

(No Model.)

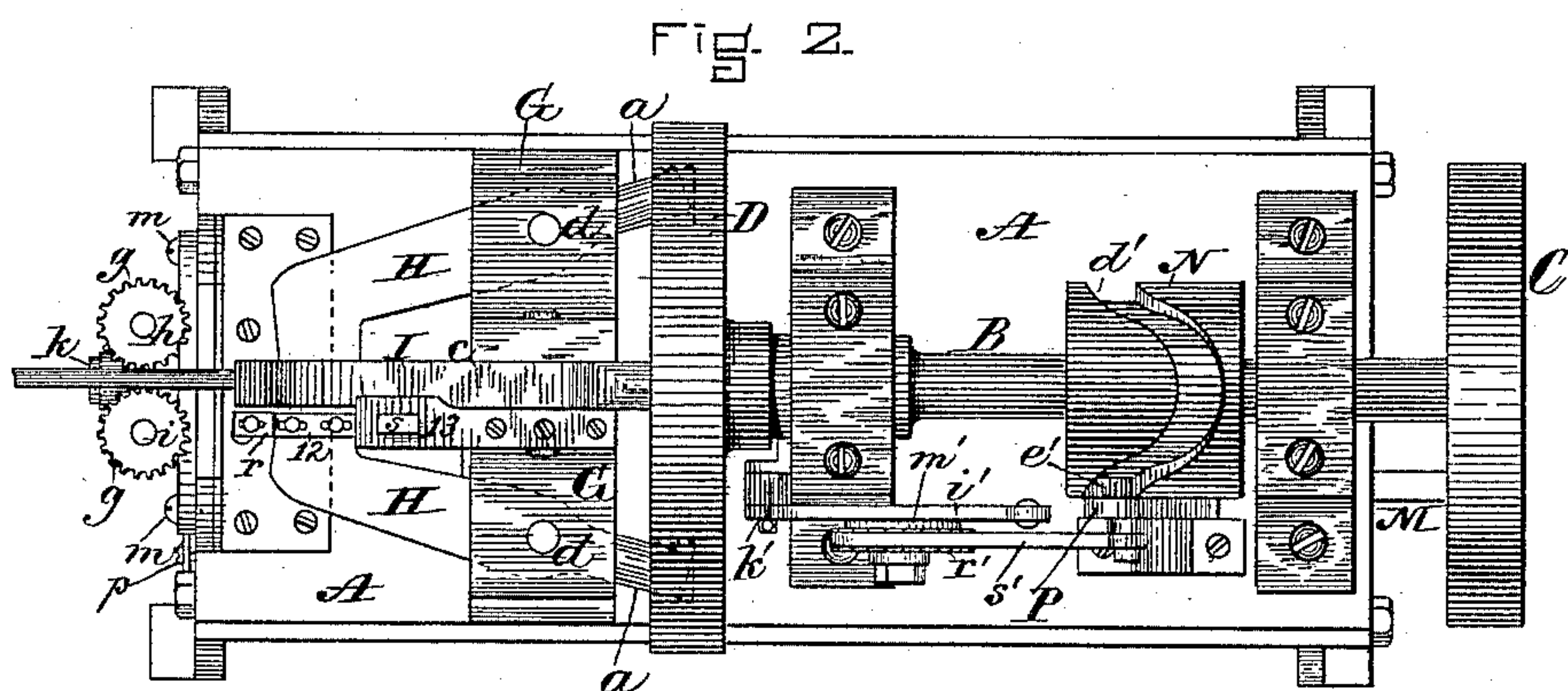
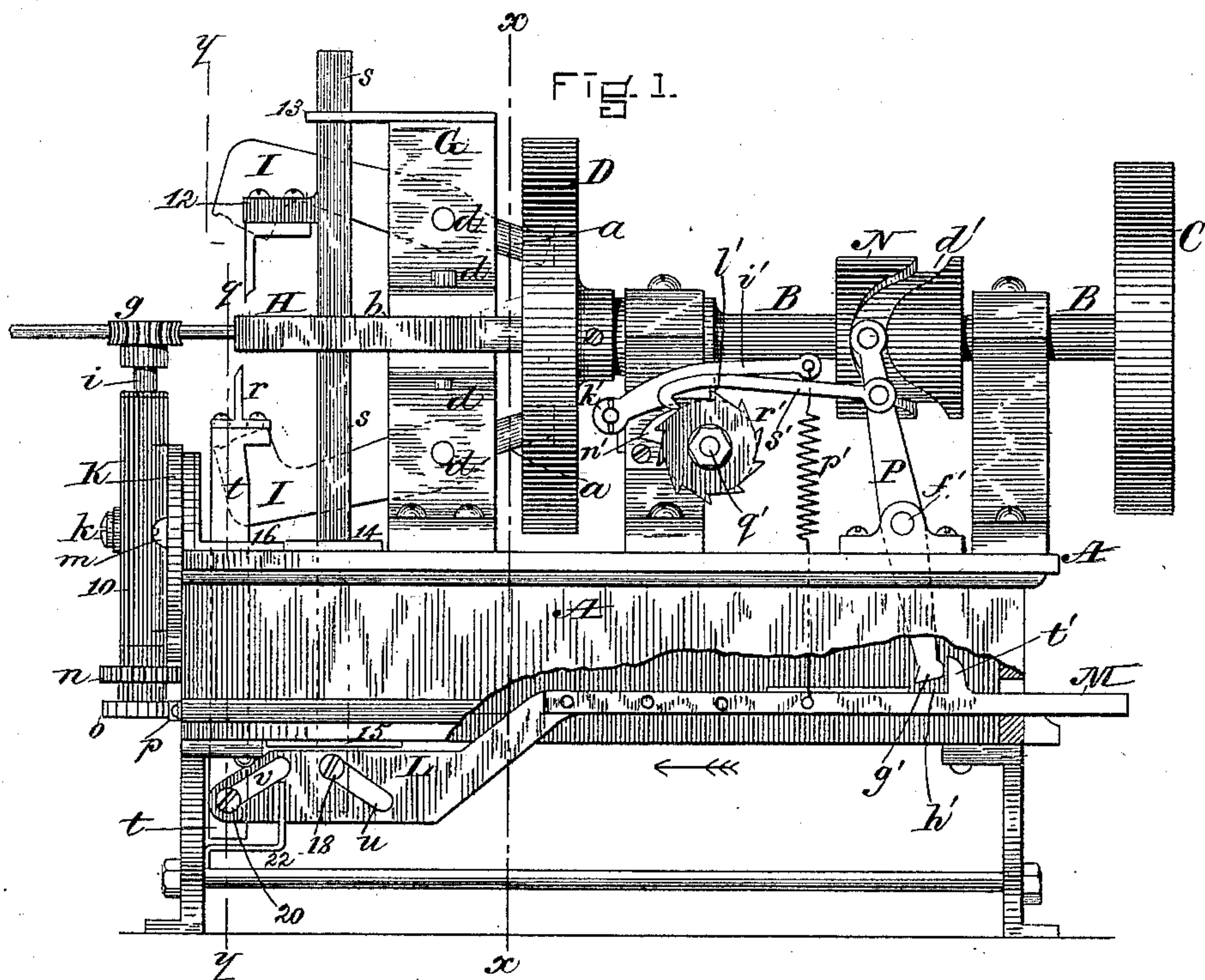
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C. E. MOORE.

MACHINE FOR FORGING HORSESHOE NAILS.

No. 432,634.

Patented July 22, 1890.



WITNESSES.

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E. F. Edgett

INVENTOR.

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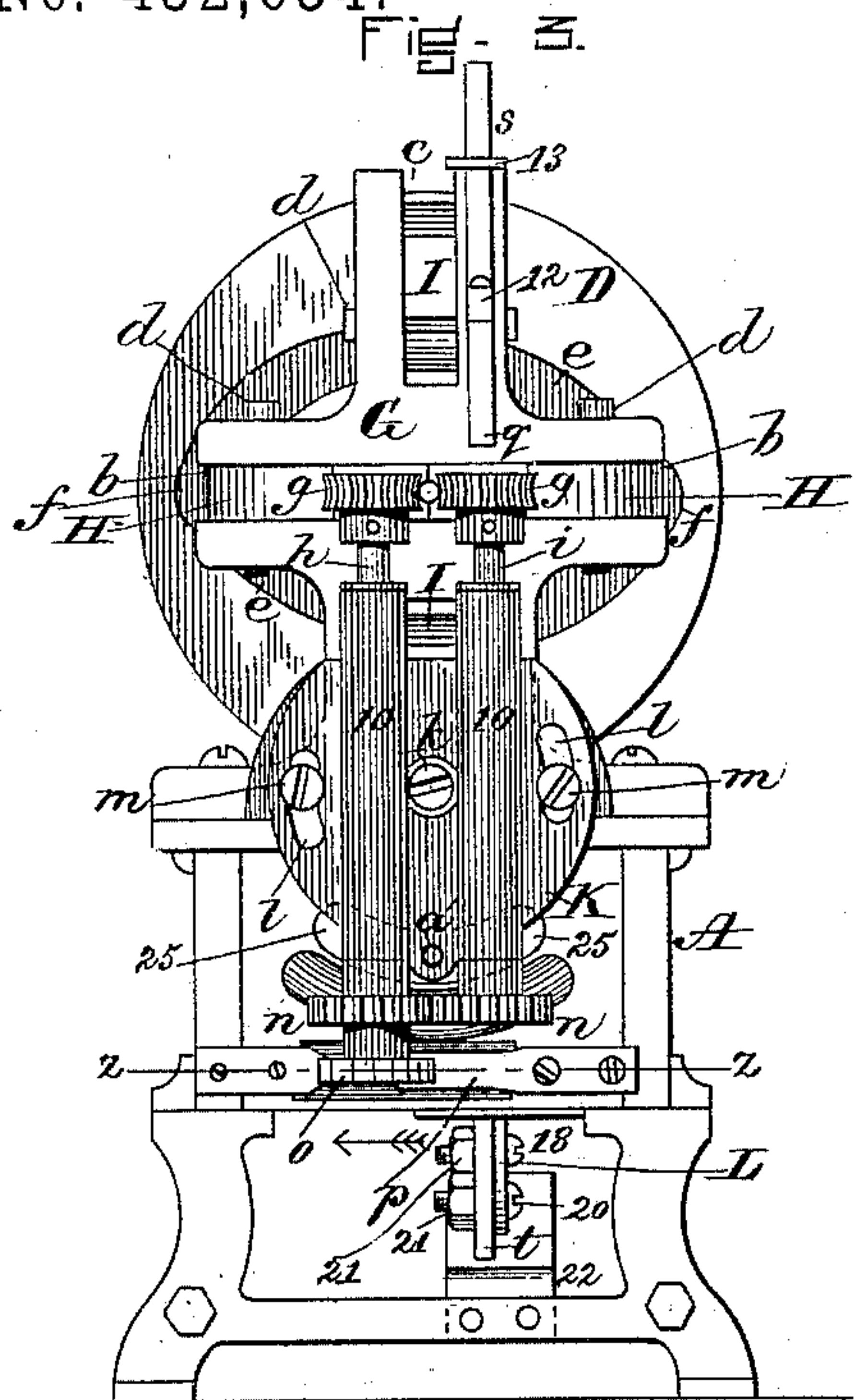


Fig. 3.

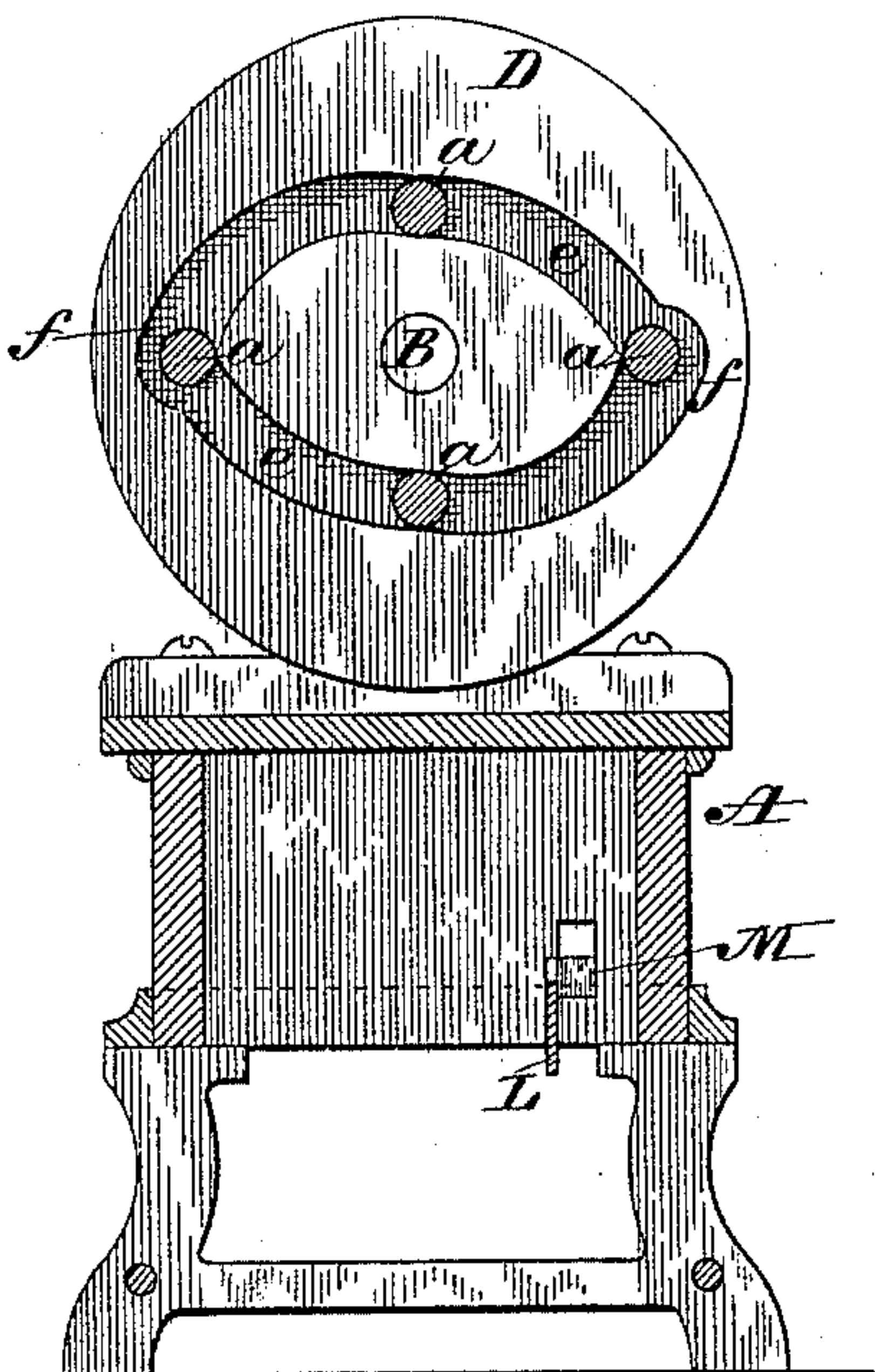
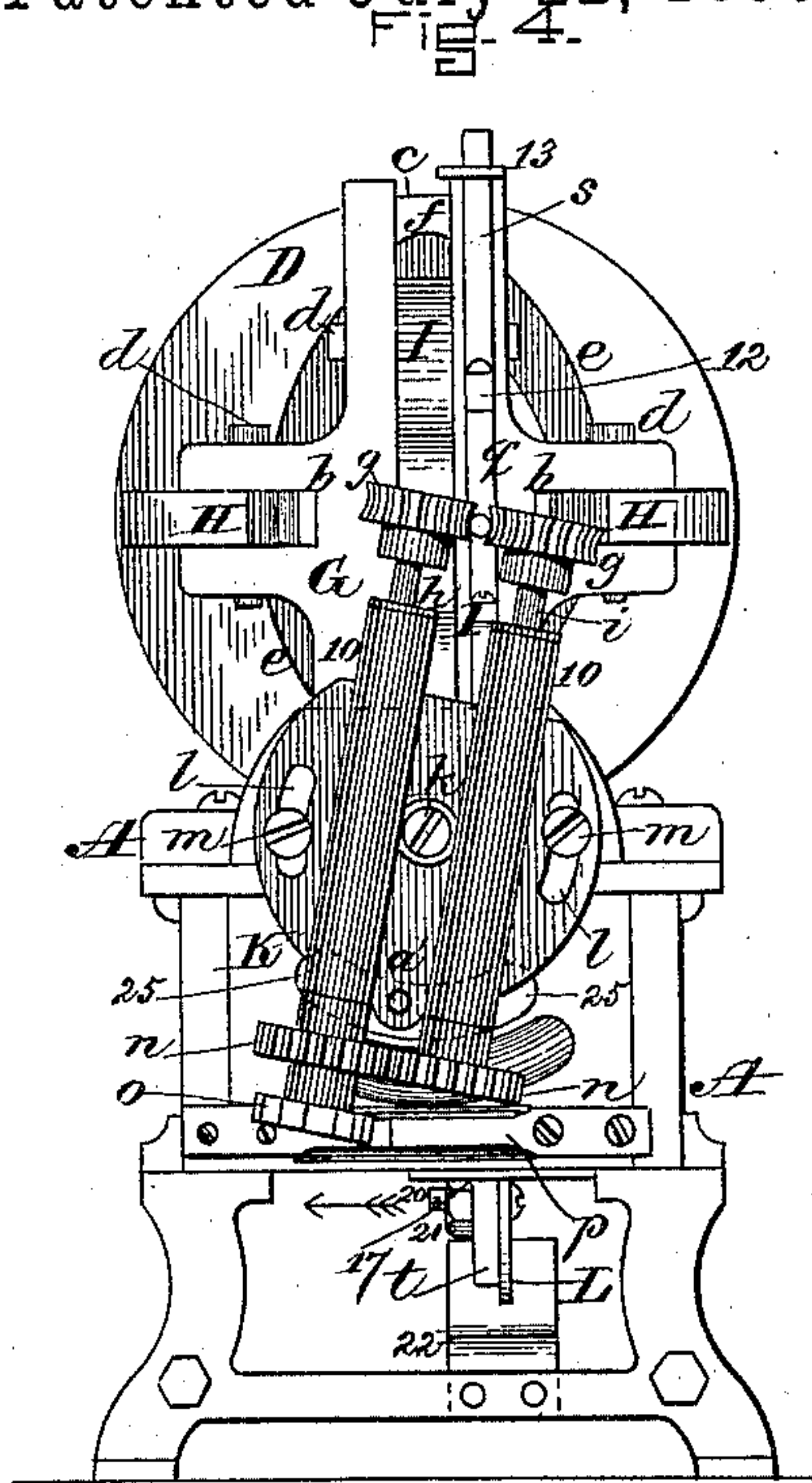
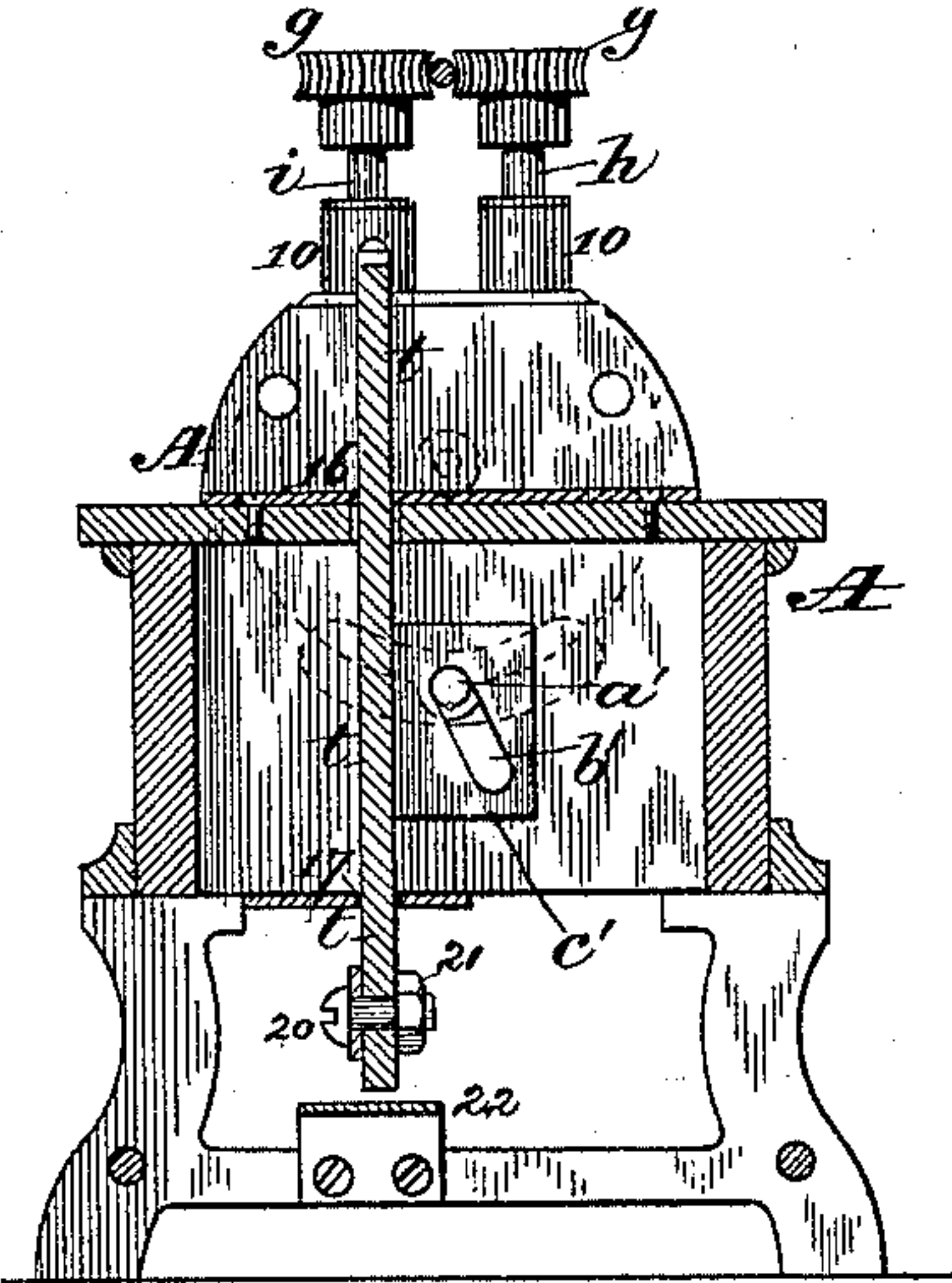


Fig. 6.



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(No Model.)

3 Sheets—Sheet 3.

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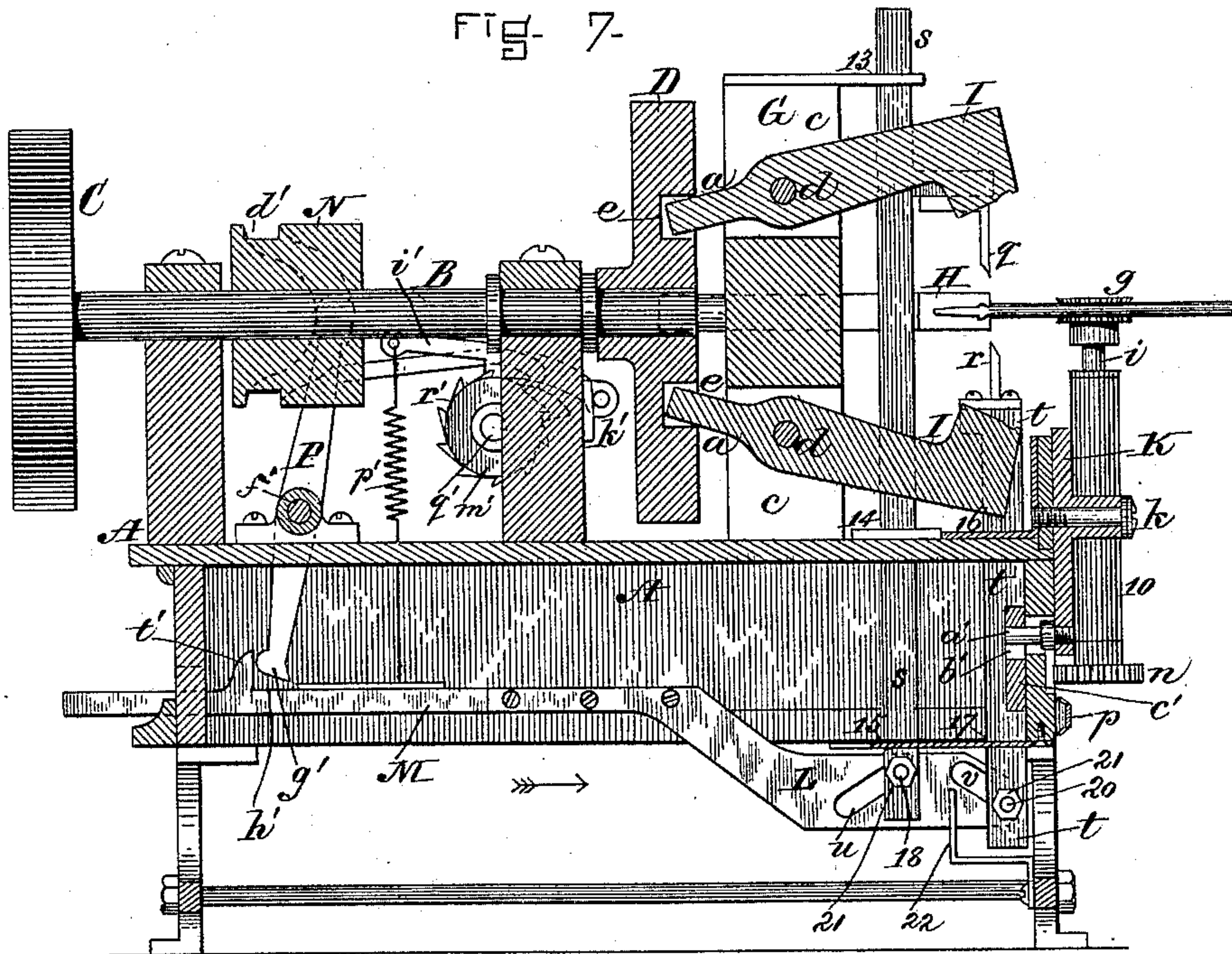
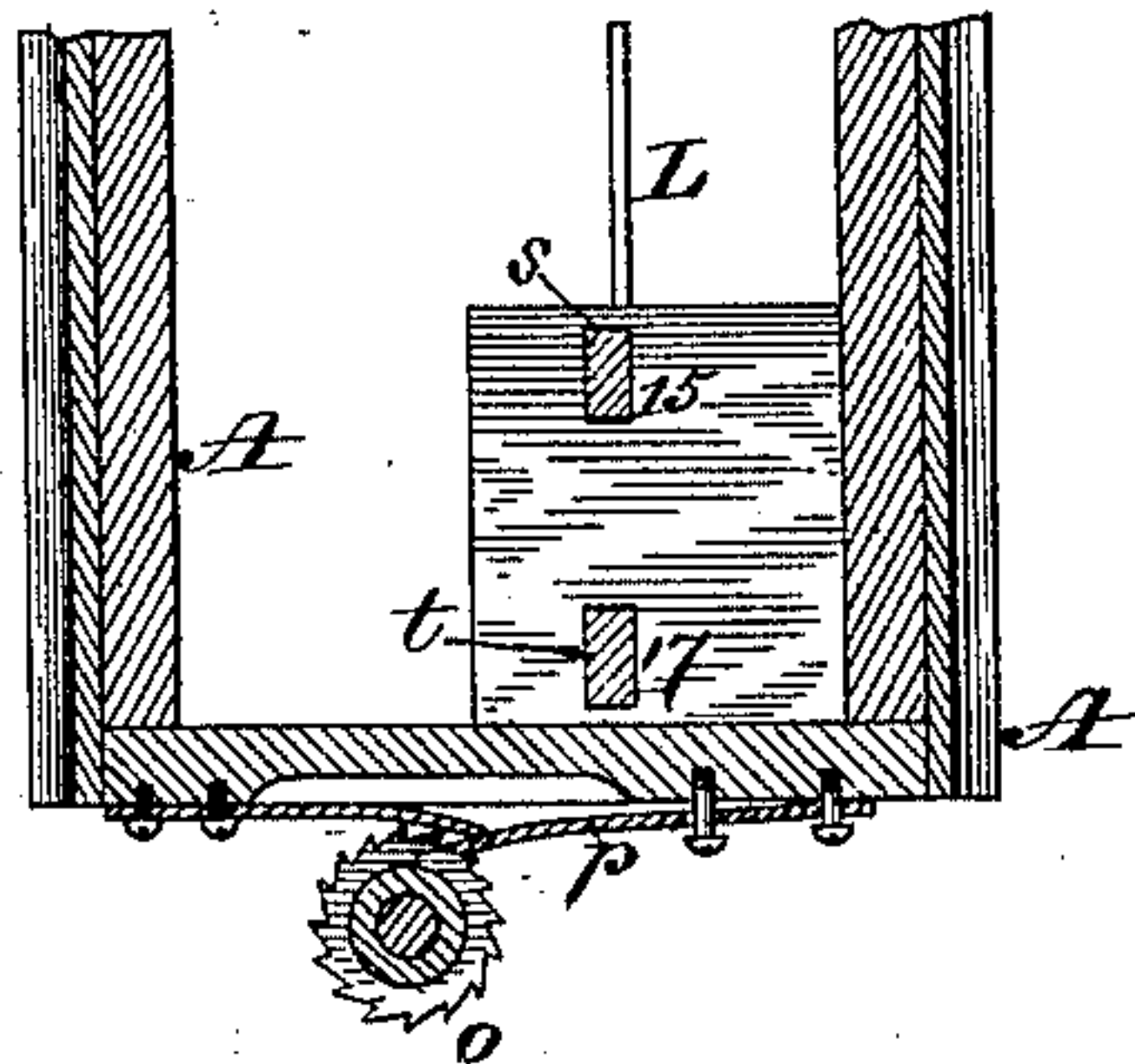


FIG. 8.



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UNITED STATES PATENT OFFICE.

CHARLES E. MOORE, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO GEORGE N. FLETCHER, OF DETROIT, MICHIGAN, AND ANN M. PUTNAM, OF BOSTON, MASSACHUSETTS.

MACHINE FOR FORGING HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 432,634, dated July 22, 1890.

Application filed April 14, 1887. Renewed October 12, 1888. Again renewed January 16, 1890. Serial No. 337,121. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. MOORE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Machines for Forging Horseshoe-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 side elevation of a machine for forging horseshoe-nails constructed in accordance with my invention, a portion of the frame-work being broken away to show the interior construction. Fig. 2 is a plan of the machine. Fig. 3 is a front elevation of the same. Fig. 4 is a similar elevation with the parts in a different position. Fig. 5 is a transverse vertical section on the line xx of Fig. 1. Fig. 6 is a transverse vertical section on the line yy of Fig. 1. Fig. 7 is a longitudinal vertical section through the center of the machine. Fig. 8 is a horizontal section on the line zz of Fig. 3.

My invention has for its object to simplify the construction of machines for forging horseshoe-nails and reduce the number of working parts, whereby an effective, durable, and rapidly-working machine is produced, which will not be liable to get out of order; and to this end my invention consists in certain novel combinations of parts and details of construction, as hereinafter set forth and specifically claimed.

In the said drawings, A represents the bed or frame-work of the machine, and B the driving-shaft, which runs in suitable bearings and carries at one end the driving-pulley C, and at the opposite end a large cam-wheel D for actuating the hammers, as hereinafter described. From the bed A rises a frame G, made in the form of a cross, and having four slots, two horizontal ones $b\ b$ and two vertical ones $c\ c$, in which are placed the hammers H H I I, which vibrate on pivots d , passing through the frame G. These hammers, arranged as described, are operated alternately in pairs by the groove e of the cam-wheel D, within which fit the rear ends or helves a of

the hammers, the form of the groove e being such that when the two side hammers are thrown toward each other to give the blow the upper and lower hammers will be simultaneously drawn back, and vice versa, the hammers being thus actuated in both directions without the aid of springs or other auxiliary devices, and caused to act upon all four sides of the nail being forged. The cam-groove e is provided at two points diametrically opposite each other with recesses or enlargements f , into which the helves of each pair of hammers enter a short time previous to their operative faces being brought together, whereby sufficient play or loose movement of the hammers is produced previous to their contact with the nail-rod to cause them to strike the same with a rebounding blow similar to that struck with an ordinary hammer when held in the hand, the greater part of the forward movement of each pair of hammers being produced positively by the cam-groove, while the remainder or latter portion of the forward movement is effected by the momentum of the hammers themselves, which causes them when running at a high rate of speed to be carried forward with sufficient force to give a smart and powerful drawing-blow, after which they are free to rebound or recede from the heated nail-rod, as the recesses f are of the proper length and shape to admit of this movement. The pivots on which the hammers oscillate are located near their rear ends, thus placing the larger and heavier portion of each hammer in front of its pivot, whereby the momentum of the hammers is increased as they are thrown forward by the cam to give the blow. The faces of the hammers are provided as usual with suitable grooves or dies of the proper form to give the nail the desired shape. By releasing the hammers from the positive action and control of the cam-groove just previous to their contact with the nail-rod, as described, and allowing them to complete their movement by their own momentum and then rebound before being again acted upon positively by the cam-groove and brought under its control, a more concussive and instantaneous impact is

produced, whereby the character or quality of the blow is improved and rendered much more effective, as it is a well-known fact that a gradual or positive blow, even at a very high rate of speed, will cool heated iron much faster than an instantaneous blow from a hammer carried forward by its own momentum and free to rebound or recede at the instant of its impact, and that a blow from a hammer of the latter description will do more effective work at a much lower rate of speed than can be accomplished with a positively-actuated hammer.

It is obvious that in my improved machine the absolute freedom of the hammers to rebound or recede from the iron at the instant of the delivery of the blow will diminish the actual time of contact of the hammer-face with the heated iron to a minimum, and thereby proportionately reduce its cooling effect upon the nail being formed, it being desirable to have the hammer-faces in actual contact with the nail-rod for the shortest possible length of time, as it is of the utmost importance to maintain the nail-rod at a white heat during the formation of the nail, as otherwise inferior results will be produced, and it is evident that the greater the length of time that the large cool body of iron composing the front end of the hammer remains in contact with the small portion of iron which forms the nail the sooner it will be reduced from a white to a red heat, in which latter condition the iron cannot be worked to advantage.

I will now proceed to describe the manner in which the nail-rod is fed into the machine.

g g are a pair of feed-rolls, the peripheries of which are slightly concave and are provided with sharp teeth to prevent them from slipping on the nail-rod as the latter passes between them. These rolls are secured to the upper ends of a pair of vertical shafts *h i*, which are supported in long bearings 10 in a disk or carrier head *K*, which is supported by and oscillates upon a center pin or stud *k*, projecting from the front of the frame-work *A*. The carrier-head is steadied and guided as it is oscillated by slots *l* and screws or pins *m*, located on opposite sides of the center, and which also serve to limit the movement of the head in either direction. To the lower ends of the shafts *h i* are secured the gears *n n*, which engage with each other, and on the shaft *h* beneath its gear *n* is secured a ratchet-wheel *o*, with the teeth of which engages a stationary spring-pawl *p*, secured to the front of the frame *A*, whereby, as the carrier-head *K* is oscillated on the pin *k* as a center by mechanism hereinafter described, the feed-rolls are revolved intermittingly to carry forward the nail-rod at the required times, each movement of the lower end of the shaft *h* in the direction of the arrow, Figs. 3 and 4, causing the pawl *p* to engage a new tooth of the ratchet-wheel *o*, while the movement of the shaft *h* in the opposite direction produces a partial rotation of the said ratchet-wheel by

reason of one of its teeth being engaged by the pawl *p*.

q r are the cutters by which the finished nail is severed from the nail-rod after being formed by the hammers. The upper cutter *q* is secured to a horizontal projection or offset 12 near the upper end of a vertical bar *s*, which slides in suitable guides or bearings 13 14 15 in the frame-work, and the lower cutter *r* is secured to the upper end of a vertical bar *t*, which also slides in suitable guides or bearings 16 17 in the frame-work, the cutters being secured to the bars *s t* by means of screws and slots, whereby they may be adjusted horizontally in the direction of the length of the nail-rod to adapt them to cut off nails having heads of any desired length.

The sliding cutter-bars *s t* are moved simultaneously in opposite directions to cause the cutters to advance to sever the nail from the rod, and then return to their normal positions in the following manner: *M* is a horizontal sliding bar, the rear end of which passes through an aperture in the frame-work. At the front end of this bar is an enlarged portion or cam-plate *L*, which is provided with two oppositely-inclined cam-slots *u v*, within which fits screws or pins 18 20, passing through and projecting from the lower ends of the sliding cutter-bars *s t*, to which they are secured by nuts 21. The cam-plate *L* is supported by and slides in a guide 22, secured to the frame-work, and thus, as the bar *M* and the cam-plate *L* are reciprocated by mechanism to be hereinafter described, the slots *u v*, acting upon the screws 18 20, cause the cutter-bars to be simultaneously moved in opposite directions, whereby the required movements are imparted to the cutters. The oscillating carrier-head *K* is connected directly with the lower cutter-bar *t*, whereby the oscillation of the shafts *h i*, with their feed-rolls, is produced by means of a pin *a'*, projecting from the inner face of the head *K*, through a curved slot 25 in the frame-work *A*, into an inclined cam-slot *b'*, formed in a lug or plate *c'*, Figs. 6 and 7, projecting from one side of the cutter-bar *t*, and by this construction the movement of the carrier-head *K* in the most simple, direct, and effective manner, and at a point where it is especially desirable to avoid the employment of complicated mechanism, on account of its liability to get out of order. When the nail is finished and ready to be cut from the nail-rod, it is moved laterally out of the path of the vertical hammers by the oscillation of the carrier-head *K* and its feed-rolls on the center pin *k*, previously described, this movement of the nail-rod bringing it within the path of the cutters just before the latter are brought together. These movements are produced by the bar *M* as it is pushed forward in the direction of the arrow, the return movement of the bar *M*, which takes place after the nail has been severed from the rod, causing the feed-rolls, with the nail-rod, to be swung back

to their proper central position with relation to the upper and lower hammers, and also causing the cutters to recede from each other, the feed-rolls being simultaneously rotated by means of the stationary pawl *p* and ratchet-wheel *o* sufficiently to feed the nail-rod forward the exact amount required for the next nail.

The horizontal bar *M*, with its cam-plate *L*, is reciprocated to actuate the cutter-bars and feed mechanism at the required times in the following manner. Upon the driving-shaft *B* is placed a cam-wheel *N*, within the groove *d'* of which fits an anti-friction roll *e'*, placed on a stud projecting from the upper end of a rocker arm or lever *P*, fulcrumed at *f'*, the lower end of the lever *P* engaging with the bar *M* when the rear end of the latter is raised sufficiently to cause the foot *g'* of the lever *P* to engage the projection *t'* on the upper side of the bar *M*. The cam-groove *d'* is of such form that each complete revolution of the cam-wheel *N* will produce two backward and forward oscillations of the rocker-lever *P*. The elevation of the rear end of the bar *M* is produced by a lever *i'*, fulcrumed at *h'*, and having on its under side a shoulder *l'*, which rests on the periphery of a wheel *m'*, provided with a cam or projection *n'*, Fig. 1, and seen dotted in Fig. 7, the free end of the lever *i'* being connected with the bar *M* by a spiral spring *p'*. On the shaft *q'* of the wheel *m'* and contiguous to the latter is secured a ratchet-wheel *r'*, which is actuated by a reciprocating pawl *s'*, pivoted to the rocker-lever *P* near the upper end of the latter, whereby, through the connections described, each half-revolution of the cam-wheel *N* causes the ratchet-wheel *r'* to be moved forward one tooth and with it the wheel *m'*, and thus as the latter is rotated its cam *n'* is brought up against the under side of the lever *i'*, raising the same and putting a tension upon the spring *p'* to lift the bar *M* into engagement with the rocker-lever *P* as soon as the foot *g'* of the latter is brought into line with the projection *t'* by the movement of the cam-wheel *N*. When this engagement has taken place, the rocker-lever *P* is moved by the cam *N* to push the bar *M* forward in the direction of the arrow, Figs. 1 and 7, which, through the connections described, oscillates the carrier-head *K* with the feed-rolls to move the nail-rod laterally into line with the cutters, and causes the latter to be brought together to sever the finished nail from the rod. At the completion of the forward movement of the bar *M* the cam *n'* passes out of contact with the shoulder *l'* of the lever *i'*, when the latter will drop and allow the rear end of the bar *M* to descend sufficiently to disengage the notch *h'* from the foot *g'* of the rocker-lever *P*, which on its return movement bears against a lug or projection *t'* on the bar *M*, and thus moves the latter back to its original position, when it will remain stationary until, by the complete revolution of the ratchet-

wheel *r'*, the cam *n'* is again brought into position to raise the lever *i'*, when the operation will be repeated as before. The return movement of the bar *M* in the direction contrary to the arrow, Figs. 1 and 7, causes the cutters to recede from each other and the nail-rod to be swung over into its proper central position with relation to the hammers and fed forward the exact amount required for the next nail. The number of teeth of the ratchet-wheel *r'* corresponds to the number of blows given by either pair of hammers, and consequently the number of blows to which the nail is subjected previous to being cut off is regulated and determined by the number of teeth in the said ratchet-wheel *r'*, as a complete revolution of said wheel is required to bring the cutters and feed mechanism into action, and when it is desired to vary the number of blows of the hammers to which the nail is subjected the ratchet-wheel is removed from its shaft *q'*, and another having a different number of teeth substituted therefor.

The above-described machine possesses very few parts, and the connections between the moving portions are of the simplest and most direct character, thus relieving the machine of all unnecessary complication, reducing its cost, and rendering it exceedingly durable and free from liability to derangement, while the friction and wear and tear are reduced to a minimum, there being no powerful hammer-springs to be forced back against their own resistance, which has heretofore caused a great waste and much unnecessary loss of power.

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

1. The combination, with the hammers arranged to operate alternately in pairs, of the cam-wheel *D*, adapted to actuate the hammers in both directions and having a groove *e* for the reception of the hammer-helves provided with recesses or enlargements *f*, whereby the hammers are released from the control of the cam previous to giving their blow, and left free after striking the heated nail-rod to instantly rebound or recede from the same before being again brought under the control of the cam, substantially as and for the purpose set forth.

2. The combination, with the lower vertical sliding cutter-bar *t*, provided with a lug or plate *c'*, having a cam-slot *b'*, of the oscillating head *K*, carrying the feed-rolls and their connected shafts, and having a pin *a'* fitting within the cam-slot *b'* of the lug *c'*, whereby the movement of the sliding cutter-bar *t* is communicated directly to the oscillating carrier-head *K*, substantially as and for the purpose described.

3. The combination, with the reciprocating bar *M*, having at its front end an enlarged portion or cam-plate *L*, provided with two oppositely-inclined cam-slots *u v*, of the vertically-sliding cutter-bars *s t*, carrying the cutters *q r*, and provided at their lower ends

with screws or pins 18 20, fitting within the slots *u v* of the cam-plate L, all operating substantially in the manner and for the purpose set forth.

- 5 4. The combination of the hammers and their operative cam-wheel D, the vertically-sliding cutter-bars *s t* and their cutters *q r*, the feed-rolls *g g*, with their connected shafts and oscillating carrier-head K, the latter con-
10 nected directly with the lower cutter-bar *t* by a pin *a'* and cam-slot *b'*, the horizontal reciprocating bar M with its notch *h'*, connected with and operating the cutter-bars *s t*, the rocker-lever P, adapted to engage the notch

h' of the bar M, the cam N on the driving- 15 shaft B, engaging with the rocker-lever P, the lever *i'*, connected with the bar M by a spring *p'*, the cam *n'* on the shaft *q'*, the ratchet-wheel *r'* on said shaft *q'*, and its actuating-pawl *s'*, pivoted to the lever P, all operating 20 substantially in the manner and for the purpose described.

Witness my hand this 5th day of April, A. D. 1887.

CHARLES E. MOORE.

In presence of—

P. E. TESCHEMACHER,
EDWIN F. EDGETT.