March 10, 1936. J. F. STANDISH 2,033,158

MACHINE FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

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Fig. 1.

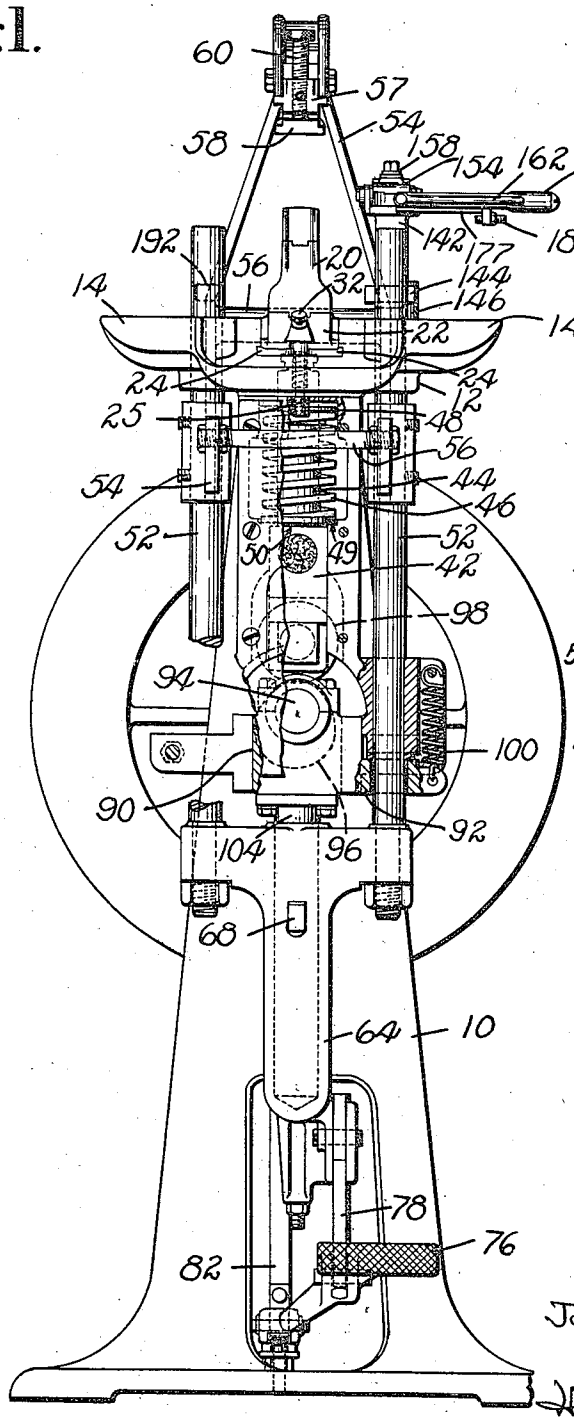
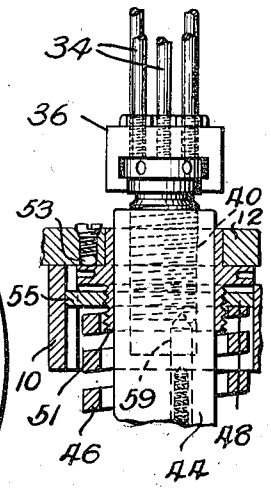


Fig. 2.



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Fig. 3.

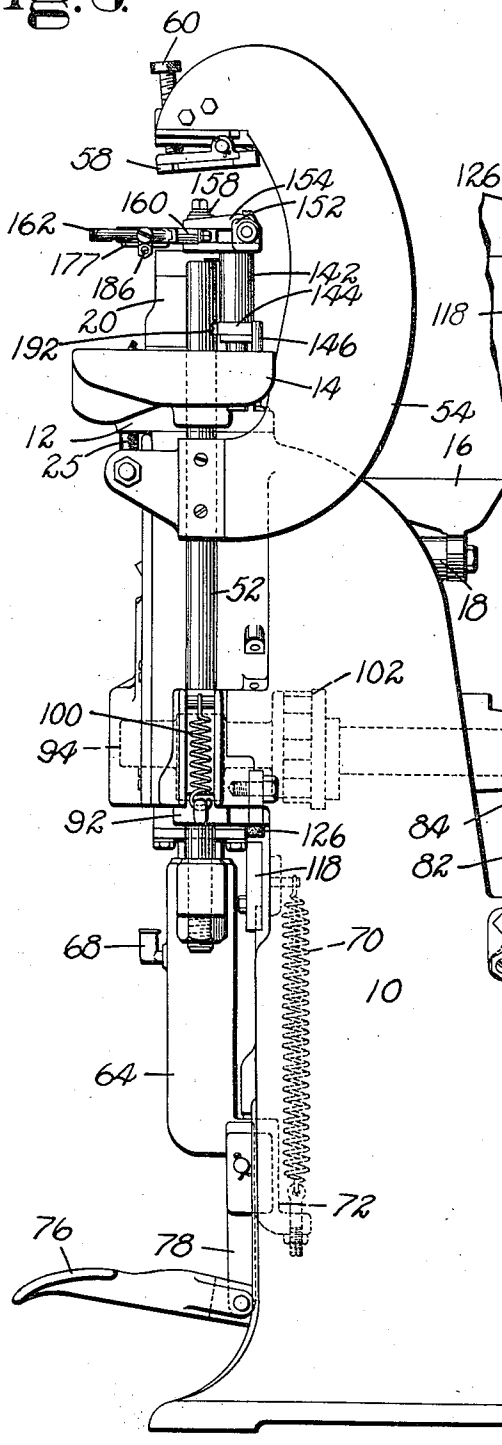
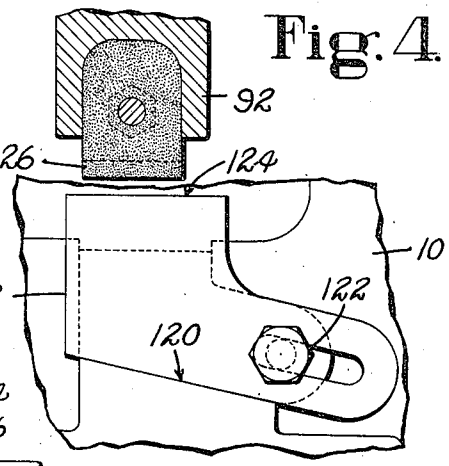
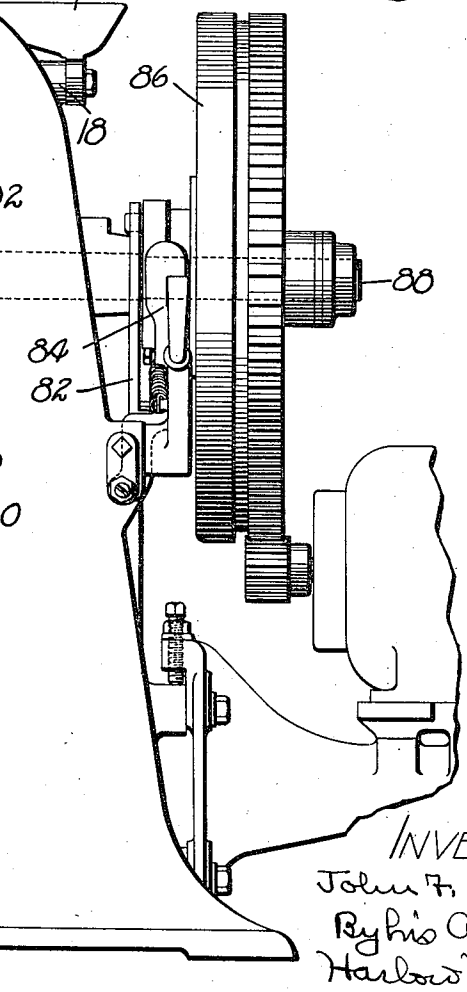


Fig. 4.





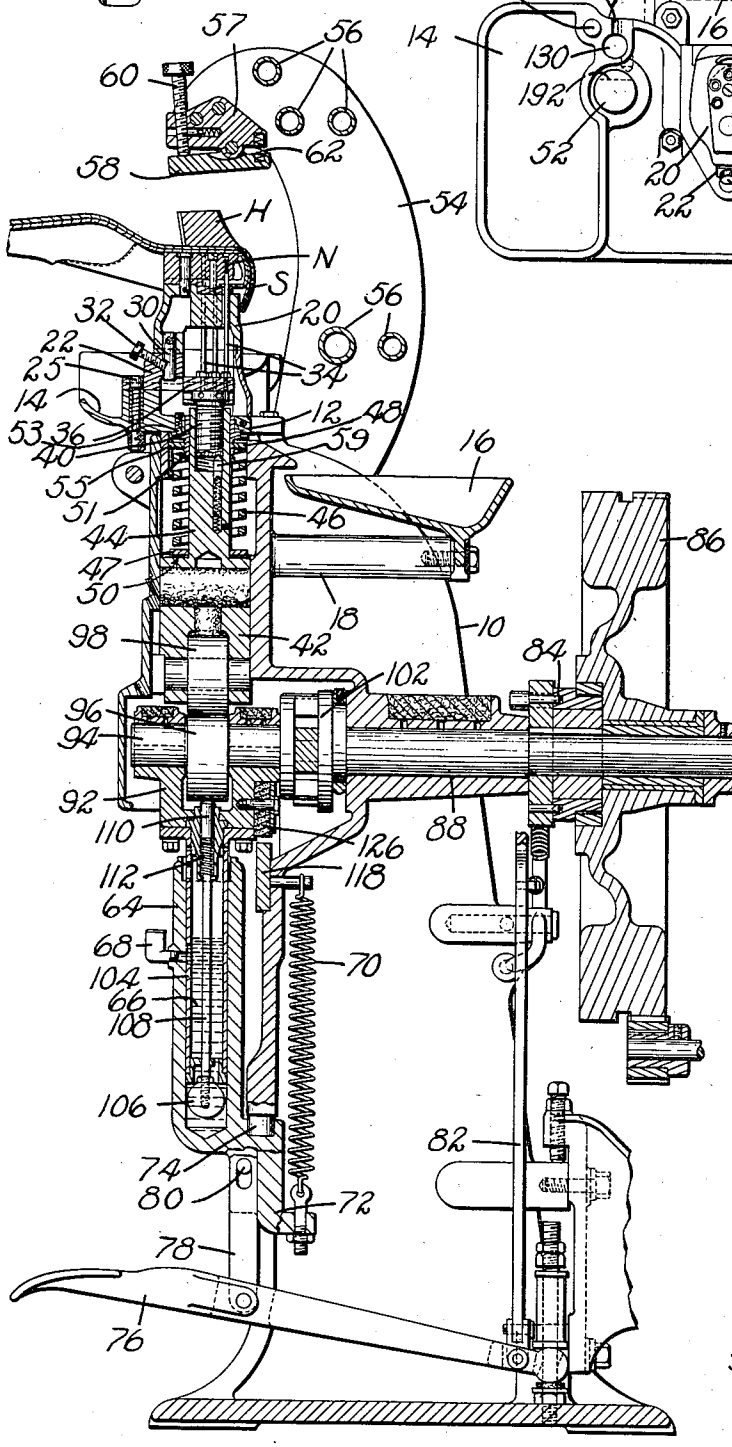
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MACHINE FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

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Fig. 5.



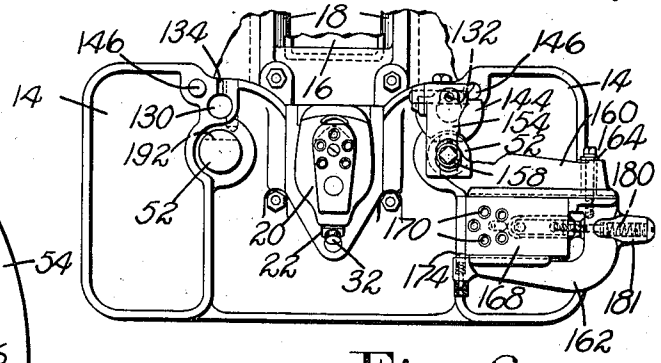


Fig. 6.

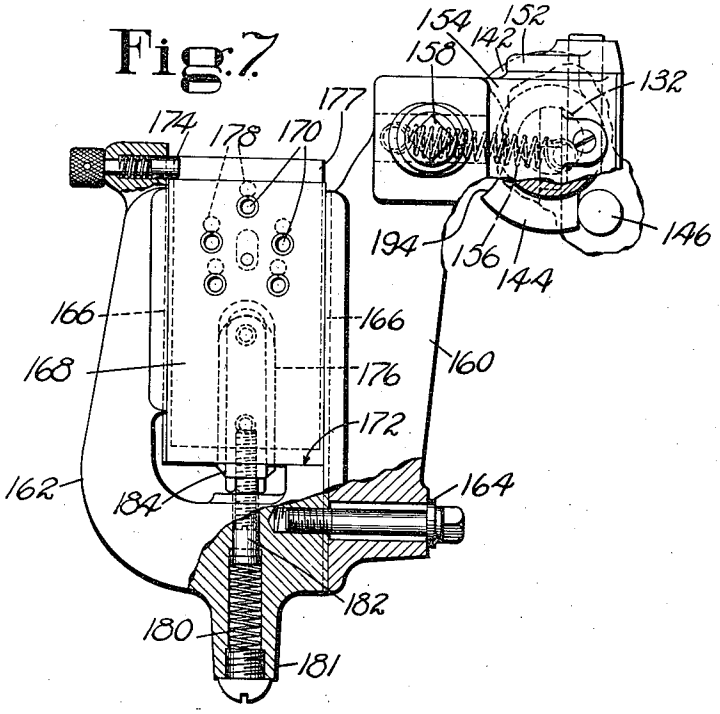
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MACHINE FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

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Fig. 7.



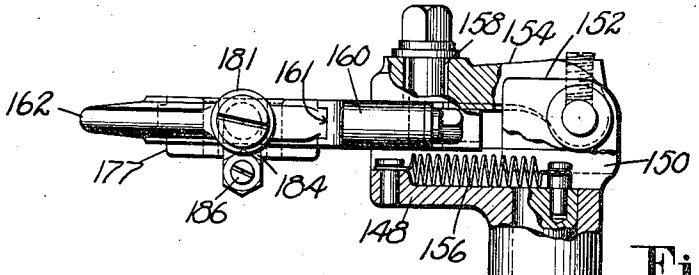
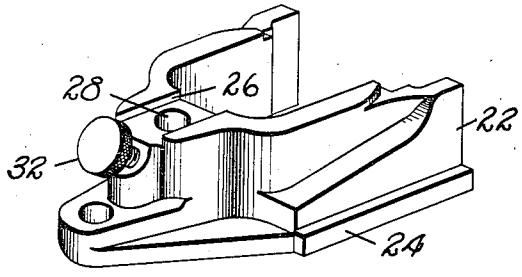
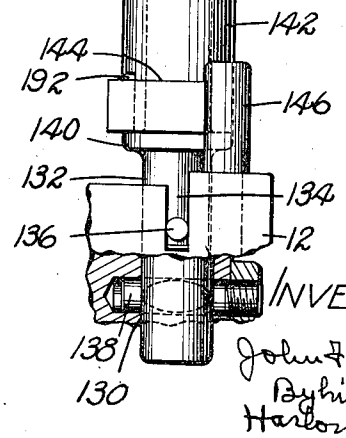


Fig. 8.

Fig. 9.





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Patented Mar. 10, 1936 2,033,158

UNITED STATES PATENT OFFICE

2,033,158

MACHINE FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

John F. Standish, Winthrop, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application August 25, 1933, Serial No. 686,836

58 Claims. (Cl. 1—32)

My invention relates to machine for operating upon the heel-portions of shoes, it being especially concerned with heel-attaching machines. In the embodiment of the invention which I have chosen to illustrate herein, the attachment is effected by nails driven from within a shoe through the heel-seat thereof into a heel.

The invention has as an object the provision of a machine for performing operations of the character above indicated, which machine shall be simple in construction, relatively inexpensive to manufacture and maintain in operation, positive in action, and capable of applying an operating pressure varying with the character of the work operated upon. For the accomplishment of this object, I combine with a work-support or jack, work-pressing mechanism and mechanism for inserting nails or other fastenings, operating means for one of the mechanisms, as that for inserting the fastenings, and means for moving the other mechanism by a force dependent upon the resistance encountered by the mechanism first moved. Preferably, the force thus applied to the second mechanism is the reactive force generated by the first and is transmitted through the operating mechanism. By such an organization, when, for example, the action of nail-inserting drivers is resisted by the work, there is made effective a reaction which urges a pressure-abutment into heel-clamping relation. There is thus attained an automatic variation of the force exerted upon the work, since the greater the opposition to driving movement, and therefore the tendency to displace the work from its support, the greater is the pressure resisting such tendency. To permit the communication of the reaction from one mechanism to the other, there may be employed a yieldable mounting for the operating means, so when the operation of a mechanism is resisted the movement of the operating mechanism thereby produced will affect the companion mechanism. I have herein illustrated a cam rotatable in a spring-supported bearing-block, the cam acting in its rotation to actuate the drivers, and, as it yields with the block, forcing the pressure-abutment against the work. Since, with such mechanisms as those for clamping work upon a support, it may be desired to establish initial contact by an act of the operator, as by treadling to bring the pressure-abutment against the heel to be attached, the reactive force of one mechanism is transmitted to the other through connections which may be made effective or ineffective. A highly desirable form of connecting means consists of a fluid device, there being shown a fluid-containing cylinder mounted upon the pressure-abutment, a co-operating tubular piston joined to the yieldable bearing, and a valve also carried by said bearing and operated by the cam actuating the drivers, said valve either leaving the passage between the cylinder and piston open to allow free relative movement of the abutment and bearing, or closing the passage to lock the two in pressure-transmitting relation. A device of this character is positive and unvarying in action. Simplicity of structure is attained by operating the drivers and their carrier-plunger through a cam rotatable in vertical alinement with the plunger, and by employing the same cam to communicate movement to the pressure-abutment and to control such movement, as by the operation of the previously mentioned valve. The abutment or pressure-head may be carried by rods arranged to reciprocate vertically at opposite sides of the work-supporting jack, these side-rods also carrying below the cam the cylinder which, with its piston and controlling valve, couples the head to the bearing-block to receive the reactive pressure.

Another object of the invention is to provide a convenient nail-loading or delivering mechanism for a machine of the character previously indicated. This mechanism is so arranged that it may deliver from either side of the frame to the nailing mechanism. This end I attain by spaced mountings, shown as consisting of openings in the frame, either of which mountings may receive a spindle or support upon which loading mechanism may move, said mechanism being reversible to adapt it to either position. A spring acts on the loading mechanism, this being arranged to cross the axis about which such mechanism oscillates and thus cause its movement to either extreme position. Regardless of its interchangeability, the loading mechanism preferably has means for adjustably mounting its nail-holding block so its nail-receiving passages may be caused to register accurately with the jack or other passages to which it delivers and also has effective means for releasably retaining the block in place. Vertical yieldability of the loader-arm carrying the nail-holding block guards against injury, as when the block is struck by the nail-drivers, and retaining means prevents movement of the pressure mechanism when the loading mechanism leaves its normal position.

A further object of this invention is to arrange for the application of any one of a plurality of differently formed jacks to the frame of a heel-

attaching machine. This I accomplish by the use of an adaptor, which at its lower side has means for engaging the machine frame and at its upper side means for engaging a particular one of a set of jacks which it is desired to employ, there being also provided means for releasably locking the adaptor in place upon the frame and for releasably locking the appropriate jack upon the adaptor.

In the accompanying drawings illustrating my invention in one of its many possible forms,

Fig. 1 shows my improved heel-attaching machine in front elevation, with parts broken away;

Fig. 2 is a detail in front elevation of the upper portion of the driver-carrying plunger;

Fig. 3, a side elevation of the machine;

Fig. 4, an enlarged detail in front elevation of the stop mechanism for the pressure-head;

Fig. 5, a central vertical section through the machine;

Fig. 6, a top plan view with parts omitted;

Fig. 7, a broken top plan view of the loading mechanism;

Fig. 8, a broken side elevation of said mechanism; and

Fig. 9, a perspective view of the adaptor for connecting different jacks to the frame.

The frame of the machine is furnished by a column 10, at the top of which is secured a cap 12 formed with receptacles 14 to receive and hold clear of the moving parts nails dropped by the operator. Below the cap at the rear, where the receptacles 14 can not conveniently be extended, an additional receptacle 16 is mounted upon horizontal projections 18 from the column. The cap 12 is arranged to carry a work-supporting jack 20, but since it may be desired to apply to the machine jacks differently formed, I prefer to interpose between the cap and jack an adaptor 22. This adaptor is shown in Figs. 1 and 9 of the drawings as in the form of a block having lateral projections 24, 24 received by opposite ways in the cap. When slid into position in the ways, the adaptor may be releasably secured by a spring-actuated pin 25 movable vertically in the cap. There will be an adaptor for each jack differing from others of the set in the formation of its base, the upper surface of each adaptor being arranged to properly receive the jack to which it corresponds. A slot 26 in the top of the adaptor receives a tongue upon the base of the jack, this connection holding said jack against angular displacement. At the bottom of the slot is a cylindrical bore 28 into which enters a projection 30 (Fig. 5) depending from the co-operating jack, which is thus locked against movement along the slot. This projection may be differently located from front to rear of the machine for jacks having their driver-passages arranged for different nailing designs. A screw 32 threaded through the adaptor and entering a depression in the projection 30 serves to lock the jack removably in place.

In each jack are vertical passages arranged in accordance with the particular nail-inserting design to be employed. In these passages operate nail-drivers 34 rising from a plate 36, the lower side of which is recessed (Fig. 2) to receive the cylindrical head of a screw 40 threaded into a plunger 42. This connection of the driver-plate to the plunger-screw facilitates the changing of jacks for the nailing of different designs. The plunger has a lower portion, which is guided to slide vertically at the front of the column 10, and a reduced upper cylindrical portion 44. The portion 44 is surrounded by a helical spring 46 abutting at its lower end against a washer 47, which normally rests on a shoulder 49 (Fig. 1) formed upon the column but which, as the plunger rises, is engaged by a shoulder 50 (Fig. 5) at the top of the lower portion thereof. At its upper extremity the spring contacts with a collar 48 threaded upon a sleeve 51 rotatable in the cap and serving as a guide for the plunger. A spring-actuated detent 53, engaging any one of a circular series of depressions in the sleeve, fixes it in its adjusted position. The collar is preferably held against rotation by a projection 55 entering a vertical slot in the column. By turning the sleeve upon the cap, the compression of the spring may be altered with a corresponding variation in the resistance offered to the elevation of the drivers by the actuating means. By rotating the screw 40, the plate 36 with the drivers 34 may be raised and lowered to change the amount which said drivers project above the jack-top at their extreme of upward travel. This adjustment may be retained by a spring-actuated pin 59 movable vertically in the plunger and engaging one of a circular series of depressions in the lower extremity of the screw 40.

Guided for vertical reciprocation in the cap 12 and in the front of the column 10 are spaced side-rods 52, 52. Fixed to the rods just below the cap are the opposite arms of a yoke 54. These arms, which may be of heavy sheet material stayed at 56, curve upwardly, inwardly and forwardly, converging to a point above the jack-top, where they carry secured between them a pressure-head or abutment 57 for holding a heel for nailing upon the heel-seat of a jacked shoe. The head is shown as having pivoted upon it a plate 58, arranged for contact with the tread-surface of a heel and adjustable as to angle by a screw 60 against which the plate is urged by a spring 62. The lower extremities of the rods 52 are joined by the laterally extended upper portion of a cylinder 64 constituting one element of a fluid connecting device, this cylinder being partially filled with some such liquid as oil, shown at 66 in Fig. 5 of the drawings. A filling cup 68 at the front of the cylinder permits the introduction of liquid when desired. It will be seen that the rods 52, pressure elements 54, 57 and 58 and the cylinder 64, together furnish a slide movable upon the frame to carry the plate 58 from a raised position, in which a shoe may be jacked and a heel applied to its heel-seat, to a depressed position, in which the plate contacts with the tread-surface of the heel to hold it against the nail-inserting force of the drivers. The normal elevation of the slide is produced by a tension-spring 70 joined at its upper end to the column and at its lower extremity to a projection 72 at the rear of the cylinder 64. This draws the slide against a stop 74 upon the column.

The slide may be lowered to bring the abutment-plate 58 into contact with the heel, by a treadle 76 joined to the bottom of the cylinder 64 by a link 78 through a slot-and-pin connection 80. At the rear of the column the treadle has pivoted to it a link 82 which controls a single-rotation clutch mechanism 84. This clutch mechanism, when the treadle 76 is sufficiently depressed, transmits power from a constantly rotated wheel 86 to the main driving shaft 88 of the machine. Save for unimportant structural details, the clutch mechanism and the manner of its control may be as in Letters Patent of the United States No. 1,545,575, Standish, July 14,

1925, so these will not further be described. The depression of the treadle, first about a fulcrum at the rear to the rod 82, lowers the slide to establish contact of the plate 58 with the work. Upon encountering the resistance to movement furnished by said work, the treadle turns upon the link 78, elevating the link 82 to trip the clutch 84 and cause the shaft 88 to receive its single rotation. The slot-and-pin connection at 80 permits the power-actuation of the machine with less shock to the operator whose foot may be on the treadle. Final pressure is now to be applied to the work and the attaching nails driven.

Guided at its opposite sides in ways 90 at the front of the column, between the lower extremity of the driver-plunger 42 and the top of the cylinder 64, is a bearing-block 92 in which is journaled a horizontal shaft 94, having fixed upon it a cam 96 vertically alined and contacting with a roll 98 rotatable at the bottom of the driver-plunger and being essentially a part thereof. Springs 100, 100, connecting the opposite sides of the column and lateral projections from the block, draw said projections yieldably against a horizontal surface of the column (Fig. 1). The plunger-roll 98, while the machine is at rest, bears upon the cam under the influence only of the weight of the plunger and the elements which it carries, the force of the spring 46 being received by the shoulder 49 upon the column. The cam-shaft 94 is rotated, with a capacity for relative lateral movement, by connection to the driving shaft 88 through an Oldham or like coupling 102.

Depending from the under side of the block 92 and operating in the cylinder 64 is a tubular piston 104. At the beginning of an operating cycle, the lower extremity of the piston is open so the cylinder may be lowered by the treadle 76 without material resistance, the contained liquid flowing unobstructed between the elements of the connecting device. When the power-actuation occurs, the bottom of the piston is closed by a valve 106 carried upon a rod 108 passing through the piston and having a head 110 guided in the block 92 and forced against the cam 96 by a spring 112 surrounding the rod. The contour of the cam is such that closure of the piston by action of the spring 112 occurs immediately after rotation of the shaft 94 has begun. This closure, stopping the flow of the liquid 66 between the opposite sides of the valve, causes the piston and cylinder to be locked together by the practically incompressible liquid so they move as a unit, coupling the cam-block and the pressure-abutment to travel together. As the cam continues to turn, the valve remains closed. There now exists a partially balanced system in which the single cam 96 acts oppositely to elevate, by its rotation, the drivers 34 for the insertion of the nails and, by its bodily movement of translation, to draw down the pressure-head 57 to hold the heel upon the heel-seat to resist the driving force. That is, the weight of the plunger 42 and the elements which it carries, the resistance of the spring 46 to compression, and the further resistance offered by the drivers as the nails enter the work, produce a reaction which is transmitted by the cam, through bodily movement as its rotation is resisted, through the yieldable block 92, piston 104, liquid 66, closed valve 106, cylinder 64, side-rods 52 and yoke 54 to the pressure members 57 and 58. The effective work-clamping pressure thus produced is diminished by the elevating force of the springs 70 and 100 to the extent which these exceed the weight of the parts thus counterbalanced. This, of course, is much less than the reactive force. Anything which increases the resistance to movement of the drivers will correspondingly increase the work-holding pressure. This may be by compression of the spring 46 as a result of adjustment of the collar 48, or by raising the drivers by the screw 40 so the nails are sunk more deeply in the heel-seat. The ends of the drivers, as they indent the heel-seat, will give greater resistance to movement of the plunger 42, with a consequently increased reaction and holding effect at the end of the nail-inserting stroke. It will be seen that the work-retaining pressure will be dependent upon the differential between the various actions and reactions already stated and independent of the dimensions of the heel being attached. On the other hand, because of the fact that the clamping pressure increases with the resistance to the driving of the nails, I obtain an automatic variation in said clamping pressure to most effectively hold heels of different densities. If the wood of a heel happens to be spongy and soft, so a heavy pressure would unduly compress it, wrinkling and more or less permanently deforming the heel-covering, the nails would penetrate the heel easily, producing less reaction and therefore a diminished work-clamping pressure. Were a heel of hard wood to be nailed, the resistance to the nails would be greater and the heel-holding pressure increased. In all cases the forces may be so proportioned that, without there being applied an undue pressure which might crush a heel or mutilate its covering, all heels may be held firmly upon the heel-seats of the shoes so a proper driving of the nails and a tight crease are assured. During this application of final pressure under the power of the machine, the springs 100 allow the cam-block 92, now locked to the abutment-slide by the valve 106, to descend whatever amount the clamping travel of the plate 58 renders necessary. To prevent the momentum imparted to the elements by the throw of the cam as it lowers the slide from causing excessive movement of the plate 58 and too great a pressure upon the work, a stop-plate 118 (Figs. 4 and 5) is mounted to slide over an inclined surface 120 upon the frame. It is fixed in position by a slot-and-screw connection 122, with its upper surface 124 presented at the desired level to receive contact of a bumper 126 of fiber or like material secured to the block 92. The stop-plate is so located that it permits full normal action of the pressure elements but prevents overthrow. After the cam has caused the nail-inserting stroke of the drivers 34, it allows the spring 46 to lower them. The block 92 is elevated by the springs 100, the plate 58 leaves the heel under the influence of the spring 70, the cam opens the valve 106 to free the abutment-slide from the cam-block, and the spring 70 completes the raising of the slide and returns the treadle to its elevated position.

Nails may be fed directly to the jack-passages, or they may be transferred thereto by the loader mechanism particularly illustrated in Figs. 7 and 8 of the drawings. Since the location of the machine may render the loading of the jack more convenient from one side than from the other, the mechanism is so arranged that with only the simplest manual operations it may be mounted either at the left or the right of the jack. At each side of the frame in the upper portion of the cap 12 is a vertical bore 130 (Fig. 6) to receive a

spindle 132. A slot 134 opens from each bore, the two slots extending in different directions. The spindle has a lateral projection 136 which may enter either slot and locate the spindle at angles about its axis separated by 180°. A pin 138 inserted in a horizontal bore in the cap and passing through a depression in one side of the lower extremity of the spindle may retain said spindle against vertical displacement in either position. Surrounding the spindle and resting upon a shoulder 140 thereon is a sleeve 142, at the bottom of which is a lug 144 of such angular extent horizontally that either of its opposite ends may contact with a stop-projection 146 rising from the cap. With one of the lug-surfaces against the stop, the loading mechanism will be positioned to receive nails. With the other surface in engagement with the stop it will be properly located to deliver the nails to the jack-passages. At its upper end the sleeve has a lateral projection or enlargement 148 in which is a slot 150 having rising at opposite sides of one extremity spaced lugs 152, 152 upon which is pivoted the inner portion 154 of a sectional loader-arm. A tension-spring 156, attached at one end to a spindle and at the other to the outer extremity of the sleeve-extension, acts to turn the sleeve about the spindle; and since its point of attachment to the spindle is such that the spring passes over the axis in shifting from one extreme to the other, it serves to draw the ends of the lug 144 against the stop 146 in both the nail-receiving and nail-delivering positions. Joined by a slot-and-screw connection 158 to the arm-portion 154 is the main or outer portion 160 of the loader-arm extending substantially at right angles to the pivoted portion. At one side the portion 160 has a slot 161 to receive a two-sided frame 162 held in place by a slot-and-screw connection 164. At the outer side of the frame is a guideway 166, and into this and the arm-slot 161 may be slid any one of a set of loader-blocks 168 having nail-holding passages 170 corresponding in arrangement to the passages in one of the jacks 20. The block is located in the frame by engagement of one end with a surface 172 thereof, the opposite extremity being removably retained by a spring-latch-pin 174 movable laterally of the frame. By the connections 158 and 164 at right angles to each other, there may be attained a universal adjustment of the loader-block-passages in a horizontal plane, so they may be alined accurately with the jack-passages.

Guided at 176 on the under side of each loader-block is a nail-retaining shutter 177 provided with delivering openings 178 normally out of alinement with the loader-block-passages. This normal position is yieldably maintained by a spring 180 situated in a bore in a projecting portoin 181 of the frame 162 and forcing a plunger 182 against an upstanding terminal portion 184 of the shutter. This same portion 184 may have threaded horizontally through it, below the body of the shutter, a screw 186. The frame-projection 181 containing the spring 180, may be used as a handle to oscillate the loader about its supporting spindle. When the loader-arm containing nails in its passages 170 and supported upon the shutter 177 is turned about the spindle 132, the screw 186 engages the front of the jack 20 just as the loader-passages are approaching registration with the jack-passages, forcing the shutter outwardly until its openings are alined with the loader-passages, thus allowing the nails to fall into the jack.

In shifting the loading mechanism from one side of the machine to the other, the spindle 132 bearing the sleeve 142 is inserted and secured in the desired bore 130. The main portion 160 of the loader-arm with the frame 162 is released at the connection 158, inverted so it may extend in the opposite direction from its mounting, and again fixed in place. The arm and frame are made symmetrical upon their opposite sides, so this will not disturb the vertical relation of the mechanism to the jack-top. The loader-block 168 must, of course, also be inserted in its frame so the shutter 177 is at its under side. Mounted upon either side of the machine, the loader-arm will be capable of rising upon the pivotal connection to the lugs 152. If the drivers 34 are set somewhat high, and the machine were treadled with the loader-block over the jack, contact of the drivers with the block might cause injury, were it not that the arm may swing upwardly about its pivot and thus protect the parts from breaking.

If desired, further protection may be given the loading mechanism, and the hands of the operator and the operator's assistant may be guarded against injury. This, I attain by holding the pressure mechanism against movement while the loading mechanism is out of its normal position. The lug 144 on the loader-sleeve 142 is in horizontal alinement with and is arranged for movement through a depression 192 in the adjacent side-rod 52 (Fig. 1). In the nail-receiving position of the loader-arm, the side-rod is free to reciprocate through a segmental vertical slot 194 in the lug (Fig. 7); but when the loader-arm starts its oscillation toward the nail-delivering position over the jack, the body of the lug, at one side or the other of the slot, enters the depression and maintains the pressure mechanism locked until the loading mechanism is returned to normal. As a result of this, the pressure-plate 58 can not be lowered when the loader-block is beneath it, so there is no way in which the attendants' hands can be caught between the block and plate; nor can the block be thrown up upon its pivotal mounting against the plate, if the machine be treadled with such force as to trip the clutch 84 and so cause the elevation of the drivers. The retaining action is the same whether the loading mechanism be mounted at the right or left of the frame, a portion of the lug 144 entering the depression in the side-rod which may, at that time, be adjacent to it.

To summarize the operation of the machine, by the use of a proper adaptor 22, a jack 20 having its drivers 34 arranged in accordance with the desired nailing design is mounted upon the frame-cap 12. The abutment-plate 58 is adjusted by the screw 60 at such an angle as to contact with substantial uniformity over the heels to be nailed. The loader mechanism has been mounted upon the desired side of the machine and supplied with a block 168, the passages 170 of which correspond to those of the jack. These passages are filled by the operator's assistant with nails N resting points up upon the shutter 177. The arm 154, 160 is swung about the spindle 132 until the block-openings and jack-openings are in vertical alinement. This alinement has been insured by adjustment of the loading mechanism at 158 and 164. In approaching the nail-delivering position, contact of the shutter-screw 186 with the jack compresses the spring 180 and brings the shutter-openings 178 into registration with the block-openings

170, the released nails falling into the jack-passages, where their heads rest upon the drivers. A shoe S (Fig. 5) is jacked and a heel H positioned upon its heel-seat. The operator may now depress the treadle 76 until the plate 58 engages the heel, the height of the work being thus measured. At this time the valve 106 is held open by the cam 98, and the flow of liquid between the piston 104 and the cylinder 64 allows the latter, with the connected pressure-abutment, to descend freely, save for the resistance of the elevating spring 70. When the downward travel of the plate 58 is stopped by the heel, the fulcrum of the treadle shifts, so the rod 82 is caused to trip the clutch 84. The shaft 88 thereupon rotates and through the coupling 102 turns the cam-shaft 94 through a single rotation. The cam 96 at once permits the spring 112 to close the valve 106, locking the cylinder and piston together through the contained liquid. The block 92 is thus compelled to move with the pressure-abutment. Continued rotation of the cam, by its action upon the roll 98 of the plunger 92, raises said plunger and its drivers against the depressing force of the spring 46. The resistance of the spring produces a reaction which causes the block 92 to descend against the sustaining effect of the springs 70 and 100, and this reactive force is communicated through the piston, the cylinder and the succeeding elements of the chain to the head 57 and its plate 58 resting upon the heel H. There is consequently applied to the work a certain clamping pressure which may be regulated by position of the sleeve 51. When the rising nails penetrate the heel-seat of the jacked shoe and the heel, there is a further reactive force similarly transmitted, the magnitude of which will depend, as already pointed out, upon the character of the material, the clamping pressure being in proportion to the resistance encountered, and therefore the tendency of the drivers to push the work away from the jack is effectively resisted. By this action, a securely attached heel with a tight crease is assured under widely varying conditions and without attention upon the part of the operator. The nails having been driven, the cam allows the plunger and drivers to descend under the influence of the spring 46, the block 92 to be elevated by the springs 70 and 100, with a corresponding raising of the head 57. Finally the valve 106 is opened by the cam, freeing the cylinder from the piston. The spring 70 thereupon completes the elevation of the pressure-head, leaving the jack free for the removal of the heeled shoe and for a repetition of the heeling operation.

Having described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, movable operating means for moving one of the mechanisms, and means for moving the operating means and thereby the other mechanism by a force dependent upon the resistance encountered by the mechanism first moved.

2. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, and means for moving the other mechanism by a force dependent upon the resistance encountered by the mechanism first moved, said means including a fluid connecting device.

3. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, and means including the operating means for transmitting the reactive force of the operated mechanism to the associated mechanism to effect its movement.

4. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, a yieldable member resisting the movement of the operated mechanism, and means for transmitting the reactive force of the operated mechanism to the associated mechanism to effect its movement.

5. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, a yieldable member resisting the movement of the operated mechanism, means arranged to vary the resistance of the yieldable member, and means for transmitting the reactive force of the operated mechanism to the associated mechanism to effect its movement.

6. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, a yieldable mounting for the operating means, and means for transmitting the movement of the mounting as it yields in the operation of the mechanism to the associated mechanism.

7. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, a yieldable mounting for the operating means, means for transmitting the movement of the mounting as it yields in the operation of the mechanism to the associated mechanism, and means for rendering the transmitting means effective or ineffective.

8. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, and means for transmitting the reactive force of the operated mechanism to the associated mechanism to effect its movement, said means including a fluid connecting device.

9. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, means for transmitting the reactive force of the operated mechanism to the associated mechanism to effect its movement, said means including a fluid connecting device,

and means for rendering said connecting device effective or ineffective.

10. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, means for transmitting the reactive force of the operated mechanism to the associated mechanism to effect its movement, said means including a fluid connecting device, and means controlled by the operating means for rendering said connecting device effective or ineffective.

11. In a machine for operating upon the heel-portions of shoes, a work-support, movable fastening-inserting mechanism and movable work-pressing mechanism co-operating with the support, operating means for moving one of the mechanisms, a yieldable mounting for the operating means, and means including a fluid connecting device with an element carried by the mounting for transmitting the movement of the mounting as it yields in the operation of the mechanism to the associated mechanism.

12. The combination with a work-support, of reciprocatory fastening-inserting drivers movable therein, a movable operating member for the drivers, a work-pressing member co-operating with the support, and means for connecting the operating member and the work-pressing member to move together as a unit.

13. The combination with a work-support, of reciprocatory fastening-inserting drivers movable therein, a movable operating member for the drivers, a work-pressing member co-operating with the support, means for locking together the operating member and the work-pressing member, and automatic means for controlling the locking means.

14. The combination with a work-support, of reciprocatory fastening-inserting drivers movable therein, a movable operating member for the drivers, a work-pressing member co-operating with the support, a co-operating fluid containing cylinder and piston movable with the work-pressing member and with the operating member, and a valve movable by the operating member to close the passage between the cylinder and piston.

15. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, and means made effective by the movement of the drivers for forcing the abutment into heel-clamping relation.

16. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, a member rotatable to operate the drivers and mounted for a movement of translation, and means for transmitting such movement of translation to the heel-abutment.

17. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, means made effective by the movement of the drivers for forcing the abutment into heel-clamping relation, and a stop for limiting the movement of the abutment.

18. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, a member rotatable to operate the drivers and mounted for a movement of translation, means for transmitting such movement of translation to the heel-abutment, and a stop variable in position to adjustably limit the movement of the abutment in engagement with the clamped heel.

19. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, a yieldable bearing, an operating member for the drivers rotatable in the bearing, and connections for transmitting the yielding movement of the bearing to the abutment.

20. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, a yieldable bearing, an operating member for the drivers rotatable in the bearing, an hydraulic cylinder arranged to move with the abutment, a tubular piston carried by the bearing and movable in the cylinder, and means for controlling the flow of liquid between the cylinder and piston.

21. In a heel-attaching machine, a jack, drivers movable in the jack, a heel-abutment movable toward and from the jack, a yieldable bearing, an operating member for the drivers rotatable in the bearing, an hydraulic cylinder arranged to move with the abutment, a tubular piston carried by the bearing and movable in the cylinder, and a valve movable upon the bearing under the control of the operating member and governing the flow of liquid between the cylinder and piston.

22. In a heel-attaching machine, a jack, drivers movable in the jack, a spring for holding the drivers normally retracted, means arranged to vary the resistance of the spring, a heel-abutment movable toward and from the jack, and means made effective by the movement of the drivers for forcing the abutment into heel-clamping relation.

23. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a movable pressure-abutment cooperating with the jack, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a cam rotatable upon the frame in vertical alinement with the plunger and engaging said plunger to effect the insertion of the nails from the passages, and means movable by the cam for controlling the pressure-abutment.

24. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack, a plate carrying drivers operating in the jack-passages, a screw threaded into the upper extremity of the plunger and upon which the driver-plate rests, and means for reciprocating the plunger.

25. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a collar threaded to move longitudinally of the plunger, and a spring interposed between the collar and the plunger.

26. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a threaded sleeve surrounding the plunger and rotatable in the frame, a collar threaded upon the sleeve, and a spring interposed between the collar and plunger.

27. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a cam movable upon the frame in vertical alinement with the plunger and engaging said plunger to

effect the insertion of the nails from the passages, and a pressure-head movable in the frame by the cam and co-operating with the jack.

28. In a heel-attaching machine, a frame, a jack mounted thereon, nail-driving mechanism co-operating with the jack, rods arranged to reciprocate vertically in the frame at opposite sides of the jack, a yoke carried by the rods and extending above the jack, a pressure-head secured to the yoke and co-operating with the jack, and means for reciprocating the rods.

29. In a heel-attaching machine, a frame, a jack mounted thereon, nail-driving mechanism co-operating with the jack, rods arranged to reciprocate vertically in the frame at opposite sides of the jack, a yoke carried by the rods and extending above the jack, a pressure-head secured to the yoke and co-operating with the jack, a cam movable upon the frame between the rods, and connections between the cam and rods for moving the pressure-head.

30. In a heel-attaching machine, a frame, a jack mounted thereon, nail-driving mechanism co-operating with the jack, rods arranged to reciprocate vertically in the frame at opposite sides of the jack, a yoke carried by the rods and extending above the jack, a pressure-head secured to the yoke and co-operating with the jack, a cam movable upon the frame between the rods, and a member connecting the rods below the cam and acted upon by said cam.

31. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a bearing-block yieldably mounted upon the frame, and a cam rotatable upon the block and engaging the plunger.

32. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a driving shaft rotatable upon the frame, a bearing-block yieldably mounted upon the frame, a shaft rotatable in the block and having a cam engaging the plunger, and connections to the driving shaft for rotating the cam-shaft.

33. In a heel-attaching machine, a frame, a jack provided with nail-receiving passages and mounted upon the frame, a plunger arranged to reciprocate in the frame below the jack and having drivers operating in the jack-passages, a bearing block yieldably mounted upon the frame, a cam rotatable upon the block and engaging the plunger, a pressure-head movable upon the frame and co-operating with the jack, and means for communicating the yield of the block to the head.

34. In a heel-attaching machine, a jack, movable nail-driving mechanism and a movable pressure-head co-operating with the jack, a yieldable bearing-block, and an operating member rotatable upon the block and acting on the driving mechanism and on the head.

35. In a heel-attaching machine, a jack, movable nail-driving mechanism and a movable pressure-head co-operating with the jack, a yieldable bearing-block, an operating member rotatable upon the block and acting on the driving mechanism, and means for coupling the block and head to move together.

36. In a heel-attaching machine, a jack, movable nail-driving mechanism and a movable pressure-head co-operating with the jack, a yieldable bearing-block, an operating member rotatable upon the block and acting on the driving mechanism, means for coupling the block and head to move together, and a stop variable in position to limit the travel of the coupled elements.

37. In a heel-attaching machine, a jack, movable nail-driving mechanism and a movable pressure-head co-operating with the jack, a yieldable bearing-block, an operating member rotatable upon the block and acting on the driving mechanism, and an hydraulic device for coupling the block and head to move together.

38. In a heel-attaching machine, a jack, movable nail-driving mechanism and a movable pressure-head co-operating with the jack, a yieldable bearing-block, an operating member rotatable upon the block and acting on the driving mechanism, and means controlled by the operating member for coupling the block and head to move together.

39. In a heel-attaching machine, a jack, movable nail-driving mechanism and a movable pressure-head co-operating with the jack, a yieldable bearing-block, a cam rotatable upon the bearing-block and engaging the driving mechanism, a cylinder movable with the head, a tubular piston movable in the cylinder and connected to the block, and a valve co-operating with the piston and movable by the cam.

40. In a heel-attaching machine, a frame provided with mounting means spaced from each other, nailing mechanism carried by the frame between the mounting means, a support for nail-loading mechanism arranged to be positioned by the mountings at either side of the nailing mechanism, and loading mechanism movable upon the support and reversible to adapt it for co-operation with either mounting.

41. In a heel-attaching machine, a frame provided with mounting means spaced from each other, nailing mechanism carried by the frame between the mounting means, a support for nail-loading mechanism arranged to be positioned by the mountings at either side of the nailing mechanism, the support and mountings being provided with means for holding said support in different angular relations about its axis when at opposite sides of the nailing mechanism, and loading mechanism movable upon the support.

42. In a heel-attaching machine, a frame provided with spaced vertical openings, nailing mechanism carried by the frame between the openings, a spindle interchangeable between the openings, a sleeve movable about the spindle, and a loader-arm formed in two sections, one of said sections being secured to the sleeve and the other section being reversible upon the sleeve-section.

43. In a heel-attaching machine, a frame provided with spaced vertical openings from which open slots situated at different angles peripherally of the respective openings, nailing mechanism carried by the frame between the openings, a spindle interchangeable between the openings and having a projection arranged to enter either slot, a sleeve movable about the spindle, and a loader-arm secured to the sleeve.

44. In a heel-attaching machine, a frame provided with spaced vertical openings from which open slots situated at different angles peripherally of the respective openings, a projection from the frame adjacent to each opening, nailing mechanism carried by the frame between the openings, a spindle interchangeable between the openings and having a projection arranged to enter either slot, a sleeve movable about the

spindle and provided with two surfaces for engaging the frame projections, and a loader-arm secured to the sleeve.

45. In a heel-attaching machine, a frame provided with spaced vertical openings, nailing mechanism carried by the frame between the openings, a spindle interchangeable between the openings, a sleeve movable about the spindle, a spring joining the upper extremity of the spindle to the sleeve, and a loader-arm formed in two sections, one of said sections being secured to the sleeve and the other section being reversible upon the sleeve-section.

46. In a heel-attaching machine, a frame provided with spaced vertical openings, nailing mechanism carried by the frame between the openings, a spindle interchangeable between the openings, a sleeve movable about the spindle, a horizontally extending spring joining the upper extremity of the spindle to the sleeve and being movable across the axis of the sleeve during its movement between opposite extremes, and a loader-arm secured to the sleeve.

47. In a heel-attaching machine, nailing mechanism including a vertically movable element, a movable support, and a loader-arm carried by the support and being free to move under the influence of the element of the nailing mechanism.

48. In a heel-attaching machine, a frame, a jack mounted thereon, drivers operating in the jack, a spindle rising from the frame adjacent to the jack, a sleeve rotatable about the spindle, and a loader-arm pivoted upon the sleeve for vertical movement under the influence of the drivers.

49. In a heel-attaching machine, nailing mechanism having nail-receiving passages, and loading mechanism comprising a block provided with nail-holding passages, an arm by which the block is carried, said arm being movable to bring the block-passages and nailing mechanism passages into nail-delivering registration, and means arranged to vary the normal position of the block in a plurality of directions in the plane of its delivering movement.

50. In a heel-attaching machine, a frame, nailing mechanism mounted upon the frame and having nail-receiving passages, a loader-arm formed in inner and outer sections, the inner section being arranged to oscillate upon the frame, slot-and-screw connections between the arm-sections, a loader-block provided with nail-holding passages and variable in position upon the outer arm-section, and means arranged to fix the loader-block in different positions upon the arm.

51. In a heel-attaching machine, a main frame, nailing mechanism mounted upon said main frame and having nail-receiving passages, a loader-arm formed in inner and outer sections, the inner section being arranged to oscillate upon the frame, slot-and-screw connections between the arm-sections, a frame variable in position upon the outer arm-section, slot-and-screw connections between the loader-frame and arm, and a loader-block carried by the frame and provided with nail-receiving passages.

52. In a heel-attaching machine, a frame, nailing mechanism mounted upon the frame and having nail-receiving passages, a loader-arm formed in inner and outer sections, the inner section being arranged to swing horizontally and vertically upon the frame, slot-and-screw connections between the arm-sections, a loader-block provided with nail-holding passages and variable in position upon the outer arm-section, and means arranged to fix the loader-block in different positions upon the arm.

53. In a heel-attaching machine, nailing mechanism, pressure mechanism movable toward and from the nailing mechanism, loading mechanism delivering to the nailing mechanism, and retaining means for the pressure mechanism movable by the loading mechanism.

54. In a heel-attaching machine, nailing mechanism, pressure mechanism movable toward and from the nailing mechanism, and loading mechanism delivering to the nailing mechanism, said pressure mechanism and loading mechanism having a projection and depression arranged to interlock when delivering movement is imparted to the loading mechanism with the pressure mechanism in its normal position.

55. In a heel-attaching machine, a frame, nailing mechanism mounted thereon, a rod reciprocating in the frame and provided with a depression, and a loader-arm arranged to oscillate on the frame to deliver nails to the nailing mechanism and having a projection entering the rod-depression when the arm is in the nail-delivering position.

56. In a heel-attaching machine, a frame, nailing mechanism mounted thereon, opposite side-rods reciprocating in the frame and each provided with a depression, a pressure-head carried by the side-rods and co-operating with the nailing mechanism, a mounting adjacent to each side-rod, and a loader-arm arranged to oscillate upon either mounting to deliver nails to the nailing mechanism from either side of the frame, said arm when in nail-delivering position having a projection entering one of the depressions.

57. In a heel-attaching machine, a frame, an adaptor provided at its lower side with means for engaging the frame and at its upper side with means for engaging a particular one of a set of jacks, a jack supported upon the adaptor, means for releasably locking the adaptor upon the frame, and means for releasably locking the jack on the adaptor.

58. In a heel-attaching machine, a frame provided with horizontal ways, an adaptor having at its lower portion projections engaging the ways and in its upper surface a slot and a bore opening from the slot, a jack having a projection entering the slot and a pin entering the bore, a screw threaded through the adaptor for contact with the pin within the bore, and a retaining pin movable in the frame and engaging the adaptor.

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