

# H.E. & C.W. Woodford. Horse Shoe Nail Mach.

No 59,327.

Patented Oct 30. 1860.

Fig. 1.

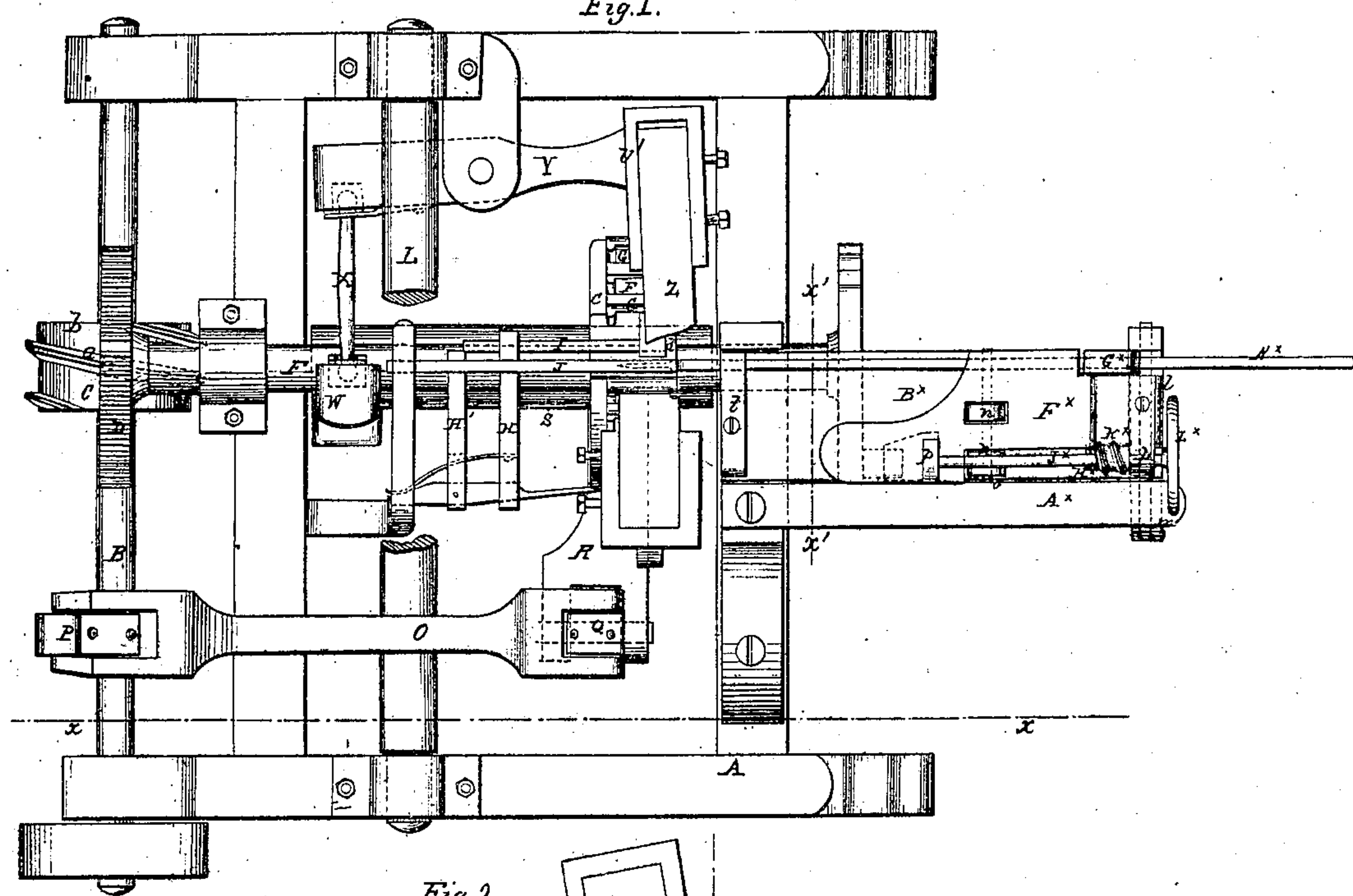


Fig. 2.

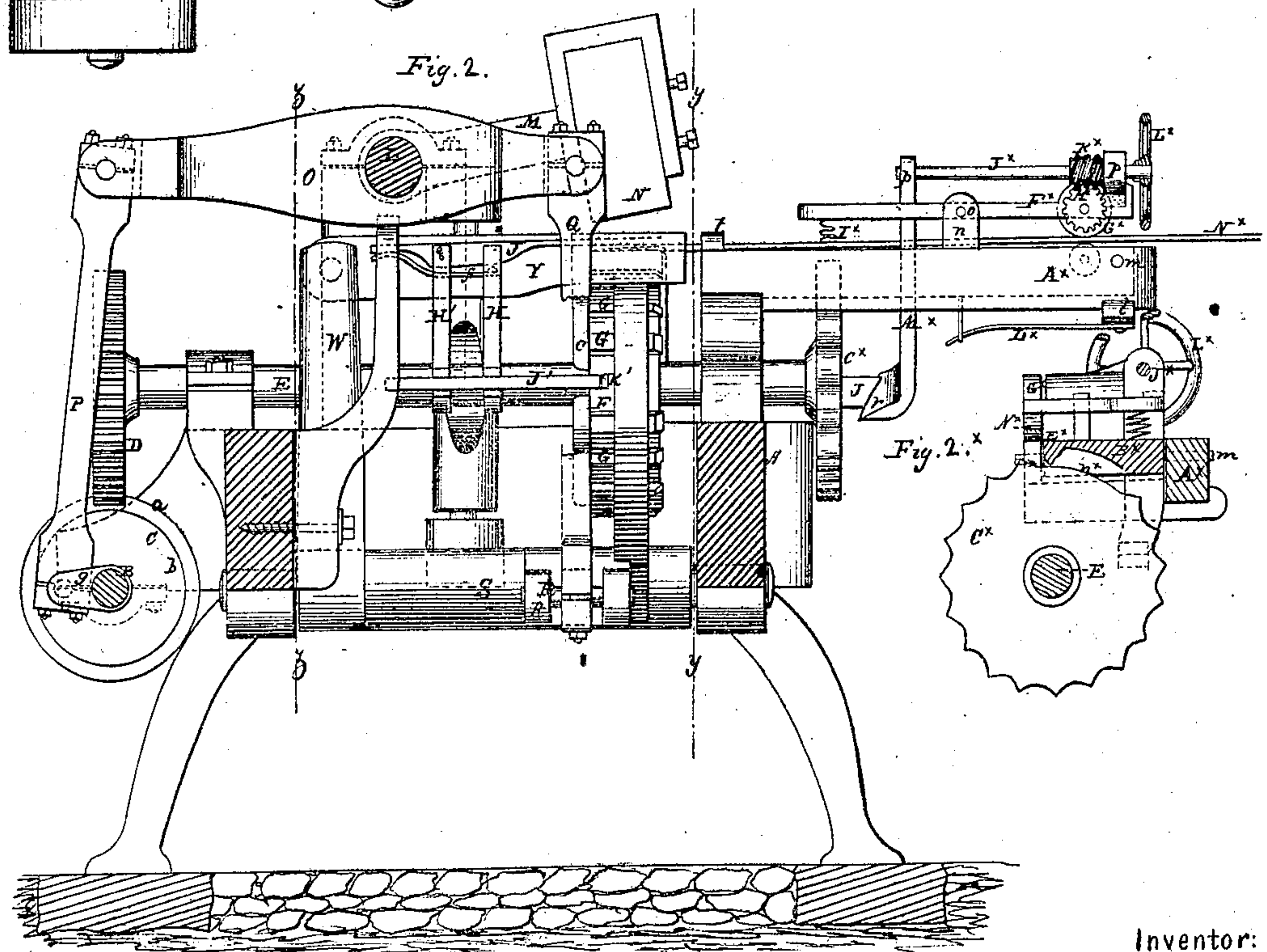
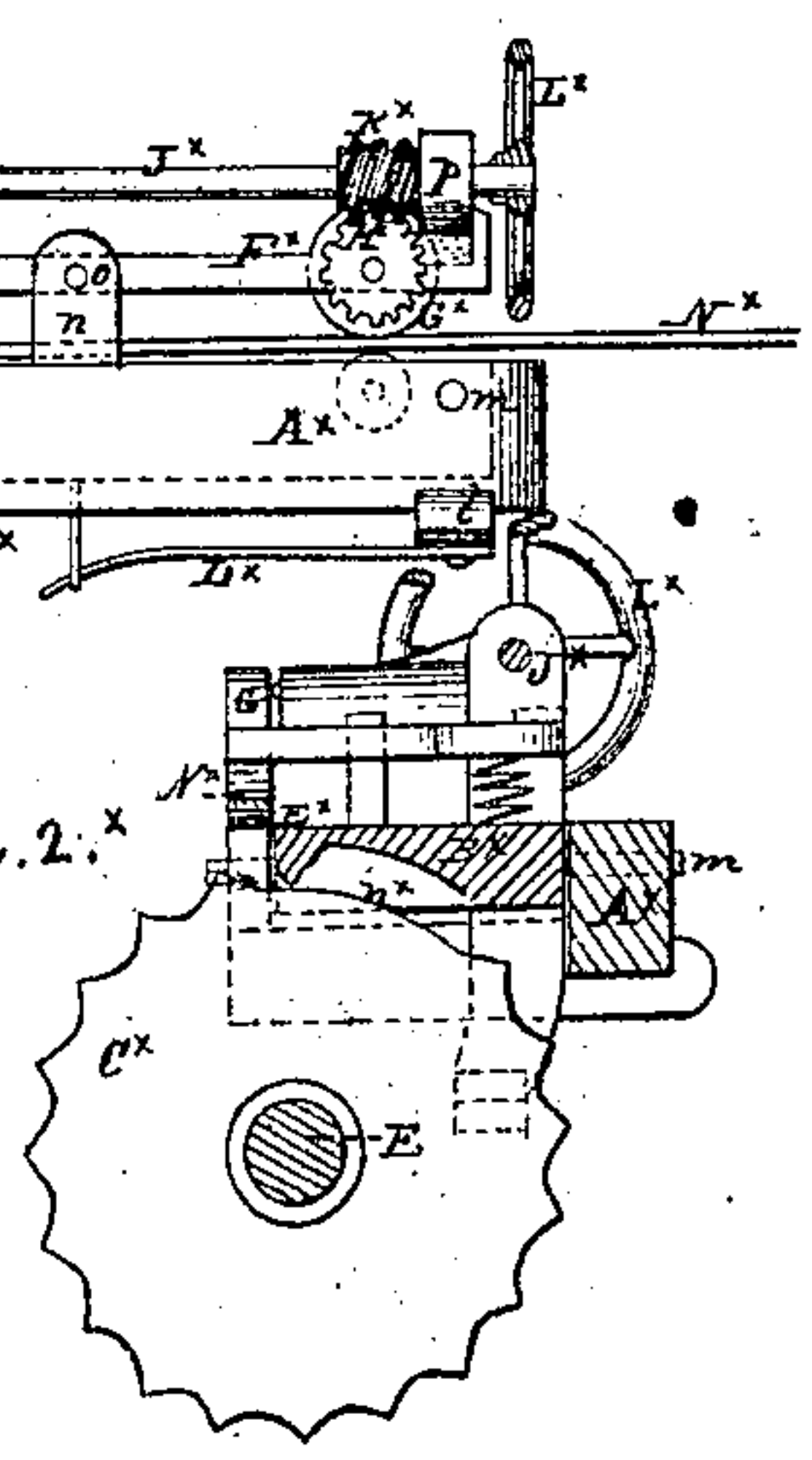


Fig. 2.<sup>x</sup>



Witnesses:

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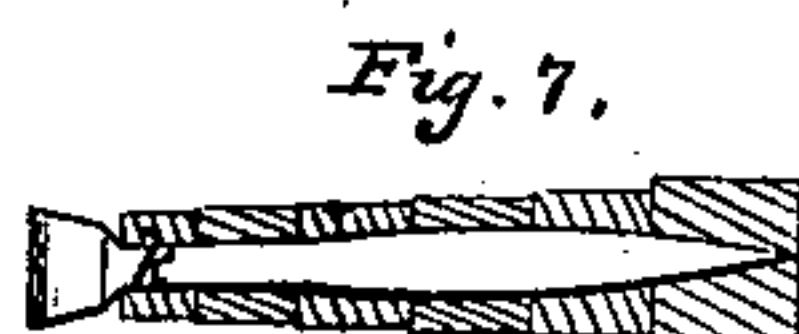
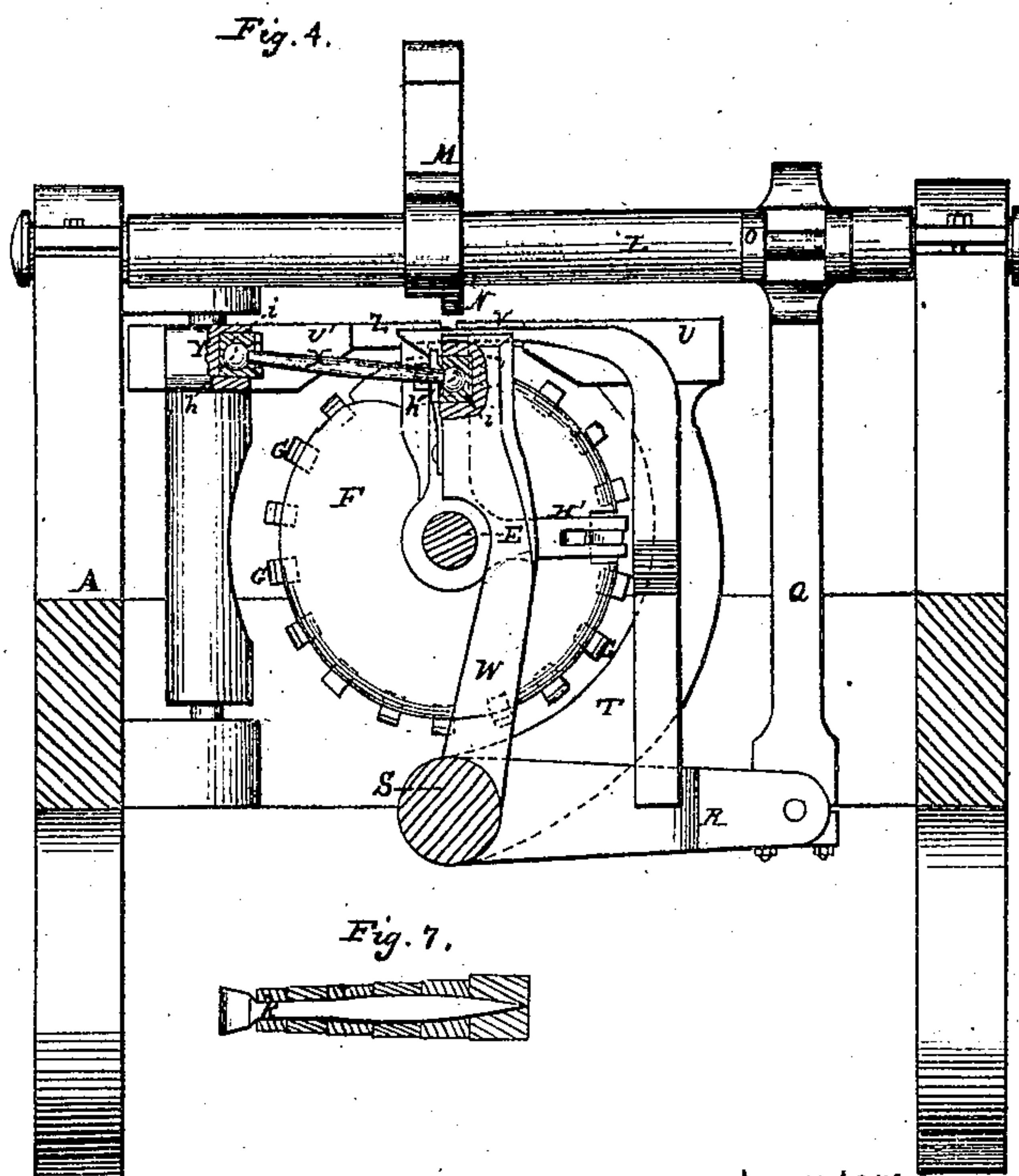
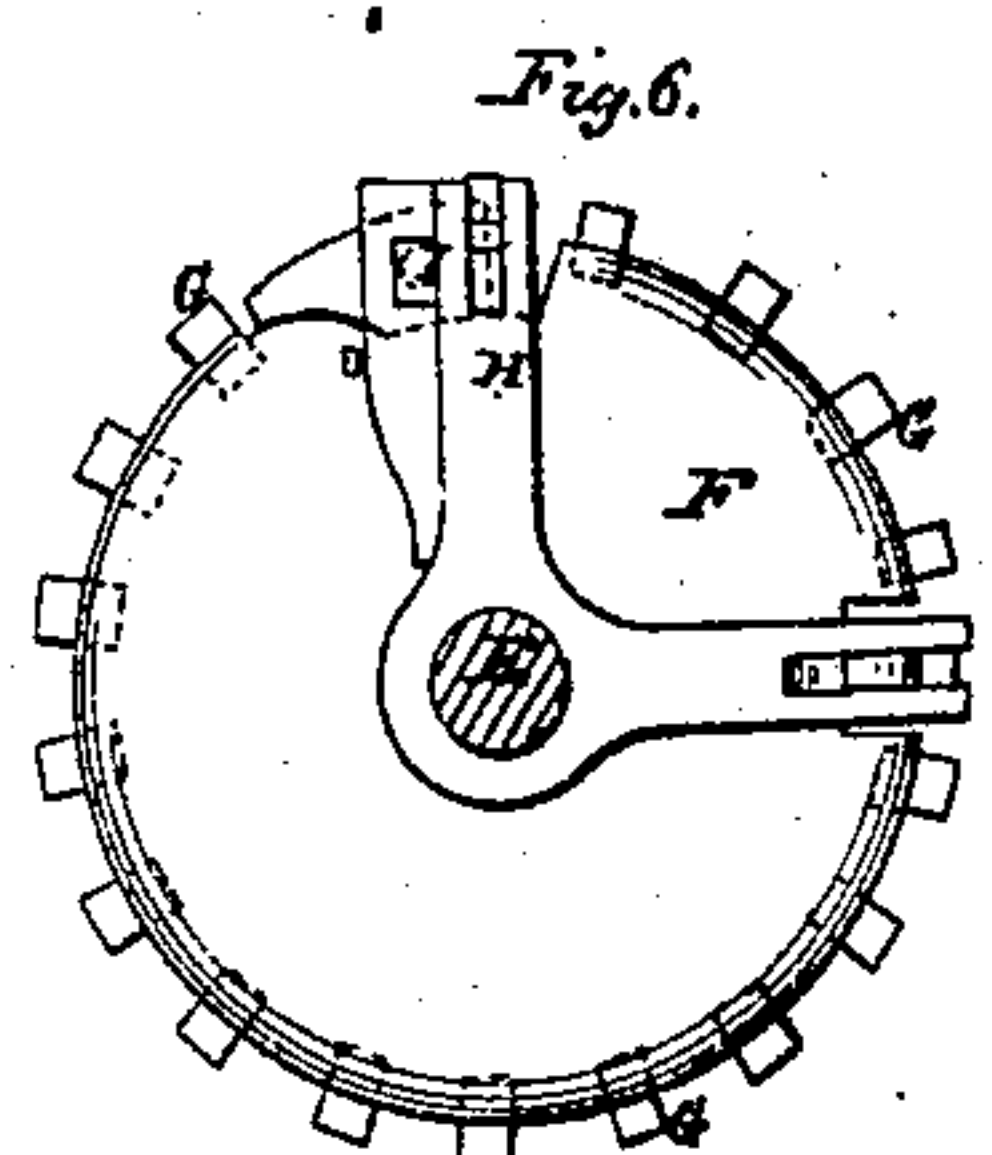
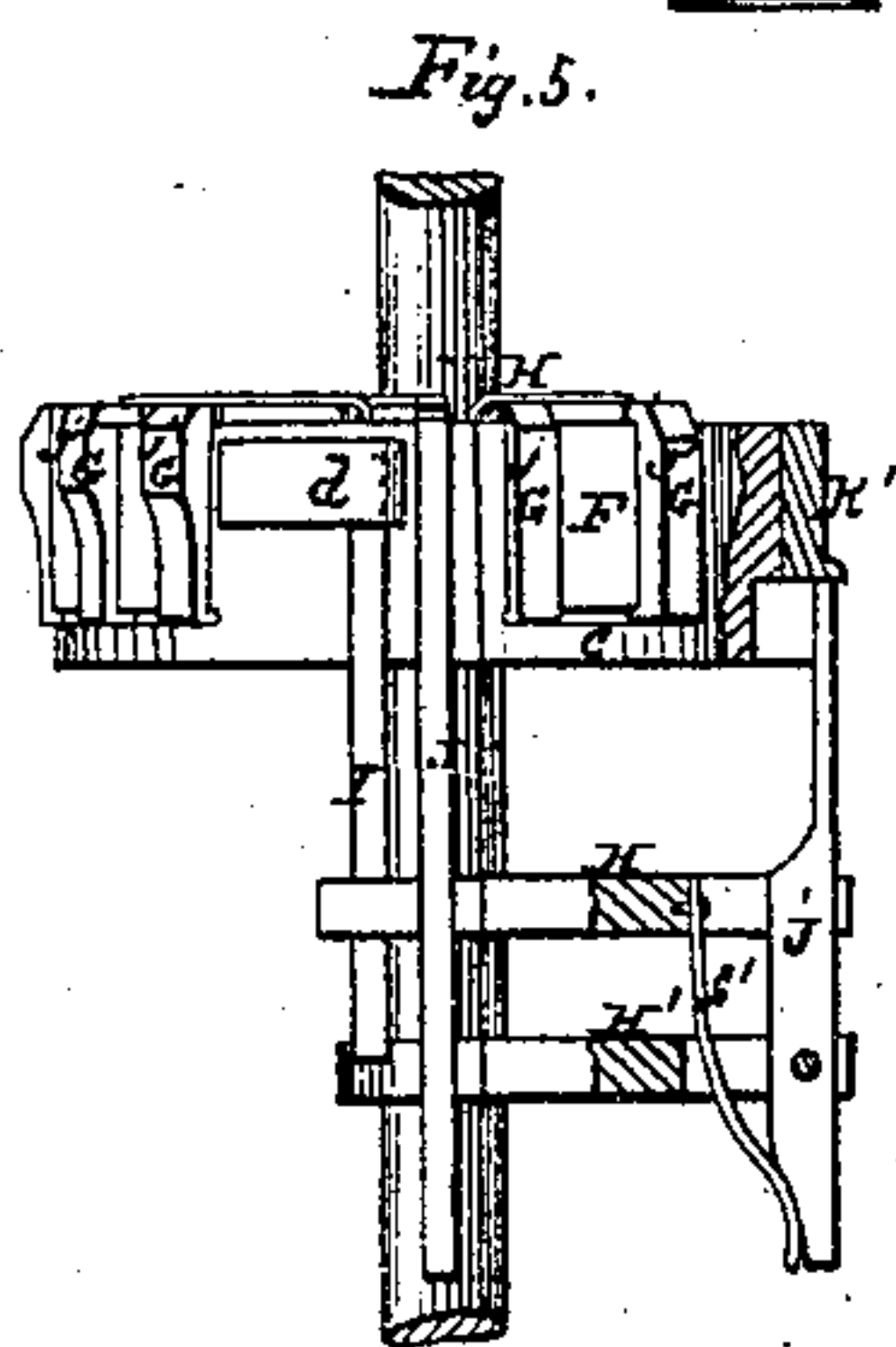
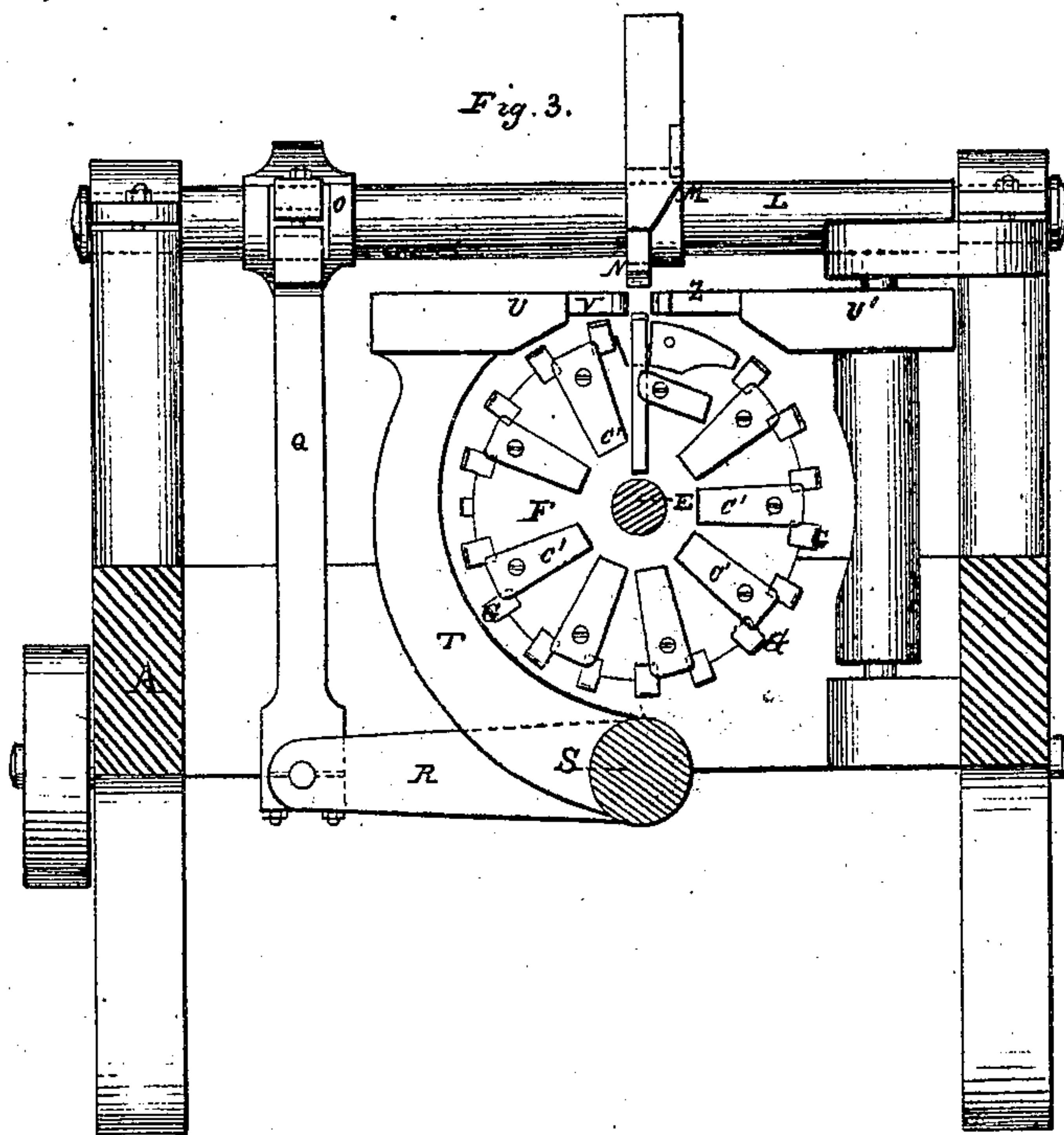
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*Horse Shoe Nail Mach.*

*No 59,327.*

*Patented Oct 30. 1866.*



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN HORSESHOE-NAIL MACHINES.

Specification forming part of Letters Patent No. 59,327, dated October 30, 1866.

*To all whom it may concern:*

Be it known that we, HENRY E. WOODFORD and CHARLES W. WOODFORD, of Keeseville, in the county of Essex and State of New York, have invented a new and Improved Machine for Making Horseshoe-Nails; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, Sheet No. 1, is a plan or top view of our invention; Fig. 2, a side sectional view of the same, taken in the line  $x x$ , Fig. 1; Fig. 2\*, a transverse section of a portion of the same, taken in the lines  $x' x'$ , Fig. 1; Fig. 3, Sheet No. 2, a transverse vertical section of the same, taken in the line  $y y$ , Fig. 2; Fig. 4, a transverse vertical section of the same, taken in the line  $z z$ , Fig. 2; Fig. 5, a detached plan or top view of the rotating anvil; Fig. 6, a detached rear view of the anvil; and Fig. 7, a view of the nail made by our machine.

Similar letters of reference indicate corresponding parts.

This invention relates to a new and improved machine for making horseshoe-nails, and of that class in which the nails are formed by forging instead of being compressed in the proper shape by means of dies.

The object of this invention is to produce a machine which will make a nail equally as good as those made by hand, and which will perform the work expeditiously.

A represents a framing, which may be constructed in any proper manner, to support the working parts; and B is a driving-shaft, having its bearing at one end of the machine, and a cam, C, upon it, composed of a spiral thread,  $a$ , on the periphery of a wheel,  $b$ . The thread  $a$  of this cam gears into a worm-wheel, D, which is keyed on a shaft, E, placed longitudinally on the framing A; and on said shaft E there is keyed a wheel, F, the periphery of which has a series of dies, G, fitted in it. These dies G have a position on the periphery of the wheel F parallel with the shaft E, and they are secured upon the wheel by having the periphery of the latter mortised to receive

the lower parts of the dies, and having a flange,  $e$ , at the rear edge of the wheel, beveled or grooved in dovetail form to receive the rear ends of the dies, the latter being retained in position by means of buttons or clamps  $e'$  bearing against their front ends. By this arrangement the dies may be readily secured to and detached from the wheel, and this is necessary, as the dies require to be detached occasionally for grinding, repair, &c.

On the shaft E there are keyed two right-angular arms, H H', and to one end of the arm H a bar, I, is attached parallel with the shaft E, said bar extending forward and having a cross-head,  $d$ , upon it, which rests in a recess in the wheel F, and has its outer surface curved corresponding to the curvature of the periphery of wheel F. (See Fig. 6.) To the corresponding end of the arm H' there is attached by a fulcrum-pin,  $e$ , a lever, J, having a spring,  $f$ , bearing against it, which has a tendency to keep the outer end of the lever in line with the edge of the cutter K, (see Fig. 5,) at the front edge of wheel F. A similar lever, J', is pivoted to the opposite end of the arm H', and has a spring,  $f'$ , bearing against it to keep its outer end in line with a cutter, K', at the rear edge of wheel F. (See Fig. 5.)

On the upper part of the framing, A above the shaft E and at right angles therewith, there is placed a shaft, L, which has an arm, M, keyed firmly upon it, and to the outer end of this arm a hammer, N, is attached. The shaft L has a bar, O, upon it, one end of which is connected by a rod, P, with a crank,  $g$ , on the driving-shaft B, and the opposite end connected by a rod, Q, with the outer end of an arm, R, which projects at right angles from a shaft, S, in the lower part of the framing A. To the front end of this shaft S there is attached an arm, T, the upper end of which is provided with a socket, U, to receive a hammer, V. The shaft S also has an upright arm, W, attached to it, the upper end of which is connected by a link, X, with the rear end of a lever, Y, the front end of which is provided with a socket, U', to receive a hammer, Z. Both of these hammers V Z are shown in Fig. 1, and they are at opposite sides of the hammer N, and as the machine operates they work



simultaneously toward and from each other. The hammer V works or moves in the arc of a vertical circle, as the arm T, to which it is connected, is attached directly to the shaft S. The hammer Z works in the arc of a horizontal circle, as the lever Y, to which it is attached, works in a horizontal plane; but the faces of both hammers V Z meet their work—the nail—and act upon it in a horizontal plane, and consequently in a direction at right angles with the hammer N.

The link X is connected with the lever Y and the arm W by means of ball-and-socket joints, as shown clearly in Fig. 4, each end of the link being provided with a sphere, R, fitted in a corresponding shaped socket, i, made in the lever and arm. By this means the lever Y is operated with the smallest possible degree of friction.

The first six dies G (there being fourteen in all) have their upper sides constructed with faces j, of gradually-increasing length, and they recede consecutively from the front edge of the wheel F, so as to act or draw out the nail F under the blows of hammer N from its neck R toward its point. (See Fig. 7, in which the consecutive action of the dies upon the nail are shown in red.) The succeeding six dies G act upon the nail similar to the first six. The last six dies may be constructed precisely similar to the first six, so as to repeat the operation of the latter; or they may be modified somewhat, according to the shape designed to be given the nail. I do not confine myself to any precise form of dies, nor to the exact manner in which they may operate upon the nail. The first six, for instance, may operate from the head of the nail toward the point, and the other six operate from the point toward the head; and then the end of the nail is cut off by the cutter K', the superfluous metal caused by the drawing out of the nail being cut off by the cutter K'. The remaining two dies are what may be termed "finishers," and act upon the whole length of the nail with the exception of the head.

The dies are moved from underneath the nail by the rotation of wheel F, the latter being rotated by the cam C and worm-wheel D. The spiral thread *a* on the wheel *b* of this cam is so formed as to rotate the shaft E and wheel F intermittingly, the wheel F having its dwells during the time the hammer N descends and strikes the nail upon a die, G, and said wheel F moving so that a succeeding die will be brought underneath and in line with hammer N as the latter ascends. This result is attained by having the thread *a* formed with a spiral portion, which rotates the worm-wheel D, and with a portion which is in a plane at right angles with the shaft B of the wheel *b*, the latter portion of the thread, of course, causing the dwells. The side hammers, V Z, act upon the nail during the time the hammer N rises.

From the above description it will be seen that the wheel F, with its dies G, constitutes a rotating anvil, and that the nail is formed by

a series of blows from a vertical and two side hammers, and gradually drawn out and forged into the proper form, precisely similar to the hand-made nails.

I will now proceed to describe the feeding apparatus.

A<sup>x</sup> is a bar which extends horizontally outward at right angles from the framing A, and having a cross-bar, *l*, at its end, to which a bed-piece, B<sup>x</sup>, is connected by a joint, *m*; and on the front end of the shaft E, underneath the bed-piece B<sup>x</sup>, there is keyed a wheel, C<sup>x</sup>, the greater portion of which is toothed, and having a smooth portion, *n*<sup>x</sup>, as shown in Fig. 2<sup>x</sup>. The bed-piece B<sup>x</sup> rests on this wheel C<sup>x</sup>, and is kept in contact with it by a spring, D<sup>x</sup>. (Shown in Fig. 2.)

In the outer end of the bed-piece B<sup>x</sup> there is fitted a roller, E<sup>x</sup>, and on the bed-piece B<sup>x</sup> there are attached two lugs, *n n*, which serve as bearings for a rod, *o*, which serves as a pivot for a plate, F<sup>x</sup>, the latter having a shaft placed transversely in its outer end, with a roller, G<sup>x</sup>, on one end and a worm-wheel, H<sup>x</sup>, on the opposite end. The roller G<sup>x</sup> is directly over the roller E<sup>x</sup> in the outer end of the bed-piece B<sup>x</sup>, and under the inner end of the plate F<sup>x</sup> a spring, I<sup>x</sup>, bears, which spring has a tendency to keep the roller G<sup>x</sup> in contact with the roller E<sup>x</sup>, as will be fully understood by referring to Fig. 2.

J<sup>x</sup> is a shaft, which is fitted and works in suitable bearings *p p* on the plate F<sup>x</sup>, and has a screw, K<sup>x</sup>, upon it, which gears into the worm-wheel H<sup>x</sup>, and on the outer end of the shaft J<sup>x</sup> a thumb-wheel, L<sup>x</sup>, is secured. The plate F<sup>x</sup> also has a pendant, M<sup>x</sup>, attached, which passes down through a mortise in the bed-piece B<sup>x</sup>, and has a lip, *r*, at its lower end, against which a projection, *s*, on the wheel C<sup>x</sup> acts during each revolution of said wheel. On the inner end of the bed-piece B<sup>x</sup> there is secured a transverse cleat, *t*, having a hole made in it, through which the bar from which the nails are made is fed to the rotating anvil and hammers.

The wheel C<sup>x</sup>, as it rotates, in connection with the spring D<sup>x</sup>, gives a vibrating motion to the bed-piece B<sup>x</sup>, the teeth of the wheel C<sup>x</sup> raising the bed-piece, and the spring D<sup>x</sup> forcing it down, the bed-piece remaining stationary when the smooth portion *n*<sup>x</sup> of the periphery is passing underneath the bed-piece, and during the time said smooth surface *n* of the wheel C<sup>x</sup> is passing underneath the bed-piece the projection *s* of wheel C<sup>x</sup> acts against the lip *r* at the lower end of the pendant M<sup>x</sup>, and the rear part of the plate F<sup>x</sup> is raised, and space is allowed between the rollers G<sup>x</sup> and E<sup>x</sup> to allow the latter to feed the bar to the anvil. The bar designated by N<sup>x</sup> is fed to the anvil when the cross-head *d* is in line with the hole in the transverse bar or cleat *t*, and the feed-motion is given the bar by turning the shaft J<sup>x</sup> by hand or automatically by gearing from any proper shaft of the machine. As soon as the smooth portion *n* of wheel C has



passed underneath the bed-piece  $B^x$ , and the projection  $s$  of wheel  $C^x$  ceases to act against the pendant  $M^x$ , the spring  $I^x$  causes the roller  $G^x$  to be pressed down, and the bar  $N^x$  is clutched between the rollers  $G^x$   $E^x$  and the feed stopped. The piece of the bar  $N^x$  to form the nail receives several blows from the hammer on the cross-head  $d$  just at the inner side of the head of the nail, and the several dies  $G$  then pass consecutively under the nail, the bar  $N^x$  being raised by the upward movement of the bed-piece  $B^x$  to admit of the dies  $G$  passing underneath it. When the last die  $G$  acts upon the nail the latter is cut off from the bar by the cutter  $K$ , the lever  $J$ , acted upon by spring  $f'$ , throwing the finished nail from the machine. The lever  $J'$ , acted upon by spring  $f''$ , throws the superfluous metal cut off from the point end of the nail out of the machine.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The intermittingly-rotating anvil provided with dies, in connection with the vertical and lateral hammers, and arranged to operate substantially in the manner as and for the purpose herein set forth.

2. The securing of the dies  $G$  in or to the periphery of the wheel  $F$  by means of the dove-

tail groove in the flange  $c$ , to receive one end of the dies, and the buttons or clamps  $C$ , bearing against the opposite ends, substantially as shown and described.

3. Giving the anvil an intermittingly-rotating motion by means of the cam  $C$  and worm-wheel  $D$ , constructed or arranged substantially as set forth.

4. The cutters  $K$   $K'$ , in combination with the intermittingly-rotating anvil, substantially as and for the purpose specified.

5. The vibrating bed-piece  $B^x$ , provided with the roller  $E^x$ , in connection with the plate  $F^x$ , provided with the roller  $G^x$ , the toothed wheel  $C^x$ , having a smooth portion,  $n$ , on its periphery, and the projection  $s$  on said wheel, with the pendant  $M^x$  of plate  $F^x$ , all arranged to operate substantially as and for the purpose set forth.

6. The screw  $K^x$  and worm-wheel  $H^x$ , in combination with the vibrating bed  $B^x$  and the plate  $F^x$ , substantially as and for the purpose specified.

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Witnesses:

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