(No Model.)

6 Sheets—Sheet 1.

E. WOODWARD.

MACHINE FOR LOADING HEELS WITH NAILS.

No. 562,944. Patented June 30, 1896.

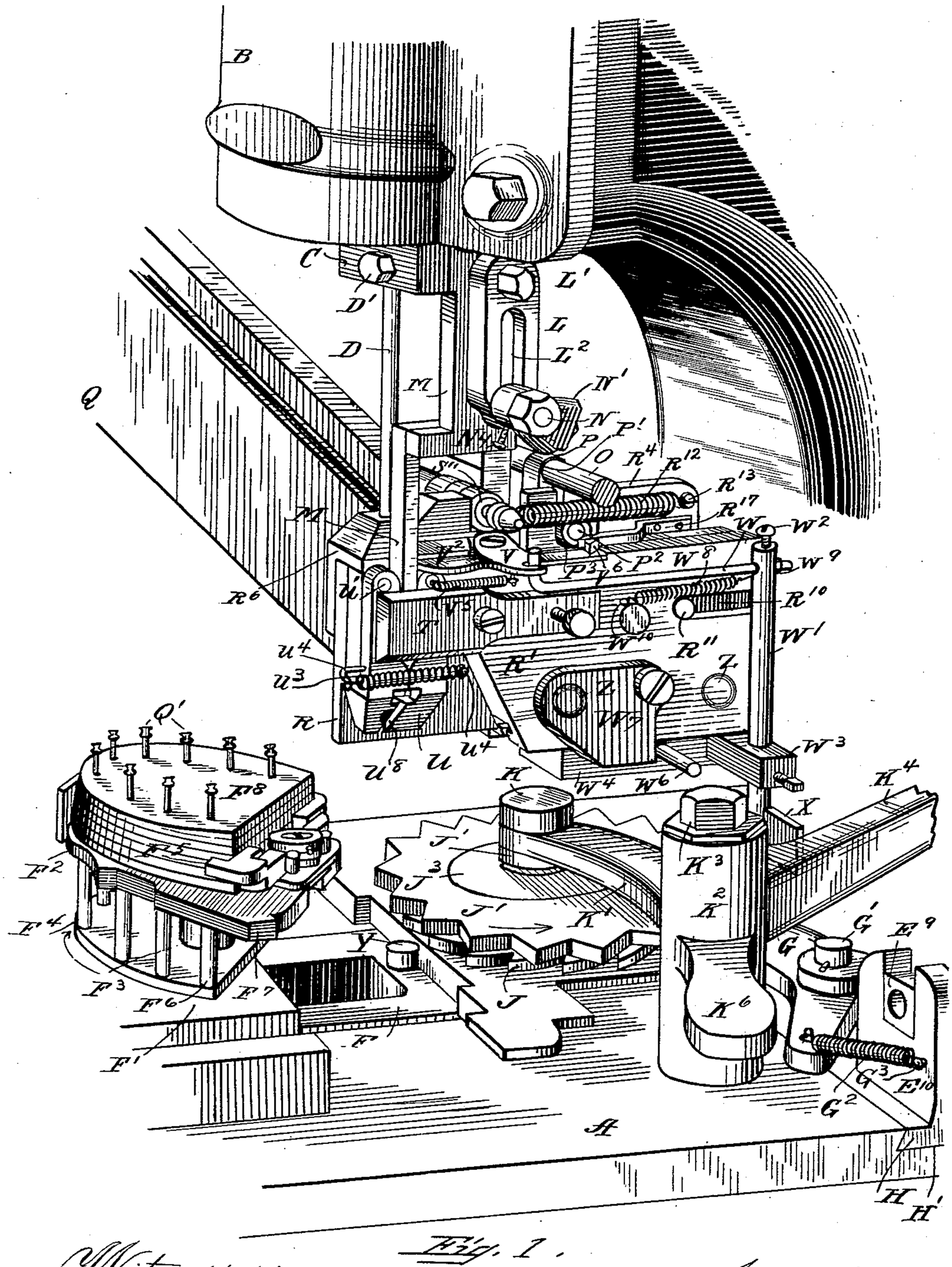

Fig. 1.

Witnesses:
E. L. Harlow.
L. B. Brown.

Inventor:
Erastus Woodward
By J. L. Rueck
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(No Model.) 6 Sheets—Sheet 2.

E. WOODWARD.

MACHINE FOR LOADING HEELS WITH NAILS.

No. 562,944. Patented June 30, 1896.

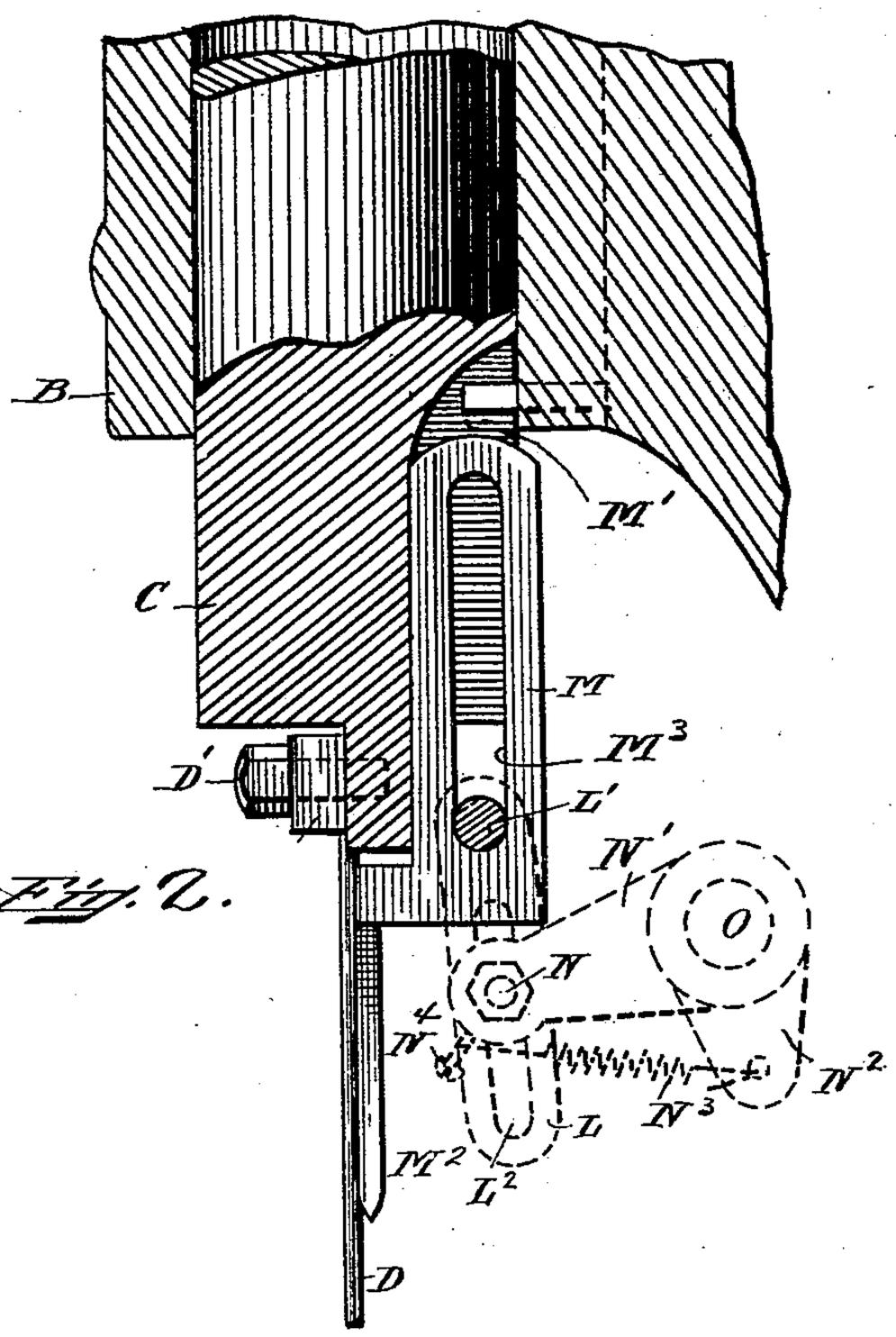

Fig. 2.

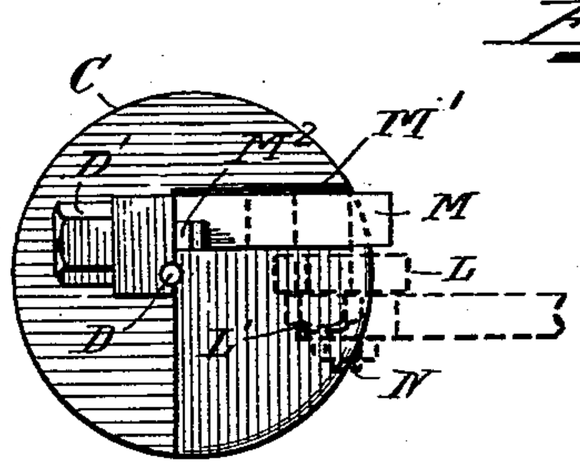

Fig. 3.

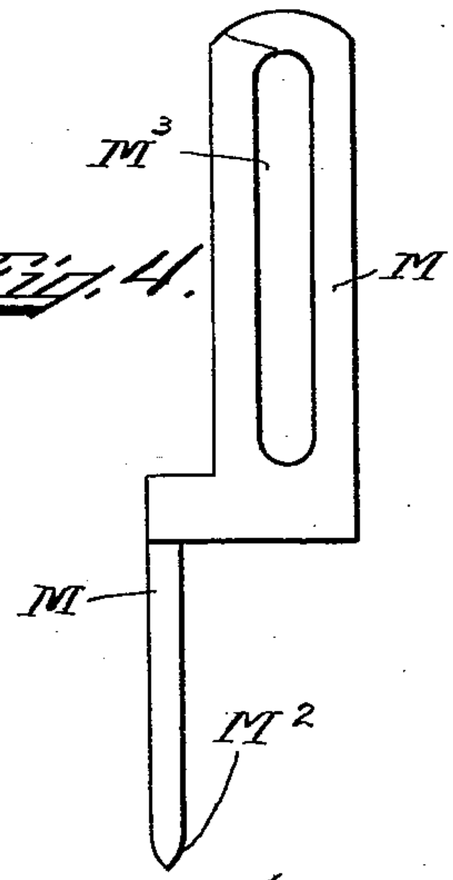

Fig. 4.

Witnesses.
E. L. Harlow.
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Inventor.
Erastus Woodward
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(No Model.) 6 Sheets—Sheet 3.

E. WOODWARD.

MACHINE FOR LOADING HEELS WITH NAILS.

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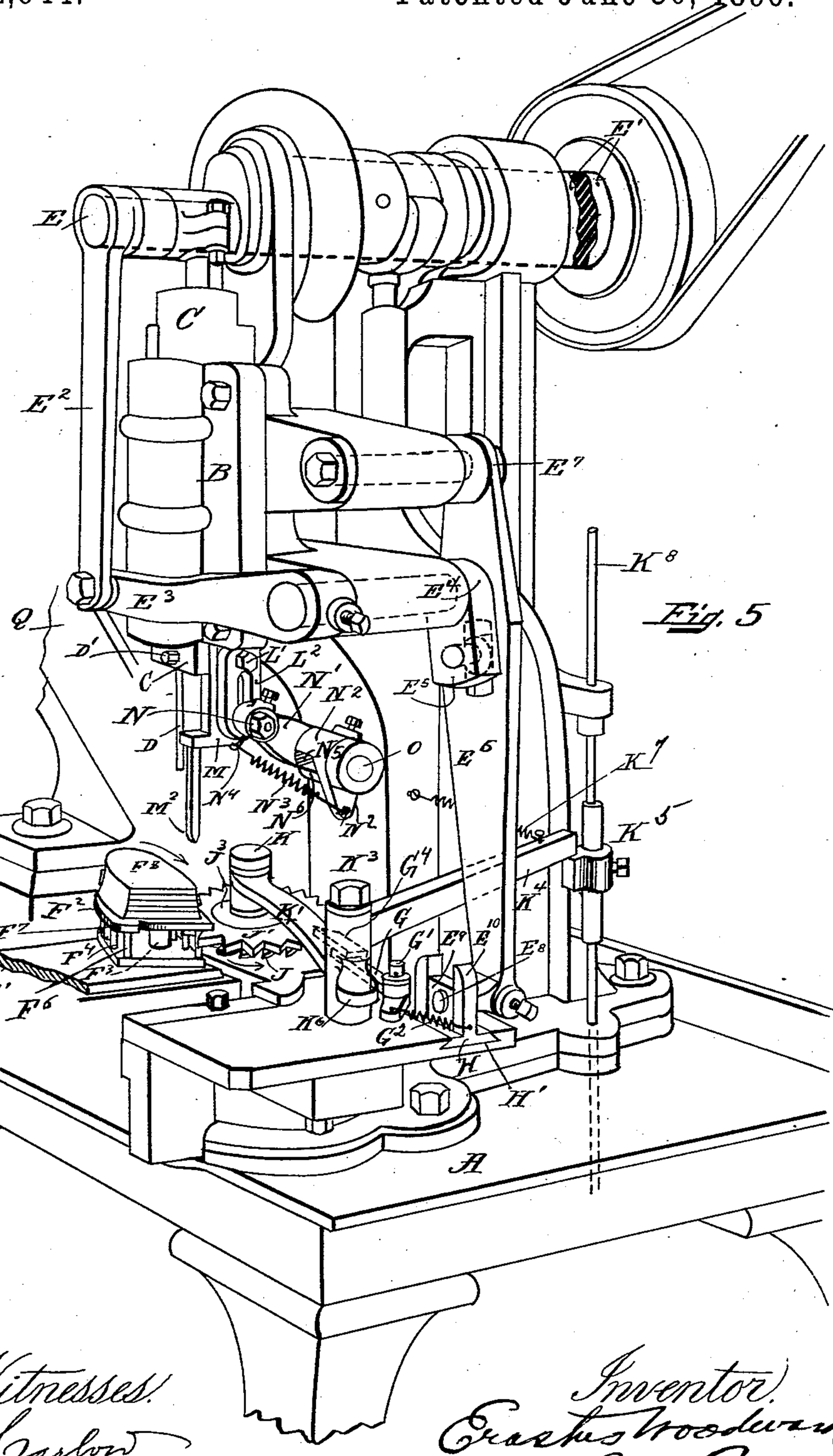

Fig. 5

Witnesses:
E. L. Harlow.
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(No Model.) 6 Sheets—Sheet 4.

E. WOODWARD.

MACHINE FOR LOADING HEELS WITH NAILS.

No. 562,944. Patented June 30, 1896.

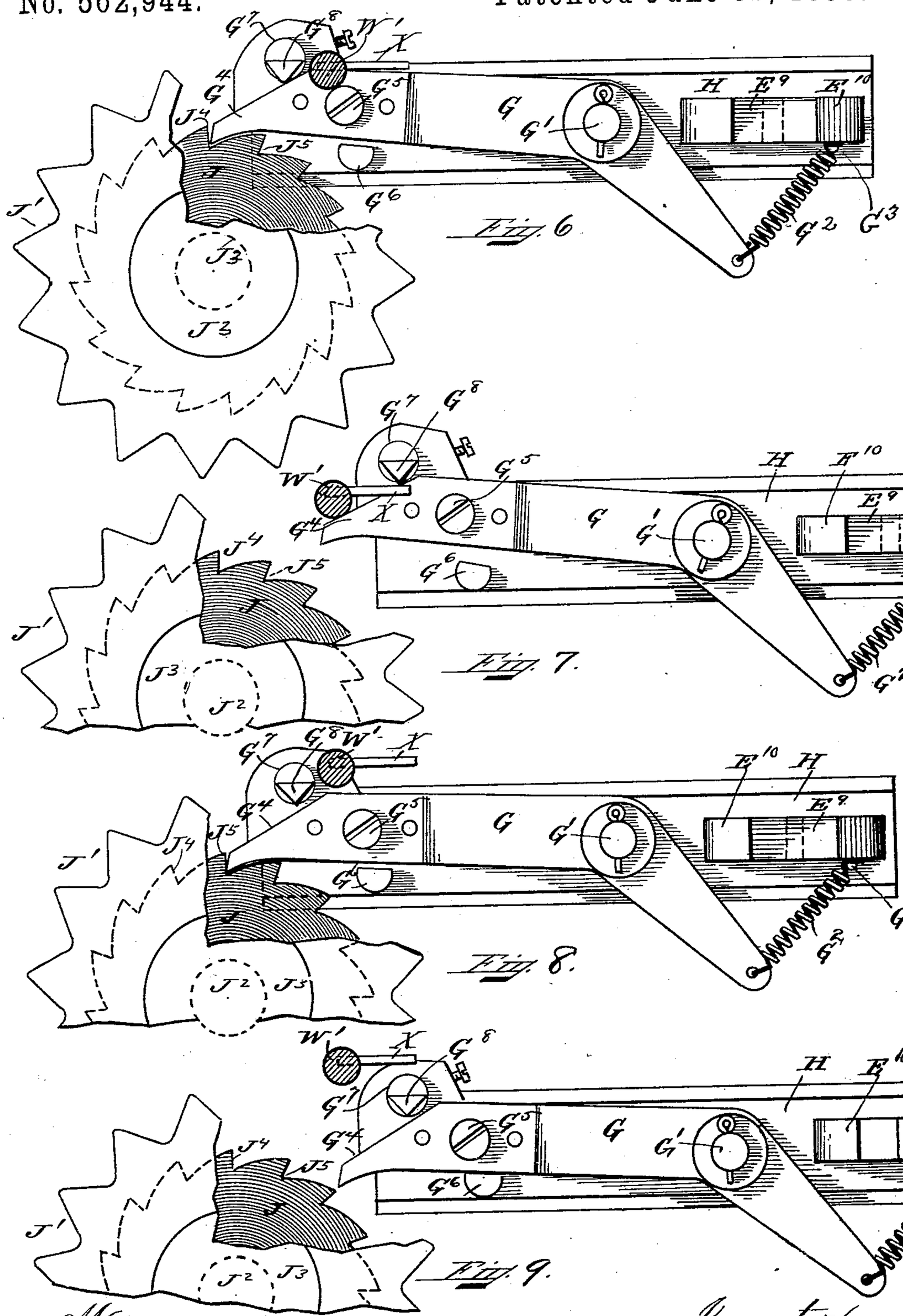

Fig. 6

Fig. 7.

Fig. 8.

Fig. 9.

Witnesses:
E. L. Harlow.
S. H. Grow.

Inventor:
Erastus Woodward
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(No Model.) 6 Sheets—Sheet 5.

E. WOODWARD.

MACHINE FOR LOADING HEELS WITH NAILS.

No. 562,944. Patented June 30, 1896.

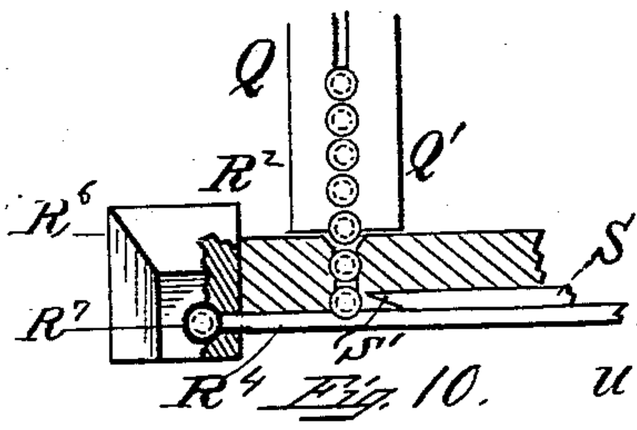

Fig. 10.

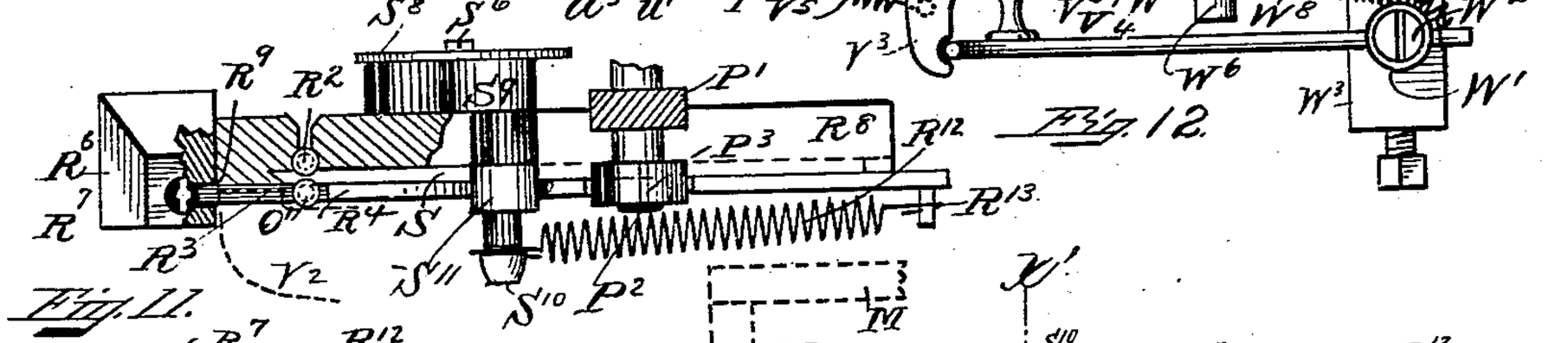

Fig. 12.

Fig. 11.

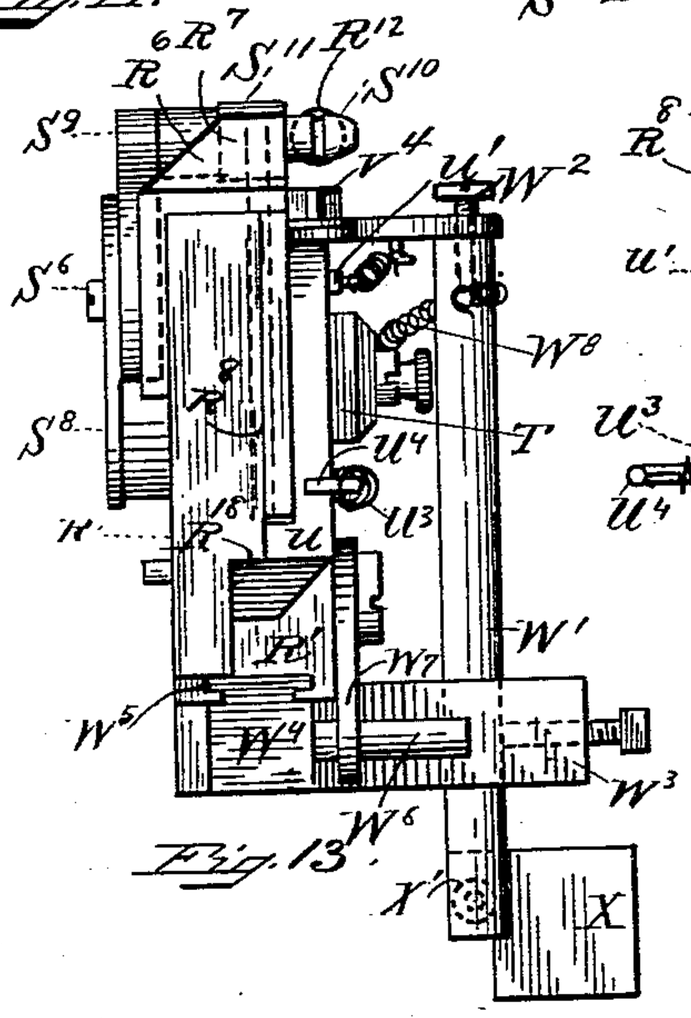

Fig. 13.

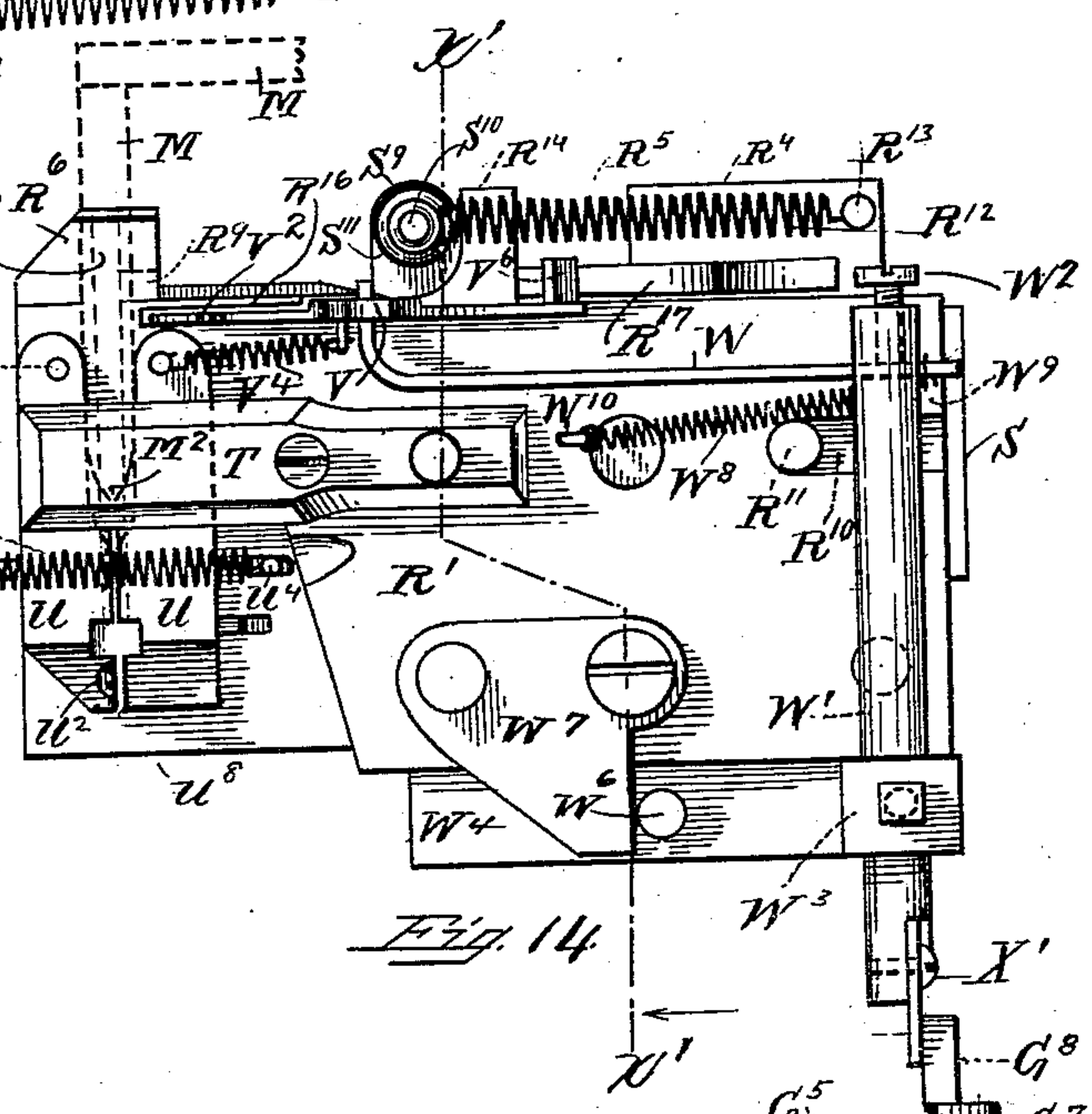

Fig. 14.

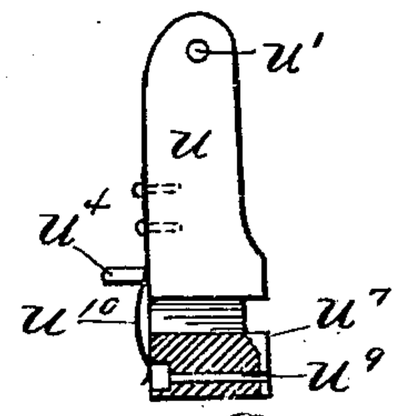

Fig. 14a.

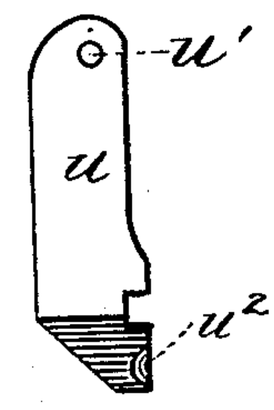

Fig. 15.

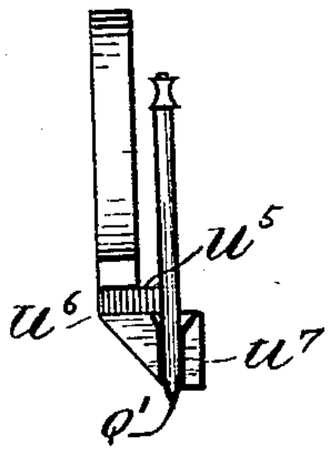

Fig. 16

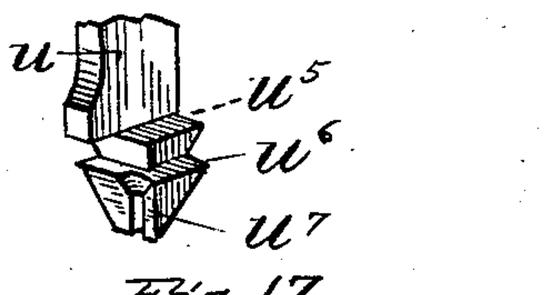

Fig. 17.

Witnesses:
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S. H. Brown.

Inventor:
Erastus Woodward,
By J. L. Ruck,
Atty.

(No Model.) 6 Sheets—Sheet 6.

E. WOODWARD.

MACHINE FOR LOADING HEELS WITH NAILS.

No. 562,944. Patented June 30, 1896.

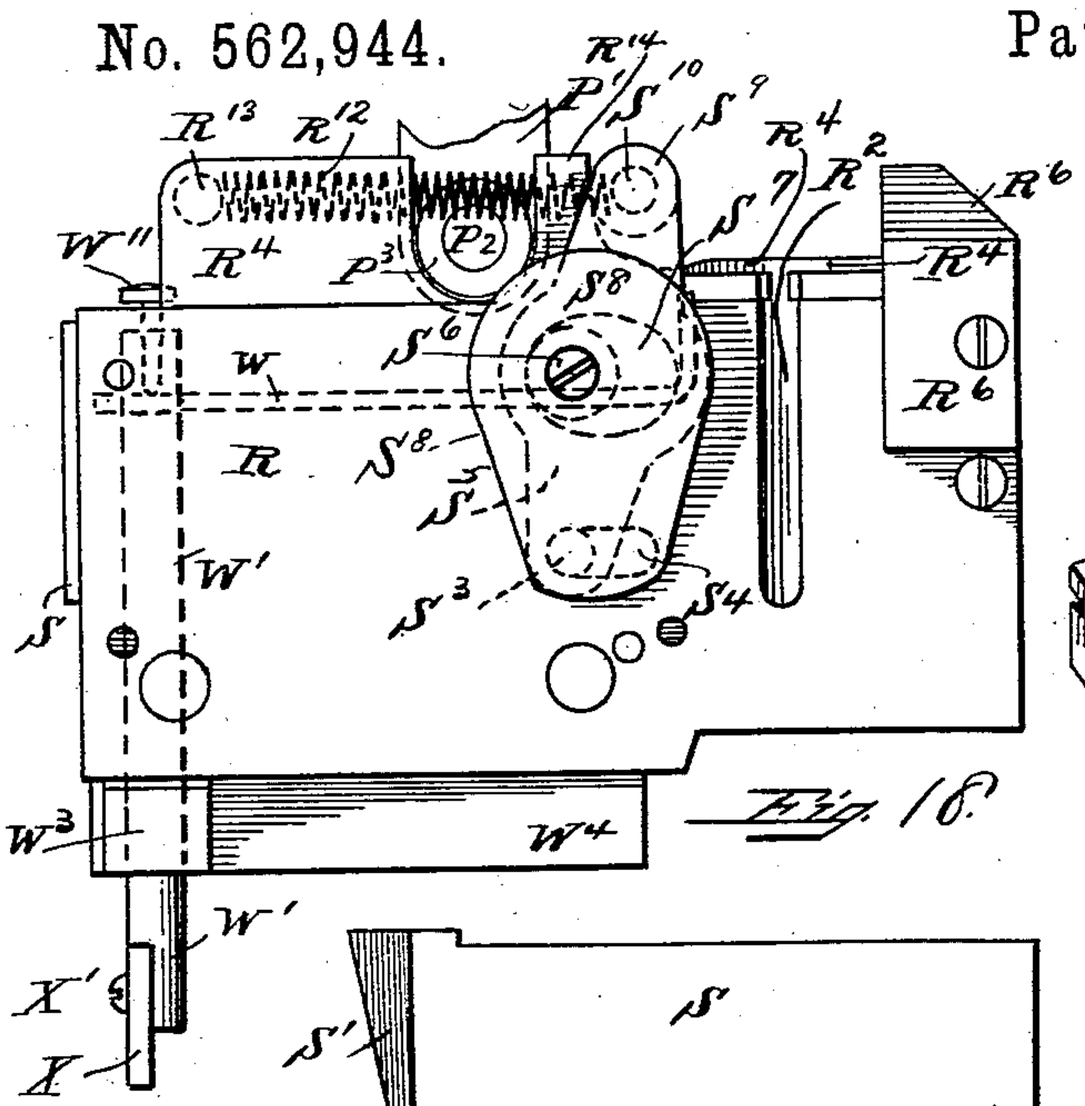

Fig. 18.

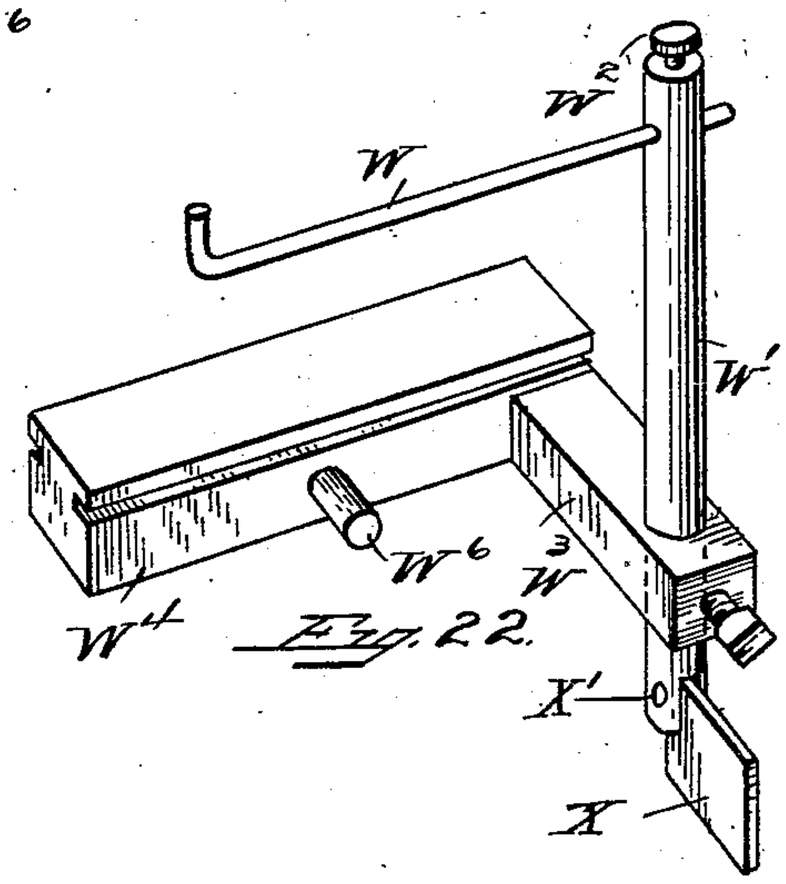

Fig. 22.

Fig. 19.

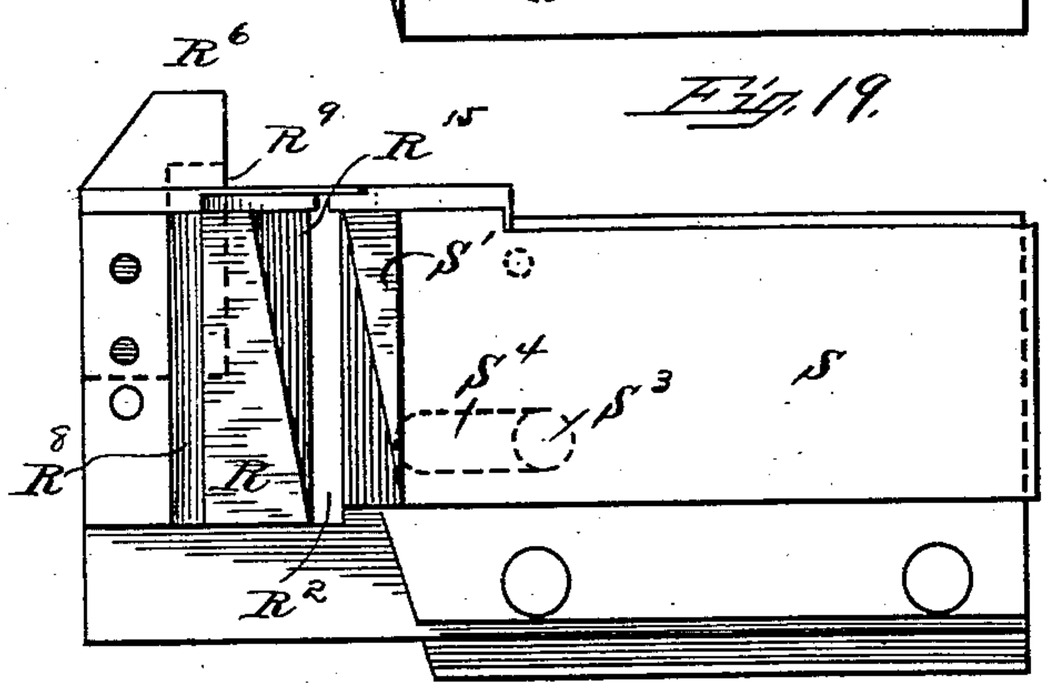

Fig. 20.

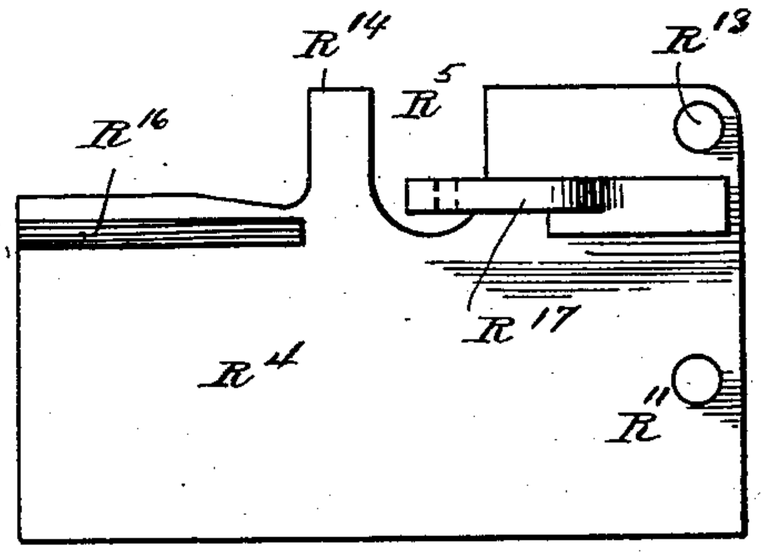

Fig. 23.

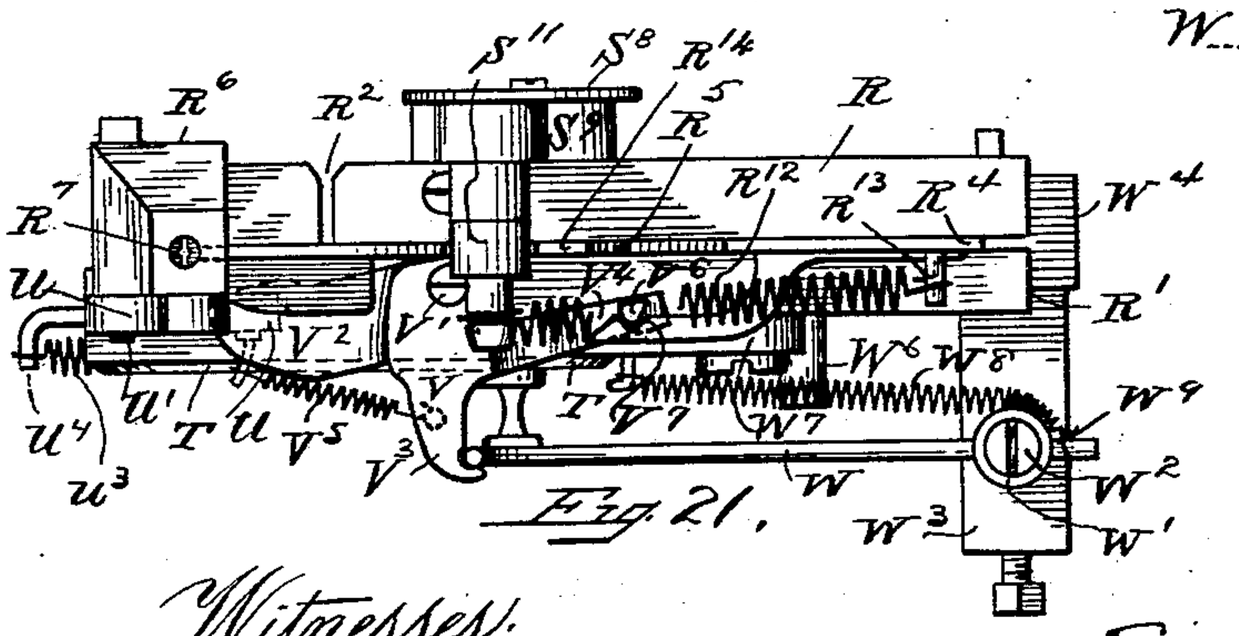

Fig. 21.

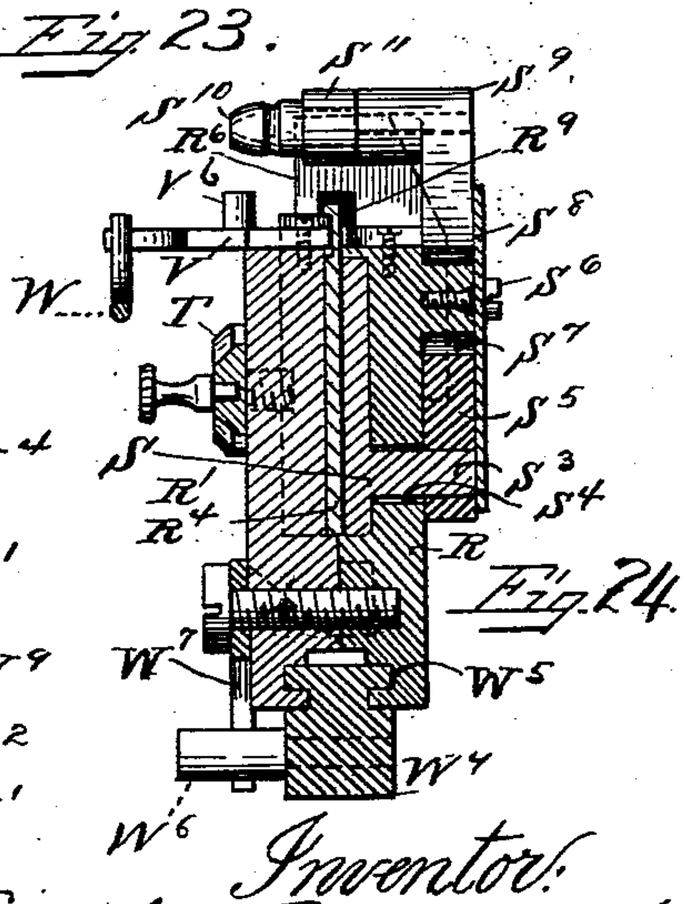

Fig. 24.

Witnesses:
E. L. Harlow.
S. W. Brown.

Inventor:
Erastus Woodward
By J. S. Rusk
Atty

UNITED STATES PATENT OFFICE.

ERASTUS WOODWARD, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO THE WOODWARD MANUFACTURING COMPANY, OF SACO, MAINE.

MACHINE FOR LOADING HEELS WITH NAILS.

SPECIFICATION forming part of Letters Patent No. 562,944, dated June 30, 1896.

Application filed January 15, 1895. Serial No. 534,963. (No model.)

To all whom it may concern:

Be it known that I, ERASTUS WOODWARD, of Somerville, county of Middlesex, and State of Massachusetts, have invented new and useful Improvements in Machines for Loading Heels with Nails, of which the following is a specification; and I hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a machine by which nails are partly driven into a pile of heel-lifts in order to form a heel-blank ready to be attached by the same nails to the shoe. One object of my invention is to produce a machine in which the undriven or feeding nail will control the feeding operation of the heel-supporting plate, so that if a nail is not received from the nail-raceway into the nail-feedway, and thence fed forward toward the position to be driven by the nail-driver, the heel-plate will not be moved, and the heel will thus remain stationary until a nail is so received and fed into position to be driven by the driving mechanism into said heel.

Another object of my invention is to produce a machine in which but one nail at a time can pass from the nail-raceway into the nail-feedway, so that only one nail at a time can be fed forward into position to be driven by the nail-driver into the heel.

These and other objects are carried out in a manner hereinafter fully and at large set forth.

My invention consists of mechanism by which the heel will be fed after each operation of the nail-driver, but will not be so fed unless a nail has been received from the nail-raceway into the nail-feedway and fed forward into position to be driven into the heel by the nail-driver, the feeding or undriven nail thus acting to control the feeding of the heel-plate and the heel carried thereon.

My invention further consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In United States Letters Patent No. 507,772, dated October 31, 1893, and granted to me for machines for loading heels with nails, and reissued to the Woodward Manufacturing Company, of Saco, Maine, April 16, 1895, and numbered 11,486, I have shown, described, and claimed a machine in which the feeding of the heel-plate is regulated by the driven nails, and is not fed unless a nail is driven, whereas in the machine forming the subject-matter of this application it is not the driven nails which control the feeding of the heel-plate, but the undriven or feeding nails which control the mechanism which operates the heel-plate on which the heel is located.

In the accompanying drawings, which illustrate my invention, Figure 1 is a perspective view of the machine after a heel has been loaded with nails and about to be removed. Fig. 2 is a sectional detail view of the plunger and coöperating parts. Fig. 3 is an inverted plan view looking upwardly toward the bottom of the plunger. Fig. 4 is a detail view of the jaw-separator. Fig. 5 is a perspective view on a smaller scale than Fig. 1 and showing the mechanism by which the machine is actuated and for clear illustration omitting certain parts into which the nail is fed and driven into the heel. Figs. 6, 7, 8, and 9 are detail plan views showing various positions of the feeding mechanism by which the heel-supporting plate is turned after each nail-driving operation. Fig. 10 is a detail plan view of the nail-raceway and nail-feedway and showing a nail pushed forward by the nail-feeder into position to receive the impact of the nail-driver. Fig. 11 is a detail plan view of the nail-feedway and showing the means by which but one nail at a time is allowed to pass into the nail-feedway. Fig. 12 is a plan view of the mechanism into which the nails are received one at a time from the nail-raceway and fed into position to be driven into the heel by the nail-driver. Fig. 13 is an end view of the same mechanism. Fig. 14 is a side view of the same mechanism, taken on the side opposite to the nail-raceway. Figs. 14ª, 15, 16, and 17 represent detail views of the jaws by which the nail is held in position to be driven into the heel. Fig. 18 is a side view of the nail-feeding mechanism, taken on the side opposite to that shown in Fig. 14. Fig. 19 is a detail view of the nail-separator. Fig. 20 is a longitudinal sectional view on the line *x x*, Fig.

12. Fig. 21 is a plan view of the same mechanism shown in Fig. 12, but differing from said figure in that the positions of certain parts are changed by the passing of an undriven nail into position under the nail-driver. Fig. 22 is a detail perspective view of a governor for controlling the operation of the feeding mechanism by which the heel-supporting plate is operated. Fig. 23 is a detail view, in side elevation, of the nail-feeder. Fig. 24 is a cross-sectional view taken on the line $x' x'$, Fig. 14.

Like letters of reference refer to like parts throughout the several views.

Referring now to the drawings, (see Figs. 1 to 5,) A represents a table suitably supported from the floor.

B is a plunger-head carrying the plunger C, which is mounted therein and carries the nail-driver D, and receives its motion from a crank-arm E, mounted on a suitable driving-shaft E′, which receives its motion from any suitable power, and by means of the ordinary clutch-operating devices can be connected or disconnected from the driving power.

In the table A there are ways F, in which moves a slide F′, carrying a heel-plate F^2, capable of rotation on an axis F^3. On the under side of this plate there is a series of feed-pins F^4, adapted to engage with the feeding mechanism hereinafter described.

A heel-holding device F^5 is located above the plate F^2 and holds the heels F^8 in position to receive the nails, and it is not herein particularly described or claimed, as said heel-holding device, the heel-plate, the slide, and the pin Y form a part of the subject-matter of another application, filed by me September 21, 1895, Serial No. 563,197.

The slide F, carrying the heel-plate, can be drawn toward and held in contact with the feeding mechanism, in the manner shown in my Patent No. 507,772, and in said Reissue No. 11,486, or by means of a spring suitably connected to said slide and table or any other desirable manner. On the end of the crank-arm E there is journaled a pitman E^2, connected at its lower end to a curved arm E^3, pinned on a shaft E^4, which has a right-angle extension E^5, having a pin moving in a vertical shaft E^6, fulcrumed above on a suitable fixed shaft E^7, so that the said shaft has a to-and-fro motion from the power transmitted from the block E^5. The lower end of said shaft E^6 is connected by a pin E^8 to a block E^9, mounted in an upright projection E^{10}, forming a part of the slide H, which is moved to and fro in the guideway H′ by the oscillations of the vertical shaft E^6, fulcrumed on the shaft E^7. On said slide H there is pivotally connected a pawl G, pivoted at G′ to the slide H, and to its rear end there is connected one end of a spring G^2, whose other end is connected to the projection E^{10} at G^3, the tendency of which spring is to draw said rear end toward the upright projection E^{10} and to cause the forward end to move toward the ratchet-wheel J, to which is secured the sprocket-wheel J′, both of which are mounted loosely on the shaft J^2, having a circular head J^3, set in the upper side of the sprocket-wheel J′. On the forward end of the pawl G there is a finger G^4, secured by suitable screw G^5 to said forward end, and the limit of movement of said forward end, due to the tension of the spring G^3, is limited by a pin G^6 on slide H. From the forward end of the pawl G and on one side of the finger G^4 there extends upwardly a pin G^7, having its upper end G^8 cut substantially in triangular shape.

The rotation or feeding of the heel-plate F^2 is caused by the engagement of the teeth of the sprocket-wheel J′ with the feeding points or pins F^4 on the heel-plate, and the operation of said ratchet-wheel J and sprocket-wheel J′ is caused by the pawl G, so that it will be understood that the feeding of the heel-plate depends upon the movement given to the ratchet-wheel J′ by the pawl G, and it will be hereinafter explained how the said pawl G is caused to engage said ratchet-wheel J when a nail passes from the nail-raceway into the nail-feedway and is moved forward into position to be driven by the nail-driving mechanism into the heel, and it will be set forth how said pawl is prevented from operating the said ratchet-wheel J when a nail has not been received from the raceway into the nail-feedway and moved forward toward the nail-driving mechanism.

When the feeding operation is finished, so that the last one of the feeding points or pins, which I have marked F^6, comes between the teeth of the sprocket-wheel J, a corner F^7 of the heel-plate will come in contact with the knob K on the end of the arm K′, extending from the hub K^2, pivoted on a pin K^3. Another arm K^4 extends from the hub K^2 to the clutch-operating mechanism K^5, and the movement imparted to said knob K will release the arm K^4 from said clutch-operating mechanism K^5 and the machine will automatically stop. The hub K^2 is provided with a handle K^6, so that the lever may be operated by hand to stop the machine. A suitable spring K^7 is secured to an arm K^4 and to the frame of the machine, and tends to hold said mechanism in the position shown in Figs. 1 and 5, so that the tripping of the clutch-operating mechanism will take place when the corner F^7 contacts with the knob K and moves it rearwardly from the position shown in Figs. 1 and 5.

The nail-driver D is secured to the bottom of the plunger C by suitable set-screw D′, and on the adjacent side of said plunger there is located a jaw-separator M, adapted to move up and down in a slot M′, formed in one side of the plunger C, (see Figs. 2 and 3,) and it is provided with a slot M^3. The said jaw-separator extends downwardly and is provided at its lower end with a wedge-shaped point M^2 for a purpose hereinafter described. On one side of the jaw-separator M there is

arranged a link L, having a slot L^2, and through the upper end of said link there is a pin L′, which extends through the link into the slot M^3 of the jaw-separator M, and is secured in the plunger C, and is adapted to have a movement up and down in said slot, and in the upper position of the plunger, as shown in Fig. 1, said pin L′ holds the jaw-separator M in its upper position, and when movement is communicated to the said link L to cause it to move downward, the pin L′, when it reaches the position shown in Fig. 2, moves said jaw-separator downward from the position shown in Figs. 1, 2, and 3.

In the bottom of the slot L^2 there is located a pin N, to which is pinned by a set-screw an arm N′, extending to and surrounding the shaft O and provided with a right-angle extension N^6, partly around the shaft O, and adapted to move in a recess N^5, cut in the fixed sleeve N^2. A spring N^3 has one end secured to said sleeve N^2, and the other end to a pin N^4 on the upper end of the arm N′. By means of this extension N^6, working in the recess N^5, the movements of the link L and plunger C are communicated to the fixed sleeve N^2 and shaft O. By means of this recess N^5 the upward movement of the arm N′ with the link L and plunger C is provided for in the event of the shaft O and sleeve N^2 being stopped by the fouling of the nails or other obstruction, as the extension N^6 moves in a recess N^5 toward the upper front edge of said recess N^5, but not in contact therewith, and in said upper movement of the plunger C the spring N^3 is put under tension, so that after removal of the nail which caused the stopping of the nail-feeder R^4 and shaft O, the spring N^3 moves said sleeve N^2 to its upper normal position, and the extension N^6 bears against the rear upper side of the recess N^5, and in such position in the downward movement of the parts communicates motion to the sleeve N^2 and from said sleeve to the shaft O, on which the sleeve N^2 is pinned fast, and in the upward movement of the plunger C and coöperating parts motion is communicated to the fixed sleeve N^2 and shaft O through the spring N^3, the upper end of which moving upwardly with the plunger C pulls the sleeve N^2 and shaft O and causes the revolution of the same in a direction opposite to that caused by the downward movement of the plunger C and coöperating parts.

In the downward movement of the plunger C the link L moves downwarly, as indicated in dotted lines, Fig. 2, and the jaw-separator M does not receive any downward movement until the pin L′ reaches the bottom of the slot M^3 in the upper part of said jaw-separator, and then in the continued downward movement of the plunger C the link L, jaw-separator M, and nail-driver move together by the continued descent of the plunger C, but from the above it will be seen that the nail-driver D moves downwardly a distance equal to the length of the slot M^3 in the jaw-separator M before the jaw-separator receives any downward movement. When the upper part of the slot L^2 in the downward movement of the plunger comes in contact with the pin N, the shaft O is caused to rotate by the lever N′ in the downward movement of the plunger, and said shaft is rotated in an opposite direction when the ascent of the plunger takes place.

On the same shaft O and to the left of the lever N′, at P′, there is a vertical arm P, pinned fast on the said shaft, and at its lower end is provided with a right-angle pin P^2, surrounded by an antifriction-roller P^3, fitting in a recess R^5 of the nail-feeder R^4, so that the opposite oscillations of the shaft O, which take place in the upward and downward movement of the nail-driving mechanism, are imparted through the arm P to the said nail-feeder R^4, and moves the same forwardly and rearwardly between the plates R R′.

The link L, lever N′, sleeve N^2, and arm P are practically one and move together, and in the upward movement of the machine when the nail-feeder R^4 comes in contact with too solid a resistance, as, for instance, a nail becomes fouled, the lever N′ and sleeve N^2 will separate and the sleeve N^2 will stop with the shaft O, and the lever N′, turning on said shaft, will continue upwardly with the link L, and thus the stopping of the rotation of the shaft O by the nail-feeder R^4, through the arm P encountering an obstruction, does not interfere with the upward movement of the plunger C and its coöperating parts, and this arrangement acts as a safety-valve to protect the working parts of the machine when a nail has become fouled in the nail-feedway, and upon the removal of the obstruction the shaft O, arm P, and sleeve N^2 return to their proper relative positions by means of the tension of the spring N^3.

In the operation of the machine a line of nails Q′ (see Figs. 10 and 11) is arranged in a nail-raceway Q, leading into the opening R^2, cut in the plate R of the nail-feeding mechanism, so that there is always a nail ready to pass into said opening R^2, and from there into the nail-feedway, in a manner hereinafter described. The said nail-feeding mechanism consists of two side plates R and R′, between which there is formed a nail-feedway R^3, in which is adapted to reciprocate the nail-feeder R^4 in its to-and-fro movements, caused by the pin P^2 on the end of the arm P, mounted fast on the shaft O and fitting in a recess R^5 of said nail-feeder. (See Figs. 1 and 18.) On the forward end of said nail-feeding mechanism there is a block R^6, secured by screws to the side R, and having an opening R^7 in which the nail-driver D is adapted to reciprocate, and below said opening R^7 there is formed between the plates R and R′ the circular passage R^8, (see Figs. 13, 18, and 20,) in which the nails are pushed by the nail-feeder R^4 to receive the impact of the nail-driver D in its downward movement. In one side of said block R^6 there is a recess R^9, in which the forward end of the

nail-feeder R^4 moves in feeding the nails into the passage R^8. (See Figs. 10, 11, 12, 14, and 20.)

In the upper position of the parts shown in Fig. 1 the pin P^2, with the antifriction-roller P^3, fitting in the recess R^5 of the nail-feeder R^4, moves said feeder forward from the position shown in Fig. 11 to the position shown in Figs. 10 and 12, so as to feed a nail received into the nail-feedway R^3 forwardly into the nail-passage R^8, to receive the impact of the nail-driver D and be driven into the heel, and the machine is so timed that in the upward movement of the nail-driving mechanism the arm P, with its pin P^2, moves the nail-feeder R^4 forwardly to feed another nail into the passage R^8 to receive the next impact of the nail-driver as it descends, and in the descent of said nail-driving mechanism the pin P^2 in the recess R^5 moves said nail-feeder R^4 rearwardly past the two openings R^2, into which the nails are received from the nail-raceway Q, in order to permit another nail to pass from said opening R^2 into the nail-feedway R^3, in a manner hereinafter explained, so that in the upward movement of the nail-driving mechanism the shaft O rotates and through the arm P moves the nail-feeder R^4 forwardly, and in the downward movement of the nail-driving mechanism the shaft O rotates in an opposite direction and through the arm P moves the nail-feeder R^4 rearwardly.

At the rear end of the plate R' there is cut a slot R^{10}, open at its rear end, (see Fig. 14,) and there is adapted to move in said slot a pin R^{11}, secured to and extending out from the nail-feeder R^4. The said pin in the position shown in Fig. 14 controls the distance the feeder R^4 moves forwardly, and its rearward movement is controlled by the spring R^{12}. At one side of said nail-feeder R^4 there is arranged a movable plate S, (see Figs. 10, 11, 14, 18, and 24,) and referred to in this specification as the "nail-separator," the function of which is to permit but one nail at a time to pass from the vertical opening R^2 into the nail-feedway R^3, so that but one nail at a time can pass into the passage R^8 and receive the impact of the nail-driver, and thereby prevent clogging and injury to the machine. This nail-separator, at its forward end and on the opposite side from the opening R^2, is cut away and inclined inward from the top to the bottom, as shown at S', Figs. 19 and 20. From the lower end of said separator there extends outwardly a pin S^3, Fig. 18, adapted to move in a slot S^4 of the side R. Said pin is secured at its outer end to a suitable vertical arm S^5, mounted on a pin S^6, located in a slot S^7, formed in said vertical arm S^5, and the plate S^8 is arranged on the outside of said arm, and through it the pin S^6 passes to hold said arm in place. To the upper end S^9 of said arm (see Figs. 12, 18, 19, 21, and 24) there is rigidly secured a horizontal pin S^{10}, and near the outer end of said pin there is an antifriction-roller S^{11}, which is adapted always to be in contact with an upward extension R^{14} of the nail-feeder R^4, on one side of the recess R^5, (see Figs. 12, 14, 18, and 21,) so that the forward movement of the nail-feeder R^4, caused by the arm P in the upward movement of the nail-driving mechanism, imparts movement to the vertical arm S^5 and moves it into the position shown in Figs. 12, 14, and 18, so that the upper end moves forwardly and the lower end moves rearwardly, and with it the pin S^3 and the nail-separator S, so that the rear end of the separator S projects beyond the plates R R'.

In the downward movement of the nail-driving mechanism the arm P, through its pin P^2, imparts a rearward movement to the nail-feeder R^4, and as the upper projection R^{14} recedes from the antifriction-roller S^{11} on the pin S^{10} the spring R^{12}, secured to the nail-feeder R^4 by a pin R^{13}, and to the extreme end of the pin S^{10}, exerts its tension and pulls the upper end of the vertical arm S^5 rearwardly, which, being mounted on the pin S^6, throws the pin S^3 at the lower end forwardly in the slot S^4, and thereby imparts a forward movement to the nail-separator S, and in said forward movement as it passes the vertical opening R^2 the upper part of the pointed end S' passes in between two nails in the line of nails in the opening R^2, and moves one nail into the nail-feedway R^3, (see Fig. 11,) the inclined side of said separator acting to push one nail into the nail-feedway, so that there is always one nail in said feedway ready to be fed forward by the nail-feeder R^4 as it moves forwardly in the upward movement of the nail-driving mechanism.

The pointed end of the nail-separator S in passing between two nails moves but one into the feedway and cuts off the nails back of the nail forced into the nail-feedway, so that but one nail at a time can be received into the said nail-feedway. The machine is so timed that the forward end of the nail-feeder R^4 is within the block R^6 when the nail-separator has passed back of the first nail on the line of nails in the opening R^2, (see Fig. 10,) and by such an arrangement more than one nail is prevented from passing into the nail-feedway R^3 in front of the nail-feeder R^4, as said separator closes the opening R^2 until the nail-feeder has passed in advance and closes said opening R^2, so that another nail cannot pass into said nail-feedway R^3. Thus it will be seen in the upward and downward movement of the nail-driving mechanism the pin P^2 imparts, respectively, a forward and rearward motion to the nail-feed R^4, and the rearward and forward movements of said nail-feeder actuate the nail-separator S in its forward and rearward movements, but the forward movement of the nail-feeder R^4 causes the rearward movement of the nail-separator S, and the rearward movement of said nail-feeder causes the forward movement of said nail-separator, as previously described.

It is obvious that in no case can the nails in the opening R^2 pass into the nail-feedway

R^3, as the forward wedge-shaped end S′ in its forward movement passes between two nails as the nail-feeder R^4 begins its rearward movement, and when said nail-feeder has passed rearwardly of the opening R^2 one nail is fed in the nail-feedway by the forward end of the nail-separator, (see Fig. 11,) so that in no case can more than one nail have uninterrupted movement into the nail-feedway R^3, because when the separator is in its rearward position the nail-feeder is in its forward position and closes access to said feedway R^3, and when the nail-feeder R^4 begins to recede the separator moves forward, and when the nail-feeder has passed rearward of the opening R^2 the nail-separator has passed in between two nails and fed one into said feedway and blocked the other nails from passing therein. On the inner side of the plate R (see Fig. 20) there is provided an inclined wedge-shaped recess R^{15}, into which the inclined wedge-shaped end S′ of the separator S is adapted to fit in its forward limit of movement.

At the forward end of the plate R′ there is pivoted at U′ the nail-holding jaws U, inclined inwardly near their lower ends, as shown at U^2, and normally held together by the spring U^3, secured to the pins U^4 on the side plate R′, and against the upper sides of said jaws there is arranged a plate T, secured to the side R′, in order to assist in holding the jaws in their proper positions. The said jaws are substantially of the same construction, and have two offsets U^5 and U^6 at their lower ends, which fit, respectively, under the lower end of the plate R′ and the offset R^{18} of the plate R, (see Fig. 13,) and at the lower end of said jaws there is formed in each jaw a recess U^7, which match and together form a circular passage U^8, when the jaws are held closed by the spring U^3, and said circular passage is about the same diameter as the body of the nail, and in the lower end of one of the jaws, as shown in Fig. 14ª, a movable pin U^9 is located, its forward end extending outwardly in the recess U^7 about half-way across the passage U^8, and against its rear end a spring U^{10}, secured to the upper part of said jaw, bears and tends to hold said pin U^9 out into the passage U^8. When a nail is fed forward into the passage R^8, it falls vertically in the passage U^8, formed by the recesses U^7 in the two jaws, and is held in this position by the pin U^9, which slightly yields to the fall of the nail Q′, which is held in a position (shown in Fig. 16) ready to receive the blow of the nail-driver and be driven into the heel, the two jaws thus acting to hold the nail vertically, so that it will be driven straight into the heel.

As shown in the drawings in dotted lines, Fig. 14, and full lines, Fig. 1, the jaw-separator M, with its wedge-shaped point M^2, reciprocates between the jaws U, and, as previously stated, the machine is so timed that the pin L′ does not reach the lower end of the slot M^3 in the upper end of the jaw-separator until the nail-driver D has acted on the upper end of the nail and driven it partly into the heel, and then the jaw-separator moves downwardly with the continued downward movement of the nail-driver and separates said jaws, in order that in the revolution of the heel the nail may pass from between the recesses U^7 at the lower end of the jaws, and thus permit the movement of the heel, and the part of the heel to receive the next nail comes under the said passage U^8, as at the beginning of the upward movement of the nail-driving mechanism the feeding mechanism acts on the pins F^4 to revolve the heel-plate for the heel to receive the next nail, so that as the jaws are separated at the downward limit of movement of the nail-driving mechanism the nail driven into said heel leaves said passage U^8 at the beginning of the upward movement of the nail-driver D and before the jaws close by the upward movement of said jaw-separator M, and from the above it will be seen that the nail is held by said jaws and is driven a sufficient distance in the heel to guide it during the rest of the driving operation before the jaw-separator acts on said jaws to move them from the nail, and by this provision the nail is driven straight into the heel the entire distance before the jaws are opened the full distance to release said nail from the recesses U^7.

Pivoted to the upper side of the plate R′ at V′ there is a device V, which will be called a "nail-feeler," having its forward end V^2 partly across the forward end of the nail-feedway R^3, (see Fig. 12,) owing to the tension of the spring V^5, secured at one end to a pin to the under side of said nail-feeler, and at the other end to a pin on which one of the jaws is pivoted, and tends to hold said feeler partly across the opening of the nail-feedway R^3. In the side and at the forward end of the nail-feeder R^4 there is cut a slot R^{16}, (see Fig. 23,) which is of sufficient depth to receive the forward side V^2 of the nail-feeler V and pass by the same without imparting any movement to the said nail-feeler, so that the nail-feeder in its forward movements does not itself actuate or give any motion to the nail-feeler by contact with the forward end V^2 of said feeler. The said feeler is provided with two other arms extending in different directions, V^3 and V^4, the arm V^3 having a recess to receive one end of the rod W, hereinafter referred to, and the arm V^4 having at its extreme end a wedge-shaped pin V^6. Now if by any chance the nails in the raceway and in the opening R^2 should become exhausted or not properly fed, so that there is no nail to pass into the nail-feedway, the reciprocations or movements of the nail-feeder R^4 and separator S do not affect the position of the nail-feeler shown in Fig. 12, or give any motion to the nail-feeler, and the nail-feeler remains in its normal position, as shown in said figure, as the recess R^{16} in the nail-feeder R^4 receives the forward end V^2 of the nail-feeler therein, and imparts no movement whatever to the said nail-feeler,

which remains perfectly stationary, and does not affect or give any movement to the rod W. Now if a nail is moved into the nail-feedway R^3, as hereinbefore described, in the position shown in Fig. 11, it rises on the top of the said nail-feedway by its collar and its shank projects downwardly in the said feedway, and as the feeder reciprocates and moves said nail forwardly its shank comes in contact with the forward end V^2 of the nail-feeler and moves the same from the raceway toward the position shown in Fig. 21, throws the pin V^6 on the inner side of the arm R^{17}, extending from the side of the nail-feeder R^4, (see Figs. 21 and 23,) and in the forward movement of the nail-feeder R^4 the arm R^{17} acts on said pin V^6 and imparts continued movement rearwardly to the forward side V^2 and arm V^3, and moves the same into the position shown in Fig. 21, with the pin V^6 resting in the recess V^7 on the arm R^{17}, and from this recess V^7 the pin V^6 easily passes, owing to the roundness of its contacting side in the rearward movement of the nail-feeder R^4. This rearward movement of the arm V^3 is communicated to the rod W, secured to a vertical arm W', (see Figs. 12, 13, 14, 18, 21, 22, and 24,) having at its upper end a suitable set-screw W^2, and at its lower end said arm W' passes through a horizontal arm W^3, having a suitable set-screw to adjust the position of the vertical arm W', and at its extreme lower end there is secured a rectangular-shaped plate X, secured to said vertical arm W' by a screw X'. The said arm W^3 is secured to a horizontal moving block W^4, located in a suitable recess W^5, formed between the plates R and R', and its forward limit of movement is regulated by a pin W^6, which is adapted in the forward movement of the said block to contact with a suitable depending plate W^7 and limit the said forward movement, and the rearward movement of said block W^4 is against the tension of the spring W^8, secured to a pin W^{10} on the side R', and at the other end around the rear end W^9 of the rod W, and the tendency of said spring is normally to draw said block W^4 to said forward position. The motion imparted by the arm V^3 of the nail-feeler V, caused by the passage of a nail through the nail-feedway R^3, actuates the forward end V^2 thereof, so that the pin V^6 passes inside the arm R^{17} and gives a rearward motion to the rod W, vertical arm W', and block W^4, so that the parts assume the position shown in Fig. 21.

Referring now to Figs. 6, 7, 8, and 9, the plate X on the lower end of the arm W', when no nail has been fed into the nail-feedway R^3, will be located on the inner side of the upper end G^7 of the pin G^8, as shown in Figs. 6 and 7, and in the reciprocating motion of the slide H the pawl G is lifted, as shown in Fig. 7, and does not engage a new tooth J^5, but will pass over into the same tooth J^4, which it previously fed when a nail had been driven. When, however, a nail has been fed and the block W^4 and the plate X have been moved outwardly into the position shown in Fig. 21, the said plate X passes to the outer side of the upper end G^7 of the pin G^8 on the pawl (see Figs. 8 and 9) and holds said pawl downwardly in the position shown, so that the upper end G^7 of the pin G^8 on the pawl passes on the inner side of the plate X, and the pawl G, being held in its downward position, the finger G^4 in the continued forward movement of the slide H engages with the next tooth J^5 of the ratchet-wheel J and actuates the same, and with it the sprocket-wheel J'. (See Figs. 8 and 9.) This wheel J' engaging with the feeding-pins F^4 on the heel-plate F^2 causes a movement to the heel-plate and heel and swings said heel into position to receive the next nail to be driven.

It will be seen that as many nails will be driven in the heel as there are feeding-pins F^4, and it will also be understood that the heel-plate F^2 will be turned as long as a pin F^4 lies in the depression in the sprocket-wheel J', the feeding operation being in a direction indicated by the arrow in Fig. 5.

The movement of the sprocket-wheel J', caused by the pawl G, begins as the nail-driver starts to ascend, but the jaw-separator M does not begin its upward movement until the pin L' reaches the upper end of the slot M^3, when both nail-driver D and jaw-separator M continue together their upward movement, so that by this arrangement the jaws are held open by the said separator sufficient time to permit the driven nail to leave the passage U^8, after which, as the jaw-separator moves upwardly with the nail-driver, the jaws close to their normal position to receive the next nail fed forward by the nail-feeder R^4, so that after each nail has been driven the nail-driving mechanism starts its upward movement, followed by the upward movement of the jaw-separator when the pin L' reaches the upper end of the slot M^3, and the feeding operation of the heel-plate takes place through the pawl G, slide H, oscillating shaft E^6, pitman E^2, and coöperating parts.

As shown in Fig. 18, the arm S^5 is loosely mounted on the pin S^6 by means of the slot S^7, and the object of thus loosely mounting the arm S^5 on the pin S^6 is to provide a lost motion of the movement of the upper end S^9 of the arm S^5, in that, as the nail pusher or feeder R^4 begins either to move forwardly or to move rearwardly, due to the oscillation of the arm P, pin P^2, and friction-roller P^3, mounted in the nail-feeder R^4, the effect of such movements is not immediately imparted to the nail-separator S, through the arm S^5 and pin S^3, working in the slot S^4, so that a certain movement is allowed the nail-feeder R^4 before the movement from the nail-feeder R^4 is communicated to the nail-separator S, which movement exists until the opposite side of the slot S^7 is brought, by the movement of the nail-feeder R^4, to a bearing upon the pin S^6, when the continued movement of

the nail-feeder R^4 is communicated through the arm S^5, bearing on the pin S^6, and through the pin S^3 working in the slot S^4 to the nail-separator S, so that with the nail-feeder R^4 in its forward position, as shown in Figs. 10 and 18, as it begins its rearward motion, it does not effect or produce a forward movement to the nail-separator S until the opposite side of the slot away from the pin S^6 moves over to and bears on said pin as a center, and then the continued rearward movement of the nail-feeder R^4 imparts through the pin S^3, at the lower end of the arm S^5, a forward movement to the nail-separator, and when a forward movement is imparted to the nail-feeder R^4 the same amount of forward movement is given said nail-feeder R^4 before its continued movement is imparted to the nail-separator S to withdraw it to its rearward position.

From the above it will be seen that in both the forward and rearward movements of the nail-feeder R^4 there is allowed a certain amount of movement which is not communicated to the nail-separator S.

Now, referring to Fig. 11, in which the nail-feeder R^4 is shown in its rearward position and the nail-separator in its forward position, the forward movement of the nail-feeder R^4 is not communicated to the nail-separator S to produce a rearward motion until said nail-feeder R^4 reaches the opening R^2, when the continued movement forward of said nail-feeder imparts a rearward movement of the nail-separator S, and in the continued forward movement of the nail-feeder R^4, as it passes by and closes the opening R^2, the nail-separator S is withdrawn from between the nails to the position shown in Fig. 10, and by this means only one nail at a time can pass into the nail-feedway R^3 in position to be moved forward by the nail-feeder R^4, as the nail-separator S holds the nails in the raceway from continued downward movement until the nail-feeder R^4 has passed beyond the opening R^2 and is moving one nail forwardly into position to be driven, and as soon as the said nail-feeder R^4 has passed beyond the opening R^2 the opposite end of the slot S^7 has reached a bearing on the pin S^6, and then the continued forward movement of said nail-feeder R^4 is communicated to the nail-separator S, which, through the pin S^3 at the lower end of the arm S^5, is withdrawn to its rearward position, as shown in Fig. 10. Now with the nail-feeder R^4 in its forward position and the nail-separator S in its rearward position, as shown in Fig. 10, the beginning of the rearward movement of the nail-feeder R^4 is lost to the nail-separator S until the said feeder approaches the opening R^2, leading into the feedway R^3, when the opposite side of the slot S^7 has reached a bearing on the pin S^6, and the continued rearward movement of the nail-feeder R^4 imparts a forward movement, through the pin S^3, to the nail-separator S, which moves between the nails, and, owing to its front wedged end, gradually pushes one nail into the nail-feedway R^3 as the nail-feeder R^4 uncovers the opening R^2 into the nail-feedway R^3, so that this rearward lost motion is provided that the nail-separator S will not move forwardly between the nails and attempt to crowd or push a nail into the nail-feedway R^3 until in its rearward movement the nail-feeder R^4 begins to uncover the opening R^2, leading into the nail-feedway R^3. If this lost motion was not provided, the nail-separator S would move in between the nails and tend to push a nail into the nail-feedway R^3, occupied by the nail-feeder R^4, but by this provision the nail-separator S does not begin to move between the nails until the front end of the nail-feeder R^4, in its rearward movement, is near the opening R^2, and as the wedge-shaped end S′ of the nail-separator S gradually moves between the nails the nail-feeder R^4 recedes and passes by the opening R^2 as the nail-separator S forces a nail into the nail-feedway R^3 and blocks the other nails from passing into the nail-feedway R^3.

Y represents a suitable pin in the table A, Fig. 1, directly in the line of movement of the nail-driver, and over which the various feeding-pins F^4 rest in the revolution of the heel in alinement with the nail-driver D to present a solid bearing for the heel to the blow of the nail-driver.

Z represents two bolts which pass through the plates R and R′ of the nail-feeding mechanism and secure the same in the position shown, the other ends of said bolts being secured to a suitable casting on the side of the machine.

The power is started through a vertical rod K^8 of the clutch-actuating mechanism on the side of the machine, and the upper end of said rod may engage with any suitable clutch mechanism for throwing on or off the power from the driving-shaft, and the lower end of said rod extends below the table to a suitable foot-treadle. When the last nail has been driven, the projection F^7 in the revolution of the heel-plate strikes the knob K and throws the end of the arm K^4 away from its connection with the clutch-operating mechanism K^5, and the machine is automatically stopped, or, if desired, the machine can be stopped at any time by the operator moving the handle K^6 to slip the arm K^4 from connection with the clutch-operating mechanism.

From the foregoing description it will be seen that each nail fed forward by the nail-feeder and driven into the heel has, in its passage toward the nail-driving mechanism, actuated the nail-feeler, and through the nail-feeler the governor or controller of the feeding mechanism for the heel-supporting plate, so that after the nail has been driven into the heel, and as the nail-driving mechanism begins its upward movement, the pawl G on the slide H actuates the sprocket-wheel J′ to feed the heel-supporting plate and heel in position to receive another nail, so that,

briefly stated, each nail, previous to its being driven, has actuated certain mechanism, which, after the nail is driven into the heel, causes the operation of the feeding mechanism and heel-supporting plate to expose a new part of the heel for the next nail.

The undriven or fèeding nail referred to in this specification as controlling the operation of the feeding mechanism of the heel-supporting plate is to be understood as referring to any location of a nail after it has been separated from the other nails in the nail-raceway and is moved along the nail-feedway under the influence of the nail-feeder, or is passing down the driveway to the nail-holding device, or is held in the nail-holding device in position to be driven by the nail-driving mechanism into the heel; that is, it refers to any location of a nail after it has been separated from the other nails in the nail-raceway up to the time it is driven into the heel.

By means of this invention it is possible for one operator to attend to a number of machines, as he has only to place the heel in position on the heel-plate, start the machine, and leave it. At the proper times, depending upon the passage of the feeding nails, the feeding of the heel will take place, and when the last nail has been driven, the end F^7 of the heel-plate will contact with the knob K and throw the arm K^4 away from the clutch-operating mechanism, and the machine will stop, so that the machine is automatic so far as driving the nails and stopping when the work has been done.

The drawings forming a part of this application represent views of a machine in which my invention is embodied, but it will be understood that the same may be varied and my invention carried out in a variety of ways, and I therefore do not limit myself to the arrangement and construction shown, as the same may be varied without departing from the spirit of my invention.

Although I have shown and described my invention as embodied in a heel-machine, yet it will be understood that it is applicable to machines doing other classes of work, into which nails, pegs, or the like are driven.

Having thus ascertained the nature and set forth a construction embodying my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to actuate said heel-plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by said nail-driving mechanism, a nail-separator for moving one nail at a time into position to be fed by the nail-feeder, and mechanism operated by the nail-driving mechanism for actuating said nail-feeder and nail-separator.

2. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to operate said heel-plate, nail-driving mechanism for driving nails into the said heel, a nail-feeder for moving the nails into position to be driven by said nail-driving mechanism, a nail-separator for moving one nail at a time into the path of the nail-feeder and connected to said nail-feeder, and mechanism operated by the nail-driving mechanism for actuating said nail-feeder and nail-separator in opposite directions.

3. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to actuate said heel-plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by said nail-driving mechanism, a nail-separator for moving one nail at a time into position to be fed by said nail-feeder, means for imparting the movement of said nail-feeder to said nail-separator after the said nail-feeder has moved a predetermined distance, and mechanism operated by the nail-driving mechanism for actuating said nail-feeder.

4. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to actuate said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, means for feeding the nails into position to be driven by the said driving mechanism, a nail-holding device for holding the nails in position to be driven by said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail is supported, a jaw-separator operated by the nail-driving mechanism for separating said jaws to release the nail driven into the heel, and means for imparting to the said jaw-separator the movement of said nail-driving mechanism after said driving mechanism has moved a predetermined distance.

5. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to actuate said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by the said nail-driving mechanism, a nail-separator for moving one nail at a time into position to be fed by said nail-feeder and connected to said nail-feeder, mechanism operated by said nail-driving mechanism for actuating said nail-feeder and nail-separator, in combination with a nail-holding device adapted to receive the nails fed by said nail-feeder and hold the same in position to be driven by said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail is supported, and a jaw-separator operated by said nail-driving mechanism for separating said jaws to release the nail driven into the heel.

6. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to actuate said heel-supporting plate, nail-driving mechanism for driving nails into the heel

carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by said nail-driving mechanism, a nail-separator for moving one nail at a time into position to be fed by said nail-feeder, means for imparting the movement of said nail-feeder to the said nail-separator after the said nail-feeder has moved a predetermined distance, mechanism operated by the said nail-driving mechanism for actuating the said nail-feeder, in combination with a nail-holding device adapted to receive the nails fed by said nail-feeder and hold the same in position to be driven by said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail is supported, a jaw-separator operated by the nail-driving mechanism for separating said jaws to release the nail driven into the heel, and means for imparting to the said jaw-separator the movement of said nail-driving mechanism after said driving mechanism has moved a predetermined distance.

7. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by said nail-driving mechanism, a nail-separator connected to the said nail-feeder for moving one nail at a time into position to be fed by the said nail-feeder, mechanism for actuating said nail-feeder, and means for imparting the movement of said nail-feeder to the said nail-separator.

8. In a heel-loading machine, a heel-supporting plate, having a series of feeding-points located thereon representing the number of nails to be driven, feeding mechanism adapted to engage with said feeding-points for operating said heel-plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by the said nail-driving mechanism, a nail-holding device adapted to receive the nails fed by said nail-feeder and hold the same in position to be driven by said nail-driving mechanism, and means operated by the said nail-driving mechanism for actuating said nail-holding device to release the nails driven into the heel.

9. In a heel-loading machine, a heel-supporting plate having a series of feeding-points located thereon representing the number of nails to be driven, feeding mechanism adapted to engage with said feeding-points for operating said heel-plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by the said nail-driving mechanism, a nail-holding device adapted to receive the nails fed by said nail-feeder and hold the same in position to be driven by said nail-driving mechanism and provided with a retaining device for holding the nails in position to be driven by said nail-driving mechanism, and means operated by said nail-driving mechanism for actuating said nail-holding device to release the nails driven into the heel.

10. In a heel-loading machine, a heel-supporting plate having a series of feeding-points located thereon representing the number of nails to be driven, feeding mechanism adapted to engage with said feeding-points for operating said heel-plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for moving the nails into position to be driven by the said nail-driving mechanism, a nail-holding device adapted to receive the nails fed by said nail-feeder and hold the same in position to be driven by said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail fed forward by the nail-feeder is supported, and means operated by the said nail-driving mechanism for separating said jaws to release the nail driven into the heel.

11. In a heel-loading machine, a heel-supporting plate, having a series of feeding-points located thereon representing the number of nails to be driven, feeding mechanism adapted to engage with said feeding-points for operating said heel-plate, nail-driving mechanism for driving nails into the heel carried by the said heel-plate, a nail-feeder for moving the nails into position to be driven by the said nail-driving mechanism, a nail-holding device adapted to receive the nails fed by the said nail-feeder and to hold the same in position to be driven by the said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail fed forward by the nail-feeder is supported, a jaw-separator operated by the nail-driving mechanism for separating said jaws to release the nail driven into the heel.

12. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, means for feeding the nails into position to be driven by the said driving mechanism, a nail-holding device for holding the nails in position to be driven by the said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail is supported, and a spring-controlled retaining device in one of said jaws adapted to contact with a nail and hold the same in the said matching recesses, and a jaw-separator operated by the nail-driving mechanism for separating said jaws to release the nail driven into the heel.

13. In a nail-driving machine, a nail-driver, a nail-feeder for moving the nails into position to be driven by said nail-driver, a nail-separator connected to said nail-feeder for moving one nail at a time into position to be fed by said nail-feeder, mechanism for feed-

ing the work, mechanism in the path of the feeding nails for controlling the operation of said work-feeding mechanism and adapted when actuated by a feeding nail to cause the operation of said work-feeding mechanism, a nail-holding device adapted to receive the nails fed by said nail-feeder and to hold the same in position to be driven by said nail-driving mechanism, and mechanism for releasing the nails from the said nail-holding device.

14. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, and mechanism between said nail-feeler and said feeding mechanism for controlling the operation of said feeding mechanism and adapted when actuated by the movement of said nail-feeler by contact with a feeding nail to cause the operation of said feeding mechanism and heel-supporting plate.

15. In a heel-loading machine, a heel-supporting plate having a series of feeding-points located thereon, feeding mechanism adapted to engage with said feeding-points for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, and mechanism between said nail-feeler and said feeding mechanism for controlling the operation of said feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the operation of said feeding mechanism and heel-supporting plate.

16. In a heel-loading machine, a heel-supporting plate having a series of feeding-points located thereon representing the number of nails to be driven, feeding mechanism adapted to engage with said feeding-points for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, and mechanism between said nail-feeler and said feeding mechanism for controlling the operation of said feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the operation of said feeding mechanism and heel-supporting plate.

17. In a heel-loading machine, a heel-supporting plate having a series of feeding-points located thereon, mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a feed-wheel adapted to engage with each feeding-point in turn, a pawl for operating said feed-wheel, a nail-feeler located in the path of the nails fed by said nail-feeder, and mechanism between said nail-feeler and said pawl for controlling the movement of said pawl and feed-wheel and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the engagement of said pawl and feed-wheel and the operation of said heel-supporting plate.

18. In a heel-loading machine, a heel-supporting plate having a series of feeding-points located thereon, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, feeding mechanism adapted to engage with each feeding-point in turn and consisting of members capable of engagement and disengagement, a nail-feeler in the path of the feeding nails, and mechanism between said nail-feeler and said feeding mechanism for controlling the operation of said feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the engagement of the members of said feeding mechanism and the operation of said feeding mechanism and heel-supporting plate.

19. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-separator for moving one nail at a time into position to be fed by said nail-feeder, connecting mechanism between said nail-feeder and said nail-separator whereby the movement of one is communicated to the other, and mechanism for actuating said nail-feeder and said nail-separator.

20. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, means for feeding nails into position to be driven by said nail-driving mechanism, a nail-holding device consisting of two jaws normally held together and adapted to receive the nails between the said jaws and hold the same in position to be driven by said nail-driving mechanism, and mechanism operated by said nail-driving mechanism engaging with said jaws for releasing the nails driven into the heel from said nail-holding device.

21. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by the said heel-plate, means for feeding the nails into position to be driven by said nail-driving mechanism, a nail-holding device adapted to receive the nails and hold the same in position to be driven by said nail-driving mechanism, and mechanism operated

by said nail-driving mechanism for releasing the nail driven into the heel from said nail-holding device.

22. In a heel-loading machine, a heel-supporting plate, feeding mechanism adapted to operate said heel-supporting plate, a nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by the said nail-driving mechanism, and a nail-holding device adapted to receive the nails fed by said nail-feeder and hold the same in position to be driven by said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nails fed forward by said nail-feeder are supported, and mechanism for separating said jaws to release the nail driven into the heel in the operation of the driving mechanism.

23. In a nail-driving machine, a nail-driver, a nail-feeder for feeding the nails into position to be driven by said nail-driver, mechanism for feeding the work, a nail-feeler in the path of the nails fed by said nail-feeder, mechanism between said nail-feeler and said work-feeding mechanism for controlling the operation of said work-feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the operation of said work-feeding mechanism, and a nail-holding device adapted to receive the nails fed by said nail-feeder and to hold the same in position to be driven by said nail-driver.

24. In a nail-driving machine, a nail-driver, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, mechanism between the said nail-feeler and the said work-feeding mechanism for controlling the operation of said work-feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the operation of said work-feeding mechanism, a nail-holding device for receiving the nails fed by the said nail-feeder and hold the same in position to be driven by said nail-driver, and mechanism for releasing the nails from the said nail-holding device upon the operation of said nail-driver.

25. In a nail-driving machine, a nail-driver, a nail-feeder for feeding the nails into position to be driven by said nail-driver, a nail-separator for moving one nail at a time into position to be fed by said nail-feeder, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, and mechanism between the said nail-feeler and said work-feeding mechanism for controlling the operation of said work-feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the operation of said work-feeding mechanism.

26. In a nail-driving machine, a nail-driver, a nail-feeder for feeding the nails into position to be driven by said nail-driver, a nail-separator connected to said nail-feeder for moving one nail at a time into position to be fed by said nail-feeder, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, and mechanism between said nail-feeler and said work-feeding mechanism for controlling the operation of said work-feeding mechanism and adapted upon the movement of said nail-feeler by contact with a feeding nail to cause the operation of said work-feeding mechanism.

27. In a nail-driving machine, a nail-driver, means for feeding the nails into position to be driven by the said nail-driver, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, and mechanism between the nail-feeler and said work-feeding mechanism for controlling the operation of said work-feeding mechanism and adapted upon the engagement of a feeding nail with said nail-feeler to cause the operation of said work-feeding mechanism.

28. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, means for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, mechanism between the said nail-feeler and said feeding mechanism for controlling the operation of said feeding mechanism and adapted upon the engagement of a feeding nail with said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, and means for normally holding said feeler in the path of the feeding nails.

29. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, means for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, and mechanism between said nail-feeler and said feeding mechanism for controlling the operation of said feeding mechanism and adapted upon the engagement of a feeding nail with said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate.

30. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, means for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, mechanism between said nail-feeler and said feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, and

means adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail.

31. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, mechanism between said nail-feeler and said feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, and means on said nail-feeder adapted to actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail.

32. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-feeler in the path of the feeding nails, mechanism between said nail-feeler and said feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, means on said nail-feeder adapted to actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail, and means for normally holding said nail-feeler in the path of the feeding nails.

33. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-separator for moving one nail at a time into position to be fed by said nail-feeder, a nail-feeler in the path of the feeding nails, mechanism between the said nail-feeler and said feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, means on said nail-feeder adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail, and means for normally holding said nail-feeler in the path of the feeding nails.

34. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-separator connected to the said nail-feeder for moving one nail at a time into position to be fed by said nail-feeder, a nail-feeler in the path of the feeding nails, mechanism between the said nail-feeler and said feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, means on said nail-feeder adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail, and means for normally holding said nail-feeler in the path of the feeding nails.

35. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said heel-plate, a nail-feeder for feeding the nails into position to be driven by said nail-driving mechanism, a nail-separator connected to the said nail-feeder for moving one nail at a time into position to be fed by said nail-feeder, mechanism operated by said nail-driving mechanism for actuating said nail-feeder and said nail-separator, a nail-feeler in the path of the feeding nails, mechanism between said nail-feeler and said feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said feeding mechanism and heel-supporting plate, means on said nail-feeder adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail, a nail-holding device adapted to receive the nails fed by the said nail-feeder and hold the same in position to be driven by said nail-driving mechanism and consisting of two jaws normally held together and provided with matching recesses in which the nail fed forward is supported, and a jaw-separator operated by the said nail-driving mechanism for separating said jaws to release the nail driven into the heel from said nail-holding device.

36. In a nail-driving machine, a nail-driver, means for feeding the nails into position to be driven by said nail-driver, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, mechanism between said nail-feeler and said work-feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said work-feeding mechanism, and means adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail.

37. In a nail-driving machine, a nail-driver, a nail-feeder for feeding the nails into position to be driven by said nail-driver, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, mechanism between the said nail-feeler and the said work-feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said work-feeding mechanism, and means on said nail-feeder adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail.

38. In a nail-driving machine, a nail-driver,

a nail-feeder for feeding the nails into position to be driven by said nail-driver, mechanism for feeding the work, a nail-feeler in the path of the feeding nails, mechanism between the said nail-feeler and the said work-feeding mechanism adapted when actuated by the movement of said nail-feeler to cause the operation of said work-feeding mechanism, means on said nail-feeder adapted to engage with and actuate said nail-feeler upon the engagement of said nail-feeler with a feeding nail, and means for normally holding said nail-feeler in the path of the feeding nails.

39. In a heel-loading machine, a heel-supporting plate, feeding mechanism for operating said heel-supporting plate, nail-driving mechanism for driving nails into the heel carried by said plate, means for feeding the nails into position to be driven by said nail-driving mechanism, and mechanism coöperating with said feeding mechanism to control the operation thereof and having a part extending into the path of the feeding nails and adapted when actuated by engagement with a feeding nail to cause the operation of said feeding mechanism and heel-supporting plate.

40. In a nail-driving machine, a nail-driver, means for feeding the nails into position to be driven by said nail-driver, mechanism for feeding the work, and mechanism coöperating with said work-feeding mechanism to control the operation thereof and having a part extending into the path of the feeding nails and adapted when actuated by engagement with a feeding nail to cause the operation of said work-feeding mechanism.

41. In a nail-driving machine, a nail-driver, means for feeding the nails into position to be driven by said nail-driver, mechanism for feeding the work, and mechanism coöperating with said work-feeding mechanism to control the operation thereof and having a part extending into the path of the feeding nails and adapted when in engagement with a feeding nail to cause the operation of said work-feeding mechanism.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 12th day of January, 1895.

ERASTUS WOODWARD.

Witnesses:
L. H. TROW,
E. L. HARLOW.