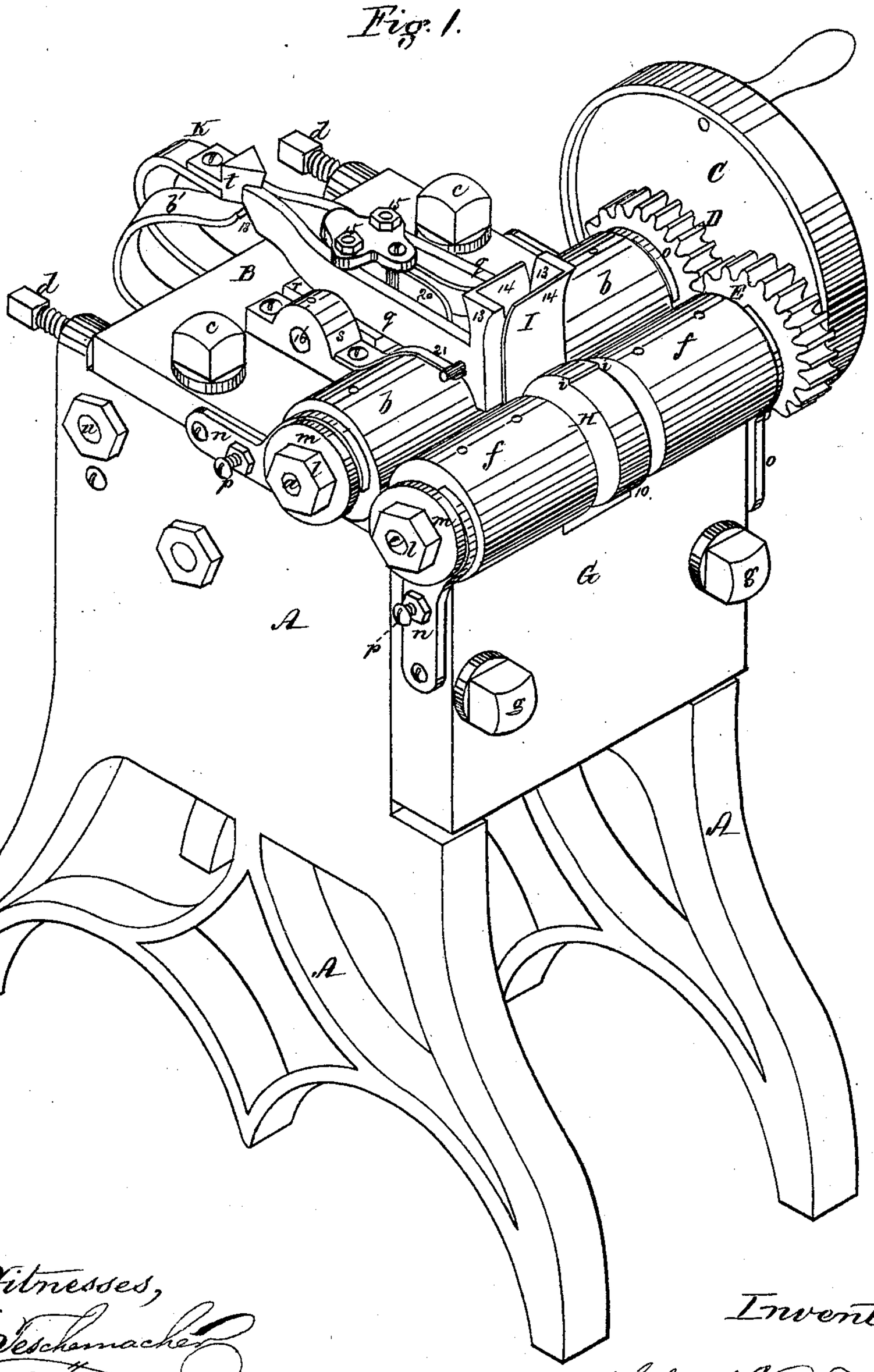
3 Sheets--Sheet 1.

S. S. PUTNAM.

Machines for Finishing Horseshoe Nails.

No. 144,922. Patented Nov. 25, 1873.

Fig. 1.



Witnesses,
P. C. Teschemacher
W. J. Cambridge

Inventor,
Silas S. Putnam

3 Sheets--Sheet 2.

S. S. PUTNAM.

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Fig: 2.

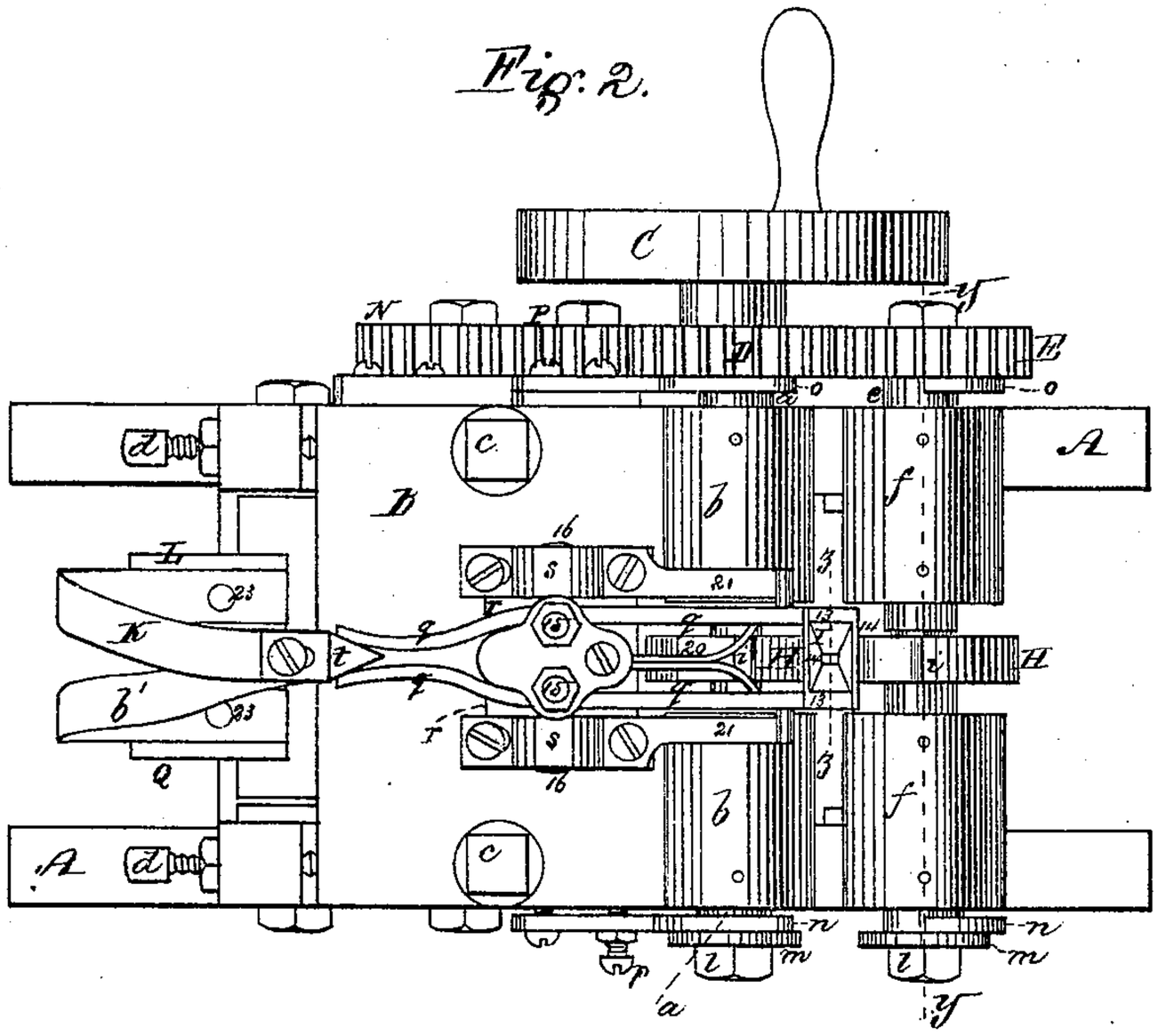


Fig: 4.

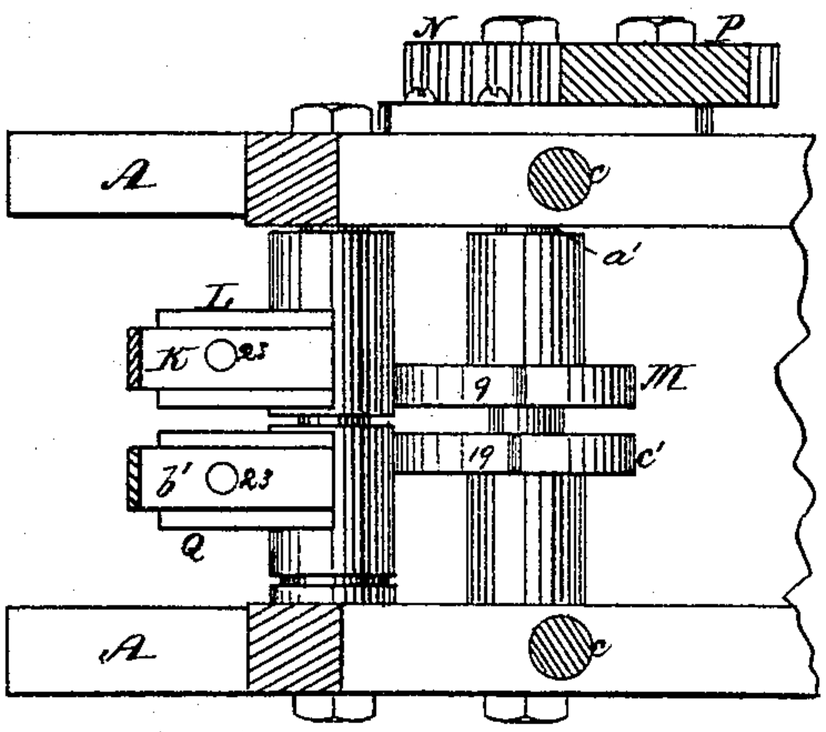
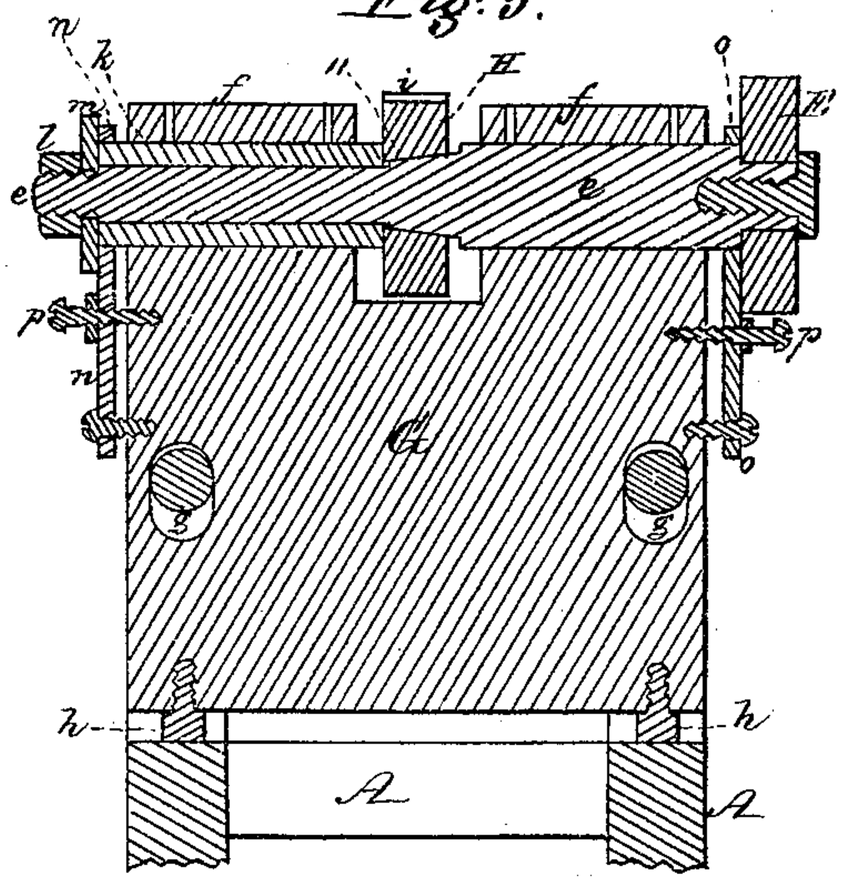


Fig: 5.



Witnesses,
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3 Sheets--Sheet 3.

S. S. PUTNAM.

Machines for Finishing Horseshoe Nails.

No. 144,922. Patented Nov. 25, 1873.

Fig. 3.

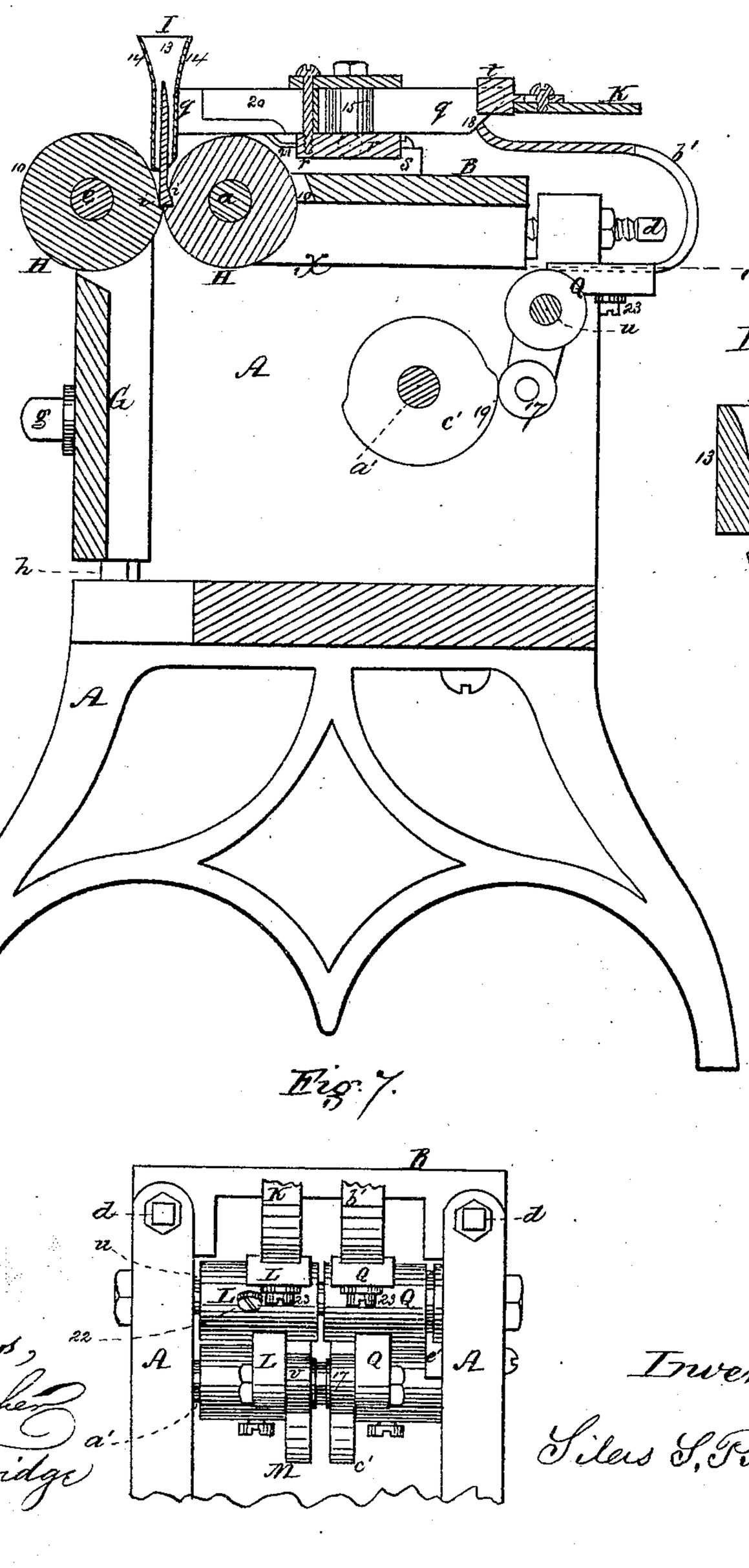

Fig. 6.

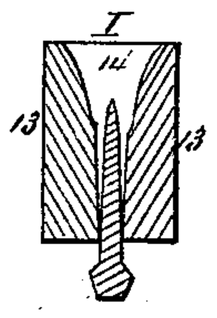

Fig. 7.

Witnesses,
P. C. Teschemacher
W. J. Cambridge

Inventor,
Silas S. Putnam

UNITED STATES PATENT OFFICE.

SILAS S. PUTNAM, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR FINISHING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **144,922**, dated November 25, 1873; application filed May 31, 1873.

To all whom it may concern:

Be it known that I, SILAS S. PUTNAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented a Machine for Rolling and Reducing the Thickness of Forged Horseshoe-Nails, whereby they are condensed and hardened to render them stiff and fit for driving, 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 a machine constructed in accordance with my invention. Fig. 2 is a plan of the same. Fig. 3 is a longitudinal vertical section through the center of the same. Fig. 4 is a horizontal section on the line *x x* of Fig. 3. Fig. 5 is a vertical section on the line *y y* of Fig. 2. Fig. 6 is a section on the line *z z* of Fig. 2. Fig. 7 is a rear elevation of a portion of the machine.

The ordinary forged horseshoe-nails do not possess sufficient stiffness to prevent them from bending while being driven, in consequence of which it has been customary for blacksmiths to hammer them on their anvils previous to driving, in order to condense the iron, and thereby harden and stiffen the nails.

My invention has for its object to produce a machine for performing this labor, heretofore done by hand, and at the same time reduce the nails to a proper and uniform thickness; and consists in a conductor formed of two movable clamping portions operated by suitable mechanism, and a pair of flat-surfaced rolls having depressions extending entirely across their faces to admit the head of the nail, a portion of the surface of each roll being eccentric, so that as the rolls revolve the width of the space between the two will gradually contract to correspond with the desired taper of the nail as it passes through, whereby it is condensed and hardened, and rendered stiff and fit for driving. My invention also consists in a device for securing the rolls upon their shafts, whereby they may be readily adjusted thereon.

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 represents the frame-work of the machine, and *a* the driving-shaft, which runs in boxes *b* attached to or forming a part of the top plate B, which is held in place by screw-bolts *c*, passing through slots, and is made adjustable, horizontally, by screws *d*. To the driving-shaft *a* is attached the driving-pulley C, and a gear, D, which engages with another gear, E, on a shaft, *e*, which runs in boxes *f* attached to or forming part of an adjustable plate, G, which is secured in place by screw-bolts *g* passing through slots, and is moved vertically by means of screws *h*. To each of the shafts *a e*, at or near its center, is secured a roll, H, provided with a depression or shoulder, *i*, extending entirely across its surface, these depressions, as they come together, forming a recess to receive the head of the nail. A portion of the surface of each roll, from the depression *i* to the point 10, is made eccentric, so that as the rolls revolve together the space between the two will gradually contract to conform to the desired taper of the nail. The width of this space is, however, less than that of the corresponding portion of the nail after it is forged, and, consequently, as the nails are drawn down between the rolls they are reduced in thickness and slightly elongated, which operation serves to condense, smooth, and harden the iron, so as to render the nail stiff and fit for driving, thus avoiding the necessity of hammering it previous to use, as has heretofore been necessary. The nail is purposely left a little narrow by the forging-machine, so that the slight lateral spread which it receives will give it the exact width required for the finished nail. The remaining portion of each roll from the point 10 to the depression *i* is made concentric, so that their surfaces will revolve in contact with each other, or nearly so, from the time the point of the nail has been acted upon until the depressions are brought opposite each other to receive the head of another nail. The depression *i* of the roll attached to the shaft *a* is of a greater depth than the depression in the opposite roll, and of somewhat different form, these depressions being made to correspond to the form of the opposite sides of the head of the nail, which is slightly reduced in thickness in its passage between the rolls. Instead of each roll having a depression, *i*, as

shown, one roll only may be provided with a depression of sufficient size to admit the head of the nail. I prefer, however, to have each roll provided with a depression, as shown, as the surface-motion of both rolls is then equal, and a better effect is produced.

Rolls constructed as above described, with depressions extending entirely across them from side to side, present many advantages over those having dies cut in their surfaces, for the reason that when worn out of shape they can be readily ground and rendered true at a very trifling cost; whereas, when a die becomes worn, it has to be recut, which is quite expensive; furthermore, the first cost of the roll is not so great, as the shape can be produced by grinding without first taking the temper out of the roll, and then retempering, as is necessary in cutting a die; and when the depression extends across the roll, as shown, there is no necessity for a nice lateral adjustment, as is required to bring the dies of the two rolls exactly in line.

Each of the rolls is forced onto a tapering portion, 11, of its shaft, by a sleeve, *k*, which revolves within its box, and is held firmly up against the roll by a screw-nut, *l*, bearing on a washer, *m*, by which construction the roll is confined tightly upon its shaft without any liability of slipping, while it can readily be removed when occasion requires, or adjusted around its center so as to bring its depression *i* exactly opposite to that of the other roll. The shafts *a e* and rolls H attached thereto are adjusted laterally by means of hooked plates *n n o o*, the plates *n* bearing against the inner sides of the washers *m* and the plates *o* against the inner sides of the gears D E, the distance of these plates from the sides of the frame A being regulated by screws *p*. By adjusting the sliding top plate B by means of the screws *c d* the distance apart of the rolls H may be varied, while their relative height may be adjusted by moving the sliding plate G by means of the screws *h*.

I will now describe the mechanism which seizes the forged horseshoe-nail and delivers it to the rolls H. I is a conductor, into which one nail at a time is dropped with the head downward, the inclined side of the head of the nail being inward, so as to fit into the correspondingly-shaped depression *i* in the inner roll H. This conductor is formed of two separate portions, 13, the inner side of each of which is made flaring at the top and inclines down slightly toward the opposite portion, as seen in Fig. 6, and each of these portions is provided with a side piece, 14, which is so placed as to slide against the side of the opposite portion, 13. Each of the portions 13, with its side piece, is attached to a lever, *q*, which is pivoted vertically at 15 to a block, *r*, which is provided with gudgeons 16 resting in boxes *s* attached to the top plate B. The rear portions of the levers *q* are curved as seen in Fig. 2, and their ends flare outward to admit the point of a wedge, *t*, which is attached to a stiff, curved spring-arm, K, the lower end of which is secured to a bell-crank, L, which is placed on a shaft, *u*, and rocks therewith, its lower arm carrying a roll, *v*, which rests against the edge of a cam, M, on a shaft, *a'*, to which is attached a gear, N, which is revolved by an intermediate gear, P, which engages with the gear D on the driving-shaft *a*, and thus, as the cam M is revolved, its projecting portion 9 strikes the roll *v* and rocks the bell-crank L, thus advancing the wedge *t*, which separates the rear ends of the levers *q*, and causes the two portions of the conductor to approach each other and gripe the sides of the nail, as seen in Fig. 6, which takes place immediately after the head of the nail has dropped into the recess formed by the two depressions *i* in the rolls H. As the wedge advances the two portions of the conductor are brought nearer together, so as to close upon the tapering sides of the nail as it is drawn out of the conductor by the revolution of the rolls H. This drawing of the nail against the inner sides of the conductor, which gripe it tightly during the operation, serves to straighten it if crooked, and also keep it straight while passing through the rolls, which would otherwise be likely to bend it. As soon as the nail is seized by the movable sides of the conductor I, the latter is suddenly carried down with a movement faster than the surface motion of the rolls by the rocking of the levers *q*, on the gudgeons 16, whereby the head of the nail is forced down to the bottom of the recess formed by the depressions *i* on the rolls H, thus insuring the proper grasping of the nail thereby. The levers *q* are rocked at the proper time to depress the conductor I by means of a stiff spring-arm, *b'*, attached to a bell-crank, Q, which is provided with a friction-roll, 17, and is rocked on the shaft *u* by a cam, *c'*, similar to the cam M, and also secured to the shaft *a'*. The upper end of the arm *b'* bears against the inclined ends 18 of the levers *q*, and thus, as it is advanced by the action of the projecting portion 19 of the cam *c'* on the roll 17, the levers *q* are rocked as required. The two portions of the conductor I are separated to receive a fresh nail by means of a spring, 20, which spreads the front ends of the levers and forces back the wedge *t* into the position seen in Fig. 1 as soon as the projecting portion 9 of the cam M passes out of contact with the roll *v*, and simultaneously therewith, or nearly so, the conductor I is raised by means of two springs, 21, attached to the boxes *s*, and bearing against pins on the outer sides of the levers *q*, the rise of the levers taking place as soon as the projecting portion 19 of the cam *c'* has passed out of contact with the roll 17. The cams M *c'* may be so adjusted upon the shaft *u* as to cause the nail to be griped by the conductor and carried down thereby at any desired time. A sufficient amount of tension is put upon the spring-arm K when advanced to cause a nail of less than ordinary width to be firmly grasped between the sides of the

conductor, while the spring-arm will yield when a nail of greater width is seized; and a tension is also put upon the spring-arm b' when advanced so as to insure the proper holding down of the conductor I. The bell-crank L is secured to the shaft u by a screw, 22, which admits of its being adjusted as required to allow of the wedge t being brought into an exactly central position to operate equally on both levers q, and the bell-crank Q is prevented from moving laterally upon the shaft u by a plate, e', secured to the framework and fitting into a groove formed in the central portion or hub of the crank. The arms K b' are secured to their bell-cranks by screws 23 passing through slots, whereby the arms can be adjusted as desired.

I do not confine myself to the use of the wedge t and inclines 18 for producing the required movements of the levers q, as it is evident that some other mechanical equivalents may be employed for this purpose.

From the foregoing it will be seen that by the use of the above-described machine I am enabled to condense and harden forged horseshoe-nails so as to render them stiff and fit for driving, and at the same time smooth, straighten, and reduce them to a uniform thickness, thereby materially increasing their market value and dispensing with the tedious operation of hammering each nail by hand previous to using, as has heretofore been necessary.

I do not claim a pair of rolls for drawing down a blank to form a horseshoe-nail, as this is shown and described in Letters Patent of the United States granted to myself and L. H. Dwelley, March 5, 1867; but

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

1. The combination of the rolls H H and a conductor, I, formed of two movable clamping portions, operated by suitable mechanism, as set forth.

2. In a nail-finishing machine, the sleeve K and screw-nut l, in combination with the shaft a or e with its tapering portion 11, the boxes $f\,f$, and the roll H, all constructed and operating substantially as and for the purpose described.

Witness my hand this 26th day of May, A. D. 1873.

SILAS S. PUTNAM.

In presence of—

P. E. TESCHEMACHER,

W. J. CAMBRIDGE.