(No Model.) 4 Sheets—Sheet 1.

W. ROSS & J. BILBIE.

NAILING MACHINE.

No. 428,255. Patented May 20, 1890.

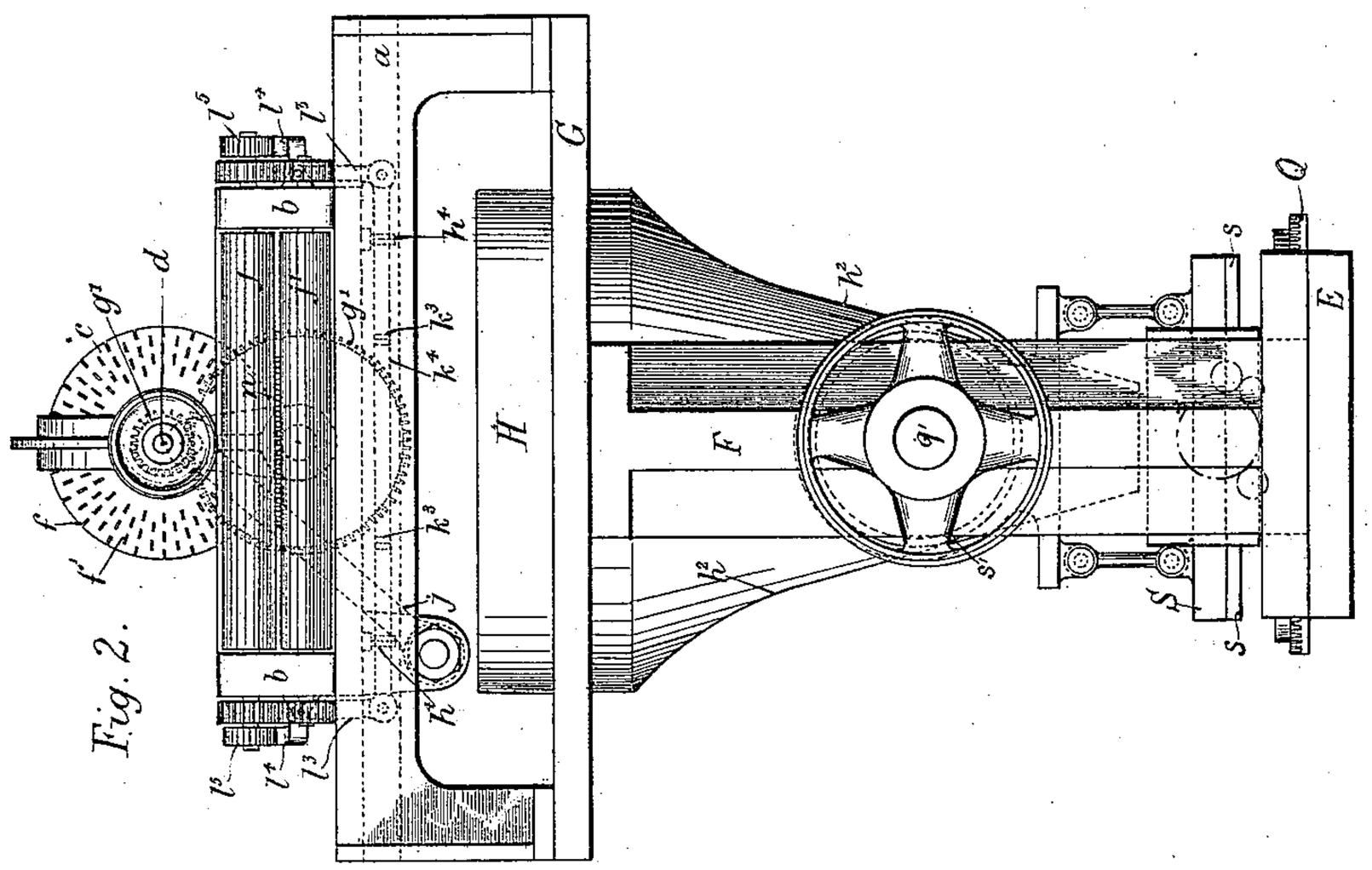

Fig. 2.

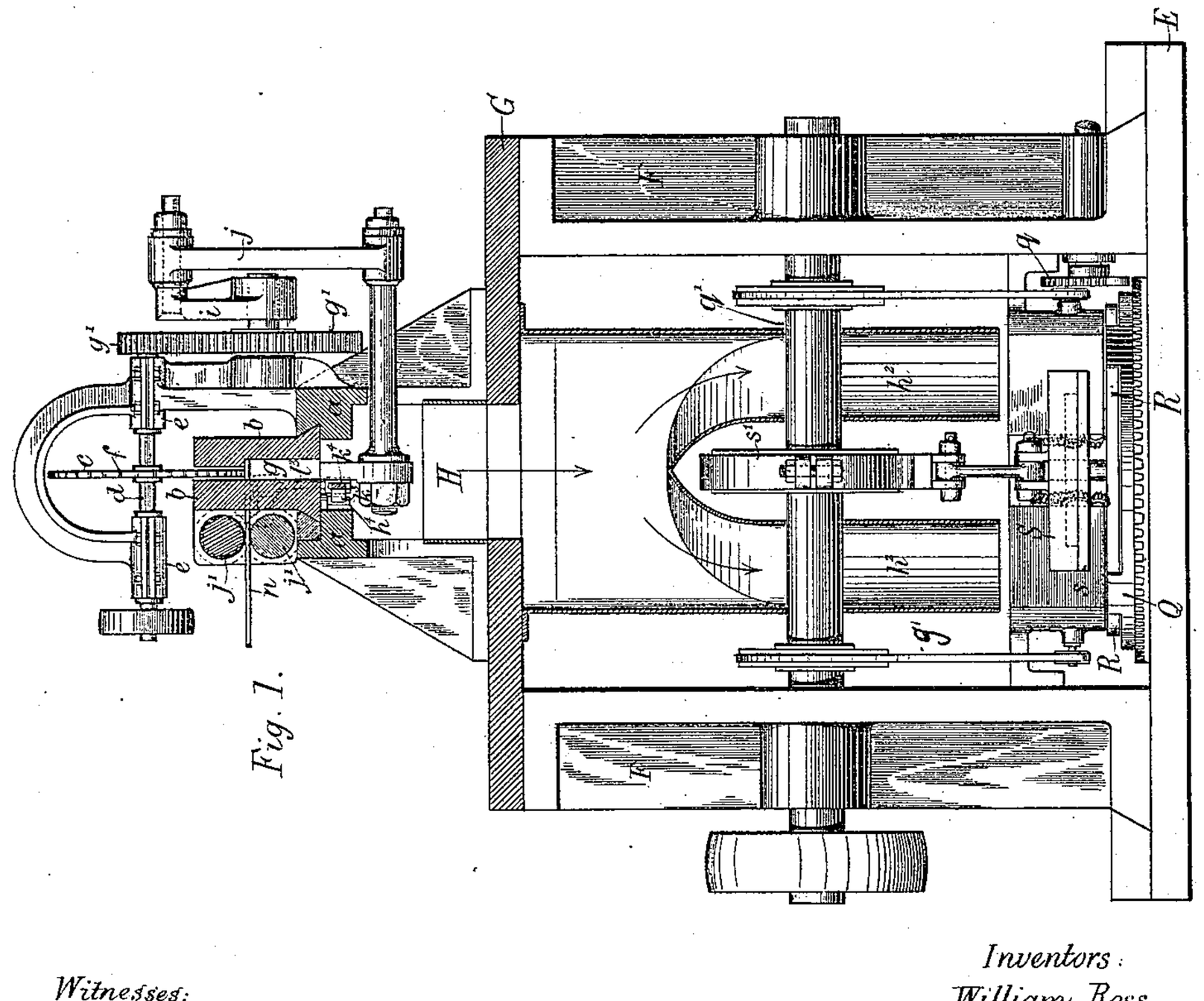

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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Fig. 4.

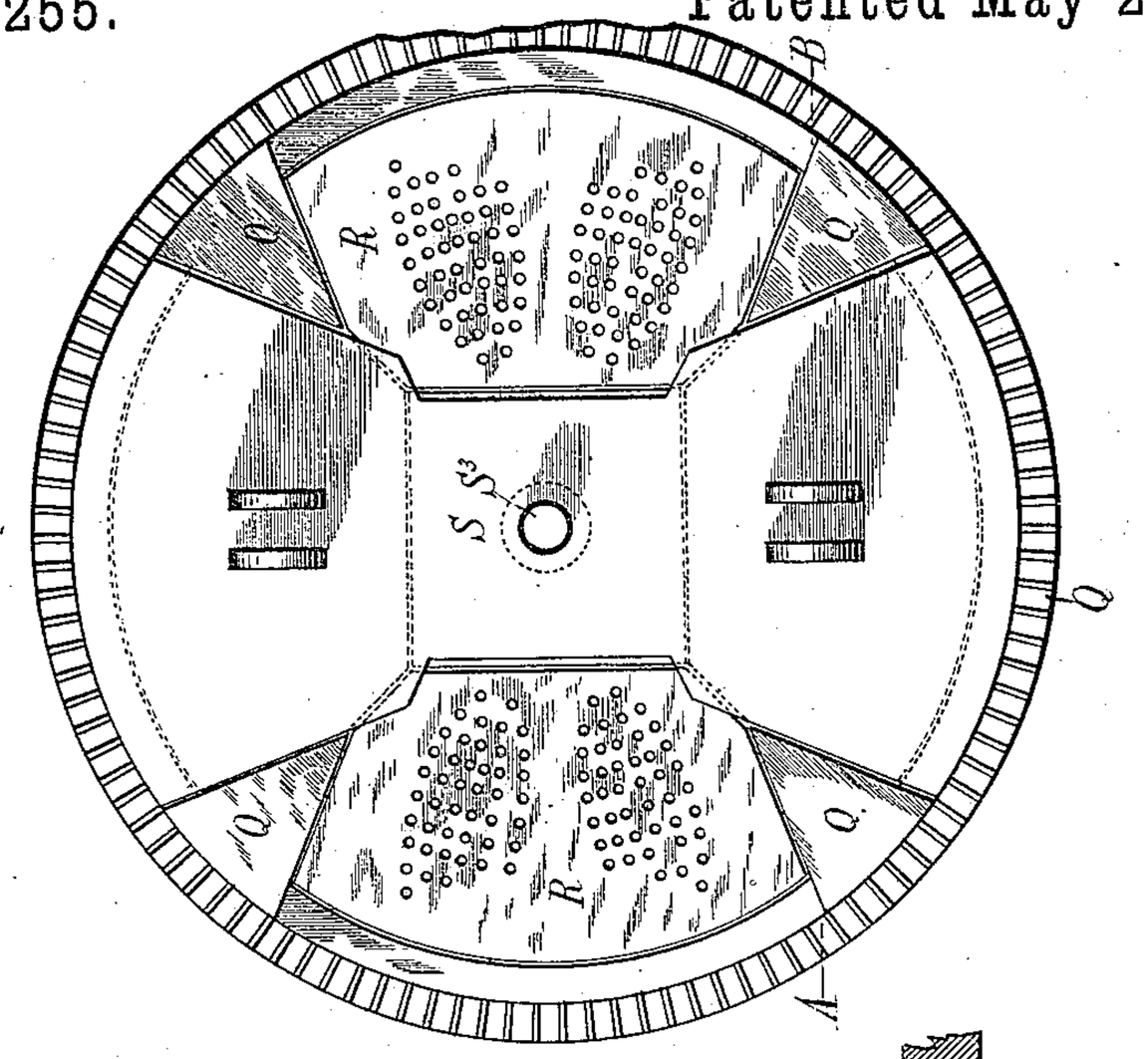
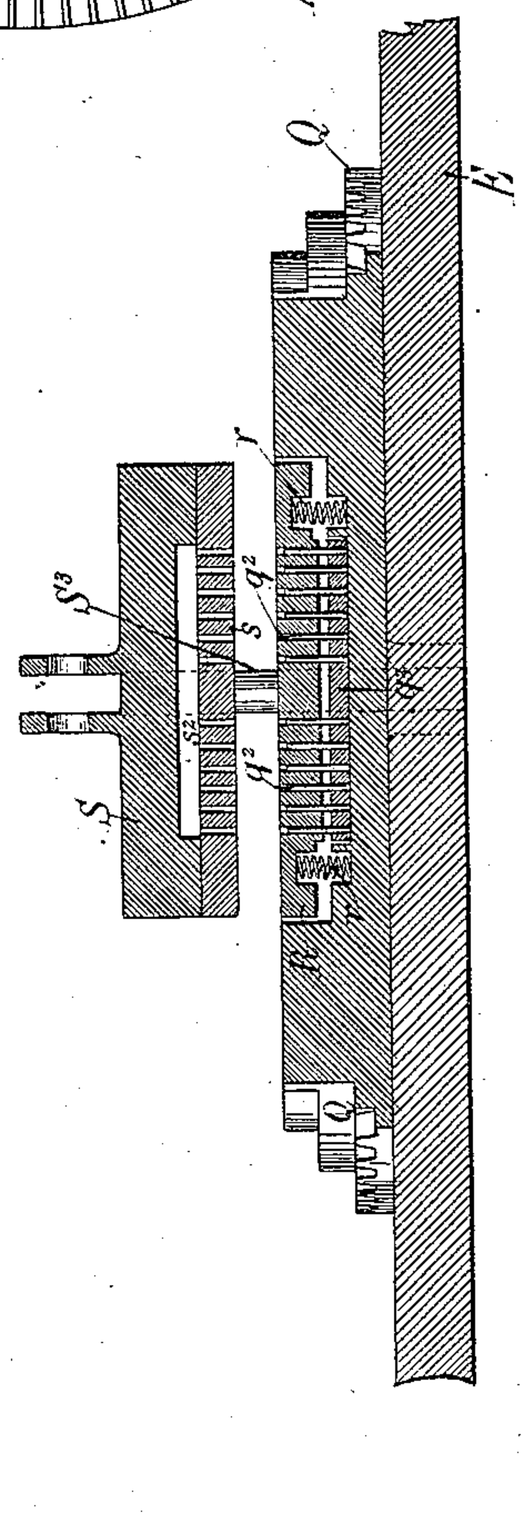


Fig. 3.



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(No Model.) 4 Sheets—Sheet 3.

W. ROSS & J. BILBIE.

NAILING MACHINE.

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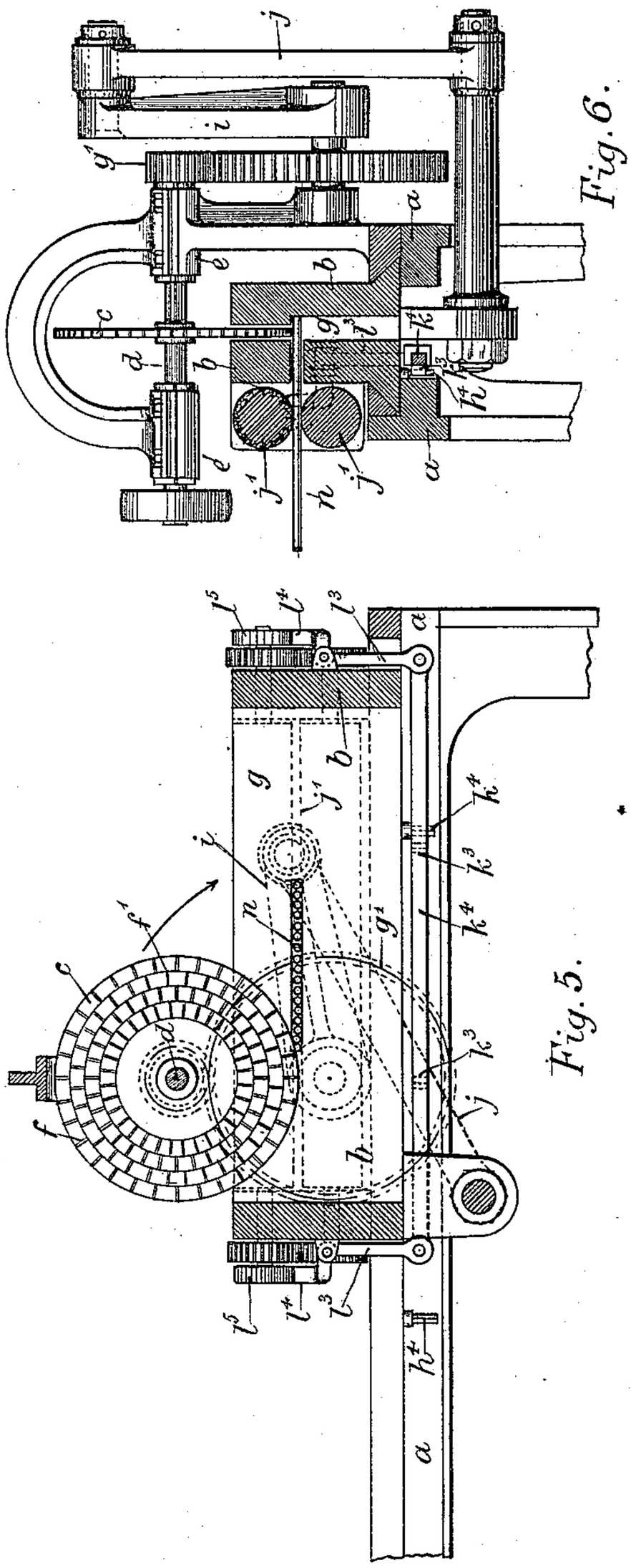

Fig. 6.

Fig. 5.

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(No Model.) 4 Sheets—Sheet 4.

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NAILING MACHINE.

No. 428,255. Patented May 20, 1890.

Fig. 9.

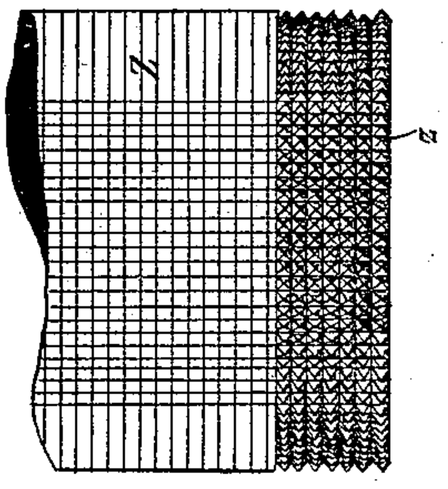


Fig. 10.

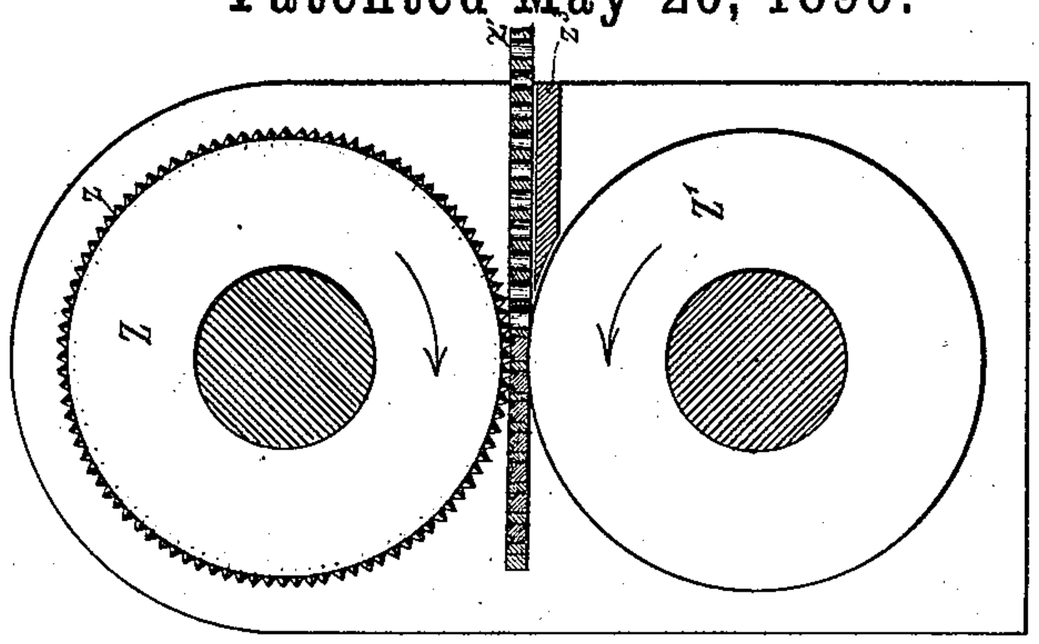


Fig. 7.

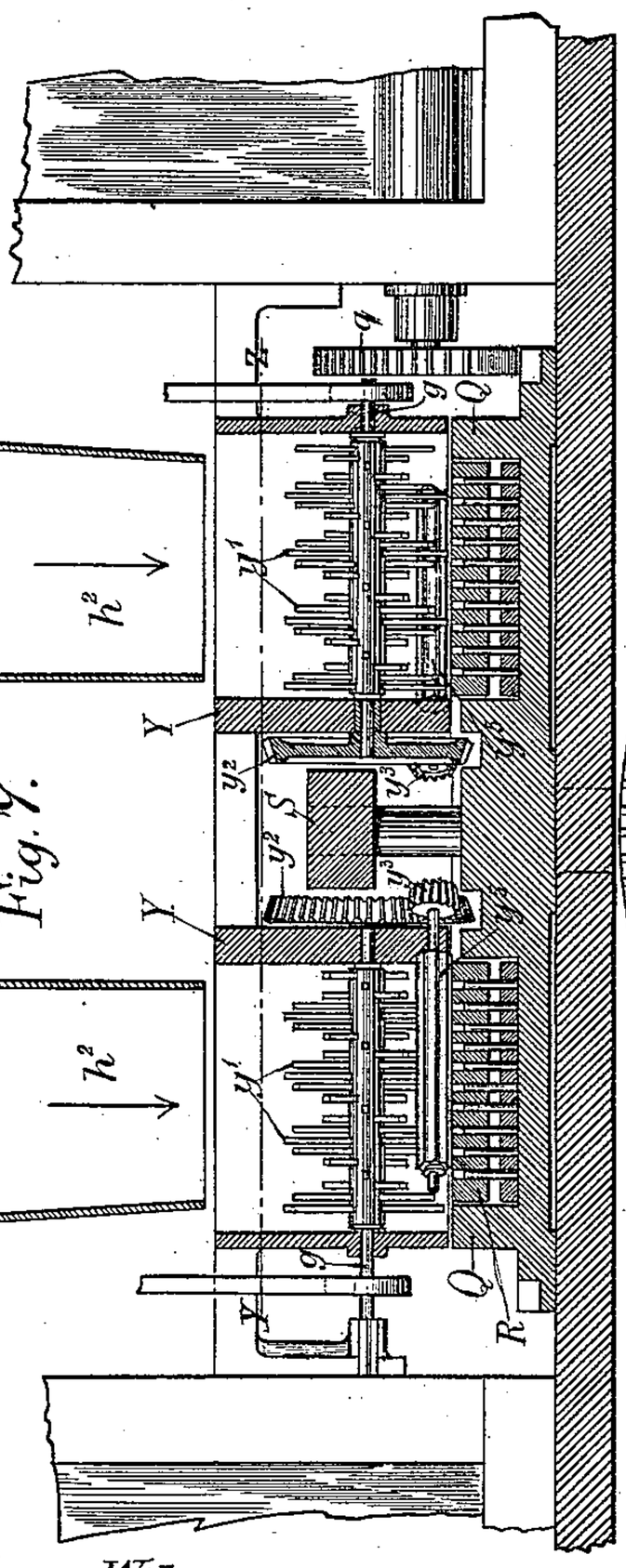
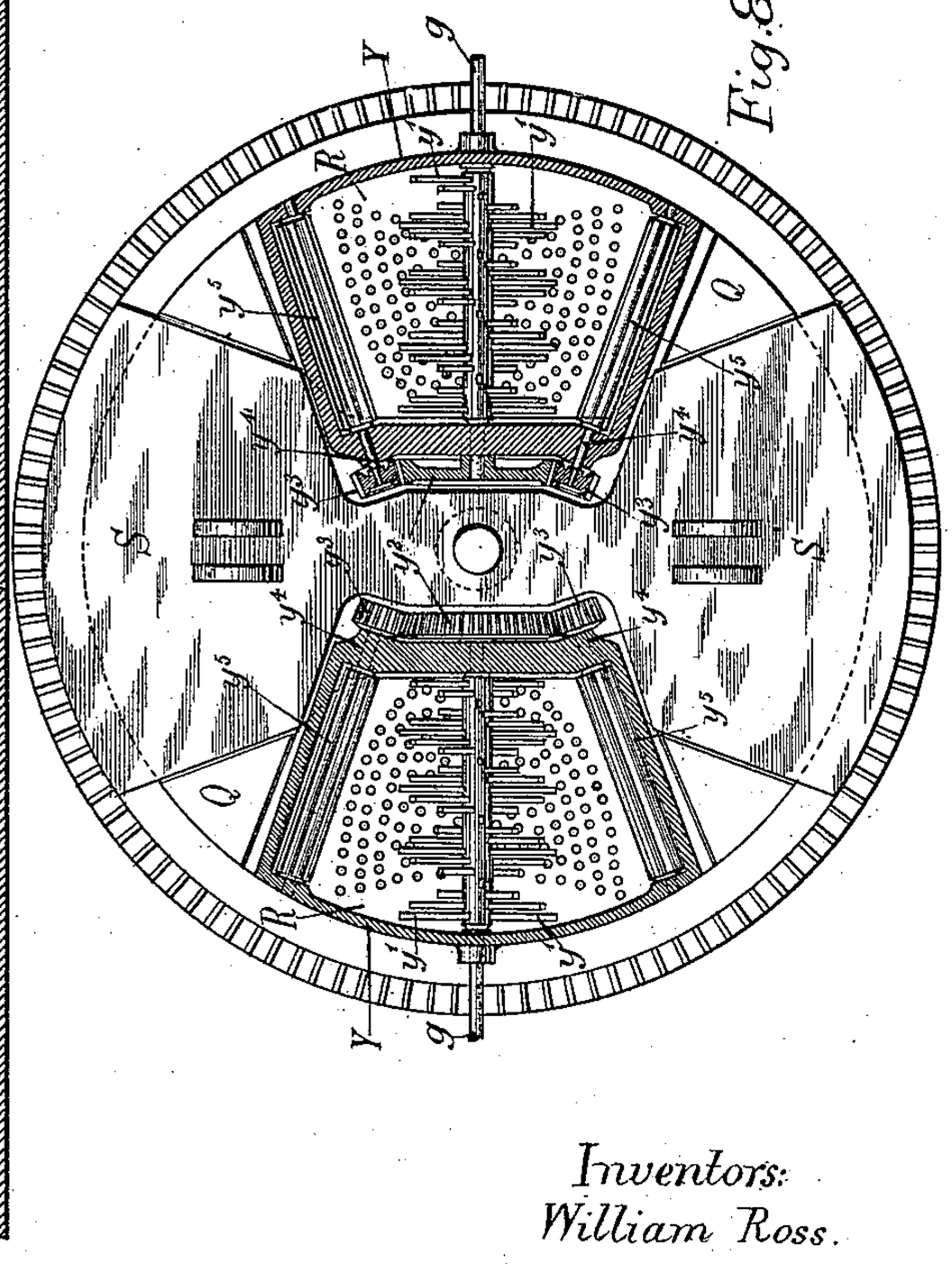


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM ROSS AND JOHN BILBIE, OF LONDON, COUNTY OF MIDDLESEX, ENGLAND.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 428,255, dated May 20, 1890.

Application filed February 6, 1889. Serial No. 298,860. (No model.) Patented in England March 18, 1887, No. 4,131, and April 7, 1887, No. 5,184.

To all whom it may concern:

Be it known that we, WILLIAM ROSS, of No. 3 Bedford Villas, Bowes Park, and JOHN BILBIE, of No. 80 Queen Victoria Street, engineers, both of London, in the county of Middlesex, England, subjects of the Queen of Great Britain and Ireland, have invented certain new and useful improvements in machinery for the manufacture of studs from metallic and other wire and the subsequent insertion thereof in sheets of soft material, (for which we have obtained Letters Patent in Great Britain, Nos. 4,131, March 18, 1887, and 5,184, April 7, 1887,) of which the following is a specification.

Our invention relates to and has for its object the manufacture of improved combined machinery for the double purpose of preparing studs from lengths of suitable material—such as wires of metal, wood, or vulcanite—and of then inserting the said studs, according to a determinate pattern, in soft material, such as the sole-leathers of boots and shoes.

The invention consists in improved shearing mechanism for the manufacture of studs from lengths of wire, in improved stud-feeding mechanism, in improved stud inserting and burring mechanism, and in the combination of the above-mentioned improvements in a single machine, complete in itself and adapted for the accomplishment in their proper order of the several subsidiary processes which together constitute the object of our said invention. We conduct the said subsidiary processes and accomplish the said object by means of the mechanism illustrated in detail in the accompanying drawings, which are to be taken as part of this specification and read therewith. They illustrate the application of our invention to the studding of pairs of sole-leathers.

Figure 1 is a front elevation of a machine complete in itself and embodying our invention. Fig. 2 is a side elevation corresponding therewith. Fig. 3 is a sectional elevation taken on the line A B of Fig. 4. Fig. 4 is a plan of Fig. 3. Fig. 5 is a front sectional elevation of the stud-shearing mechanism. Fig. 6 is a sectional end elevation of the same, showing it at a different point of its stroke. Fig. 7 is a front sectional elevation of the mechanism for delivering and inserting the studs. Fig. 8 is a plan thereof, taken on the line Y Z of Fig. 7. Fig. 9 is a plan of a stud-burring roller; and Fig. 10 is an end elevation of a stud-burring and its felly-roller, illustrating the operation of burring. Figs. 3 to 8 are drawn to a larger scale than Figs. 1 and 2.

The frame of the machine consists of a suitable base-plate E, two standards F F, and a cross-piece G, upon which latter is mounted the bed *a* of the stud-shearing mechanism.

b is a table adapted in any convenient way to travel to and fro upon the bed *a*. The figures show the use of a V-groove for this purpose.

The rotary shearer *c* is carried upon a spindle *d*, which is rotated in suitable bearings *e e* through its driving-pulley. The cutting-edges of the shearer are produced by forming rectangular notches *f* around the plate of metal out of which it is made. Slots *f'* are also made in the plate. These are arranged in circles, the slots in the outer circle interspacing the notches, and those in the inner circle interspacing those in the circles next to them. A deep groove *g* is formed in the table, and the latter is moved to and fro upon the base by a gear g', a crank *i*, and a link *j*. The wires *n* are fed through the side of the table between a pair of finely milled or indented rollers j', which are rotated at the end of each travel of the table by a gear of any suitable type. The one illustrated in the figures consists of two studs k^3 k^3 upon a bar k^4, suspended from a pair of bell-cranks l^3 l^3. Each crank terminates in a pawl l^4, which engages in a ratchet-wheel l^5 upon one of the feed-rollers. The object of milling the feed-rollers is to provide for the wires being indented for the purpose of improving the hold of the material upon the studs. As the table reaches the end of its travel one of the studs k^3 will be brought into contact with its respective pin h^4, with the effect of turning the top roller j' far enough to feed the wires for the length of one stud. As the periphery of the shearer wears away the slots of the outer

circle are opened, and so furnish a new set of cutting-edges. As the studs are made they drop downward, as indicated by the arrows in Fig. 1, into the hopper H, and from there through chutes h^2 h^2 into the stud-feeding mechanism. This is illustrated in detail in Figs. 7 and 8.

Y Y are bottomless boxes, into which the studs drop from the shearing mechanism just described through the said chutes h^2. The boxes are braced together, and their bottom edges fit down close enough upon the plate Q to prevent any studs jamming between the box and plate. A shaft g is supported in suitable bearings in the ends of each box and is adapted to be driven from the shaft q'—*e. g.*, by bands g'. Around the shaft g there projects a series of arms y', which are preferably arranged in one or more spirals about the shaft.

The object of the rotating shaft g and arms y' is to act as an agitator, so as to keep the studs in the box in a state of constant agitation, for the purpose of facilitating their entrance into the perforations in the plate R; and to further effect this purpose we sometimes impart a reciprocating longitudinal motion in addition to the rotary one. The inside end of each shaft g is fitted with a gear y^2, which engages with pinions y^3 upon the respective ends of shafts y^4, adapted to rotate inside the box in bearings in the box ends. Circular cutters y^5 are mounted upon the shafts y^4, and are consequently revolved at a high speed. The edges of the cutters y^5 only just clear the plates Q and R, so that if a stud has not settled down into a perforation in the latter or should be a trifle too long it will either be pulled out of the perforation or cut down.

Each box with its agitator, circular cutter, and the gearing to operate the latter constitutes that part of our invention which is hereinafter referred to as a filler or a stud-feeding mechanism. The studs drop from the stud-feeding mechanism into the stud-inserting mechanism, (illustrated in detail in Figs. 3 and 4,) which we will now describe.

Q is a plate adapted to be revolved intermittently by suitable gearing q, driven from a shaft q'. The central part q^3 of the said plate is removable, and from it project four sets of plungers q^2. Over the plungers q^2 a perforated plate R is supported by spiral springs r at a distance equivalent to the length of a stud, and as the projection of the plungers q^2 above the surface of the plate Q at its center q^3 is equivalent to the thickness of the perforated plate R it follows that the resilience of the springs r (their strength being adapted to effect this) will support the plate R at a height above the plungers q^2 equal to the length of a stud.

S is a presser worked by an eccentric s' upon the shaft q', from which eccentric it is evenly and strongly hung.

S^3 is a guide provided to secure a truly rectilinear motion on the part of the presser. The shaft is driven in any convenient way, but is timed to rotate in harmony with the plates Q and R. In size this presser corresponds with the area within which are comprised the sets of plungers q^2. Its under face s is perforated to receive the plungers, and a clearance-space is provided between the presser and the said under face. As the studs drop from the boxes Y Y into the perforations in the plate R they rest therein in a vertical position upon the plungers q^2. Both plates Q and R are then rotated until the perforations in the latter and the plungers q^2 in the former are respectively under the sets of perforations in the presser-face s, when the said motion is automatically arrested by any convenient device—*e. g.*, the omission of teeth from the pinion of the gearing q. The eccentric s' on the shaft at this moment drives the presser S down upon the soles previously laid fairly over the sets of perforations in the plate R. The latter yields before the descent of the presser, and the studs are forced into the soles, the expelled pellets of leather rising into perforations in the presser-face s. The presser is raised by the eccentric and the studded soles removed. The pinion of the gear q re-engages with its spur-wheel, and the plate R is again charged with studs, as before described. After the sole-leathers (or other materials) have been studded in the method hereinbefore described they are passed between two rollers. (Illustrated in Figs. 9 and 10.)

Z is a hard-metal roller having pyramidal or conical projections z formed upon its periphery.

Z′ is a plain roller set parallel with the one just described and separated as to its periphery and the apices of the projection z by a distance a little less than the length of the studs. Both rollers are supported in suitable housings and driven at the same angular velocity in the direction indicated by the arrows.

We provide a suitable table z^3, upon which the sole-leathers z' are laid to be fed up to the rollers. As the said sole-leathers are drawn between the rollers the projections z enter the studs and burr them over the leather, as shown on the left-hand side of Fig. 10.

We claim—

1. The combination of stud-shearing mechanism, bottomless stud-boxes in close contact with a perforated plate thereunder, an agitator consisting of a shaft from which radiate arms arranged in spirals thereon, and which arms are adapted to be moved within the said box, a perforated plate supported by springs over a second plate having plungers entering the respective perforations in the said perforated plate and adapted to be moved intermittently under the filling devices, and a perforated presser adapted to drive the material to be studded down upon the perfo-

rated plate previously charged with studs, as set forth.

2. The combination of a notched and slotted circular shearer, a traveling table having a groove within it adapted to receive a segment of a rotary shearer, gearing by which a to-and-fro motion is communicated to the said table from the shaft of the said shearer, a pair of feed-rollers for feeding the wire past the shearer for the length of a stud, bottomless stud-boxes in close contact with a perforated plate thereunder, an agitator, a perforated plate supported by springs over a second plate having plungers entering the respective perforations in the said perforated plate and adapted to be moved intermittently under the said bottomless stud-boxes, and a perforated presser adapted to drive the material to be studded down upon the perforated plate previously charged with studs, as set forth.

In testimony whereof we have hereunto affixed our signatures, in presence of two witnesses, this 4th day of January, 1889.

WILLIAM ROSS.
JOHN BILBIE.

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