

No. 694,656.

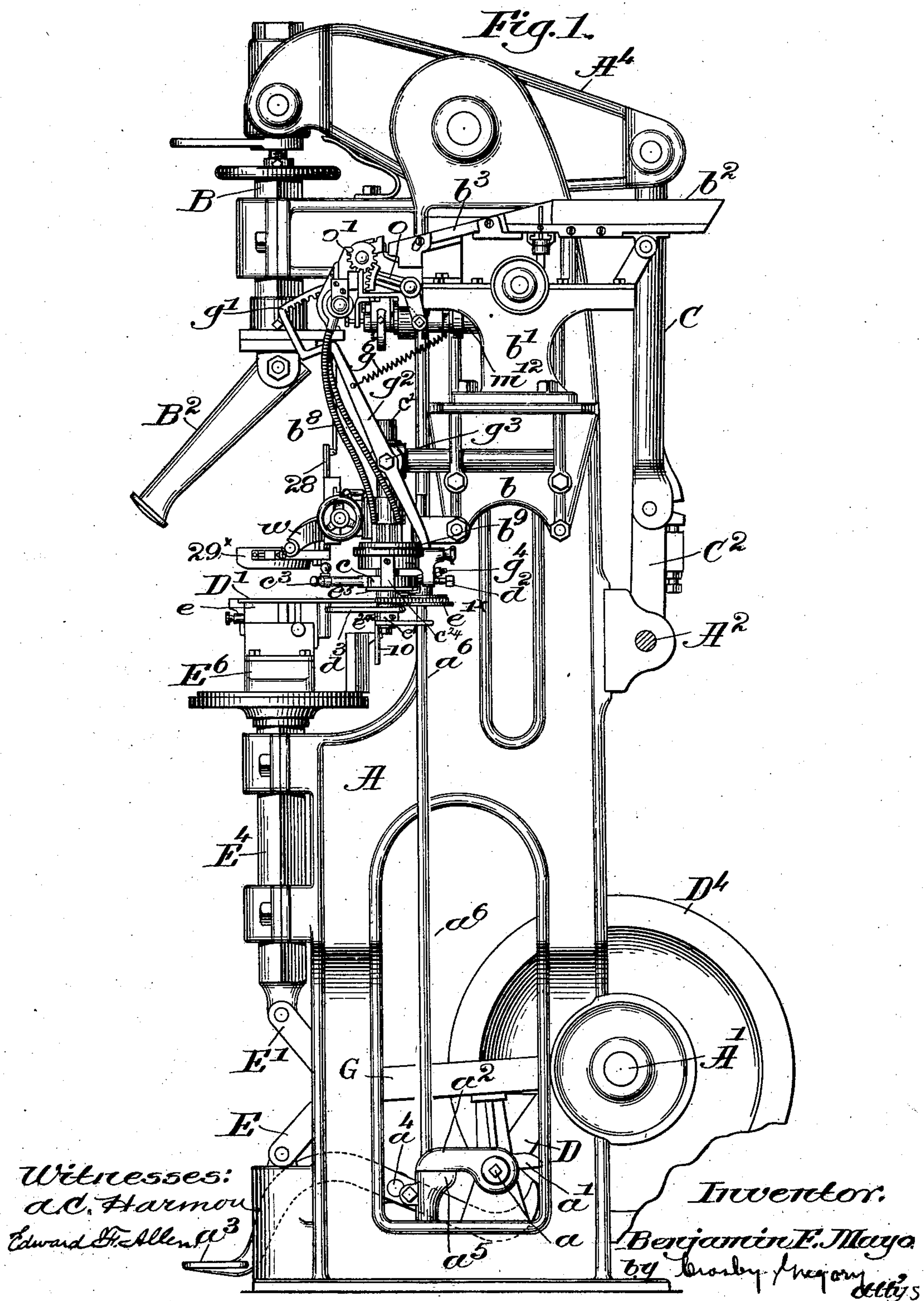
Patented Mar. 4, 1902.

B. F. MAYO.  
HEEL NAILING MACHINE.

(Application filed Mar. 3, 1897.)

(No Model.)

3 Sheets—Sheet 1.



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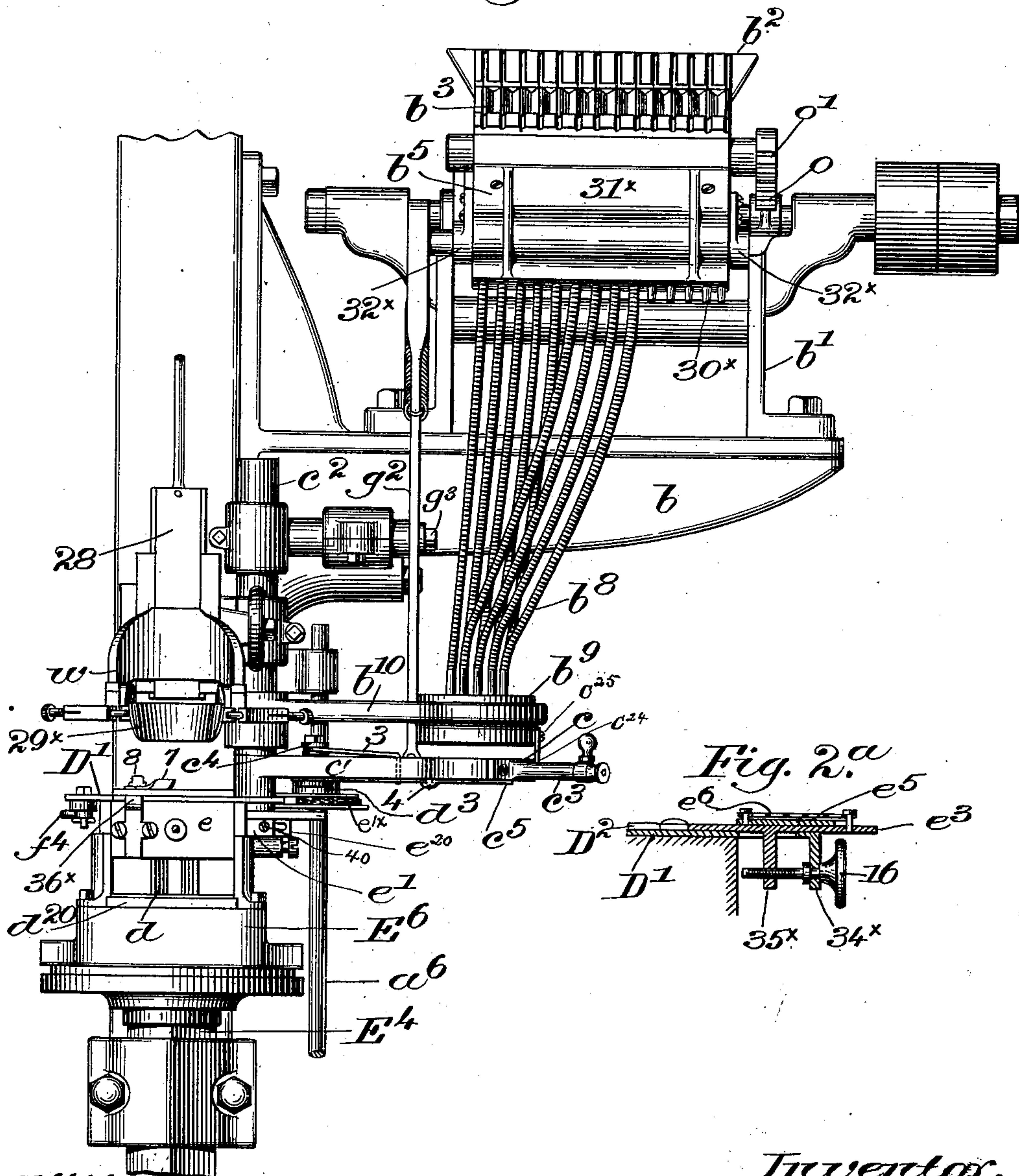
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3 Sheets—Sheet 2.

Fig. 2.



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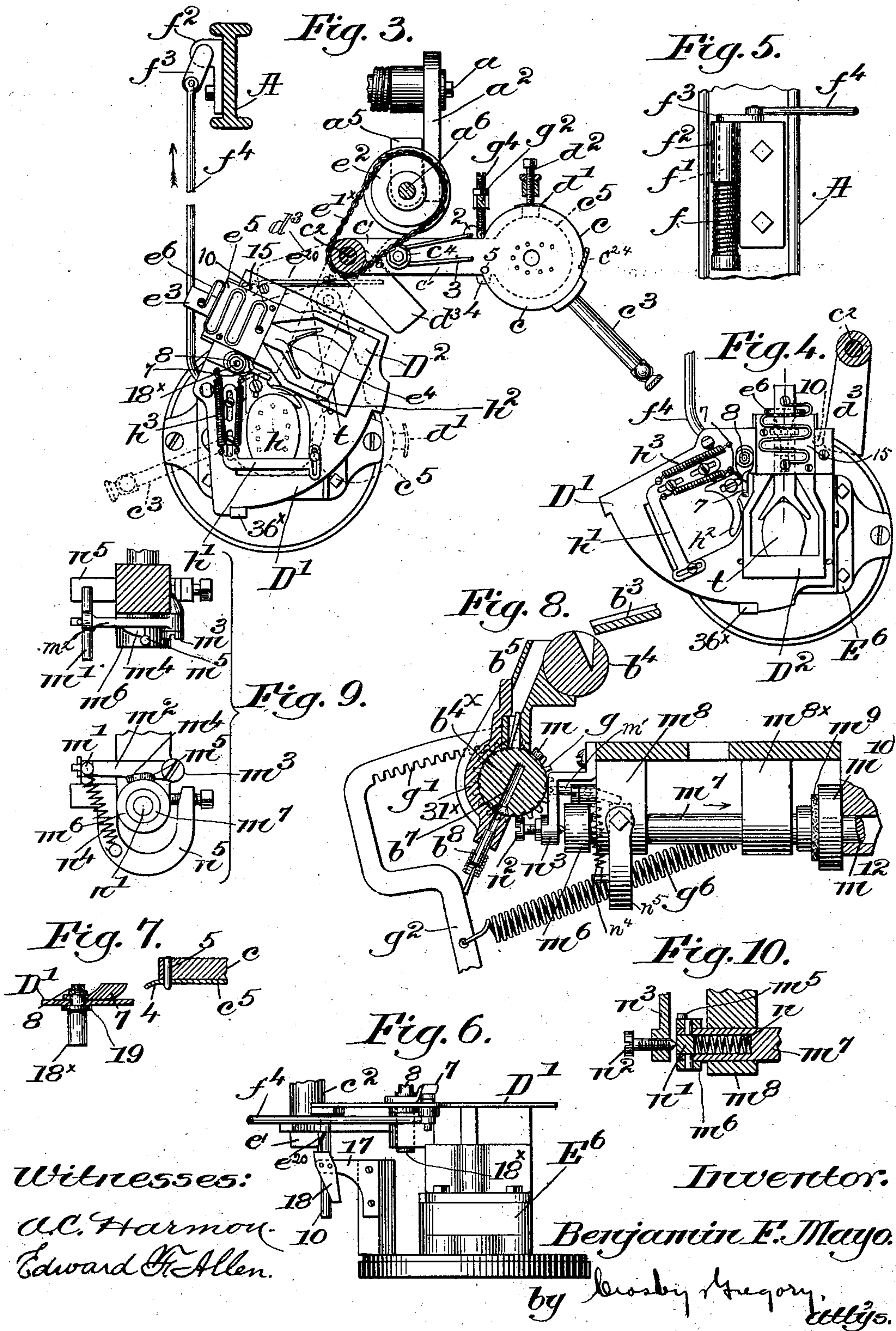
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3 Sheets—Sheet 3.



Witnesses:

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# UNITED STATES PATENT OFFICE.

BENJAMIN F. MAYO, OF SALEM, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE UNITED SHOE MACHINERY COMPANY, A CORPORATION OF NEW JERSEY.

## HEEL-NAILING MACHINE.

SPECIFICATION forming part of Letters Patent No. 694,656, dated March 4, 1902.

Application filed March 3, 1897. Serial No. 625,873. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN F. MAYO, of Salem, county of Essex, State of Massachusetts, have invented an Improvement in Heel-Nailing Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to that class of machines which are used for attaching the heels of boots or shoes. I have herein shown and described one form of machine in which the various features of my invention are embodied. In the machine shown in the drawings and described in this specification the nails which are to be used in attaching the heel are applied in bulk to a nail-assorting mechanism, from which they are delivered with their points all arranged in the same direction into the nail-carrier. After receiving the nails this nail-carrier moves into position over a nail-block, and the nails are discharged from the carrier into the holes in the nail-block. As the nail-carrier is brought into position for the discharge of its nails into the nail-block the heel-holder and the top-lift carrier are put into a position to receive a heel and top lift, respectively, and the said holder is locked in such position while the nails are discharged from the carrier into the nail-block, after which the carrier is returned into its nail-receiving position and there locked, and a heel and top lift are applied to the holder or positioning device, leaving the parts in readiness to start the machine to attach a heel to a shoe. In this condition of the parts the operator will actuate a starting device, preferably a foot-treadle, to start the machine, and the spindle carrying the nail-block bed-piece will be raised, lifting the usual nail-block. The nail-block in rising carries with it the heel until the latter is placed closely against the heel end of the sole of the shoe. The shoe is held in usual manner on a suitable jack or post, and in the further upward movement of the nail-block bed-piece, the nail-block being arrested by contact of the heel with the sole of the shoe, the drivers actuated by the continued rising of

the spindle act on the nails in the holes in the nail-block and drive them therefrom into the heel and sole. The heel having been attached to the shoe, the nail-block bed-piece is lowered, and a locking device, which previously retained the heel-holder in position, is actuated to release the heel-holder, permitting the same to move under the action of a suitable spring to put the top-lift carrier in working position and place the top lift held by it between the heel and the nail-block, so that when said block rises for the second time the top lift is spanked onto the heads of the nails left projecting from the heel, and thereafter the nail-block will be lowered, leaving the machine in position to repeat the operation described.

The machine has attached to it a suitable box or receptacle, in which are placed the nails in bulk, the said receptacle having suitable means to take the nails from bulk and place them in suitable raceways, from which they are taken by a device having the capacity of receiving nails from said raceways, in which they lie point first and head first, and delivering them with their points all in the same direction, herein represented as leading, said points entering a nail-reverser, from which reverser the said nails are all delivered head first into guide-tubes communicating with the nail-carrier when in position, the nails being so controlled that they will not be delivered by the reverser into said tubes until the said carrier is in proper position to receive them. The nail-carrier has at its under side a gate—a plate which in its normal position closes the lower ends of the nail-holes in the nail-carrier and prevents the nails from passing through the said carrier; but when the said nail-carrier is turned into position over the nail-block the said gate is released, so that it may be moved aside quickly by a suitable spring to thus let the nails drop freely from the nail-carrier into the nail-block. This nail-reverser is actuated by mechanism connected with and moved by the nail-carrier.

Figure 1 is a right-hand side elevation of a sufficient portion of a heeling-machine of usual



construction with my improvements added to enable my invention to be understood. Fig. 2 is an enlarged partial front elevation thereof. Fig. 2<sup>a</sup> is a detail to be referred to.

5 Fig. 3 is a plan view chiefly to show the heel-holder or positioning device and the top-lift carrier and the nail-carrier and some of their coöperating parts in locked position in readiness to start the machine to attach a heel,

10 the dotted lines in said figure showing the nail-carrier in the position it will occupy when its nails are being discharged into the nail-block, the gate connected with the said nail-carrier being represented as released. Fig.

15 4 shows the position of the said heel-holder or positioning device and top-lift carrier when the top lift is to be attached, the said positioning device remaining in the position shown in said figure until the nail-carrier is

20 again moved into position to discharge its nails into the nail-block, the nail-carrier for this purpose being put into the dotted-line position, Fig. 3, and turning the positioning device from the position Fig. 4 into the full-

25 line position, Fig. 3; Fig. 5, a detail to be described. Fig. 6 in detail shows part of the nail-block and heel-holder or positioning device; Fig. 7, a detail to be referred to, showing the means used to release the latch holding the

30 gate. Fig. 8 is an enlarged detail showing part of the nail-assorting device. Fig. 9 shows in two views parts of the devices shown in Fig. 8, and Fig. 10 is a detail showing the end of the shaft.

35 The framework A, the shaft A', the balance-wheel D<sup>4</sup>, mounted on said shaft loosely, the clutch-controlling lever D, the link or connecting-rod G, having at one end an eccentric-strap embracing an eccentric on the

40 shaft A' and connected at its other end to toggle-links E and E', the spindle E<sup>4</sup>, having at its upper end a nail-block bed-piece E<sup>6</sup>, above which is a spring-supported nail-block e and the walking-beam A<sup>4</sup>, its attached toggle C C<sup>2</sup>, shaft A<sup>2</sup>, and the working spindle B are and may be all substantially as shown and described in United States Patent No.

45 446,383, dated February 10, 1891, so need not be herein more specifically described. The

50 clutch-controlling lever D herein, as in the said patent, is used to release part of a Horton clutch and let the constantly-rotating pulley D<sup>4</sup> take the shaft A' for a full rotation. The lever D is herein shown as fixed

55 upon a short shaft a, mounted in suitable stands fixed to the frame, said shaft having a toe a' and an arm a<sup>2</sup>. The toe a' is acted upon whenever the machine is to be started to attach a heel by the inner end of a starting device or treadle a<sup>3</sup>, pivoted at a<sup>4</sup>. The

60 shaft a, carrying the clutch-controlling lever D, must be so held that the machine cannot be started until after the nail-carrier, to be described, has been turned away from its position over the usual nail-block and has been

65 brought into substantially its nail-receiving

position, and for this purpose the arm a<sup>2</sup> has been added to said shaft, it coöperating with the lug a<sup>5</sup>, fast on a rod a<sup>6</sup>, which is rotated by or with the nail-carrier, so that said lug 70 at times, especially when the nail-carrier is in position above the nail-block to supply it with nails, comes below said arm and prevents the shaft a from being started by the starting device or treadle. In the patent re- 75

ferred to the working spindle carried a sliding jack; but herein the said spindle has attached to it a jack B<sup>2</sup> of another well-known form, and the shoe when placed on the said jack and the jack turned into vertical posi- 80

tion puts the heel part of the shoe-upper into a yoke-like clamp 29<sup>x</sup>, pivotally mounted on forked arms w of a vertically-movable slide 28, all as shown in said patent. This clamp 29<sup>x</sup> serves to position the heel end of the shoe. 85

The machine-frame has applied to it a bracket b, on which stands the frame b' of a nail-assorting device, having a hopper b<sup>2</sup> and raceways b<sup>3</sup>, at the lower end of which is a circularly-moving nail-controller b<sup>4</sup>, (see Fig. 90

8,) provided with pockets, each pocket discharging its nails into a nail-receiving chute b<sup>5</sup>. This nail-assorting mechanism so far described is and may be all substantially as shown and fully described in United States 95

Patent No. 577,213, dated February 16, 1897. At the lower end of the chute b<sup>5</sup> I have located a circularly-moving nail-reverser or point-arranging mechanism b<sup>4x</sup>, it, as shown, consisting of a cylinder having a series of like 100

holes b<sup>7</sup>. The nails entering the chute b<sup>5</sup> will be stopped by said reverser; but when said reverser is put into such position that the holes b<sup>7</sup> therein register with the said chutes b<sup>5</sup> then the nails will enter the said holes, as 105

herein represented, point first, and thereafter the reverser is turned over into the position shown in Fig. 8, when the nails will leave the reverser head first and enter the open upper ends of the tubes b<sup>8</sup>, there being one such 110

chute b<sup>5</sup> and hole b<sup>7</sup> and tube for each nail to be used, the lower ends of said tubes being connected (see Fig. 2) with a foot-plate b<sup>9</sup>. (See Figs. 1 and 2.) The specific construction of this nail assorting and delivering 115

mechanism just described is not an essential part of my present invention, and any suitable nail-assorting mechanism may be employed within the scope of my invention.

In heel-nailing it is frequently desired to 120

employ a different number of nails and different spacing of nails, and to do this it is necessary for the device employed to receive the nails to have a capacity of receiving a greater or less number of nails in nail-holes 125

suitably spaced to insure that the proper nail-holes of the nail-block be fed with nails to thus insure the driving of the nails from the nail-block in the desired places, and to embody this idea I have employed a foot-plate or device b<sup>9</sup>, herein shown as detachably 130

mounted on an arm b<sup>10</sup>, so that it may be read-



ily removed from the machine and another foot-plate containing a proper number of nail-holes suitably spaced be substituted for it.

The nail-carrier *c* is herein represented as  
 5 a plate of about five-eighths of an inch in thickness, more or less, it having an arm *c'*, provided at its end with a hub, which (see Figs. 1, 2, and 3) is mounted loosely on a reduced part of a stationary stud *c<sup>2</sup>*, the larger  
 10 outer end of said nail-carrier being herein shown as provided (see Fig. 3) with nail-holes of any desired number and arranged in the desired form. The nail-carrier has attached to it a handpiece *c<sup>3</sup>*, by which when desired the  
 15 nail-carrier may be moved from its nail-receiving into its nail-discharging position, the normal position of said nail-carrier when the machine is at rest being under the foot-plate, where it is locked by a spring *c<sup>24</sup>*, secured by a  
 20 suitable screw *c<sup>25</sup>* (see Fig. 2) to the arm *b<sup>10</sup>*, the free end of said spring entering a suitable notch in the carrier *c*. (See Fig. 3.) The nail-carrier has pivotally mounted upon it at *c<sup>4</sup>* a gate *c<sup>5</sup>*, the shape of which is shown best by  
 25 dotted lines in Fig. 3, said gate sustaining the nails deposited in the holes of the nail-carrier. The gate has an ear 2, (see Fig. 3,) which is engaged by one end of a spring 3, fixed at its opposite end to the arm of the nail-carrier, so  
 30 that said spring acts normally when permitted to swing the gate about the pivot *c<sup>4</sup>* that it may uncover the holes in the nail-carrier and let the nails put therein from the foot-plate drop from the nail-carrier into the holes  
 35 in the nail-block. The gate, preferably of spring-steel, has a finger 4, (see Figs. 3 and 7,) which when the gate is in position to sustain nails in the holes of the carrier is held in such position by a suitable gate-locking  
 40 device, shown as a pin 5, located in the carrier. (See Fig. 7.) The end of the finger 4, when the carrier loaded with nails is swung, as herein represented, by hand to the left in  
 45 Fig. 3, meets a stationary stop 7, held in place by a nut 8, applied to the upper end of a stud 18<sup>x</sup>, having a collar 19 and extended through a heel-holder *D'*, to be described, the said stop acting to depress the finger and release the  
 50 spring 3 swing the gate aside quickly, so that the nails in the carrier and supported by the gate may readily drop from the nail-carrier into usual holes in the nail-block, said nails meeting the upper ends of usual drivers *d*,  
 55 normally standing in said holes, said drivers being partially shown in Fig. 2. The gate has a projection *d'*, which when the nail-carrier is moved, as herein shown, by hand from the position in which the nails therein were  
 60 discharged into the nail-block into its normal or nail-receiving position meets an adjustable stop *d<sup>2</sup>*, which arrests the gate, and thereafter the nail-carrier in its further movement brings the locking device or pin 5 in position  
 65 to enter the hole in the finger and again lock the gate to the carrier.

Let it be supposed that a heel has been ap-

plied to a shoe, that a top lift has been spanked onto the heel, and that the spindle *E<sup>4</sup>* is lowered and the machine, with the exception of  
 70 the pulley *D<sup>4</sup>*, at rest. In this position of the machine the heel-holder *D'* and the top-lift carrier *D<sup>2</sup>*, but without a top lift therein, will occupy the full-line position, Fig. 4, and the nail-carrier will be locked in the full-line po-  
 75 sition, Fig. 3—its nail-receiving position—where it will be provided with nails. When the nail-carrier is now turned from its normal or full-line position, Fig. 3, to the left, a cam or arm *d<sup>3</sup>*, fixed to and movable with said nail-  
 80 carrier, is made to meet in its travel a stud 10, (see Fig. 4, where said stud is shown by dotted lines as extended below the under side of the heel-holder,) said cam or arm acting to turn said heel-holder about the pivot 18<sup>x</sup>, to  
 85 which said holder is fastened, from the full-line position, Fig. 4, into the full-line position, Fig. 3, the nail-carrier at the end of such movement occupying the dotted-line po-  
 90 sition, Fig. 3, the nail-holes in the nail-carrier then coinciding with the holes in the nail-block, so that when the finger 4 meets the stop 7 to unlock the gate the gate is opened by the spring 3, and the nails in the nail-carrier enter the nail-holes in the nail-block, and  
 95 thereafter the nail-carrier is returned into its full-line position, Fig. 3. The heel-holder is locked in the full-line position, Fig. 3, by means of a locking device, represented as a spring *e<sup>20</sup>*, (see Figs. 1, 3, and 6,) adjustably  
 100 attached by a suitable screw 40 to an ear *e'*, (see Figs. 1 and 2,) fixed to the reduced lower end of the stud *c<sup>2</sup>*, the bent end of said spring engaging the stud 10.

The nail-carrier and the shaft *a<sup>6</sup>* are so  
 105 combined that movement of the carrier also moves the shaft and its lug *a<sup>5</sup>*. This connection, as herein represented, (see Fig. 3,) is by a chain *e'<sup>x</sup>*, extended about a suitable or  
 110 usual chain-receiving hub of the nail-carrier and about a suitable sprocket-wheel *e<sup>2</sup>*, fast on the shaft *a<sup>6</sup>*. When the nail-carrier occupies its nail-receiving position, the lug *a<sup>5</sup>* on the shaft *a<sup>6</sup>* is made to occupy a position  
 115 at one side of the toe *a<sup>2</sup>*, and the machine may be started; but when the nail-carrier is moving between its nail-receiving position and nail-discharging position the said lug is turned to occupy a position to engage the lug *a<sup>2</sup>* and prevent the machine from being started.  
 120

While the heel-holder *D'* is locked and held and while the nail-carrier occupies its nail-receiving position, the operator places a heel  
 125 *h* in the heel-holder, (see Fig. 3,) putting the breast of the heel against a yielding breast-gage *h'* and the back or convex part of the heel against the back-part gage *h<sup>2</sup>*, said gage being held in position by a suitable screw  
 130 (see Fig. 3) in the slot of said gage, it having been previously adjusted to adapt it to receive and position a heel of the size to be used relative to the nail-holes in the nail-block, the breast-gage *h'*, controlled by a suitable spring, contacting with the breast of the heel.



The spring enables the gage to adapt itself to any variations in sizes of heels, and under the action of said spring the breast-gage may when acting upon a small heel cross partly  
 5 over the recess made in the holder to receive the heel. The operator at the same time also supplies to the top-lift carrier  $D^2$  a top lift  $t$ , said top-lift carrier being represented as connected with the heel-holder  $D'$ . (See Fig. 3.)  
 10 The top-lift carrier to receive a top lift, as shown, has a slotted shank, and said carrier presents a straight edge, which acts as a breast-gage to meet the breast of the top lift, the shank of the plate being provided with suitable  
 15 gibs 15, fixed on plate  $D'$ , to form the side walls of an overhanging guideway for the shank of the plate constituting the top-lift carrier. The inner end of the said plate receives in its slot (see Fig. 3) the shank  $e^3$  of  
 20 a forked piece  $e^4$ , which bears against the rear or convexed end of the top lift, the said shank being adjustably mounted in the holder  $D'$  by a suitable screw 16, (see Fig. 2<sup>a</sup>), which may be rotated in the ear 34<sup>x</sup> of said holder  $D'$ , said  
 25 screw entering a threaded lug 35<sup>x</sup>, extended downwardly from said shanks  $e^3$ , the rotation of the screw adjusting the position of the fork with relation to the rear of the heel to thereby control the position of the top lift and in-  
 30 sure its proper presentation to the heel. The shank of the top-lift carrier has united with it by two or more screws or rivets (see Fig. 3) a plate  $e^5$ , and a spring  $e^6$ , connected at one end with said plate and at its other end with  
 35 a pin on the shank  $e^3$ , normally acts to move the top-lift carrier  $D^2$  to the left in Fig. 3, causing the top lift to be held firmly between the breast-gage of the top-lift carrier and the fork  $e^4$ . The nail-carrier having been turned  
 40 into its normal or nail-receiving position and a heel and top lift having been put into their proper places in the heel-holder and top-lift carrier and the shoe to which a heel is to be applied having been put upon the lower end  
 45 of the jack or post  $A^2$  while the same is in the full-line position, Fig. 1, the jack is thereafter turned or pushed backwardly into a substantially vertical position to thus put the  
 50 part of the heel outside the usual counter into the clamp 29<sup>x</sup>, and the operator then puts his foot on the starting treadle or device  $a^3$  and moves the clutch-controller  $D$  to effect the starting of the shaft  $A'$ . When the machine  
 55 is started, the spindle  $E^1$  is actuated to effect the attaching of the heel, the shaft straightening the toggle and lifting the nail-block bed-piece and with it the nail-block supported by it in usual manner by a spring, (not shown,) causing the nail-block on which the heel rests  
 60 to press the heel against the sole of the shoe, the rising of said nail-block after the heel has been firmly seated on the sole being checked, but the nail-block bed-piece continues to rise, causing the drivers standing in the holes of  
 65 the nail-block and sustaining the nails to act upon and drive the nails from said holes into

the heel and then into the sole. During this upward movement of the nail-block bed-plate the spring 17, connected therewith, (see Fig. 6,) meets the free, but tapered end of the  
 70 spring  $e^{20}$ , which causes the spring 17 to be moved aside. When the spring 17 arrives above the spring  $e^{20}$ , a releasing device 18, carried by said spring 17, by the reaction of  
 75 said spring comes into position above the spring  $e^{20}$ , so that as the nail-block bed-piece again descends the tapered left-hand end of said releasing device 18 meets the side of  
 80 the spring  $e^{20}$  next the stud 10 and pushes said spring  $e^{20}$  aside, so that the heel-holder  $D'$  is no longer locked in place. When the spring  $e^{20}$  is moved to release the pin 10, the nail-block bed-piece has arrived again in substantially its lowest position and the heel at-  
 85 tached to the sole has been lifted from the space in the holder  $D'$ , in which it previously rested, and in this condition a suitable spring or device  $f$ , (see Fig. 5,) normally wound up, surrounding a shaft  $f'$ , sustained in suitable  
 90 ears  $f^2$  of a plate secured to the frame, acts and turns the said shaft  $f'$ , causing the crank  $f^3$ , attached at its upper end, to move the rod  $f^4$  in the direction of the arrow, Fig. 3, and quickly turn the holder  $D'$  into the full-line  
 95 position, Fig. 4, thus placing the top lift in position between the lower end of the heel and the nail-block. The second rotation of the shaft  $A'$  is now begun and finished, and in its operation the nail-block is raised, as  
 100 before, acting against the top lift then placed above it and spanking the same onto the nails previously partially driven from the nail-block into the heel. The nail-reverser  $b^{4x}$ , which acts to deliver nails as required, is  
 105 caused to operate by the movement of the carrier into its nail-receiving position, the carrier and reverser being connected operatively for this purpose by suitable mechanism, one form of which will now be described. The nail-reverser has attached to it at one  
 110 end a gear  $g$ , which is engaged by a toothed sector  $g'$ , at the upper end of a lever  $g^2$ , pivoted at  $g^3$ , a spring  $g^6$  connected with said lever normally acting to pull it the direction to turn upward the open ends of the holes  $b^7$   
 115 in said reverser, putting said holes in line with the chutes  $b^5$ . When the nail-carrier is in position to deliver the nails therein, the reverser  $b^{4x}$  is in position to receive nails or its holes are then in line with the chutes, so  
 120 that the nails in said chutes may enter the holes in the reverser.

In the operation of the machine, the reverser having been provided with nails and the nail-carrier having discharged its nails, said nail-  
 125 carrier will be returned to its full-line normal position, Fig. 3, and during this movement the nail-reverser will be started by the action of the nail-carrier through the lever  $g^2$ , so that at this time the nail-assorting mech-  
 130 anism will be operated to feed nails from the nail-controller into the chutes  $b^5$ . The lower



end of the lever  $g^2$  has a screw  $g^4$ , which may be so adjusted that the nail-carrier when coming into its nail-receiving position will actuate the lever  $g^2$  and put the holes in the reverser in such position as to enable the nails to leave said holes and enter the nail-tubes  $b^3$  as soon as the carrier arrives fully in its normal or nail-receiving position. The reverser has a stud  $m$ , which in the movement of said reverser meets one end of a short lever  $m'$ , mounted loosely on one end of a lever  $m^2$ , pivoted at  $m^3$ , said lever having a cam-shaped block  $m^4$ , against which normally rests a pin  $m^5$ , extended from a collar  $m^6$ , fast on the end of a shaft  $m^7$ , supported in suitable bearings  $m^8$   $m^{8x}$ , attached to the under side of the frame  $b'$ , said shaft having at its opposite end a friction device  $m^9$ , which may be forced against the face of the continuously-rotating driving-pulley  $m^{10}$ , fast on a shaft  $m^{12}$ , driven in any suitable manner—for instance, as in said Patent No. 577,213—the said friction-pulleys being forced in contact whenever the controller  $b^4$  is to be turned to discharge nails, and as this controller is to be moved only at a certain defined time I determine its time of operation by or through the lever  $m^2$ . Whenever the lever  $m^2$  is lifted to release the pin  $m^5$  of the collar  $m^6$ , a spring  $n$ , inside the shaft  $m^7$ , is permitted to act and push the shaft in the direction of the arrow on it in Fig. 8, thus forcing the washer  $m^9$  in driving contact with the said pulley. The outer end of the spring  $n$  rests against a block  $n^1$ , held in fixed position by a screw  $n^2$ , mounted adjustably in a bracket  $n^3$ . The lever  $m'$  has one of its ends resting normally on a fulcrum  $n^5$ , and a spring  $n^4$  is connected to said lever between the lever  $m^2$  and the said fulcrum, so that when the lever  $m'$  is struck by the upward movement of the projection  $m$  the lever  $m^2$  will be lifted; but when the said projection on the return movement strikes said lever the spring  $n^4$  lets the lever  $m'$  turn on  $m^2$ . During the rotation of the shaft  $m^7$  the pin  $m^5$  arrives against the outer inclined face of the cam  $m^4$  and pushes the collar  $m^6$  to the left, Fig. 8, and it also moves the shaft  $m^7$  to the left, releasing the driving friction and letting the said shaft stop.

The shaft  $m^7$  in practice will have mounted upon it a cam  $m^{81}$  like that shown by like letter in said Patent No. 577,213, said cam operating a lever  $o$ , having at one end teeth (see Fig. 1) which engage the teeth of a partial gear  $o'$ , fast on the shaft of the nail-controller.

The tubes  $b^3$  are connected at their upper ends with nipples  $30^x$ , provided with nail-passages, some of which are shown uncovered in Fig. 2, said nipples extending from the end casing or concave  $31^x$ , surrounding one side of the nail-reverser, the said concave serving to prevent the escape of nails except at the proper place, the journals of the nail-reverser taking their bearing in side plates  $32^x$ .

The nail-block has a stop  $36^x$ , (see Figs. 2,

3, and 4,) against which strike suitable projections (see Figs. 3 and 4) of the holder  $D'$  when the latter is put into either of its extreme positions.

The lever  $g^2$  has connected with it a spring  $g^6$ , which, as already explained, imparts movement to said lever in the direction to turn the reverser from its position, Fig. 8, and put the open ends of the holes  $b^7$  in line with the chutes  $b^5$  to receive nails, the movement of said lever in the opposite direction to insure the discharge of the nails being effected by the nail-carrier.

The nail-controller and the nail-reverser are both shown as cylinders having, it will be supposed, a series of pockets or holes to handle a series of nails or enough nails to at one and the same movement fill the nail-carrier, and the chutes and raceways are also in series side by side. The nail-block bed-piece receives within it a suitable driver-plate  $d^{20}$ , carrying the usual drivers.

From the foregoing it will be understood that the starting of the nail-assorting mechanism is controlled by or through the movement of the nail-carrier or a part cooperating therewith which actuates a suitable moving device, as the lever  $g^2$ , and it will also be observed that the main shaft  $A'$  of the machine cannot be started so long as the nail-carrier is in position to feed its nails to the nail-box, for should that happen the machine would be smashed, and hence the position of said carrier is made to control the time of starting the movement of the main shaft and the die-bed spindle.

While I have herein shown my invention as applied to the type of machine shown in said Letters Patent, it should be understood that my invention is not limited to use on a machine of that description, but is applicable to many other different types of machine, and while all the features of my invention are herein shown as combined in one machine and while the best results are secured by so combining them it is nevertheless possible to secure many of the advantages of the invention by employing some of its features without others, and I should consider within the scope of my invention machines in which any one or more of the features of the invention were employed without the use of other features of the invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a nailing-machine, a raceway to guide a series of nails with their heads arranged indiscriminately, a movable nail-controller to receive only the nails leaving the raceway with their heads in one direction, and a series of chutes into which said controller deposits the nails received by it and which also receives the nails leaving the raceway with their heads in the other direction, nail-delivery tubes, and a nail-reverser located between



said chutes and nail-delivery tubes to take the nails from the chute and reverse and deposit them in the nail-delivery tubes.

2. A casing presenting a concave interior surface and having a series of nail-passages arranged at opposite sides of the longitudinal center thereof, a series of chutes communicating with the upper nail-passages of said casing, a series of nail-receiving tubes in communication with the lower passages of said casing, a cylindrical reverser located in said casing and presenting a nail-supporting portion and a series of nail-receiving holes, said supporting portion sustaining the ends of nails in the series of upper nail-passages in the casing, and means to move said reverser in one direction to put its series of holes in position to receive the nails previously sustained by it, and to thereafter move said reverser in an opposite direction to put said holes in position to enable the nails therein to be discharged into said tubes.

3. A nail-reverser having a series of passages to hold a series of nails, a foot-plate, a series of tubes intermediate said reverser and foot-plate, a nail-carrier having a gate to close the passages of the carrier when the latter is in position under the foot-plate to receive nails, combined with means controlled by said carrier, when moved into position to receive nails, to actuate the said reverser and effect the delivery of its nails into said carrier.

4. In a machine of the class described, a continuously-rotatable shaft having at one end part of a clutch, a second shaft having a cooperating clutch part and provided with a collar having a stud, an arm against which said stud may act at each rotation of the said second shaft to separate said clutch parts, a nail-assorting mechanism, and heel-attaching mechanism, combined with means under the control of the workman to move said arm, and a spring to move said second shaft to effect the engagement of said clutch to start said second shaft.

5. A nail-controller, a continuously-rotated shaft having a connected disk forming one part of a clutch, a second shaft in line with it and having part of a clutch adapted to cooperate with the clutch part of said continuously-rotating shaft, a locking device to hold said second shaft in position to separate said clutch parts leaving said second shaft at rest, means intermediate said second shaft and said nail-controller, to operate the latter, a nail-reverser, and means to start it into operation, said nail-reverser when started acting on said locking device and effecting the release of said second shaft, and means to thereafter effect the engagement of the clutch parts of said shafts in order that the continuously-rotating shaft may start the second shaft and actuate the nail-controller.

6. In a heeling-machine, mechanism for supplying nails including means for causing the nails all to point the same way and for delivering the nails with their points arranged

as desired, a nail-carrier, and mechanism under the control of said nail-carrier for automatically causing nails to be supplied directly from said point-arranging means to said nail-carrier.

7. In a heeling-machine, nail-driving mechanism, a nail-carrier to present nails to said driving mechanism, mechanism for supplying nails including means for causing the nails all to point the same way and for delivering nails with their points arranged as desired, mechanism under the control of said nail-carrier for automatically causing nails to be supplied directly from said point-arranging means to said nail-carrier, and means to sustain the nails in said carrier while the carrier is being moved toward the driving mechanism.

8. A nail-point-arranging mechanism, and a nail-carrier, combined with intermediate mechanism to actuate said nail-point-arranging mechanism from the nail-carrier.

9. In a heeling-machine, a nail-block, and a movable nail-carrier; combined with automatic mechanism controlled by the said carrier to supply said carrier with nails at the desired times.

10. In a heeling-machine, a nail-block, nail-assorting mechanism, a nail-carrier movable between said nail-block and said nail-assorting mechanism, said carrier when in its receiving position effecting automatically the operation of the nail-assorting mechanism to deliver nails to the carrier, the carrier in its other position discharging its nails into said nail-block, a series of drivers occupying a position in said block, means to actuate said drivers, and means to restrain the operation of said nail-assorting mechanism while the nail-carrier occupies a position with relation to the said block to discharge its nails in the holes of the block.

11. In a heeling-machine, a nail-block, nail-assorting mechanism, a nail-carrier movable between said nail-block and said nail-assorting mechanism, said carrier when in its nail-receiving position effecting automatically the operation of the nail-assorting mechanism to deliver nails to the carrier, the carrier in its other position discharging its nails in the said nail-block, a heel-holder, and means actuated by said nail-carrier when being moved into the position to supply the nail-block with nails to move said holder and put the heel-receiving portion thereof in line with the nail-block.

12. In a heeling-machine, a nail-carrier, a gate connected therewith to sustain the ends of the nails in the carrier, a locking device to hold the gate closed to retain nails, and means to depress the gate to release it from the locking device.

13. In a heeling-machine, a nail-carrier, a gate to keep nails therein, a locking device to retain said gate closed, means to release the gate automatically from said locking device, means to open said gate, heel-attaching mech-



anism, a heel-holder for presenting a heel to be attached, a top-lift holder for presenting a top lift to be attached, and means for automatically moving the top-lift holder into position to present a top lift.

14. A nail-carrier, a gate to close its nail-receiving holes; means to lock said gate in its closed position to sustain the nails in the holes of the nail-carrier, means to unlock said gate, means to move the gate to effect the discharge of the nails from the carrier, and means to close said gate automatically preparatory to supplying said carrier with nails.

15. A movable nail-carrier having a movable gate, means acting normally to open said gate, means to close said gate automatically as the carrier is being moved into nail-receiving position, and means to lock said gate in its closed position.

16. A pivoted nail-carrier, a gate pivoted on said carrier and a spring acting normally to open said gate, combined with a stop to meet said open gate as the carrier is being swung back into receiving position, said stop arresting said gate while said carrier is completing its movement, and means to lock said gate in its closed position.

17. A movable nail-carrier having a movable gate, means acting normally to open said gate, means to close said gate as the carrier is being moved into nail-receiving position, means to lock said gate in closed position, and means to lock the carrier with the gate closed in nail-receiving position.

18. A starting-treadle, a controlling-lever, a shaft to which it is attached, said shaft having an arm; and a shaft having a lug to at times come under and prevent movement of said arm and its shaft, combined with a nail-carrier, and means between it and said shaft having said lug to turn said shaft and lug, substantially as and for the purposes set forth.

19. A nail-block, a heel-holder having devices to receive a heel, combined with a nail-carrier, means to supply it in one position with nails, and means actuated by said nail-carrier when being moved in position to supply the nail-block with nails to move said holder and put the heel-receiving portion thereof in line with the nail-block.

20. A nail-block, a heel-holder having devices to receive a heel, combined with a nail-carrier, means to supply it in one position with nails, and means actuated by said nail-carrier when being moved into position to supply the nail-block with nails to move said holder and put the heel-receiving portion in line with the nail-block, and means to lock the said heel-holder in such position.

21. In a heeling-machine, a nail-block, a movable heel-holder having devices to receive a heel and a top lift, a device to lock said heel-holder with the heel in position to be applied to the shoe, means to effect the release of said locking device, and means to thereafter automatically move the said heel-holder

and put the top lift in position to be applied to the heel.

22. In a heeling-machine, means for positioning the heel end of a shoe, a heel-holder comprising a movable plate to receive a heel, an attached back gage to receive and position the rear end of the heel with relation to the heel end of the shoe, and a yielding breast-gage to keep the heel in position against said back gage, combined with similar mechanism for locating the rear end of the top lift with relation to the rear end of the heel.

23. In a heeling-machine, means for positioning the heel end of a shoe, a movable heel-holder comprising a plate to receive a heel, said plate having an attached back gage, means to adjust said back gage and adapt said heel-holder to receive and position the heel with relation to the heel end of the shoe, and a spring-controlled breast-gage.

24. A movable heel-holder, a movable nail-carrier, means actuated thereby to move the said heel-holder into position to put the heel held by it in attaching position, means to lock and retain said holder temporarily in said attaching position, and means to subsequently automatically release said locking means.

25. A nail-block, a heel-holder and top-lift carrier having devices to receive and hold a heel and a top lift, a nail-carrier, means to supply it in one position with nails, and means actuated by said nail-carrier when being moved into position to supply the nail-block with nails to move said holder and put the heel-receiving portion thereof in line with the nail-block.

26. A nail-block, a heel-holder and top-lift carrier having devices to receive and hold a heel, combined with a nail-carrier, means to supply it in one position with nails, and means actuated by said nail-carrier when being moved into position to supply the nail-block with nails to move said holder and put the heel-receiving portion in line with the nail-block, and means to lock the said heel-holder in such position.

27. A heel-holder having mechanism for positioning the rear end of a heel; combined with a top-lift holder comprising a device to position the rear end of a top lift with relation to the rear end of the heel, a slide carrying a breast-gage, and means acting on said slide to force said breast-gage against the breast of the top lift.

28. In a heeling-machine, a nail-block, a heel-holder and a top-lift holder movable independently of said nail-block, and means to adjust one of said holders with relation to the other to insure the application of the top lift in proper position with relation to the attached heel.

29. In a heeling-machine, mechanism for positioning the rear end of a shoe; a heel-holder composed of a plate provided with a breast-gage and an independent rear end gage to receive between them a heel, a top-lift holder



- movable with said plate and presenting a breast-gage, an independent device to engage the rear end of the top lift in said holder, and means to relatively adjust said gage and the device engaging the rear end of the top lift, whereby the convexed end of the top lift may be properly positioned with relation to the convexed end of a heel to which said lift is to be applied.
30. In a heel-attaching machine, mechanism for taking nails with their points arranged indiscriminately and presenting them all pointing the same way, a nail-carrier for receiving the nails, said carrier being movable to place the nails in position to be driven, mechanism for delivering the nails from said nail-presenting mechanism to the carrier, means for supporting a shoe in position for the heel-attaching operation, a series of drivers and mechanism for actuating the drivers to attach the heel.
31. A nail-block bed-piece, a nail-block carried thereby, a pivoted heel-holder having a stud, a spring-controlled releasing device to hold said holder, combined with means to keep said heel-holder in position for nailing the heel, said releasing device acting in one direction of movement of the bed-piece to disengage from said stud the means employed to hold it.
32. In a heeling-machine, a nail-block, and an independent heel-holder adapted to receive and hold a heel; combined with a top-lift carrier attached to and movable with said heel-holder, said top-lift carrier receiving a top lift, and automatic means to actuate said heel-holder to put the heel or top lift in operative position with relation to the nail-block, and means acting independently of the means for moving the heel-holder to lock said heel-holder in its operative position during the time that the nails are being driven from said block into the heel to attach it to the sole of a boot or shoe.
33. In a heeling-machine, the following instrumentalities viz: a nail-block, a series of tubes to present nails, a carrier movable between said block and tubes, a heel-holder movable in one direction by said carrier, a treadle, a clutch-controlling lever, a device controlled by said carrier when it stands in its operative position with relation to said nail-block to prevent the said clutch-controller from being moved to start the machine while the nails are being fed from said carrier into said nail-block.
34. In a machine to automatically supply nails to a heel, the following instrumentalities, viz: nail-assorting mechanism, a nail-block, a heel-holder, a nail-carrier, tubes adapted to receive the assorted nails from said nail-assorting mechanism and deliver them into holes in said carrier, and means intermediate said carrier and said nail-assorting mechanism, and controlled by said carrier to automatically start said nail-assorting mechanism into operation when said carrier is to be supplied with nails.
35. In a heeling-machine, a nail-block, and a movable nail-carrier, tubes to conduct nails to said carrier; and means to automatically supply nails to said tubes; combined with means controlled by the said carrier to actuate the nail-supplying means to supply said tubes and carrier with nails at the desired time.
36. In a heeling-machine, a nail-carrier having a series of holes to receive nails, a gate pivoted on and movable with said nail-carrier, means to close said gate automatically and lock the same when the carrier is in position to receive nails, and means to automatically unlock and to open said gate when the carrier is in position to discharge its nails.
37. A nail-carrier having a gate opened by a spring for the discharge of nails from the carrier in one position, combined with a stop to meet and arrest said gate as the carrier is being swung back into its nail-receiving position, the stop arresting the gate while the carrier completes its movement, and means to lock the gate in its closed position.
38. In a heeling-machine, a nail-block to receive nails to be driven into a heel, a series of tubes, and means to hold them in a position to receive nails, a heel-holder having devices to receive and hold a heel, a nail-carrier movable from the position occupied by said tubes into position to supply the nail-block with nails, and an arm or projection extended from said nail-carrier, the movement of said carrier from its nail-receiving into its nail-discharging position causing said arm to act against said heel-holder and put it into position to receive a heel after the nail-block has been filled.
39. In a heeling-machine, a nail-block to receive nails to be driven into a heel, a series of tubes, means to hold them in a position to receive nails, a heel-holder having devices to receive and hold a heel, a nail-carrier mounted on a shaft, means to move said carrier from the position occupied by said tubes into position to deposit the nails contained in the carrier in the holes of said nail-block, means actuated by said carrier to turn said heel-holder into position to receive a heel to be held at the nail-block to receive nails, a shaft having a lug and occupying a position parallel with the shaft on which the carrier is mounted, a clutch-controlling lever, and means to rotate the shaft having said lug to put the latter in position to lock the said clutch-controlling lever when the nail-carrier is in position to supply the nail-block with nails.
40. A series of drivers, means to actuate the same, a nail-block, a movable heel-holder having also devices to carry a top lift, means to lock the heel-holder in position with relation to said nail-block while the drivers act to drive the nails from the nail-block into



said heel, means to operate after the heel has been attached to the shoe to release the locking device holding the heel-holder, and means to turn said heel-holder to bring the top-lift carrier connected therewith and supplied with a top lift, into position between said nail-block and the heel, and means to effect a relative movement of said nail-block and heel to attach the top lift.

41. A nail-block, a movable plate having devices to hold a heel and also a top lift, means to lock said plate in position to maintain the heel held by it in position to be attached to a shoe, means to thereafter release the said locking device, and means to turn said plate and put the top lift in operative position with relation to the nail-block.

42. In a heeling-machine, a nail-block, a series of drivers occupying a position in said block, mechanism to actuate said drivers, a nail-carrier, actuating means for said nail-block, and means to restrain the operation of the driver-actuating mechanism while the nail-carrier is in position to discharge its nails into said block.

43. A nail-block, nail-assorting mechanism, a nail-carrier movable between said nail-block and said nail-assorting mechanism, said carrier when in its receiving position causing the operation of the nail-assorting mechanism to deliver nails to the nail-carrier, the nail-carrier in its other position discharging its nails into said nail-block.

44. In a heeling-machine, a nail-block, nail-assorting mechanism, a nail-carrier movable between said nail-assorting mechanism and said nail-block, and means intermediate said carrier and nail-assorting mechanism whereby said nail-carrier is made to operate the nail-assorting mechanism to supply the carrier with nails.

45. A heel-attaching machine comprising mechanism for supporting a shoe and for presenting a heel to be attached to the shoe, nail-driving mechanism, nail-assorting mechanism, a movable device to transfer nails from the nail-assorting mechanism to the nail-driving mechanism and means for delivering nails from the nail-assorting mechanism to the transferring device.

46. In a heel-attaching machine, nail-driving mechanism, nail-assorting and point-arranging mechanism, a device to transfer nails from the nail-assorting mechanism to the nail-driving mechanism, and means, operative when said transferring device is in position to receive nails, for causing nails to be delivered directly from said point-arranging mechanism to said device.

47. In a heel-attaching machine, nail-driving mechanism, nail-assorting mechanism, a device to transfer nails from the nail-assorting mechanism to the nail-driving mechanism, and connections wherethrough the nail-assorting mechanism is rendered operative or inoperative by movement of said transferring device.

48. In a heel-attaching machine, mechanism for securing a heel to a shoe, a heel-holder, and a top-lift carrier, means to place the heel-holder in position for the heel to be attached to the shoe, means for locking the heel-holder in said position, and automatic means to remove the heel-holder and put the top-lift carrier in position for the top lift to be attached to the heel.

49. In a heeling-machine, mechanism for attaching a heel to a shoe, nail-assorting mechanism, a nail-carrier movable from position to receive nails from the nail-assorting mechanism into position to deliver nails to the heel-attaching mechanism, and means to prevent automatically the operation of the nail-assorting mechanism when the nail-carrier is not in position to receive nails.

50. In a heel-attaching machine, mechanism for taking nails from bulk and presenting them all pointing the same way, a nail-carrier for receiving the nails, said carrier being movable to place the nails in position to be driven, mechanism for delivering the nails from said nail-presenting mechanism to the carrier and mechanism independent of the nail-carrier for driving the nails to attach the heel to a shoe.

51. In a heeling-machine, heel-attaching mechanism, a heel-holder, and a top-lift holder, both movable to and away from the attaching mechanism, means for automatically moving the heel-holder away from the attaching mechanism and for moving the top-lift holder into position for a top lift to be attached and a nail-carrier movable into position for delivering nails to the attaching mechanism, the top-lift holder being moved away from the attaching mechanism as the nail-carrier is moved to the attaching mechanism.

52. In a heel-attaching machine, mechanism for presenting a plurality of nails all pointing the same way, nail-driving mechanism, a nail-carrier movable from position to receive nails from the nail-presenting mechanism to place nails in position to be driven, means for actuating said nail-presenting mechanism to deliver nails to the carrier, said means operating when the carrier is in nail-receiving position and being inoperative when it is not in receiving position, a heel-holder and a top-lift holder, and means for operating them to present a heel and a top lift alternately for the operation of the attaching mechanism.

53. In a heel-attaching machine, nail assorting and delivering mechanism, heel-attaching mechanism, a nail-carrier movable from the nail-delivering mechanism to place nails in position to be driven, a heel-holder and a top-lift holder, means for placing the heel-holder in position to present a heel to be attached, and means for automatically moving the heel-holder out of such position and for automatically moving the top-lift holder into position to present a top lift to be attached.

54. In a heeling-machine, a heel-holder,



heel-attaching mechanism, a device for supplying nails to said mechanism, and connections between said device and the heel-holder whereby the heel-holder is moved to put the heel in position to be attached.

5 55. In a heeling-machine, a nail-carrier movable from a nail-receiving to a nail-delivering position, and a lock for preventing the starting of the machine when the nail-carrier is in nail-delivering position.

10 56. In a heeling-machine, a nail-carrier movable from a nail-receiving to a nail-delivering position, a lock for preventing the starting of the machine when the nail-carrier is in its nail-delivering position, and connections between the nail-carrier and the lock for operating the lock whereby the lock is rendered inoperative when the nail-carrier is in its nail-receiving position and is made effective when 15 20 the nail-carrier is in its nail-delivering position.

57. In a heeling-machine, nail assorting and delivering mechanism, heel-attaching mechanism, a nail-carrier movable into posi-

tion to receive nails from the nail-delivering 25 mechanism and in such movement causing the operation of the delivering mechanism, said carrier being also movable for presenting nails to said attaching mechanism, a gate for retaining the nails in said carrier, and means 30 for moving said gate as the carrier approaches the heel-attaching mechanism.

58. In a heel-attaching machine, means for supporting a shoe in position for a heel to be attached and mechanism for attaching a heel, 35 one of said parts being movable relatively to the other, a heel-holder and a top-lift holder, and means controlled by the movement of said movable part for moving the heel-holder and top-lift holder. 40

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN F. MAYO.

Witnesses:

GEO. W. GREGORY,  
ADDIE F. DANIELS.