R. ROSS.

Machines for Finishing Horseshoe Nails.

No. 142,352. Patented September 2, 1873.

Fig. 1.

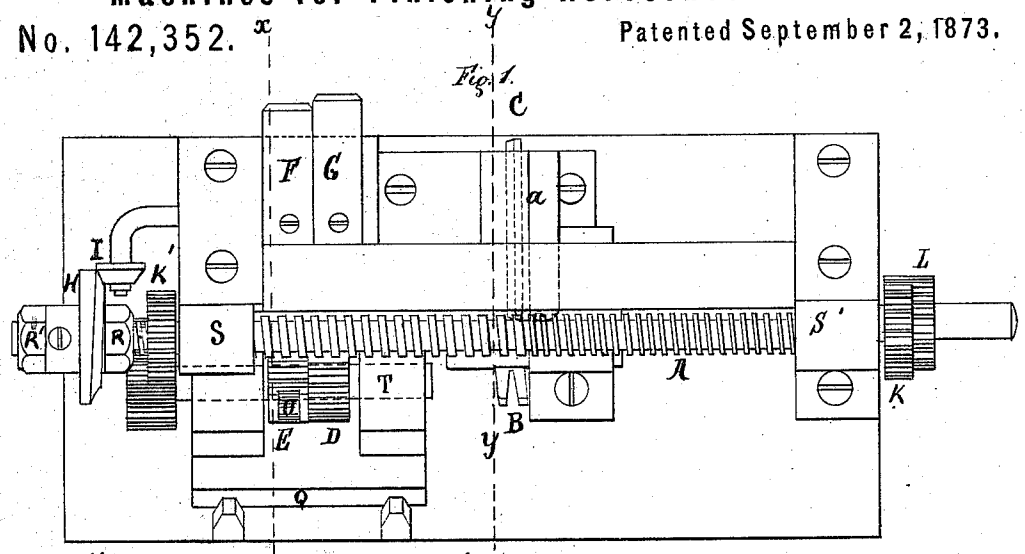


Fig. 2.

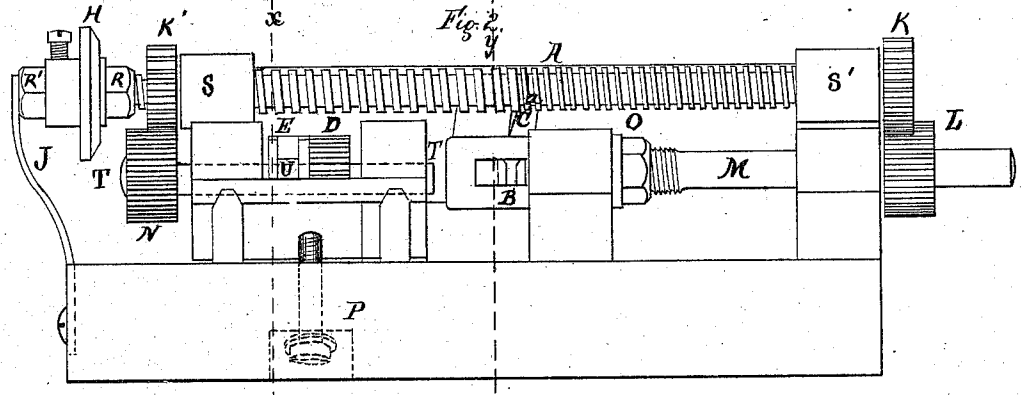


Fig. 3.

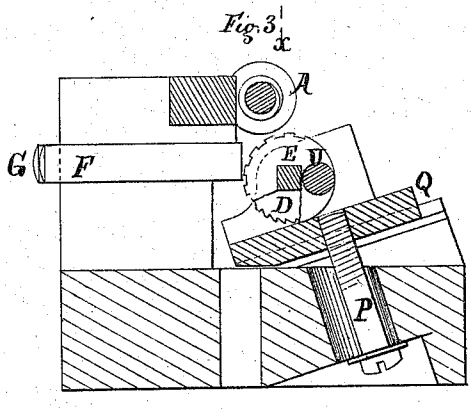


Fig. 4.

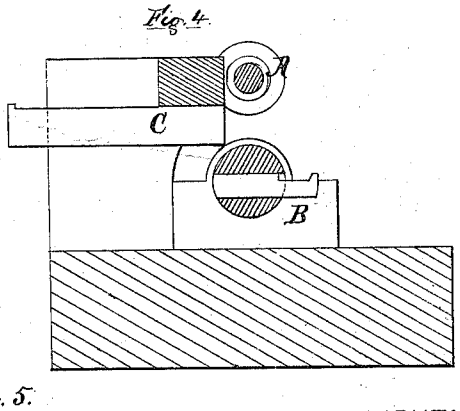
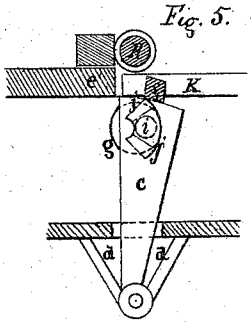


Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT ROSS, OF VERGENNES, VERMONT, ASSIGNOR TO THE NATIONAL HORSE-NAIL COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR FINISHING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **142,352**, dated September 2, 1873; application filed July 14, 1873.

To all whom it may concern:

Be it known that I, ROBERT ROSS, of Vergennes, in the county of Addison and State of Vermont, have invented certain Improvements in Machines for Finishing Horseshoe-Nails, of which the following is a specification:

My invention relates to a machine for shearing, beveling, and hardening the points of horseshoe-nails after the same have been formed into blanks by other mechanism; and it consists, principally, of three features: First, a feed-screw, by which the nails are advanced with a differential movement, held stationary during the shearing operation, and then advanced to the beveling and the hardening mechanism. Second, in combination with a feed-screw, operating as above described, a shearing punch and die, the latter revolving in such manner as to shear the superfluous metal from the sides of the blanks, and prepare it for the milling-cutter. Third, the beveling and hardening cylinders, the former being provided with teeth for cutting a bevel on the front edge of the nail, and the latter being provided with blunt teeth or rollers for compacting and hardening the point of the nail.

In the accompanying drawing, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation thereof. Fig. 3 is a sectional view of Figs. 1 and 2 taken on the plane indicated by lines *x x x* to show the beveling and hardening mechanism, and Fig. 4 is a similar view taken on the planes indicated by lines *y y y* to show more clearly the shearing punch and die; and Fig. 5 illustrates a reciprocating instead of a rotating shearing-die with the corresponding modifications.

The feeding mechanism comprises the following principal parts: The feed-screw A, the cam-wheel H, the bearing-roller I, the spring J, collars R R′ on the screw-shaft, the journal-boxes S S′, and the pinions K K′.

The shearing device consists of the revolving die B and the main shaft M, with which it rotates, the stationary punch C, the clamping-piece *a*, the collar O, the gear-wheel L; and, in Fig. 5, the inverted pendulum *c*, the hanger *d*, the punch *e*, die *f*, the crank-shaft *g*, crank-pin *h*, segmental block *i*, curved slot *j*, and the clearing-block *k*.

The beveling and hardening device consists of the milling-cutter D and the corrugated hardening-roll E on the shaft T, the gear-wheel N, the dies F and G, the sliding frame Q, the adjusting-screw P, and the auxiliary roller U.

The feed-screw A is revolved by the pinion K gearing into the wheel L on the main shaft M. The threads of the feed-screw become coarser at a point to the right of the punch C for the purpose of separating the nails, and thereby preventing the die B from catching more than one nail at a time in passing over the punch. The screw-shaft has an end or longitudinal play, which is governed by the beveled cam H bearing against the conical roller I in a direction opposite to the lead of the screw-threads by means of the spring J. The surface of the cam H, which bears against the roll I, is at an angle with the axis of the screw-shaft. This angle has the same pitch as the coarser threads of the feed-screw, and the cam is so adjusted as to counteract the advance of the threads by moving the shaft in the opposite direction at an equal speed during the shearing of the nail. Instead of the friction-roll I, any other form of stop may be used that will act upon the cam H to give the feed-screw the necessary end movement. The end of the main shaft M is enlarged for the reception of the shearing-die B, though any suitable device may be used for securing the die to the shaft. On its open end the die B has beveled projections on each side, which guide the nail more certainly to the center of the die in case a nail too small to fill up the space between the threads be placed in the screw. The shearing-punch C is clamped securely to the stock, being placed directly opposite the slot in the revolving shearing-die B. The clamping-piece *a* has its outer end rounded off, as indicated by the dotted lines in the drawing, to guide the nails over the punch. Both the punch and die are at an angle to the axis of the feed-screw, the angle being coincident with the pitch of the screw-

threads, as the nails within the screw-threads will have the same general inclination.

In the reciprocating shearing-die, as shown in Fig. 5, the die *f* is secured to and swings with an inverted pendulum, *c*, which latter is pivoted on the hanger *d*. In the upper end of the pendulum is a curved slot, *j*, in which plays a segmental block, *i*, and in this block revolves a crank-pin, *h*, on the crank-shaft *g*.

The effect of this mechanism is to produce a differential movement in the die *f*, as described in Letters Patent No. 139,331, granted to me May 27, 1873, as assignor to the National Horse-Nail Company. This movement of the die is rapid in its approach to and retreat from the punch, but slow at other points, to enable the sheared nail to pass from, and the blank to reach, the punch in time for the return of the die *f*. The stationary clearing-block *k* sets loosely in the slot of the reciprocating die, and clears the die of the nail on its return, this block being, at the same time, sufficiently distant from the punch *e* to permit the nail to pass freely between them. The other parts of the machine operate substantially the same with the reciprocating as with the rotating shearing-die.

The milling-cutter D (a side view of a part of which is shown in Fig. 3, where part of the roll E is broken away) is keyed on the shaft T, which is rotated by the gearing N K′. The cutter, by means of its sharpened teeth, readily bevels down the point of the nail on its face, the die G serving as a bearing for the nail during the operation. This mill, however, is intended to remove only a part of the superfluous metal from the end of the nail, the fine hard point being produced by the roll E, which is provided with blunt teeth or corrugations, and reduces and hardens by compacting the end of the nail; or, the small auxiliary roll U may be placed in the periphery of the roll E, to perform the same function. The shaft T, on which both rolls are keyed, is journaled in an adjustable frame, Q, which latter is secured in place by the screw P, or other suitable mechanism. The object of this adjustable frame is to regulate the bevel on the nail.

In operating the machine, the nails are inserted between the finer threads of the feed-screw, and advanced thereby until within a short distance of the shearing-punch, when the screw-threads widen and separate the nails farther apart. When each nail is directly before the punch, it is held stationary, as above described, until the shearing-die passes over it and trims off its sides, when it again moves on with increased speed, by reason of the return axial motion of the feed-screw, and thus, passing clear of the die at its next revolution, the nail passes on to the milling-cutter, which bevels its face at the point sufficiently to enable the roll to perfect the nail by producing a fine hard point thereon.

Manifestly, my invention may be varied from in many non-essential particulars, without avoiding the principles involved therein. Thus, inasmuch as the main feature of my invention consists in giving a longitudinal reciprocating movement to the feed-screw during a part of its revolution, so as to allow the nail to be held stationary for a time against the trimming punch or anvil before passing off from the screw, it is immaterial whether this reciprocation be effected by means of a cam and spring, as shown, or by any other means adapted to produce the desired movement—as, for instance, by the use of a weight in lieu of the spring, to give the return movement to the screw; or by the use of a grooved cam, to give both the advance and the return movement. So far, again, as concerns this main feature of my invention, the shearing-die, as already described, may be made reciprocating instead of revolving, or the shearing-die might be made stationary and the punch revolving. The milling-cutter, too, may be made to operate both as a cutter and a roll. These and many other variations from the mode above indicated, which I deem the best mode of carrying out my invention, may be made without departing from the leading feature of it.

What I specially claim is—

1. The combination, in a nail-machine, of the feed-screw, the cam H, and the friction-roll I, or their equivalents, by means of which a longitudinal reciprocating movement is imparted to the screw during a part of its revolution, substantially as and for the purpose set forth.

2. The milling-cutter D and supporting-die G, in combination with the feed-screw A, substantially as described.

3. The corrugated roll E and supporting-die F, in combination with the feed-screw A, substantially as and for the purpose set forth.

4. The auxiliary roll U, supported on the periphery of the roll E, substantially as and for the purpose described.

5. The combination of the auxiliary roll U, the milling-cutter D, and the screw A, substantially as set forth.

6. The combination, in a nail-machine, of a shearing-punch and die or dies, and a longitudinally-reciprocating feed-screw, the parts being arranged, substantially as described, so as to trim the nail before it passes off from the screw.

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Witnesses:
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J. G. HINDES.