

M. FOSTER.

3 Sheets--Sheet 1.

*Machine for making spikes,
pins, nails, bolts, &c.*

No. 119,925.
Plate 1.

Patented Oct. 17, 1871.

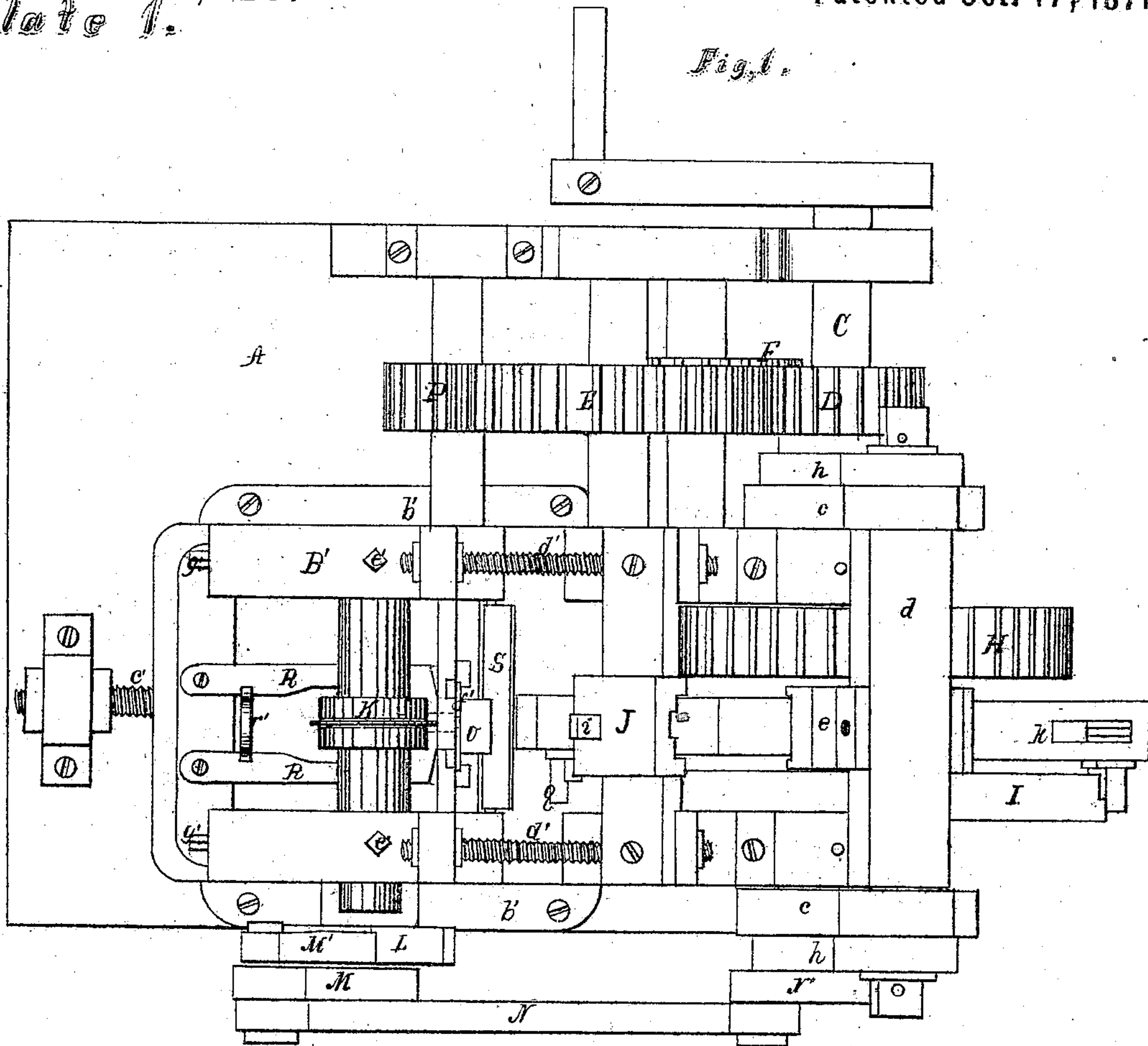


Fig. 4.

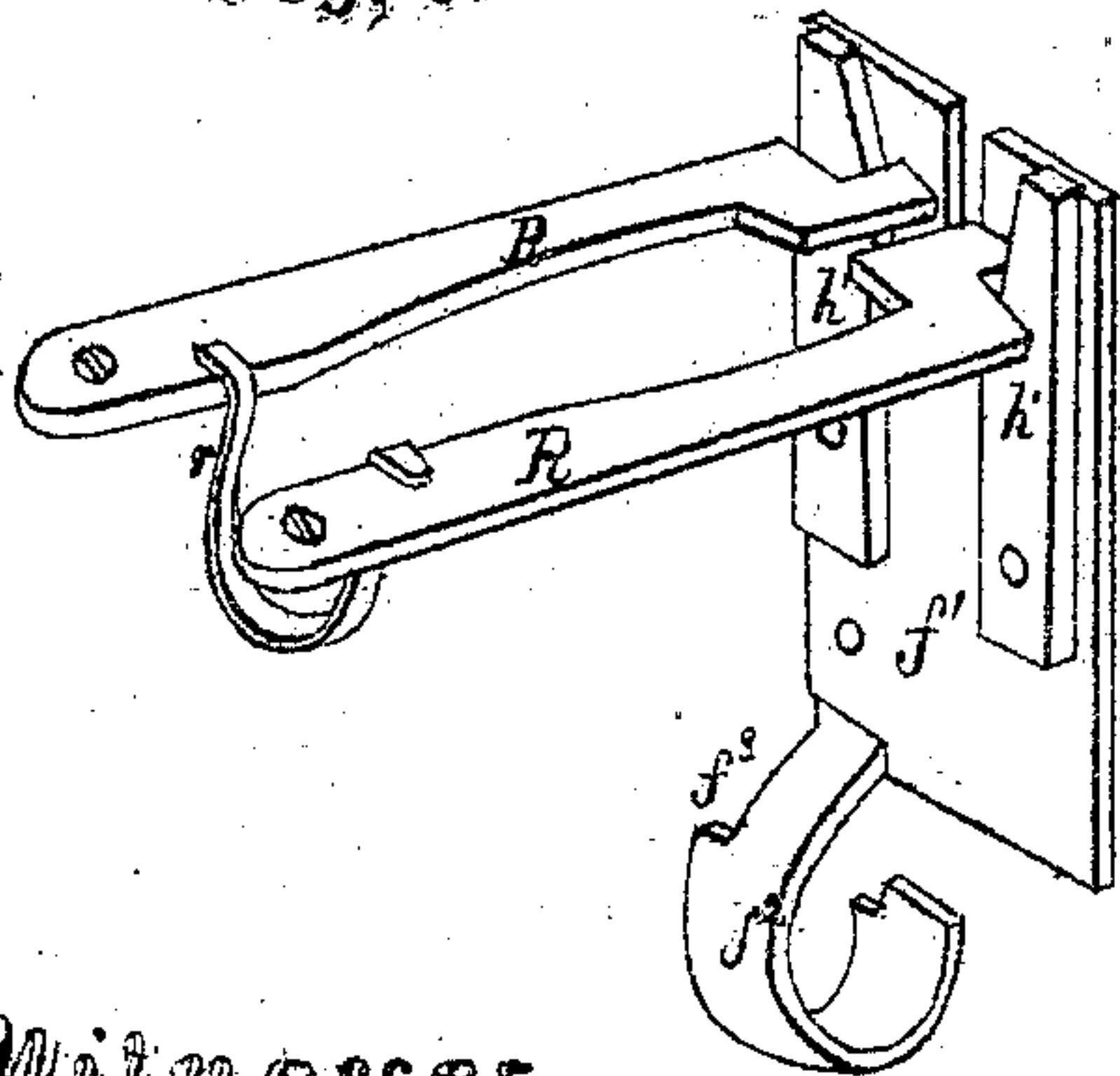
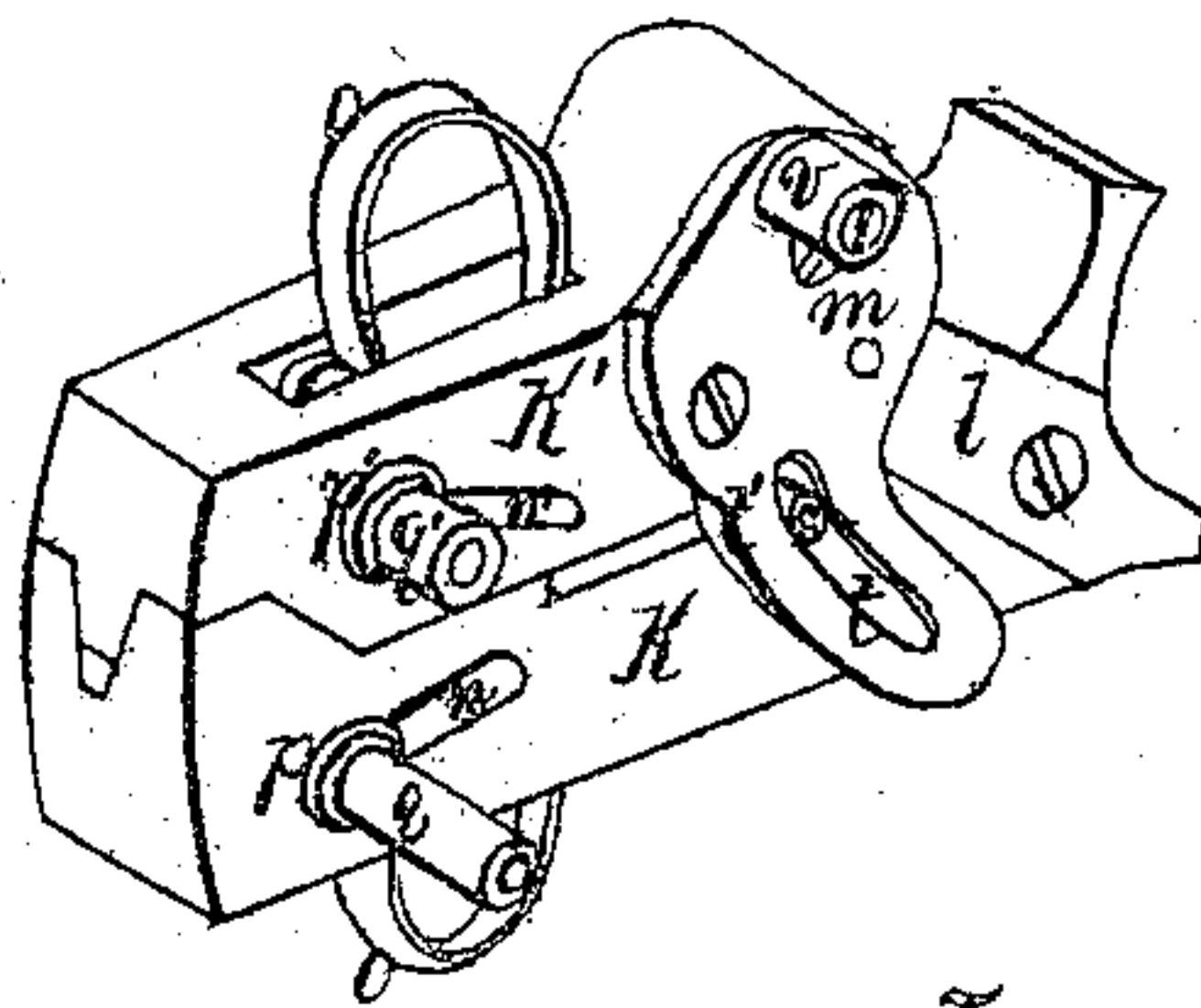


Fig. 5.

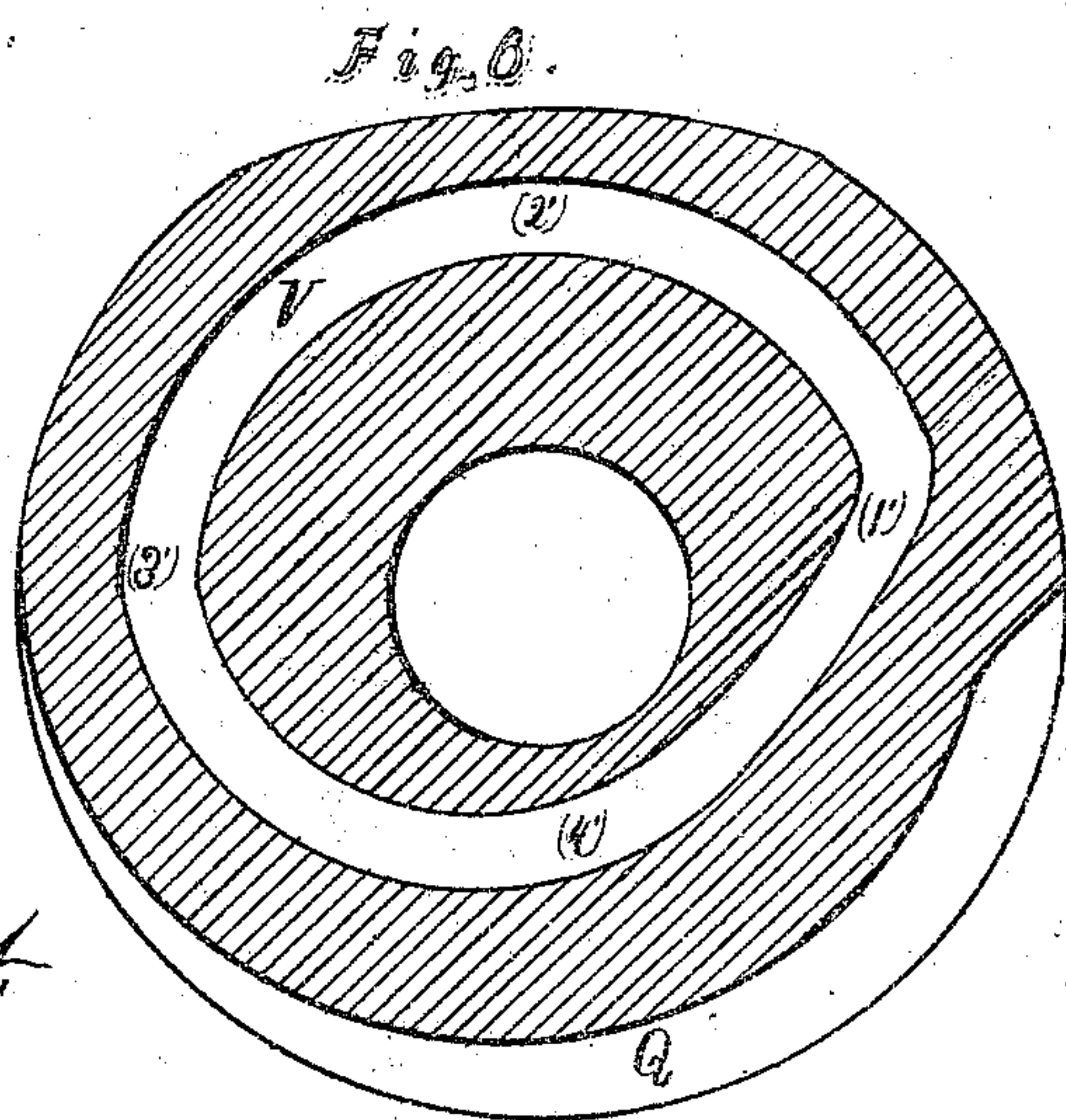
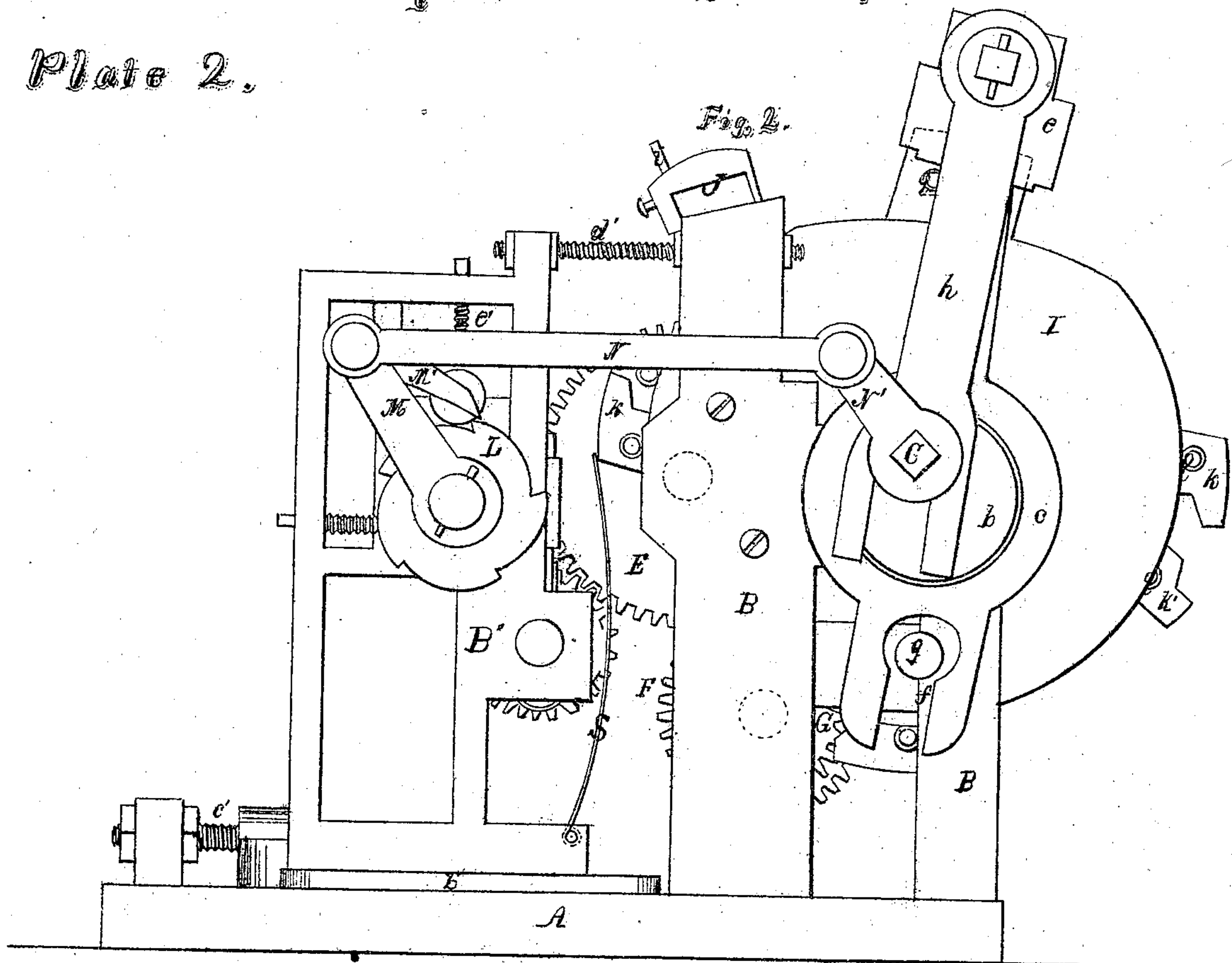


Inventor.
Morrison Foster

Witnesses.
Geo. W. Tibbitts
Nelson D. Sweet

No. 119,925. **M. FOSTER.** Patented Oct. 17, 1871.
*Machine for making spikes,
 pins, nails, bolts, &c.*

Plate 2.



Witnesses.
 Geo. W. Tibbitts
 Nelson S. Sweet.

Inventor.
 Morrison Foster

M. FOSTER.

Machine for making spikes,
pins, nails, bolts, &c.

No. 119,925.

Patented Oct. 17, 1871.

Plate 3.

Fig. 3.

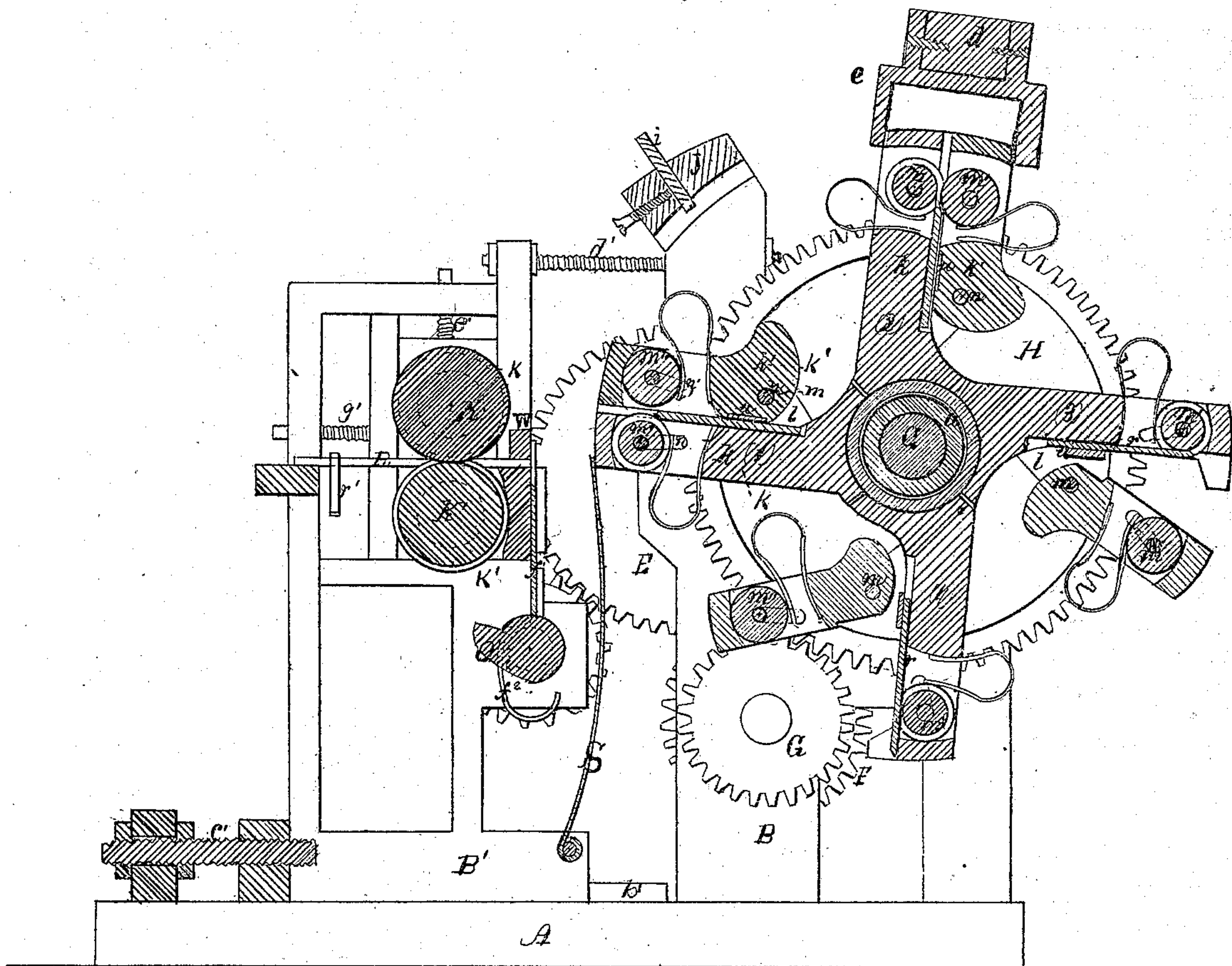
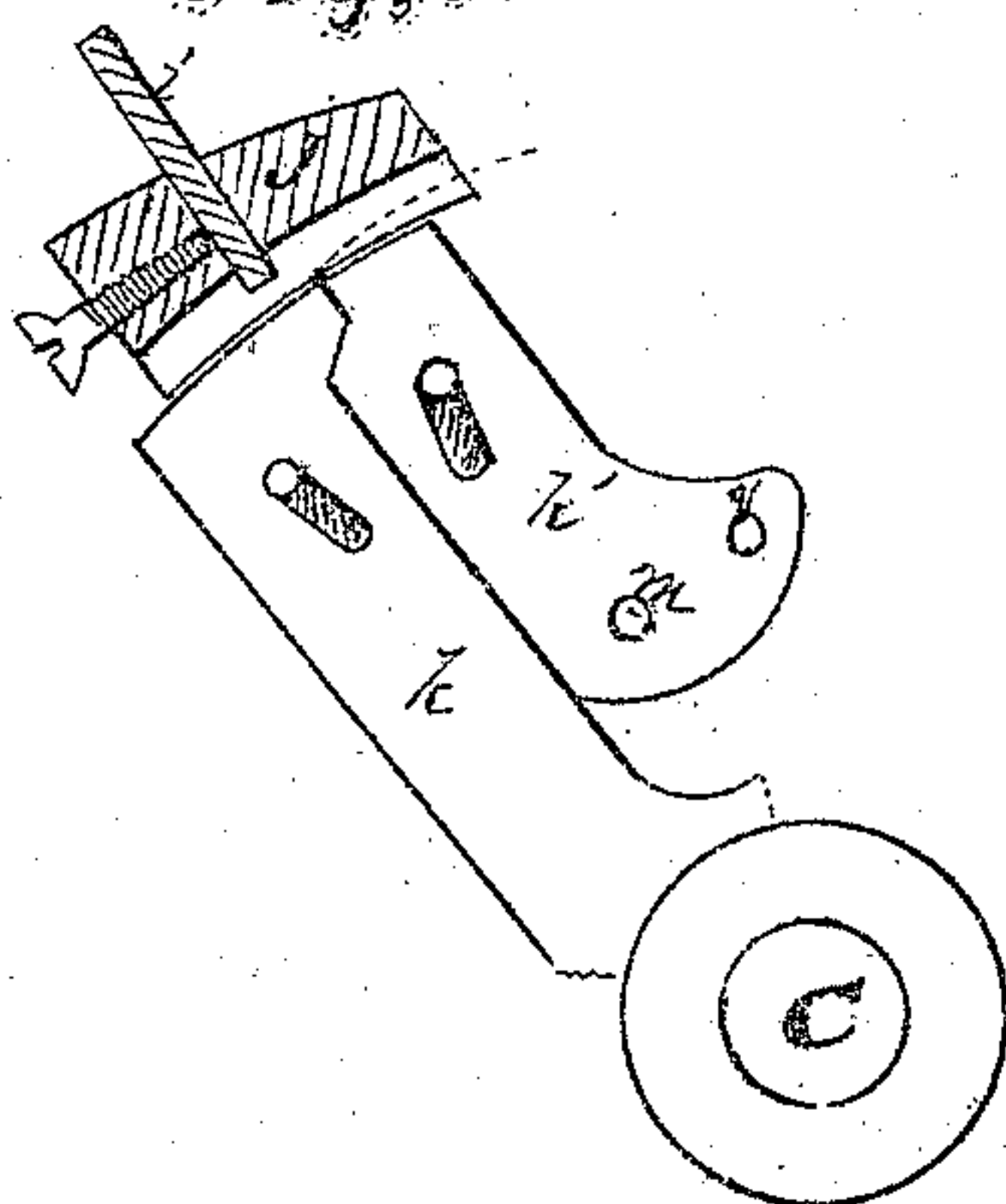


Fig. 7.



Witnesses.

Geo. W. T. Abbott
Nelson C. Sweet

Inventor.

Morrison Foster

UNITED STATES PATENT OFFICE.

MORRISON FOSTER, OF CLEVELAND, OHIO.

IMPROVEMENT IN MACHINES FOR MAKING SPIKES.

Specification forming part of Letters Patent No. 119,925, dated October 17, 1871.

To all whom it may concern:

Be it known that I, MORRISON FOSTER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Making Spikes, Rivets, Screws, Blank-Pins, Nails, Bolts, &c.; and that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings making a part of this specification, in which—

Figure 1 represents a plan of the machine. Fig. 2 represents a side elevation of the machine. Fig. 3 represents a longitudinal vertical section through the same. Fig. 4 represents the pinchers to hold and the cutter to cut the blank. Fig. 5 represents a pair of griping-jaws detached from the machine. Fig. 6 represents a reversed view of the stationary grooved cam which operates the griping-jaws automatically and returns the pointing-rollers to their places. Fig. 7 represents a detached view of one pair of the revolving griping-jaws, showing their relation with the bending device and the stationary segment.

Similar letters of reference where they occur denote like parts of the machine in all the figures.

My invention relates to an improved machine for making spikes, pins, nails, bolts, &c.; and consists of certain combinations of parts, as will be hereinafter more fully set forth.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

A represents the bed-plate, to which is fastened the frame B, which should be substantially built of iron or other strong material. C is the main shaft, by which motion is communicated to the different parts of the machine. On one end of this shaft C there is a cogged wheel, D, that gears with and operates a power-transmitting cog-wheel, E, which latter in turn gears with another cog-wheel, F, placed on the same shaft with a pinion, G, which gears with a larger cog-wheel, H, revolving round a hollow shaft, *a*. To this cog-wheel H are attached four sets of griping-jaws, which are opened and closed in succession, and at the right time, by means of the grooves in the stationary cam I, as will be described hereafter. On each side of the frame B, and keyed on the shaft C, is a cam, *b*, operating eccentrics *c*. To the upper arms of the eccen-

tries *c* are round boxes, through which pass the ends of a cross-head, *d*, and oscillate therein. On each end of the cross-head *d* is an arm, *h*, fitting on square bearings on the ends of the cross-head. The lower ends of the arms *h* are forked, and straddle the main shaft C, which keeps the cross-head, and consequently the header, always square with the center of the shaft C. To the cross-head *d* is attached the header *e*, which is a strong box inclosing a heading-die to suit the kind of head to be made. The ends of the box envelop and hold the griping-jaws together firmly while the die is forming the head; the sides of the box at the same time push forward and operate the pointing-rolls. The eccentric *c* has also an arm extending downward below the cam *b*. In this lower extension of the eccentric *c* is a slot, *f*. In this slot *f* is a stationary pin, *g*, attached to the frame B. As the header, operated by the cam *b*, rises and descends, it is guided by this pin *g* working in the slot *f*, which gives it also an oscillating movement. The slot *f* is enlarged at its upper part to allow the header to take the same speed as the griping-jaws and travel a short distance on each pair, while operating on the spike, pin, or nail, &c., held by the griping-jaws. Each set of griping-jaws is formed of two parts, *k* and *k'*, held together by two side pieces, *l*, fastened to the jaw *k*. The pin in passing through the jaw *k'* and the side pieces *l* keeps the jaws together, at the same time forming a hinge, allowing the jaw *k'* to open and close. The jaw *k* being fastened firmly to the large cog-wheel H is held stationary, following, however, the revolving motion of the latter. Each jaw *k* and *k'* carries a pointing roller, *m'* and *m''*, for the purpose of forming a point on the spike, pin, nail, &c., to be made. The roller *m''* is made with a tongue, which, at the time the point is made, fits in a corresponding groove in the roller *m'*. This tongue and groove are for the purpose of keeping the metal from jamming in the jaw, or forming a fin while the pointing-rollers are making the point. The axles of these pointing-rollers pass through slots *n n'*, cut through each side of each of the jaws *k k'*. These slots incline toward each other in the direction of the pin *m*, which, when the sides of the header *e* press on the collars *p p'* placed on the axles of the rollers outside of the jaws *k k'*, causes the rollers to form the point on the article to be made. When the point is finished and the

header rises off the jaws the pointing-rollers are pushed back to their normal position by the peculiar shape of the periphery of the stationary cam I, the ends of the axles q q' of the pointing-rollers extending out over the periphery of the cam I for this purpose. The springs o o also assist in pushing back and holding in their normal position the pointing-rollers until by the revolution of the wheel H they again arrive opposite the depression in the periphery of the top of cam I, which allows them to be again pushed down by the side of the header. Attached to frame B, and lying between the point where the blank is fed in and the header, is a stationary segment, J. Attached to this segment is the bending-bar or roller i , to give a preliminary bend to the head of the blank for the purpose of making hook-headed spikes. The segment J is cut on its inner side to the same radius as the ends of the griping-jaws when they are closed. The end of griping-jaw k' , when it opens, moves in a radius outside of and standing at an angle from the radial plane on which the closed jaws move, so that the griping-jaws, in passing under the stationary segment J and in close contact with it, are held firmly together by it, and the blank is prevented from being jarred out of position while the bar or roller i is bending it over to the required preparatory angle. The segment J has a groove in its lower side through which the upper end of the blank passes, and across which groove the bending-bar i interposes. Within each pair of griping-jaws is placed a clearer, r , which, as soon as the spike, pin, or nail is finished, is, by the opening of the jaw k' , caused to slide under the end of the spike or other article and move toward the head far enough to disengage it entirely from the griping-jaws, (in case it should be disposed to stick,) and permit it to drop from the machine. This clearer r has attached to its side a pin, s , which plays in a circular slot, t , cut in a side piece, t' , fastened to the movable jaw k' , so that when the movable jaw k' opens the pin s is pushed forward and with it the clearer r . By the closing of the jaws the pin s , with clearer r , is returned backward by the same slot, so as to be out of the way of the new blank upon which the jaws take hold when they shut. The clearer r is kept in position in a slot in jaw k by a guide-plate, u , which is attached to the stationary jaw k , and also by the groove in the pointing-roller m' . The griping-jaws are opened, also closed, automatically by a positive motion given to them by the peculiarly-shaped stationary grooved cam I. The roller v on the movable jaw k' plays in the groove V in the cam, which causes the jaw to open at the point 3' and to shut at the point 1', and remain shut until it reaches again the point 3'. This dispenses entirely with the use of a spring for shutting the jaw. The pointing-rollers are pushed back to their places, after they have formed the point, by the periphery of the stationary cam I, and the springs o could be dispensed with. After they have been pushed back they are kept there by the spindle of the roller q , following the outside of the cam I, and the spindle

of the roller q' on the movable jaw k' doing the same until the jaw opens, after which it follows the groove Q until the jaw has shut again, when it resumes its position with the spindle of roller q on the outside of cam I until both reach the depression at top of cam I, when they are free to be driven down by the header to again perform their function of pointing.

The material or blank is prepared and fed to the jaws as follows: In front of the heading and pointing machinery stands an adjustable frame, B'. It is kept in steadiness and guided laterally by two guides, b' b' , between which it can slide. Two bolts, d' d' , also connect it, and secure it at its upper part to the frame B. It is adjusted (in or out) by the adjusting-screw c' . When adjusting it the bolts that secure it to the bed-plate A and to the frame B are loosened. In the frame B', their shafts passing through adjustable bearings, are two feed-rollers, K and K'. The roller K has a tongue fitting into a groove in the roller K', which groove is made of such a width as, while feeding, to roll the blank to the exact width necessary to fit in the groove in the griping-jaw k . The feeding-rollers are operated by means of the ratchet-wheel L, which is attached to the roller K'. This ratchet-wheel is periodically revolved by the ratchet-pawl M' attached to an arm, M, which gets an oscillating motion from the connecting-rod N, the latter being joined to a crank, N', which is attached to the main shaft C of the machine. On the face of the adjustable frame B', and between the feed-rollers and the line of the revolving griping-jaws, is the cutter f^1 , operating perpendicularly against an upper and inverted cutter, W, which is stationary, and also fitted to the movable frame B'. When the rod has been fed forward the length necessary for a spike-pin, &c., the cutter f^1 is raised upward by means of the cam O placed on a shaft which is operated by the pinion P that gears with the cog-wheel E, the rod being at the same time held firmly by a pair of pinchers, R. Previous to the knife cutting off the rod the pinchers R squeeze and swage it laterally, (where the point of the spike comes,) so that when the pointing-rollers afterward operate on the upper and lower sides of the blank the point is rolled out to a breadth not more than equal to the original width of the rod, and the formation of a fin is thus avoided. The pinchers R are operated in the ascent of the cutter f^1 by two guides, h' , attached to the cutter. These guides h' , being inclined toward each other in the form of a V, bring the pinchers R to bear on the rod at the moment before it is cut off. As soon as the rod is cut off, the cam O continuing to revolve, a pin on the cam's shaft strikes the lower part f^2 of the cutter f^1 at f^3 and draws it down, also releasing the pinchers R, allowing them to open, so that the next blank may be fed forward after the jaw k' , which is full open at the time, has passed the point of feeding, and be fully fed in by the time the jaw k has arrived at that point; the two jaws then close upon it. After it is fed forward the blank protrudes its whole length beyond the face of the frame B', and across the radial line on which the ends of

the griping-jaws revolve, the face of the inverted cutter W in the adjustable frame B' being set at the exact distance from the ends of the revolving-jaws as will leave the amount of material protruding from the end of the griping-jaws that is necessary to form the head of the spike, pin, &c., when the griping-jaws shall have seized the blank, which they do at the same instant the cutters cut it off. In order to effect the seizing of the blank at the right time the griping-jaws are so operated by the groove in the cam I that they shall shut at the same moment that the cutters sever the blank from the rod. In feeding rods through the machine there is usually at either or both ends of the rod a short piece or remnant, which, being too short to reach to and be seized by the pair of jaws it was fed for, drops, on being cut off prematurely, across the track of the next advancing griping-jaws, and is liable to fall into the jaws, get crosswise, and give trouble by preventing the jaws from shutting. To obviate this danger a guard or shield, S, is placed in a slanting position in front of the cutters for the purpose of warding off or conducting such short piece safely out of the way. This guard or shield is placed upright, its lower end moving on a hinge, or it may be swung from above. Its upper end is inclined over and leans against the frame B in the path of the revolving griping-jaws. As these jaws, each pair severally, strike it, the hinge at its lower end allows it to be swung by them out of their way, and by its own weight, or by a spring which may be attached to it, to return to its normal position as soon as the jaws pass.

The operation of the machine is as follows: The frame B' being adjusted so that the stationary upper cutter W, against which the cutter f^1 works, shall stand at just such distance from the ends of the revolving griping-jaws as will leave the exact quantity of material protruding from the griping-jaws that is necessary to make the size of head required for the contemplated spike, pin, nail, or other article. A rod is placed in the feed-rollers. The feed-rollers are then rotated a certain distance (sufficient to feed the length of the blank wanted) by the ratchet L, the ratchet-pawl M being operated by arm M', connecting-rod N, and crank N', direct from the main shaft C. The rod is, by the operation of the feed-rollers, thus made to protrude across and beyond the upper cutter W just the length necessary to form a blank for the article being made. Most of it, therefore, necessarily extends also across and beyond the radial line on which the griping-jaws revolve. The cutter f^1 now begins to rise, (being moved by the cam O,) the pinchers R are drawn together on the rod and swage or squeeze it laterally where the point of the succeeding blank is to be, the blank now to be cut off having been similarly operated on previously. The cutter, continuing to rise, finishes its operation by cutting off the protruding blank, and is immediately drawn back again by the pin on the shaft with the cam O. The instant the blank is cut off a pair of griping-jaws (being timed to close at the same moment) seize it firmly and carry it

round with them, its upper end protruding from the jaws just the distance required to give material enough to form the head of the article being made. The advantage of having the frame B' and the cutters adjustable is here demonstrated. The griping-jaws now pass with the blank under the stationary segment J, which holds the jaws firmly together when making hook-headed spikes. While the jaws are thus firmly held by segment J the end of the blank strikes against the bar or roller i , which gives the head a preparatory bend. When not making hook-headed spikes the bar or roller i is removed out of the way. The wheel H, and with it the griping-jaws, continuing to revolve, the jaws being kept closed by the pin and roller v , moving in the groove V of stationary cam I, from 1' to 2', carries the jaws to the position 2' under the header e . The cam b , operating on the stirrup c , now brings the header e down on the jaws, inclosing them and holding them tight together while the die in the header forms the head on the blank, and the sides of the header-box at the same time push forward the pointing-rollers m and m' . The pointing rollers, being guided toward each other on their pins in the slots $n n'$, form the point on the pin, spike, nail, &c. The header, e , after the head and point are finished, continues to travel with and upon the jaws until by the beat of the cam b it is raised off the jaws, when it is swung back by the cam b to meet the next pair of advancing jaws, and repeat the heading and pointing operations. The pointing-rollers on being relieved of the pressure of the header are returned to their normal position by the rotary movement of the jaws, causing their spindles $p p$ to ride up on the cam-shaped periphery of the disk or cam I, the springs o acting as auxiliaries, though not essential. The griping-jaws continuing to revolve to the position 3', the roller v following the groove V from 3' to 4', the movable jaw k' begins to open, pushing forward at the same time the clearer r , which throws the finished article out of the griping-jaws, leaving them open and ready to receive the next blank when they shall have rotated to the proper place. After the jaws begin to open the pointing-roller m'' is kept in its position by its spindle q' , following the groove Q in the stationary cam I, while the spindle q of the pointing-roller m' continues to follow the circular periphery of the stationary cam I, and is thus kept in its position. The cogs of the pinion P and cog-wheel E are made deep enough to admit of sufficient variation being made in the depth they mesh into each other to enable the cutters to be adjusted horizontally without throwing the cogs out of gear.

Having thus fully described the construction and operation of the machine, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The adjustable cutters f^1 and W arranged in relation to the revolving griping-jaws, in the manner and for the purpose specified.

2. The combination of the cam I with the pointing rollers m' and m'' , and their spindles q and q' , and jaws $k k'$, as and for the purpose set forth.

3. The combination of the frame B, pin *g*, slotted yoke *c*, cam *b*, and cross-head *d*, and header *e*, as and for the purpose described.

4. The guides or arms *h*, in combination with the cross-head *d* and shaft *c*, to keep the header and heading-die pointed toward the shaft *c*, substantially as described.

5. The combination of the segment J, bar *i*, and the revolving griping-jaws *k k'*, arranged and operating in relation to one another as described.

6. The combination of the clearer *r* with the

jaws *k k'* and slotted plate *t'*, arranged and operating as described.

7. The guard or shield S, constructed as described, and operating in connection with the griping-jaws, in the manner and for the purpose specified.

MORRISON FOSTER.

Witnesses:

GEO. W. TIBBITTS,

GEO. A. KOLBE.

(103)