No. 607,924. Patented July 26, 1898.

E. T. FREEMAN.

NAILING MACHINE.

(Application filed Feb. 15, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

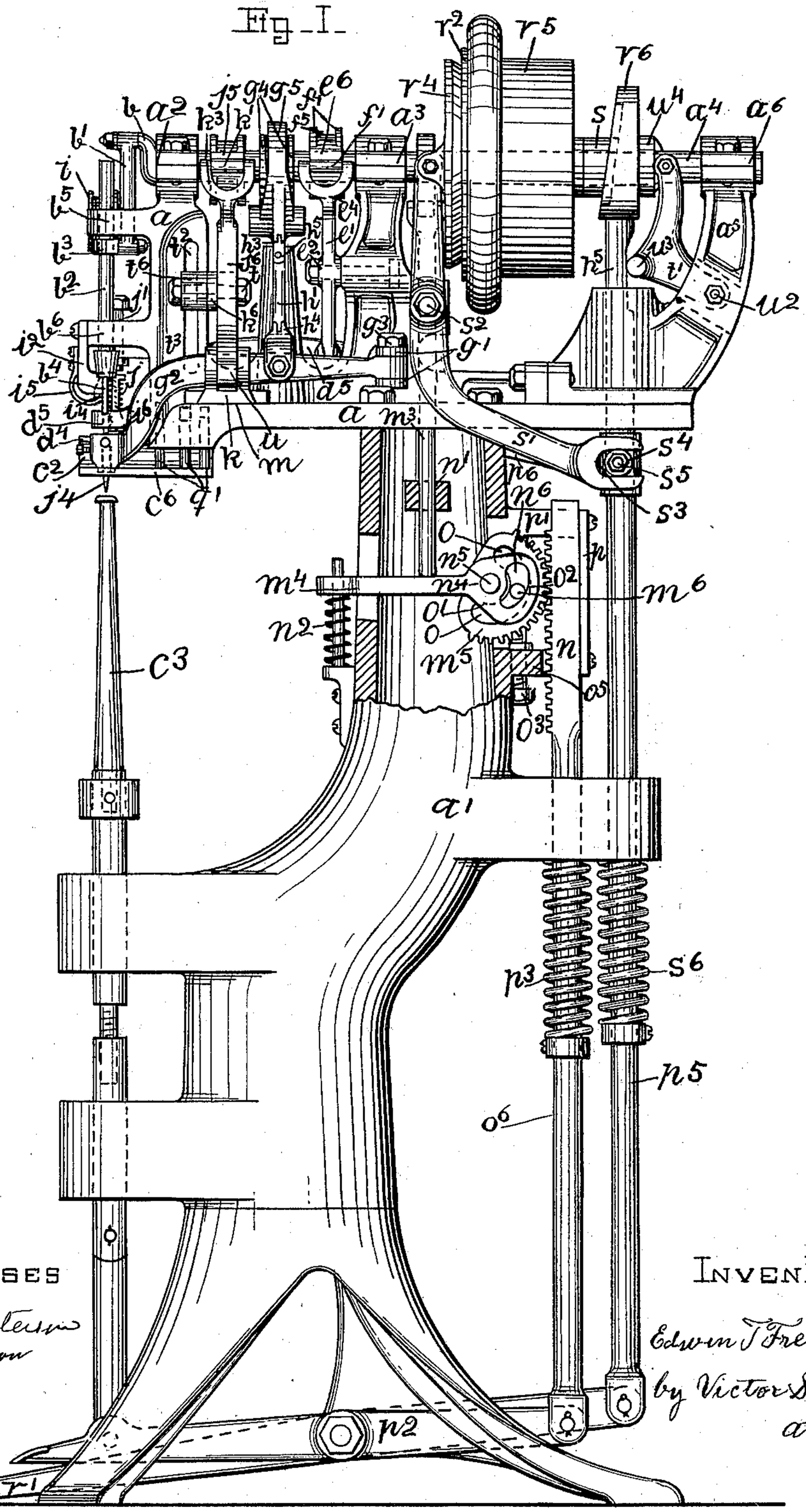

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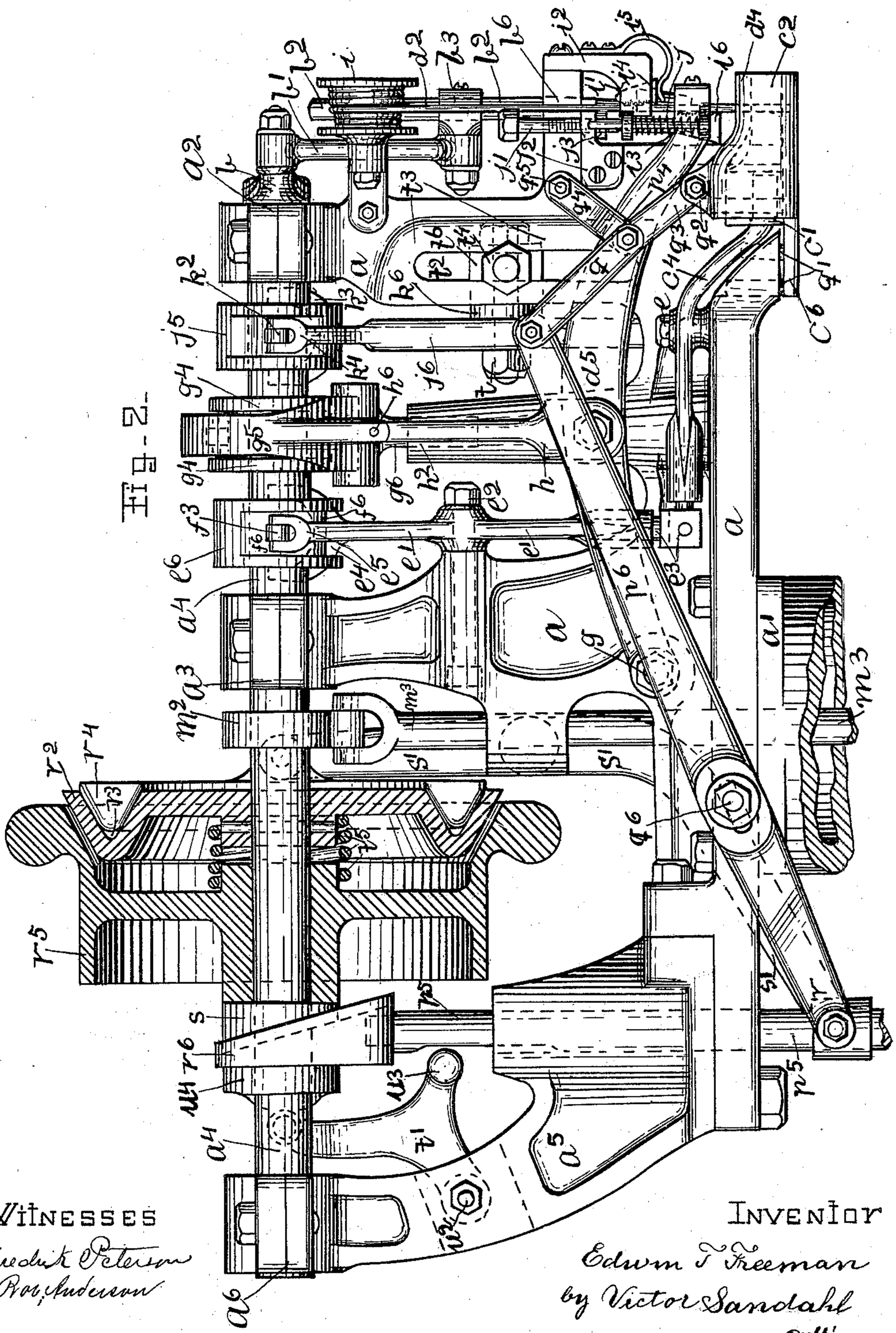
Fig. 2.



WITNESSES

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4 Sheets—Sheet 3.

Fig. 3.

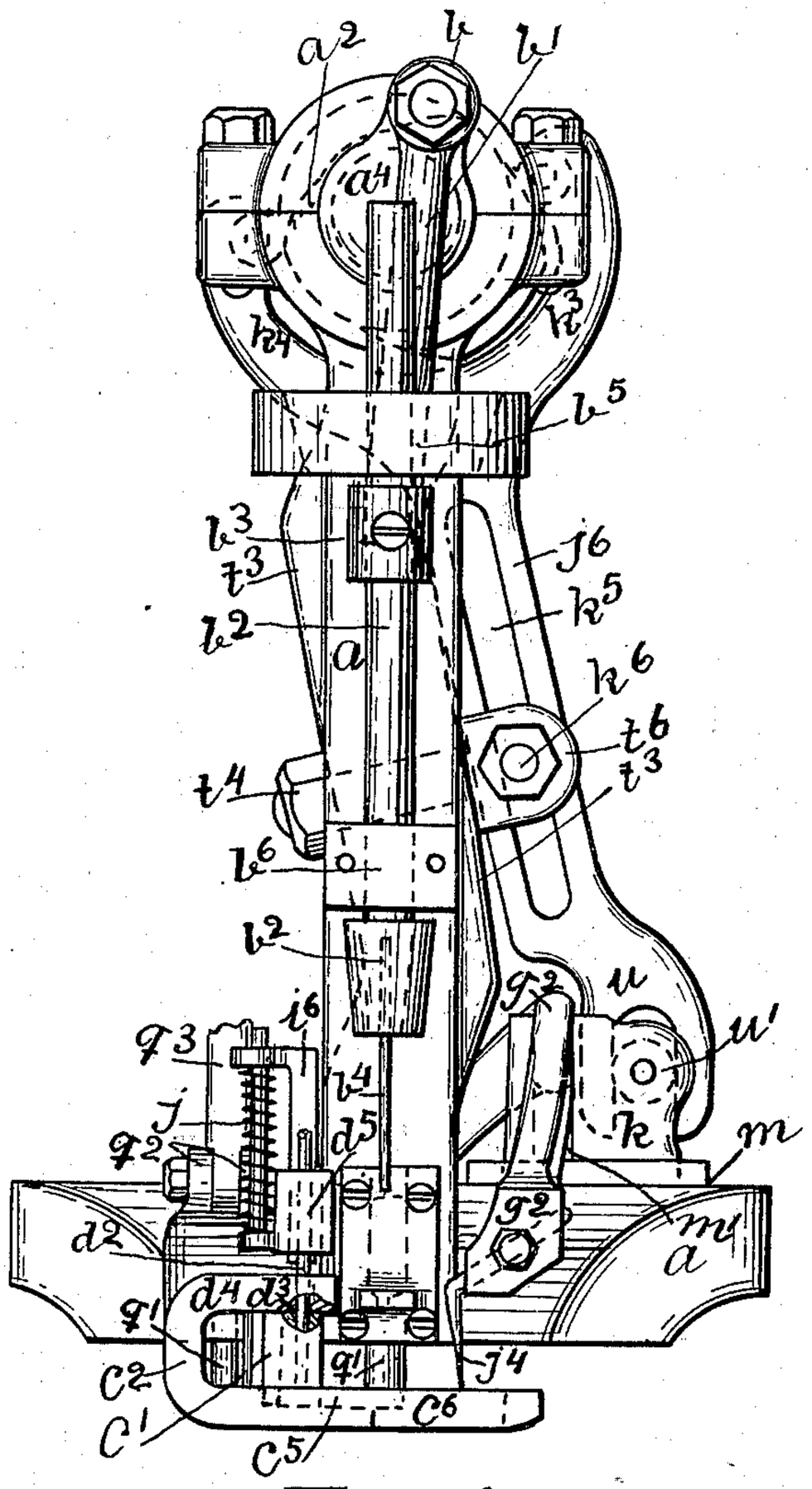

Fig. 4.

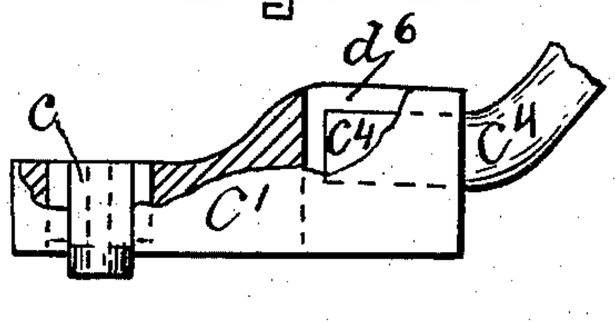

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Fig. 5.

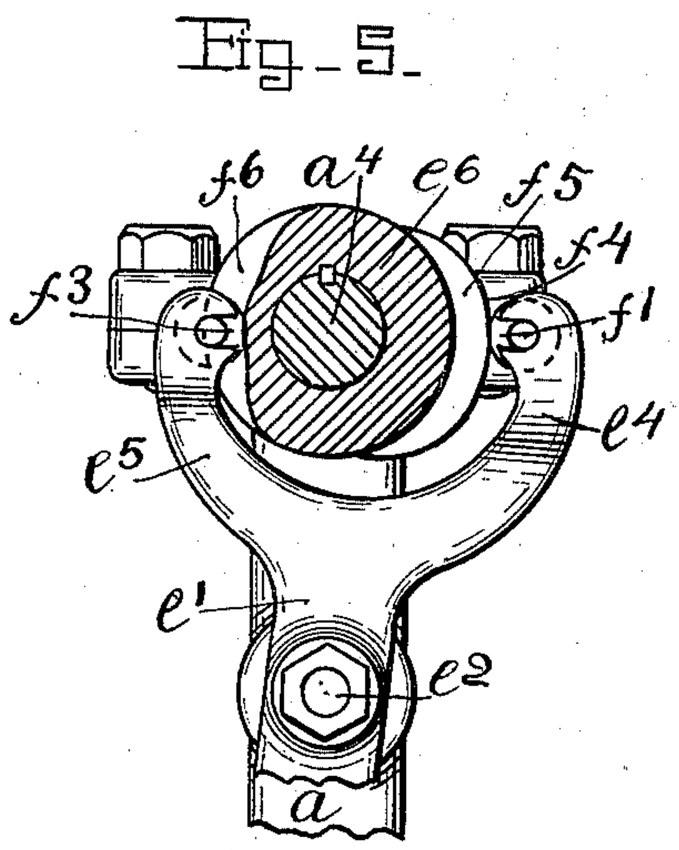


Fig. 6.

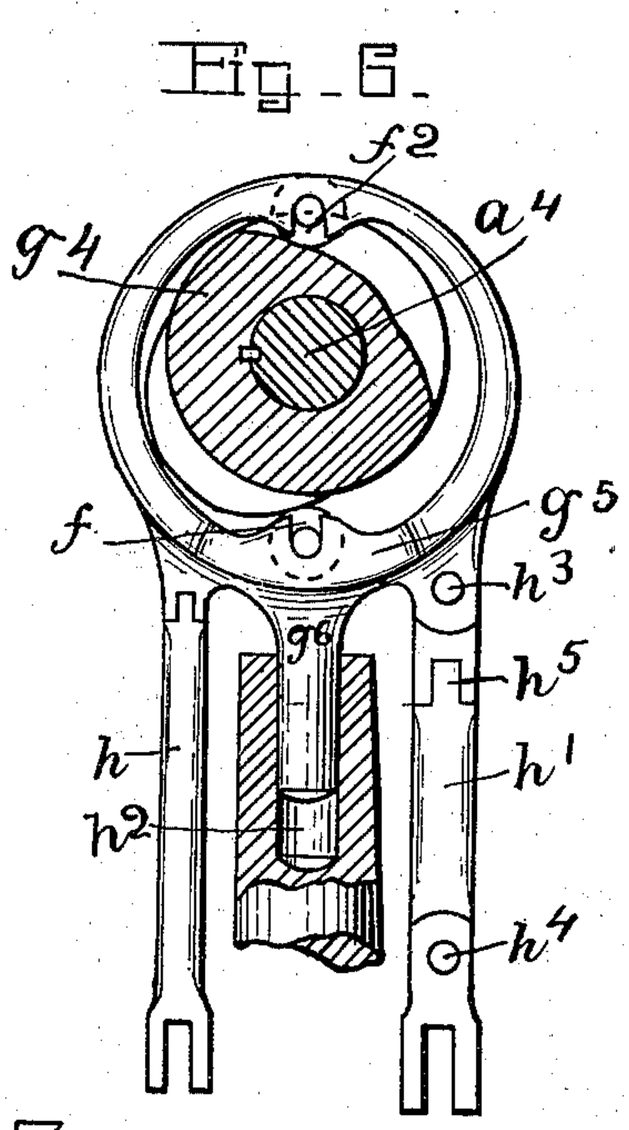
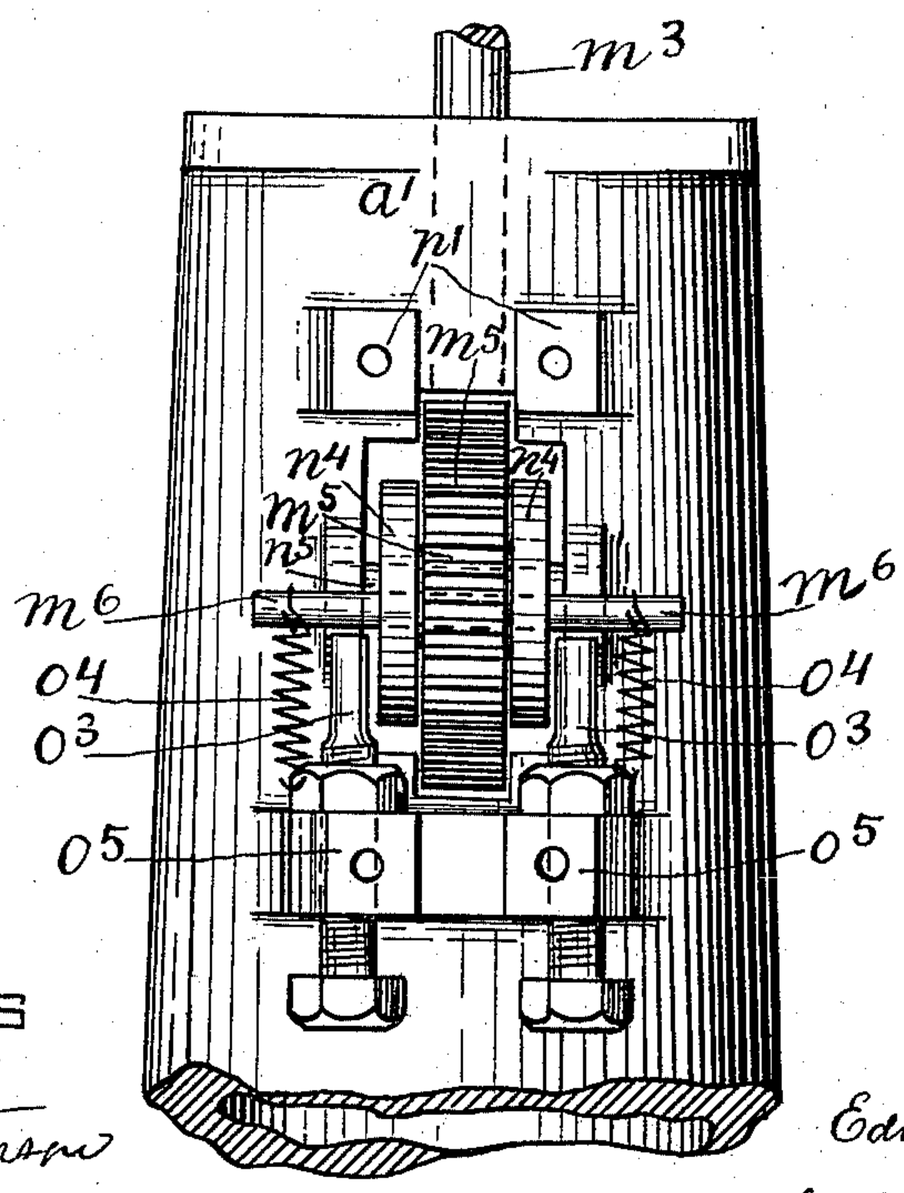


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWIN THEOPHILUS FREEMAN, OF HALIFAX, CANADA.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 607,924, dated July 26, 1898.

Application filed February 15, 1897. Serial No. 623,543. (No model.)

To all whom it may concern:

Be it known that I, EDWIN THEOPHILUS FREEMAN, of Halifax, in the county of Halifax and Province of Nova Scotia, Canada, have invented certain new and useful Improvements in Nailing-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

The main feature of my invention consists of a nose-plate against which the stock, when the machine is in motion, is periodically pressed by a stock-support, which is automatically adjustable to the varying thicknesses of the stock, and the nose-plate automatically moved from the stock-support at the stopping of the machine, so as to permit the stock to be removed, and, if desired, replaced by another, and the nose-plate at the starting of the machine moved toward the stock-support.

Other important features of my invention consist of the combinations of the cams and levers operating the awl and the wire-feeding mechanism.

Another feature of my invention consists of the means whereby the awl is forced to feed the stock.

Another important feature of my invention consists of the mechanism which by connection periodically depresses the stock-support.

In the accompanying drawings, Figure 1 is a right-hand side elevation of a machine embodying my invention, showing the nose-plate in its lower position and the upper end of the column in section. Fig. 2 is a left-hand side elevation, partly in section, of the head portion of the machine, showing the nose-plate in its upper position. Fig. 3 is a front view showing the nose-plate, the adjustable stock-feeding mechanism, and a nail-carrier and a wire-feeding mechanism. Fig. 4 is a view, partly in section, of the nail-carrier and front end of the lever operating the nail-carrier. Fig. 5 is a view of the cam and lever which operate the nail-carrier lever, the cam being shown in section. Fig. 6 is a view of a cam and of a block operated by the cam, whereby vertical motions are given to the awl-carrying and wire-feeding levers, the cam being shown in section. Fig. 7 is a view of part of mechanism whereby the stock-support is periodically depressed.

The same letters of reference indicate the same or similar parts in all the figures.

The frame a is mounted on a column a' and has the front and middle bearings a^2 and a^3 for the shaft a^4. An arm a^5 is bolted to the frame a and has the third bearing a^6 for the shaft a^4. On the front end on the shaft a^4 is a crank b, which carries a rod b'. This rod is connected by connection b^3 to a bar b^2, which bar carries the driver b^4 and is guided in vertical bearings b^5 and b^6, and which is by its connection to the crank given a reciprocating motion.

The driver b^4 enters a nail-guide c in its downward movement and drives a nail that is in the guide through a perforation in the nose-plate c^2 and into stock, which is held by a stock-support c^3 against the nose-plate. The nail-guide c extends through a nail-carrier c', which is guided between an upper part d^4 and a lower part c^6 of the nose-plate. When the driver is withdrawn from the nail-guide, the nail-carrier is moved from the driver by a lever c^4, and when stopped at its extreme outer position the wire d^2 is fed a proper length through a perforation d^3 and into the nail-guide. After the wire is fed into the nail-guide the nail-carrier is moved toward and into line with the driver, thereby causing a nail to be cut from the wire by the sides of the perforation d^3 and the nail-guide c and carried in the nail-guide into line with the driver.

Studs q' extend from the lower part c^6 of the nose-plate c^2 and into vertical bearings in the frame a. Thereby the nose-plate is prevented from lateral movements, but capable of vertical movements. From the upper part d^4 of the nose-plate project ears q^2, to which the lower end of a bar q^3 of a toggle-joint p^4 is attached. The upper end of a bar q^4 of the toggle-joint is hung on a stationary stud q^5. A bar q is attached to the toggle-joint and to one end of a lever p^6. This lever is slotted where hung on a stud q^6, so as to be permitted to be both slid and turned on the stud. The end r of the lever is pivotally attached to a rod p^5, which is pivotally attached to a treadle r' and carries at its upper end an inclined block r^6. When the treadle r' is operated to raise the rod p^5, the inclined block r^6 forces in a well-known manner the driv-

ing-pulley r^5 against a friction-wheel r^2, which is firmly mounted on the shaft a^4, thereby causing the starting of the machine if power is transmitted to the driving-pulley. The front end of the lever p^6 is moved forward and downward when the machine is started by the raising of the rod p^5. Thereby the bars in the toggle-joint p^4 are moved into line with each other, thereby forcing the nose-plate c^2 downward. When the treadle r' is released, the rod p^5 is lowered and a spring t^5 is permitted to move the driving-pulley out of contact with the friction-wheel and the bars of the toggle-joint p^4 are moved out of line with each other. Thereby, respectively, the machine is stopped and the nose-plate raised.

The lever c^4 is pivotally attached to the frame a at e and has its front end extending into a groove d^6, which extends vertically in the nail-carrier c' and is adapted to permit the nail-carrier to be moved vertically by the nose-plate without altering the position of the lever c^4, but does not permit the lever c^4 to be moved laterally without moving the nail-carrier. The lever c^4 is moved laterally by a lever e', which levers are connected by a universal joint e^3.

The lever e' is hung on a stud e^2 and has arms e^4 and e^5 extending upward, one on each side of a cam e^6, which is mounted on the shaft a^4. The arm e^4 has two bearings, one on each side of the flat surface of the cam, for a cam-roller f'. The arm e^5 has two bearings for a shorter cam-roller f^3. Both of these cam-rollers are in contact with the periphery of the cam e^6. This cam has a projection f^4 projecting from its periphery. Through the middle of the width of this projection extends a groove f^5, which is wider than the length of the cam-roller f^3, including the bearings for the cam-roller. The radius to the bottom of this groove is equal to the radius of the cam proper. In the middle portion of the periphery of the cam on the side opposite to the projection f^4 is a groove f^6, which has its width equal to the width of the groove f^5 and which has its bottom a distance from the periphery of the projection f^4 equal to the diameter of the cam proper.

When the cam e^6 is revolved and the projection f^4 reaches the cam-roller f', the cam-roller is moved from the center of the cam. Thereby the upper end of the lever is moved in the same direction, and the cam-roller f^3 is held in contact with the bottom of the groove f^6, as the sides of the groove pass one on each side of the cam-roller, and the distance between the periphery of the projection f^4 and the bottom of the groove f^6 is equal to the diameter of the cam proper. It will be seen that the projection f^4 passes the cam-roller f^3 without moving the cam-roller, as the sides of the groove f^5 pass one on each side of the cam-roller. This cam, with its two cam-rollers, gives a more steady positive motion than cams in general use, as two cam-rollers are used and both are in contact with the cam during the entire revolution of the cam and both having bearings, one at each end, in the same lever. Thus an even pressure is given to each end of the cam-rollers and also to the lever having the bearings for the cam-rollers, as the middle of the length of the cam-rollers and the longitudinal center of the lever are in line with the middle of the width of the periphery of the cam.

A wire-feeding lever d^5 is at its rear end hung on one end of a stud g. This stud has its bearing, in which it can be turned, in the frame a and has its other end forked, in which fork the rear end of an awl-carrying lever g^2 is turned laterally on a stud g^3. The levers d^5 and g^2 are moved vertically by connection to a block g^5, which block has two cam-rollers f and f^2 in contact with a cam g^4. This cam is similar to the cam e^6, and the cam-rollers f and f^2 are similar and placed similar, respectively, to the cam-rollers f' and f^3, with the exception that one cam-roller is placed in the block above the center of the shaft a^4, on which the cam is mounted, and the other placed in the block below the center of the shaft. Thereby the block is given a vertically-reciprocating motion. An arm g^6 extends from the block g^5 and into a bearing h^2, in which it is capable of vertical movement, but prevented from lateral movement. Thereby the arm is acting as a guide for the block when moved by the cam.

The lever d^5 is connected to the block g^5 by an arm h, which is pivotally attached to the lever, and also at h^6 pivotally attached to the block. The other lever is connected to the block by an arm h', which is pivotally attached to the lever, and also at h^3 pivotally attached to the block, and which is jointed at h^4 and h^5, so as to permit the lever to be moved both vertically and laterally.

The wire d^2 is coiled upon a reel i and passes through an inclined perforation i^3 and into the perforation d^3, which extends through the upper part of the nose-plate. The perforation i^3 extends through the lever d^5, and when the lever d^5 is moved downward an inclined toothed block i^6 in the perforation i^3 binds in a well-known manner the wire to the lever. Thereby the wire is fed into the nail-guide. When the movement of the lever is reversed, the block i^6 loses its hold on the wire, which is insured from upward movements in a well-known manner by an inclined toothed block i^4, which has its position in an inclined perforation i', extending through a stationary block i^2, through which perforation the wire also passes.

The awl j^4 is carried in a well-known manner by the front end of the lever g^2 and is forced by the vertical movement of the lever to puncture the stock supported by the stock-support c^3 and to withdraw from the stock. When the awl is forced into the stock, the end of the lever g^2 carrying the awl is moved by a sliding block k toward the driver b^4, thereby causing the awl to move the stock.

When the awl comes into line with the driver, the movement of the lever is stopped and the awl withdrawn from the stock, and the sliding block moves the lever in the opposite direction. In the sliding block is a groove m', through which the lever g^2 extends and in which the lever is prevented from lateral movement, but capable of a vertical movement. The sliding block is slid in a groove m and has a roller u' (shown in dotted lines in Fig. 3) pivotally attached to it. The end u of a lever j^6, which is forked, fits over the roller u'. Thereby the sliding block is slid when the lever is moved by a cam j^5. In the lever j^6 is a longitudinal slot k^5, and a stud k^6, provided with a shoulder, extends through the slot k^5 and is firmly secured by a nut to the lever. This stud k^6 extends through a perforation in a stud t^6, in which the stud is capable of being turned. The stud t^6 has a shank extending through a vertical slot t^2 and is secured to the frame by a nut t^4. The slot t^2 is made in a part t^3 of the frame, which part is sloping toward the sliding block k.

On the upper end of the lever j^6 are arms k^3 and k^4, which are similar to the arms e^4 and e^5 and carry cam-rollers k' and k^2. These cam-rollers are in contact with a cam j^5 and are similar to the cam-rollers f' and f^3, and the cam j^5 is similar to the cam e^6.

The extent of the feeding of the stock by the awl can be regulated by the raising and lowering of the studs k^6 and t^6 in their respective slots. If they are raised, the extent of the movement of the lower end of the lever j^6 will be longer, and if moved downward the extent of the movement will be shorter. Consequently the awl, which moves the stock, is moved accordingly by its connection to the lever. If the part t^3, having the slot t^2, was not sloping or giving a proper angle to the frame, the difference of the movement of the awl would be at both the ends of the movement. Consequently the perforation left in the stock by the awl would not be in line with the driver and the nail driven on one side thereof.

The stock-support c^3 is connected by a treadle p^2 to a rod o^6, which is surrounded by a coil-spring p^3. By the tendency of this spring the stock-support is forced to press the stock against the nose-plate. On the upper end of this rod is a toothed rack n, which is guided by a plate p and parts o^5 and p' of the column a' and which engages a segment-gear m^5. This segment-gear is hung on a stud n^5 in the forked end n^4 of a lever m^4, which lever is also hung on the stud n^5, which stud has its bearings in the column a'. The other end of the lever m^4 is held in contact with a vertical rod m^3, which has a cam-roller at its upper end in contact with a cam m^2 and which is guided in a bearing n'. In the segment-gear m^5 is a semicircular slot o, and in the lever m^4, in line with the slot o, is a slot n^6, similar to the slot o. The inner side o' of the slot o and the outer side o^2 of the slot n^6 are eccentric to each other, they being farthest apart at their upper ends. A roller m^6 is placed in the slots with the ends extending outside the lever and above two bolts o^3, one end over each bolt. Two coil-springs o^4 are attached to the roller and to stationary parts of the machine. The tendency of these springs is to force the roller downward and into contact with the upper ends of the bolts o^3. When the rod m^3 is depressed by the cam m^2, the end of the lever m^4 having the slot n^6 is raised, and the roller m^6 is clamped between the sides o' and o^2 of the slots when that part of the slot n^6 reaches the roller, when the distance between the sides o' and o^2 is equal to the diameter of the roller.

It will be seen that by the clamping of the roller m^6 between parts of the segment-gear and the lever m^4 the segment-gear is forced to turn on its fulcrum the remaining part of the upward movement of the end of the lever having said part, thereby causing the rod o^6 to be raised against the influence of the spring p^3 and the stock-support to be depressed. When the movement of the lever m^4 is reversed and the roller m^6 reaches the bolts o^3, the roller is forced by the bolts out of its clamping position and held there until said part of the slot n^6 in the next movement reaches the roller. By this periodical movement the stock-support provides for varying thicknesses of stock and also permits the stock to be moved freely by the awl, as the lateral movement of the awl toward the driver corresponds with the periodic depressing of the stock-support. By the lowering or raising of the bolts o^3 the extent of the periodical depressing of the stock-support can be adjusted to any suitable length.

Having thus described my invention, what I claim is—

1. In a nailing-machine, in combination, a movable stock-support automatically adjustable to the varying thicknesses of stock, a nose-plate, and starting and stopping mechanism connected with said nose-plate and operating the nose-plate, for the purpose set forth.

2. In a nailing-machine, a movable nose-plate, starting and stopping mechanism connected with said nose-plate, and a nail-carrier guided by said nose-plate, for the purpose set forth.

3. In a nailing-machine, in combination, a vertically-movable stock-support periodically depressed and adapted to automatically provide for varying thicknesses of stock, a nose-plate, and starting and stopping mechanism by connecting mechanism moving said nose-plate, for the purpose set forth.

4. In a nailing-machine, the combination of a movable nose-plate, a toggle-joint attached to the nose-plate, a lever connected to starting and stopping mechanism, a bar connecting said toggle-joint and lever, for operation substantially as described.

5. In a nailing-machine, a revolving cam,

a projection on the periphery of said cam, a groove in said projection, another groove in said cam opposite to said groove, a lever having one part extending on one side of the center of the cam, and another part extending on the opposite side of the center of the cam, one of said parts operated by said projection to move the lever in one direction, and the other part operated by the bottom of the latter groove to move the lever in the opposite direction, for the purpose set forth.

6. In a nailing-machine, in combination, a revolving shaft, a cam g^4 on said shaft, a block carrying cam-rollers f and f^2, one of the cam-rollers carried above the center of the shaft and the other carried below the center of the shaft, arms g^6, h and h' on said block, one arm serving as a guide to the block, levers connected to the other arms for operation thereof, for the purpose set forth.

7. In an adjustable stock-feeding mechanism in a nailing-machine, in combination, a lever having a lateral motion, a longitudinal slot in said lever, a stud having two shank portions, one of the portions extending through said slot and adapted to be adjusted and secured in position in the slot, a sloping part of the frame of the machine, a vertical slot in the sloping part, a stud extending through the vertical slot in the sloping part and adapted to be secured in position and adjusted vertically, a bearing in the latter stud for the other shank portion of the former stud, for operation substantially as described.

8. In a nailing-machine, in combination, a revolving shaft, a cam mounted on said shaft, a lever moved laterally by said cam and having a longitudinal slot, a stud extending through said slot and adapted to be moved in the slot and secured in its position and holding said lever in position, a sloping part of the frame of the machine, a vertical slot in the sloping part, a stud extending through the slot in the sloping part and adapted to be moved in the slot and secured in its position, and the first stud secured to the latter stud, a block having a groove and connected to the lower end of said lever having the longitudinal slot, a lever extending through said groove and moved laterally by said block, a block connected to the latter lever, a cam giving a reciprocating motion to the latter block, an awl carried by the latter lever and thereby given vertical and lateral motions, for the purpose set forth.

9. In a nailing-machine, in combination, a revolving shaft, a cam j^5 on said shaft, a lever j^6 operated by said cam, cam-rollers k' and k^2 carried by said lever, a longitudinal slot k^5 in the lever, a fork u at the lower end of the lever, a sloping part t^3 of the frame, a slot t^2 in the sloping part, adjustable studs k^6 and t^6 secured to each other and kept in position in the slots k^5 and t^2, respectively, a block k having a groove m', a roller u' having its bearings in the block k, the fork u fitting over said roller, a lever g^2 extending through the groove m' and adapted to be moved laterally by the block k, a block g^5 connected to the lever g^2 by an arm h', cam-rollers f and f^2 carried by the block g^5, a cam g^4 mounted on a shaft a^4 and giving a vertical motion to the block g^5, an awl carried by the lever g^2, for the purpose set forth.

10. In a nailing-machine, in combination, a lever, means to operate said lever, a slot in said lever, a gear, a slot in said gear, a roller in the two said slots, a stock-support, connection between said gear and stock-support, said connection operated by said gear to periodically depress said stock-support, for the purpose set forth.

11. In a nailing-machine, in combination, a lever having one end forked, a stud through the forked end on which the lever is turned, a semicircular slot through the sides of the forked end, means to give a vertical motion to said lever, a gear hung in the forked end of said lever and on said stud, a semicircular slot in said gear in line with the first slot, one side of the first slot and the opposite side of the latter slot eccentric to each other, a roller in said slots periodically locking said lever and gear together and periodically unlocking them, means to adjust the roller to lock and unlock said lever and gear at any desired time of the movement of the lever, a rod provided with a rack having teeth engaging said gear, whereby the rod is moved periodically up and down, a stock-support connected with said rod.

12. In a nailing-machine, in combination, a revolving shaft, a cam on said shaft, a rod depressed periodically by said cam, a lever depressed by said rod, means to move said lever upward, one end of said lever forked and hung on a stud, a semicircular slot through the sides of said forked end, a gear hung on said stud and in the forked end of said lever, a semicircular slot in the gear in line with the other slot, one side of the latter slot eccentric to the opposite side of the first said slot, a roller placed in said slots, said roller periodically locking and unlocking the lever and segment-gear, adjustable bolts under said roller, unlocking the roller and upholding it before being locked, a rod provided with a rack having teeth engaged by said gear, a stock-support connected with the rod provided with the rack, for the purpose set forth.

13. In a nailing-machine, in combination, a revolving shaft, a cam m^2 on the shaft, a rod m^3 depressed by said cam, a lever m^4 depressed by said rod, a spring upholding the lever m^4, one end of the lever forked and hung on a stud n^5 and having a slot n^6, a gear m^5 in the forked end of the lever m^4 and hung on the stud n^5, a slot o in said gear having its side o' eccentric to the opposite side o^2 of the slot n^6, a roller m^6 in said slot, said roller locking and unlocking said lever and gear, adjustable bolts o^3 regulating the operation

of the roller m^6, springs bearing against the roller, a rod o^6 provided with the rack n, said rack engaged by the gear m^5, a stock-support c^3 connected to the rod o^6 by the treadle p^2, for operation substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 2d day of February, A. D. 1897.

EDWIN THEOPHILUS FREEMAN.

Witnesses:
LOUIS A. SOMERS,
W. H. COVERT.