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MACHINE FOR MAKING HORSESHOE NAILS.

No. 62,322.

Patented Feb. 26, 1867.

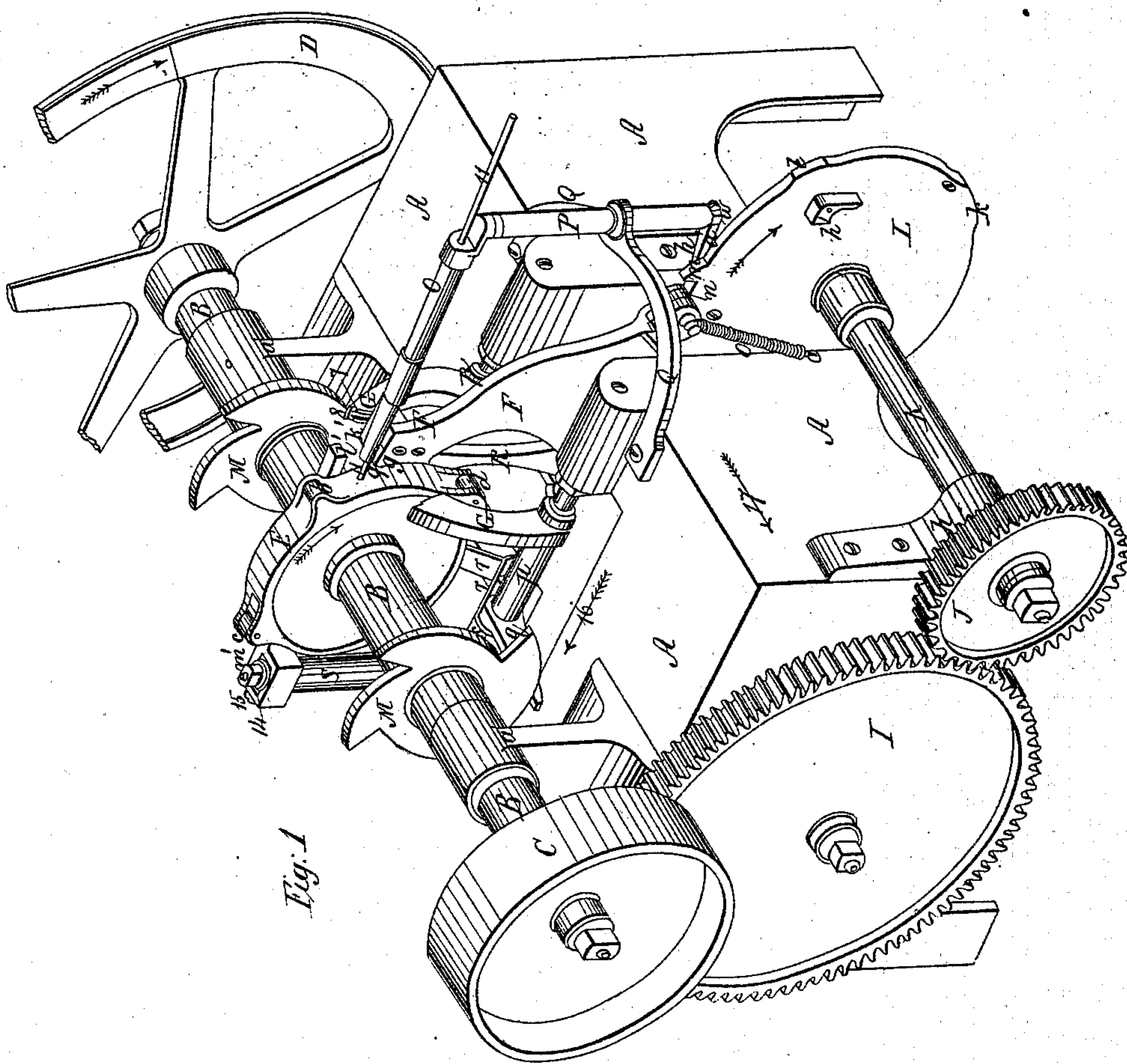


Fig. 1

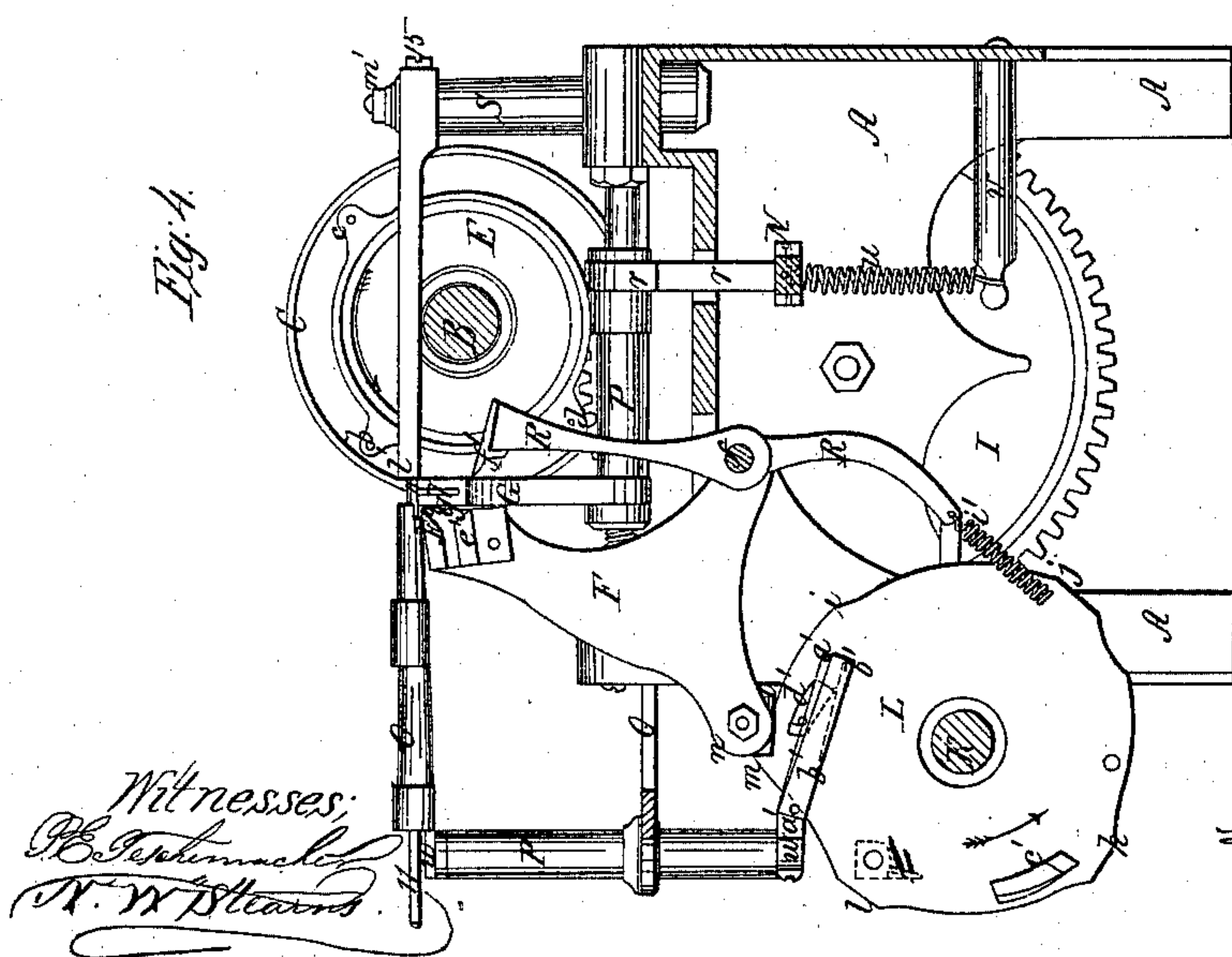
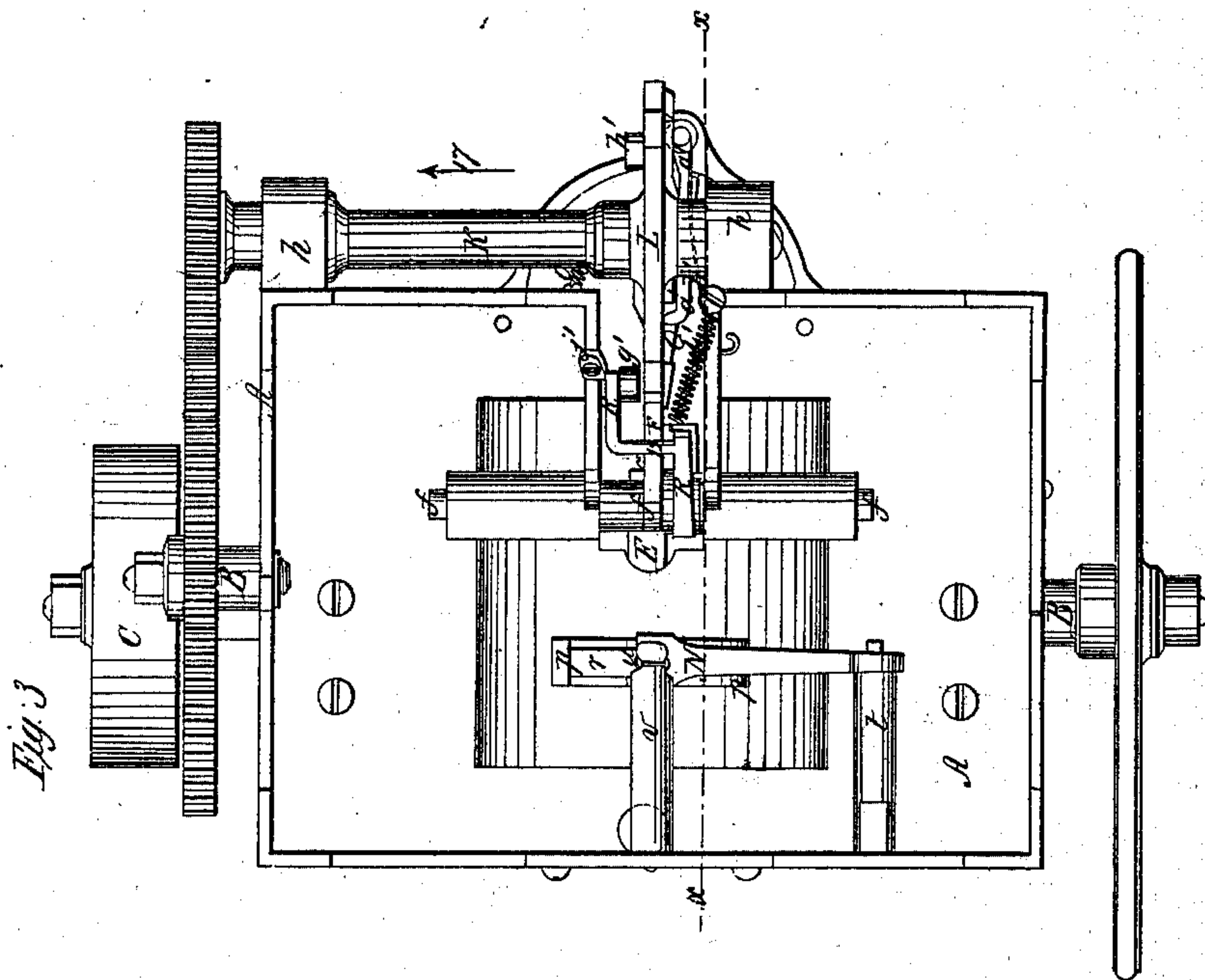
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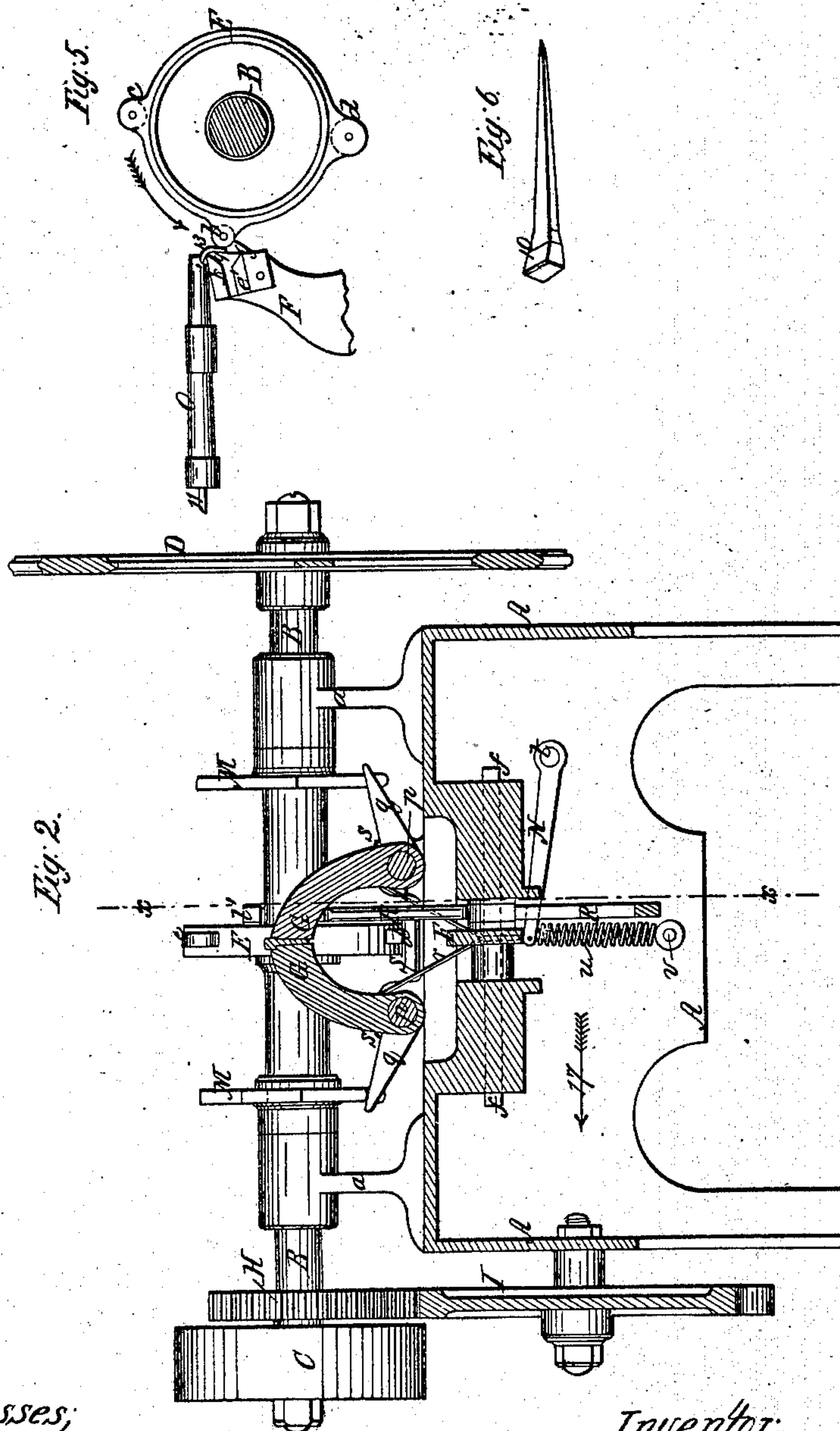




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# United States Patent Office.

LUCIUS H. DWELLEY, OF DORCHESTER, MASSACHUSETTS.

*Letters Patent No. 62,322, dated February 26, 1867.*

## IMPROVEMENT IN MACHINES FOR MAKING HORSE-SHOE NAILS

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, LUCIUS H. DWELLEY, of Dorchester, in the county of Norfolk, and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Horse-Shoe and other Wrought Nails, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of my improved machine.

Figure 2 is a longitudinal vertical section through the same in a plane passing through the centre of the side hammers, looking in the direction of the arrow 16.

Figure 3 is a plan of the under side of the machine.

Figure 4 is a transverse vertical section through the machine, in the direction of the line  $x x$  of figs. 2 and 3, looking in the direction of the arrows 17, the side hammers being open.

Figure 5, detail to be referred to.

Figure 6 is a view of a horse-shoe nail.

In some classes of wrought-nail machines, where the nail is formed in part by revolving friction-rolls of small diameter, it is liable to be elongated to a greater extent than is intended for the amount of stock fed in, thereby producing an imperfectly pointed nail. To remedy this difficulty is the object of my present invention, which consists in forming the nail on two sides by means of a revolving disk furnished with rolls of a gradually increasing diameter, in connection with a vibrating "former," while the alternate sides are formed by means of spring hammers, the end of the blank being cut off, in case it should be elongated sufficiently to extend beyond a predetermined point, by suitable cutters, after which the nail is finished, and then separated from the rod by other cutters, thus enabling me to produce a perfectly pointed nail, of the exact length required, for the amount of stock fed into the machine.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A is the framework of the machine, in suitable bearings  $a$ , rising from which runs the driving-shaft B, which carries at one end the driving-pulley C, and at the opposite end the fly-wheel D. E is a disk, of the form seen in the drawings, which is also secured to the driving-shaft B, and carries a series of rolls,  $b c d$ , of a gradually-increasing diameter, and placed at gradually-increasing distances from the centre of the driving-shaft, around which they are carried, for the purpose of gradually reducing the nail, and thereby preventing the "grain" of the iron from being injured, as will be more fully described hereafter. F is a vibrating "former," pivoted to the framework on a shaft,  $f$ , and against the front face  $g$  of which the nail rod is bent down and drawn out by the rolls  $b c d$ , as the disk E revolves, as seen in fig. 5. I will now describe the manner in which the face  $g$  of this "former" F is advanced and carried back at the required intervals to allow the alternate sides of the nail to be operated upon by the side hammers G, as will be more particularly described hereafter. H is a gear on the driving-shaft B, which gives motion, through the intermediate wheel I, to a gear, J, on the shaft K, which runs in bearings  $h$ , projecting from the side of the framework. This shaft K carries at its inner end the cam-wheel L, on the periphery of which are five projections,  $i j k l m$ , of the form seen in fig. 4, and, with the exception of  $m$ , formed with their faces at equal distances from the centre, around which they are carried. The lower extremity of the "former" F is bifurcated, and carries a friction-roll,  $n$ , which is held constantly in contact with the periphery of the cam-wheel L by means of a spiral spring,  $o$ , one end of which is attached to the framework. It will thus be seen that, as the wheel L is revolved, the projections on its face will strike successively against the roll  $n$ , and vibrate the "former" F into the required position, to act as a support for the nail while being operated upon by the rolls on the disk E, (the face of the "former" forming one side of the nail;) and these vibrations of the "former" take place just previous to the arrival of each of the rolls  $b c d$  opposite to its face  $g$ . As soon as the projections on the wheel L pass from under the roll  $n$ , the "former" F is carried back a short distance by the spring  $o$ , so as to allow the side hammers G to operate on the alternate sides of the nail. These hammers are of the form seen in figs. 1 and 2, and are attached to the horizontal shafts  $p$ , which have their bearings in the framework; and from these shafts project the tappets  $q$ , which are operated by the cams M on the driving-shaft B. These cams have three "beats," and are of such a form (as shown in figs. 1 and 2) as to hold the side hammers open while the finished nail is being cut off, and a



fresh portion of the rod fed in and operated upon by the roll *b*, as will be more fully described hereafter. hammers *G*, when released, are thrown towards each other by means of the straps *r*, of leather, or other suitable material, which are secured to the shafts *p* at *s*, their lower ends being brought together and secured to an arm, *N*, which is pivoted to a stud, *t*, projecting from the inside of the framework; and this arm *N* is drawn down by a spring, *u*, attached to stud, *v*, also projecting from the inside of the framework. The force of the spring *u* is thus transmitted equally, through the arm *N* and straps *r*, to the shafts *P*, thus causing both hammers to strike evenly at the same instant. In the face of each of the hammers *G* is formed a groove, *7*, of a form corresponding to one side of the shank of a finished nail, the head being formed in the groove *8*, which is made by cutting away the upper edge of the hammers so as to leave a space corresponding to the width of the head of the nail; and the upper edge *9* of the "former" *F* is cut away so as to form the inclined side *10* of the head of the nail, fig. 6. The nail is thus operated upon alternately on opposite sides, first by one of the rolls on the disk *E*, in connection with the "former" *F*, and afterwards by the spring hammers *G*, a nail being formed at each revolution of the disk *E*. The nail rod *11* is fed into the machine through a tube or conductor, *O*, the outer end of which is attached to a vertical shaft, *w*, which passes through a hollow post, *P*, supported on arms *Q*, projecting from the framework, and carries at its lower end an arm, *a'*, which is vibrated against the resistance of the spring *b'* by means of the lugs or projections *c' d'* on the side of the wheel *L* as it revolves; and the conductor *O*, with the nail rod, is thus vibrated to one side at the required intervals, for a purpose which will be described hereafter. I will now describe the manner in which the end of the blank is cut off previous to the nail being completed; in case it should "run to length," or be elongated to a greater extent than is intended for the amount of stock fed into the machine. *e'* is a cutter, which is secured to the side of the "former" *F*, and operates in connection with a cutter, *f'*, secured to the upper extremity of a lever, *R*, which is pivoted on the same shaft as the "former" *F*. The lower end of the lever *R* is bent, and carries a roll, *g'*, which is struck by a projection, *h'*, on the wheel *L*, and the lever *R* is thus vibrated against the resistance of a spiral spring, *i'*, by which means the cutter *f'* is carried forward as required. *j'* is a stop, against which the end of the lever *R* strikes, which thus prevents the bent portion *12* from striking against the wheel *L*. The nail rod is carried to one side over the cutter *e'* by the conductor *O* after the blank has been operated upon by the rolls *b* and *c*, and by the side hammers; and any portion which extends below the lower edge of the cutter *e'* is cut off by the cutters *e'* and *f'*, which are operated at the required time, as explained, (the cutter *e'* thus acting as a gauge to determine the exact amount of stock required for the nail just previous to its being completed,) after which the nail rod is carried back by the conductor *O*, and the nail is finished by the roll *d* and side hammers *G*. The cutters *e' f'* may be made adjustable in accordance with the size of the nail to be made, or the stage at which the end of the blank is to be cut off. The finished nail is cut off, and the rod fed forward sufficiently far to form the next nail, in the following manner: *k'* is a knife-edged cutter, which is secured to the side of the "former," and operates in connection with a square-edged cutter, *l'*, placed opposite; and the nail rod is vibrated to one side, to bring it into a line with these cutters, by the conductor *O*, which is moved at the required moment by the lug or projection *d* on the wheel *L*. The "former" *F*, and with it the cutter *k'*, are now moved forward by the projection *m* on the wheel *L* striking the roll *n*, the projection *m* being of such a height as to raise the end of the "former" *F* sufficiently to cause the cutter *k'* to strike the nail rod on the bent portion *13*, (fig. 5,) and carry it forward into contact with the cutter *l'* and thus sever the finished nail from the rod, which then falls down into a receptacle beneath, placed to receive it. The moment the cutter *k'* strikes the rod on the portion *13* it commences to draw it forward through the conductor *O*, until it is arrested by striking the cutter *l'*, the distance which it is thus carried forward leaving a sufficient amount of the rod projecting over the edge *9* of the "former" *F* on its return to form the next nail, as seen in figs. 1 and 4. The bent portion of the rod, against which the cutter *k'* strikes, and by which the rod is drawn forward, thus serves as a handle, and avoids all necessity of employing nippers, dogs, or other devices to grasp the rod when it is to be fed in. As soon as the nail is cut off the projection *d'* passes off the end of the arm *a'*, which is then retracted by the spring *b'*, which causes the conductor *O*, and with it the nail rod *11*, to be carried back to their original position, the projection *m*, at the same time, passing from under the roll *n*, and allowing the spring *o* to draw back the "former" *F* into the position seen in fig. 4. It will thus be seen that the cutter *k'*, in addition to cutting off the nail, also feeds in the rod for the next nail, thus making the machine self-feeding, and economizing labor. The cutter *l'* is attached to a post, *S*, projecting up from the framework by means of a slot, *14*, and nut *m'*, by which means it can be moved further forward or back, by turning a screw, *15*, which passes through the cutter into the end of the post *S*, so as to allow more or less stock to be fed into the machine, as may be desired, the cutter *k'* feeding in the rod until it is arrested by contact with the cutter *l'*; and therefore the greater the distance back of this cutter *l'* the greater the length of rod drawn into the machine for the next nail by the forward movement of the "former" *F*, and *vice versa*, the cutter *l'* thus acting as a gauge to measure the exact length required for the next nail. By thus drawing the nail rod into the machine instead of pushing it in against a gauge, as heretofore, all liability is avoided of bending or "crippling" the rod, and thus varying the amount of stock fed in, an event of frequent occurrence in nail machines as ordinarily constructed. The number of rolls on the disk *E* may be varied, if desired, the movements of the side hammers, "former," and cutters being made to correspond to the number of rolls employed; and if the number of rolls on the disk is increased, the end of the blank may be cut off at such a time as to allow the blank to be operated upon afterwards by two or more of the rolls, and a corresponding number of times by the side hammers. When it is desired to elongate the nail more gradually, the disk *E* is furnished with a greater number of rolls of a larger diameter; and thus, as the number of blows of the side hammers correspond to the number of rolls on the disk, the nail will be operated upon a greater number of times by the side hammers to form its point. It is evident that this machine may be employed to advantage for forging other articles besides nails. I do not therefore limit myself to its use for this purpose alone.



### Operation.

The parts being in the position represented in figs. 1 and 4, and the machine being set in operation, the nail rod, properly heated, is fed in through the conductor O until a sufficient amount to form a nail is projected over the edge 9 of the "former" F. The roll *b* on the disk E now strikes the end of the rod, bending it down, as seen in fig. 5, and pressing it against the face *g* of the "former" F, (which is slightly curved, as seen in figs. 4 and 5,) by which means the blank is drawn down slightly. The projection *i* on the wheel L now passes from under the roll *n*, which allows the spring *o* to draw back the "former" F, and clear its face *g* from the bent portion of the nail rod, which is thus left free to be operated upon by the side hammers G, which are then thrown forward by the spring *u*. These hammers, with their grooves 7 and 8, serve to draw down the nail to a point, and form it on two of its sides. The cams M on the driving-shaft B now commence to depress the tappets *q*, and draw back the hammers G, when the projection *j* on the wheel L passes under the roll *n*, raising it, and moving forward the "former" F as before. The roll *c* (which is of a greater diameter, and set further out from the centre around which it is carried, than the roll *b*) now strikes the nail, and draws it out still further, the roll *c*, on account of its greater diameter, tending to increase the width rather than the length of the nail in a greater measure than the small roll *b*, this tendency increasing with the diameter of the roll. The "former" F is now drawn back as before, and the operation of the side hammers is repeated. The side hammers are now drawn back, the projection *c'* on the wheel L at the same time striking the end of the arm *a'*, and vibrating the conductor O, which carries the nail rod to one side over the cutter *e'*. The projection *k* now strikes the roll *n*, and the "former" F commences to move forward; and at the same time the projection *h'* strikes the roll *g'* on the end of the lever R, which causes the cutter *f'* to move forward to meet the cutter *e'*, and thus sever any portion of the blank which may extend below the lower edge of the cutter *e'*, thus cutting off any excess of length, and preventing the nail from being made of a greater length than is intended for the amount of stock fed in. The projection *c'* now passes off the end of the arm *a'*, and the conductor O, with the nail rod, is returned to its original position by means of the spring *b'*. At the same time the projection *h'* passes off from the roll *g'*, and the lever R and cutter *f'* are drawn back by means of the spring *i'*, while the "former" F is drawn back by the spring *o*, to clear its face from the nail, which is now operated upon by the side hammers G. The "former" F is now carried forward again by the projection *l*, and the roll *d*, of a still greater diameter than the roll *c*, finishes the nail and gives it the required form, the space between the roll *d* and the face of the "former" F being of a width corresponding to the thickness of a finished nail. The "former" F is now drawn back by the spring *o*, so as to clear the nail, and the projection *d'* then strikes the arm *a'*, and vibrates the conductor O and nail rod to one side, into a line with the cutters *k' l'*. The projection *m* on the wheel L now strikes the roll *n*, and rocks the "former" F, causing the cutter *k'* to strike the nail rod on the bent portion 13, and carry it forward until it strikes against the square-edged cutter *l'*, by which it is severed, and the feeding forward of the rod arrested. The height of the projection *m* on the wheel L is such as to cause the "former" F and cutter *k'* to be carried forward sufficiently far to meet the cutter *l'* and sever the nail, when the cutter *l'* is adjusted at its greatest distance from the cutter *k'*. This forward movement of the cutter *k'* thus draws the nail rod forward a distance equal to the exact length required to form the next nail. The projection *m* now clears the roll *n*, allowing the spring *o* to draw back the "former" F; and at the same instant the projection *d'* passes off the end of the arm *a'*, which is then retracted by the spring *b'*, carrying with it the conductor O and nail rod into their original position, the portion of the nail rod which was drawn in by the forward movement of the cutter *k'* being left projecting over the edge 9, when it is struck by the roll *b* as the disk E revolves, and the operation continues as before, the nail being drawn down alternately on opposite sides, first by one of the rolls on the disk E, in connection with the "former" F, and afterwards by the side hammers G; and by thus reducing it gradually all liability of injuring the "grain" of the iron is avoided.

### Claims.

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

1. The combination of the rolls upon the disk E with the former F and hammers G, when so combined and arranged that the blows of the hammers are given between the action of the separate rolls upon the article being wrought, substantially as described.
2. I also claim cutting off a portion of the blank, previous to the nail being finished, by means of the cutters described, and for the purpose set forth.
3. I also claim the combination of the cams M, hammers G, and cutters *k' l'*, when such cams are so formed as to hold the hammers apart and out of action when the cutters sever the nail from the rod.
4. I also claim vibrating the conductor O by means of the arm *a'* with its spring *b'*, operated by the projections *c' d'* on the wheel L, substantially as described.

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Witnesses:

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