it may secured in chairs, in the manner shewn by cross sections thereof in plans H and J on the said drawing, or by any other means which may be suitable for the purpose.

The inventor does not bind himself to the size or angle of the crossing, or to the description of materials of which any part of it may be composed, or to the particular mode of manufacturing the crossing or any part thereof, or as to the number or division of the pieces of which the same may be composed, whether one or more, or as to the form of the top or sides of the rails.

What the inventor claims, thirdly, is the use of the additional guard or check and wing-rails, and the additional tongue, and the sloping of the ends or end of the same respectively, as aforesaid, and the adaptation of railway crossings by means of these assistants to wheels of carriages, when fitted with such tires or hoops, as before described, having on the inside of the tire the portion intended for running on roads, so as to allow such wheels to run over the crossings on railways, while at the same time permitting engines, carriages, cars, vans, waggons, trollies, lorries, and trucks, and other vehicles commonly used on railways, to run over such crossings in the usual way without interruption.

The inventor has shewn, in plan K on the said drawing, how railway crossings may be adapted to wheels of carriages, when fitted with such tires or hoops as before described, but having the portion intended for running on streets or roads on the outside of the tire; but he does not wish to be understood as asserting that crossings so adapted as last aforesaid would be applicable to wheels of carriages having flanged tires such as now in common use for railways.

And generally, the inventor claims the combination and adaptation to each other of the several parts of his said invention, as hereinbefore set forth.

This is the specification referred to in the annexed Letters of Registration granted to William Elsdon, this twentieth day of October, 1863.

JOHN YOUNG.

REPORT.

Improvements in the construction of Rail and Road Carriages, &c.

REPORT.

Royal Mint, Sydney,
8 *September*, 1863.

Sir,

Having examined and considered the application of Mr. William Elsdon, for Letters of Registration for an invention for the construction of Rail and Road Carriages, &c., we have the honor to report that we see no objection to the protection sought for being granted.

The documents as per margin are herewith returned.

Petition to Governor.
Drawing.
Letter to Private Secretary, from Allen, Bowden, and Allen.

We have, &c.,
E. W. WARD.
JOHN WHITTON.

The Honorable
The Colonial Secretary.

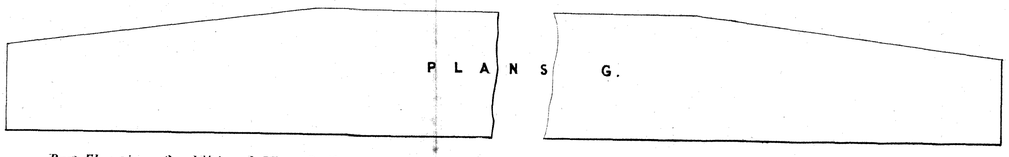
[Drawings—one sheet.]

NO. 80
COPY

AN INVENTION

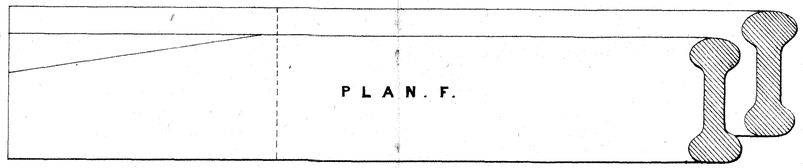
for the construction of Rail and Road Carriages and Improved Wheel Tyres and an Improvement in Railway Crossings adapting them to such carriages

Details of Rails. &c.
Scale ¼th full size

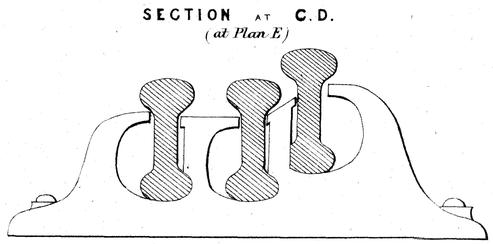


Part Elevation of additional Wing Rails

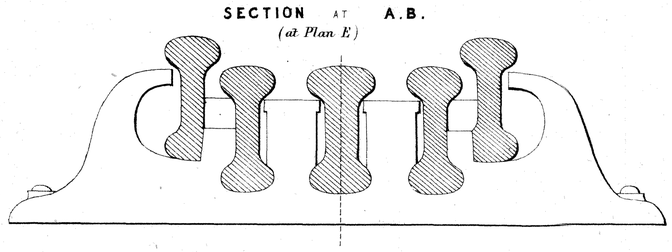
Part Elevation of Tongue



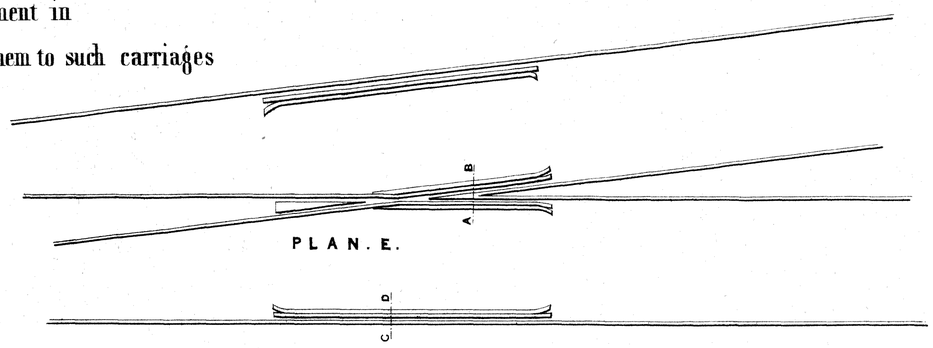
Elevation of End of Guard or Check Rails at Crossing



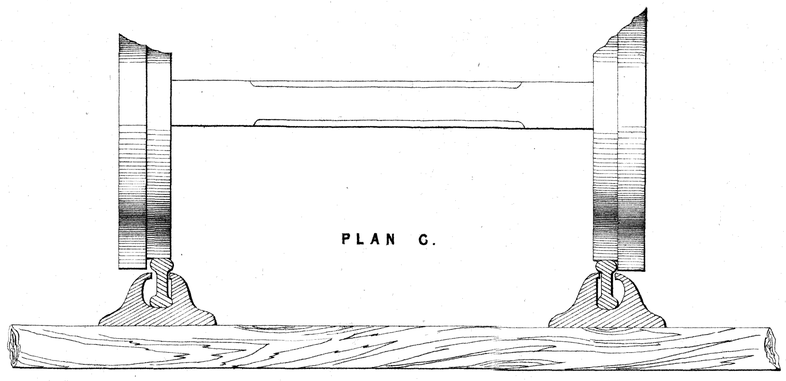
PLAN. H



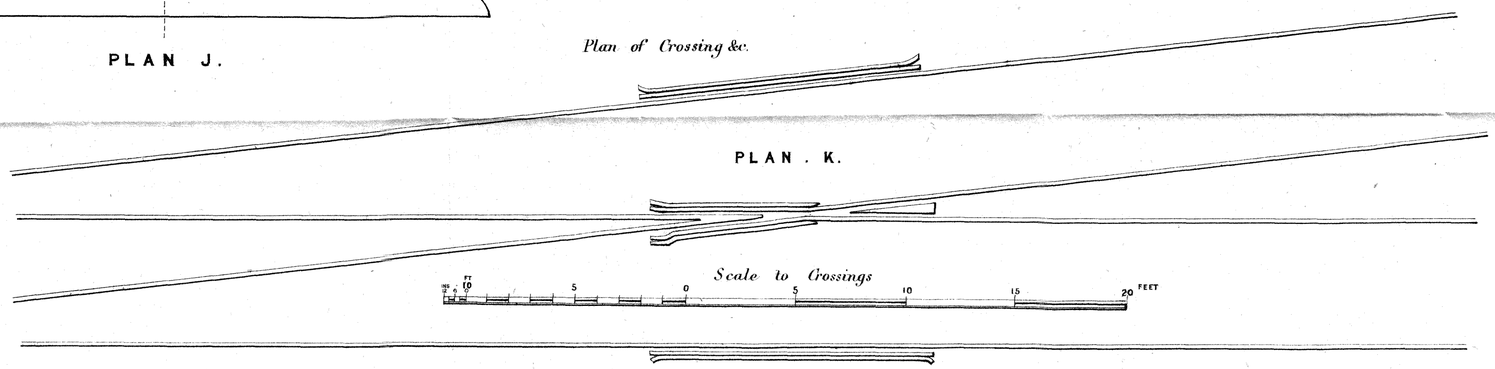
PLAN J.



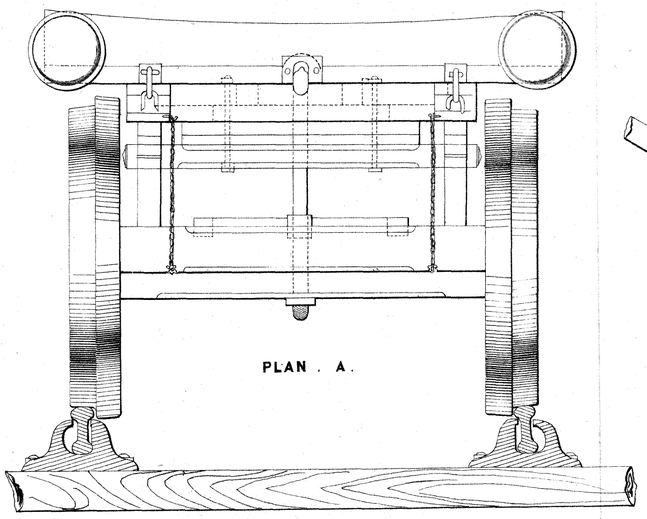
Plan of Crossing &c



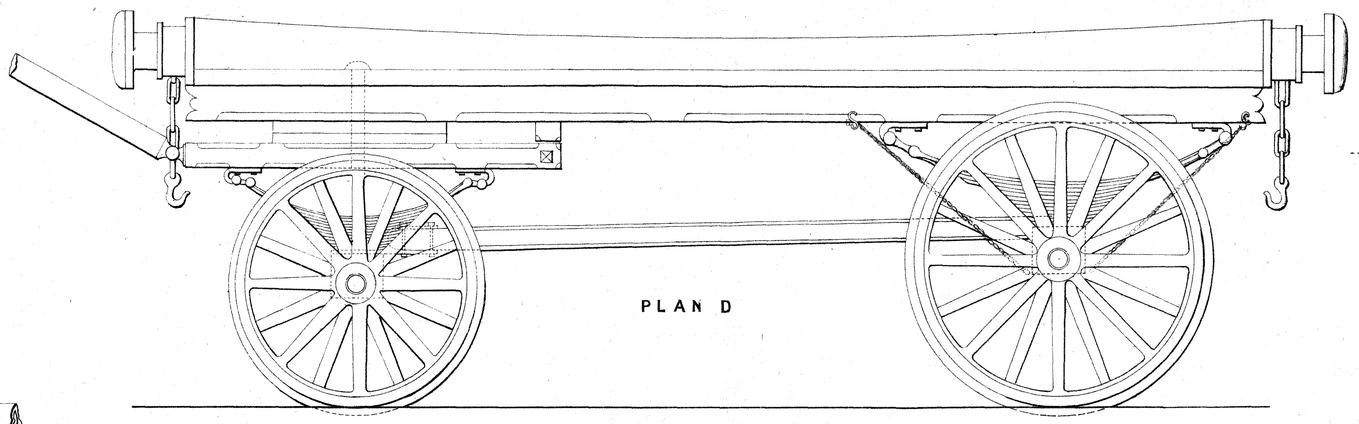
Plan of Crossing &c.

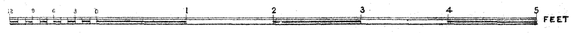


End Elevation

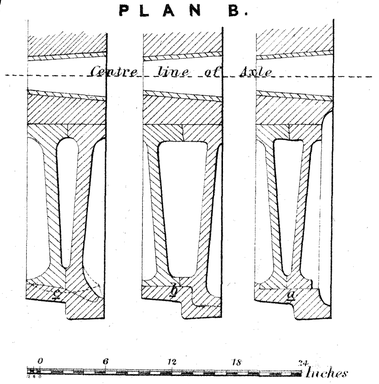


Side Elevation





Section of Hoops or Tyres



This is the Drawing referred to in the annexed Letters of Registration granted to William Elsdon this twentieth day of October 1863.

(Signed)

John Young

A.D. 1863, 28*th October*. No. 81.

IMPROVEMENTS IN SAW-MILLS MACHINERY.

LETTERS OF REGISTRATION to James Hartwell Williams and William Henry Wilkinson, for Improvements in Saw-mills Machinery.

[Registered on the 29th day of October, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Hartwell Williams and William Henry Wilkinson, both of Sydney, in the Colony of New South Wales, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for Improvements in Saw-mills Machinery, which is more particularly described in the specification marked A, and the drawings marked B and C, respectively, hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine

and

and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said James Hartwell Williams and William Henry Wilkinson, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Hartwell Williams and William Henry Wilkinson, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Hartwell Williams and William Henry Wilkinson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-eighth day of October, in the year of our Lord one thousand eight hundred and sixty-three.

JOHN YOUNG.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS COME, We, James Hartwell Williams and William Henry Wilkinson, both of Sydney, New South Wales, and trading under the name and style of Wilkinson Brothers and Co., send greeting:

WHEREAS we are desirous of obtaining Letters Patent for securing unto us Her Majesty's Special License, that we, our executors, administrators, and assigns, or such others as we or they should or may at any time agree with, and no others, should and lawfully might, from time to time, and at all times during the term of fourteen years, to be computed from the day on which this instrument is left at the office of the Colonial Secretary, at Sydney, make, use, exercise, and send, within the Colony of New South Wales, an invention for Improvements in Saw-mills Machinery; and in order to obtain the said Letters Patent, we must, by an instrument in writing under our hands and seals, particularly describe and ascertain the nature of the said invention, and in what manner the same is to be performed: Now know ye, that we, James Hartwell Williams and William Henry Wilkinson, do hereby declare the nature of the said invention, and the manner performed, to be particularly described and ascertained in and by the following statement and description, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon, which indicate the parts there referred to, and here particularly explained—that is to say:—

The invention has for its object the introduction of certain mechanical arrangements in sawing and lifting logs of wood.

Drawing No. 1.

Fig. No. 1 represents a longitudinal elevation of a vertical saw-frame, driven by the direct action of steam; fig. No. 2 represents a sectional end view of the same vertical saw-frame; A, steam cylinder; B, piston rod; C, top of sash in which the piston rod B is attached; C^1, bottom of the sash—between C and C^1 the vertical saws (1, 2, 3, or more) are firmly secured; D D^1 guide rods keyed in the top and bottom of the sash; E, log of wood to be sawn; F F, connecting rods; G G, crank pins; H H^1 pillow blocks; I I, fly-wheels; L, driven shaft; *m m m m*, guide bushes; K K K K, framing columns; J, link motion acting on the feed wheel; O, feed regulator; P, feed wheel; R R, spur wheel and pinions used to retard the motion transmitted by the driven shaft L, by a pulley marked *a*, provided with pressed roller, as shewn on the plan, *k l v b;* eccentric transmitting the motion to the slide-valve of the steam cylinder by two rocking shafts and suitable lever with rods, as marked on the plan, *c d f g;* Y, chain acting on the feeding pawl *z;* W, watertight compartment in which the frame is erected.

Having now described the different parts of the saw-frame, we proceed to explain the mode of working the machine. Steam from a steam boiler is admitted in the cylinder A, through the slide valve, as in an ordinary steam-engine; the sash is immediately lifted, and a rotatory motion transmitted to the driven shaft L, the balanced fly-wheels I I acquire

acquire a momentum which enables the crank G to pass the dead centres; the eccentric *b* is propelled by that motion, and the steam is distributed to each alternative stroke of the piston, and regulated by a throttle-valve and governor, in a similar manner to a steam-engine. The saws 1 2 3, or more, are now in proper motion, and kept to 140 double strokes per minute; the link J, which oscillates between two brackets, is fitted with a sliding block connected to the sash by a stud, which, by the motion of the sash to the oscillating link, is transmitted to the lever regulator by the intermediate pawl *z*. The feed-wheel is propelled, and transmits its motion to the log, by two pinions which gear into racks, fixed on the carriage where the log E is secured ready to be sawn. The chain Y is unfastened, and the pawl *z* drops on the ratchet feed-wheel, so that at each stroke of the sash the ratchet-wheel advances one or more teeth, according as the nature of the work requires. The number of teeth is regulated by the regulating lever O, on which a sliding block acted upon by a screw draws the block in or out of the centre, and carries with it the feed-pawl *z*; the log is then propelled forward, and meets the cutting edge of the saws, so that at each stroke, while the saws are rising, a fresh portion of the log is advanced ready to be cut in the down stroke. The saws are placed in the sash with a fall at the bottom equal to three-fourths of an inch, in order to prevent the saws from touching the log during the ascending stroke. The log having been cut, the feed-pawl is lifted out of gear by the chain Y, and the press roller K is brought to bear on the strap which is driven by the pulley *a*, fixed on the shaft L, and immediately the rotatory motion is given to the pinion and wheel R R, the carriage and log are brought back with a fast speed, and a new log placed ready for cutting. We claim as our improvements—the direct action of steam to the saws; the peculiar construction of the sash, and the arrangements of the connecting rods; the oscillating link used for feeding the log; and the arrangements for reversing the motion of the carriage.

DRAWING No. 2.

Fig. No. 3 represents a plan of a lifting and shifting apparatus, used to supply the vertical frames with logs to cut, and remove them after cutting.

Fig. No. 4 represents a sectional elevation of the apparatus; P, driving pulley receiving rotatory motion from the motive power; S, vertical shaft on which the pulley P is keyed on; R, driving pinion with clutch-box, *g*, cast on; *x*, sliding clutch-box working on a feather; Y, striking lever moving on a centre, with bell-crank working in a cam; L, lever with cam attached to it; *t*, revolving centre; *n*, acting lever solid with the cam, and fixed to the lever L; *m*, connecting rod to break lever; B, break strap and pulley; A, barrel shaft on which the break pulley B is fixed; D, barrel; W, spur wheel in gear with pinion R; H, cast iron box in which the mechanism is fixed, and revolves on the shaft S; F F, transversal wooden girders fixed on the box H; *a*, cast iron shoe fitted with friction rollers and sheave, firmly fixed on the girders F F; O, rope or chain wound up on the barrel at one end, and passing on the sheave to hook the log chain; R, friction rollers working on a circular rail fixed over head to suitable girders; E, circular iron rails fixed to the girders; *p*, hook fastened on the rope or chain O, holding the triangular dog chain; *u u*, timber dogs; M, log of wood to be placed on the frame for cutting, and removal after cutting.

Having thus described the several parts of the apparatus by alphabetical letters, we proceed to explain the mode of working it:—A leather strap is adjusted on the pulley P and the driving pulley of the motive power, which causes the shaft S to revolve; the pinion R, being loose on the shaft and only supported by a collar, allows the shaft to revolve through it, without causing any motion; the sliding clutch secured by the feather revolves with the shaft, and can rise or fall at the command of the lever Y; the end of the shaft S revolves in a cup fixed on the cast iron box H. By the three positions the lever L assumes, the log is either lifted from the ground, then held, or lowered. To effect this, the cam and the acting lever *n* are the principal agents, as will be readily understood by referring to fig. 4 (sectional elevation), in which the three positions of the lever are illustrated. The middle position of the lever L, marked *l* 2, represents the apparatus inactive, or in the act of lowering the log, as the sliding clutch *x* is out of gear, and the acting lever *n*

just

just pressing easily on the break pulley B, and by the amount of pressure exerted on the lever the speed in lowering the log is regulated. In the position *l* 2, the log is held fast at whatever height it has been raised, for the cam is still working in a circle which gives no motion to lever Y, therefore the whole pressure is on the break pulley transmitted by the acting lever *n*, rod *m*, and strap. The third position is in *l* 3; this causes the log to rise from the ground. When the lever L is raised from *l* 2 to *l* 3, the gudgeon of the bell-crank lever Y is drawn by the cam, near to the centre *t*, in an eccentric, which gives a motion towards the centre *t*, and throws the lever Y upward, striking the sliding clutch-box into gear with the clutch *g*; the pinion R then becomes fixed on the shaft S, and capable of driving the spur-wheel W keyed on the shaft A, which holds the barrel D and the break pulley B; the rope winds round the barrel, and the log rises until the lever assumes the position *l*, where it is held fast by the break, until released again by the gradual ascension of the lever to the position *l* 2.

The apparatus possesses another great advantage,—that of shifting the log to any place round the circular rail, as its motions are perfectly independent of the place in the circle where it is wanted to perform, as the box H and girders F are entirely free to move round without interfering with the driving motion P. The cast iron shoe *a* and box H are kept apart by the girders F F, and lateral deflection prevented by the tension rods *d d*. We claim entire novelty in this apparatus, either for saw-mill use, or where weights of any kind have to be raised and shifted.

W. H. WILKINSON, (L.S.)

By J. H. WILLIAMS, his Attorney.

Witness—HENRY DEAN.

J. H. WILLIAMS. (L.S.)

This is the specification, marked A, referred to in the annexed Letters of Registration granted to James Hartwell Williams and William Henry Wilkinson, this twenty-eighth day of October, 1863.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
13 *October*, 1863.

SIR,

Petition to the Governor. Specification, in duplicate. Drawings Nos. 1 and 2. Memo. of payment of £20, signed by J. G. Lennon.

Having examined and considered the application of William Henry Wilkinson and James Hartwell Williams for Letters of Registration, under Act of Council 16 Vict., No. 24, for "Improvements in Saw-mill Machinery," we have the honor to report that we see no objection to the necessary protection being granted.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

No 81
(Copy) B

IMPROVEMENTS IN SAW-MILLS

Drawing N°1.

VERTICAL STEAM SAW-FRAME

Fig N°1
Longitudinal Elevation.

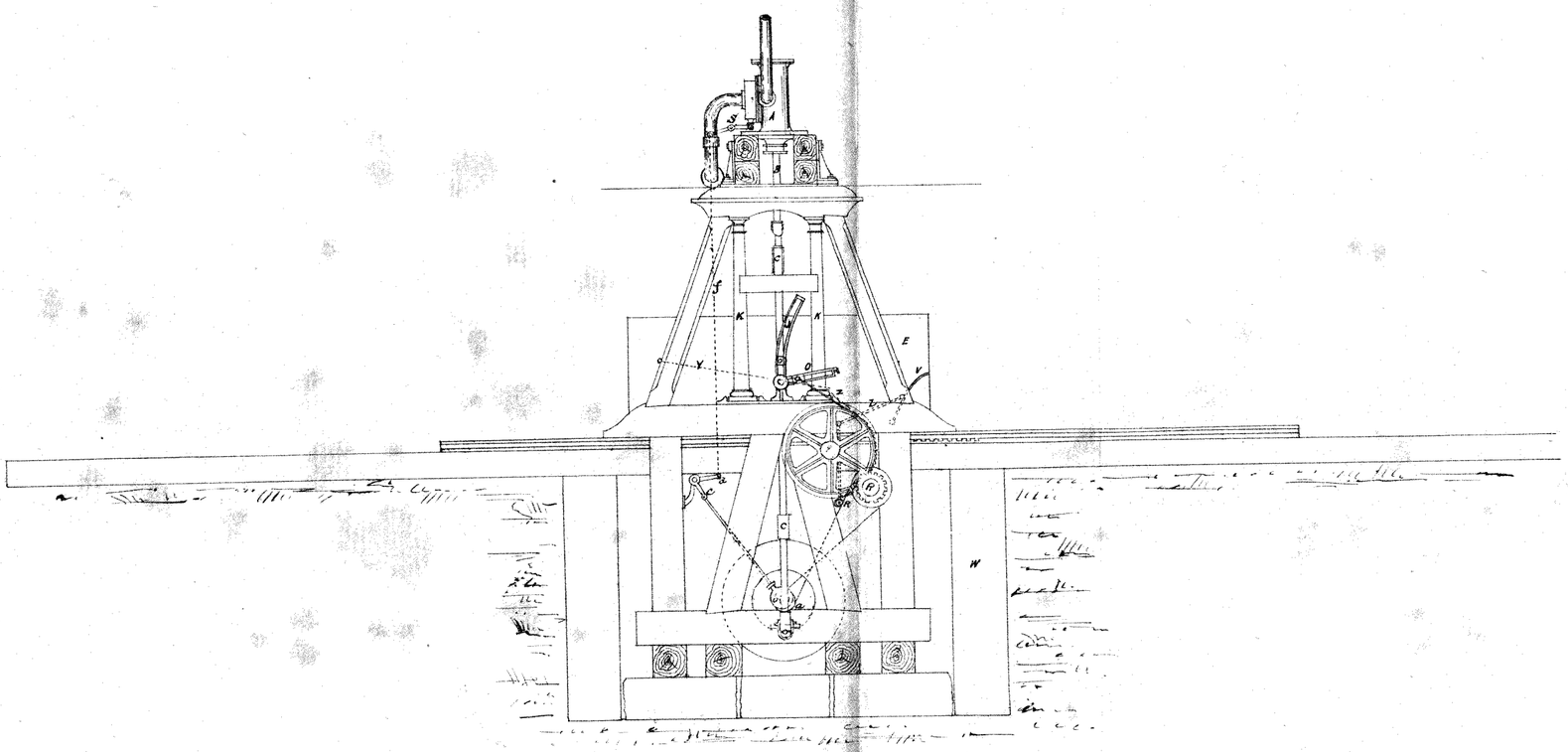
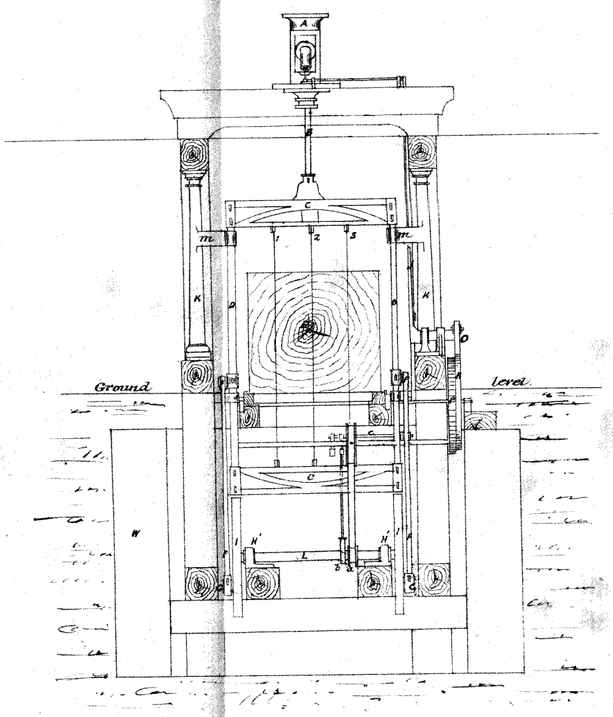


Fig N° 2
Sectional End View.



These are the Drawings referred to in application for Letters of Registration, for an Invention for an improvement in Saw-mill Machinery.

W.H. Wilkinson
by J.H. Williams
his Att'y

Sg^d J.H. Williams.

This is the Drawing marked B, referred to in the annexed Letters of Registration granted to James Hartwell Williams, and William Henry Wilkinson, this twenty eighth day of October 1863.

Sg^d John Young.

No 81
(Copy)C.

IMPROVEMENTS IN SAW-MILLS.

Drawing No 2.

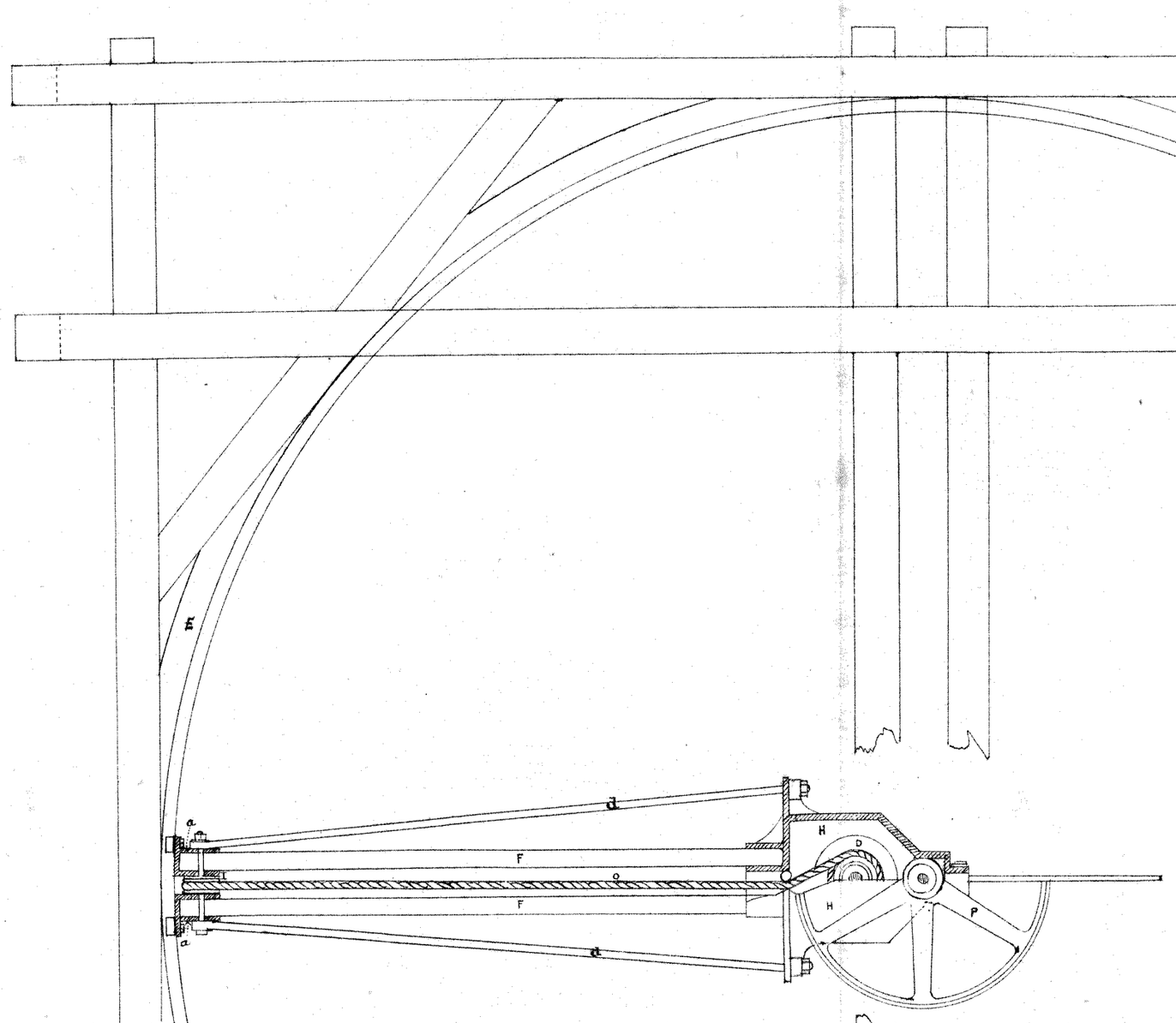


Fig No 3

PLAN

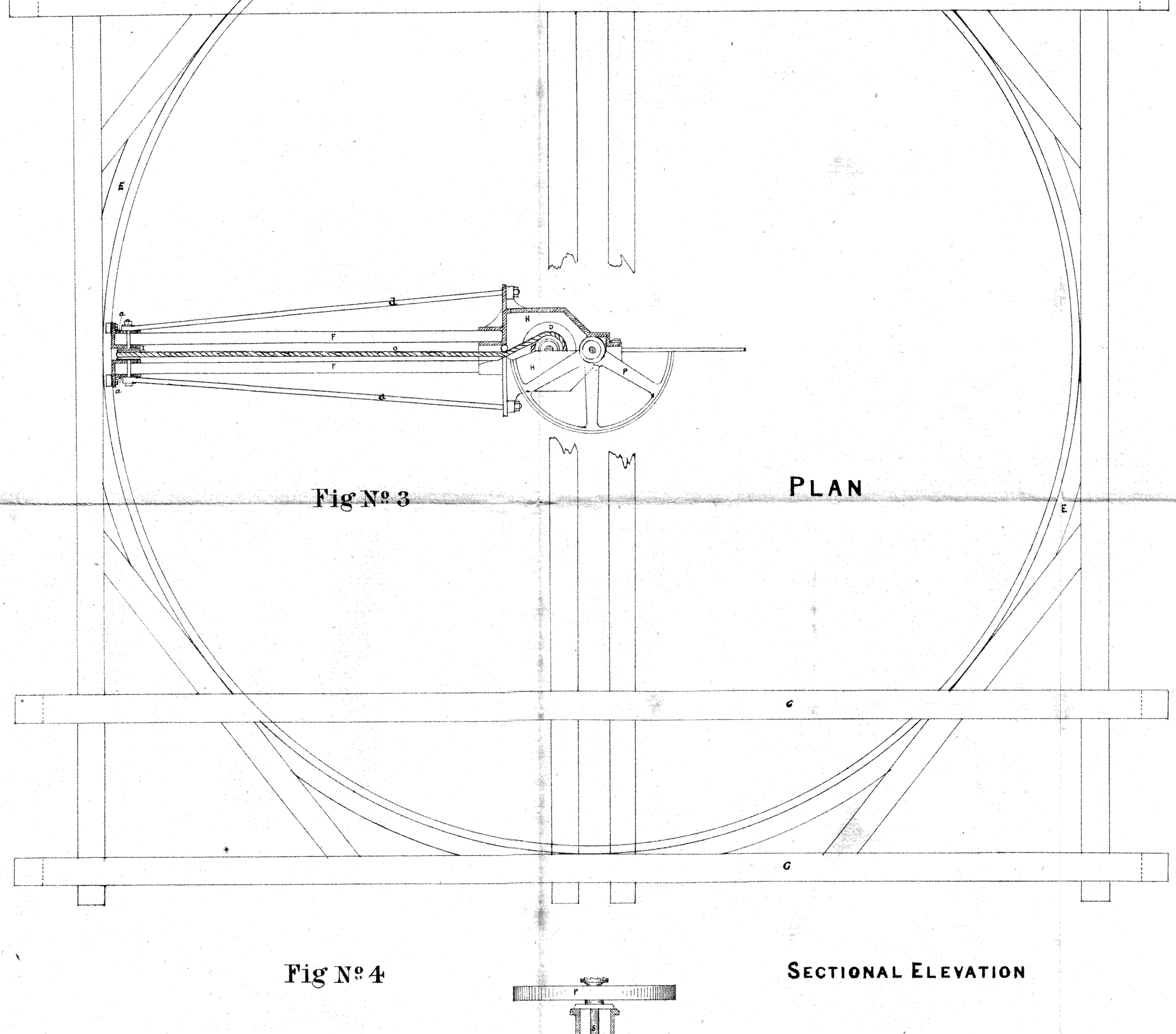
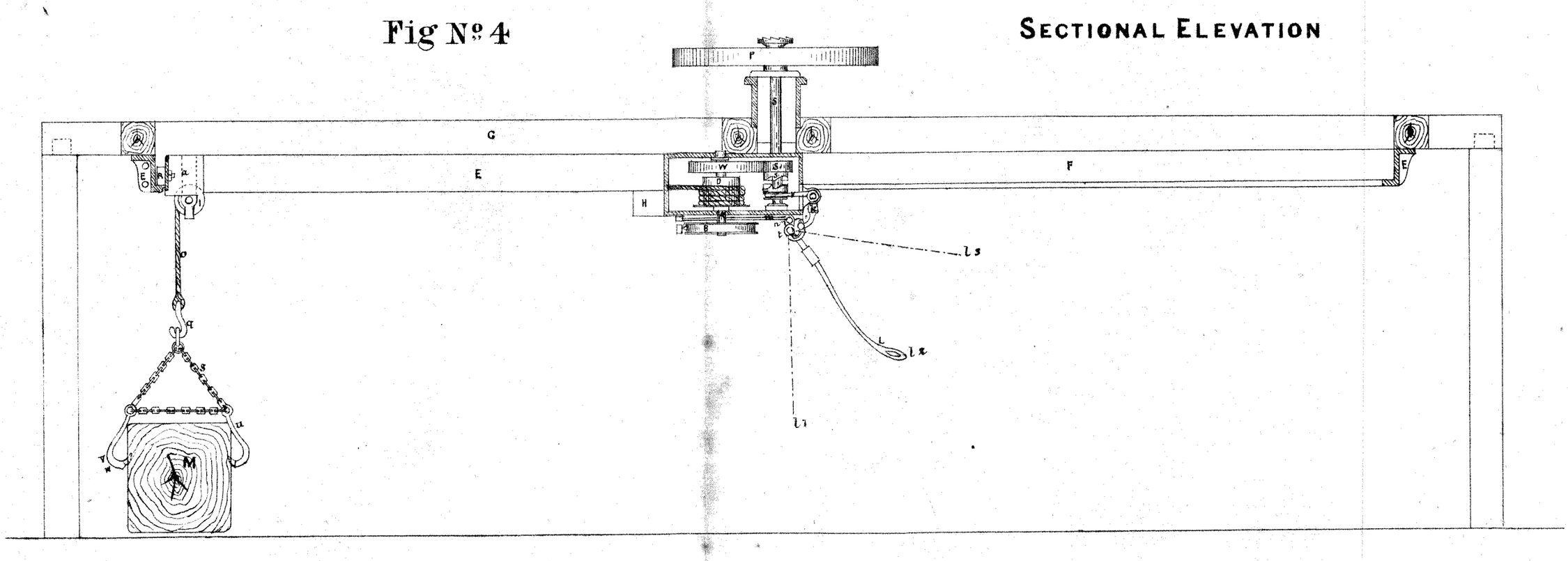


Fig No 4

SECTIONAL ELEVATION



These are the Drawings referred to in the application for Letters of Registration for an Invention for Improvements in Saw-mill Machinery

W.H. Wilkinson
by J.H. Williams
his Atty
Sgd J.H. Williams.

This is the Drawing marked C. referred to in the annexed Letters of Registration granted to James Hartwell Williams, & William Henry Wilkinson, this twentyeighth day of October 1863.

Sgd John Young.

A.D. 1863, *3rd November.* No. 82.

IMPROVEMENTS IN MACHINERY FOR PREPARING DOUGH, &c.

LETTERS OF REGISTRATION to Ebenezer Stevens, for Improvements in Machinery for preparing Dough, &c.

[Registered on the 5th day of November, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Ebenezer Stevens, of No. 139, Cheapside, in the city of London, in England, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in Machinery for preparing Dough and Paste suitable for "making bread, biscuits, pastry, cakes, and similar articles; also, improvements in Ovens, "Hot-plates, and Cooking Apparatus," which is more particularly described in the specification, marked A, and the drawings, marked 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17, respectively, which are hereunto annexed; and that he, the said petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition from competent persons appointed by me to examine and consider the matters stated therein,

therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Ebenezer Stevens, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Ebenezer Stevens, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Ebenezer Stevens shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this third day of November, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

A.

SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME: Be it known that I, EBENEZER STEVENS, of No. 139, Cheapside, in the city of London, do hereby declare the nature of the invention for improvements in Machinery for preparing Dough and Paste suitable for making bread, biscuits, pastry, cakes, and similar articles; also, improvements in Ovens, Hot-plates, and Cooking Apparatus, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof (that is to say):—

THE first part of my invention has for its object improvements in machinery for preparing dough and paste suitable for making bread, biscuits, pastry, and cakes. By means of this machinery, dough and paste may be prepared without the materials being handled or touched by the operator; the process is thus rendered perfectly cleanly, whereas the hand process, as ordinarily practised, is the reverse of this. The use of the machinery described also results in promoting the health of the employed, in a great saving of labour, and in a great increase in the yield of bread, which also is of a better quality. For this purpose, machinery is constructed in the several manners shewn in the annexed drawings, which I will now proceed to describe.

DESCRIPTION OF THE DRAWINGS A.

These drawings shew a double machine, consisting of two mixing vessels with the apparatus used in conjunction therewith. Fig. 1 is a front view, fig. 2 an end view, and fig. 3 a transverse section of the machine; fig. 4 is a plan with some of the parts removed, and fig. 5 is a front view, partly in section, and also with some of the parts removed. The framing of the machine consists of the two side frames *a a*, connected together by the two longitudinal horizontal frames a^1 and a^2. On the side frames *a a* are erected the standards a^3 a^3, which support the hoppers to contain the flour to be mixed; the upper part *b* of each hopper is of wood (this part is removed in fig. 4), whilst the lower part b^1 is a trough of cast-iron with a longitudinal slit or opening along the bottom. There is, however, a low partition in the centre of the hopper which divides the slit into two parts or lengths, each of which is fitted with a slide, *c*, by which the slit may be closed; the slide is supported by guide-bars screwed to the underside of the trough b^1, and is provided with handles, c^1, and also with turn-buttons, c^2, with which to secure it. The hoppers are closed at the top by lids, b^2, hinged to them, as is shewn, and in the lid is an opening of sufficient size to admit of sacks of flour being emptied into the hopper; this opening is fitted with a cover, b^3. Within the hoppers are arranged agitators, *d d*, which are employed to keep the flour in motion, so that it may run with regularity through the slits at the bottom when these are open; these agitators are blades fixed on the axes d^1 d^1, which are kept in rotation, when required,

required, by having spur-wheels, *e e*, upon them, which gear with other spur-wheels, *f f*, and these latter are driven in a manner hereinafter described. The spur-wheels *e* are capable of sliding on the axes d^1, so that they can be drawn out of gear when desired, and with this view the wheels are fitted with handles, e^1; the axes d^1 have feathers upon them, to prevent the wheels *e* rotating independently of their axes. The flour, on descending from the hopper, falls into mixing vessels, and to distribute it evenly over the bottom thereof, or over the dough therein, the dusting-boards *g g* are used; these are mounted on axes, g^1 g^1; g^2 g^2 are arms on the axes g^1—they are connected by rods, *h*, with the crank-pins *i i*, fixed in arms on the pinions i^1, which gear with spur-wheels *j*, on the axes d^1 of the agitators; the dusting-boards *g* thus have an oscillating motion given to them, and the flour, as it falls, coming against these boards, is thrown by them first to one side and then to the other of the mixing vessels. The mixing vessels *k* are made by preference of galvanized sheet-iron, rivetted together; they are each mounted on three wheels; the stud-axes of the two hinder wheels k^1 k^1 are fixed to the bottom of the vessel, and the axis of the third or front wheel k^2 is carried by a fork at the lower end of a vertical spindle, k^3, which is capable of turning in a bracket-piece rivetted to the mixing vessel, as is shewn. The upper end of the spindle k^3 is squared to receive a handle, shewn partly in the drawing fig. 3, and marked *k* 4, by means of which the mixing vessel can be drawn from place to place; and by directing the handle to one or other side, a corresponding direction will be given to the leading wheel, and the vessel will thus be steered or guided. The bottom of the mixing vessel *k* is made double, and the space enclosed is employed to contain warm water, to keep the dough at the proper temperature for fermentation when the mixing is complete. The water is poured in at the opening, k^5, and run off, when done with, by the cock k^6; or steam may be employed to warm the mixing vessel, or gas may be laid on under it. In very hot climates it is necessary to cool in place of to heat the mixing vessel; k^7 is a portion of the front of the mixing vessel, which is removable to facilitate the taking the dough or paste out of the vessel; at other times it is held in its place by the catches k^8. The mixing vessels are kept in their places in the machine, during the mixing process, by bars, *l*, which bear on the front of these vessels; the bars have eyes at their ends, which pass over screws projecting from the side frames *a*, and they are secured by the hand-nuts l^1. Within the mixing vessels are the mixers *m*; they are teeth made of wrought iron, and set in inclined positions on the cranked axes or bars m^1 m^1; these have sockets formed at their ends, which are made square interiorly. The way in which these mixers are carried and are actuated, as shewn in these drawings, and as is suitable for machines of very large size, is as follows:—*n n* are standards which carry, in suitable bearings, tubular axes, *o*; through each of these axes a bar, *p*, passes; it is also further supported by a bearing, p^1, and is squared at the end; these bars *p* are capable of sliding within the tubular axes, but are made to turn with them by means of feathers or otherwise. The squared ends of the bars *p* fit into the sockets at the ends of the mixers, so that when the four tubular axes *o* are driven, they carry the mixers with them. Simultaneous motion is given to these four axes by the four large spur-wheels, *f f*, mounted upon them; the two wheels which are at one end of the machine gear together, as do also the two wheels at the other. *r* is a horizontal axis at the centre of the machine; it is carried in bearings on the frames *a*, and is driven either by power, or by a crank-handle applied at its end and actuated by manual labour—with this machine, however, power is more commonly employed. The axis *r* has at each end a pinion, r^1, which gears with one of the spur-wheels *f*, and from them, as has already been traced, the mixers receive motion. The pinions r^1 are not fixed on their axis, but are capable of sliding on a feather; this arrangement is made in order that the speed of driving may be varied, to effect which there are also other larger pinions, r^2 r^2, similarly mounted on the axis *r*, and these, when the pinions r^1 r^1 are out of gear, can be made to gear with the spur-wheels *s s*, of which there are two, one at each end of the machine; they are mounted on two of the tubular axes *o*; the axis *r* has also a fly-wheel, r^3, upon it, to keep the speed of rotation as nearly uniform as may be. When the machine is desired to run fast, that is to say—when only a part of the flour has been let down and mixed with the water, and before the dough is stiff, the larger pinions r^2 are made to gear;

gear; but as soon as the dough stiffens, these are thrown out, and the smaller pinions r^1 thrown into gear, so that the machine may be driven at a slower speed. In order to throw these pinions in and out of gear, there is a collar on each pair of pinions, r^1 r^2, which is embraced by a fork, t, capable of sliding to and fro in guides in the frame; these forks are each attached to connecting rods, u u, and these are pin-jointed to a lever, v, mounted on a fixed centre, v^1; this arrangement causes the pinions at the opposite ends of the machine to move in unison. w is the handle by which the pinions are thrown in and out of gear; it is mounted on the fixed centre w^1, and at its inner end is pin-jointed to one of the forks t, as is shewn; this lever can be locked to the frame by a pin, w^2, either in position to retain in gear the pinions r^1 r^1 or the pinions r^2 r^2, as may be required. When the dough or paste is completely mixed, it becomes necessary to remove the mixers from the mixing vessels, and for this purpose the bars or axes p have to be drawn back. To effect this end, each of the axes p has a collar on it at p^2, which is embraced by a fork on one of the levers x; these levers are mounted on fixed centres at x^1, and each of them, at its inner end, is pin-jointed to one of the connecting rods y. These rods are connected in pairs to the levers z z; one of these levers z serving for the axes p p of one of the mixing vessels, and the other lever, z, for the axes p p of the other mixing vessel. A A are the handles by which this gear is worked; they are fixed on horizontal axes, A^1 A^1, and at their inner ends they each have an arm, A^2, projecting downwards, and entering a slot in one of the rods y. Thus it will be seen that by turning one of the handles A, the axes p p of one of the mixing vessels can be withdrawn or protruded out, as may be required. There are holes in the sides of the mixing vessels, through which the axes p p can pass freely. Another method of carrying and actuating the cranked mixer axes m^1, and which is preferable, except where the machines are of very large size, is hereinafter described.

Description of the Drawings B.

These drawings shew a single machine for preparing dough and paste; the said machine consisting of one mixing vessel and one hopper, with the apparatus used in conjunction therewith. Fig. 6 is an end view, fig. 7 is a front view, partly in section; fig. 8 is a front view (with the mixing vessel removed); and fig. 9 is a plan (with the hopper and parts connected therewith removed) of such a machine. The machine is in most respects similar to one half or part of that already described, and the letters of reference on the drawings, in so far as they correspond with the letters of reference on the drawings A, refer to the description of those drawings hereinbefore contained. There are, however, some alterations in the arrangement of the present machine, to which I will now proceed to refer. The two side frames a a are connected together by a single transverse frame of corresponding depth, a^x, as the drawing shews, in place of by two bars or frames as before. The frame also in this machine is furnished with a bracket, a^4, springing from one of the side frames, to support an outside bearing of the axis r, whereas in the former machine a separate standard was employed for that purpose. Connected with the frame are also arms, a^5, tied together by a bar, a^6, and having friction-wheels, a^7 a^7, mounted upon them; these arms are to support a lid, with which the mixing vessel is fitted when the lid is out of use, and the friction-wheels are to enable the workman, without difficulty, to run the lid on to or off from the mixing vessel. The agitators d in the hopper are fewer in number than those contained in the hoppers of the double machine, as the single machine is not of so great a width, and the number of mixers m is also for the same reason decreased. There is also a slight modification in the method of actuating the dusting-board g, an eccentric, i^2, being fixed on the axis of the pinion i^1, to the strap of which the rod h is attached. There are also in this machine other minute differences in the form of the parts, to which it is unnecessary to allude.

Description of the Drawings C.

These drawings shew a machine similar to that shewn in the drawings B, in as far as its mode of action is concerned, but differing therefrom in that the mixing vessel is fixed, and serves in great part as the frame of the machine. Fig. 10 is a plan, fig. 11 is a front view, and fig. 12 an end view of the machine (the two latter views both shew the machine

machine partly in section). The mixing vessel k stands on four feet, k^x k^x, and to each end of this vessel a casting, a^8, is bolted, and these carry the bearings of the axes p, and have brackets upon them, with bearings for the axis r; the latter being further supported by outside bearings, carried by the brackets a^4 a^4; the hopper b is also carried by standards, a^9 a^9, supported on the castings a^8. The apparatus by means of which the pinions r^1 and r^2 are slid along their axis, and also that by means of which the axes p p are protruded and withdrawn, is similar to the corresponding apparatus of the machines already described, and consequently I have considered it unnecessary to shew it in the drawing. Brackets to carry the axes of the levers v and z of this apparatus are bolted to the back of the mixing vessel.

Description of the Drawings D.

These drawings shew another machine, in which also the mixing vessel is fixed, and serves for the frame of the machine, but in this case the mixing vessel is made of wood, and the hopper and parts in connection therewith are dispensed with, the flour being put into the mixing vessel by hand. Fig. 13 is a front view, fig. 14 an end view, fig. 15 a plan, and fig. 15^x a transverse section of the machine. The mixing vessel k is mounted on four feet k^x k^x, and is, as before mentioned, constructed of wood; the semi-circular false bottom k^9 of the mixing vessel is, however, of sheet metal, fitted tightly to the side of the vessel; the space between the two bottoms is, as before, for containing warm water, and suitable apertures are provided for the introduction and withdrawal of the water. The axes p of the mixers are carried in bearings on the castings a^8 fixed to the ends of the vessel k, and they are arranged and act in the manner already described, except that the two axes cannot be drawn back simultaneously, gear for this purpose not being provided; each of them, however, has a separate lever-handle, w, which is forked at the end, and embraces a collar on the axis, and these handles serve to draw the axes in and out. The axis r also has its bearings on brackets of the castings a^8; it has but two pinions r^1 r^1 upon it, and these are permanently fixed; the two speeds of driving being in this case obtained in a different manner from that hereinbefore described; the axis has also a fly-wheel, r^3, upon it, and the fly-wheel has a crank-handle, by which the axis can be turned. The pinions r^1 gear with and drive the wheels f, and thus the mixers are actuated when the slow speed is required; for the quicker speed, these pinions are thrown out of gear by sliding the axis r in its bearings; r^x is a turnover piece, which keeps the axis in the position required, with the pinions either in or out of gear; this it does by acting as a stop to a collar on the axis, so as to prevent it sliding; the piece r^x is lifted by hand, to set the axis free to slide. For the faster speed, a crank-handle is applied to the end of one of the axes p, which is, as is shewn, squared to receive it; the pinions r^1 may either be left in or thrown out of gear. The cover k^{10} of the mixing vessel is arranged to be used as a dough board.

I would remark, that it is only in machines of very large size that it is desirable to drive the mixer axis m^1 from both ends; in machines of ordinary size, it is only necessary to drive it from one end, and this greatly simplifies the arrangement of the gearing. A plan of a machine thus arranged is shewn at fig. 16 of the drawing D^1. In this machine also but one axis p is employed, the mixer bar at the other end being supported simply in a socket formed in the end of the mixing vessel. The axis p employed is not made to slide, and the method of holding and driving the mixer bar m^1 is modified to admit of this, in a manner hereinafter described. This is a change also, which greatly simplifies the arrangement of the machine, and it forms an important part of my invention. The machine has a movable mixing vessel, which is received between the two standards a a of the frame, and is held in its place by hooks or catches, l^x, at the back, in place of by the bar l, as before; the standards a are connected together by a bed-plate, as is shewn. The axis p is made in two parts, the bearings of one part being carried by the standard, and that of the other, by the end of the mixing vessel. If the machine, however, were made with a fixed mixing vessel, it would not be necessary to make the axis p in separate parts; it is required when a movable mixing vessel is employed, to allow the vessel to be run in and out; but when the vessel is in its place, the axis works as if it were in one piece, there being a fork formed on one part of the axis, which then embraces a cross-

head

head on the other part of the axis. The standards *a a* also carry the axis *r*; this axis, however, has pinions, r^1 and r^2, at one end of it only, and similarly there is but one wheel *f*, and one wheel *s*. The pinions r^1 and r^2 have a handle attached to them, by which they are moved in and out of gear. In this machine, also, the fly-wheel r^3 is not mounted on the axis *r*, but its axis is carried by a separate standard, and has fixed on it a spur-wheel, r^4, which gears with another larger spur-wheel, r^5, on the axis *r*; this arrangement, as it causes the fly-wheel to revolve more rapidly than the axis *r*, allows of a lighter wheel being used without any loss of efficiency. In order to give sufficient strength to the mixer bar, to allow of its being driven from one end only, I strengthen it in the angle by means of a diagonal tie. Fig. 17 is a side view of a mixer bar, m^1, thus strengthened; m^x is the diagonal tie; it extends, as the drawing shews, from the square driving socket of the mixer bar to the horizontal portion thereof. Figs. 18 and 19 are end views of the mixer bar shewn at fig. 17, and fig. 20 is a transverse section of the same. It will be seen that the form of the mixers *m* is somewhat varied—that indicated in these figures is very effective. In this case, in order that the mixer bar m^1 may be movable, as is required, the driving socket of the bar is notched on one side, as is shewn by the end view. This allows it readily to be put on or removed from the axis *p*; and to prevent it falling off this axis, when in the course of each rotation the notch is uppermost, a semi-circular lip is formed in the mixing vessel immediately under the axis, and this receives and supports the boss or exterior of the driving socket of the mixer bar—the end of the driving axis *p*. I do not, in this case, make it square in section, but I make it to correspond in form with the notch in the mixer-bar, into which it is to fit. The mixer bar may also be prevented falling off the axis *p* by means of a ring made to slide over the point of junction. If desired, the mixing vessel may be divided into two compartments by a central partition, and then two mixer bars are used, one in each compartment. In the partition there is a bearing carrying a short axis, which receives at each end the end of one of the mixer bars, which it retains, as already described, either by means of a lip or by means of a sliding ring. When the axis *p* is turned, both mixer bars will be driven, and they are arranged so that when the mixers *m* of one bar are in the dough, those of the other are up out of it; consequently, the power to drive two mixer bars so arranged will be more uniform than when one bar only is used. In some cases, when employing a flour hopper above the mixing trough, I dispense with the vibrating dusting-board *g*, and in place thereof I make a portion of the slide *c* of perforated metal or gauze; the motion of the stirrers within the hopper will ensure the passage of a continued shower of flour through the perforated portion of the slide. Fig. 21 is a front view, and fig. 22 a vertical section of a portion of a flour hopper thus constructed.

In making the best bread it is customary always to sift the flour; when this is desired, I mount a rotatory sieve in the hopper, over the mixing vessel, and in place of putting the flour direct into the hopper, I put it into a shoot at the side, from whence it passes through the sieve and into the hopper. Fig. 23 is a vertical section of the upper part of a hopper, with a rotatory screen combined with it. D is the shoot into which the flour is placed. E is the axis on which the rotatory screen F is fixed; this screen is conveniently made of perforated metal or wire gauze, or it may be made of woven fabric. The axis E is caused to rotate by means of a pinion, G, at its end, which gears with another pinion, H, which is either turned by means of a crank-handle, or it may be thrown into gear with the wheel *e*, if sifting and mixing be required to go on simultaneously. I is an inclined propeller, mounted on the axes E within the shoot D, to draw the flour forward into the screen.

Description of the Drawings E.

These drawings shew apparatus which I employ to raise the dough or paste in the mixing vessel, in order that it may be removed therefrom. Fig. 24 is a side view; fig. 25 a front view; and fig. 26 an underside view of such apparatus; fig. 27 is a bar, which is placed in the mixing vessel on the axes *p p*, in order to receive the lifting apparatus, which consists of a scoop formed by two side plates, *a a*, and a bottom plate, a^1. On the bottom plate is the sliding bolt *b*, and the fixed stops *c c* c^1 c^1. In putting the scoop

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on to the bar, fig. 27, it is applied so that the stops c come on one side of the bar, and the stops c^1 on the other, then by shooting the bolt b the apparatus is secured. The bar fig. 27 is made to turn in a direction to bring the face of the plate a^1 of the apparatus against the dough or paste in the mixing vessel, and a piece of the dough or paste is thus scooped up, and brought to such a level that it can readily be taken out of the scoop and carried away by the workman. Fig. 28 is a side view; fig. 29 is a front view; and fig. 30 an underside view of another arrangement. The scoop is formed of side plates, a a, and a bottom plate, a^1, as before; but the method of securing it to the bar is different in these figures. The bar is marked b, and it has a frame, c, fixed upon it. To the bottom of the scoop, lugs, d d, are fixed at the back, and a single lug, e, at the front. In putting the scoop into its place, the lugs d d are passed through the fame c, and slid up towards the axis b; the lugs d d then catch the projections c^1 c^1 of the frame, and the lug e at the same time catches the front bar of the frame, and the set screw f, when screwed down, holds the parts securely in this position. In place of these arrangements, I in some cases employ a scoop, which is fixed on the mixer bar when it is required to discharge the dough. Fig. 29^x (see sheet G) is a side view; and fig. 30 is a plan of a scoop suitable to be so employed; a a are two side plates; b a bottom plate; and c a central partition. These parts form a double scoop, and it is of such a size as just to fit in between two of the mixers m, the mixer bar entering into the notches c^1 c^1 of the scoop. The scoop is secured by a bolt passing through it, and through the ends of two of the mixers m. The double scoop raises two pieces of dough at each rotation—one on the plate b, and the other on the plate c.

Description of the Drawings F.

These drawings shew a machine for mixing dough or paste of smaller size and simpler construction than those shewn in the drawings A, B, C, and D. Fig. 31 is a front view; fig. 32 an end view; fig. 33 a plan; and fig. 34 a transverse section of the machine.

In this case, as in the drawing D, the hopper and the parts in connection therewith are dispensed with, the flour being put into the mixing vessel k by hand, this vessel being also in this case constructed of wood, with the exception of its inner or semicircular false bottom, k^9, which is made of sheet metal. The mixers m, and their bar m^1, are as before, except that at one end of the bar m^1, a stud, m^2, is fixed to enter a circular hole or bearing in the end of the vessel k, there being in this machine but one axis, p, employed; one of its bearings is in the end of the vessel k^1, and the other is formed on the casting a^8, fixed to the side of the vessel; the axis p is arranged in all respects like one of the axes p, in the drawings D. The axis r has a bearing at one end on the casting a^8, and at the other a bearing on the bracket, bolted to the end of the mixing vessel. The axis has on it but one pinion, r^1, and this is fixed upon it; the axis is capable of sliding in its bearings, as before, to throw the pinion r^1 out of gear. On the axis r is a fly-wheel, r^3, and this has a crank-handle upon it, by which the axis can be turned; and the other end also is squared to receive another crank-handle, if more power should be required. There is in addition a square at the end of the axis p, for the faster speed.

Description of the Drawings G.

These drawings shew a machine still smaller, and more simple in its construction, than that shewn in the drawings F; it is such a machine as is adapted for use in small households; it is made with the axis p fixed as described in respect to fig. 16. Fig. 35 is a vertical section; fig. 36 an end view; and fig. 37 a portion of a plan of the machine. The mixing vessel is arranged as in the machine last described, but is smaller, and not provided with feet, as this machine is intended to stand on a table. The casting a^8, which is bolted on to one end of the machine, is so made as to case in the wheels f and r^1. The wheel f is fixed directly on the axis p, one bearing of which is carried by the bracket a^8, and the other by the side of the mixing vessel. A front view of the bearing within the

mixing

mixing vessel is shewn separately at fig. 38, and a plan of the same at fig. 39. In the same figures a portion of the axis p and also of the mixer bar m^1 is shewn, as will be seen. The bearing has a semicircular lip, k, upon it—this, as already mentioned, is to prevent the mixer bar m^1 falling off the axis p, when the notch in the boss of the mixer bar is uppermost. By making the axis p stationary, that is to say, so that it cannot slide endwise, I am enabled, as the drawing shews, to bring the spur-wheels close up to the side of the mixing vessel; and this is the case, whatever be the size of the machine, where a fixed mixing vessel is employed. The axis r is carried in bearings, one of which is in the casting a^8, and the other in a bracket fixed to the back of the mixing vessel. No fly-wheel is employed in machines of the small size shewn in these drawings, and for the sake of simplicity of construction, the pinion r^1 is not made to slide in and out of gear.

Another part of my invention consists of improvements in ovens, hot-plates, and cooking apparatus.

I construct ovens, according to my invention, in the manner shewn in the drawings H. Fig. 1 is a perspective view; fig. 2 a longitudinal section; and fig. 3[a] a back view of an oven. As will be seen, I employ a chamber made in fireclay; this chamber can be (unless of large size) made in one piece; it has an oblong floor, and is open at one end only, where it is fitted with doors; this chamber receives the loaves or other articles to be baked. In order to prevent the clay chamber cracking when exposed to the heat of the fire, it may, as is shewn, be surrounded by a skin of iron; the baking chamber is contained within another similar fireclay chamber, there being sufficient space all around between the two chambers to form the heating flues, and suitable openings or flue doors are arranged for cleaning these flues when required. The oven fire is situated under the open end of the baking chambers, the bottom of the outer chamber above-mentioned stopping short so as to allow room for the fireplace, which is formed in iron and lined with fire-lumps; the front of the fireplace is closed with fire-doors, and underneath the fire-bars there is an ash-pit also fitted with a door, or with a slide to regulate the draft; behind the fireplace, and underneath the baking chamber and its outer chamber or case, there is a hot closet suitable for warming or drying; this closet may be constructed either of iron or fireclay. There may be an exterior casing around the oven, which is also of iron, or in some cases this casing may be dispensed with. The flues around the baking chamber communicate with a passage in which there is a damper with a chimney, or these ovens may be constructed to bake with gas, the gas to be introduced either inside the baking chamber or between the inside and outside casing of the ovens; within the baking chamber, and running along the top of it, I place a thermometer, the graduated stem of it projects through the front of the chamber immediately over the doors, and is bent so as to lay along horizontally in a position in which, whilst it is easily observed, it is not liable to be damaged.

In some cases—as is shewn at fig. 3, which is a longitudinal section of part of an oven—I make the outer fireclay chamber considerably longer than the inner or baking chamber; and the portion thus added I make open at the top, so that the iron case over it may become heated and serve as a hot-plate. On this hot-plate I prefer to use a compound vessel, consisting of an ordinary saucepan with another inside similar to a glue-pot, but having a handle to each pan or pot; passing from the outer pot, I have a small pipe upon which I place a steamer, with another pipe or nozzle attached to fit the pipe of the outer pot, so that the steam passing from the outer pot passes into the steamer, to steam potatoes and other kinds of food. The frying-pan I make as a double pan, and between the two I have a lining of fireclay or sand, or other suitable material, to prevent the metal bottom on which the fire strikes coming into direct contact with the food. The gridiron I make with the bars fluted in the shape of a V, and the outer bars are also of a V shape, but deeper than the bars that run across; the bar at the back, close to the handle, is more deeply grooved, to receive all fat both from the bars and the outer rim. Instead of four ordinary feet, I prefer another rim of plain iron, round or square (according to the shape of the gridiron), to form a complete stand, instead of feet. I also have a sliding bolt under the handle, to slide in and out, to rest on the bars of the

fire

fire or plate. I also, for these ovens, prefer a baking-dish made double, as is shewn at fig. 3^b, to receive water between the two parts; these parts may be joined together, or there may be two dishes fitting the one in the other; in this double dish I rise a perforated strainer on legs for potatoes, and above this strainer the stand for the meat; thus there is an outer dish for water, an inner one for pudding and gravy—then a strainer for potatoes, and above a stand for the meat.

In some cases I construct ovens in a somewhat similar manner, but arranged vertically, as is shewn at fig. 4, which is a vertical section of an oven; in this case I have an outer cylinder or case of iron lined internally with fireclay, and placed vertically, and within it another similar cylinder, also lined with fireclay and closed at the lower end. Underneath the bottom of the inner cylinder is a fireplace and ash-pit, each with a door as is usual; the space between the two cylinders forms the flue from the fireplace, and over the top of the inner cylinder there is a passage leading to a chimney. The top or head of the outer cylinder is not lined, and serves as a hot-plate; it has a lid or cover in the centre, which is removed to get at the oven or inner cylinder, which also has a cover at the top, and below it a series of shelves to support the bread, meat, or other articles to be baked. At the bottom of the inner cylinder, and between it and the lining, sand or other suitable material is placed, to prevent the lowest compartment of the oven becoming too highly heated. Ovens of similar construction may also be made entirely of fireclay, without the iron cylinders or cases.

The ovens above described are portable ovens, but ovens on the same plan may be made, fixed, and of any size, and if preferred the fire may be made to play inside the chambers in which the food is placed. These ovens admit of considerable variation in form. I also construct ovens of small size, to be placed in front of a fire, of a rectangular iron case, lined with slabs of fireclay on every side. Fig. 5 shews several views of such an oven. There is a door or doors by which the articles to be baked are put into and taken out of the oven. Immediately under the baking chamber is an inclined reflector, to throw upwards on to the bottom of the baking chamber the heat which otherwise would escape in this direction; behind this reflector is a space which serves to receive plates to be warmed. The oven thus arranged may be placed on a stool or support in front of the fire, and in this case it is convenient that the said stool or support should be made adjustable in height, or it may, as is shewn, be supported on brackets, which hook on to the bars of the fire-grate. The brackets have two horizontal bars, which pass through holes in the oven-case immediately under the baking chamber, and the oven is capable of sliding on these bars to or from the fire, to regulate the heat, as may be required, the brackets also serve to hold the door level with the bottom of the oven when it is open, the door being hinged to the oven at the bottom. The same apparatus may be used also for roasting, there being a small aperture in the top of the oven which allows a hook from a bottle-jack to pass; the meat to be roasted is suspended from this hook within the oven, which is placed in front of the fire. The front of the case facing the fire is taken out, together with the front slab of the fireclay lining, so that the meat is exposed to the direct rays of the fire; the door at the back can also be opened for roasting if required. The same apparatus also serves for frying, the bottom of the oven, when the fireclay slab is removed, becoming so highly heated as to boil the grease in a pan placed upon it. It is not essential in ovens of this construction that the fireclay slabs should be used as a lining to an iron skin; the fireclay slabs could be used alone to form the chamber of the oven, or the chambers may be moulded in the piece. Ovens of a very similar size I make without the reflector at the bottom, as is shewn in fig. 6, and I provide them with a handle by which they can be moved about like an ordinary pot. The fireclay chamber may be moulded in one piece or otherwise, and is, as before, contained in an iron case with a door at the back; a convenient form for such ovens is semicircular, the convex side being towards the fire; and I fix two reflectors, the one on each side of the oven, to concentrate the heat upon it. There is a hook on the oven by which it can be hung on the bar of the fire-grate, or it may be placed over the fire—the handle forms the bracket to hold up the door when open. Ovens to be placed over the fire, I however prefer to make rectangular in section, as is shewn at fig. 7, but without any reflector; these may be made all of fireclay, or of iron and fireclay as desired.

When

Improvements in Machinery for preparing Dough, &c.

When the ovens herein described have no furnace attached to them, I provide separate fires, when the ovens are required for use in the field, or for emigrants; and these fire-grates or stoves, as is shewn at fig. 8 and at fig. 9, I make double, to admit of earth or sand between the two parts, or I line them with fireclay, and I also have a hot-plate to cover over the open fire, made removable with a fixed handle in front, and space behind, to admit the escape of the flames or smoke, there is a hole or holes in the plate as required. Also, under these fire-stoves I have a sheet or cast iron perforated slide or dish, also removable, for roasting or baking potatoes and other articles; this perforated slide or dish may be made to slide on the bars, or on a separate adjusting stand, or it may be fixed. Either of these arrangements can be used with house fires.

In witness whereof, I, the said Ebenezer Stevens, have hereunto set my hand and seal, this twenty-first day of April, in the year of our Lord one thousand eight hundred and sixty-three.

E. STEVENS. (L.S.)

This is the specification referred to in the annexed Letters of Registration granted to Ebenezer Stevens, this third day of November, 1863.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
5 October, 1863.

SIR,

Having examined and considered the application of Ebenezer Stevens, for Letters of Registration under Act of Council 16 Vic., No. 24, for improvements in Machinery for preparing Dough, &c., we have the honor to report that we see no objection to the protection sought for being granted.

Petition.
Specification.
Seventeen drawings, in duplicate.

The documents as per margin are herewith returned.

We have, &c.,
E. W. WARD.
J. SMITH.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—seventeen sheets.]

No. 83.

[Assignment of No. 13. See page 61 of this Return.]

Nº 82.

(COPY)

DRAWING Nº 1

III

Fig: 1

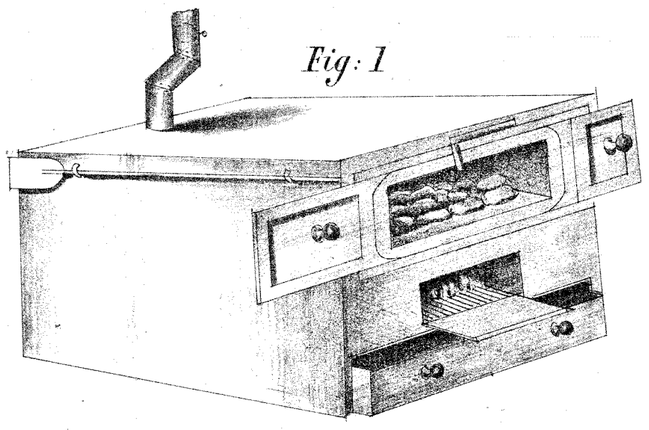


Fig: 2

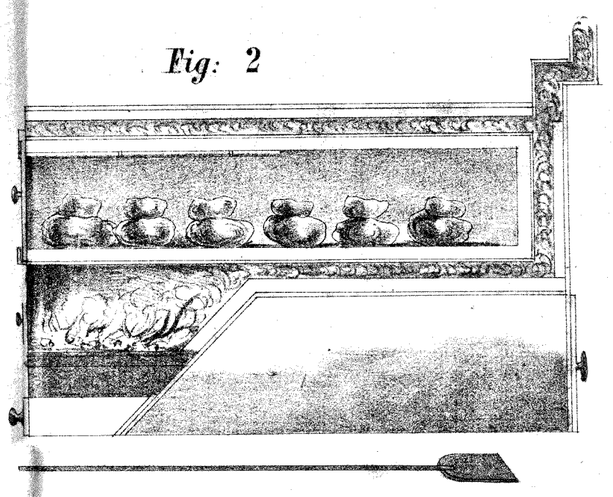


Fig: 3

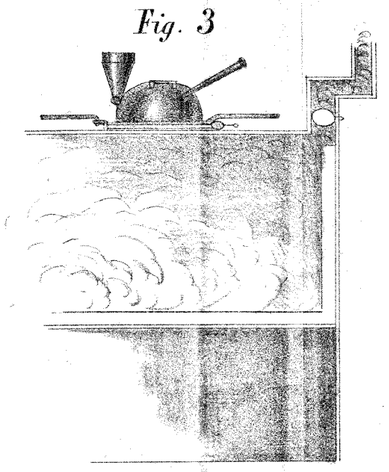


Fig: 3ª

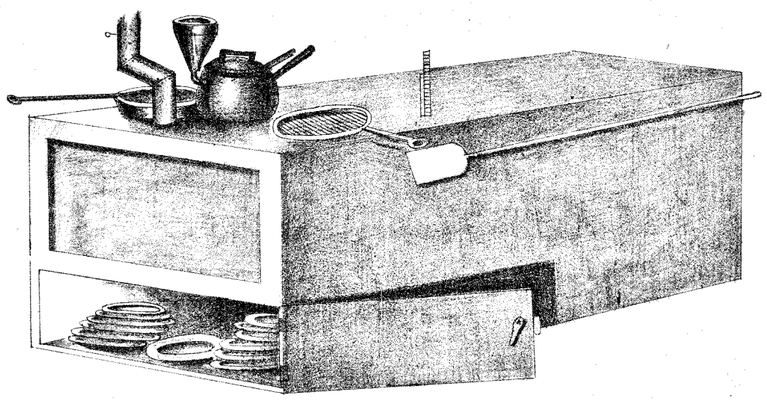


Fig: 3ᵇ

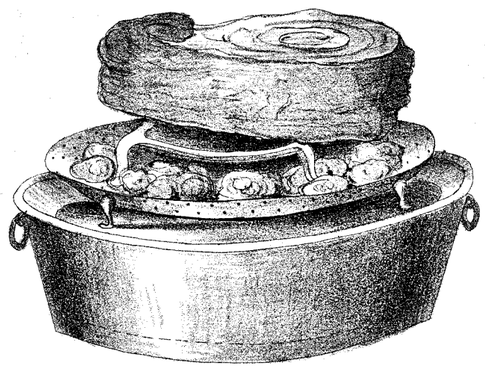
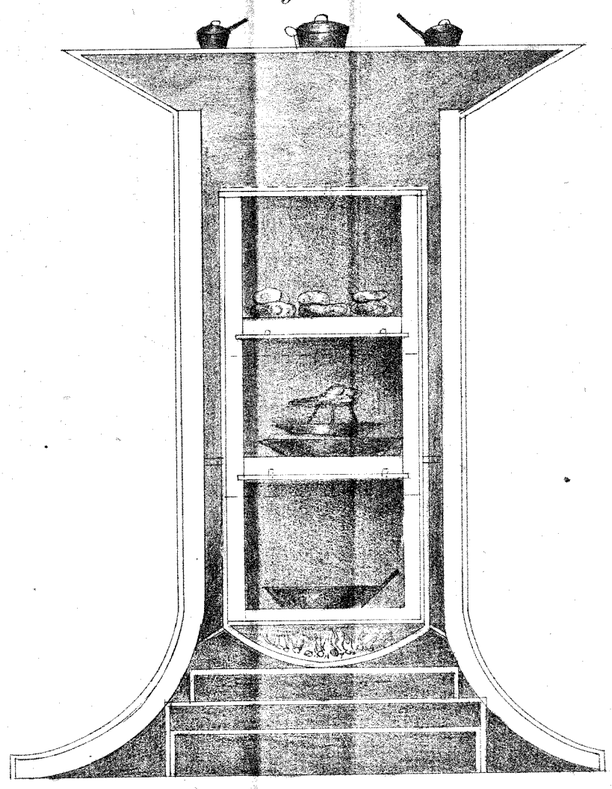


Fig: 4



Figs 5

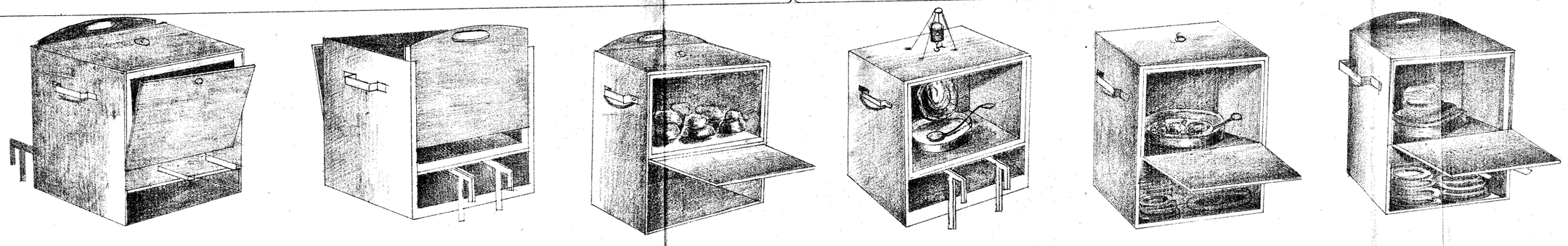


Fig: 6

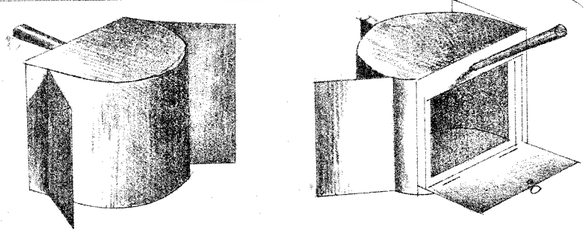


Fig: 7

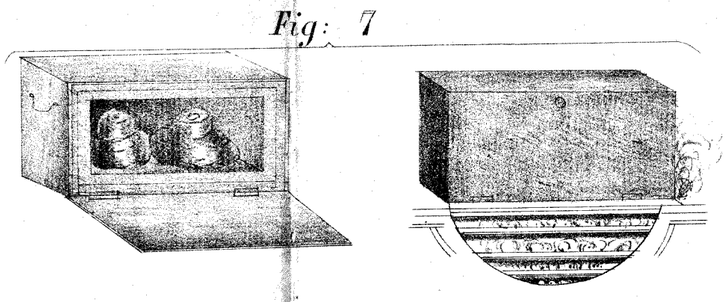


Fig: 8

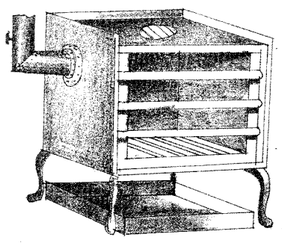
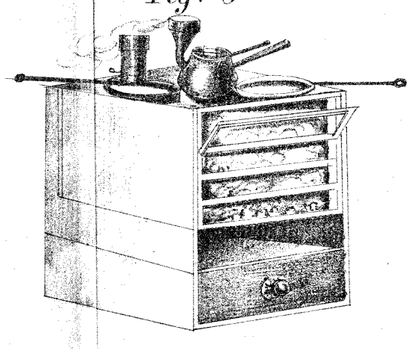


Fig: 9



This is the Drawing (Nº1) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of November 1863

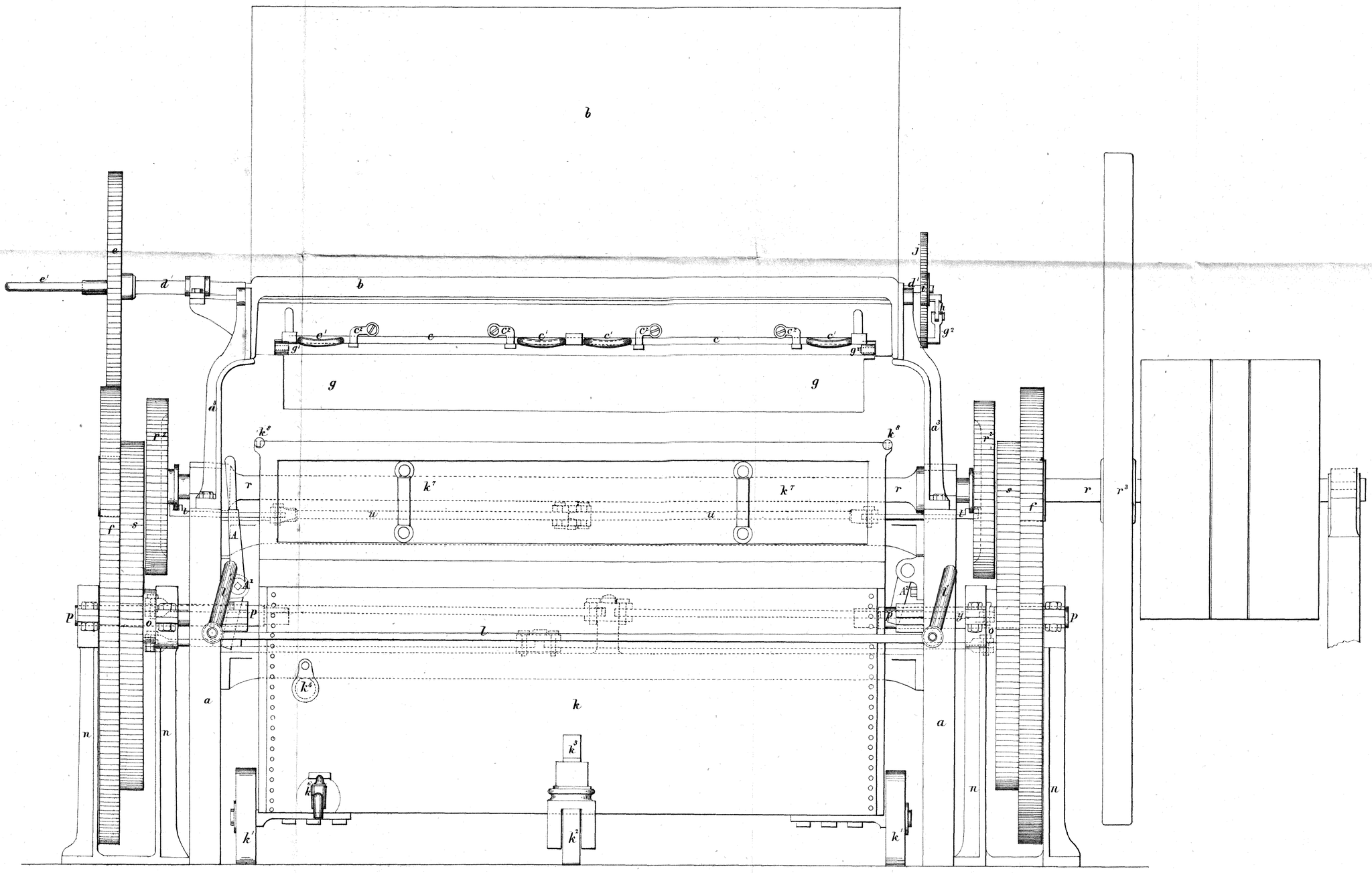
Signed: John Young

N 82

NO. 82
COPY
DRAWING NO. 2

A

Fig 1



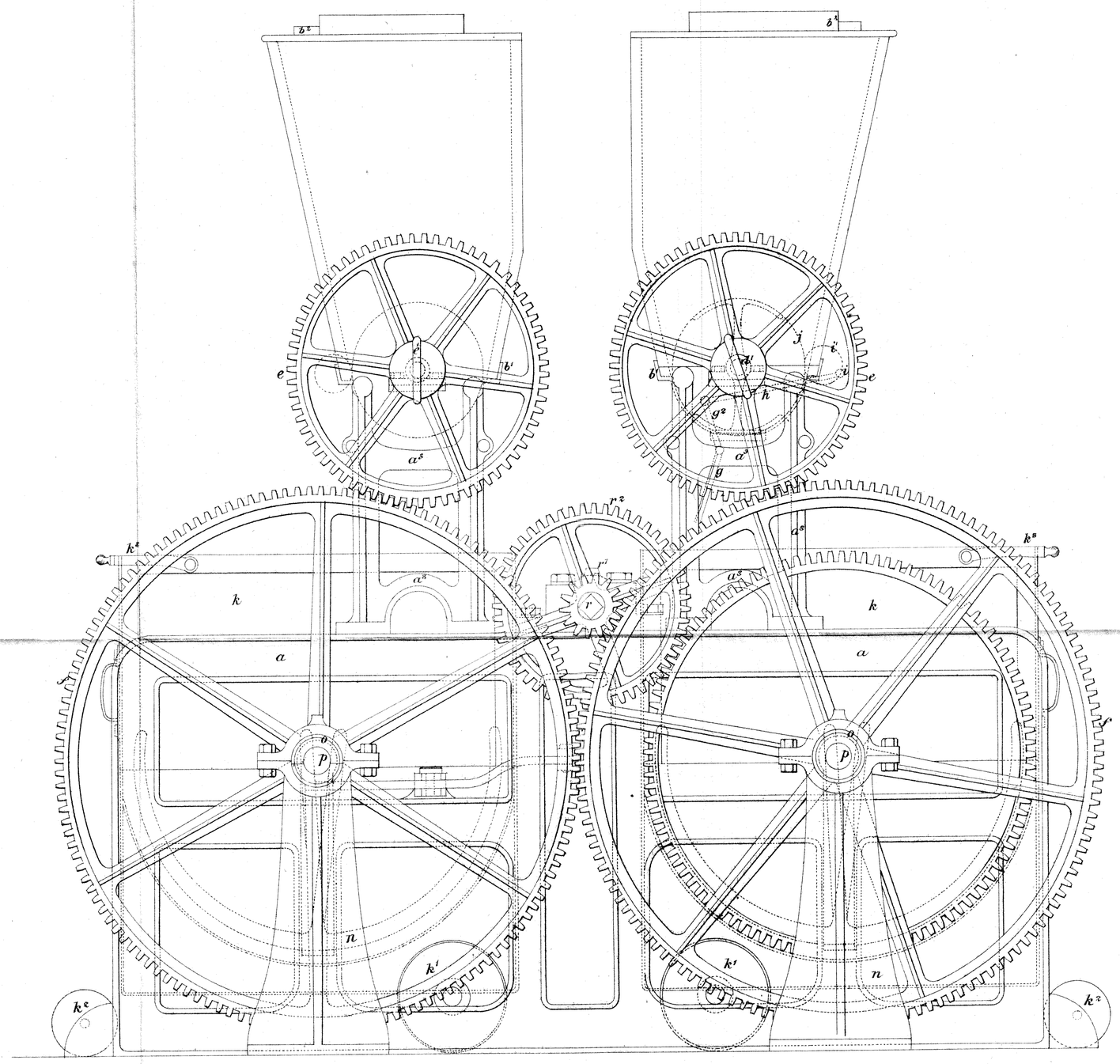
This is the Drawing (No 2) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

NO. 82
COPY
DRAWING NO. 3

A

Fig 2.



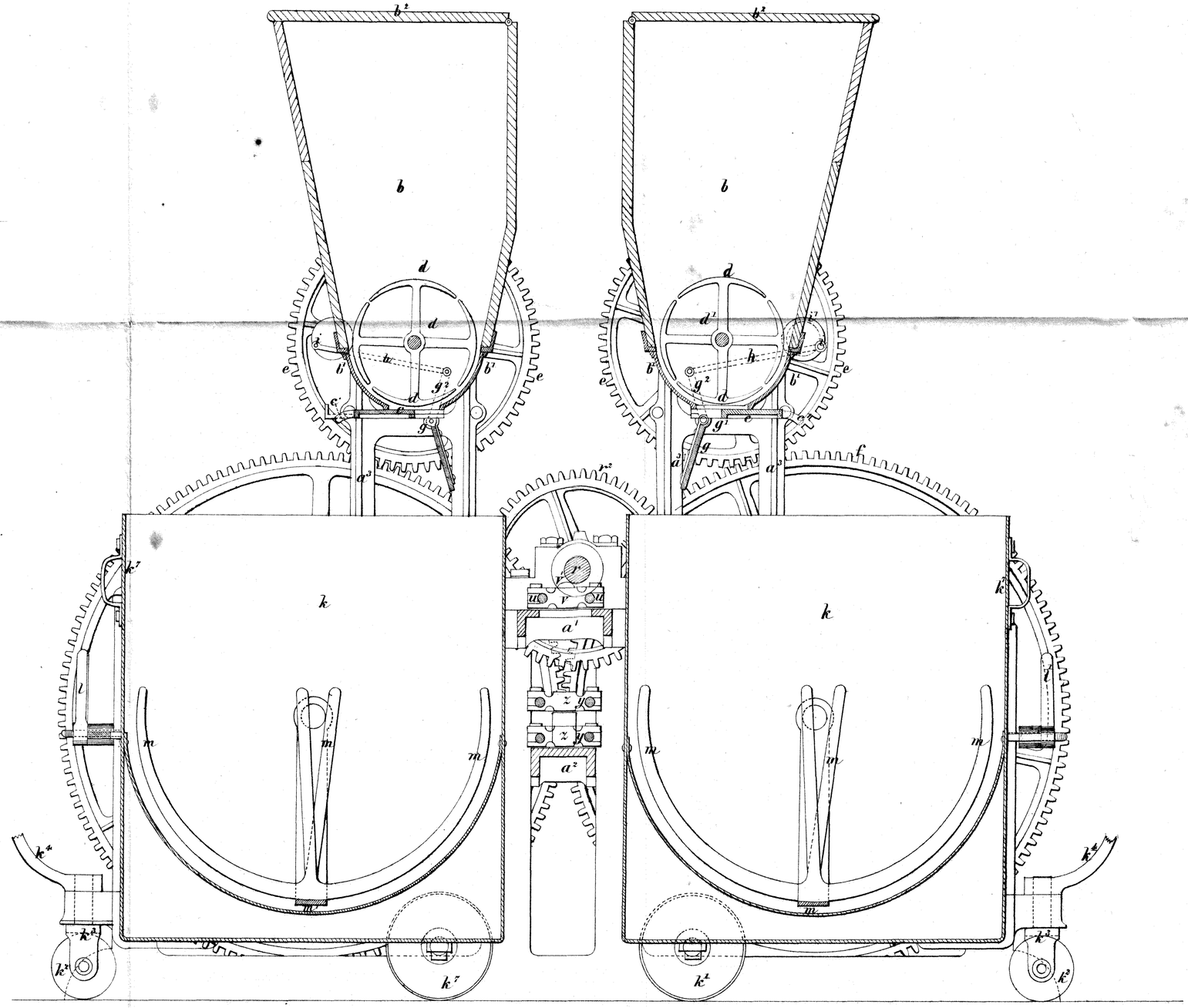
This is the Drawing (N°3) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of November 1863

Signed: John Young

NO. 82
COPY
DRAWING NO. 4

A

Fig 3.



This is the Drawing (N°4) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of November 1863

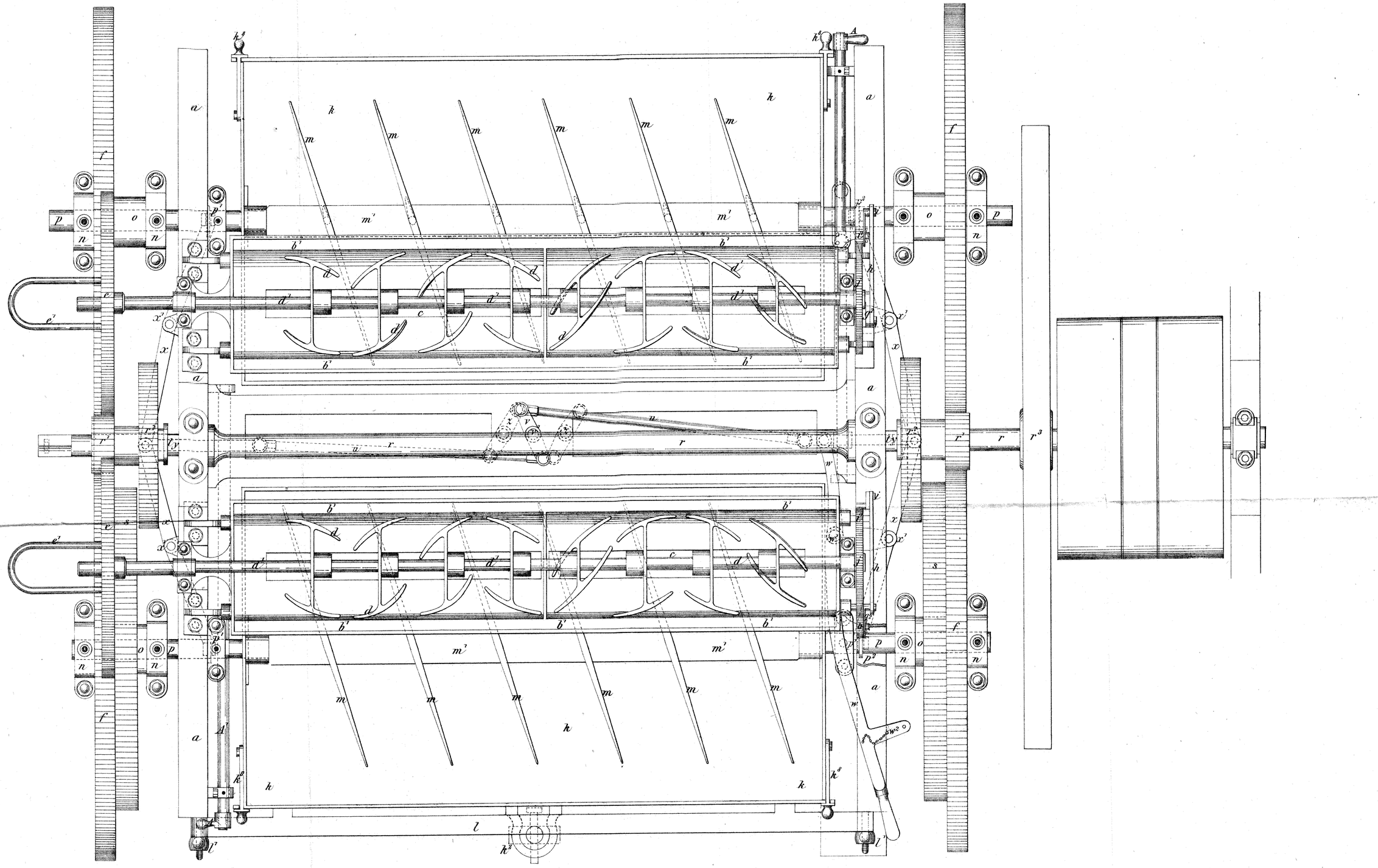
Signed: John Young

D82

NO. 82
COPY
DRAWING NO. 5

(A)

FIG. 4

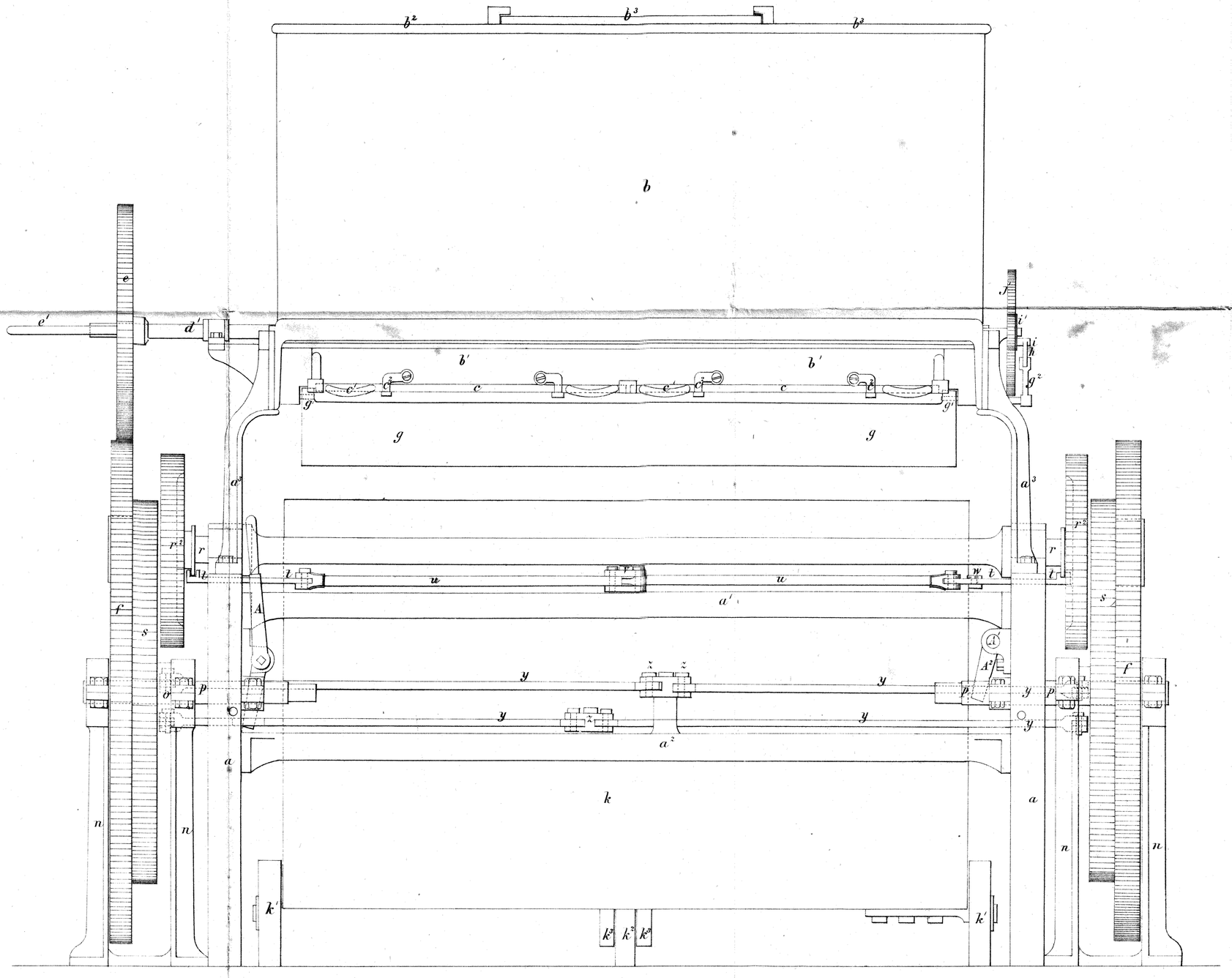


This is the Drawing (No 5) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

A

Fig. 5.



This is the Drawing (No 6) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

NO. 82
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DRAWING NO. 7

IB

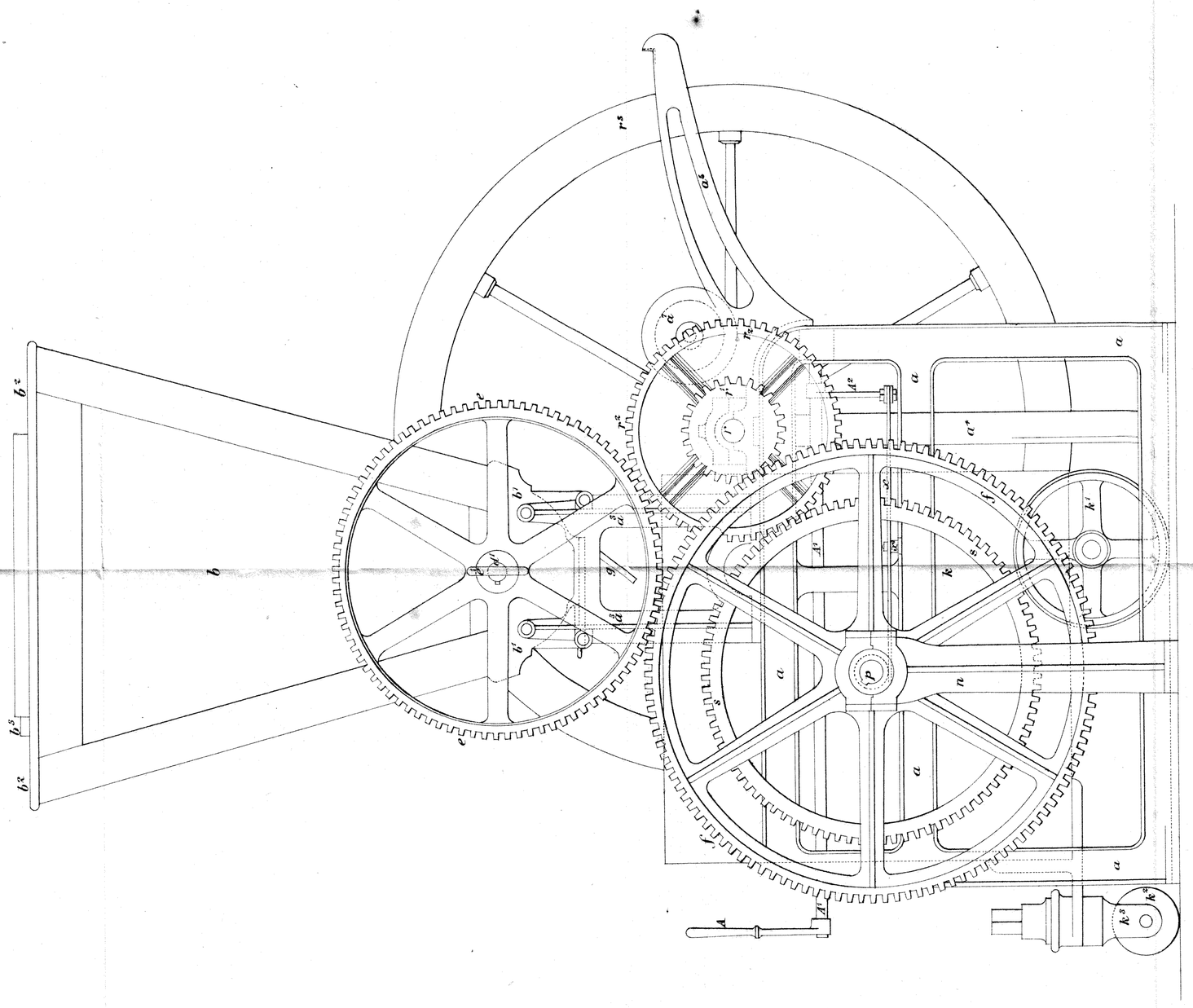


Fig 6

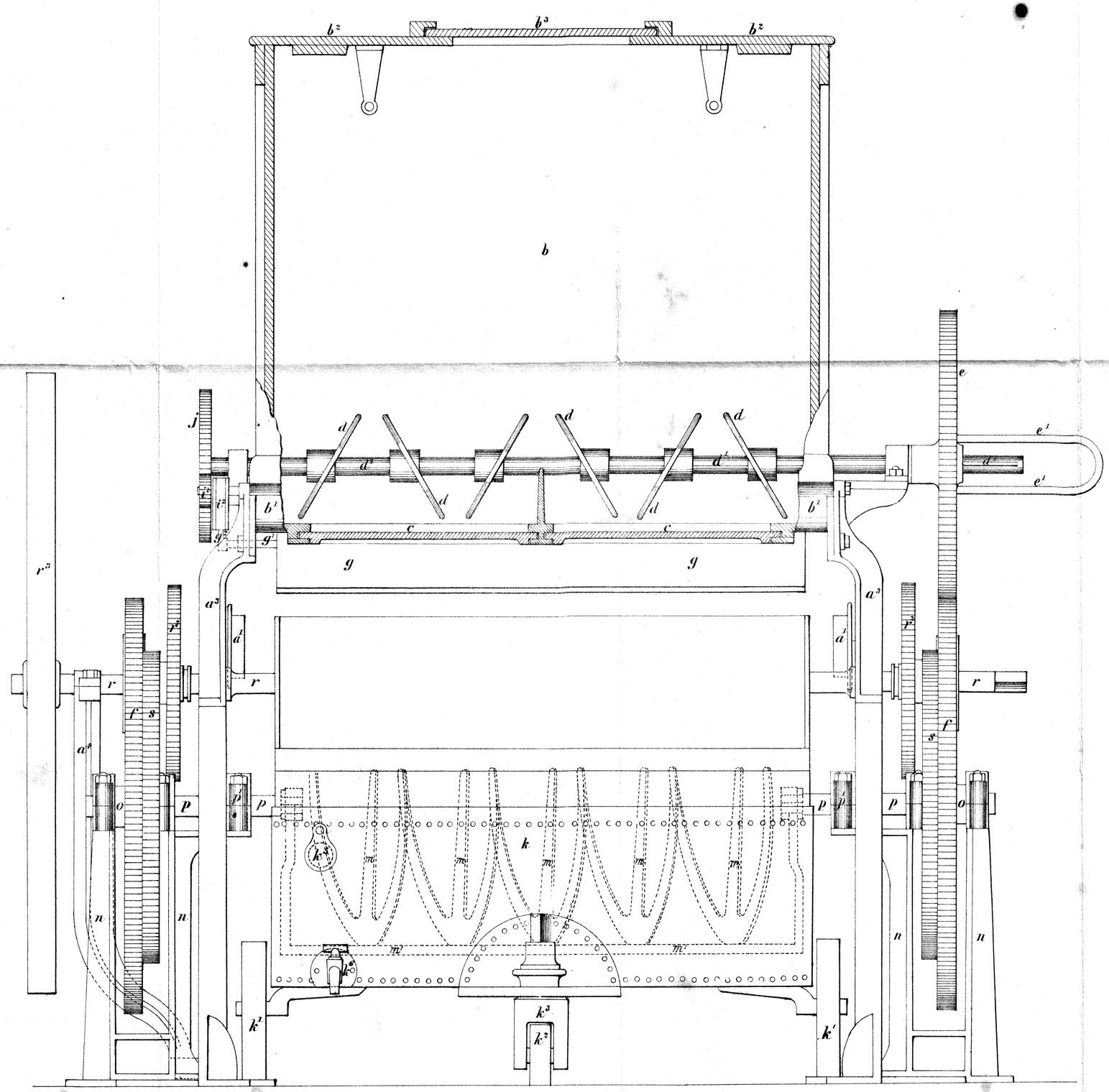
This is the Drawing (N° 7) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of November 1863

Signed: John Young

NO. 82
COPY
DRAWING NO. 8

B

Fig. 7



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Signed: John Young

NO. 82
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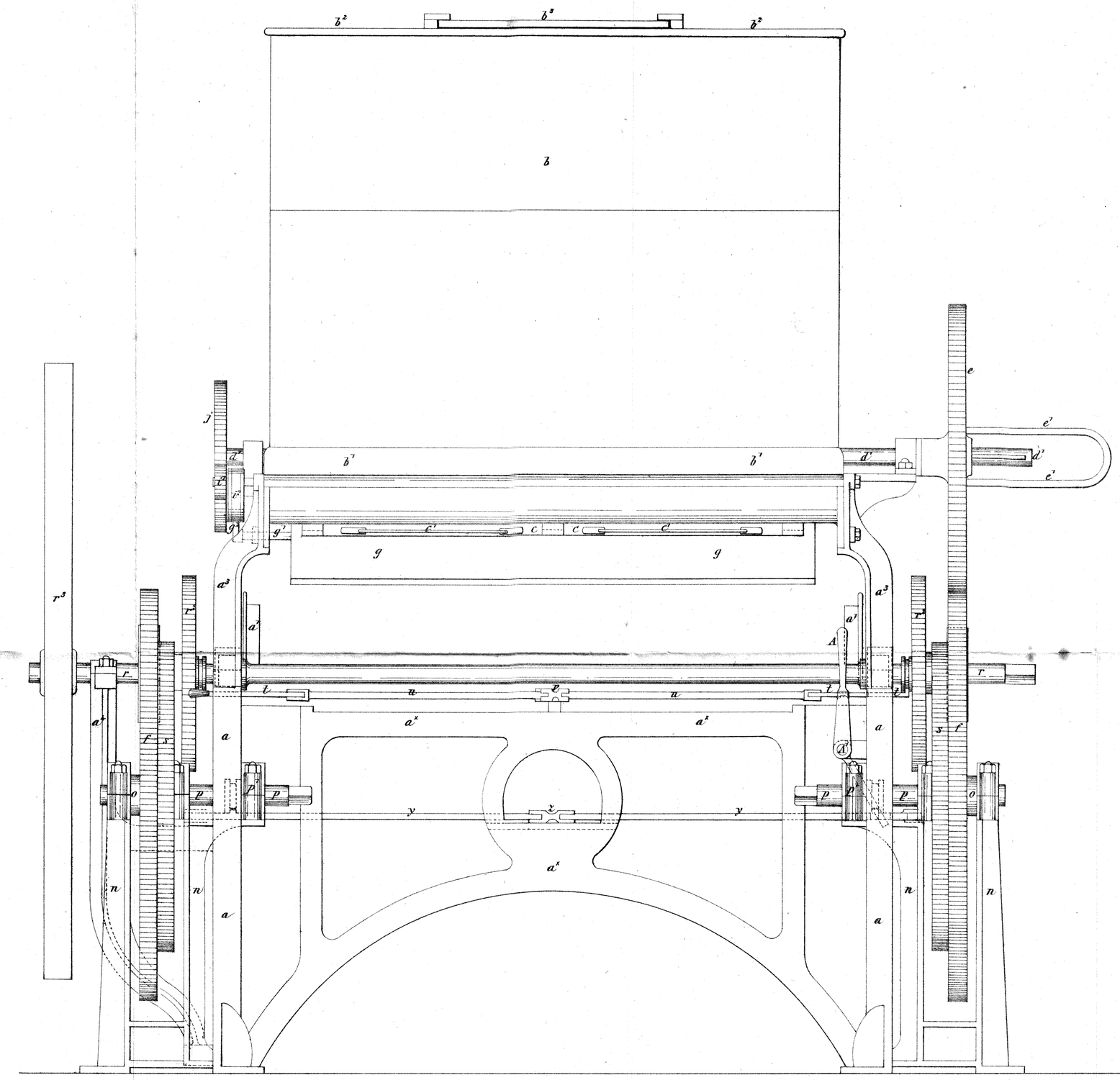
DRAWING NO. 9

FIG. 8

(B)



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Signed: John Young

NO. 82
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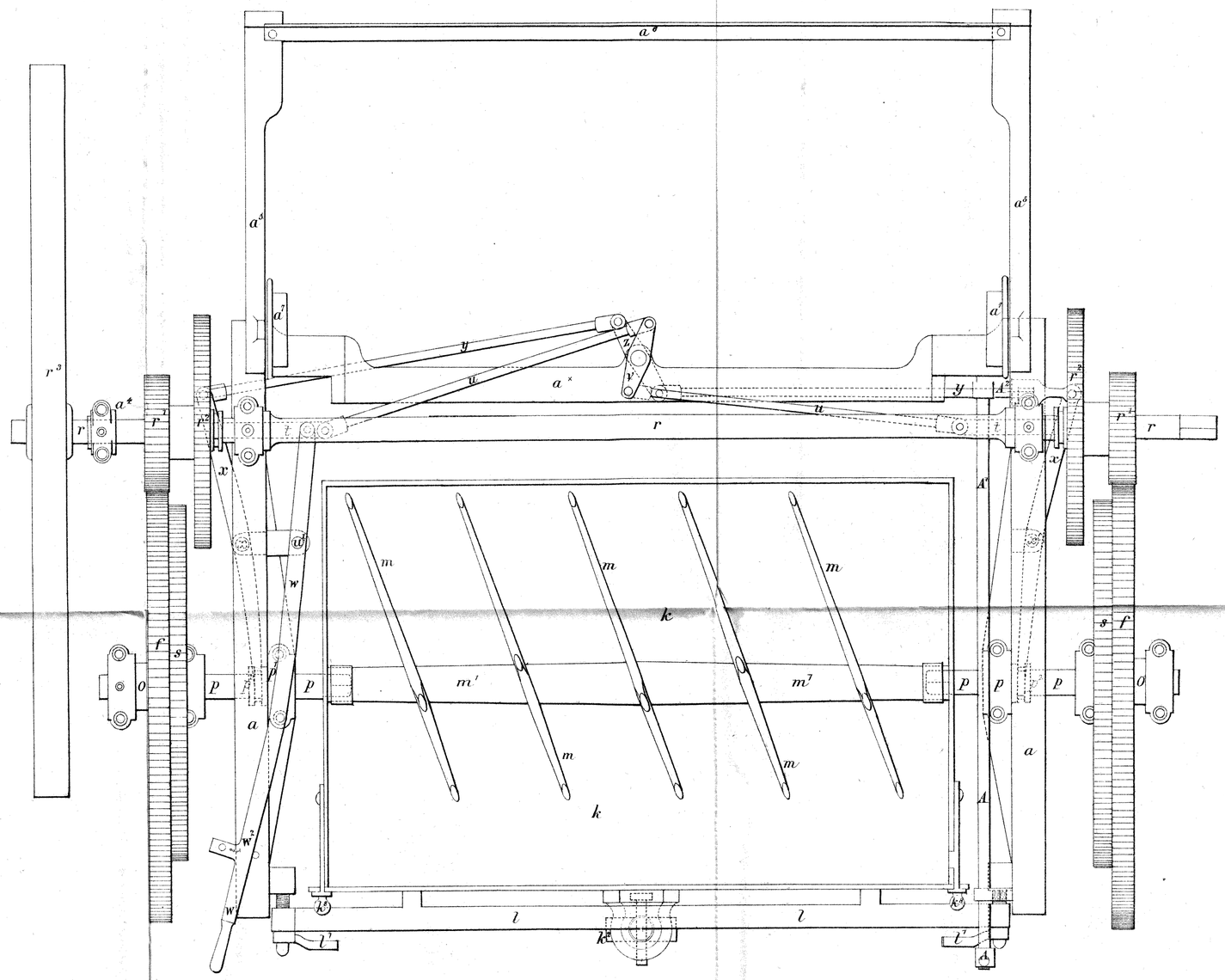
DRAWING NO. 10.

B

Fig 9.



This is the Drawing (No10) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of ~~December~~ Nov 1863

Signed: John Young

NO. 82
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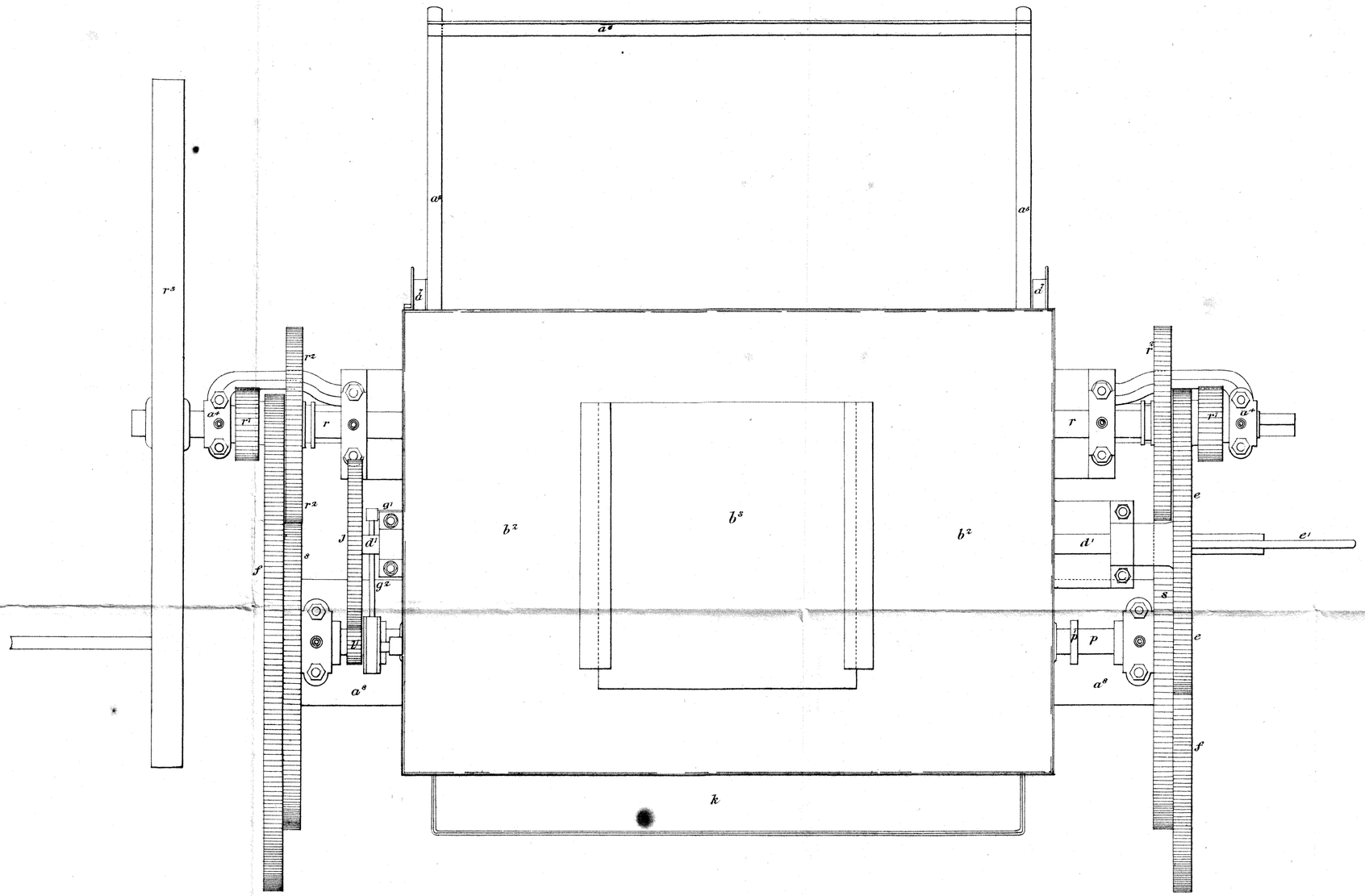
DRAWING NO. II

C.

Fig 10.



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Signed: John Young

NO. 82
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DRAWING NO. 12

C

Fig. II

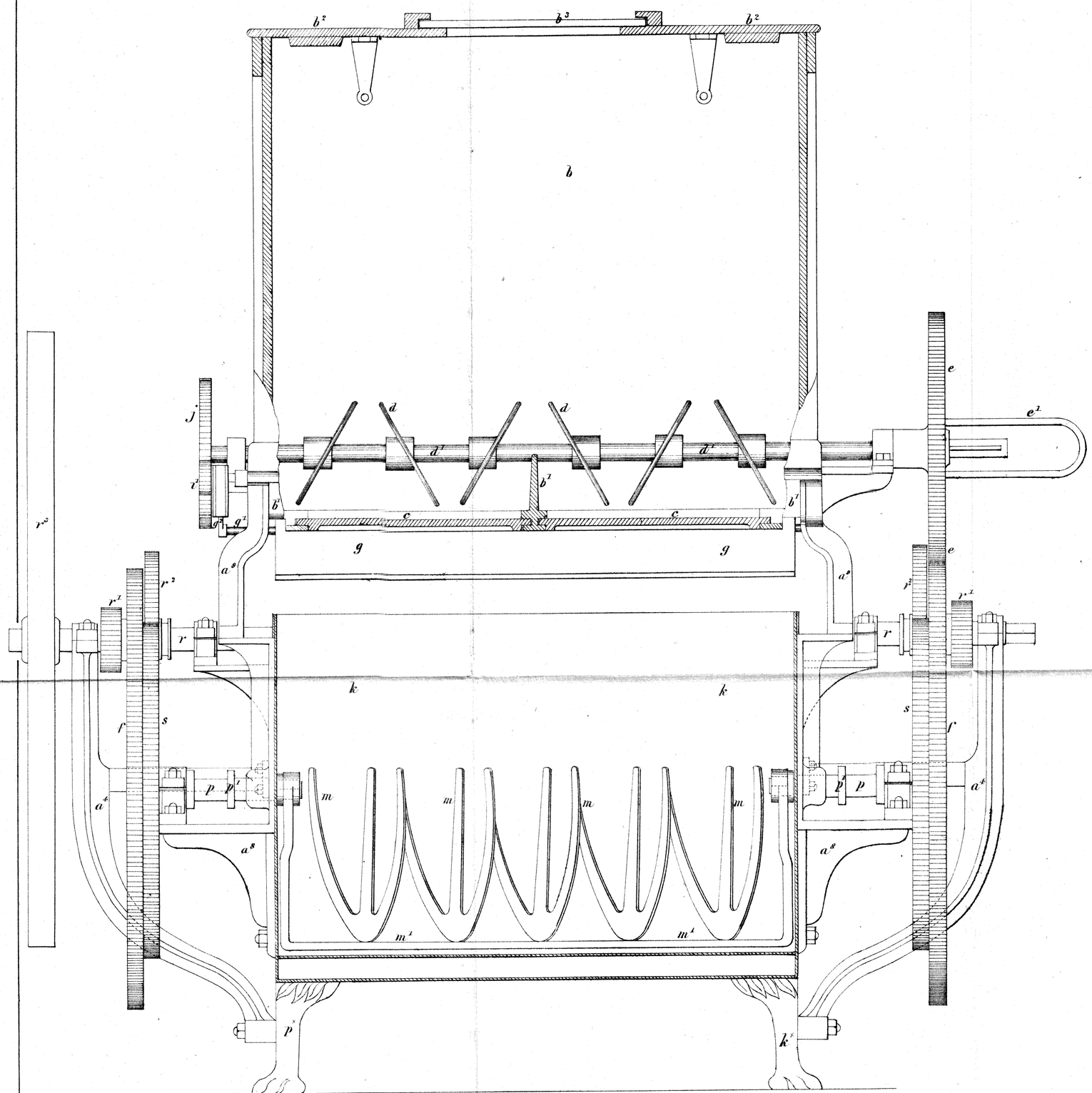
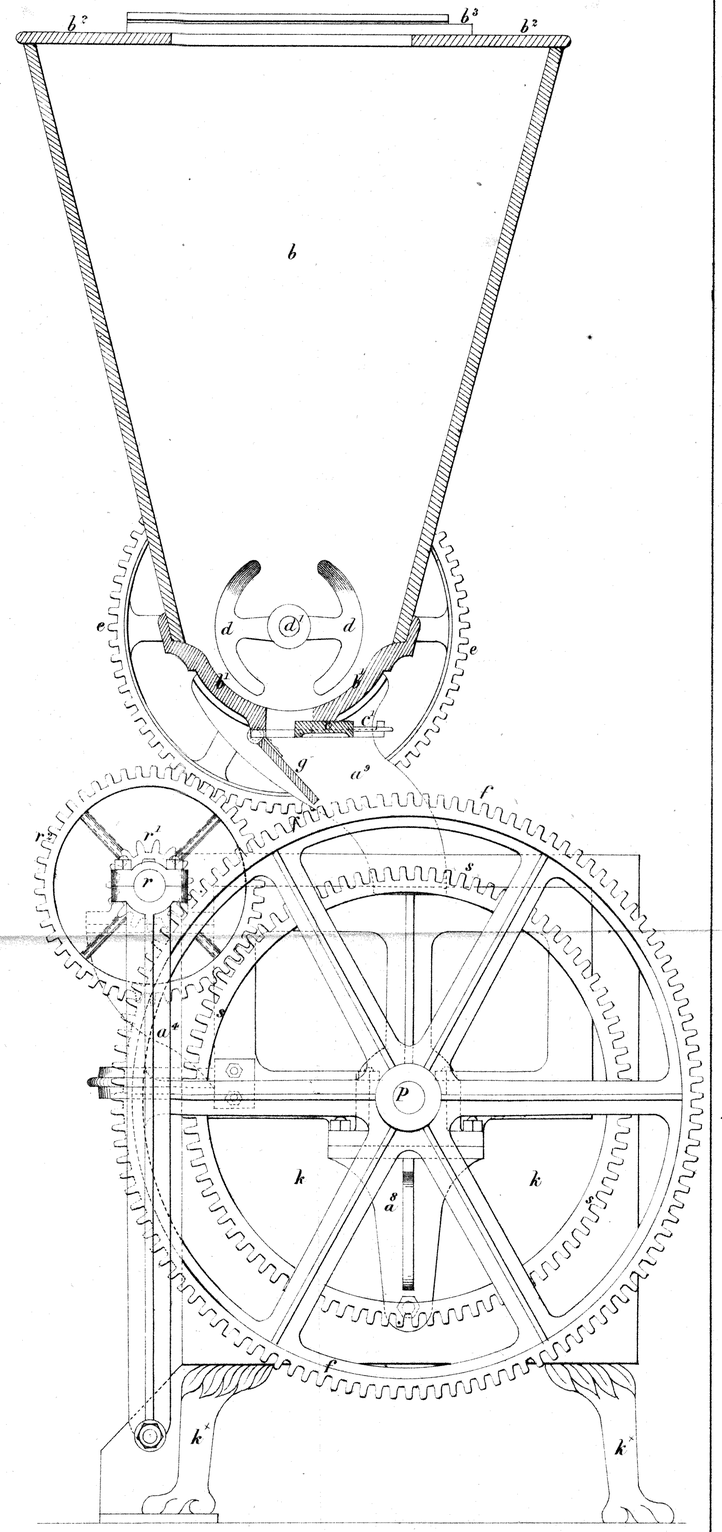


Fig. I2



This is the Drawing (N°12) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

L82

NO. 82
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DRAWING NO. 13

D

FIG. 15

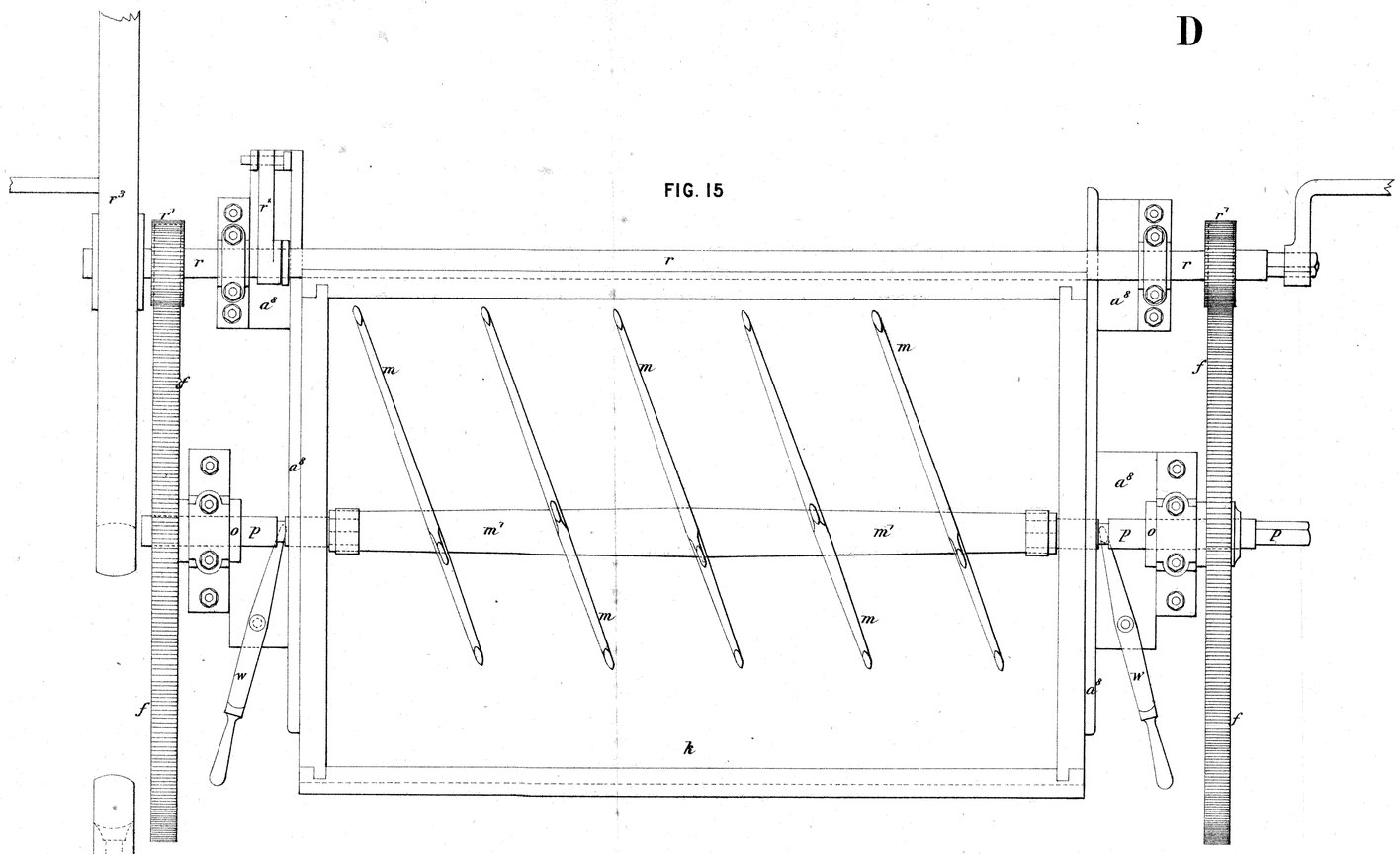


FIG. 15ˣ

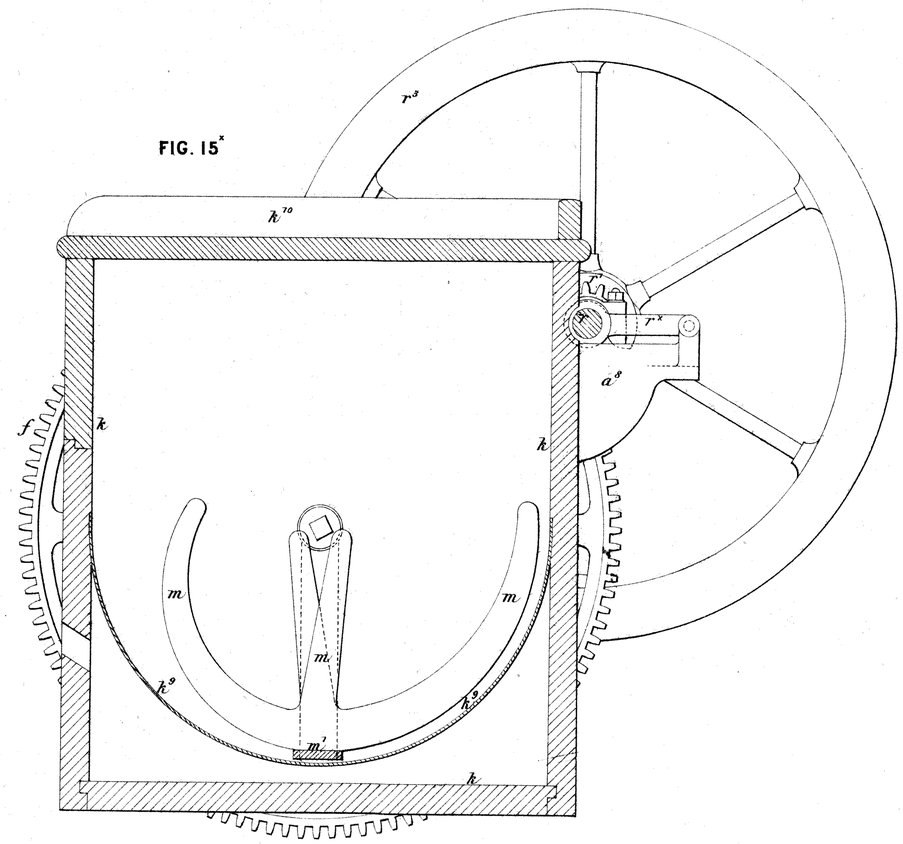


FIG. 13

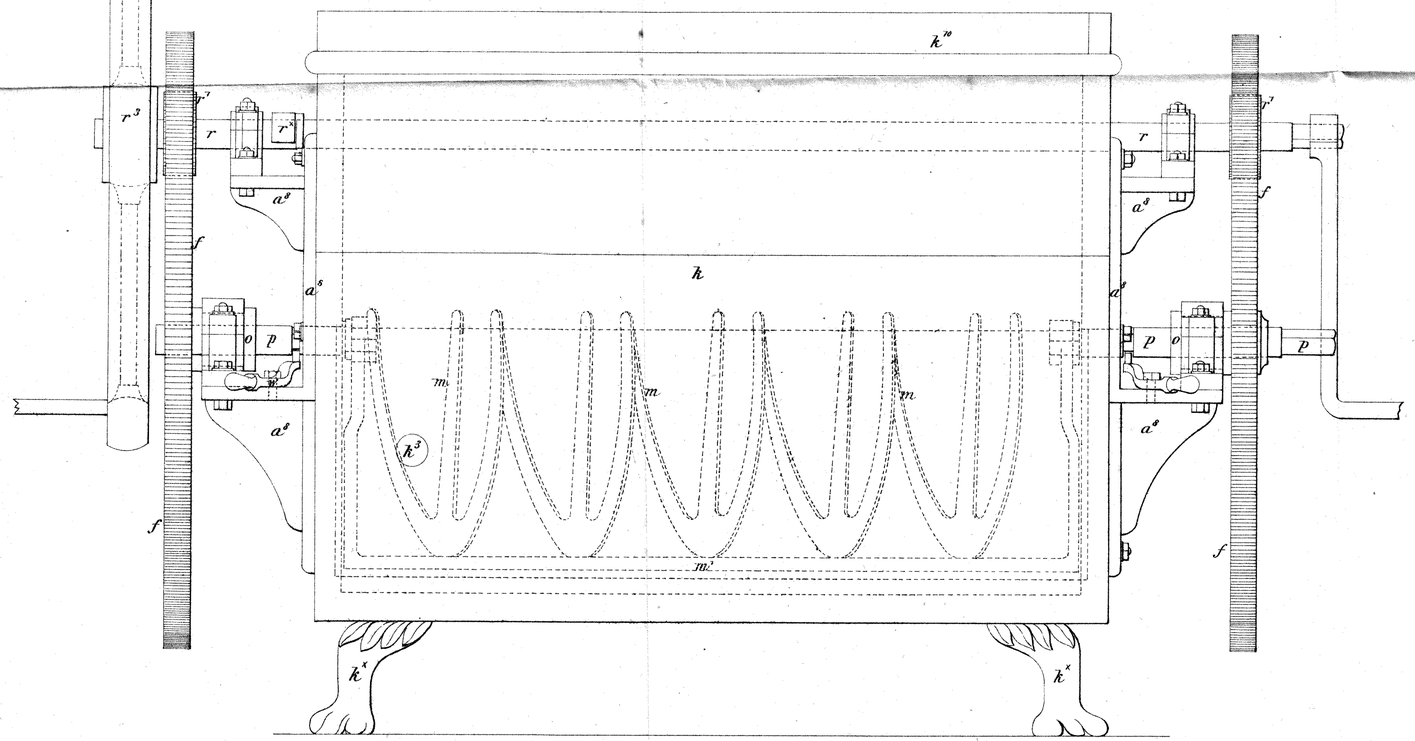
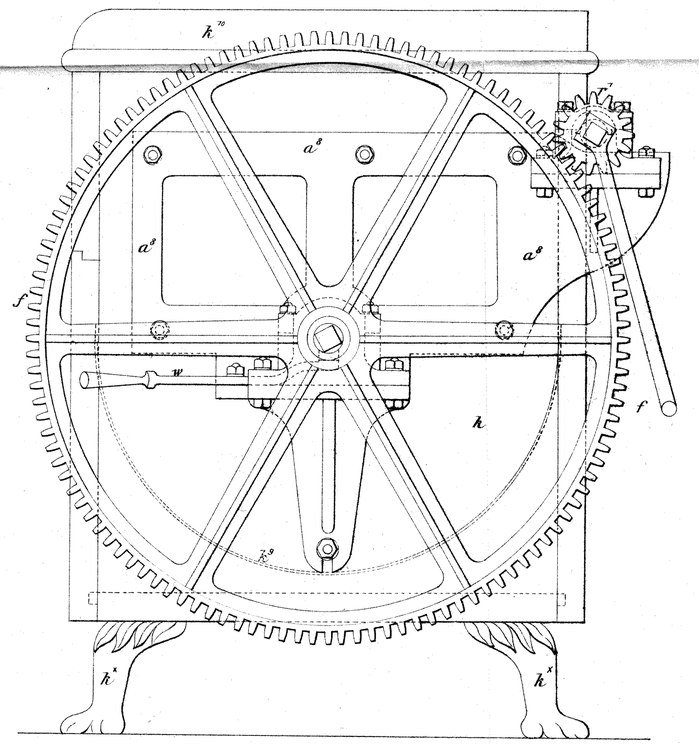


FIG. 14



This is the Drawing (No 13) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

D[1]

Fig. 16.

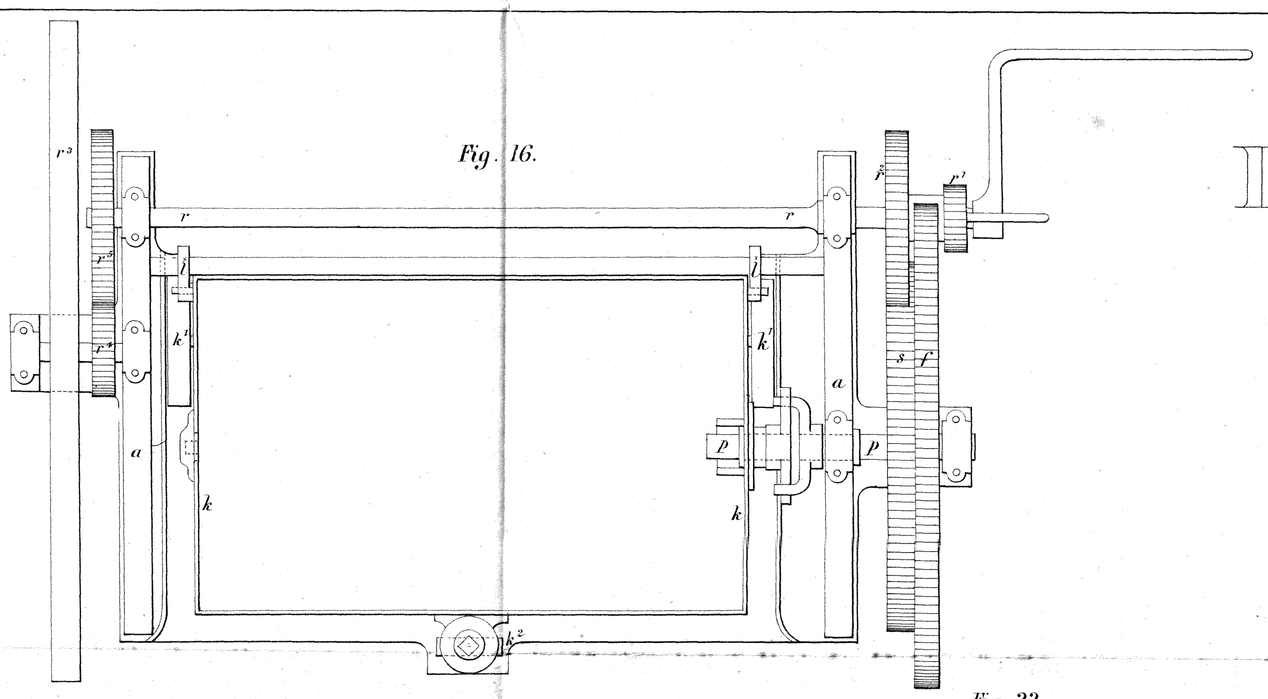


Fig. 21.

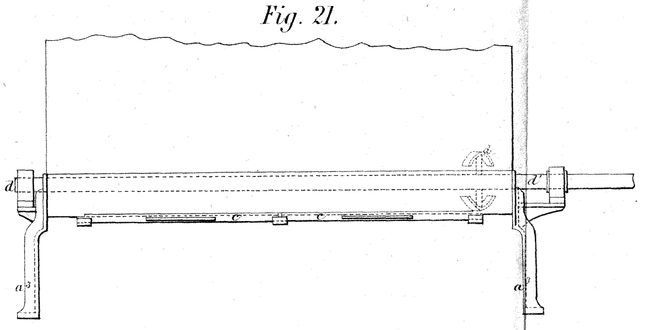
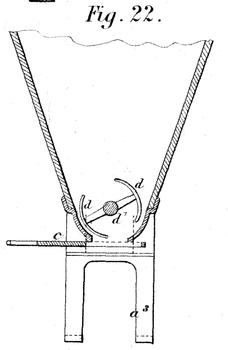


Fig. 22.



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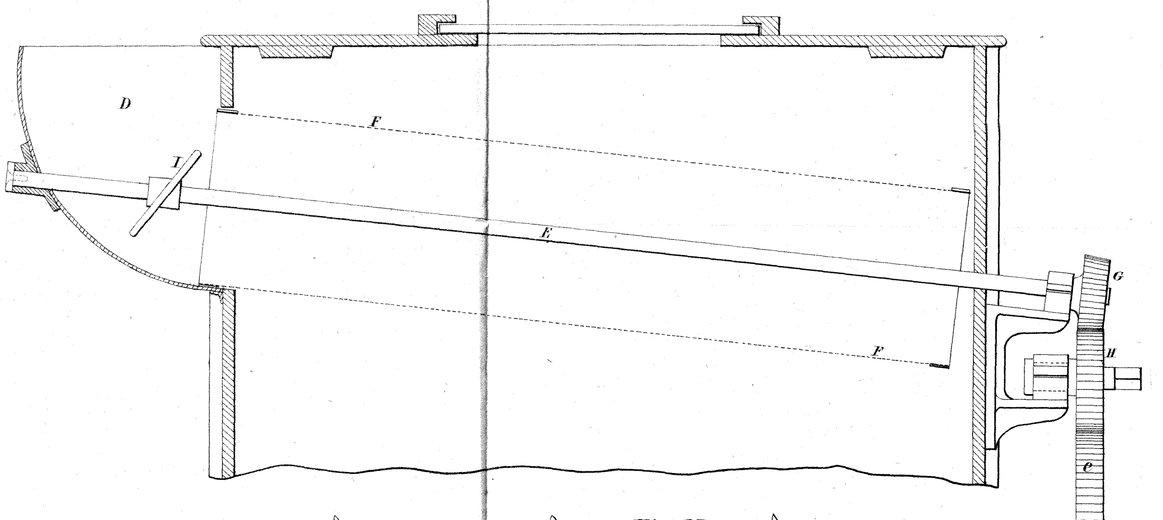

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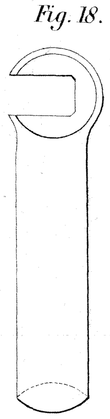


Fig 17.

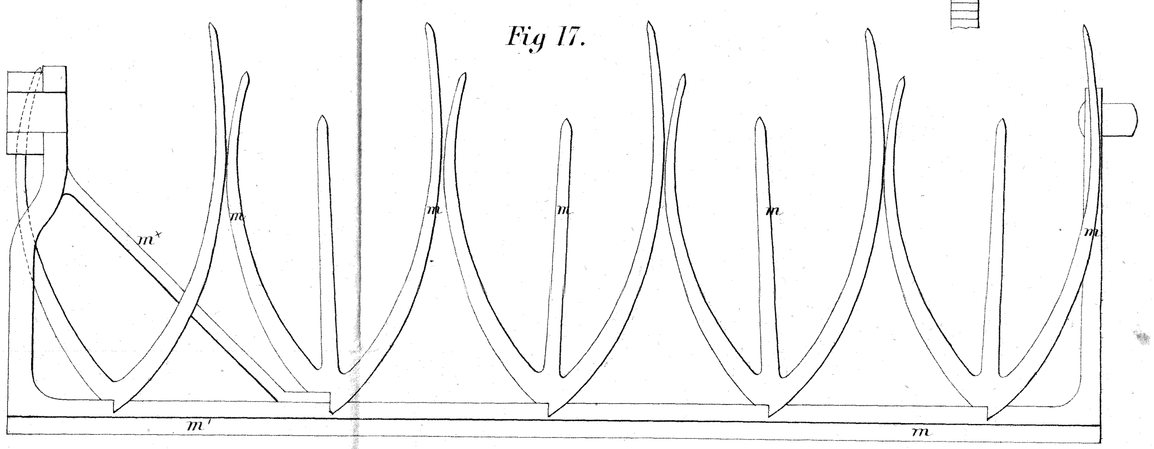
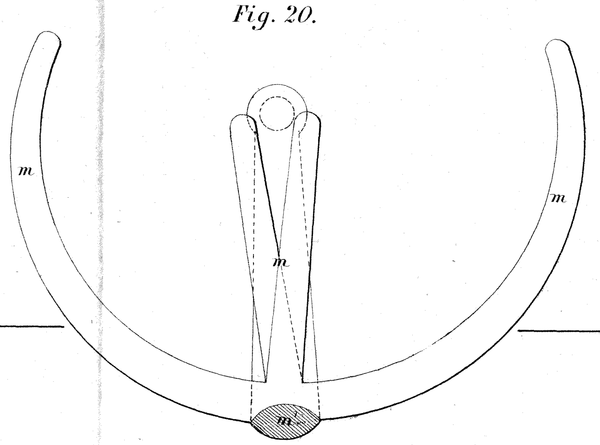


Fig. 19.

Fig. 20.



This is the Drawing (No 14) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

NO. 82
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DRAWING NO. 14

A 82

NO. 82
COPY
DRAWING NO. 15

E.

Fig 24.

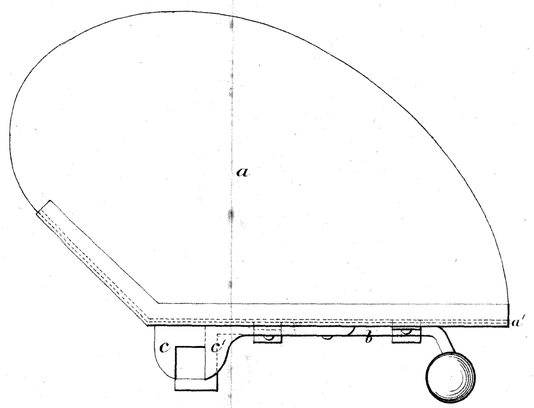


Fig 26.

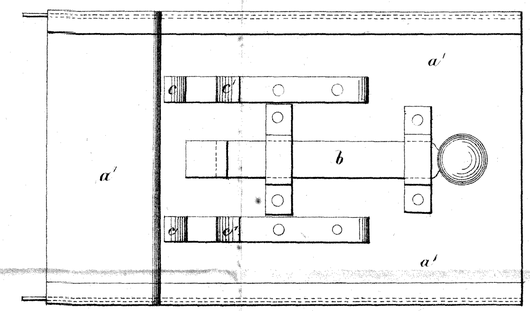


Fig 25

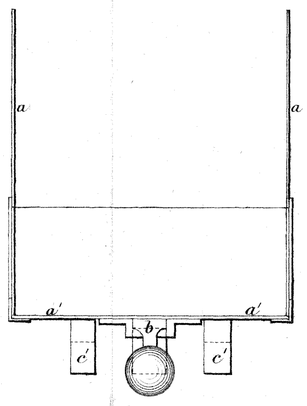


Fig 28.

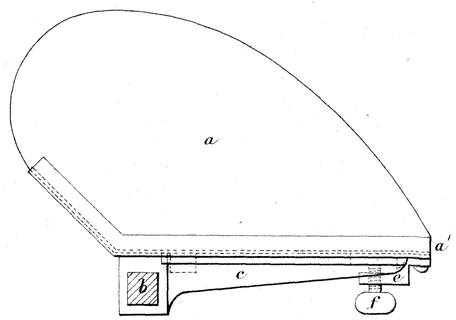


Fig 30.

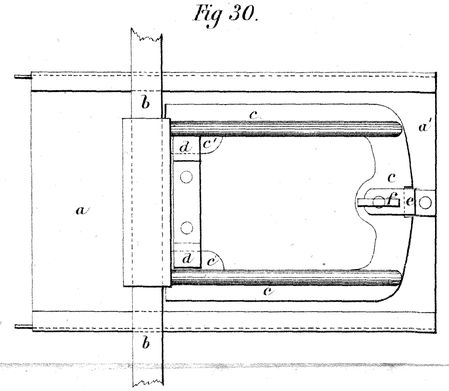


Fig 29.

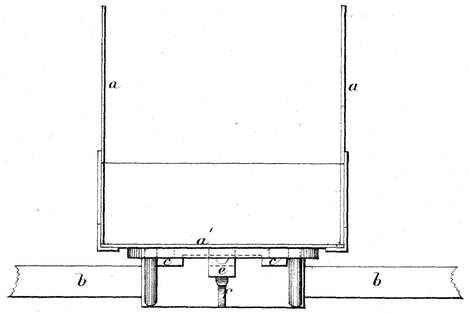
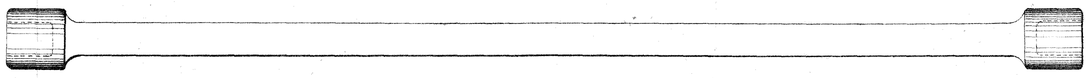


Fig. 27.



This is the Drawing (No 15) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

NO. 82
COPY
DRAWING NO. 16

F

Fig. 31.

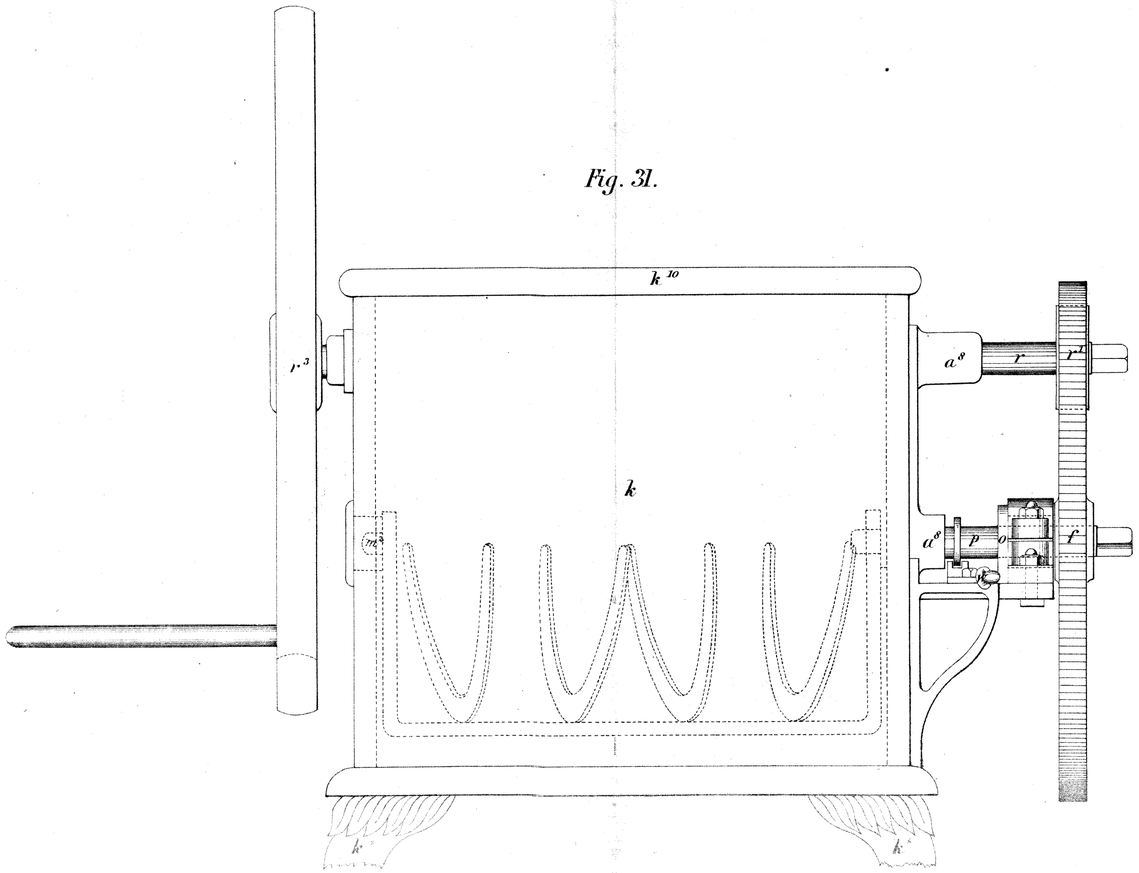


Fig. 32

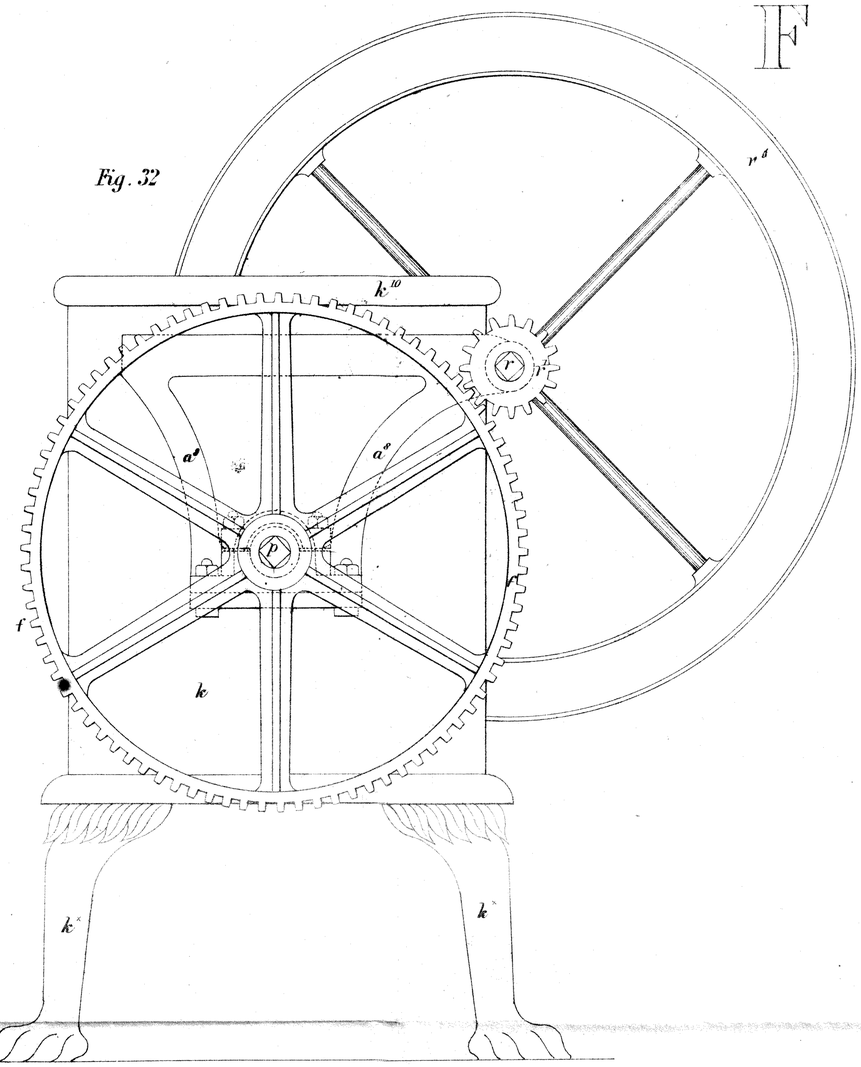


Fig. 33

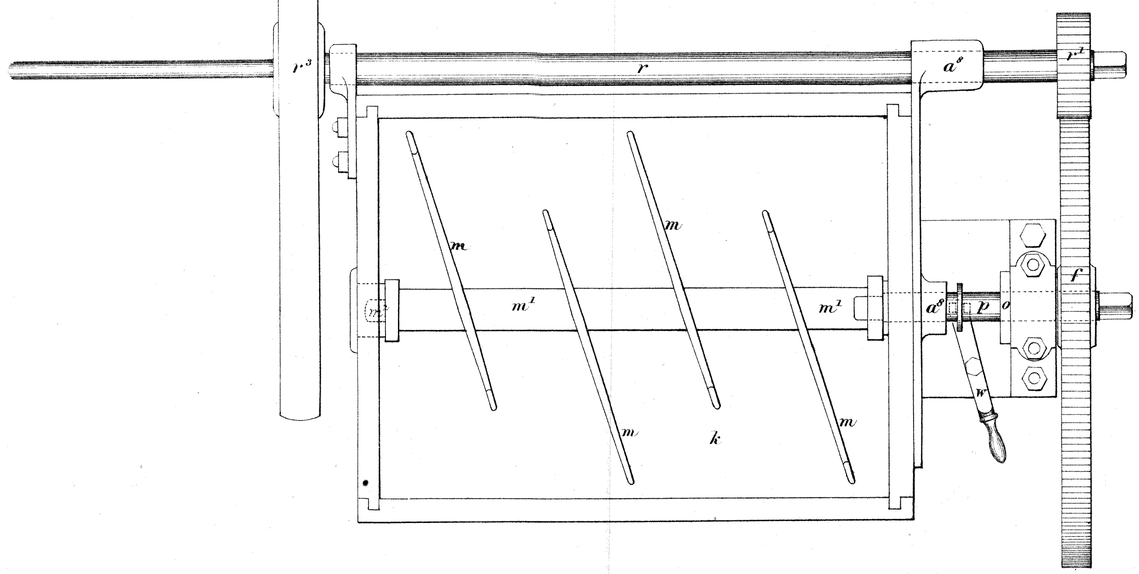
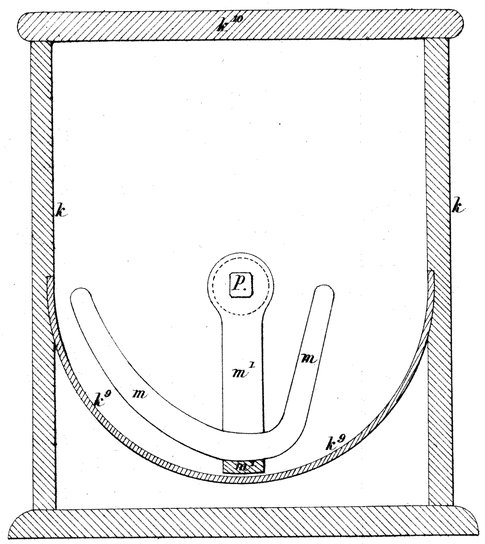


Fig. 34



This is the Drawing (N°16) referred to in the annexed Letters of Registration granted to Ebenezer Stevens this Third day of December 1863

Signed: John Young

NO. 82
COPY
DRAWING NO. 17

G

FIG. 35

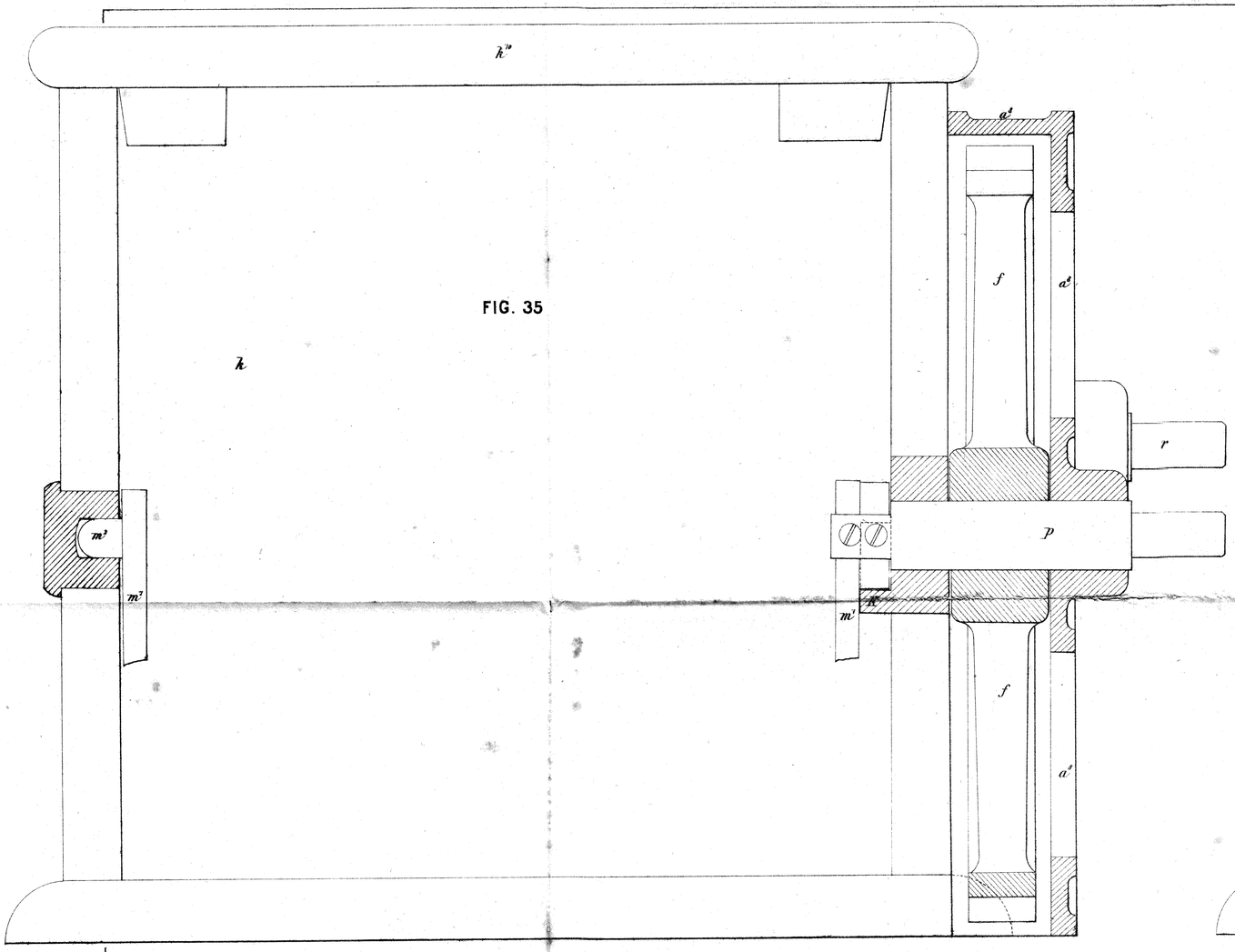


FIG. 36

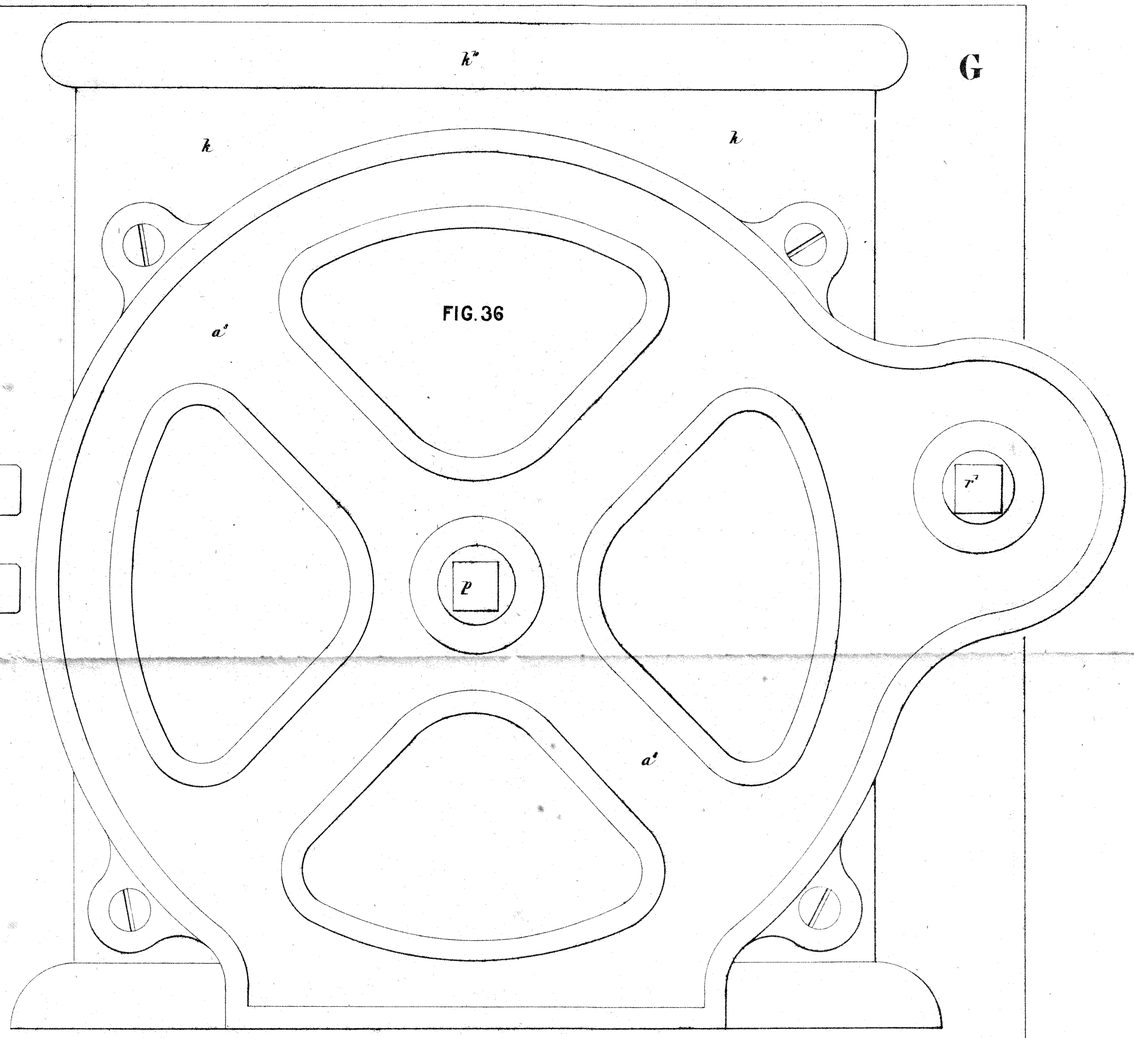


FIG. 29x

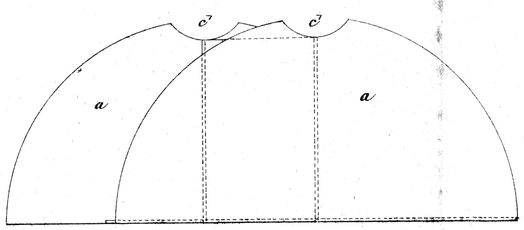


FIG. 30x

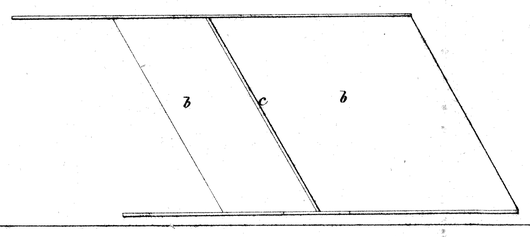


FIG. 38

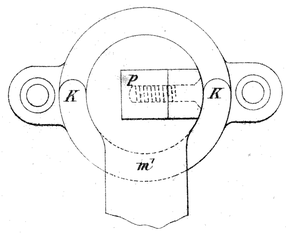


FIG. 39

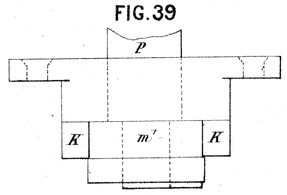
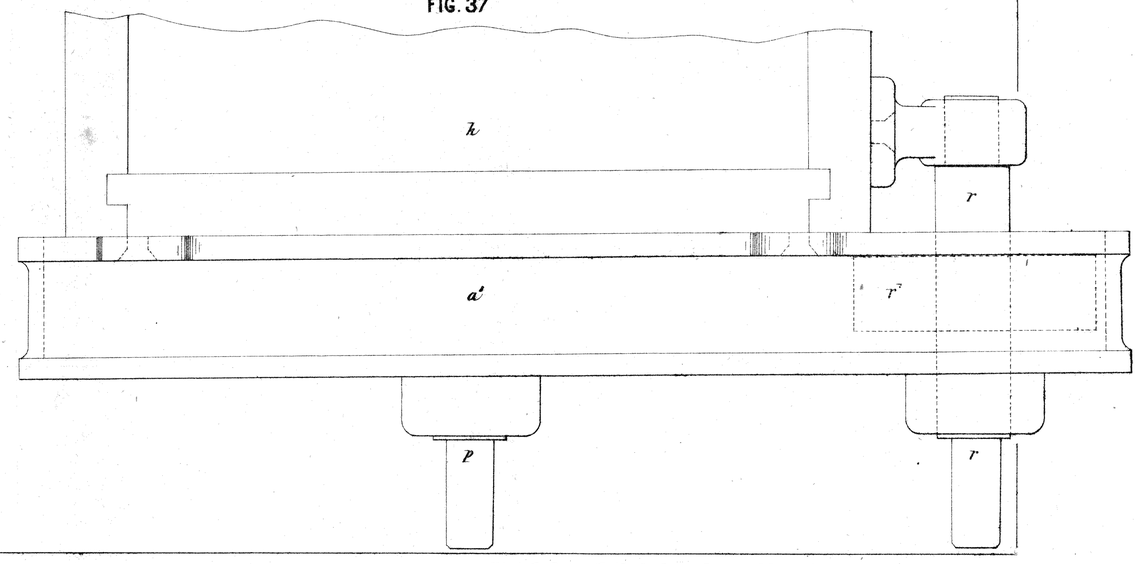


FIG. 37



This is the Drawing No. 17 referred to in the annexed Letters of Registration granted to Ebenezer Stevens this (3rd) Third day of November, 1863

Signed: John Young

A.D. 1863, 26*th November*. No. 84.

CIRCUMFERENTOR.

LETTERS OF REGISTRATION to Angelo Tornaghi, for a Circumferentor.

[Registered on the 28th day of November, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Angelo Tornaghi, of Sydney, in the Colony of New South Wales, mathematical instrument maker, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a Circumferentor, which is more particularly described in the specification and paper of drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four, and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council to grant, and do by these Letters of Registration grant unto the said Angelo Tornaghi, his executors, administrators, and assigns, the exclusive

enjoyment

enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Angelo Tornaghi, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Angelo Tornaghi shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-sixth day of November, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE invention or improvement is a new description of Circumferentor, whereby greater accuracy is obtained; the instrument at the same time being much lighter and more portable, and by no means so liable to disarrangement as the Circumferentors now in use.

The new Circumferentor consists of a large circle, graduated in the usual manner, with a long needle in a trough affixed, to place the instrument exactly due north and south, and with far greater accuracy than by the present instruments.

Movable sight-vanes or a telescope can be used, according to the wish of the surveyor.

There is also a vernier attached to and movable with the sight-vanes, with which two clamping-screws are connected, and to which clamping-screws tangent-screws may be adapted when great accuracy is sought.

There is also a circular level in connection with a ball and socket joint of an improved pattern, whereby the instrument may be levelled in a much shorter time than by any method heretofore in use.

ANGELO TORNAGHI.

This is the specification referred to in the annexed Letters of Registration granted to Angelo Tornaghi, this twenty-sixth day of November, 1863.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney, N.S.W.,
22 October, 1863.

SIR,

Having examined and considered the application of Angelo Tornaghi, for Letters of Registration, under Act of Council 16 Vic., No. 24, for a new description of Circumferentor, we have the honor to report that we see no objection to the necessary protection being granted.

Petition to Governor.
Specification.
Two sets of drawings.
Receipt from Treasurer for £20—signed by J. G. Lennon.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
W. R. DAVIDSON.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(Copy)

N°84

TORNAGHI'S IMPROVED CIRCUMFERENTER

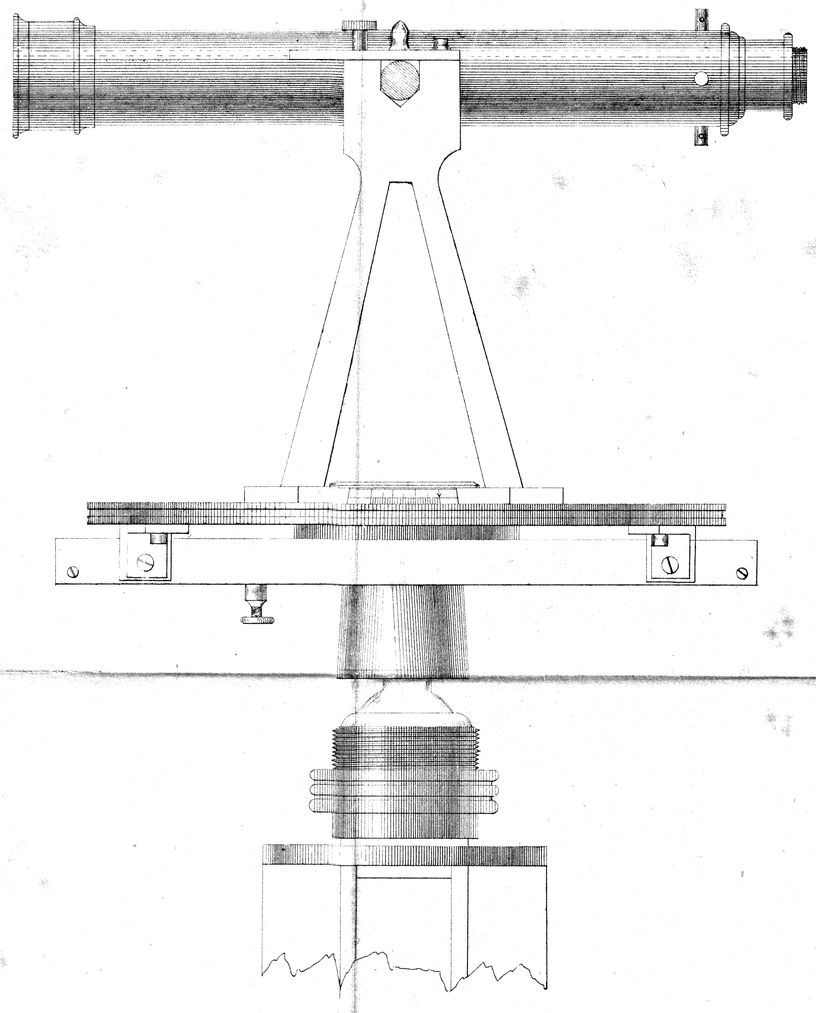


Fig 1. *Shewing Circumferenter with Telescope.*

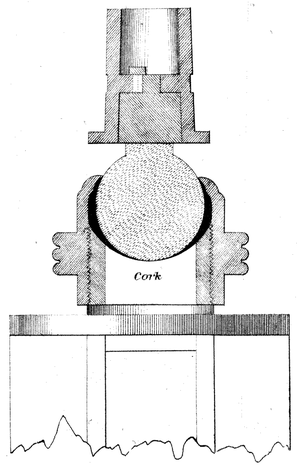


Fig 2. *Shewing principle of Ball & Socket.*

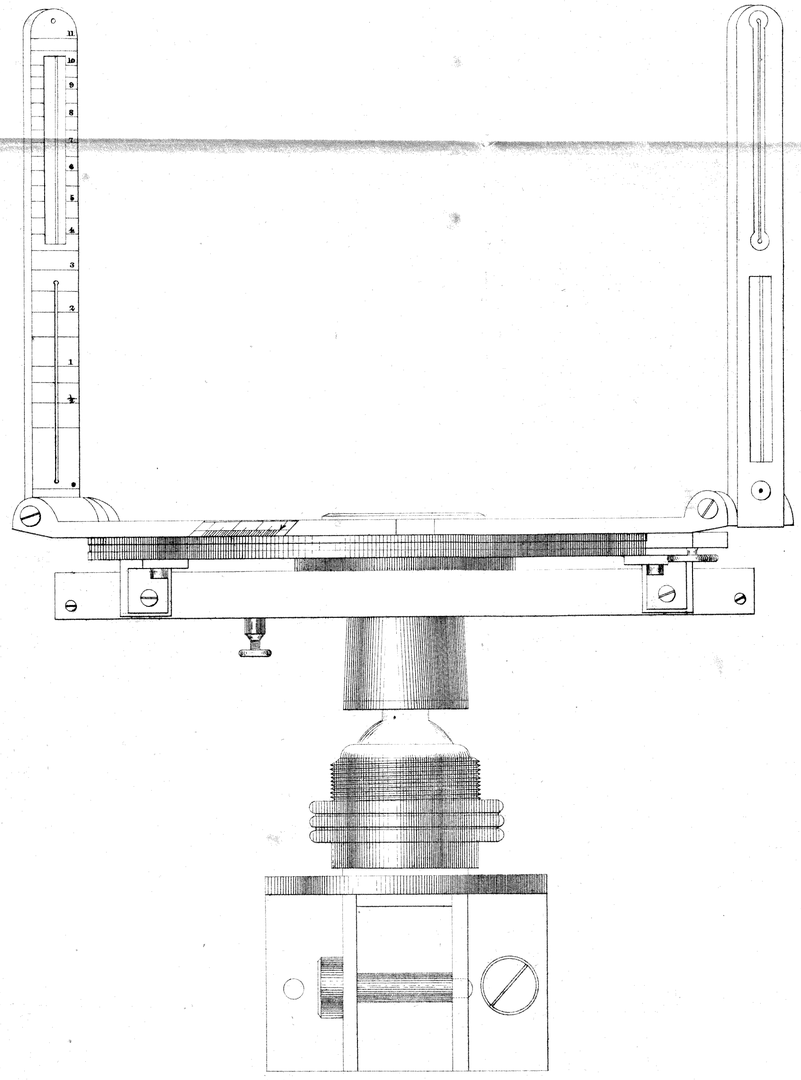


Fig 3. *Shewing Circumferenter with Sight-vanes up.*

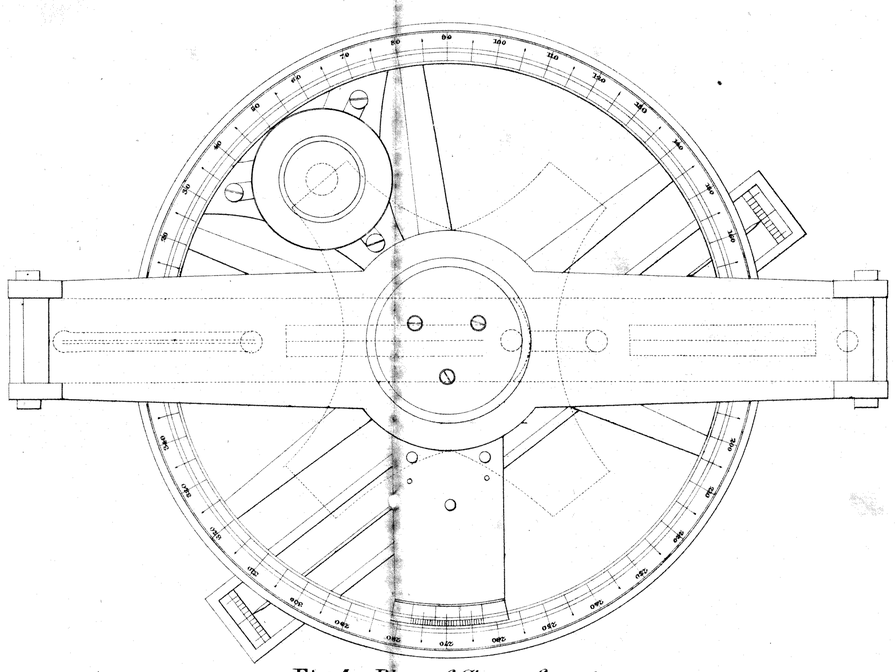


Fig 4. *Plan of Circumferenter.*

This is the Paper of Drawings referred to in the annexed Letters of Registration granted to Angelo Tornaghi, this Twenty sixth Day of November 1863.

Sgd John Young.

A.D. 1863, *3rd December.* No. 85.

COMPOUND HYDRAULIC AND PNEUMATIC MINERAL SHAFT-SINKER.

LETTERS OF REGISTRATION to James Scott, for a Compound Hydraulic and Pneumatic Mineral Shaft-sinker.

[Registered on the 5th day of December, 1863, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Scott, of Stockton, Newcastle, in the Colony of New South Wales, shipbuilder, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a Compound Hydraulic and Pneumatic Mineral Shaft-sinker, which is more particularly described in the specification and drawing which are hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four, and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information,

mation, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said James Scott, his executors, administrators, and assigns the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Scott, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Scott shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this third day of December, in the year of our Lord one thousand eight hundred and sixty-three.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THIS invention consists in the application of machinery so arranged as to obviate the great risk to human life hitherto incurred in shaft-sinking by the ordinary methods, and also in its being adapted to effect its purpose with more certainty and economy.

The apparatus by which I propose to effect this, I have designated the Compound Hydraulic and Pneumatic Mineral Shaft-sinker, which can be worked by steam or any other power applicable to the working of machinery in general.

In this invention I claim an original application of the well-known elevators usually employed in mills and dredging machines, the value of which for those purposes has been long known and highly appreciated.

The superiority of the apparatus consists in entirely dispensing with the employment of a labourer to excavate at the bottom of the shaft, while the curbing is descending through the various strata; and secondly, that in soft mineral sinking the hitherto usual pumping out of the shaft is wholly avoided until the curbing has descended to a sufficient depth and embedded itself into the imporous clay or other matter; and thirdly, in the application of atmospheric pressure on top of the curbing, thus doing away with the laborious system of pressing it downwards by a load of weights, or by the use of levers. This last arrangement I obtain through an air-pump attached to the engine, creating a vacuum, by which an amount of atmospheric pressure is exerted equal to about 15 lbs. on the square inch, or in other words, as the diameter of the curbing cylinder is to the atmospheric pressure, as at vacuum chamber, A, fig. 1.

In explanation of my system, a plan is here attached, fig. 1 being the vertical longitudinal section, and fig. 2 a horizontal section of the same. The apparatus attached for sinking the shaft, it represents the water being at its level, with the external water and sand A B, and the internal water a C, with curbing going down to D. There is here an evident counterbalance of the water between B and C; and from the water surface C the specific gravity must act with an equal force downwards to the bottom, against the external pressure E. By this I have avoided the common occurrence of the phrase given, the blowing up of the shaft, as shewn between E and F; for example, were the shaft empty, the force exerted on E to get into F would be great, as seen by the arrow.

The dredging apparatus may be worked by steam or other power, applied to the shaft at G, with driving pulleys at H; the shaft I, connected by universal joint in gear with bevel wheels, driving the pitch-chain barrel K, the chain L being kept in place by the rollers M and N, and all dredgings being discharged by the shoots at O. To work the dredging buckets up and down on the shaft G, are two bevel wheels in gear with a vertical screw, G, worked by a clutch, U, by which the screw is driven to the right or left,

left, and the buckets are raised or lowered as required, as in the dotted lines R and S. As the shaft at D is cleared away, the screw Q is put in gear by the clutch U, which lowers the whole apparatus to S, the framework turning on the shaft at Y. To raise the frame, the screw is reversed until it rises to R, when another length of chain is added, and the excavation goes on as before, until the whole length of shaft is completed down to the clay, as at V, fig. 1.

The arrangement to create a vacuum is illustrated by fig. 3. A cover of iron or wood is provided, and suspended as shewn at W; an india-rubber band is placed between the cover and cylinder, the air is then pumped off by the tube X, thus giving full weight of the atmosphere. Fig. 4, represents the shaft coming against a boulder; and although the water is high in the shaft, as at Y, the impediment can be removed from the bottom, at Z, without pumping out the water, by the use of either diving-dress or diving-bell. In conclusion, I claim that, by the non-pumping out of the shaft, the excavating of the the sand or strata can be taken up with either sludging machine or by the use of diving-dress or diving-bell.

This is the specification referred to in the annexed Letters of Registration granted to James Scott, this third day of December, 1863.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, New South Wales,
19 *October*, 1863.

Sir,

Having examined and considered the application of James Scott, for Letters of Registration, under Act of Council 16 Victoria, No. 24, for a Compound Hydraulic and Pneumatic Shaft-sinker, we have the honor to report that we see no objection to the necessary protection being granted.

Petition to Governor.
Specification.
Drawing.
Receipt from Treasury for £20

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
J. SMITH.

The Honorable
The Colonial Secretary.

[Drawings—one sheet.]

(N°85.)

COPY

FIG. 1

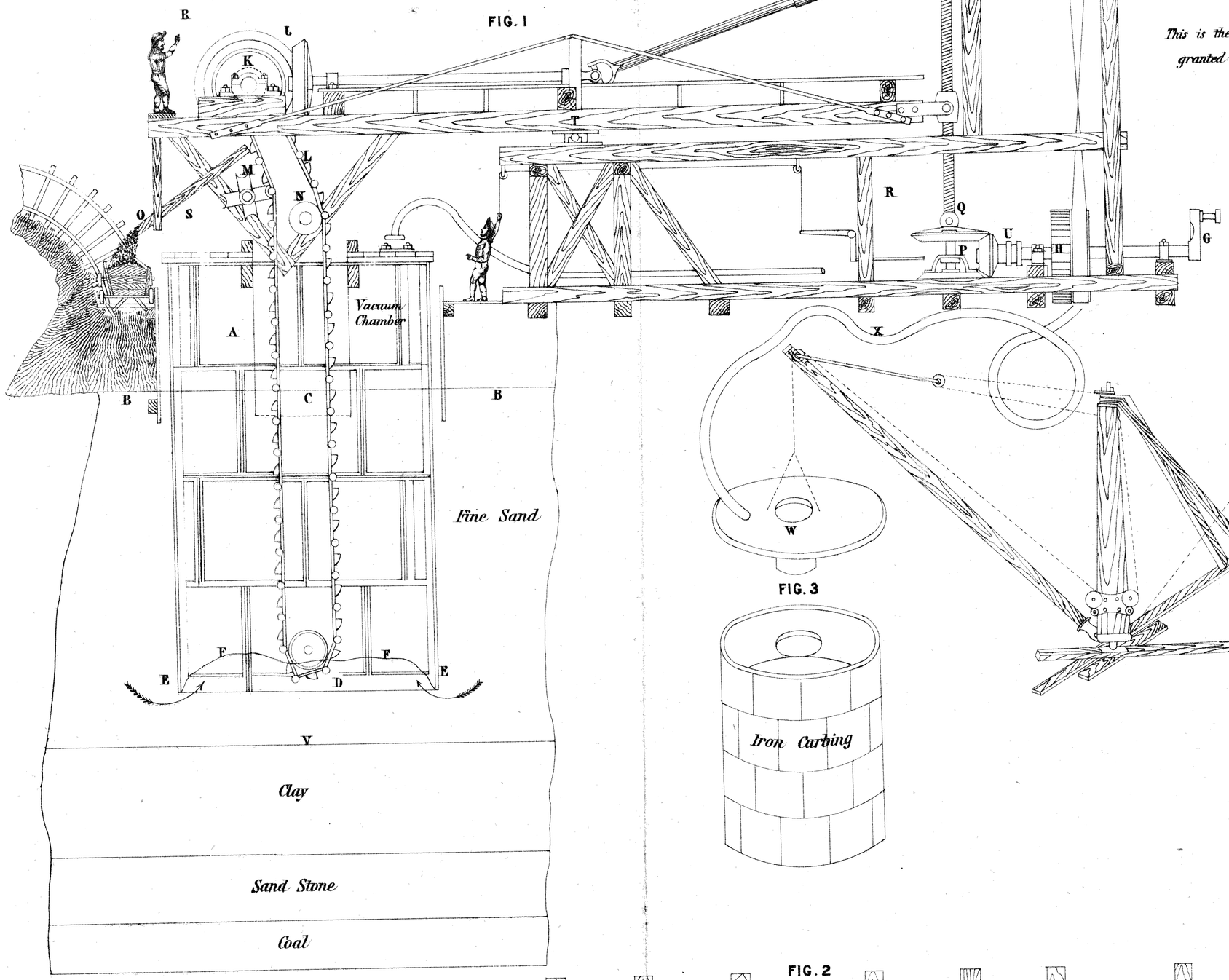
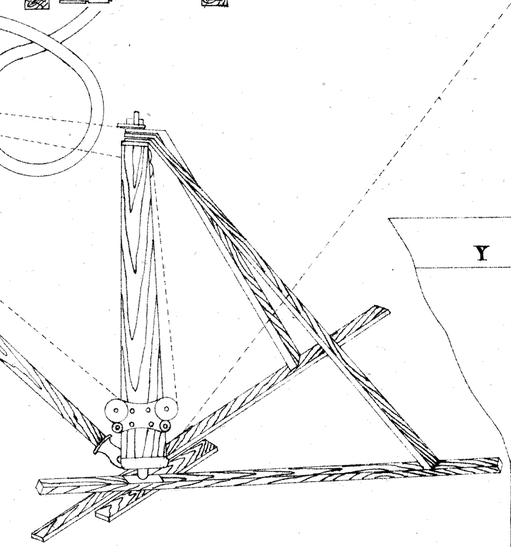


FIG. 3



This is the Drawing referred to in the annexed Letters of Registration granted to James Scott this Third day of December 1863

Signed: John Young

FIG. 4

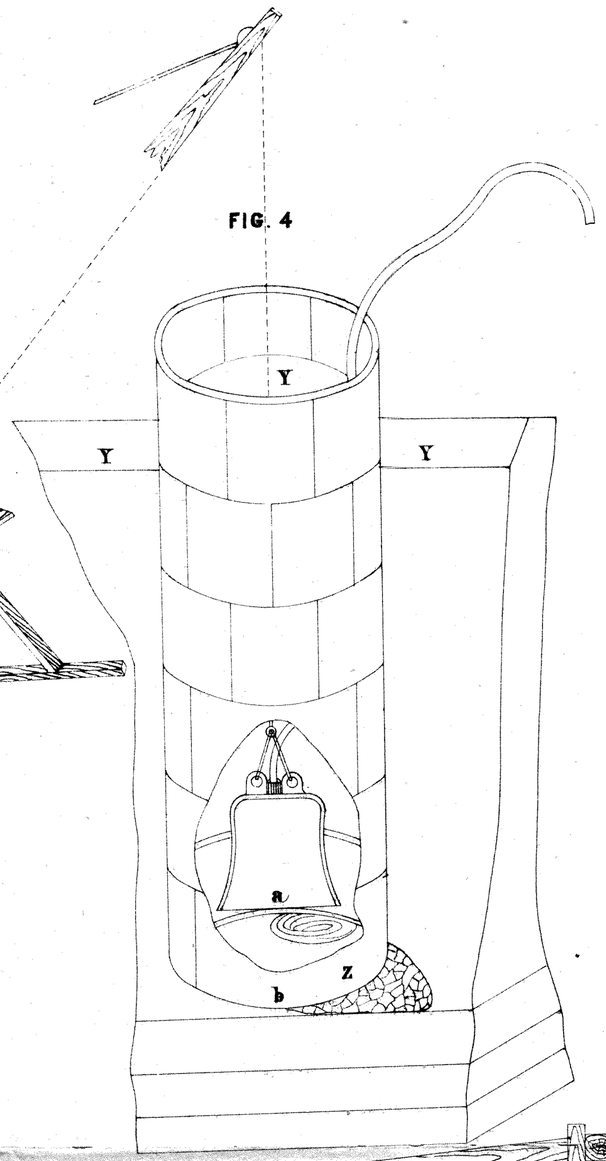
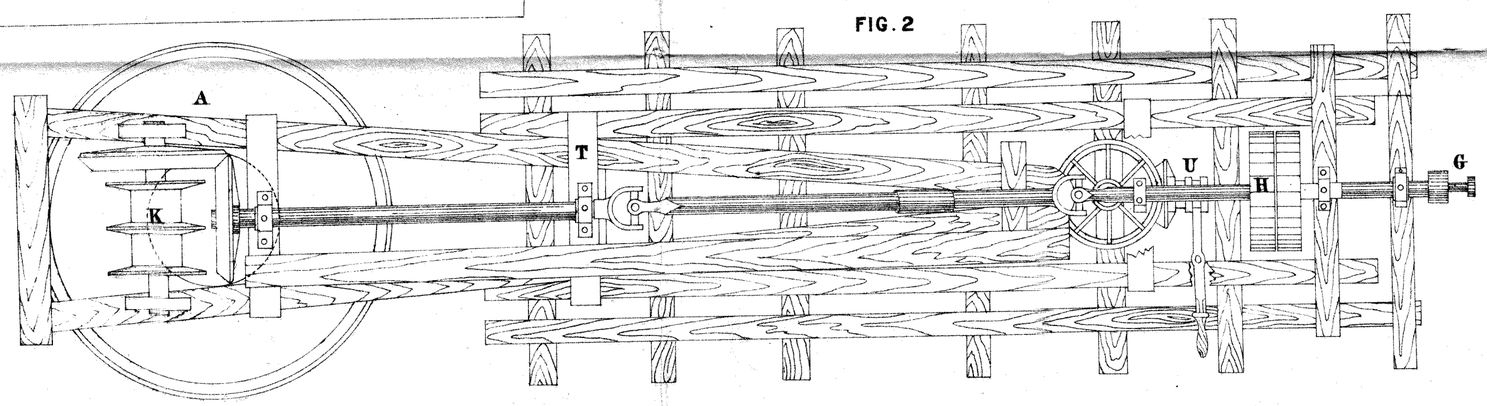
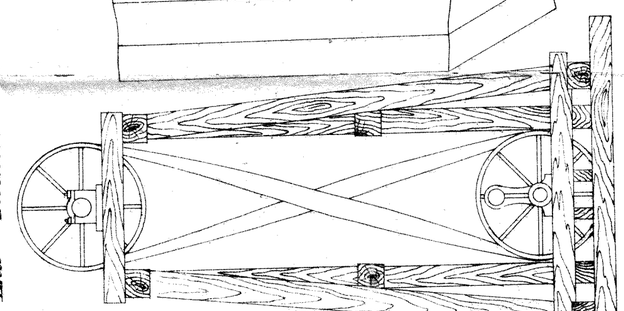


FIG. 2



End Section



NEWCASTLE, N. S. W.
November 26th. 1863
Signed: James Scott

A.D. 1864, 21*st January*. No. 86.

METHOD OF CONNECTING VARIOUS PARTS OF HARNESS, &c., BY MEANS OF RIVETS OR SCREWS.

LETTERS OF REGISTRATION to James Smith, for a method of connecting various parts of Harness, &c., by means of Rivets or Screws.

[Registered on the 22nd day of January, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS James Smith, of Botany, in the Colony of New South Wales, tanner, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of a method of attaching, connecting, and joining the various parts of harness, or other articles made of leather, by means of rivets or screws made of brass, copper, iron, tin, or other metals, instead of sewing, as at present, which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales, the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for

the

Method of connecting Harness, &c., by means of Rivets or Screws.

the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said James Smith, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said James Smith, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said James Smith shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-first day of January, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION.

To attach, connect, and join the various parts of harness, or other articles made of leather, by means of rivets made of brass, copper, iron, zinc, or other metals, instead of sewing, as at present.

MODE OF MAKING.

Great care must be taken in punching holes in the leather for the reception of the rivets; this done, insert the rivets in the holes, with or without washers, at option of maker, then rivet with hammer, in the usual way. In putting on loops, rivet one end first; then place the rivets into the holes of the strap; turn over the loop, it being previously punched. A piece of iron, the breadth and thickness of the strap, must be placed into the loop, to make it solid for rivetting.

THE ADVANTAGES.

1st.—Production at a lower price.
2nd.—Greater durability.
3rd.—Improved appearance.

This is the specification referred to in the annexed Letters of Registration granted to James Smith, this twenty-first day of January, 1864.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney, N.S.W.,
12 *December*, 1863.

SIR,

Having examined and considered, in accordance with provisions of the Act of Council 16 Victoria, No. 24, Mr. James Smith's application for Letters of Registration for his new method of connecting various parts of harness by means of rivets or screws, and having inspected some of the harness thus made, we have the honor to report that we see no objection to the issue of the Letters prayed for.

Documents herewith returned:—
Memorial.
Specification.
Mr. Leicester's letter of 5th Dec.
Memorandum of lodgment of £20.

We have, &c.,

THE HONORABLE
THE COLONIAL SECRETARY.

E. W. WARD.
CHAUNCEY LEICESTER.

A.D. 1864, 19*th February*. No. 87.

IMPROVEMENTS IN THE PROCESS OF PRESERVING PROVISIONS, AND IN THE APPARATUS EMPLOYED THEREIN.

LETTERS OF REGISTRATION to Amédée François Rémond, for Improvements in the process of preserving Provisions, and in the Apparatus employed therein.

[Registered on the 20th day of February, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Amédée François Rémond, of Charlwood-street, West Pimlico, in the county of Middlesex, in England, hath by his Petition humbly represented to me that Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, were, on the twenty-fourth day of September, in the year of our Lord one thousand eight hundred and sixty-one, granted by Her Majesty Queen Victoria, unto one George Davies, his executors, administrators, and assigns, for the using, exercising, and vending of an invention for "Improvements in the process of preserving Provisions, and in the Apparatus employed therein," which had been communicated to the said George Davies by one Alexandre Lecomte (which said invention is more particularly described in the specification and drawings hereunto annexed); and that by an indenture of assignment (a copy of which is also hereunto annexed) dated the thirteenth day of December, one thousand eight hundred and sixty-one, and made between the said George Davies of the one part, and the said Petitioner of the other part, the said invention and the said

Improvements in the process of preserving Provisions, &c.

Letters Patent (at the request of the said Alexandre Lecomte, the inventor or author of the said invention) were transferred and assigned over unto the said Petitioner, his executors, administrators, and assigns; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, do, by these Letters of Registration, grant unto the said Amédée François Rémond, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Amédée François Rémond, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Amédée François Rémond, shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this nineteenth day of February, in the year of our Lord one thousand eight hundred and sixty-four.

JOHN YOUNG.

SPECIFICATION.

THIS invention relates to the preservation of provisions in metal cases, and applies principally to the process of cooking the same, comprising an addition to the means or apparatus employed in such process, whereby an economy of time and also a great improvement in the flavour and nutritious qualities of the provisions are effected.

In the usual process of cooking provisions for preservation, they are enclosed in metal cases with a hole in the top, and these cases are placed in a calcium water bath, or "bain-marie" to be heated and boiled until it is supposed that the whole of the air and gases have been expelled; they are then closed hermetically, and the boiling is continued till the cooking is considered complete, and in most cases it is found necessary to employ a great heat to annihilate the gases that might have been left, and hence the cooking of the provisions is carried to such an extent that they are reduced to a state of jelly and fibre.

According to this invention, the provisions are placed in a metal case, the lid of which is properly soldered and has a small hole at the top as before, to which (if preferred) a small tin tube is soldered; heat is then applied, and as soon as the contents commence to boil, the vessel is put in connection with a second vessel, having a corresponding hole at the bottom, to which is also soldered a small taper tin tube, which is inserted in the tube or hole of the lid of the first-named vessel.

If the vessel in which the provisions are placed to be preserved contains much liquid, the steam formed inside the same pressing upon that liquid forces it to rise into the upper vessel, and it there serves as a water valve, which allows the gases to pass by bubbling into the atmosphere, but retains the aroma and flavour of the provisions that otherwise might have been lost; and when this first process of cooking or boiling is considered complete, the temperature of the case is lowered by raising it out of the bath into the atmosphere,

atmosphere, and a partial vacuum being thus formed inside the lower vessel or case, the pressure of the atmosphere forces the liquid to re-enter the vessel underneath. The temperature is then again raised, the connection between the two vessels is cut off, the hole in the lid is closed, and the case is again lowered into the bath and boiled until the operation of cooking is concluded.

But if the case contains very little liquid, as soon as the boiling begins and steam is given off freely, the connection between the two vessels is then made, and boiling water is added in the upper vessel, and through that bed of water, as above stated, the gases bubble out during the whole time that the operation of boiling continues; and thus all the aroma, flavour, and nutritious qualities of the provisions to be preserved are retained. When this first boiling is considered complete (the duration of which may vary from one quarter of an hour to one hour, according to the greater or lesser size of the case, and the substance to be preserved), the connection between the two vessels is then cut off, the upper vessel is removed with the water which it contained, if water had been poured therein; but if not, the temperature is lowered until the contents re-enter the lower vessel. The hole of the vessel containing the provisions is then stopped or closed by pinching together the small tube, or otherwise, and the boiling is then continued, and when the cooking is considered concluded the cases are removed from the bath and left to cool; by this process all the oxygen gas that might remain in the case when closed passes under the influence of heat into the state of carbonic acid gas, and thereby the elements of fermentation and decay are destroyed.

This process allows of a greater heat being applied at first, for the purpose of expelling all the gas without loss of flavour, and hence the time of cooking is greatly shortened, and the provisions being consequently cooked quicker; not only is the flavor retained, but the appearance and nutritious qualities of the provisions when prepared for use, are almost equal to those of freshly cooked provisions.

Where the provisions are required to be cooked in large quantities and several cases or vessels are boiled at one time, it is more convenient to substitute a long trough or troughs for the upper vessel.

This trough or troughs is or are arranged above a series of vessels or cases, and furnished with several flexible pipes provided with stop-cocks connected to its under side, so that their ends can be brought over the small openings or tubes in the several vessels or cases, and thus the one or two troughs answers the same purpose for all the vessels or cases under operation.

Such being the nature and object of my said invention for "Improvements in the process of preserving Provisions and in the Apparatus employed therein," I will now proceed to describe more in detail the manner in which the same is to be or may be performed or carried into practical effect; and in order that the same may be distinctly understood, I have annexed hereunto a sheet of drawings illustrative thereof, and have marked the same with figures and letters of reference corresponding with those in the following explanation thereof, that is to say:—

In the annexed drawing, fig. 1 illustrates the arrangement first above described. *a a* is the case or vessel containing the provisions to be preserved this case is closed entirely, with the exception of a small opening in the lid at *b*, to which a short tube is soldered; *c c* is the upper vessel open at the top, and having a small hole in the bottom at *d*, provided with a taper tube capable of fitting inside the tube of the vessel *a a*, as before described.

When the first cooking is complete, and the vessels are separated, the tube *b* is closed by compression with a pair of pincers or by soldering.

Fig. 2 shews a transverse vertical section, and fig. 3 a partial plan view of the second above described arrangement; *a a a a* are the cases containing the provisions to be preserved, which are suspended in the "bain-marie" or calcium bath *b b*, by means of an open trough or grating, *c c*, capable of being raised or lowered, and supported by chains, *d d*, passing over pulleys above. The calcium bath *b b* is heated by means of steam-pipes, *e e e e*.

Improvements in the process of preserving Provisions, &c.

f f are two troughs containing the water, which acts as a water valve, as above described. The water in these troughs is kept at the boiling point by means of steam pipes, *g g*, and the troughs are provided below with flexible tubes, *h h*, furnished with stop-cocks, for making the connections between the troughs *f f* and the cases *a a a a*, under operation.

The mode of using the apparatus is above described, with the exception that the temperature of the cases *a a a a*, and their contents, is raised by lowering them deeper into the calcium bath, and is lowered by raising them out of the same into contact with the air, which cools them.

Having now described the nature and object of the said invention for "Improvements in the process of preserving Provisions, and in the Apparatus employed therein," together with the manner in which the same is to be or may be performed, or carried into practical effect, I would remark, in conclusion, that I claim as new the peculiar method of an apparatus for cooking or preserving provisions, as hereinbefore described, and illustrated by the annexed drawings, or any modification thereof, operating in substantially the same or a similar manner.

This is the specification referred to in the annexed Letters of Registration granted to Amédée François Rémond, this nineteenth day of February, 1864.

JOHN YOUNG.

(L.S.) ASSIGNMENT.

[Registered on the 14th day of December, 1861.]

THIS Indenture, made on the thirteenth day of December, one thousand eight hundred and sixty-one, between GEORGE DAVIES, of No. 1, Searle-street, Lincoln's Inn, in the county of Middlesex, civil engineer and patent agent, of the one part, and AMEDEE FRANÇOIS REMOND, at present of No. 70, Charlwood-street, West Pimlico, in the same county, of the other part: Whereas Her present Majesty, Queen Victoria, by Letters Patent, under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date the twenty-fourth day of September, one thousand eight hundred and sixty-one, No. 2386, did give and grant unto the said George Davies, his executors, administrators, and assigns, the sole privilege during the term of fourteen years from the said twenty-fourth day of September, one thousand eight hundred and sixty-one, of using, exercising, and vending within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, the invention of "Improvements in the process of preserving Provisions and in the Apparatus employed therein," being a communication to him from abroad, by Alexandre Lecomte, of Montmatre, Paris, France, upon the conditions therein contained; and whereas the said Alexandre Lecomte, the Inventor of the said invention, has requested the said George Davies to assign the said Letters Patent unto the said Amédée François Rémond, which he hath agreed to do: Now this Indenture witnesseth that, in pursuance of the said agreement, and in consideration of the sum of ten shillings of lawful money of Great Britain, in hand well and truly received by the said George Davies from the said Amédée François Rémond, at or before the execution of these presents, the receipt whereof the said George Davies doth hereby acknowledge, and of and from the same and every part thereof doth acquit, release, and for ever discharge the said Amédée François Rémond, his executors, administrators, and assigns; he, the said George Davies, hath bargained, sold, transferred, and set over unto the said Amédée François Rémond, his executors, administrators, and assigns, all those the said Letters Patent hereinbefore in part recited, and all benefit, profit, and advantage whatsoever thereof and therefrom, and all right, title, property, claim, and demand whatsoever, both at law and in equity, of him, the said George Davies, his executors, administrators, and assigns, in or to the Letters Patent hereby assigned or expressed, and intended to be hereby assigned, including therein the right of applying for any extension or prolongation thereof; to have and to hold the said Letters Patent, and all and singular other the premises hereby assigned or intended so to be, and the said right of applying for any extension or prolongation thereof, unto the said Amédée François Rémond, his executors, administrators, and assigns, for his and their absolute use and benefit, in as ample and beneficial a manner, to all intents and purposes, as he, the said George Davies, might or could have held and enjoyed the same if these presents had not been made: And he, the said George Davies, doth hereby, for himself, his heirs, executors, and administrators, covenant with the said Amédée François Rémond, his executors, administrators, and assigns, that notwithstanding any act, deed, matter, or thing

thing by him the said George Davies done, executed, or permitted, he, the said George Davies, now hath in himself good right, full power, and lawful and absolute authority to assign the said Letters Patent and premises hereby assigned or intended so to be, in manner aforesaid, and according to the true intent and meaning of these presents: And moreover, that he, the said George Davies, his heirs, executors, and administrators, and all other persons lawfully claiming or to claim by, through, or under him, them, or any of them, shall and will, from time to time, and at all times hereafter, upon the request and at the costs and charges of the said Amédée François Rémond or the said Alexandre Lecomte, make, do, and execute all such lawful acts, deeds, matters, and things in the law whatsoever, for preparing, signing, and filing the specification required by the said Letters Patent, according to the instructions and at the risk of the said Amédée François Rémond or the said Alexandre Lecomte, and for more effectually assigning and assuring the said premises in manner aforesaid, and according to the true intent and meaning of these presents, as by the said Amédée François Rémond, his executors, administrators, and assigns, or his or their counsel, shall or may be advised and required.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year first above written.

Signed, sealed, and delivered by the within-named George Davies, in the presence of— } GEORGE (L.S.) DAVIES.

BRISTOW HUNT,
Solicitor,
1, Searle-street, Lincoln's Inn.

We certify this to be a true copy—

T. A. SIMS,
H. C. FORRESTER, } Clerks in the Great Seal Patent Office.

This is the Copy Indenture of Assignment referred to in the annexed Letters of Registration, granted to Amédée François Rémond, this nineteenth day of February, 1864.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, 2 July, 1862.

SIR,

Having examined and considered the application of M. A. F. Rémond for Letters of Registration, under the Act of Council 16 Victoria, No. 24, for an invention for Improvements in the process of preserving Provisions, we have the honor to report that we see no objection to the necessary protection being granted.

We have, &c.,
E. W. WARD.
R. GREENUP.

THE HONORABLE
THE COLONIAL SECRETARY.

P.S.—Documents as per margin herewith enclosed.

Letter from Johnson & Johnson, dated 23rd June, with Treasury receipt attached.

[Drawings—one sheet.]

(Copy)

Fig 1

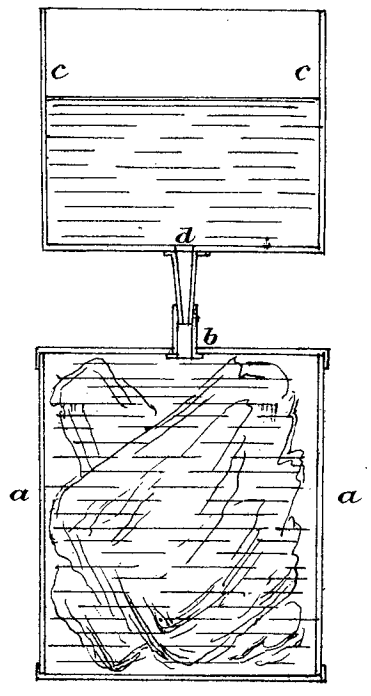
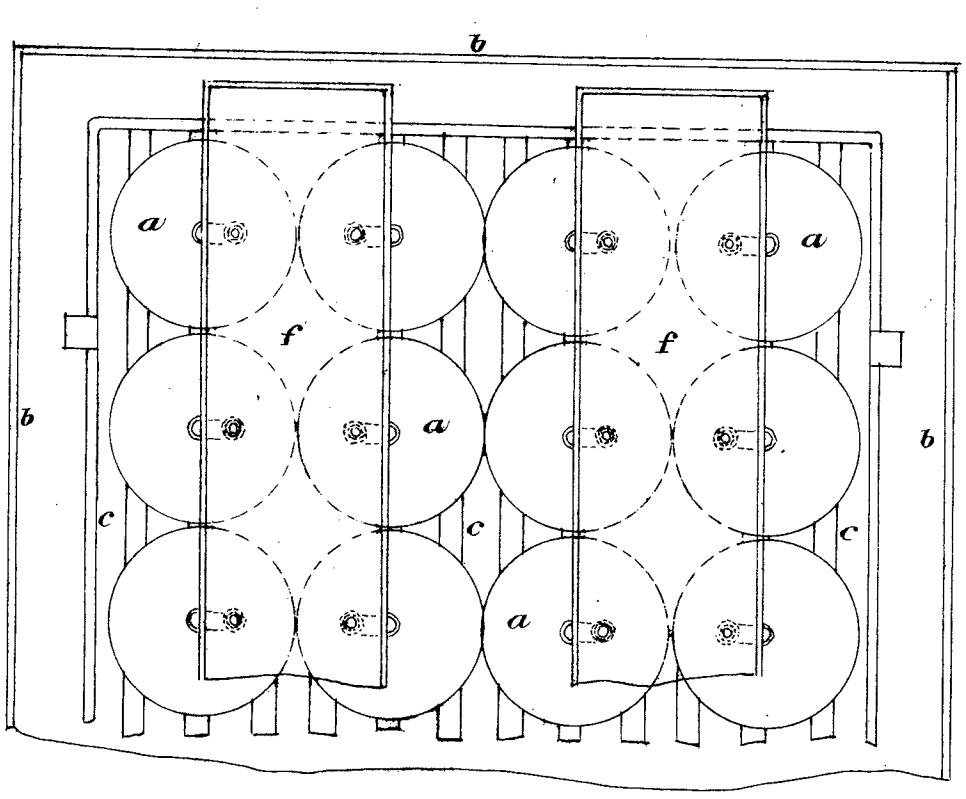


Fig 2

Fig 3



These are the Drawings referred to in the annexed Letters of Registration granted to Amedée François Rémond this 19th Day of February 1864

(Sgd) John Young

Davies & Hunt
PATENT AGENTS
London & Glasgow.

A.D. 1864, 26*th February*. No. 88.

IMPROVEMENTS IN THE MANUFACTURE OF WOODEN SLEEPERS FOR RAILWAYS.

LETTERS OF REGISTRATION to Mark William Carr, for Improvements in the manufacture of Wooden Sleepers for Railways.

[Registered on the 27th day of February, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Mark William Carr, of the Knoll, Blackheath, in the county of Kent, in England, civil engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in the manufacture of Wooden Sleepers for Railways," which is more particularly described in the specification and drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years; and I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant,

and

Improvements in the manufacture of Wooden Sleepers for Railways.

and do, by these Letters of Registration, grant unto the said Mark William Carr, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Mark William Carr, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing and fully to be complete and ended: Provided always, that if the said Mark William Carr shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-sixth day of February, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE nature of this invention is an improvement in the manufacture of transverse wooden sleepers for railways and tramways.

The improvement which forms the invention, consists in making the sleeper with grooves across its upper surface, of such form and dimensions that the particular rails and keys to be used may be securely and conveniently held in the grooves, very much as the rail and key are held in the jaws of the ordinary cast iron chair now in common use. The grooves are more or less dovetailed in their transverse vertical section, being wider below than above; they are also of sufficient width to admit of the key or keys being driven tight between the rail and one side of the groove. The form and size of the grooves may be varied to suit the form and size of the particular forms and sections of rails and keys used.

The invention consists in attaching the rail of railways to the transverse sleeper of wood by means of groove and key, without any assistance from chair, spike, nail, "dog," screw, treenail, strap, or other like contrivance.

DESCRIPTION OF THE DRAWINGS.

Fig. 1 shews an elevation, and fig. 2 a plan of transverse wood sleepers, formed with transverse grooves, together with the wedges or keys suitable for the particular section of railway bars shewn, but these will be varied if the section of rail employed is different.

This is the specification referred to in the annexed Letters of Registration granted to Mark William Carr, this twenty-sixth day of February, 1864.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
5 February, 1864.

SIR,

Having examined and considered the application of Mark William Carr, for Letters of Registration, under Act of Council 16 Victoria, No. 24, for "Improvements in the manufacture of Wooden Sleepers for Railways," we have the honor to report that we see no objection to the issue of the Letters prayed for.

The documents as per margin are herewith returned.

We have, &c.,
E. W. WARD.
CHAUNCEY LEICESTER.

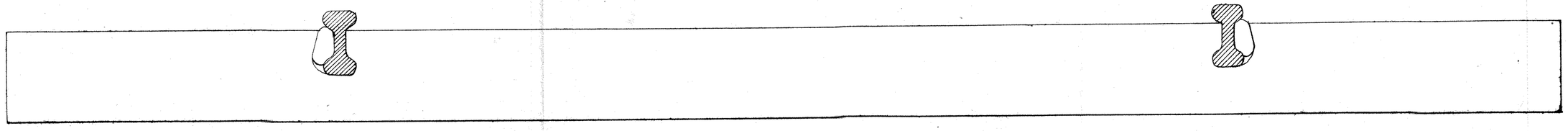
THE HONORABLE
THE COLONIAL SECRETARY.

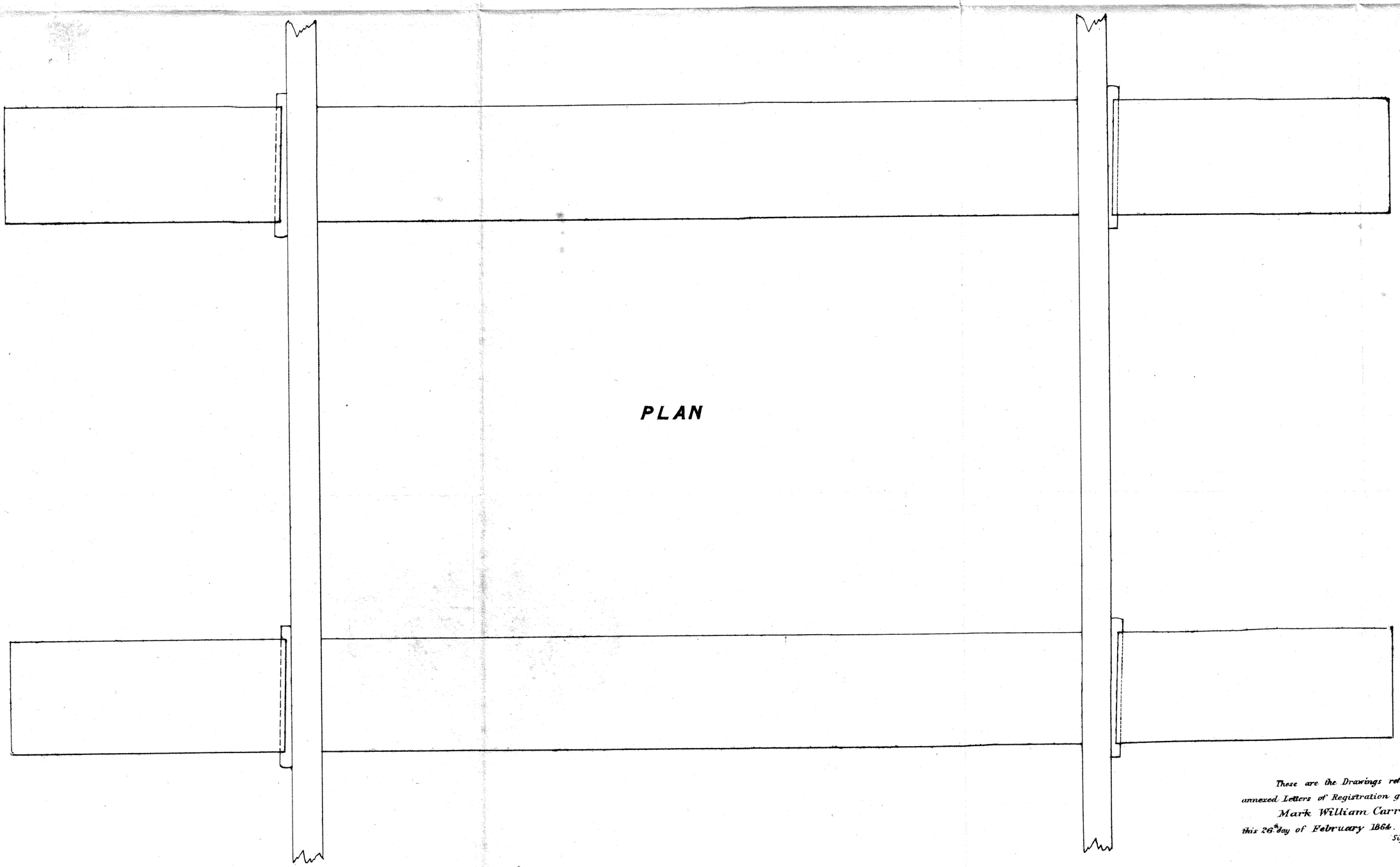
Documents returned:—
Petition to Governor.
Memo. of lodgment of £20.
Specification in duplicate.
Drawings in duplicate.

[Drawings—one sheet.]

Copy

ELEVATION





PLAN

These are the Drawings referred to in the annexed Letters of Registration granted to
Mark William Carr
this 26th day of February 1864.
Signed John Young

A.D. 1864, 26*th February*. No. 89.

IMPROVEMENTS IN WINDMILLS.

LETTERS OF REGISTRATION to Henry William Sharp, for Improvements in Windmills.

[Registered on the 27th day of February, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Henry William Sharp, of Melbourne, in the Colony of Victoria, engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in Windmills," which is more particularly described in the specification hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said Henry William Sharp, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or

improvement,

improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Henry William Sharp, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Henry William Sharp shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this twenty-sixth day of February, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION of HENRY WILLIAM SHARP, of the city of Melbourne, in the Colony of Victoria, engineer, for an invention for "Improvements in Windmills."

WINDMILLS, hitherto used as a motive power, are defective chiefly on account of their having no self-acting method of regulating speed in heavy currents of wind. This defect causes a general disarrangement of the machinery which it is intended to propel or drive.

I propose to remedy this evil as will be hereafter explained, by which means a perfect control of the mill is attained in the heaviest currents of wind.

The sails or drivers are made in the ordinary way, and carried on a vertical framing. I purpose using four sails or drivers (although I do not limit myself to that number); two of these sails or drivers are affixed to the carrying arm, and of necessity stationary, the other two are carried on gudgeons or bearings, also on the main arm, and are permitted to turn in a contrary direction to the pitch of the two stationary sails or drivers. The movable sails or drivers are regulated in their counteracting power by a spring, which is bolted on the carrying arm at the front of the sail, and bears against the inner edge of the sail, or that part opposite to the edge of the sail from whence the wind first strikes.

To render the action of the spring effective, the two movable sails or drivers on which the springs are applied have an unequal surface (that is to say), the spring bears against that part of the sail having the less surface, which is, as before stated, opposite to the part where the wind first strikes; the result in a heavy wind would be, that the widest part of the sail would be forced backwards, and so regulated by the springs on the movable sails or drivers as to regulate and counteract the excess of power imparted to the fixed sails or drivers.

Should it be deemed necessary to have six or more sails or drivers, the springs must be applied to each alternate sail or driver; in light winds where the minimum speed is only attained, all the sails or drivers act as propellers, and those having the springs attached only commence to hold back when the maximum speed is obtained.

Although I have here stated that the spring is carried in front of the sail, I would observe that I do not claim the precise position of the spring or springs, as their application may be varied indefinitely; neither do I claim any limited number of springs; but what I do claim is, the application of sails or drivers of windmills, made in one or more pieces, and acted on by a spring or springs, and so adapted as to counteract any excess of power imparted by the fixed sails or drivers, substantially as herein described and explained.

In witness whereof, I, the said Henry William Sharp, have hereto set my hand and seal, this thirteenth day of January, one thousand eight hundred and sixty-four.

Signed and sealed by the said Henry William Sharp, in the presence of— } HENRY WILLIAM SHARP. (L.S.)

E. HART,
Melbourne,
Patent Agent.

This is the specification referred to in the annexed Letters of Registration granted to Henry William Sharp, this twenty-sixth day of February, 1864.

JOHN YOUNG.

REPORT.

Improvements in Windmills.

REPORT.

Royal Mint, Sydney,
29 January, 1864.

SIR,

Having examined and considered the application of Henry William Sharp for Letters of Registration, under Act of Council 16th Victoria, No. 24, for an invention for Improvements in Windmills, we have the honor to report that we see no objection to the issue of the letters prayed for.

The documents as per margin are herewith returned.

Documents returned :—
Petition to the Governor.
Two specifications.
Memo. of ledgment of £20.

We have, &c.,

E. W. WARD.
CHAUNCEY LEICESTER, M.E.

THE HONORABLE
THE COLONIAL SECRETARY.

A.D. 1864, 8*th March*. No. 90.

IMPROVEMENTS IN REAPING AND MOWING MACHINES.

LETTERS OF REGISTRATION to William Roberts, for Improvements in Reaping and Mowing Machines.

[Registered on the 10th day of March, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS William Roberts, of Melbourne, in the Colony of Victoria, agricultural machine maker, hath by his Petition humbly represented to me that he is the assignee of Robert Bodington, of Melbourne, aforesaid, who is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in Reaping and Mowing Machines," which is more particularly described in the specification and drawings hereunto annexed, the said Robert Bodington having sold the said invention and all right to obtain Patents for the same in the Australian Colonies, to him the said Petitioner, as appears by the declaration of the said Robert Bodington, which is hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition,

from

from competent persons appointed by me to examine and to consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said William Roberts, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said William Roberts, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said William Roberts shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this eighth day of March, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THE superiority of this machine consists, and its advantages are—1st—Economy of construction; 2nd—Extreme lightness of draught, either as a mower or reaper, or combined; 3rd—The mode, as shewn in the drawings, and hereafter explained, by which means the knife-bar is carried and worked from the diametrical centre of the draught driving or bearing wheel, by which means great speed is attained in working the knives. The machine, by thus carrying the knife-bar, suits itself to any uneven surfaces it may have to traverse, without fear of derangement. The mechanical arrangements (hereafter also described and explained) as a reaper, have also their advantages, namely—1st—Lightness of draught, whether used singly or in combination with the mower,—in other words, when used in combination with any other approved mower; 2nd—The gradual and uniform delivery of the cut stuff, the extreme simplicity of the arrangements, also the easy mode of adjustment (owing to its extreme simplicity) should an adverse occurrence take place. The invention will be better understood on reference to the accompanying drawings, and to the letters and figures marked thereon which indicate the parts there referred to and here particularly explained. Fig. 1 is a plan; fig. 2, near side elevation; fig. 3, off side elevation. It also shews the mode by which the knife-bar is worked from the diametrical centre of the bearing draught or driving wheel at X; also, the pinion wheels, 14 14 and 15, by which means the vertical position of the wheel is sustained, thus dispensing with a central axis, and permitting the knife-bar working through its diametrical centre without being trammelled. Fig. 4, back end view; and fig. 5 is a section shewing face plate, arms of fly, and vertical shaft carrying the rake. A, bearing draught or driving wheel, toothed on its inner periphery; B, tubular shaft through which the connecting rod runs, terminating at E; C C C C carrying-frame and shafts; D, connecting rods; 7, pulley fixed on the horizontal driving shaft; 8, pinion wheel fitted and working into convergent eccentric wheel 6, shewn in the drawings as toothed on its outer periphery. This convergent eccentric wheel may be toothed and worked on its inner periphery or bearing, which would necessitate the frame figured 5, shewn in fig. 3, being carried and attached by brackets, as also shewn in the same view, within the convergent eccentric wheel, which has simply the advantage of lessening weight and circumscribing space; 5, frame connected to convergent eccentric wheel and attached thereto by brackets or clutches, 9 9 9; 10, iron framing carrying the tubular shaft, as also the necessary mechanical means by which the delivery is attained; this framing is permitted to oscillate, as shewn at the off side elevation at 11. 12, vertical standard carrying the horizontal driving shaft; F, connecting bar or rod attached to the vertical standard at G (shewn in the plan) which permits of the mechanical arrangements HH being worked. I, face-plate (shewn in fig. 5) on which a series of clutches are affixed

(as

(as previously described), by which means the arms of the flies are carried and adjusted by the thumb-screws KK, particularly defined in the back end view. This face-plate also retains the vertical shaft carrying the rake; L, crank (as shewn in the plan) which works the vertical shaft to which the rake is attached; this will be clearly understood on reference to fig. 5. The before described mechanical arrangements ensure a side delivery of the cut stuff. To attain a back or following delivery, the connecting rod F is disconnected at G, and by means of a bar connected at E (which bar is affixed between the face-plate at that part lettered E) holds the crank L stationary, and of necessity prevents the rake assuming a horizontal rotary motion. 14 14 and 15 are pinion wheels adapted to work tooth for tooth within the bearing draught or driving wheel, in dispensing with the central axis of which they act as auxiliaries in maintaining its vertical position. The wheel figured 15 has, independent of its duties as a maintaining power, another duty allotted to it, namely, that of driving the knife-bar at the connection 16, clearly shewn on reference to fig. 3.

Having thus described the nature of the invention, and the manner of performing the same, I would have it clearly understood that I do not claim precise details, so long as the character of the invention be retained and understood; but what I do claim is—first—driving the knife-bar from the diametrical centre of the wheel; 2nd—the mechanical arrangements by which the back and side delivery is attained; 3rd—the improvements generally, as herein substantially described and explained, either separately or in combination, or as a mower or reaper, or a mower and reaper combined.

This is the specification referred to in the annexed Letters of Registration granted to William Roberts, this eighth day of March, 1864.

JOHN YOUNG.

DECLARATION.

I, ROBERT BODINGTON, of Melbourne, in the Colony of Victoria, engineer, do solemnly and sincerely declare that I am the author and designer of an invention entitled "Improvements in Reaping and Mowing Machines;" that I have sold the said invention, and all rights to obtain Patents for the said invention in the Australian Colonies, to one William Roberts, of Melbourne aforesaid, who has (I am informed and verily believe) applied for Letters of Registration for such invention, in the Colony of New South Wales. And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the ninth year of the reign of Her present Majesty, intituled, "*An Act for the more effectual abolition of Oaths and Affirmations "taken and made in various Departments of the Government of New South Wales and to "establish Declarations in lieu thereof and for the suppression of voluntary and extra-"judicial Oaths and Affidavits.*"

ROBT. BODINGTON.

Declared before me, at Melbourne, this 11th day of February, 1864—

CHARLES P. HACKETT, P.M.

REPORT.

Royal Mint, Sydney,
New South Wales,
19 *October*, 1863.

SIR,

Having examined and considered the application of William Roberts for Letters of Registration, under Act of Council 16th Victoria, No. 24, for Improvements in Mowing and Reaping Machines, we have the honor to report that we see no objection to the necessary protection being granted.

The documents as per margin are herewith returned.

Petition to Governor.
Specification in duplicate.
Drawings ditto, as amended.
Memo. of payment to Treasury of £20, initialed J.G.L.

We have, &c.,
E. W. WARD.
E. O. MORIARTY.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

(Copy)

N°90

ROBERTS' PATENT

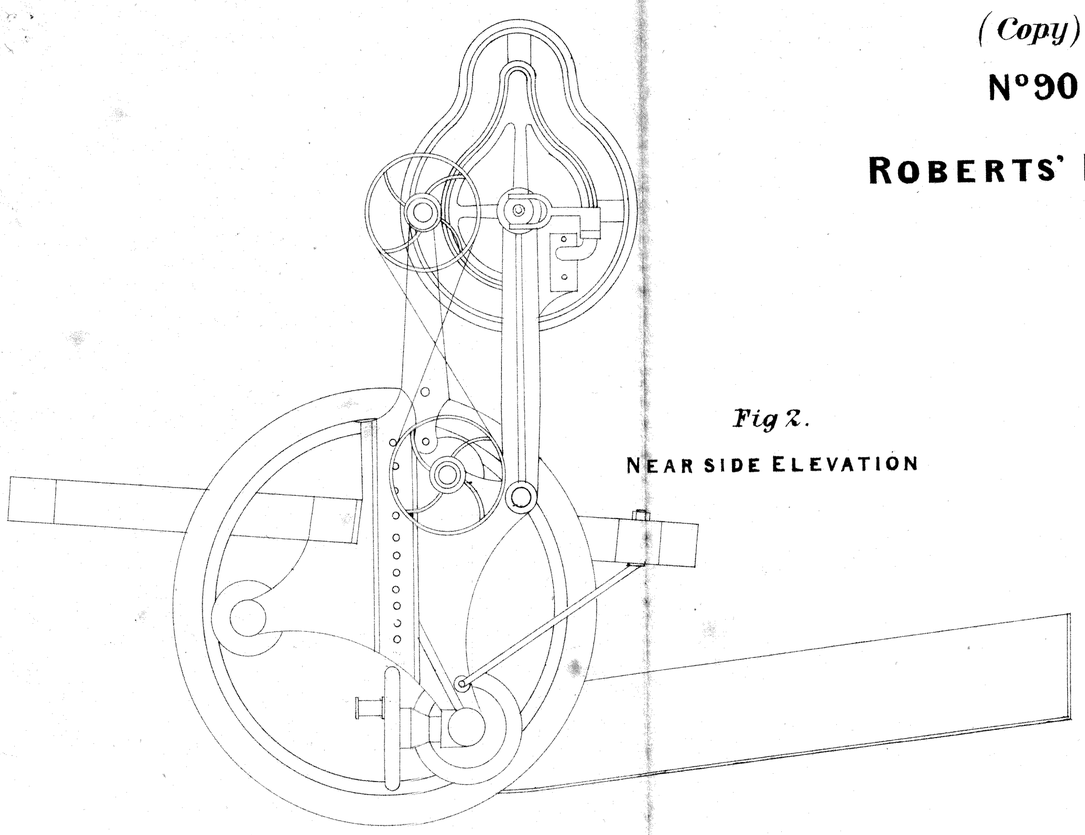


Fig 2.

NEAR SIDE ELEVATION

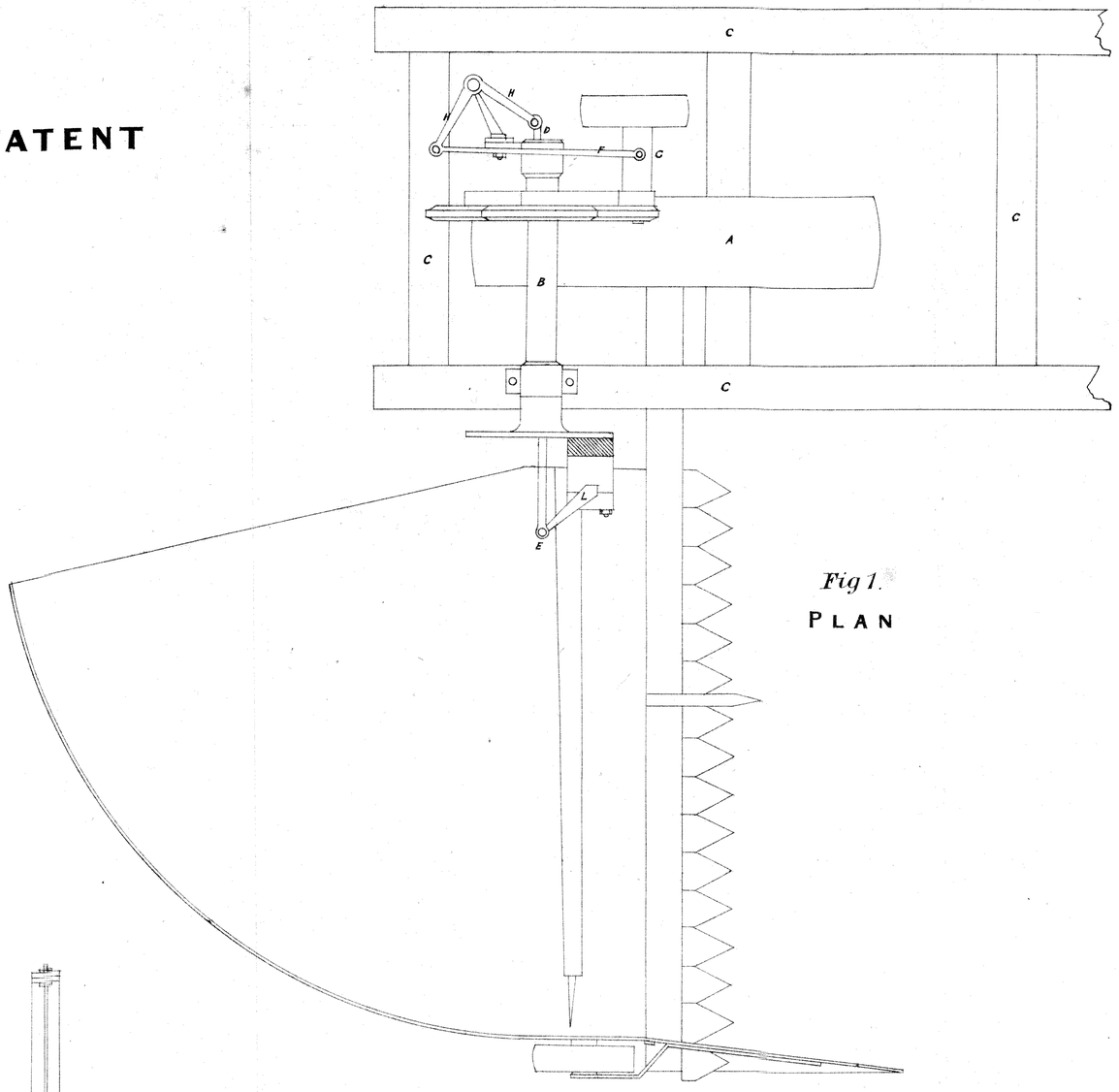
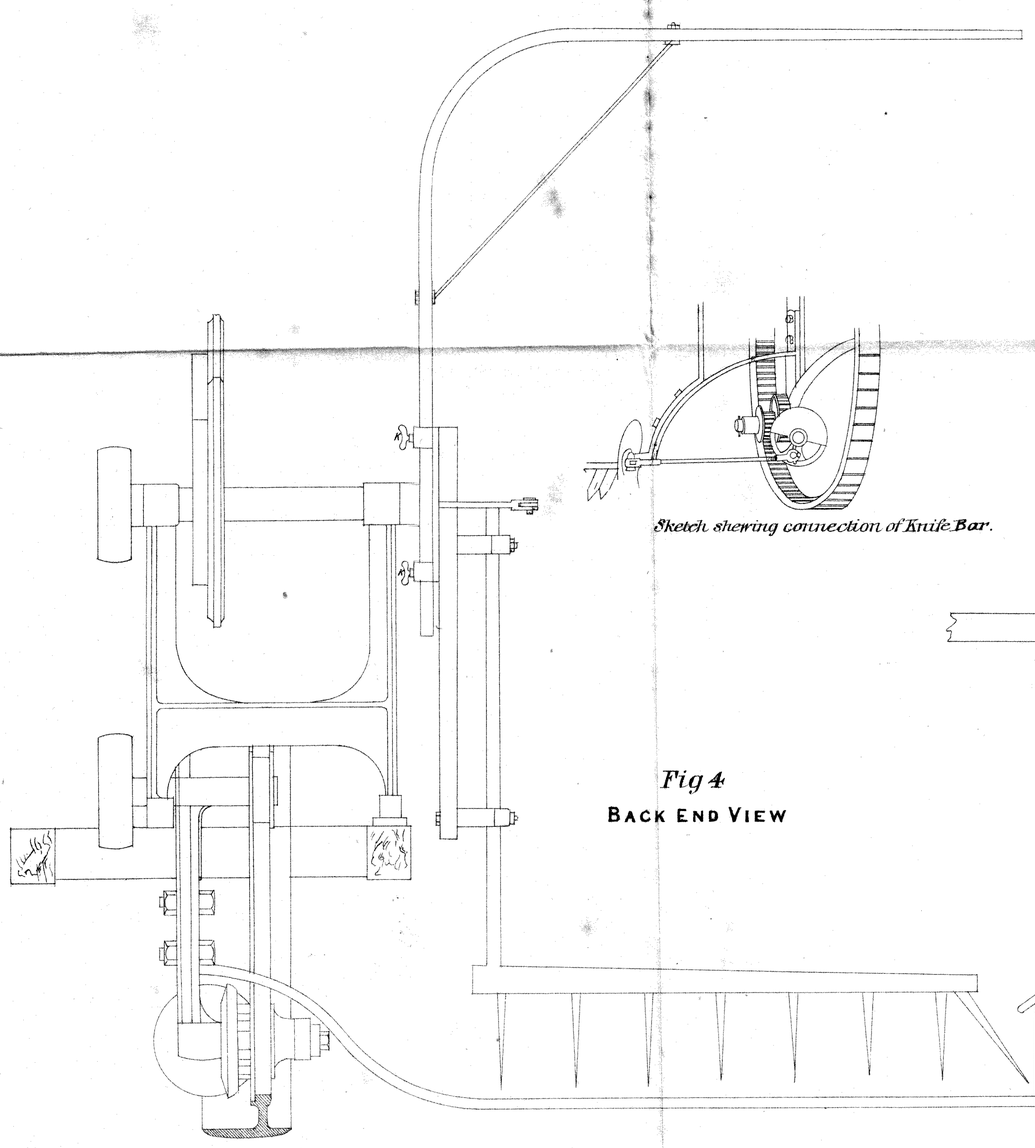


Fig 1.

PLAN



Sketch shewing connection of Knife Bar.

Fig 4

BACK END VIEW

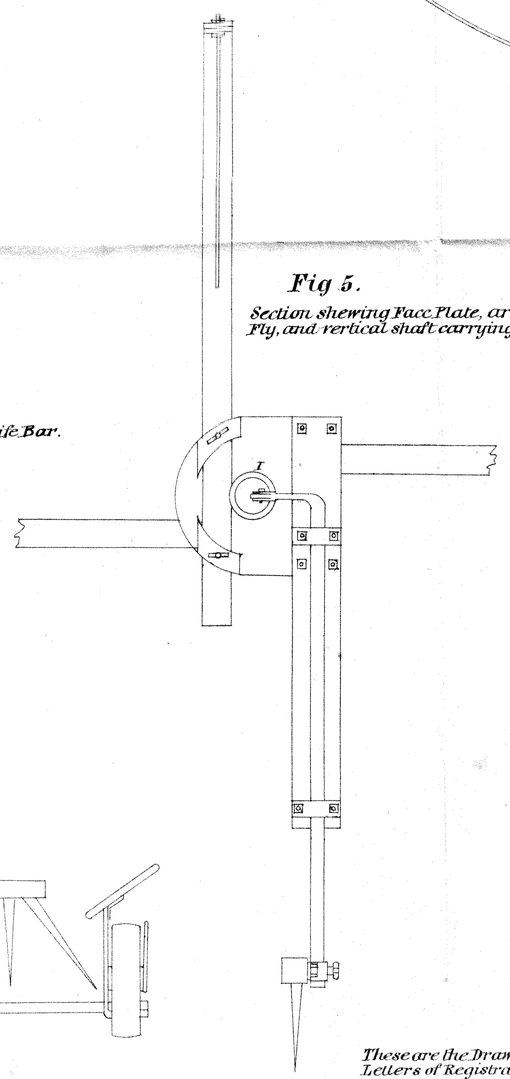


Fig 5.

Section shewing Face Plate, arms of Fly, and vertical shaft carrying rake.

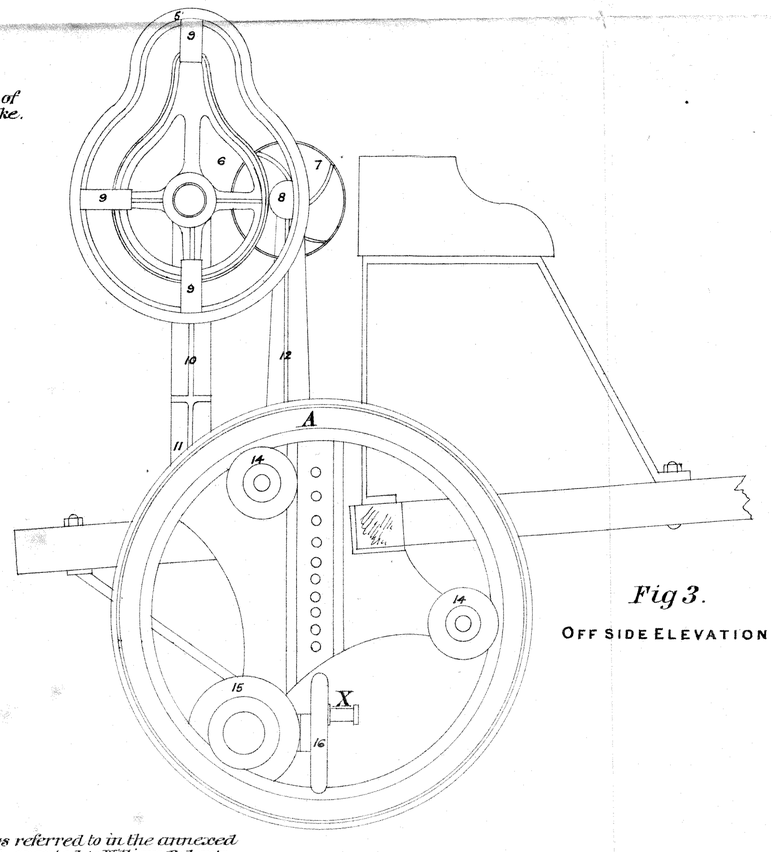


Fig 3.

OFF SIDE ELEVATION

These are the Drawings referred to in the annexed Letters of Registration, granted to William Roberts, this eighth day of March 1864

Sgd John Young.

A.D. 1864, 31*st May*. No. 91.

IMPROVEMENTS IN RAILWAYS OR TRAMWAYS, &c.

LETTERS OF REGISTRATION to Messrs. Phillips and Eve, for Improvements in Railways or Tramways, and the mode of traction thereon, and in Apparatus for propelling Carriages on such Roads and on common Roads, and the traction of Agricultural Implements, and propulsion of Vessels on Water.

[Registered on the 2nd day of May, 1864, in pursuance of the Act 16 Vict., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Philip William Phillips and John Samuel Eve, both of Melbourne, in the Colony of Victoria, gentlemen, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in Railways or "Tramways, and the mode of traction thereon, and in Apparatus for propelling Carriages "on such roads and on common roads, and the traction of Agricultural Implements, and "propulsion of Vessels on Water, parts of such invention being applicable to other useful "purposes," which said invention is more particularly described in the specification and drawing hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria number twenty-four; and have humbly

Improvements in Railways or Tramways, &c.

humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions or improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Philip William Phillips and John Samuel Eve, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Philip William Phillips and John Samuel Eve, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Philip William Phillips and John Samuel Eve shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirty-first day of May, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION of Improvements in Railways or Tramways, and the mode of traction thereon, and in Apparatus for propelling Carriages on such Roads, and on common Roads, and the traction of Agricultural Implements and propulsion of Vessels on Water, parts of such invention being applicable to other useful purposes, by Philip William Phillips and John Samuel Eve.

OUR invention will be understood by the following description, reference being had to the drawings hereto annexed, and to the letters and figures marked thereon, which indicate the same parts wherever they occur.

Fig. 1 shews a sectional view of our permanent way. A is the universal traction rail (let into the transverse sleeper) on which the traveller slides or rolls. On each side of the transverse sleeper surrounding this rail we place one iron plate, and bolt them together by rivets. B B are wooden rails placed longitudinally, for the running wheels to run upon. These rails are bolted to the transverse sleepers.

Fig. 2 shews a top view of a double chain of levers, as we propose to use them, and fig. 3 shews a side view of the chain of levers partly contracted; these levers are connected by pins or pivots, as shewn. C is the connecting rod attached to the piston, and is here shewn connected to the lever next the centre; this, however, may be connected to any portion of the chain of levers, and in any relative position, as convenience and the requirements either of speed or power may dictate. D is the bearing of the centre of the lever chain; D^1 (shewn in the top view) is the fixed central pin supporting the lever chain; E E are guide blocks connected to one of the central pins of the lever chain and slides in the guides F, which are to be connected to the main framing of the engine or locomotive carriage by any approved method. G G are the rods affixed at each extremity of the lever chain, and connected to the traveller H. This traveller encloses the upper surface and sides of the rail—the lever I (which grasps the rail when required) being reversed in its action by means of a set screw operated upon by means of a wheel and pinion, as shewn.

Fig. 4 shews an inside view, and fig. 5 is a side view of the lever I. Our invention consists in substituting for the traction of the driving wheels of the locomotive engine, a traction rail fixed centrally between the tracks of the running wheels, and which is denominated

denominated "The Universal Traction Rail." A rail of a ⊤ head shape is most suitable. On this rail an apparatus, which is fitted on and encircles the ⊤ portion of the rail, and having suspended from its centre on each side a lever which grips the under portion of the rail when required, and which is called a traveller, slides or rolls freely in the line of progression, but catches or grips the rail when attempted to be forced in the opposite direction to which it is set. Beneath the engine or locomotive carriage, placed horizontally and longitudinally, are guides similar to piston guides, but much stronger; they are supported by brackets and trusses, or otherwise fixed to the framework. To the centre of the guides, and about the centre of the carriage, a combined chain or chains of levers, as shewn in the drawings, is attached, so that in its expansion or contraction the ends of the central pins of the chain slides in the guides, with guide blocks where necessary. The centre of the combined lever chain being fixed, one of the pins next or near to the centre, and at either the centre or extremity of the lever or link (as it may be called) is attached to the piston rod or connecting rod of a steam-engine or other prime mover, so that each reciprocation of the piston expands or contracts the lever chain, thus giving a lengthened and double action to the piston stroke (forward and backward). At each end of the lever chain a rod connects it with one of the travellers, and as the chain expands from, and contracts to the centre, and the travellers only move in the line of progression, the carriage at and during each reciprocation is impelled forward with a continuous and regulated motion. Thus, in expanding, the hindmost traveller holds or grips the traction rail, and the carriage is impelled forward by reason of such expansion, whilst the foremost traveller runs or slides freely. Arrived at the end of the stroke, the next reciprocation of the piston contracts the lever chain, and now the foremost traveller grips the rail, the progress of the carriage continues, and the hindmost traveller slides or rolls freely, and takes its position for the next stroke.

In adapting this invention for propelling carriages on common roads, and for the traction of agricultural implements, legs or feet may be employed to act upon the ground, in a similar manner and for the same purpose as the traveller above described, which re-acting upon the upper portion of the guides, or by means of rollers under the framework of the carriage, the carriage rolls or slides over the upper end of the legs or feet, and is consequently propelled in the direction required.

We also propose to use tramways with transverse bars of wood or other material, for the feet to act against.

For propelling vessels, the lever chains fixed at their centres in a similar position to the paddle wheels, either outside or inside the vessel, and either above or below the water line, have at each extremity a shaft, where necessary, passing through a shifting box, and working in guides on the outside of the vessel, having one or more reefing paddles or floats at the extremity, acting directly on the water when making its stroke, and reefing or folding when taking its position. Its action, being similar to what has been before described, need not be repeated. Either one or the other end of the shafts will always be acting directly.

In all cases where an extended action of the piston is required, we propose the use of the lever chain; the piston rod being attached to one end of the chain, and the centre of the next pair of levers being fixed, any range required may be obtained by estimating the number or length of the levers. About three parts of the length of their full extension is available without much loss of power.

Where the universal traction rail is used, either wood or iron rails may be used for the running wheels to run upon, or may be dispensed with altogether. We prefer to use a wooden rail plated with iron.

The form or shape of the traveller may be varied, so long as it runs freely on the rail and takes the necessary grip when required. The traveller may be made with wheels or friction rollers under it, if so desired, but we prefer to use a sliding traveller.

We do not confine ourselves to two guide blocks, although we think that number sufficient for a chain containing the number of levers here shewn, as, if the number of levers were extended, it might be advisable to have more guide blocks.

Having

Improvements in Railways or Tramways, &c.

Having thus described the nature of the invention, and the manner of performing same, we would have it understood that we do not confine ourselves to precise details, nor to the materials of which the different parts of our invention may be made or manufactured; but what we do claim is—

1st. The use of the universal traction rail as described.

2nd. The use of the chain of levers, acted on by the reciprocating action of the piston, by which means a greater velocity is attained.

3rd. The use of travellers, made of any suitable form, as described and connected with the chain of levers, by which means the engine and vehicles attached are prevented from running in any but the required direction.

4th. The adaptation of the chain of levers to vehicles working on common roads, or to agricultural implements, as described.

5th. The adaptation of the chain of levers for propelling vessels on water, as described.

This is the specification referred to in the annexed Letters of Registration granted to Philip William Phillips and John Samuel Eve, this thirty-first day of May, 1864.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, 7 April, 1864.

SIR,

Having examined and considered the application of P. W. Phillips and J. S. Eve, of Melbourne, for Letters of Registration, under Act of Council 16 Victoria, No. 24, for an invention for Improvements in Railways or Tramways, &c., we beg to recommend that the protection sought for be granted.

The documents as per margin are herewith returned.

We have, &c.,
E. W. WARD.
E. BELL.

THE HONORABLE
THE COLONIAL SECRETARY.

Documents returned:—
1. Memorial to Governor.
2. Specification.
3. Plan.
4. Treasury memo. of lodgment of £20.
5. E. Waters' letter of 30 March, 1864.

[Drawings—one sheet.]

(Copy)

Phillips & Eres Patent

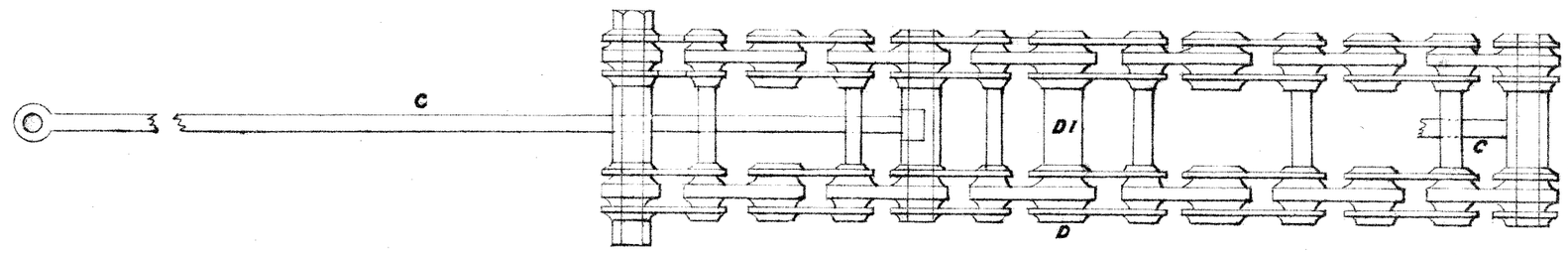


FIG 2

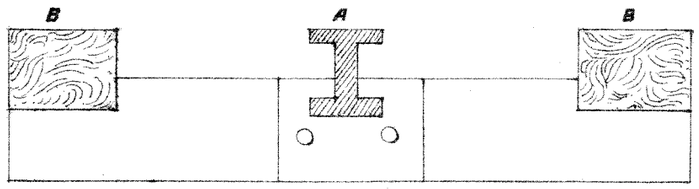


FIG 1

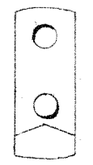


FIG 4

FIG 5

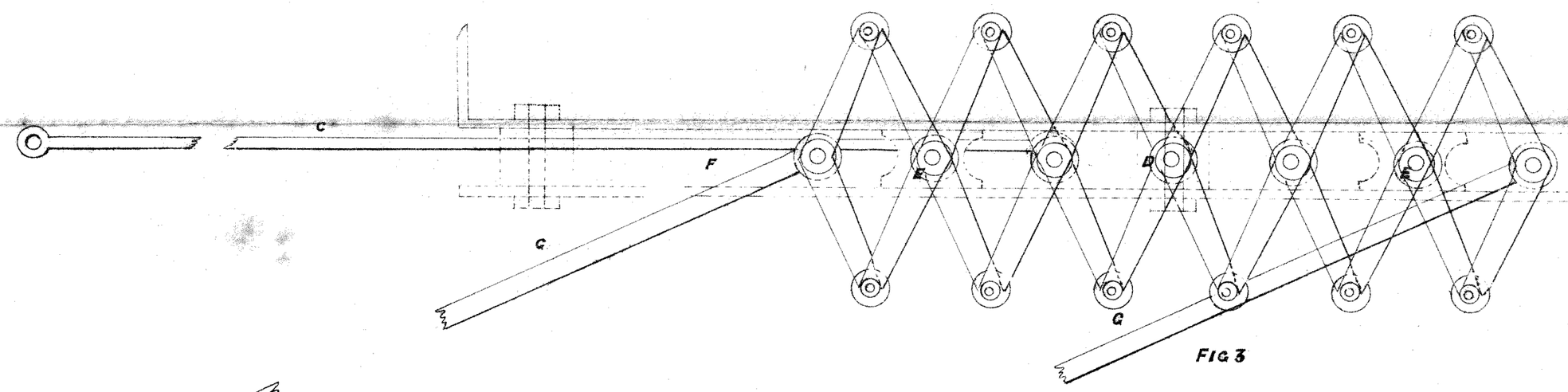
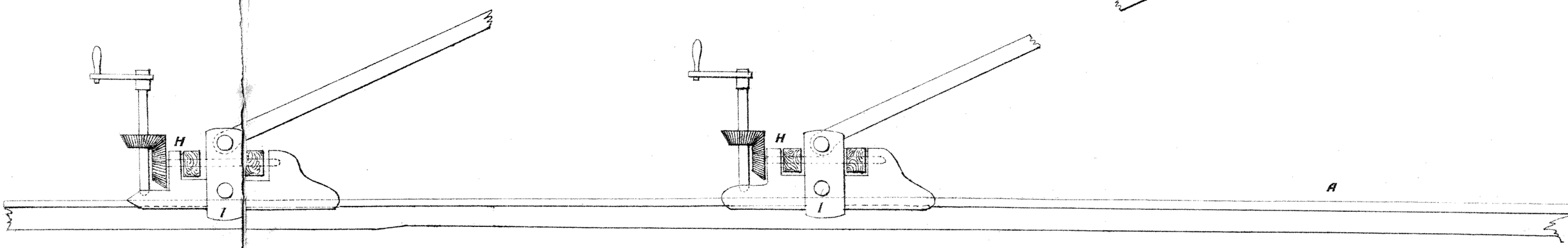


FIG 3



This is the Drawing referred to in the annexed Letters of Registration granted to Phillip William Phillips & John Samuel Eve this 31st Day of May 1864

(Sgd) John Young

A.D. 1864, 31*st May*. No. 92.

PULVERIZER.

LETTERS OF REGISTRATION to John McPherson, for a Pulverizer.

[Registered on the 2nd day of May, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John McPherson, of Good Dog, in the District of Shoalhaven, in the Colony of New South Wales, hath by his Petition humbly represented to me that he is the designer of a certain invention or improvement in manufactures, that is to say, of an invention for pulverizing Quartz and other material, which is more particularly described in the specification and drawing hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to

me

me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said John McPherson, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John McPherson, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John McPherson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirty-first day of May, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION.

QUARTZ or other material is by this my invention pulverized by the application of centrifugal force. A sketch of such invented machine is hereto annexed; fig. 1 being a cast iron case, with triangular teeth on the interior, like a ratchet; fig. 2, cast iron cover, with opening in the centre for the purpose of feeding the machine; fig. 3, bracket, to which is attached brushes, in which upright shaft runs; fig. 4, sheet iron case bolted up to cast iron case, into which reduced material falls, and escapes by spout fig. 5; fig. 6, the drawing pulley.

The force generated in the above machine is sufficient to reduce the hardest quartz or other ores to the finest dust or powder, and with a power so much less than is required by any of the present applied means; the machine being capable of pulverizing from fifty to sixty pounds of quartz per minute, with an engine power of six-horse; and the interior arrangements are such that the material is discharged free from any current of air, and may be received in a bag or open box. On the interior or lower edge of the cast iron case there is a ledge from two to three inches wide all round the case, leaving an opening as it were through the bottom, the opening being four or six inches less in diameter than the interior of case. In this opening a disc or thin plate of metal is fixed; an upright shaft revolves, filling the opening, with only a space sufficient for clearance all round, the disc forming as it were with the ledge a bottom to case. On this disc is fixed four or more arms, equal in depth to the depth of the case above the ledge; this part of the case being supplied with triangular teeth, one face of these teeth forming a right angle with the tangent line from the extremity of blades or arms, so that the material to be pulverized on leaving the arms strikes these faces at right angles, so that the reflection is again in the same line of tangent, and as action and reaction being equal reflects nearly with the same velocity, and meeting the arms at the same velocity receives a blow double the effect of the first blow; for example, if the velocity of the extremity of arms is 12,000 feet a minute, the blow that the material receives against one of these faces of teeth is equal to 12,000 feet per minute; the reflection being at the same velocity meeting the arms at 12,000 feet per minute, the effect on the material will be equal to a blow of 24,000 feet velocity; and this velocity reduces quartz without burning to the finest powder. The material after being operated upon, falls through one or more holes in the ledge into the conical case, from which it is discharged at the spout; but as air would also pass down into case and be discharged along with the material, it is necessary to neutralize the currents in the machine, which is accomplished by having a pipe surrounding the upright shaft, for the purpose of preventing the dust coming down through

Pulverizer.

through the bottom of conical case on the pulley, and for conveying air to four or more blades fixed on lower side of revolving disc. The current from these blades being equal to the current of upper blades, both currents meeting at the upper edge of conical case, the one neutralizing the other, the whole air in conical case revolves, but striking the inclined sides of case, the whole tendency is to the largest diameter. All the air that is felt at the spout is only what is due to the air revolving in the smallest diameter of case or point of cone, which is so trifling that it is scarcely felt. The dust or ground powder has a tendency to fall down the case by its own gravity, but being counteracted by the tendency of all revolving bodies to fly off at a tangent, it is kept up at top of conical case, but is caused to descend by having a fillet of metal fixed on the interior of conical case like the thread of a screw, so that, as the dust revolves in contact with case, it is made to descend by following the incline of this fillet.

This is the specification referred to in the annexed Letters of Registration granted to John McPherson, this 31st day of May, 1864.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, 18 *April*, 1864.

Sir,

Having examined and considered the application of John McPherson for Letters of Registration, under Act of Council 16 Victoria, No. 24, for an "Invention for pulverizing Quartz and other material," we beg to recommend that the protection sought be granted.

The documents as per margin are herewith returned.

Documents returned:—
1. Petition to Governor.
2. Sketch of invention.
3. Treasury memo. of lodgment of £20.

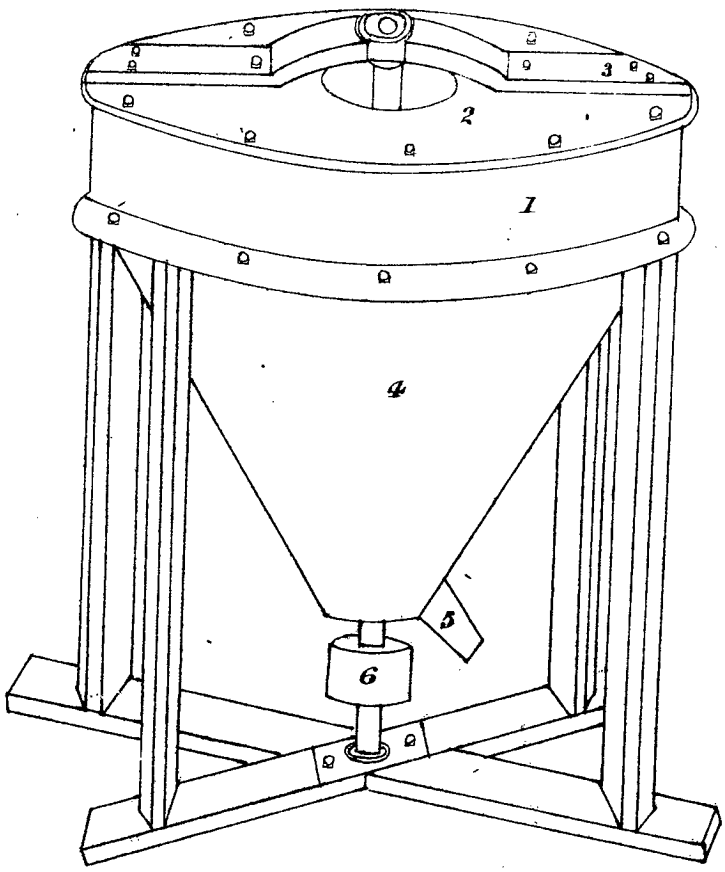
We have, &c.,

E. W. WARD.
E. O. MORIARTY.

The Honorable
The Colonial Secretary.

[Drawing—one sheet.]

(Copy)



This is the Drawing referred to in the annexed Letters of Registration granted to John Mc Pherson this 31st day of May 1864 (Sgd) John Young

A.D. 1864, 30*th June*. No. 93.

IMPROVEMENTS IN MACHINERY FOR MAKING BRICKS.

LETTERS OF REGISTRATION to George Cowdery, for Improvements in Machinery for making Bricks.

[Registered on the 1st day of July, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS George Cowdery, of Llanymynech, in the county of Salop, in England, civil engineer, hath by his Petition humbly represented to me that he is the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention for Improvements in Machinery for making Bricks, which is more particularly described in the specification and drawings hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said George Cowdery, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen

years

Improvements in Machinery for making Bricks.

years from the date hereof; to have, hold, and exercise unto the said George Cowdery, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said George Cowdery shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirtieth day of June, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION.

THIS invention relates to the manufacture of bricks, the object being to produce them at a more speedy rate and in a more efficient manner than by the means ordinarily adopted for that purpose.

In order that my said invention may be completely understood, I will now proceed to describe the best means I am acquainted with for carrying the same into practical effect, reference being had to the accompanying sheet of illustrative drawings and to the numeral figures and letters of reference marked thereon respectively, as follows:—

Fig. 1 is a side elevation of my improved brick-making machine; fig. 2 being a section taken through the barrels thereof. Similar letters of reference denote corresponding parts, where such parts appear or can be seen in each figure.

I employ a hopper, *aa*, for receiving the brick-earth, having triangular revolving shafts and rollers placed therein (shewn in section, fig. 2), or other suitable contrivance, for pressing the clay or loam into the moulds, previous to their meeting a cylindrical roller. The bricks having been thus partly formed in the brick moulds *bb*, of which a series will be seen connected together as a cylinder, *c*. The moulds now revolve on their own axis, meeting a cylindrical roller, *d*, which is supplied with projections, *ee*, which are movable on the roller, so that a flat pressure is obtained through rolling, and by thus passing against the said roller, the clay not only becomes thoroughly pressed, but receives the "keck" or indent on one bed. The brick cases or moulds, after leaving the roller, immediately pass under a series of stampers or plungers, so that the bricks are forced out of their moulds on to an endless band, from whence they are taken to be dried and burnt. This machine can be worked either by horse, steam, or other convenient power, and may be mounted on wheels, as shewn, for portability, suitable gearing being used to obtain the required speed of the various parts.

Having now described the nature and object of my said invention of "Improvements in Machinery for making Bricks," together with the manner in which the same is to be performed, I would remark in conclusion, that I do not confine or restrict myself to the precise details herein described and shewn in the accompanying sheet of drawings, as many slight modifications and variations may be made therein without in any way departing from the principle of my invention; but what I claim is, the use of triangular feeding-shafts and a cylinder of moulds or clay-holders, as shewn and described, together with the movable projections on the pressing roller, in combination with the stampers or plungers herein described, and shewn for the purposes set forth.

This is the specification referred to in the annexed Letters of Registration granted to George Cowdery, this thirtieth day of June, 1864.

JOHN YOUNG.

REPORT.

Improvements in Machinery for making Bricks.

REPORT.

Royal Mint, Sydney,
5 May, 1864.

SIR,

Having examined and considered the application of George Cowdery for Letters of Registration, under Act of Council 16th Victoria, No. 24, for an invention for "Improvements in Machinery for making Bricks," we beg to recommend that the protection sought for be granted.

The documents as per margin are herewith returned.

Documents returned:—
1. Memorial to Governor.
2. Specification pamphlet.
3. Copy of Patent granted in England.
4. Plan.
5. Memo. explaining Plan.
6. Receipt for £20 from Treasury.

We have, &c.,

E. W. WARD.
EDMUND T. BLACKETT.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—one sheet.]

No. 94.

[Assignment of No. 74. See page 363 of this Return.]

(Nº 93)

(COPY)

FIG. 1.

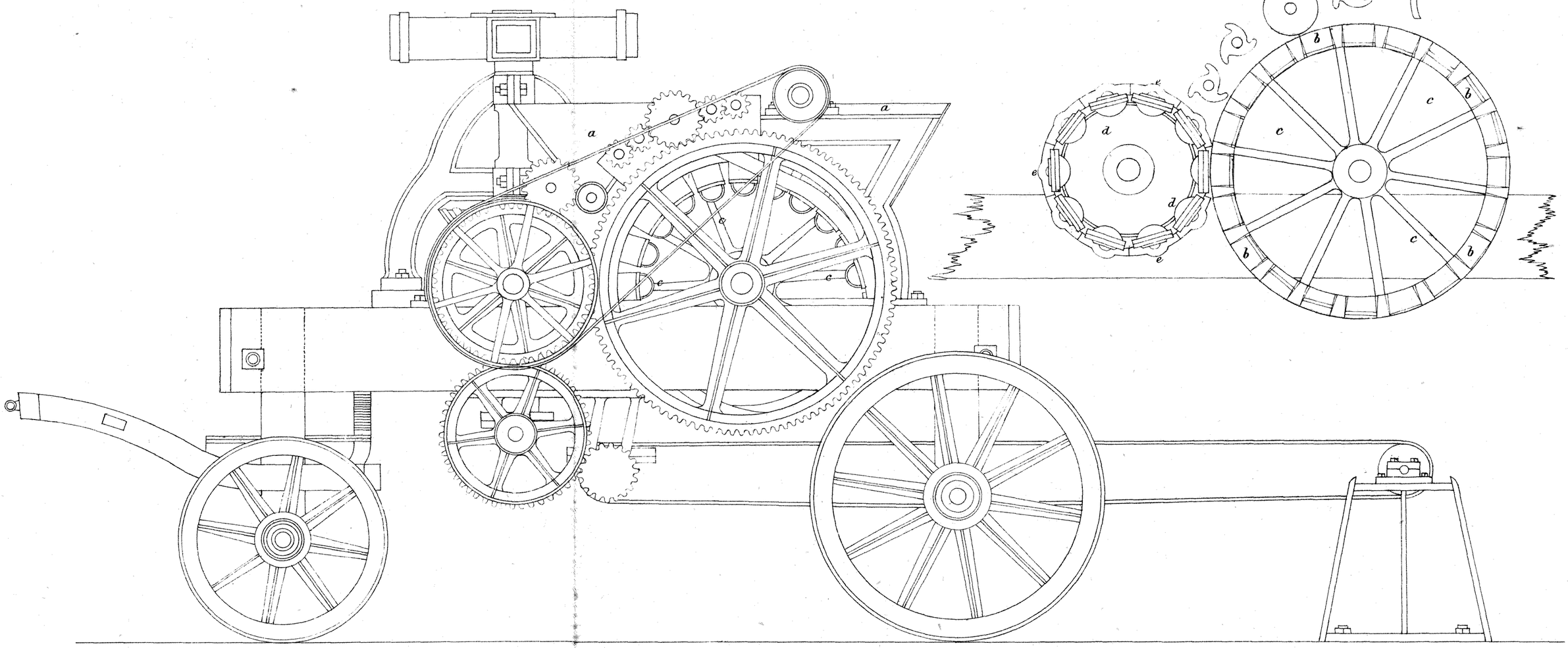
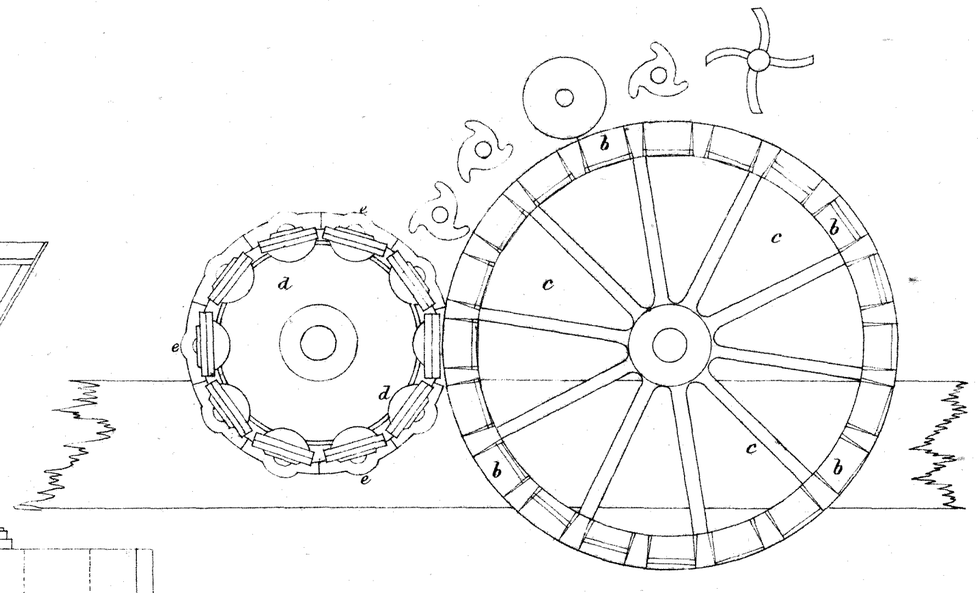


FIG. 2.



These are the Drawings referred to in the annexed Letters of Registration granted to

George Cowdery

this 30th of June 1864.

(Signed) John Young

George Cowdery

A.D. 1864, 13*th July*. No. 95.

IMPROVEMENTS IN PRESERVING ANIMAL SUBSTANCES, &c.

LETTERS OF REGISTRATION to Messrs. Hett and Bassett, for Improvements in preserving Animal Substances, and Animal and other Substances used for Food.

[Registered on the 14th day of July, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Alexander Hett, of the city of London, in England, doctor of medicine, and Frederick William Bassett, of Camberwell, in the county of Surrey, in England, civil engineer, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in preserving Animal Substances, and Animal and other Substances used for Food," which is more particularly described in the specification hereunto annexed; and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public

good,

good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Alexander Hett and Frederick William Bassett, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Alexander Hett and Frederick William Bassett, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Alexander Hett and Frederick William Bassett shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirteenth day of July, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION for Improvements in preserving Animal Substances, and Animal and other Substances used for Food.

THESE improvements consist in treating the meat or other substances to be preserved, with solutions of certain salts, by dipping or steeping therein, or by otherwise applying the said solutions to their surfaces, and then drying them externally by exposure to the air, either in its natural state or when heated by artificial means. The meat or other substances, after being thus treated, can be kept from undergoing putrefactive fermentation, and for short periods such treatment is sufficient; but if required to be kept a long period, it may further be coated or protected by a covering of certain substances hereafter named, in order to effectually retain the moisture therein.

The salts to be used are those known as sulphites, and also those known as nitrites, and we generally prefer for the purpose that known as sulphite of potash or potassa, but we do not confine ourselves to the use of this salt.

The manner in which we would generally prefer to apply or use the above-mentioned is this:—We prepare a solution of the salt in water, usually about the proportion of from three-quarters of an ounce to an ounce thereof in one pint of water, and we add to this solution a sufficient quantity of gum or other mucilage; we then dip or immerse the substance to be preserved therein for a longer or shorter period, according to its size and nature—usually from two to ten minutes is sufficient for the purpose. We sometimes use the solutions without the addition of gum or mucilage, and in some cases we use it either boiling or heated to a high degree of temperature.

Another way of treating the meat or other substances with these solutions which we sometimes adopt is, by placing it in a proper close vessel, and after exhausting the air therefrom, we admit the solution and permit it to run in and fill the vessel. We thus secure a more perfect impregnation of the surface of the substance acted upon.

After taking the meat or other substances out of the solution, we hang or place the same in some convenient situation to drain and dry, and there keep it until the surface is free from damp or moisture. The meat is thus fully prepared for any length of exposure to the atmosphere, but would, of course, after a lengthened exposure, at last become dried up by the gradual evaporation of its moisture. In order to prevent this, a protection or coating may be employed, by dipping it either into melted tallow, suet, wax, (either by itself or mixed with other substances, to give it tenacity), gum or gelatine being used, either by itself or mixed with treacle or glycerine; or it may be embedded in such tallow, suet, gum, or gelatine; or it may be wrapped in cloths, papers, or other coverings dipped or coated with tallow, wax, or any of the above-named articles, or be placed in tins or casks, and the vacant spaces be filled by pouring in such substances or mixtures.

Having

Improvements in preserving Animal Substances, &c.

Having thus described the nature of our invention, and the manner in which the same is to be performed, we hereby declare that we claim the use of certain chemical salts, commonly known as sulphites and nitrites (but more especially those of potassa and soda), for the retardation or prevention of putrefactive fermentation in animal and other substances; and we further claim the coating or enveloping of animal or other substances which have been treated with such solutions with certain coverings, as herein described, in order to effectually retain the moisture therein.

This is the specification referred to in the annexed Letters of Registration granted to Alexander Hett and Frederick William Bassett, this thirteenth day of July, 1864.

JOHN YOUNG.

REPORT.

Royal Mint, Sydney,
27 April, 1864.

SIR,

Having examined and considered the application of Newell Vicary Squarey, on behalf of Messrs. Hett and Bassett, for Letters of Registration, under Act of Council 16th Victoria, No. 24, for an invention for Improvements in preserving Animal Substances, and Animal and other Substances used for Food, we beg to recommend that the protection sought for be granted.

The documents as per margin are herewith returned.

THE HONORABLE
THE COLONIAL SECRETARY.

E. W. WARD.
J. SMITH.

Documents returned:—
1. Memorial to Governor from Mr. Squarey.
2. Do. from Norton and Barker, Solicitors for Petitioner.
3. Specification.
4. Authority from Hett and Bassett to Mr. Squarey to patent invention.
5. Treasury memo. of lodgment for £20.

A.D. 1864, 13*th July*. No. 96.

IMPROVEMENTS IN REAPING AND MOWING MACHINES.

LETTERS OF REGISTRATION to Joseph Nicholson, for Improvements in Reaping and Mowing Machines.

[Registered on the 14th day of July, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Joseph Nicholson, of North Melbourne, in the Colony of Victoria, agricultural implement maker, hath by his Petition humbly represented to me that he is the assignee of the author or designer of a certain invention or improvement in manufactures, that is to say, of an invention of "Improvements in Mowing and Reaping Machines or Grass Harvesters," which is more particularly described in the specification and paper of drawings hereunto annexed; and that he, the said petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with

the

Improvements in Reaping and Mowing Machines.

the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do by these Letters of Registration grant unto the said Joseph Nicholson, his executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Joseph Nicholson, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said Joseph Nicholson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this thirteenth day of July, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION.

My invention relates to a peculiar construction and arrangement of Machines for Reaping and Mowing, and consists—1st.—in affixing the finger-bar so as it runs direct from the axle, of which it forms a part. This bar I make in two pieces, and is so arranged that framing is dispensed with, which is accomplished by means of screws, which also serve to adjust the height of the knife-bar according to the height required in cutting the crop. The great advantage attained by this is extreme lightness of draught, combined with durability, strength, and cheapness. 2ndly.—The novelty of my invention also consists in so arranging the knives or cutters that it is impossible for them to clog or foul, and is accomplished by placing the knives or cutters alternately, the one above the next, beneath the knife-bar, and so on throughout the whole length of the bar. It will be understood that, owing to the space between the knives or cutters, both on the top and bottom of the bar, the same facilities cannot possibly be afforded for clogging or fouling as in the ordinary knives at present used.

The invention of improvements will be more readily understood and appreciated on reference to the accompanying drawings, in which similar letters and figures indicate corresponding parts wherever they occur.

Fig. 1, front view; fig. 2. near-side view; fig. 3, view of knives; fig. 4, section of bar; fig. 5, section of finger-bars; fig. 6, top view of bracket; and fig. 7, side view of same.

a, driving or draught wheel, toothed on its inner periphery; *b*, seat; *c*, tilt board, on which the cut stuff falls, and from whence it is delivered in sheaves; *d*, side-board; *e*, finger-bar; *f*, knife-bar and improved knives or cutters, as shewn clearly in fig. 3; *g*, drawing rod; *h*, pole; *i*, connection for driving knife-bar; *k k*, fastenings, connecting pole to the main frame of the machine; *l l*, fingers rivetted to the finger-bar, which serve to protect the knives or cutters in the forward movement of the machine; *m m*, holes in the finger-bar, fastened by a nut and bolt, by which means the height of the knives or cutters are adjusted; *n*, collar or shoulder, against which the draught and driving wheel bears; *o*, pinion working in the teeth of the draught and driving wheel (shewn in the near-side view); *p*, mitred or bevelled wheel, driven by pinion *o*, which imparts an eccentric motion to wheel *r*, which is connected to the knife-bar by connecting rod *i*, shewn in front elevation; *s*, bracket, borne and carried on carrying piece *t*; *t*, carrying piece, on which the bracket is affixed by means of bolts or otherwise.

Having

Improvements in Reaping and Mowing Machines.

Having thus described the nature of my invention and the manner of performing same, I would observe that I do not claim precise details, so long as the character of the invention be retained and understood, nor to the materials of which the improvements may be made or manufactured; but what I do claim is—

1st—The mode of making and fixing the finger-bar as herein substantially described and explained, by which means great beneficial results are obtained.

2nd—The peculiar construction of the knife-bar (or, in other words, the mode of affixing the knives or cutters), as also herein substantially described and explained.

3rd—The bracket, and mode of carrying same, as shewn in figures 2, 6, and 7.

4th—The mechanical arrangements generally, singly and in combination, as herein substantially described and explained.

This is the specification referred to in the annexed Letters of Registration granted to Joseph Nicholson, this thirteenth day of July, 1864.

JOHN YOUNG.

REPORT.

Royal Mint,
Sydney, 30 *May*, 1864.

Sir,

Having examined and considered the application of Joseph Nicholson for Letters of Registration, under Act of Council 16 Vic., No. 24, for an invention for Improvements in Reaping and Mowing Machines, we beg to recommend that the protection sought for be granted.

The documents as per margin are herewith returned.

We have, &c.,

E. W. WARD.
CHAUNCEY LEICESTER.

The Honorable
The Colonial Secretary.

Documents returned:—
1. Memorial to Governor.
2. Specification.
3. Do., with declaration attached.
4. Plan, in duplicate.
5. Treasury memo. of lodgment of £20.

[Drawings—one sheet.]

NICHOLSON'S
PATENT REAPING & MOWING MACHINE

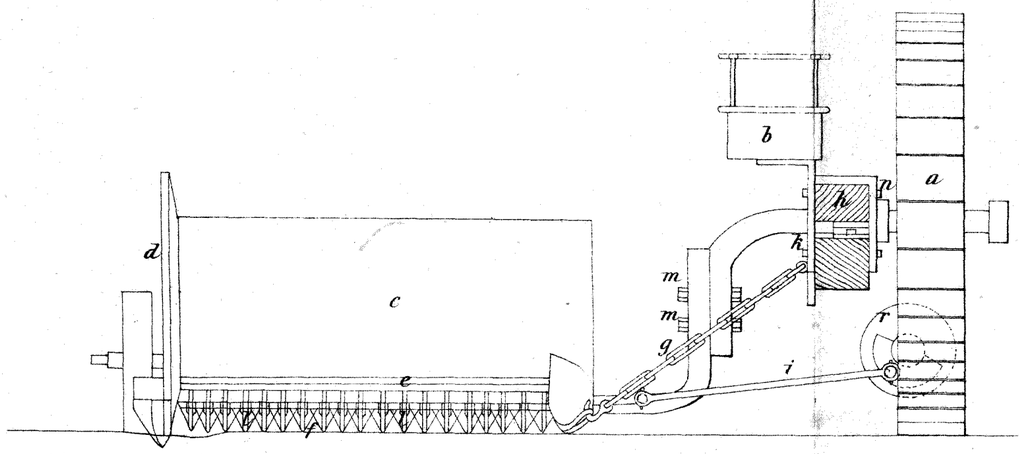


FIG. 1
FRONT VIEW

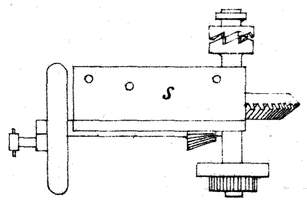


FIG. 6
TOP VIEW OF BRACKET

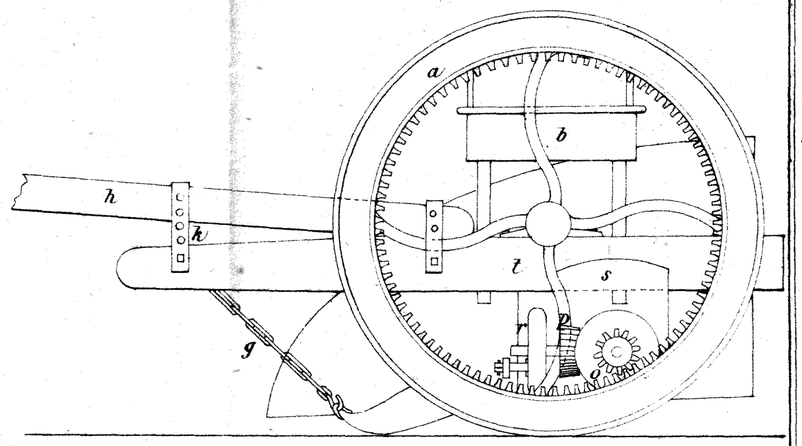


FIG. 2
NEAR SIDE VIEW

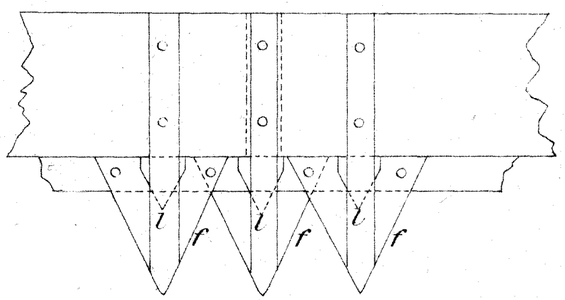


FIG. 3
VIEW OF KNIVES

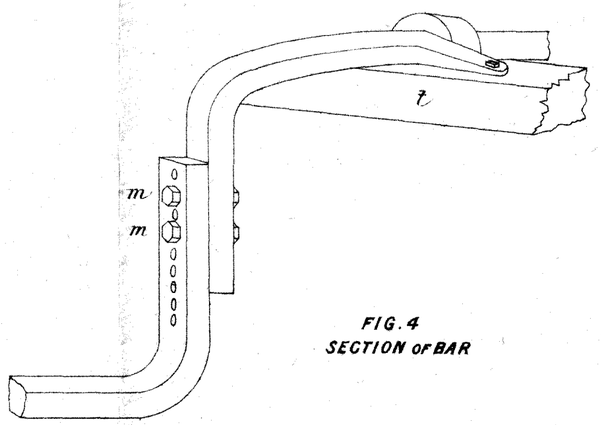


FIG. 4
SECTION OF BAR

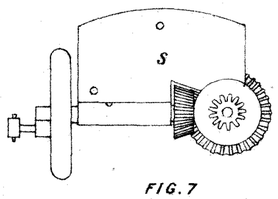


FIG. 7
SIDE VIEW OF BRACKET

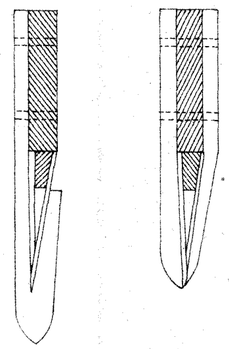


FIG. 5
SECTION OF FINGERS

This is the Paper of Drawings referred to in the annexed Letters of Registration granted to Joseph Nicholson this thirteenth day of July 1864

Signed: John Young

A.D. 1864, 16*th August.* No. 97.

IMPROVEMENTS IN SOLDERING METALS.

LETTERS OF REGISTRATION to Alfred Simpson, for Improvements in soldering Metals.

[Registered on the 17th day of August, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS Alfred Simpson, of Adelaide, in the Colony of South Australia, tin plate worker, hath by his Petition humbly represented to me that he is in part the assignee of the author or designer, and in part the author or designer, of a certain invention or improvement in manufactures, that is to say, of an invention for "Improvements in soldering Metals," which said invention is more particularly described in the specification marked A, and the drawings marked B, C, D, and E, all of which are hereunto annexed; and that he, the said Petitioner, hath deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and hath humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to him for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said Petition, from competent persons appointed by me to examine and consider the matters stated therein, and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said Alfred Simpson, his executors,

administrators,

administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said Alfred Simpson, his executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended. Provided always, that if the said Alfred Simpson shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this sixteenth day of August, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

A.

SPECIFICATION of ALFRED SIMPSON, of Adelaide, in the Colony of South Australia, tin plate worker, for an invention for "Improvements in soldering Metals."

THE nature of this invention, and the manner in which the same is to be performed, is particularly described and ascertained in and by the following statement, reference being had to the drawings hereto annexed, and to the remarks made thereon (that is to say) :—

This invention consists of a series of improvements in the method of soldering metals; and as it is more applicable to the purpose of soldering the tops and bottoms of preserve canisters than for any other purpose, I have chosen that operation as the best method of illustrating my invention.

For this purpose, the tin plate for the canister bodies must be cut and rounded in the usual way, then place the body round the block or clam (shewn on sheet 2 of the drawings), which is made of the proper size to fit the ends. The body must be held close to and tight on the block, and pressed down by the knife or lever (also shewn on sheet 2), to keep the edges in their place. The edges must overlap in the usual way, and the longitudinal opening in the knife must be so placed that the upper edge of the body plate be in the middle of it.

The solder for the side seam is to be made in the ordinary "run" strips; and a small piece, sufficient to solder the seam, is to be melted or cut off and laid in the groove of the knife or guide, which is well pressed down and held in its place by the left hand, the operator pressing his body against it, and with the right hand the hatchet bolt (see sheet 2) is used to melt and spread the solder over the seam, by being moved up and down along the groove. The groove regulates the breadth of the solder seam; and when the solder is firm, the knife is to be lifted and the body pulled off.

The tops and bottoms are to be made with grooves, for the purpose of receiving the strips of solder; and the tops of canisters, which can be filled through a stud hole (as for jams, soups, &c.), are made with a stud hole of the size required. With such canisters, first fit the top on to the body, which can be done with the hand or the tap of a hammer, then put in the ring of prepared solder, to be flat, and place the canister top undermost into the groove of the soldering pot, which fits it, one canister on each pot; and after a few seconds, dust the outside edge of the cover with resin, and keep turning the canisters round one after the other to distribute the heat, and with a piece of wire or long awl (which should be pencil-shaped and first dipped into resin), touch the melting solder round the inside; and when the solder on the first laid on canister is seen to be all melted, and to rise up equally on the outside between the lap and the body, the canister is to be lifted off and pressed down for a few seconds on a cold iron plate or stone conveniently placed at the flue end of the furnace, and the operation is complete as regards the top end.

As

As one canister is taken off, another should be instantly laid on in its place. The ends and rings can be adjusted at the mechanic's bench, and the unsoldered canisters afterwards be conveniently placed near the stove for soldering.

To solder on the other end, first put in the ring of solder and then fit on the end, using the wire for stirring through the hole in the lid, and proceeding in the same manner as above. When such canisters are filled, the hole is closed by soldering on a cap or stud in the ordinary way, or by means of my improved soldering bolt shewn on sheet 4 and hereinafter referred to. The resin is taken off the made canisters by boiling them in water with soda and afterwards rinsing them in cold water.

Canisters intended for solids, as beef, fish, &c., can have the bottoms only soldered on by this process—the tops must be soldered in the ordinary way. In some cases where tin-plate articles are used, it would not be necessary to use solder, as the tin which was applied to the plate in the tinning process would answer the purpose.

It will be seen, on reference to the drawing sheets 1 and 3, that the soldering pots above referred to (which are made of cast iron or other suitable material) have a series of grooves turned in each, so as to be suitable for soldering the different sizes of canisters, and that the heat from the furnace is conducted to that part of the soldering pots only where the seams of the canisters requiring to be soldered are placed, the soldering pots themselves having in them a certain amount of slack-lime, powdered fire-clay, or other suitable material which would act as a bad conductor of heat, for the purpose of regulating the temperature to which the articles to be soldered are exposed.

The grooves in the soldering pots must have the same bevel as the canister ends, and must be made so as to receive the ends of the canisters loosely; for if made tight, the ends would be drawn off when the canisters were lifted.

The furnace may be built of brick or other suitable material, and is covered with a metal plate perforated to receive several soldering pots, whereby several vessels can be soldered simultaneously, as shewn in section, sheet 1; and on the top of the stove a water-plate is fixed (imbedded in a layer of fire-clay, lime, and sand, to act as a non-conductor of heat), through which a small stream of water is kept running, for the purpose of protecting the face of the operator from the intense heat, as shewn in plan, sheet 1.

The bricks on the edges of the furnace and a short way down the sides should be bound together by a covering of sheet iron, as shewn in plan and perspective, sheet 1; and it is preferable that the furnaces should be so built that an operative may have room to work on each side, so that one man could attend to the pots on one side and another to the pots opposite.

To cut the prepared solder into rings, place the wooden block made for the size of canister on the reel, shewn on sheet 3 of the drawings, take three or four of the long strips, insert the tips of one end into the small hole made for the purpose, turn the reel so as to coil the solder round the block, hold the other end of the strips with the left hand, and with the shears or scissors (also shewn in sheet 3) inserted in the groove, cut the coil into rings. This reel should be fastened into a shallow box, to prevent the scraps of solder being scattered.

I propose using a soldering bolt, to be made of the same size and shape as the seam or joint required to be united, by which means the soldering is effected with less labour, especially referring to the soldering the tops or stud holes of meat tins or jam tins. This bolt is shewn on sheet 4.

On sheet 4 I have also shewn an improved method of heating the soldering bolt, by affixing it to a fire-pot of suitable construction, and applying to it the seams or joints to be united; or by means of a movable heater or heaters, which may be heated apart and applied to it when it is required to be used.

Having thus described the nature of the invention and the manner of performing same, I would have it understood that what I claim is—

1st. A new and improved method of soldering the bottoms and heads to the bodies of cans, meat or jam tins, or other vessels, and of soldering seams or joints of various forms in articles of various descriptions, by exposing at once the whole length or circumference of the laps of those parts of the plate or plates which are to be united to the heated exterior

exterior surface of a furnace or heater of suitable construction for applying the heat to the seam or joint, without applying it necessarily to the whole of the vessel or article, using as solder, for the purpose of uniting the seam or joint, a strip, ring, or piece of solder of suitable form to cover or lay in contact with the whole length of the joint.

2nd. The use of a furnace of brick or other suitable material, covered with a metal plate perforated to receive several soldering pots or heaters, whereby the soldering of several tins or other vessels can be effected simultaneously.

3rd. The use of a metal water-plate of suitable construction, applied to the last-mentioned furnace, to protect the operator's face from the heat.

4th. The use of soldering pots or heaters made of cast iron, or other suitable material, having a series of grooves turned in each, suitable for soldering different sizes of tins or other vessels.

5th. The use of slack-lime, powdered fire-clay, or other suitable material which acts as a bad conductor of heat, for filling or partially filling the soldering pots or heaters above mentioned, in order to regulate the temperature to which the articles to be soldered are exposed as above described.

6th. The use of blocks or clams, as above described, on which to solder the bodies of the tins or other vessels, whereby they are made of a proper diameter to fit the laps or turned up edges of the ends, and whereby, also, greater strength for resistance to pressure is obtained.

7th. The use of a grooved lever, so fixed that it may hold together the edges of metal that require to be soldered, and the groove in which may serve as a guide to the soldering bolt.

8th. The manufacture, by casting, or by means of rolls and shears or other machinery as herein described, of prepared solder, suitable for uniting the seams or joints, as above described.

9th. The use of solder prepared as aforesaid, either in strips, rings, or other suitable forms, for covering or laying in contact with the seams or joints to be united.

10th. The use of a soldering bolt, of iron, copper, or other suitable metal, with a surface of the same shape and size as the seam or joint to be united, so that the soldering may be effected with less labour than is required with an ordinary soldering bolt, such soldering bolt being more especially applied to soldering the tops or stud holes of meat tins or jam tins.

11th. A new method of heating the soldering bolt last described, either by affixing it to a fire-pot of suitable construction, and applying to it the seams or joints to be united, or by means of a movable heater or heaters, which may be heated apart, and applied to it when it is required to be used.

12th. The use of all or any of the arrangements or contrivances above described, either separately or in conjunction one with another.

In witness whereof, I, the said ALFRED SIMPSON, have hereto set my hand and seal, this twenty-seventh day of February, one thousand eight hundred and sixty-four.

Signed and sealed by the said ALFRED SIMPSON, in the presence of— } ALFRED SIMPSON. (L.S.)

JNO. HOWARD CLARE,
Adelaide,
Merchant.

This is the specification marked A, referred to in the annexed Letters of Registration granted to Alfred Simpson, this sixteenth day of August, 1864.

JOHN YOUNG.

REPORT.

Improvements in soldering Metals.

REPORT.

Royal Mint, Sydney,
5 April, 1864.

SIR,

Having examined and considered the application of Alfred Simpson for Letters of Registration, under Act of Council 16 Victoria, No. 24, for an "Invention for Improvements in soldering Metals," and having made some corrections in the specification, to which we have attached our initials, we recommend that the application, thus corrected, be approved.

The documents as per margin are herewith returned.

Documents returned:—
Petition to Governor.
Specification.
Plans (3 copies).
Treasury minute of lodgment of £20.
Letter from E. Waters, enclosing documents, 30 March, 1864.

We have, &c.,

E. W. WARD.
CHAUNCEY LEICESTER.

THE HONORABLE
THE COLONIAL SECRETARY.

[Drawings—four sheets.]

No. 98.

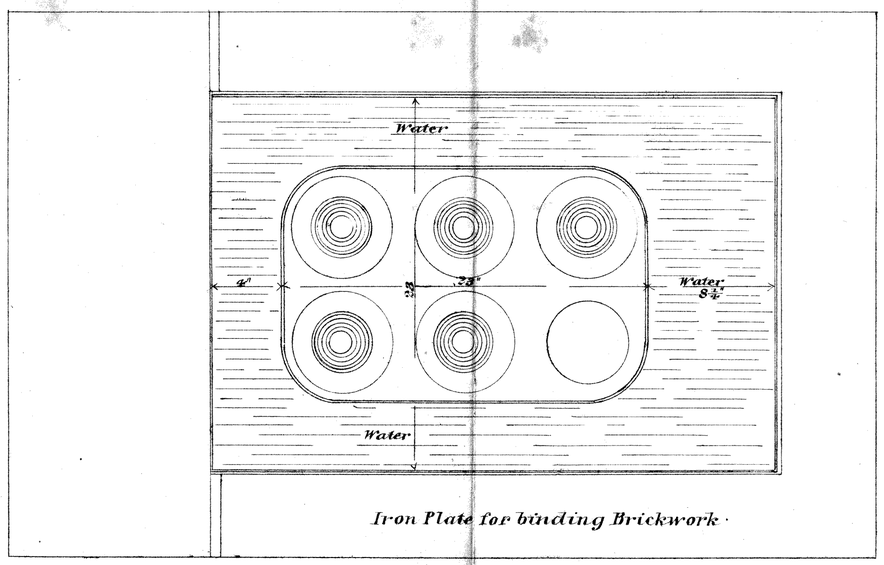
[Assignment of No. 40. See page 186 of this Return.]

Copy

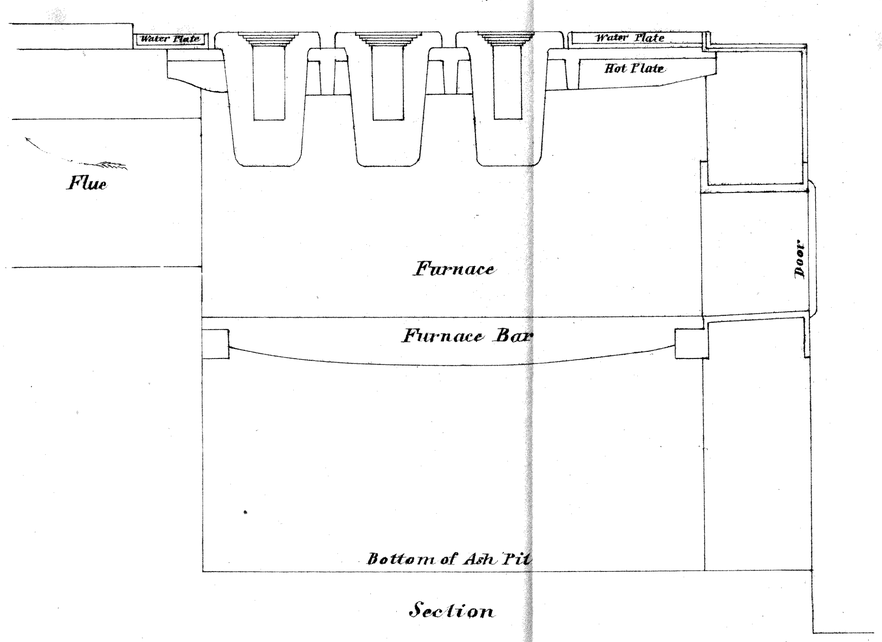
Floating Store for Cases

Sheet N°1

B

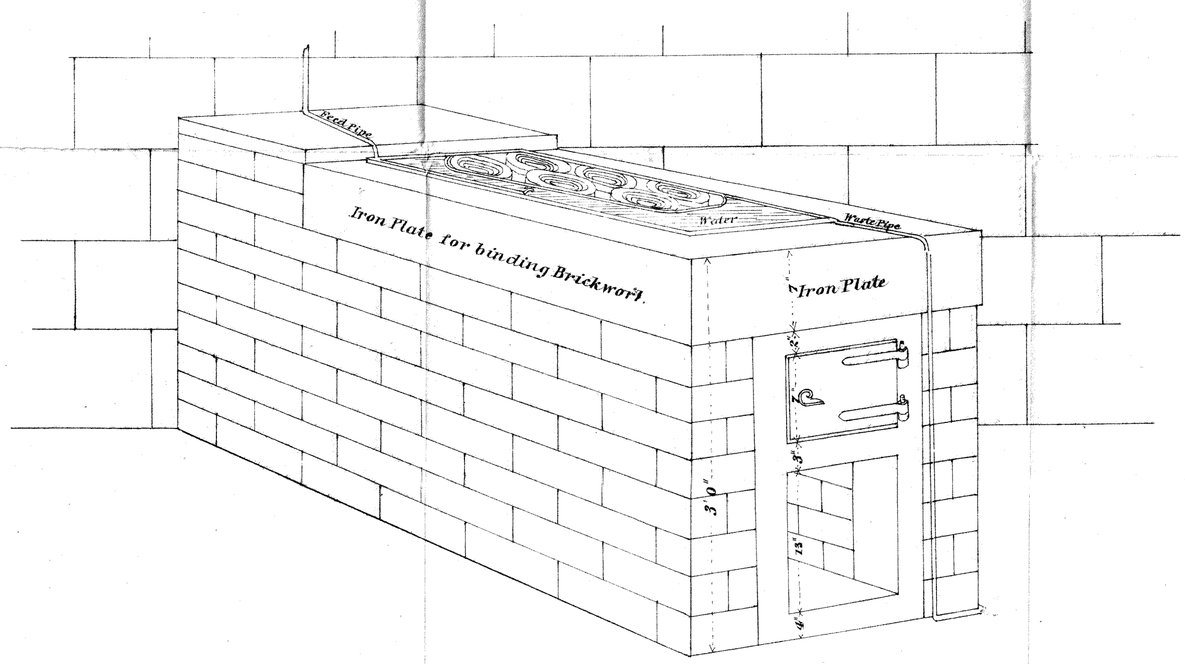


Plan shewing top of Store



Section

Inches 12 0 1 2 3 4 Feet



Perspective View

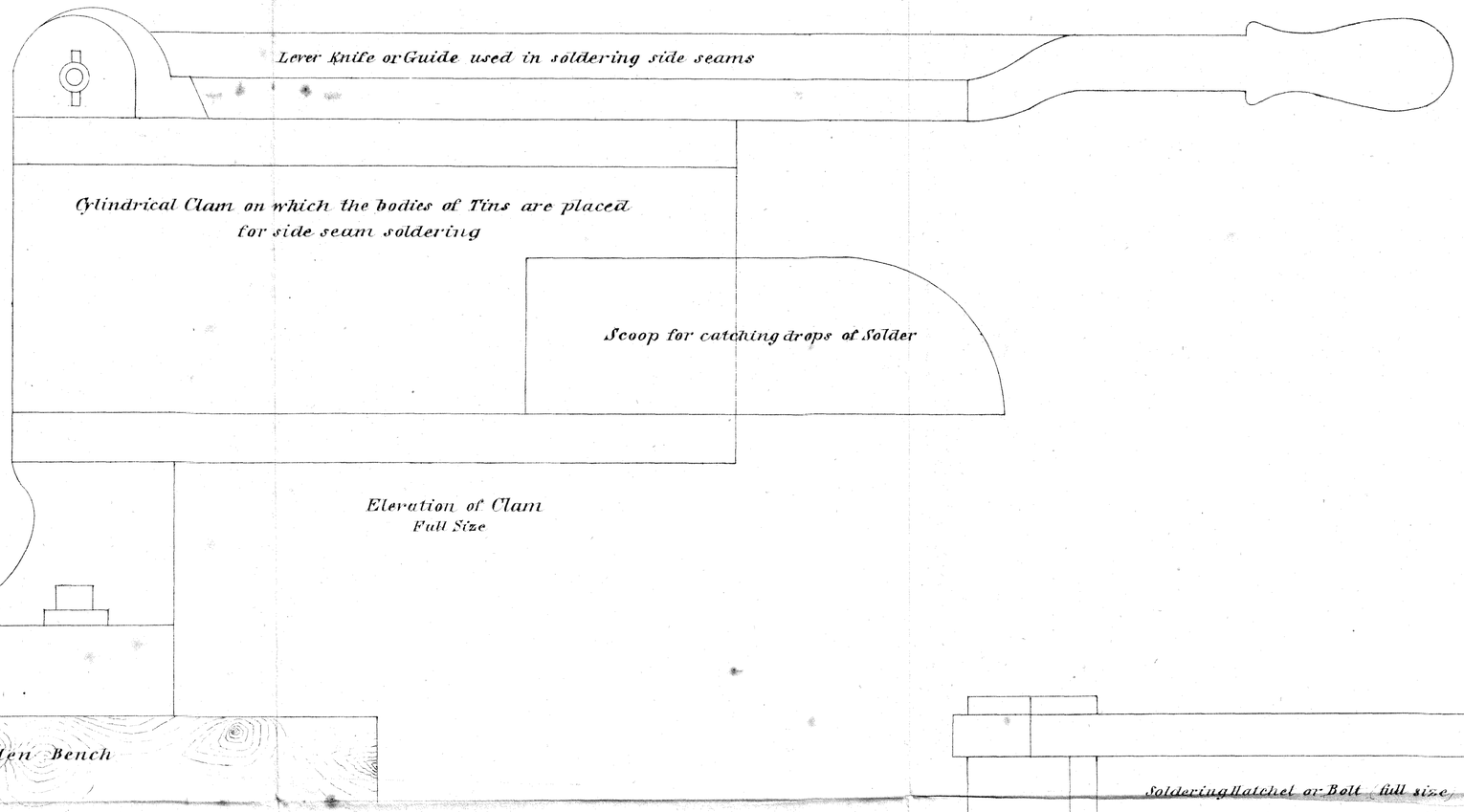
This is the Drawing marked B referred to in the annexed Letters of Registration granted to Alfred Simpson this 16th Day of August 1864.

(Sgd) John Young

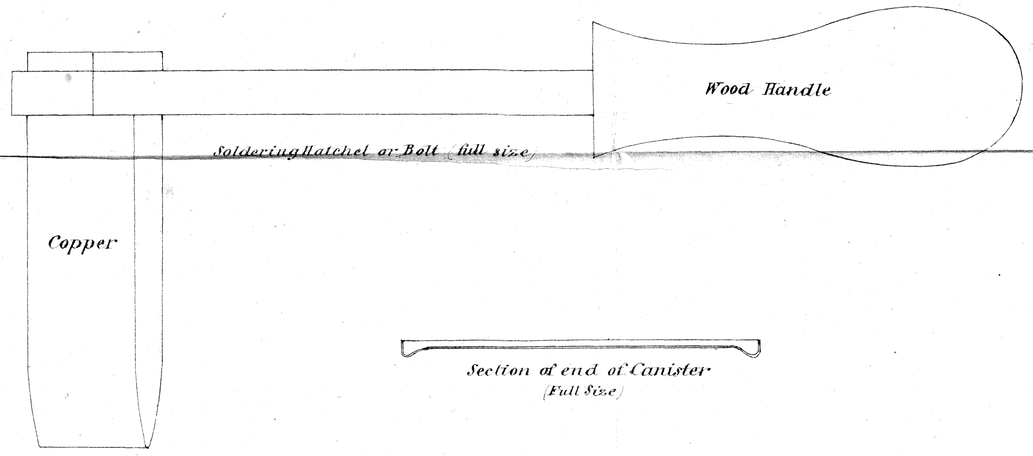
N°97.
(Copy)
C

Sheet N°2

Details of Clam &c



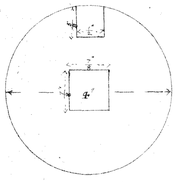
Elevation of Clam
Full Size



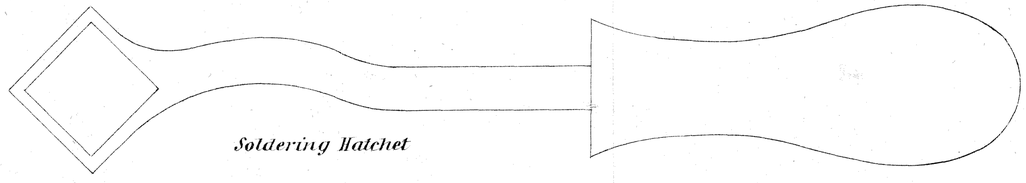
Section of end of Canister
(Full Size)

This is the Drawing marked C referred to in the annexed Letters of Registration granted to Alfred Simpson this 16th Day of August 1864.
(Sgd) John Young

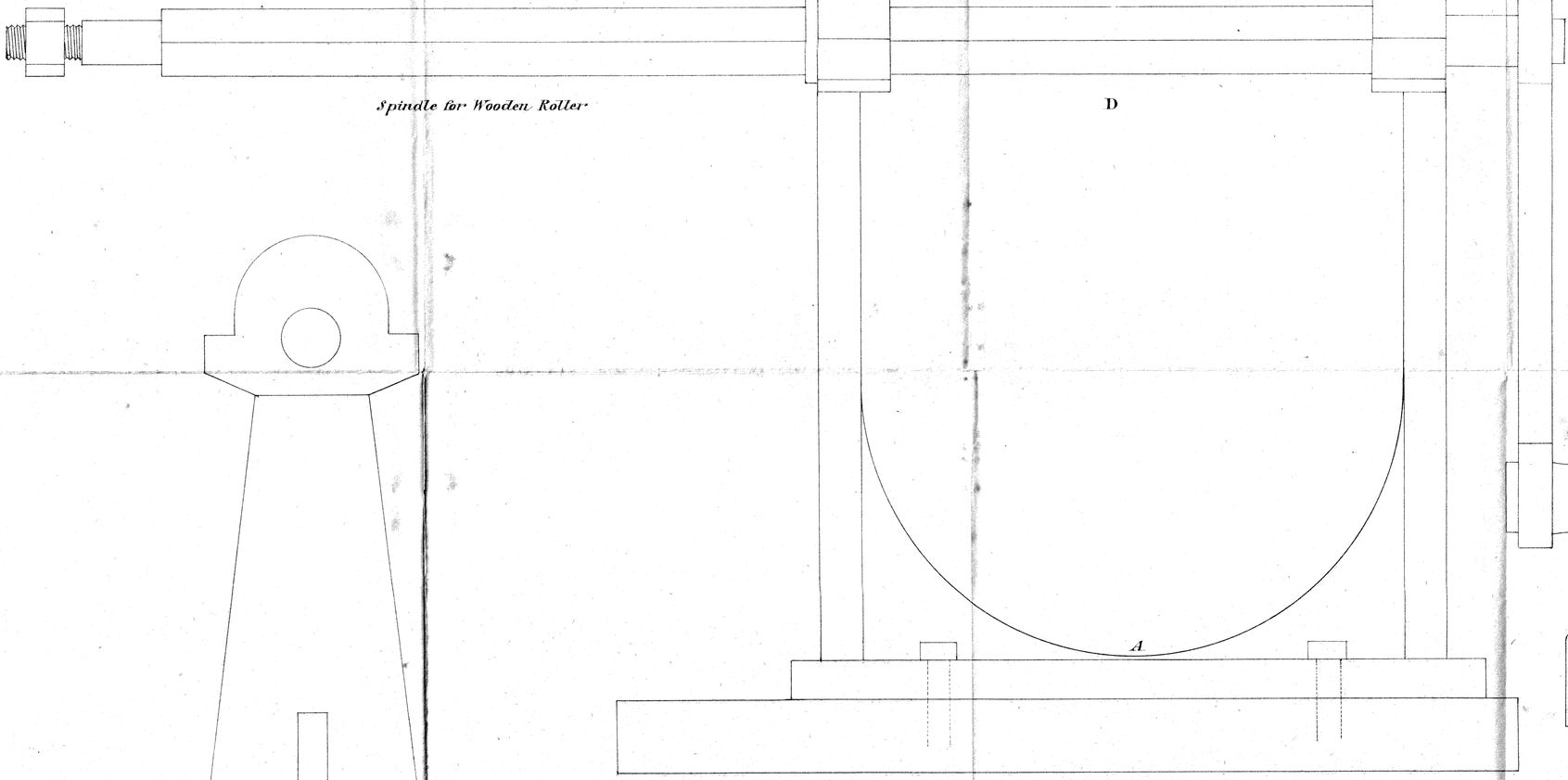
Note. This is the size for a 2 lb Canister.



Wooden Roller for Reeling Solder



NO. 97
COPY
DRAWING NO. 3

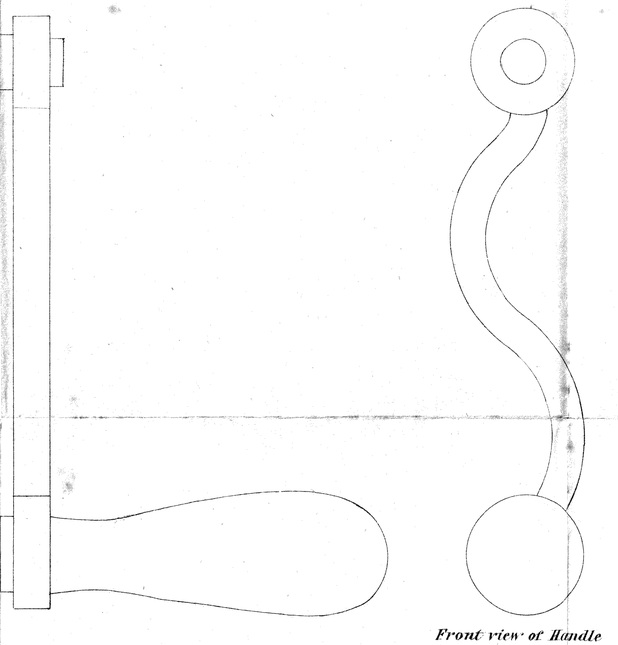


Spindle for Wooden Roller

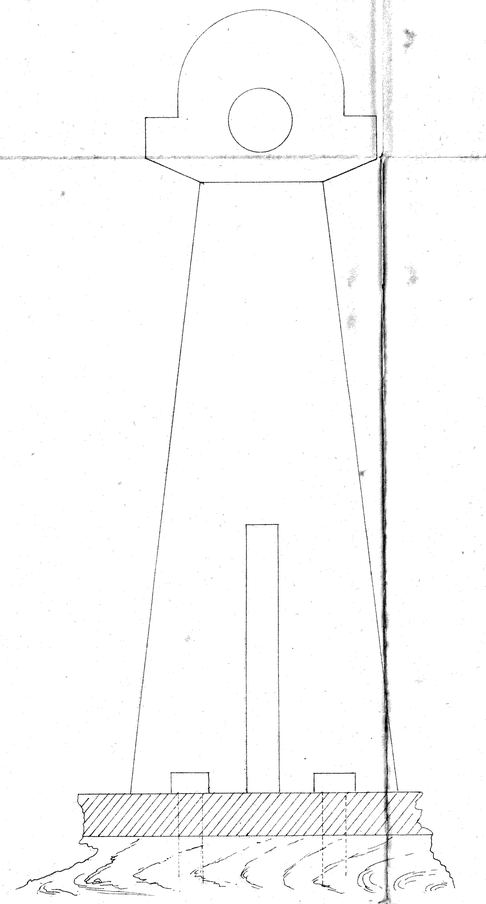
D

A

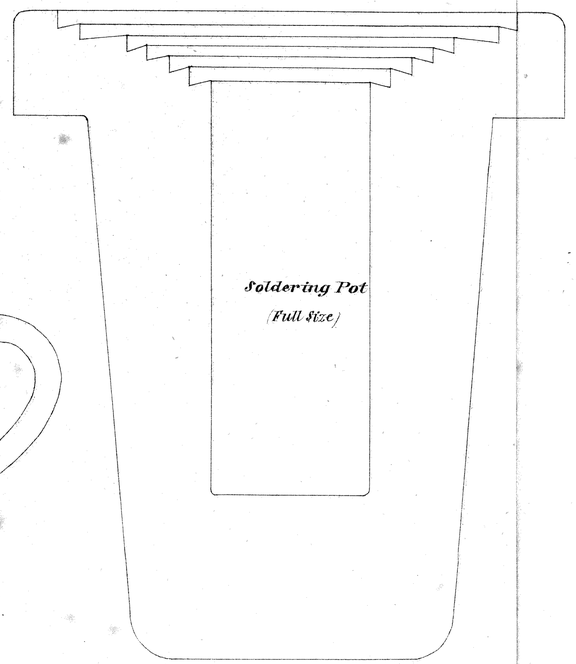
Eleration of Reel for coiling Solder Rings
(Full Size)



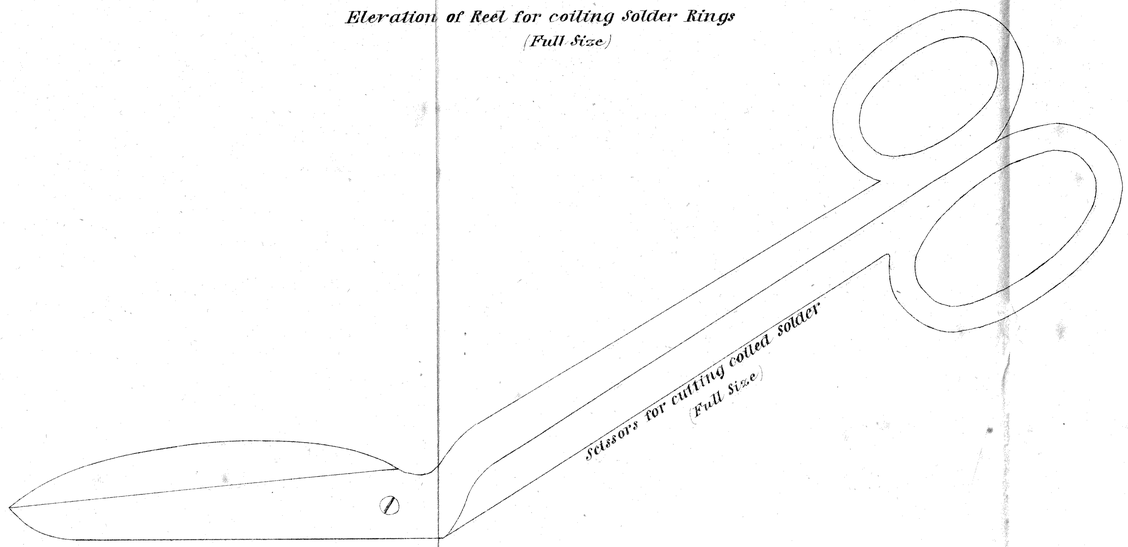
Front view of Handle



Eleration at A
(Full Size)



Soldering Pot
(Full Size)



Scissors for cutting coiled solder
(Full Size)

This is the Drawing marked D referred to in the annexed Letters of Registration granted to Alfred Simpson this 16th Day of August 1864.
Sig^d John Young

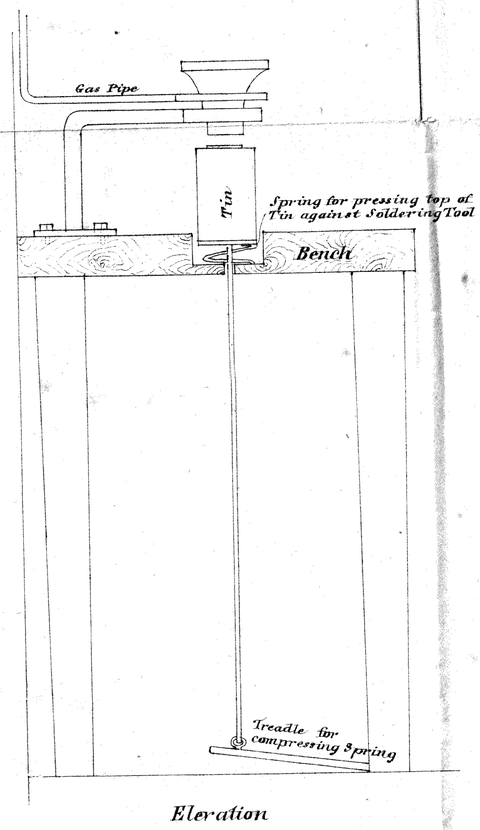
(Copy)

E

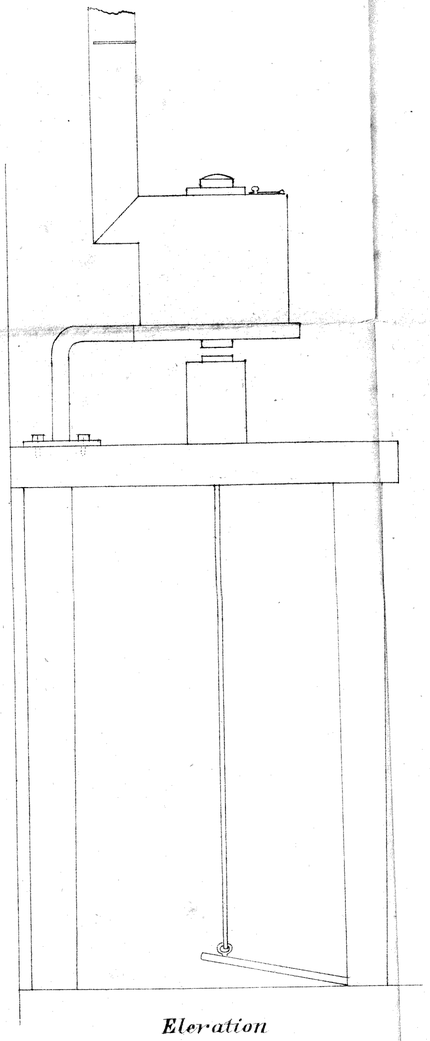
№ 97

Sheet № 4

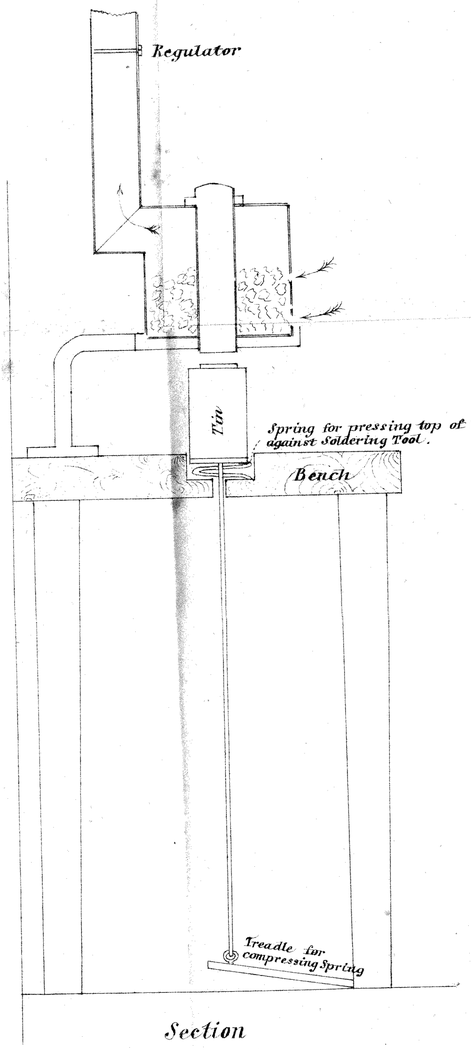
Improved Soldering Tool for tops of Cases



Elevation

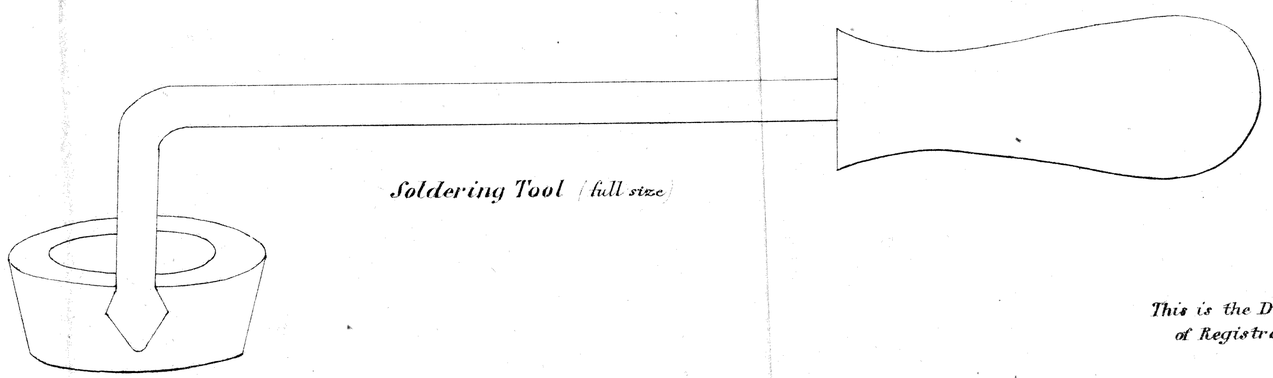


Elevation



Section

Scale 2 Inches to the Foot.



Soldering Tool (full size)

This is the Drawing marked E referred to in the annexed Letters of Registration granted to Alfred Simpson this 16th Day of August 1864.

(Sgd) John Young

A.D. 1864, *3rd November.* No. 99.

IMPROVEMENTS IN ENGINE-PACKING.

LETTERS OF REGISTRATION to John Langlands, Henry Wilson Langlands, and Edwin Hart, for Improvements in Engine-packing.

[Registered on the 5th day of November, 1864, in pursuance of the Act 16 Vic., No. 24.]

BY His Excellency the Right Honorable Sir John Young, Baronet, Knight Commander of the Most Honorable Order of the Bath, Knight Grand Cross of the Most Distinguished Order of St. Michael and St. George, Captain General and Governor-in-Chief of the Colony of New South Wales.

TO ALL TO WHOM THESE PRESENTS SHALL COME, greeting:

WHEREAS John Langlands and Henry Wilson Langlands, both of the city of Melbourne, in the Colony of Victoria, engineers, and Edwin Hart, of Melbourne aforesaid, patent law agent, have by their Petition humbly represented to me that they are the authors or designers of a certain invention or improvement in manufactures, that is to say, of an invention for Improvements in Engine-packing, which is more particularly described in the specification hereunto annexed, and that they, the said Petitioners, have deposited with the Honorable the Treasurer of the said Colony of New South Wales the sum of Twenty Pounds sterling, for defraying the expense of granting these Letters of Registration, as required by the Act of Council sixteenth Victoria, number twenty-four; and have humbly prayed that I would be pleased to grant Letters of Registration, whereby the exclusive enjoyment and advantage of the said invention or improvement might be secured to them for a period of fourteen years: And I, being willing to give encouragement to all inventions and improvements in the arts or manufactures which may be for the public good, and having received a report favourable to the prayer of the said

Improvements in Engine-packing.

Petition, from competent persons appointed by me to examine and consider the matters stated therein and to report thereon for my information, am pleased, with the advice of the Executive Council, and in exercise of the power and authority given to me by the said Act of Council, to grant, and do, by these Letters of Registration, grant unto the said John Langlands, Henry Wilson Langlands, and Edwin Hart, their executors, administrators, and assigns, the exclusive enjoyment and advantage of the said invention or improvement, for and during the term of fourteen years from the date hereof; to have, hold, and exercise unto the said John Langlands, Henry Wilson Langlands, and Edwin Hart, their executors, administrators, and assigns, the exclusive enjoyment and advantage thereof, for, and during, and unto the full end and term of fourteen years from the date of these presents next and immediately ensuing, and fully to be complete and ended: Provided always, that if the said John Langlands, Henry Wilson Langlands, and Edwin Hart, shall not, within three days after the granting of these Letters of Registration, register the same in the proper office in the Supreme Court, at Sydney, in the said Colony of New South Wales, then these Letters of Registration, and all advantages whatsoever hereby granted, shall cease and become void.

In witness whereof, I have hereunto set my sign manual, and have caused the present Letters of Registration to be sealed with the Seal of the said Colony of New South Wales, at Government House, Sydney, in New South Wales, this third day of November, in the year of our Lord one thousand eight hundred and sixty-four.

(L.S.) JOHN YOUNG.

SPECIFICATION of JOHN LANGLANDS and HENRY WILSON LANGLANDS, both of the city of Melbourne, in the Colony of Victoria, engineers, and EDWIN HART, of the same place, patent law agent, for an invention for "Improvements in Engine-packing."

OUR invention consists of an improved method of manufacturing packing for engines, whereby a great saving is effected in the quantity of tallow used, and the light screwing required for this description of packing keeps the rod steam-tight. The articles used for manufacturing this packing are as follows:—Copper or other suitable wire gauze or cloth, gasking (sometimes called webbing or sheeting), or other suitable fibrous fabrics, india-rubber, tallow, and ground black-lead. The wire cloth forms the inside of the packing next the rod, and the gasking or webbing, or other suitable fibrous fabric, is then wound round some four or five times according to the size of the stuffing-box; then a layer of india-rubber from one-eighth to about one-fourth of an inch thick, and this is again covered with the gasking or webbing until the packing becomes of the required size. The wire cloth is bent round on one side of the packing from the centre over the india-rubber, and is fastened to the webbing with copper or other suitable wire. Hard-wood pegs are inserted from the outside of the packing through to the wire gauze, or nearly so. After this has been done, tallow and ground black-lead, in the proportion of twelve parts of tallow to one part of ground black-lead, must be heated together until the mixture stands at or about 200 degrees Fahrenheit; the packing must then be inserted for about two minutes, and after being taken out and allowed to cool is fit for use. If the packing is required to withstand a greater pressure than two hundred pounds to the square inch, the mixture must consist of a greater proportion of ground black-lead, and must be heated to a higher degree according to the pressure it is required to withstand. When the packing is about to be used, the stuffing-box must be cleared out, and one ring of the packing, without the wire gauze, put at the bottom of the box as a soft bed, after which, cut open the rings at an angle sufficient to ensure an overlap, and place them all with the wire gauze side downwards until the last one, which must be placed with the wire gauze side upward, and then screw down lightly. When the engine has been working for two or three days and the packing becomes worn, it is not necessary to take out the old packing, but merely add one or more rings as may be required. The advantages of this packing are that the steam comes through the wire gauze, thereby dissolving the mixture in which it has been dipped, and hence causes the rod to lubricate of itself; that this packing never burns or gets hard, and that the wire gauze takes away all flutes in the rod; it will also be found that the india-rubber acts as an elastic casing or tightening without the rod coming in actual contact with it.

Having

Improvements in Engine-packing.

Having thus described the nature of the invention and the manner of performing same, we would have it clearly understood that we do not confine ourselves to the precise details, so long as the nature of the invention be retained and understood; but what we do claim is, the combination of materials for manufacturing packing for engines as herein described and explained.

In witness whereof, we, the said John Langlands, Henry Wilson Langlands, and Edwin Hart, have hereto set our hands and seals, this twenty-fourth day of June, one thousand eight hundred and sixty-four.

JOHN LANGLANDS. (L.S.)
H. W. LANGLANDS. (L.S.)
E. HART. (L.S.)

Signed and sealed by the said John Langlands, Henry Wilson Langlands, and Edwin Hart, in the presence of—

JAMES THOMSON,
Clerk, Melbourne.

This is the specification referred to in the annexed Letters of Registration granted to John Langlands, Henry Wilson Langlands, and Edwin Hart, this third day of November, 1864.

JOHN YOUNG.

REPORT.

Sydney, 14 *September*, 1864.

SIR,

Having, in accordance with your instructions, examined into the claims of Messrs. John Langlands, Henry Wilson Langlands, and Edwin Hart, for Letters of Registration for an invention for "Improvements in Engine-packing," we have the honor to report that we see no objection to the prayer of their Petition for the above Letters Patent being granted to them.

THE PRINCIPAL
UNDER SECRETARY.

E. O. MORIARTY.
CHAUNCEY LEICESTER.