

(No Model.)

3 Sheets—Sheet 1.

S. SHEPHERD.

BOOT AND SHOE NAILING MACHINE.

No. 272,486.

Patented Feb. 20, 1883.

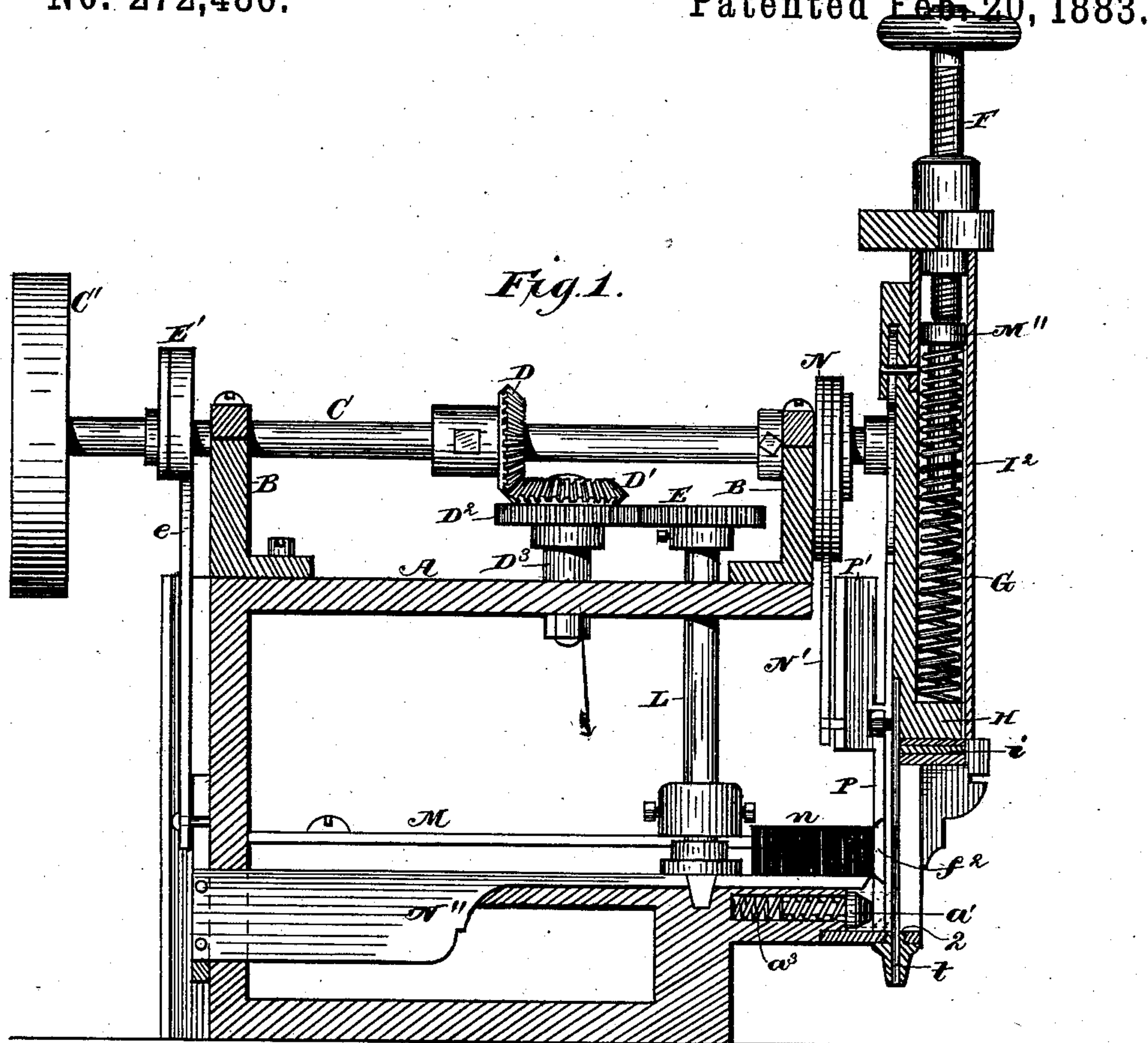


Fig. 5.

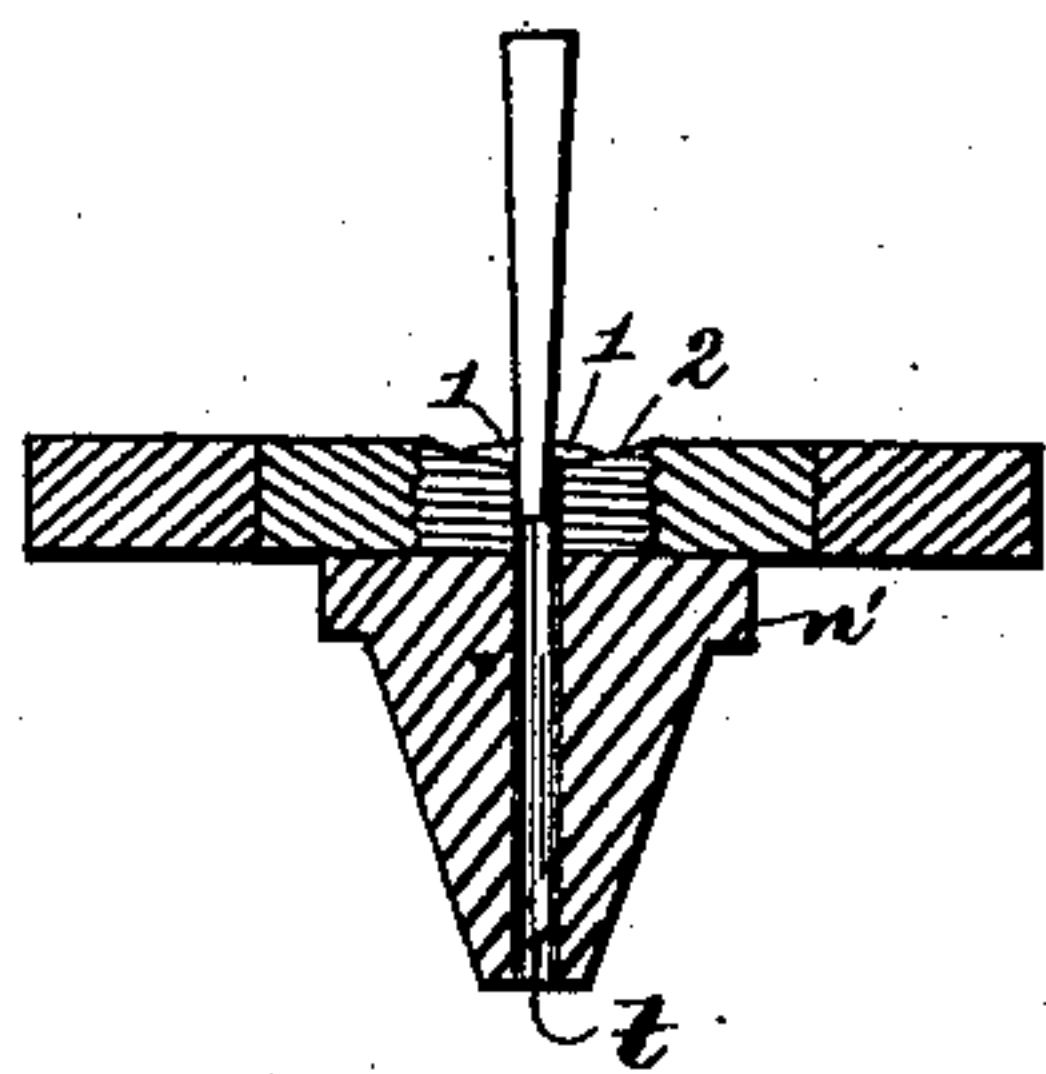


Fig. 6.



Fig. 7.



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Fig. 2.

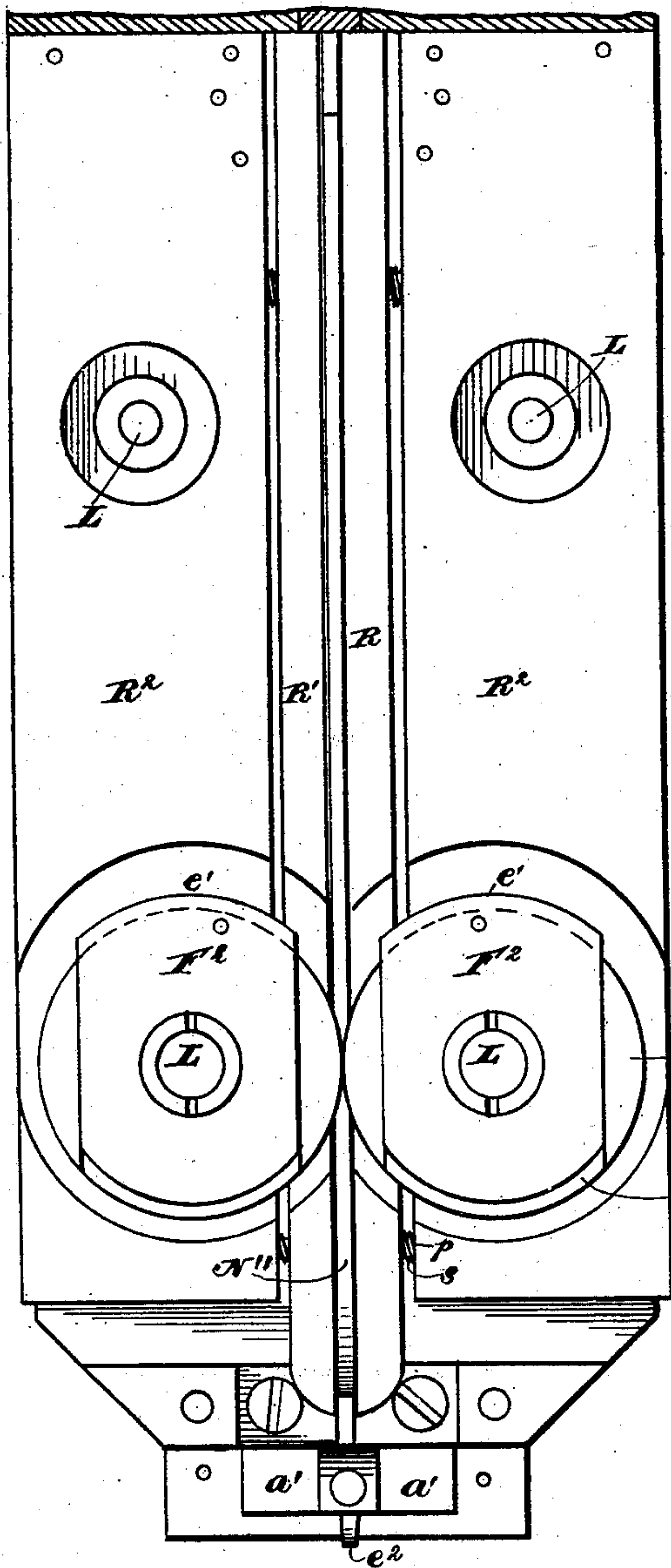


Fig. 8.

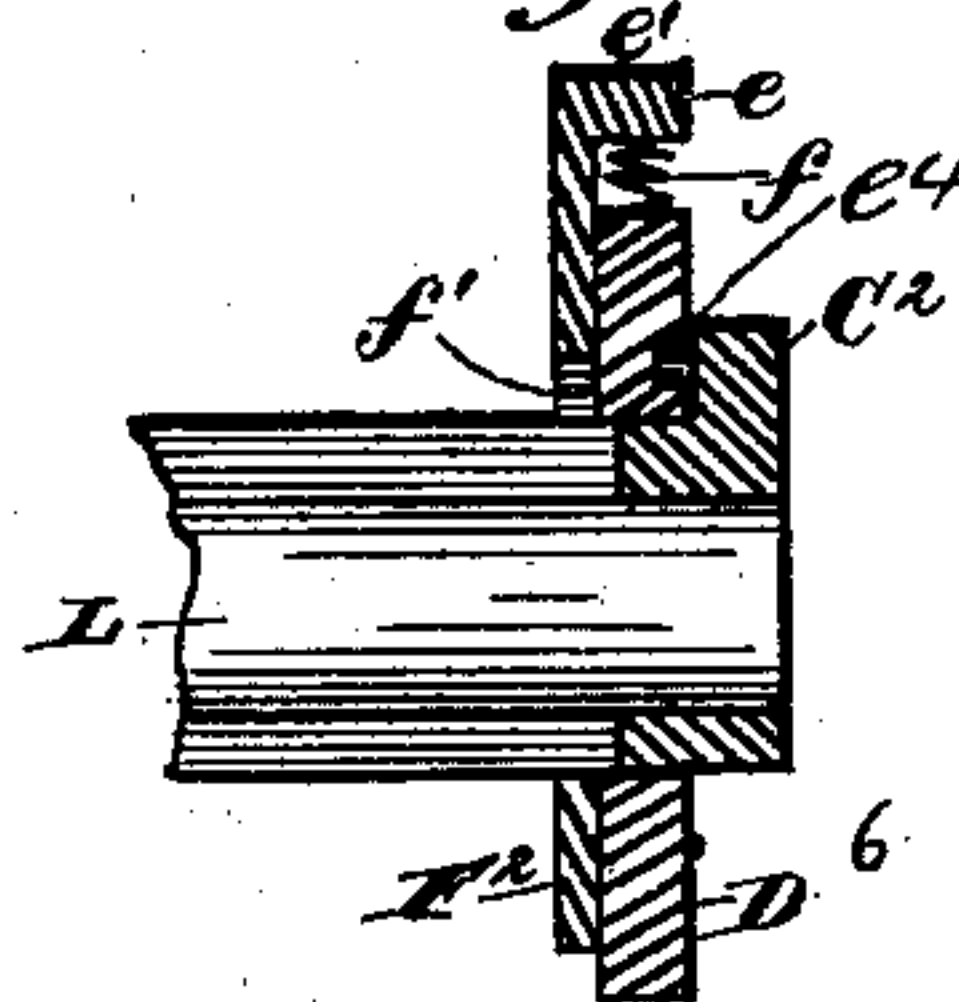


Fig. 9.

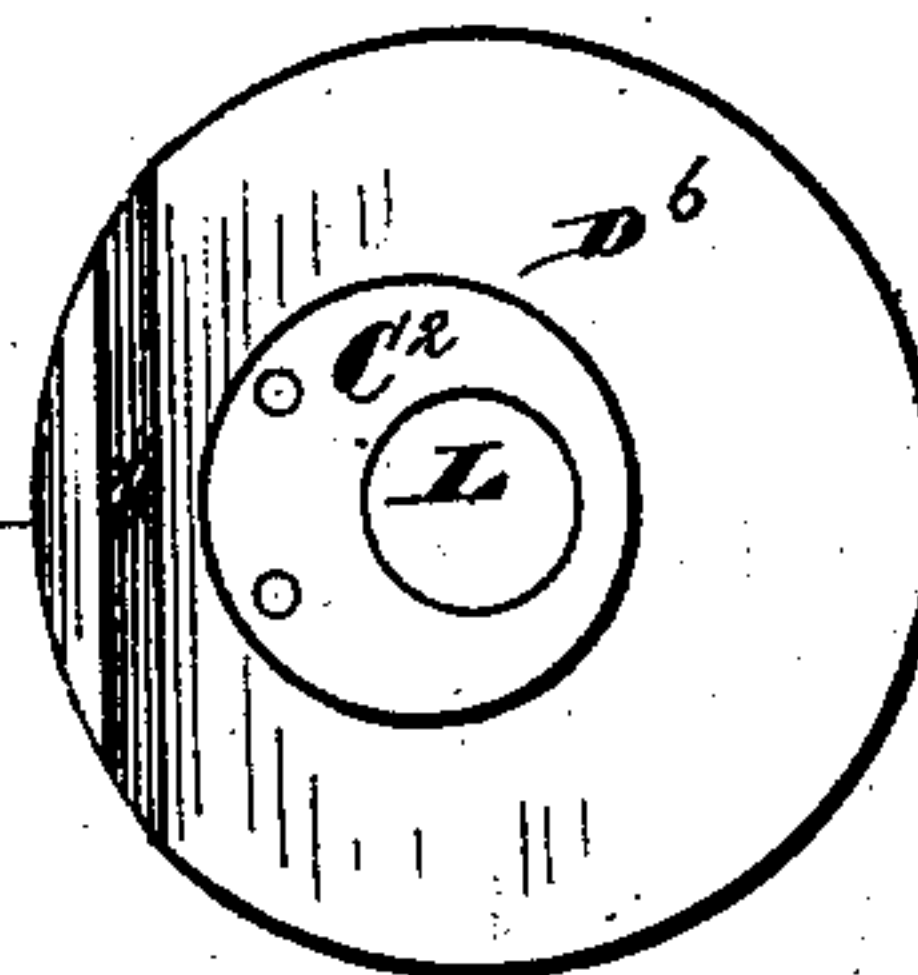


Fig. 10.



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Fig. 3.

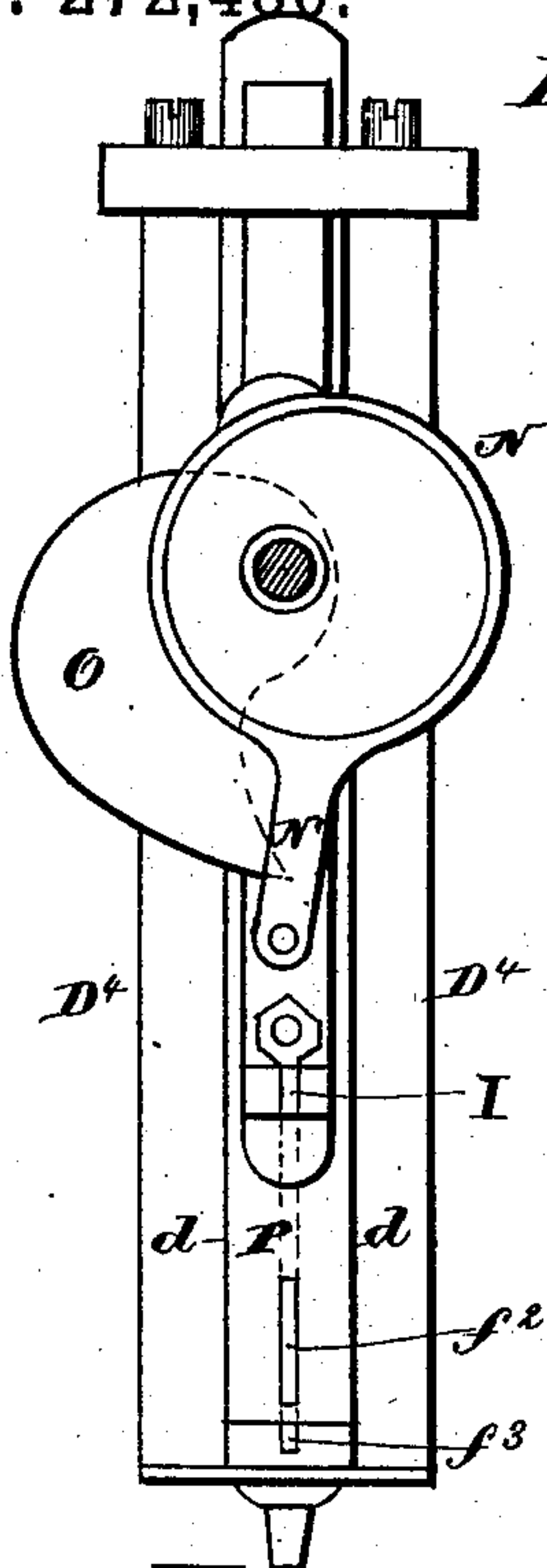


Fig. 4.

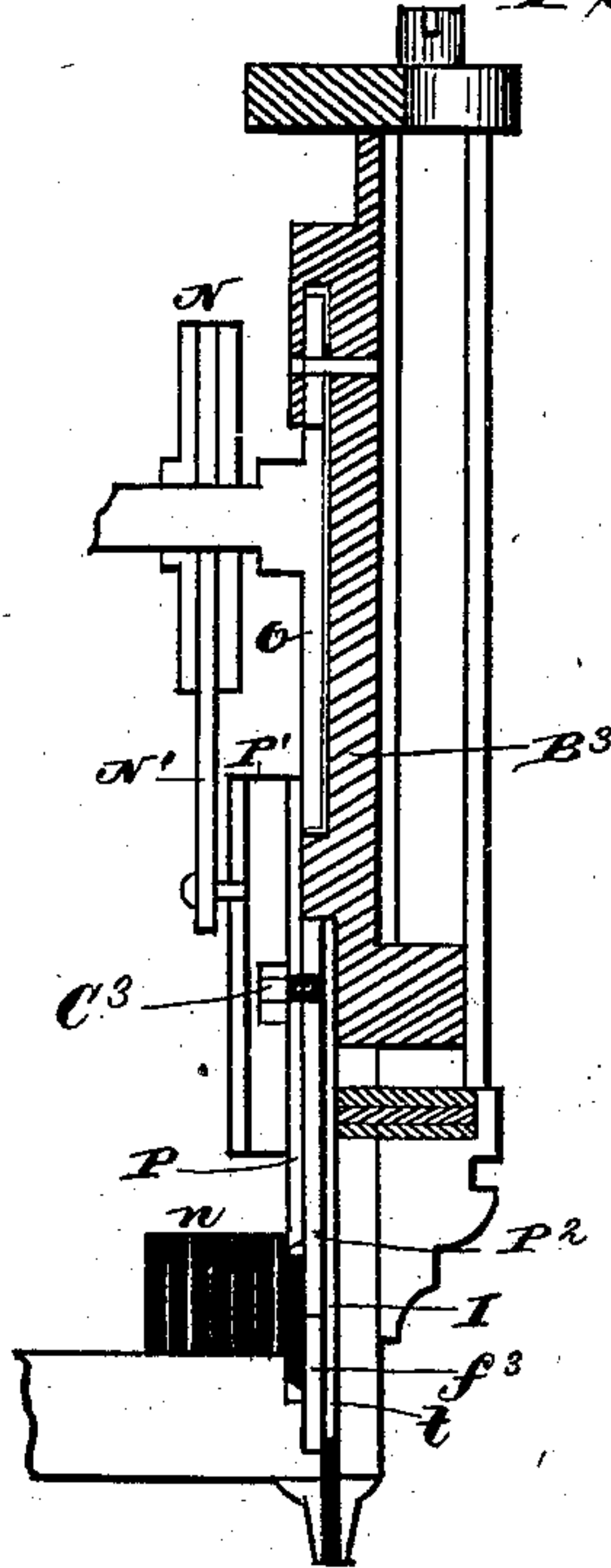


Fig. 11.

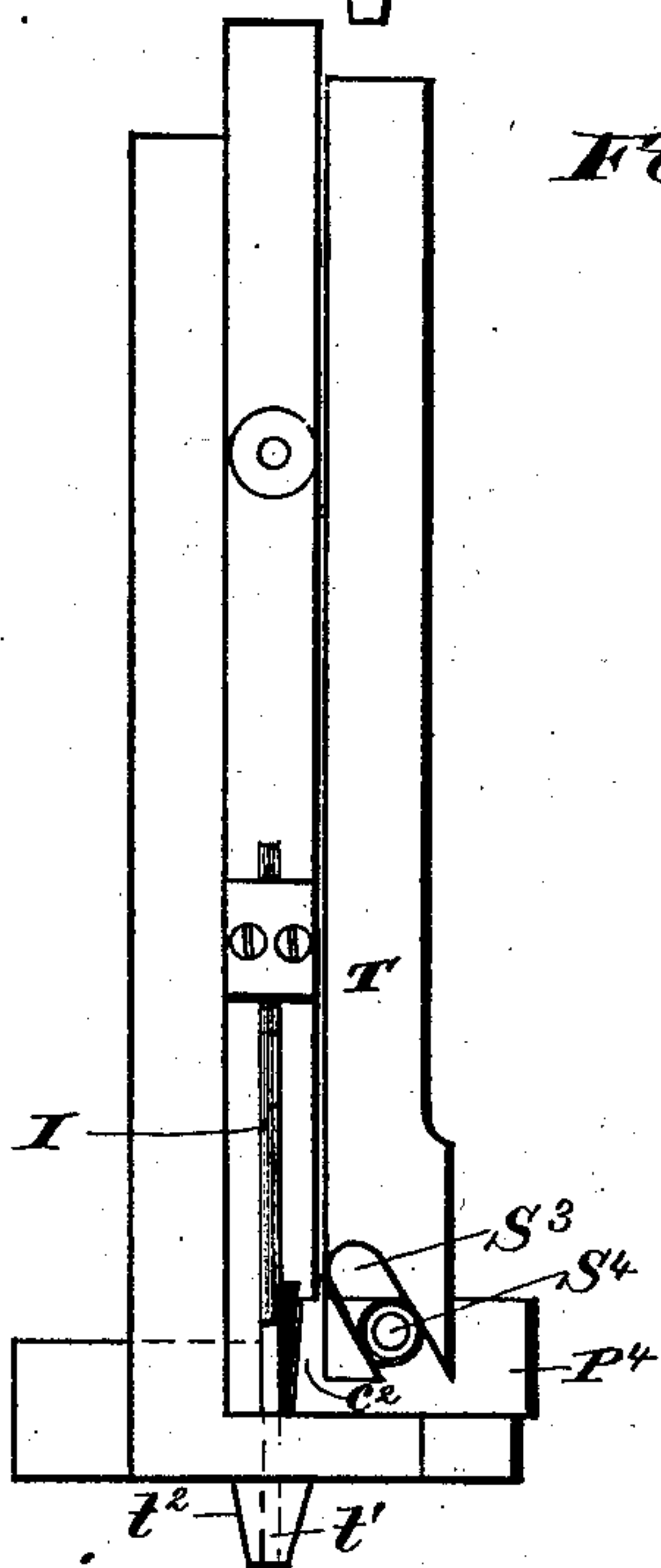
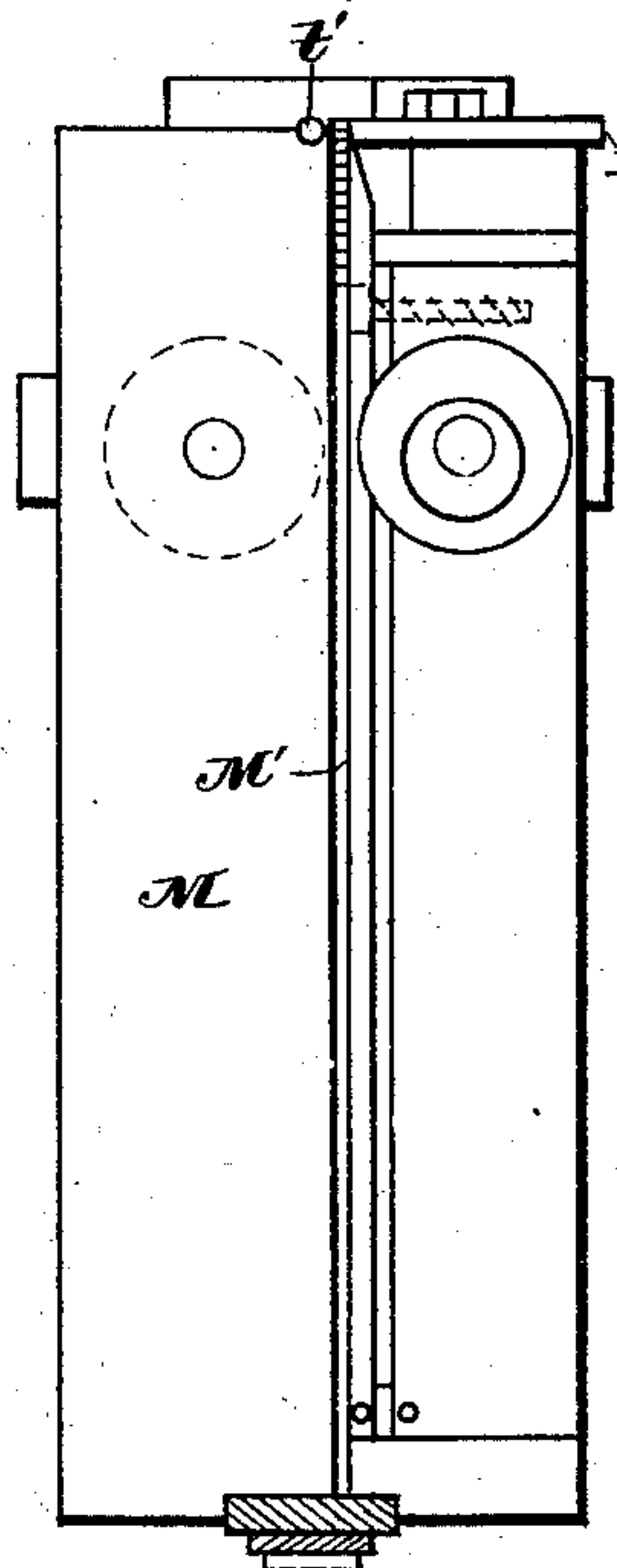


Fig. 12.



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UNITED STATES PATENT OFFICE.

SAMUEL SHEPHERD, OF NASHUA, NEW HAMPSHIRE.

BOOT AND SHOE NAILING MACHINE.

SPECIFICATION forming part of Letters Patent No. 272,486, dated February 20, 1883.

Application filed July 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL SHEPHERD, a citizen of the United States, residing at Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Machines for Nailing Boots and Shoes, of which the following is a specification.

The object of my invention is to provide, in connection with automatic mechanism for setting up a string of headless nails, such as are used for nailing boots and shoes, improved means for feeding said string of nails toward the driving mechanism and apparatus for separating the individual nails from the string and driving them successively.

To this end my invention consists in certain improvements upon the apparatus patented to me the 24th day of May, A. D. 1881, No. 242,061. These improvements relate more particularly to the feeding and separating mechanism, the devices for setting up the string of nails being substantially the same as those shown in my said Letters Patent, and therefore not shown in this application.

Referring to the drawings, Figure 1 is a central longitudinal vertical section. Fig. 2 is a plan view, the plates being removed to show the parts beneath them. Fig. 3 is an elevation of the parts shown in Fig. 4, taken from the rear of the machine. Fig. 4 is a vertical central section of the parts shown in Fig. 3. Fig. 5 is a detail view of the die placed in the throat of the machine, through which the nails pass, under the driver. Figs. 6 and 7 are detail views of modified forms of said die. Fig. 8 is a central vertical section taken through one of the cam-shafts in Fig. 2, and showing one portion of the feeding mechanism. Fig. 9 is a view of the under face of the device shown in Fig. 8. Fig. 10 is a side elevation of a part of the separating mechanism detached. Fig. 11 is an end elevation, showing a modified form of separating apparatus. Fig. 12 is a plan view of the parts shown in Fig. 11, together with part of the advancing or feeding mechanism.

In order to clearly understand the nature and object of this invention, reference must be made to the specification of my former patent, No. 242,061, in which the form of the nail, together with the automatic mechanism for

setting up a string of said nails, is fully shown and described. In that invention the nails, as they were separated successively from the advancing string of nails, were thrown into the throat of the machine, wherein they dropped by their own gravity until they rested upon the sole of the boot being nailed, in position to be struck by the plunger.

In the invention now under consideration it is my purpose to separate the nails from each other by positive mechanism, and to hold each nail in the grasp of said mechanism during every step of the distance through which it travels, whereby the supply of nails to the driver and the position or "set" of each shall be accurately controlled.

In the drawings annexed hereto, A indicates the frame of the machine, B B being angle-plates attached thereto as supports for the bearings of the main shaft C, which is driven by a suitable pulley, C'. D is a miter-gear keyed on said shaft, and meshing with a second miter-gear, D', mounted upon a stud-bearing, D². Said gear carries a pinion, D², meshing with a pinion, E, whereby motion is given to the vertical shaft L. By means of a second pinion meshing with E, rotary motion in an opposite direction is given to a second and similar shaft, which is placed directly opposite to the shaft L. The lower ends of said shafts have bearings in the floor of the machine, and a cam is placed upon each, whereby motion is imparted to a pair of finger-bars, R R'. (See Fig. 2.) Said cams are shown at C², Figs. 8 and 9. The construction and operation of these parts are substantially the same as that shown in my former patent named above, the movement of the finger-bars R R' being such as to carry the nails standing in the raceway, as shown in Fig. 1, forward and toward the driving mechanism. These nails, which are indicated in the drawings by the reference-letter *n*, as they enter the raceway M', Figs. 1 and 12, in which they are automatically set up by the mechanism shown in my former patent, pass between the finger-bars R R', which are arranged just beneath the plates M, by which the raceway is formed. The nails *n* are supported in the race by their wedging sides, which abut against the edges of the plates M, at such a point that about one-fourth ($\frac{1}{4}$) the length of

said nails projects above the plates and three-fourths ($\frac{3}{4}$) below them. Allowing for the thickness of the raceway-plates, it is evident that the finger-bars will grasp the nails, as they hang in the race, at a point not far from the middle of said nails. The arrangement and operation of these finger-bars $R R'$ are shown and described in my former patent of May 24, 1881. Being actuated by the cams C^2 , they are brought toward each other and against the string of nails, which is grasped between them. While thus holding the string of nails they move a short distance toward the front of the machine and then separate, releasing the nails and moving back to take a fresh grasp of the nails and advance them another step forward. Each finger-bar is mounted upon and carried by a plate or carrier bar, R^2 , being connected therewith by a pin, p , passing through the finger-bar and into the carrier, and having a spring, S , coiled upon it and interposed between the finger and the carrier. (See Fig. 2.) These springs allow the fingers to yield when the nails are grasped between them. Each carrier R^2 is actuated by a cam, C^2 , mounted on and carried by a vertical shaft, L , at or near each end of each carrier. Up to this point my invention is not substantially different from that shown and covered by my patent already alluded to. I will now describe in what my present improvements consist.

Just above the cam C^2 , and carried by the same shaft, L , is placed a disk, D^6 , Figs. 2, 8, and 9, which is caused to rotate with the shaft by a pin, e^4 , Fig. 8, on the cam C^2 , which engages with said disk. A portion of the upper face of each disk is cut away to form a recess, E^2 , Fig. 2, in which is fitted a plate, F^2 . The ends of this plate are rounded to coincide with the periphery of the disk D^6 , and upon one end is formed a flange, e , projecting downward over the edge of the disk, between which and said flange are placed one or more springs, f , which push the flange away from the edge of the disk, but are adapted to yield to pressure upon its periphery e' and permit the plate F^2 to slide in the channel E^2 . To permit this motion the central orifice in the plate, through which the shaft L passes, is elongated, as shown at f' , Fig. 8.

To permit the rotation of the disks D^6 and the action of the plates F^2 without interfering with the operation of the finger-bars R and R' , a circular depression is formed in the carrier-plates R^2 and a corresponding portion of the finger-bar on each side is cut away, so that the upper surfaces of both shall be flush with the upper surface of the disk D^6 and plate F^2 .

After a string of nails is set up in the manner described in my former patent, they hang in the raceway by their wedging sides coming into contact with the plates forming said raceway. Here they are fed toward the forward end of the machine by the intermittent action of the finger-bars $R R'$, which grasp the nails between them, carry them forward a distance

nearly equal to the throw of the cams which operate said finger-bars, and there leave them, while said fingers are retracted to repeat the operation.

In order to prevent the nails wedging in the raceway, a lifter, N'' , is placed directly beneath their points, and between each feed movement of the fingers it is raised by a cam, E' , and pitman e just far enough to ease the nails in the raceway without throwing them out.

The feed derived from the fingers $R R'$ being intermittent, it is desirable to impart to the nails, especially as they approach the separating and driving mechanism, a more uniform and continuous movement. It is for this purpose that I employ the disks D^6 , with their plates F^2 . These plates are so arranged that their peripheries e' , which register with each other, rotate within the vertical plane of the raceway, and therefore bear against the opposite sides of the nails passing between their peripheries e' . Their rotation is toward the forward end of the machine, and their action upon the nails begins before the latter are grasped by the finger-bars and continues after the nails are released by them. As the nails reach the point where they enter between the curved faces e' of the slide-plates F^2 they are gripped between said faces and carried by the rotation of the plates steadily toward the front of the machine, being held between said plates with a yielding contact, owing to the springs f , but with sufficient force to produce the required movement. As the nails reach the forward end of the raceway it is necessary to take them one by one, separate them from the string of nails in which they stand, and place them individually beneath the driving mechanism. In the present invention I accomplish this separation by means of a vertically-reciprocating slotted plate, having the plate of such thickness and the slot of such size as to receive a single nail only. This plate is shown at P , Figs. 1, 3, and 4. It is operated by a ring-cam, N , on the main shaft, and an arm, N' , which is pivoted to a projecting portion of the plate. When the shaft C revolves, the plate P will rise and fall, sliding in ways $d d$ upon the uprights D^4 . (See Fig. 3.) It stands against the ends of the raceway-plates M and closes the raceway, except as to a vertical slot, f^2 , formed in said plate. This slot is so located that when the plate has been raised the forward nail in the string may enter it, being pushed therein by the pressure of the nails behind, which are fed forward by the feeding-disks and finger-bars. The plate P being of the thickness of the nail and having a solid plate lying behind it, no more nails can enter its slot until the latter is emptied.

Directly in front of the plate P stands a second plate, P^2 . (See Figs. 3 and 4.) At the extreme lower end of the latter is formed a slot, f^3 , in the same vertical plane with the slot f^2 , and so arranged that when the plate P is dropped to its lowest point the slot f^2 will

coincide with the slot f^3 , the plate P^2 being immovable.

Beneath the lifter N'' is placed an ejector, a' , which is moved in one direction by spiral springs a^3 , set in apertures in the machine-frame and bearing against the ejector. (See Figs. 1, 2, and 10.) The latter is a piece of metal having a point, e^2 , of such thickness that it will enter the slot f^2 in the plate P , as well as pass through the slot f^3 in the plate P^2 . This point e^2 is beveled off at top and bottom, as shown in Figs. 1 and 10. As the spiral springs a^3 constantly force the ejector forward, the beveled point enters the slot in the plate P as often as said plate descends, and brings the slot opposite it. The movement of the ejector being in a horizontal plane, the ejector presses against the solid face of the plate P until the lower end of the slot f^2 , with the nail resting in it, comes opposite the point of the ejector. The point e^2 being beveled, its lower inclined edge will slide upon the bottom of the slot f^2 as the latter descends, and the ejector will therefore enter the slot gradually, striking the point of the nail, first pushing it out of the slot f^2 in the separating-plate P , into and through the slot f^3 in the plate P^2 , and into the throat t . The head of the nail will remain in the slot f^2 until the plate P descends far enough so that the upper end of said nail can pass the upper end of the slot f^3 , when the ejector will push the whole nail into the throat t . Here it is still held firmly by the ejector until the driver I comes down and forces the nail into the leather. As the plate P begins to rise to take another nail the beveled lower edge of the ejector engages with the lower end of the slot f^2 , and thereby draws said ejector out of the slot until its point rests against the solid portion of the plate. In Fig. 1 the latter position is shown by full lines and each of the other positions by dotted lines.

The driver which forces the nails into the leather is shown at I , Figs. 3 and 4. It consists of a straight tough wire of such size as to fill the throat t , secured by a screw-clamp, C^3 , to a vertically-sliding block, B^3 . This block moves in guideways between the uprights $D^4 D^4$, being raised by a cam, O , and thrown down by a coiled spring, G , contained within a semi-cylindrical casing, I^2 , placed upon the front of this machine. One end of the spring rests upon an offset, H , formed on the block B^3 , and its other end surrounds a core, M'' , which engages with a threaded rod, F , whereby the tension of the spring may be adjusted. By this construction I bring the end of the spring near the point where the power is applied and avoid the ungainly tower-shaped structure generally used.

It will be seen that by this arrangement the nails are held in the grasp of some part of the mechanism during nearly the entire passage from the rear end of the raceway into the boot. As they stand in the raceway they are held by their wedging sides, their parallel faces being toward front and rear. After the nail enters

the slot f^2 it is still held in the same position by the pressure of the nails behind it, and by the action of the ejector it is held in the throat of the machine, still in the same position, until the driver operates. This is a very important feature, from the fact that if the nail turns partly, or even a little, the oblong heads or ends will be set in different directions, thereby presenting a very irregular appearance, so clumsy and unworkmanlike as to seriously damage if not prevent the sale of the goods.

By this invention the above objection can be wholly obviated. It happens, however, that in certain classes of work—such as “brass-work”—it is sometimes desirable to impart some peculiar shape to the head of the nail. To accomplish this I place in the throat of the machine a small swaging-die, 2, (see Fig. 5,) having an orifice of any required shape, and of such size as to admit the point and a portion of the body of the nail, as shown in Fig. 5. When the driver descends it forces the nail through this die, which has cutting-edges 1 1, and thereby draws or swages the head of the nail into the required shape. In Figs. 6 and 7, I have shown different forms of die, and as the swage 2 is removable, being simply threaded and screwed into place by a nut, n' , the die may easily be removed and a different one inserted. This device may also be used to trim the heads of the iron nails into regular shape, this being a second method of obviating the objections caused by the turning of the nail.

In separating the nails by means of the plate P , when the foremost nail in the raceway enters the slot f^2 , it stands therein with one of its flat faces against the steel plate P^2 , upon which the plate P moves. The slot f^2 is beveled or flared outwardly at top and bottom, as shown in Fig. 1, so that the nail will tend to hug the plate P^2 and to permit the ejector to readily push the nail out of the slot.

A cushion of any suitable material may be placed beneath the offset H to deaden the impact of the sliding block B^3 , as shown at i .

A modification of the separating devices is shown in Figs. 11 and 12. Instead of a vertically-moving slotted plate, I may use a laterally-reciprocating plate, P^4 , actuated by a vertically-moving bar, T , having an inclined slot, S^3 , which engages with a pin or stud, S^4 , on the plate. The plate P^4 is placed against the end of the right-hand raceway-plate and moves in suitable supports. In this modification the throat t' , through which the nails are driven, instead of being in the same vertical plane with the raceway, is placed just at its left hand, as seen in Fig. 12.

The mode of operation is as follows: The edge e^2 of the plate P^4 is slightly inclined, so as to be parallel with the wedging side of the nail as the latter stands vertically. As the slide T comes down, its inclined slot S^3 drives the plate P^4 forward until its edge strikes the foremost nail in the string, which has emerged from the raceway and stands upon its point,

being supported on three sides by the nail in rear of it, by the edge of the separating-plate P^4 , and by the plate (not shown) in front of the latter. The plate P^4 carries the nail toward
 5 the left a distance about equal to the width of a single nail. Here the point enters the throat t' and falls by its own gravity until the nail rests upon the leather which is being fed beneath the throat-piece t^2 .

10 Except the separating mechanism just described, the parts shown in Figs. 11 and 12 do not substantially differ from matter which has been heretofore described.

I am aware that a laterally-reciprocating separator-plate, broadly, is not new, nor a separator which receives a nail in a slot, nor the combination, broadly, with a slotted separating-plate, of an ejector, such subject-matter being shown and claimed in my patent of May
 20 24, 1881, No. 242,061.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with the plates M , forming a raceway, of a plate having its face bearing against the forward ends of said plates,
 25 and provided with a vertical slot of such size as to receive a single nail, said slot being in the same vertical plane with the raceway, feeding devices for advancing the nails in said
 30 raceway, and mechanism, substantially as described, for imparting vertical reciprocation to the slotted plate, substantially as and for the purpose described.

2. The combination, with a vertically-moving
 35 separator having a slot to receive the nail, of an ejector adapted to push the nail from said slot into the throat of the machine and hold it there until the stroke of the plunger, said ejector being thrown into the slot by springs,
 40 and withdrawn therefrom by the lower end of the slot bearing against its beveled edge, upon the upward movement of the plate, substantially as and for the purpose set forth.

3. The combination, with the plunger or
 45 driver, and the device by which it is carried, of a spiral spring inclosed within a case upon

the forward end of the machine, the lower end of said spring resting on an offset formed upon the lower end of the block carrying the driver, substantially as and for the purpose set forth. 50

4. The combination, with the finger-bars R R' and their carrier-plates, of disks set upon the shafts which operate the fingers, each disk having a plate sliding therein and forced outward by springs, and provided with a flanged
 55 end curved to coincide with the periphery of the disk, said flange being adapted at each rotation to bear against the nails in the raceway, in conjunction with an oppositely-arranged rotating disk, substantially as and for the purpose set forth. 60

5. The combination, with the slotted plate P , of the ejector a' , the point of said ejector being beveled, substantially in the manner and for the purpose described. 65

6. In a machine for driving headless nails, the combination, with the driver, of the swaging-die placed in the nose of the machine, and having drawing or cutting edges which draw or shape the end of the nail as it is forced
 70 through the die by the driver, substantially as and for the purpose described.

7. The combination, with the nailing mechanism, of the die 2, having lips 1, said die being screw-threaded and provided with a nut,
 75 n' , whereby it may be secured in place or a different die substituted, substantially as and for the purpose described.

8. The combination, with the finger-bars R R' , of rotating disks mounted on the shafts
 80 which actuate the fingers, and set in cavities formed in the carrier-plates R^2 , a sliding plate, F^2 , mounted in each disk, and spiral springs f , substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed
 85 my name in the presence of two subscribing witnesses.

SAMUEL SHEPHERD.

Witnesses:

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 L. L. TILDEN.