A.D. 1835 . . . . . N° 6775.

Manufacture of Nails.

PROSSER'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, RICHARD PROSSER, of Aston, near Birmingham, in the County of Warwick, Civil Engineer, send greeting.

WHEREAS I did by petition represent unto His most Excellent Majesty William the Fourth that I had invented "CERTAIN IMPROVEMENTS IN MAKING NAILS," and His said Majesty, being willing to encourage all useful inventions, did issue His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twenty-fifth day of February, in the fifth year of His reign, whereby His said Majesty did, for Himself, His heirs, and successors, give and grant unto me, the said Richard Prosser, His especial licence that I, the said Richard Prosser, my executors, administrators, and assigns, or such others as I, the said Richard Prosser, 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 England, and Wales, and the Town of Berwick-upon-Tweed, my said Invention; in which said Letters Patent there is contained a proviso, obliging me, the said Richard Prosser, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, and to cause the same to be inrolled in His Majesty's High Court of Chancery within six months next and immediately after the date of the said Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Prosser's Improvements in Making Nails.

NOW KNOW YE, that in compliance with the said proviso, I, the said Richard Prosser, do hereby declare that the nature of my said Invention, and the manner in which the same is to be performed, are described and ascertained in manner following, that is to say:—

For the purpose of describing the nature of my Invention, and the manner of performing it in the clearest and most explicit manner of which the subject is capable, and so that persons of reasonably competent skill in the subject-matter may be able by following the directions in the Specification to practise the Invention for which the Patent is granted in as cheap and beneficial a way as I, the Patentee, can practice it, I have annexed to this written description fifteen Figures or Drawings, numbered from No. 1 to No. 15, with proper references. These Figures and this written description must, therefore, be taken together in explanation of my Invention, and of the construction of the machinery with which it is practised. In order to exhibit more clearly the construction of said machinery, I have avoided crowding and confusing the Figures with too many lines; and to render the different parts more distinct and intelligible I have exhibited them and their different positions when necessary by different coloured inks.

Figure 1 is a plan of parts of the machinery; Figure 2 is a front elevation of parts of the machinery; Figure 3 is a front elevation of the four plungers 1, 2, 3, and 4, and of the levers to which the plungers are attached; Figure 4 is a sectional elevation through the dotted line on Figure 2, and through the furnace O; Figure 5 is a plan, in which the plungers and parts carrying them, as shewn in Figure 2, are omitted, so as to exhibit more clearly the parts under them; Figure 6 is a plan of a rotary header; Figure 7 is a front elevation of Figure 6; Figure 8 is a front elevation of the wheel and pinion (shewn also in Figures 1, 2, and 5,) giving interrupted motion to the plungers; Figure 9 is a side elevation of Figure 8; Figure 10 is a side view of the edge of a sheet of metal prepared for making nails; Figure 11 is a plan of Figure 10; Figure 12 is a side view of the edge of a sheet of metal prepared for making nails; Figure 13 is a plan of Figure 12; Figure 14 is an elevation of the feeding apparatus P, of the plungers 2 and 4, of the carriers 5, 6, and 7, of the pliers U, and of the furnace O; Figure 15 is an elevation of the cam and levers which give an interrupted motion to the wheel J. Figure 5 is a plan; Figure 2, a front elevation. The same parts in both of these two Figures are marked by the same letters. A is a toothed wheel, which is fixed on the crank shaft, which wheel A gives motion to the pinion H, to which pinion is also attached a crank Z; B is a connecting rod attached to

the first-mentioned crank. The rod B gives a reciprocating motion to the inclined planes F, which inclined planes move between two friction rollers Y, Y, and cause said rollers to recede from each other. As these rollers recede from each other one of them gives motion to the hollow die intended to receive the point of the shank of the nail during the operation of heading it, and the other roller gives motion to the heading pin X; the crank Z attached to the pinion H gives motion by its connecting rod E, Figure 2, to two levers C, C, These levers C, C, are connected with each other by the connecting rod D; as the crank Z revolves it gives a reciprocating motion to the levers C, C, and causes the plungers or hammers 1 and 3 and 2 and 4 to advance and recede in pairs alternately toward and from each other, so that while the pair of plungers 1 and 3 are advancing toward each other the pair of plungers 2 and 4 are receding from each other, and vice versâ. The plungers 1 and 2 are fixed and adjusted by screws to one of the levers C, and the plungers 3 and 4 are fixed and adjusted by screws to the other lever C. The plungers 1 and 2 have a centre of motion common to both 1 and 2, and the plungers 3 and 4 have another centre of motion common to both 3 and 4. The use of these plungers is to taper or point the shank of the nail, which it does in the following manner:—The rod from which the nail is to be made is heated in a furnace O, shewn in Figure 4; this furnace should be heated by a blast regulated by a stop-cock, and the furnace should be placed between the operator and the machine which makes the nails, so that the nail rod may be properly heated (when the material from which the nails are made require heating) while the rod remains in the furnace or while it is passing through it. The motion of the nail rod into and through the furnace until it enters the machine may be given by the operator or by the feeding motion, of which a portion is shewn in Figure 4 and marked P. The nail rod is tapered on two of its sides by pressure between the plungers 2 and 4, as shewn in Figure 4. The ends of the plungers 2 and 4, shewn in Figure 4, and also the ends of the plungers 1 and 3, shewn in Figure 2, which taper if required; the two other sides of the nail rod must be so shaped and adjusted as to produce by their alternate pressures the form required for the shank of the nail. The length and extent of surface of the nail rod subjected to the alternate pressures of the plungers are regulated by the feeding motion P. Motion round the respective centres of the levers C, C, is given by means of the crank Z and the connecting rod E and D, as before described. After the shank of the nail has been formed by the repeated and alternate pressures of the two pairs of plungers 1 and 3 and 2 and 4, the plungers all become stationary at a distance from the nail rod, as

shewn in Figure 3. While the plungers are stationary the shank (attached to the nail rod) is pressed into and through one of the rotary dies No. 5, Figure 5, (which dies I call carriers,) and into the pliers U; these pliers U take hold of the pointed end of the shank of the nail and draw the shank further into the carrier. After the shank is drawn by the pliers into the carrier the shank is cut off to a proper length by means of the cutters L, L. These cutters are acted upon by cams attached to the levers K, K, connected with each other by the connecting rod D, and after the shank is cutt off, the carrier still holding the shank, revolves from the place marked 5 to the place marked 8, in Figure 2. The shank remains stationary at the place marked 8, and while the shank thus remains stationary the friction rollers Y, Y, recede from each other, and as they recede one of them gives motion to the hollow die intended to receive the point of the shank of the nail during the operation of heading it, and the other friction roller gives motion to the heading pin X. The hollow die and the heading pin X are advanced toward the rotary die until they hold the rotary die firmly between them and form the head of the nail; the pressure of the heading pin X, necessary to form the head of the nail, is regulated by the screw C. After the nail is headed the friction rollers Y, Y, advance toward each other by means of a spring or weight, and the rotary carrier is moved from place 8 to place 7 in Figure 2, and at place 7 the nail is discharged from the rotary carrier. The rotary carrier has an interrupted motion given to it by the mechanism shewn in Figure 15. The manner in which the plungers become stationary during one portion of the revolution of the partially toothed wheel A is shewn in Figure 8; while the machine is at work the wheel A is kept constantly revolving, and gives motion by its teeth to the pinion H. The wheel A, as shewn in the Figure 8, has no teeth on part of its periphery, and during the revolution of the wheel A in the direction of the arrow the motion of the pinion H ceases from the instant when the teeth of the wheel A are disengaged from the teeth of the pinion H. This cessation of motion in the pinion H continues until the teeth of the wheel A re-engage the teeth of the pinion H. The pinion H carries with it an arm *b*, having a pin near the end of the arm and at a right angle with the arm. The last tooth of the wheel A acts upon a tooth of the pinion H, and causes the pin in the arm *b* to enter a peculiarly formed groove attached to the wheel A and revolving with it. This groove is shewn in blue lines in Figure 8. While the pin in the arm *b* remains in the concentric part of the groove the plungers are stationary. Figure 9 is a side elevation of Figure 8. The pliers are shewn at U, Figure 5, in plan, and in Figure 14 in elevation, and are set in motion by a cam on the wheel A,

which cam operates on the end of a bent lever S, shewn in red lines, and causes the upright lever S to carry the rod V outwards and to the right, which motion of the rod V closes the pliers upon the pointed end of the nail and draws it through the rotary die before-described; the upright rods T, T, support on centres the pliers U and the rod V. The rod V is embraced on its upper and lower surfaces by two claws attached to the upright lever S. The upper claw W is moveable on a centre pin, and is kept slightly closed on the rod V by means of a spring, shewn at W. When the upright lever S moves outwards and to the right, the upper claw W, by means of its spring, presses on the rod V and carries the rod V, and the pliers U, and the nail shank, along with the upright lever S, until the tail of the upper claw W is brought against the screw X, when the further motion of the upright lever S releases the rod V by opening the upper claw W, at which time the upright rods T, T, the pliers U, together with the rod V, are carried back by a spring or weight. The motion of the pliers U is adjusted by means of a screw X and a screw at S. In Figure 14 three of the rotary carriers are shewn at 5, 6, and 7; two of the plungers at 2 and 4; the furnace at O with the nail rod passes through the furnace and through the feeding apparatus P, shewing the pointed end of the nail rod between the plungers 2 and 4. The feeding motion is effected by means of an indented face wheel Q (shewn in Figure 14 and Figure 5) moving with the crank shaft and operating by the indentations on its face upon a stud on the horizontal lever R, also shewn in Figures 14 and 5. The end of the lever R operates on the upright lever P, Figure 14, and forces it outward to the left, when a spring attached to the lever P draws the lever P against a screw, shewn at *a*, which screw regulates the motion of the lever P. When the lever P is moved by its spring outwards to the right, it carries by means of the claw, shewn at *w*, the nail rod in that direction through the furnace, and when the lever P moves outwards to the left the nail rod is kept stationary by means of two small claws, shewn at O in Figure 5, an inspection of which Figure will shew, that although the nail rod may be moved from the furnace O toward the machine, yet that the action of the two small claws upon the nail rod prevent it from being moved in the contrary direction. The manner in which an interrupted circular motion is given to the carriers is shewn at Figure 15. M is a cam attached to the crank shaft, operating upon the upright rod N and upon the horizontal rod O. The horizontal rod O has a pin at its end *a*, which pin traverses in a recess sunk in the wheel J. When the cam M ceases to operate on the lever N a spring forces the rod N back, and another spring forces the rod O upwards, causing the pin *a* to enter the top of the recess *b*,

when the further motion of the cam M forces the rod N and the rod O into the position shewn in Figure 15. The motion of the rod O causes the wheel J to revolve from *b* to *a* in the direction of the arrow, and the wheel J is prevented from moving in the opposite direction by a ratchet or other usual means. The carriers being fixed on the same axis as the wheel J, as shewn in Figure 5, have the same interrupted circular motion as the wheel J, the uses of which interrupted motion are to carry the nail shank from the plungers to the place where it is headed to keep the nail shank stationary during the process of heading, and to convey it when headed to the position shewn at 7, Figure 2, so that while the nail shank is drawn by the pliers *u* into the carrier at 5, a nail is under the process of heading at 8, and another nail is discharged in the finished state at the place marked 7, shewn in Figure 2. The machinery, as herein-before described applies only to that description of nail which is made from square rods, but when nails made from round wire are manufactured by this machinery the ends of the plungers must be grooved in segments of circles adapted to the size of the shank to be operated upon. Such nails made from round wire afterwards have a screw cut upon them by the modes of cutting screws, which are well known, and which I do not claim.

I claim as my Invention of improvements in making nails the machinery or mechanical effects represented in the fifteen Figures or Drawings hereunto annexed, and particularly described in this my Specification.

The foregoing description of my Invention of improvements in making nails relates to such nails as are to be made from rods; and I now proceed to describe certain other of my improvements in making nails when such nails are made from bands or sheets of wrought metal. When nails are made from bands or sheets of wrought metal, I prepare said bands or sheets by passing them through rolls or rollers having their sufaces so indented as to give the bands or sheets which pass between them the forms represented by side views in Figures 10 and 12, and in plan views of the same in Figures 11 and 13. The sheets so prepared are presented to cutters or shears, and are cut or sheared in parallel strips in the direction of the lines A, A, Figure 11, and A, A, Figure 13, the head of one nail being connected with the point of another, as shewn in Figures 10 and 12, the last process being that of separating the nails thus connected by their heads and points from each other. This said last process of separating the heads and points from each other is of course avoided where the nails are made from a single band prepared as above described, provided the width of the band be equal to the length of the nail. Where forms differing from those represented in Figures 10 and 12 are

required the indentations of the surfaces of the rolls or rollers must be prepared accordingly. My improvements in making nails from bands or sheets of metal are applicable to that description of nail commonly called cut or chisel-pointed nails, such nails having two of their opposite sides parallel to each other, and their two other sides tapering. Said nails are now manufactured by the processes of cutting a strip of metal obliquely, of griping the shank of the nail after it is thus cut, of continuing to hold the shank of the nail in griping dies while it receives its head, and of turning over the strip of metal previously to again cutting the strip of metal diagonally for the purpose of making another nail. By my improvements in making this description of nail, I, after the metal has been passed between the rolls, make it into nails by means of cutting operations only, and thus save and avoid the expense and trouble incurred by the processes of griping and heading the nail, and turning over the metal from which the nail is manufactured by the present well-known machinery.

I now proceed to describe certain other of my improvements in making nails when such nails are not made from bands or from sheets of wrought metal which are prepared by passing them through rolls or rollers. My improvements consist in giving the desired form and appearance to the bands or sheets of metal, two of which forms are shewn in side views in Figures 10 and 12, and in plan in Figures 11 and 13, by pouring melted cast iron into a suitably formed matrix or mould, an operation well known under the name or by the term casting. After the bands or sheets have been thus cast I subject them to the well-known common process by which cast iron is converted into malleable iron. After the bands or sheets have been thus converted I proceed to manufacture them into nails, in precisely the same way in which I manufacture nails from bands or sheets of wrought metal prepared by being passed between suitably indented rolls or rollers, and which I have already herein-before described.

Figure 6 is a plan, and Figure 7 an elevation, shewing another of my improvements in making nails. A, A, Figure 7, are two toothed wheels revolving toward each other. These two toothed wheels have parts cast with and to one side of each wheel, as shewn in Figure 6; this part so cast with and to one side of one of the wheels carries the heading pins *i*, *i*, *i*, *i*, *i*, *i*, and the part cast with and to one side of the other wheel carries the dies or bores *j*, *j*, *j*, *j*, *j*, *j*. Into these dies or bores I introduce the shanks of the nails which require heading, and, as the two wheels A, A, revolve, one of the heading pins *i* is brought directly opposite to one of the dies or bores *j*, and

the shank of the nail is held in one of the dies or bores *j* while it receives its head from the action of one of the heading pins *i*. The degree of pressure necessary to form the head of the nail is regulated by screws, as shewn in Figure 7.

In witness whereof, I, the said Richard Prosser, have hereunto set my hand and seal, this Thirteenth day of August, in the year of our Lord One thousand eight hundred and thirty-five.

RICHARD (L.S.) PROSSER.

AND BE IT REMEMBERED, that on the Thirteenth day of August, in the sixth year of the reign of His Majesty King William the Fourth, the said Richard Prosser came before our said Lord the King in His Chancery, and acknowledged the instrument aforesaid, and all and every thing therein contained and specified, in form above written. And also the instrument aforesaid was stamped according to the tenor of the Statute made in the fifty-fifth year of the reign of His late Majesty King George the Third.

Wills, Extra.

Inrolled the Fourteenth day of August, One thousand eight hundred and thirty-five.

LONDON:
Printed by George Edward Eyre and William Spottiswoode,
Printers to the Queen's most Excellent Majesty. 1857.

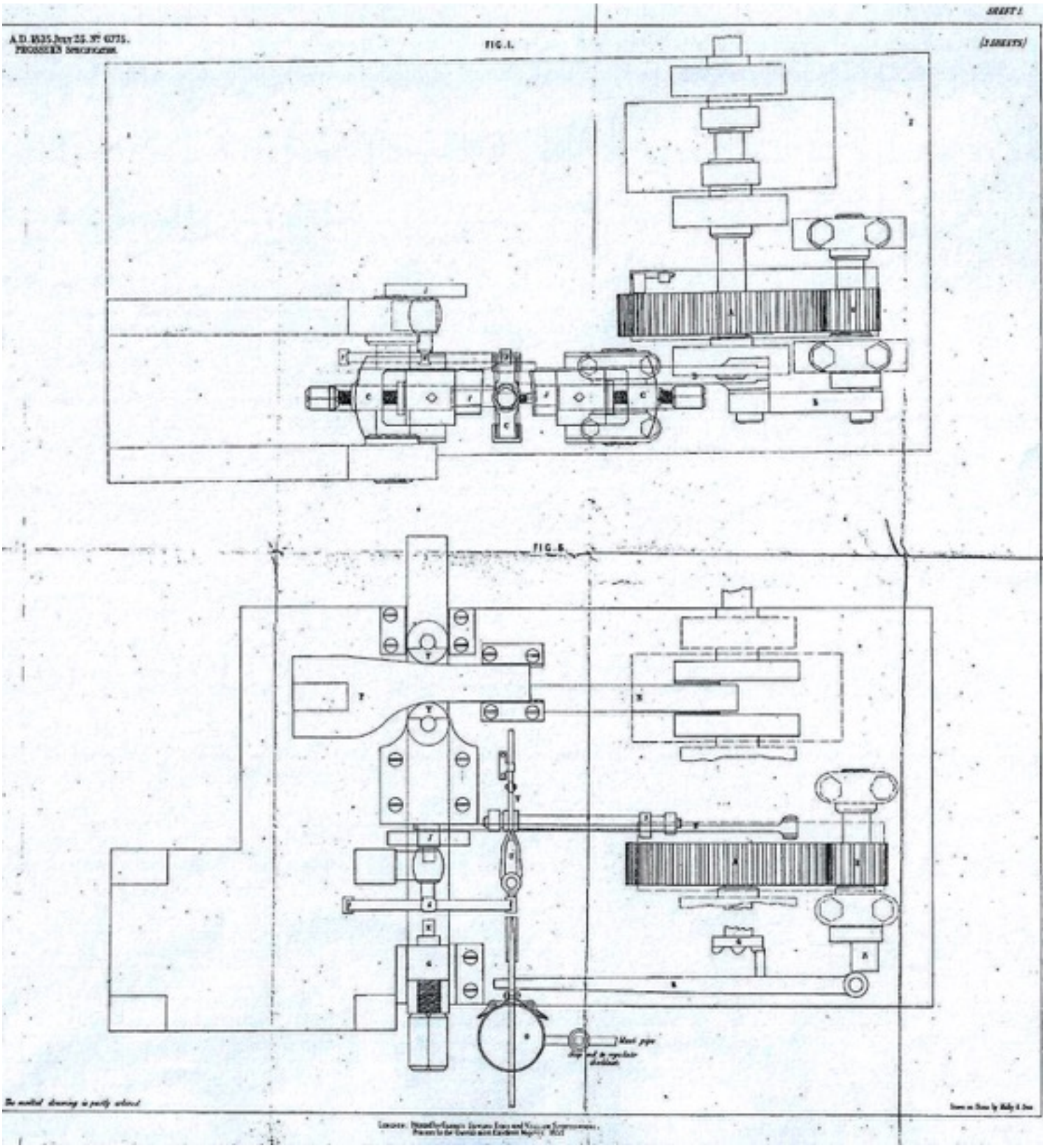
FIG. 1.
FIG. 2.

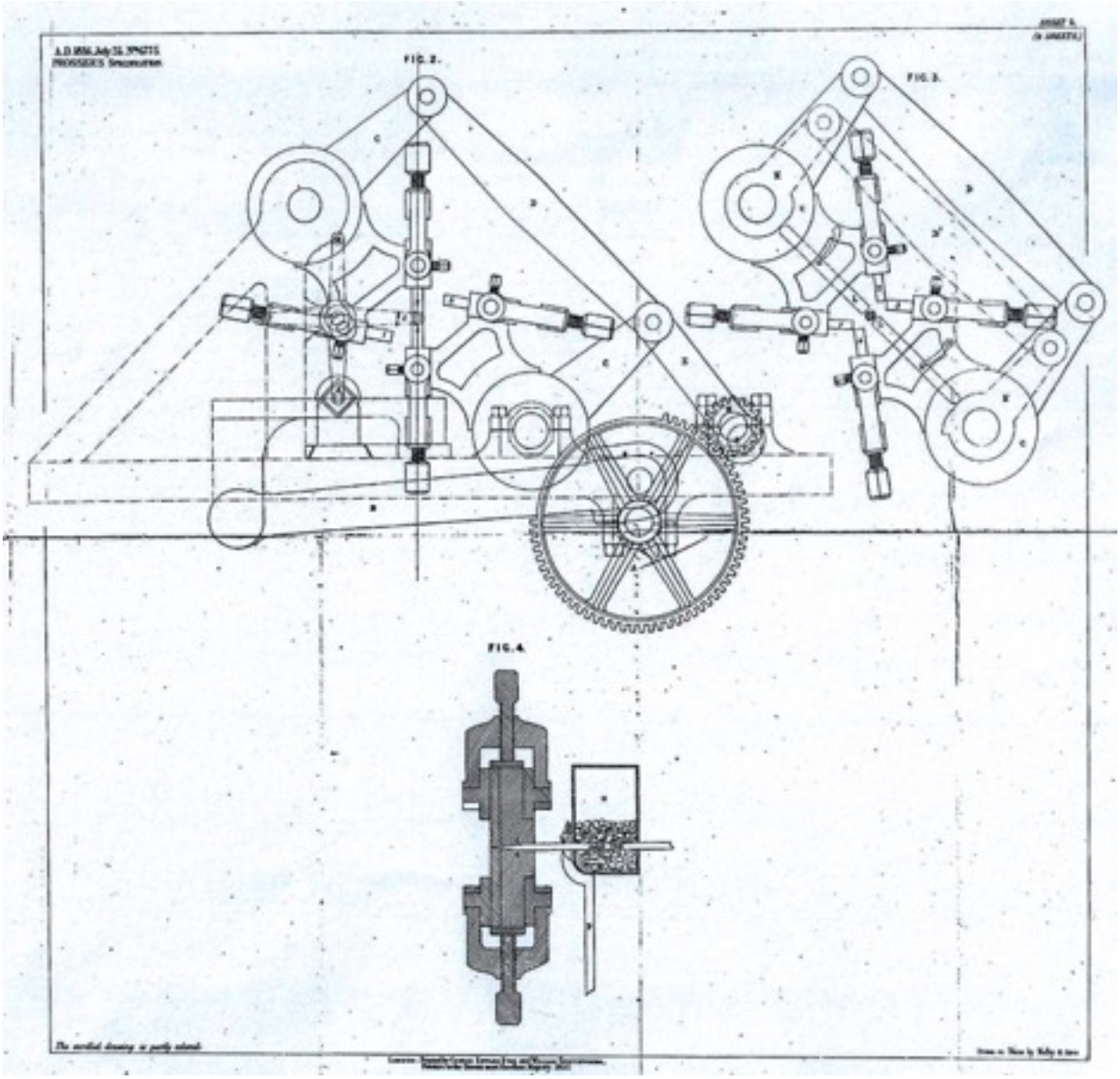
FIG. 2.
FIG. 3.
FIG. 4.