April 11, 1950 J. F. STANDISH 2,503,520

HEEL ATTACHING MACHINE

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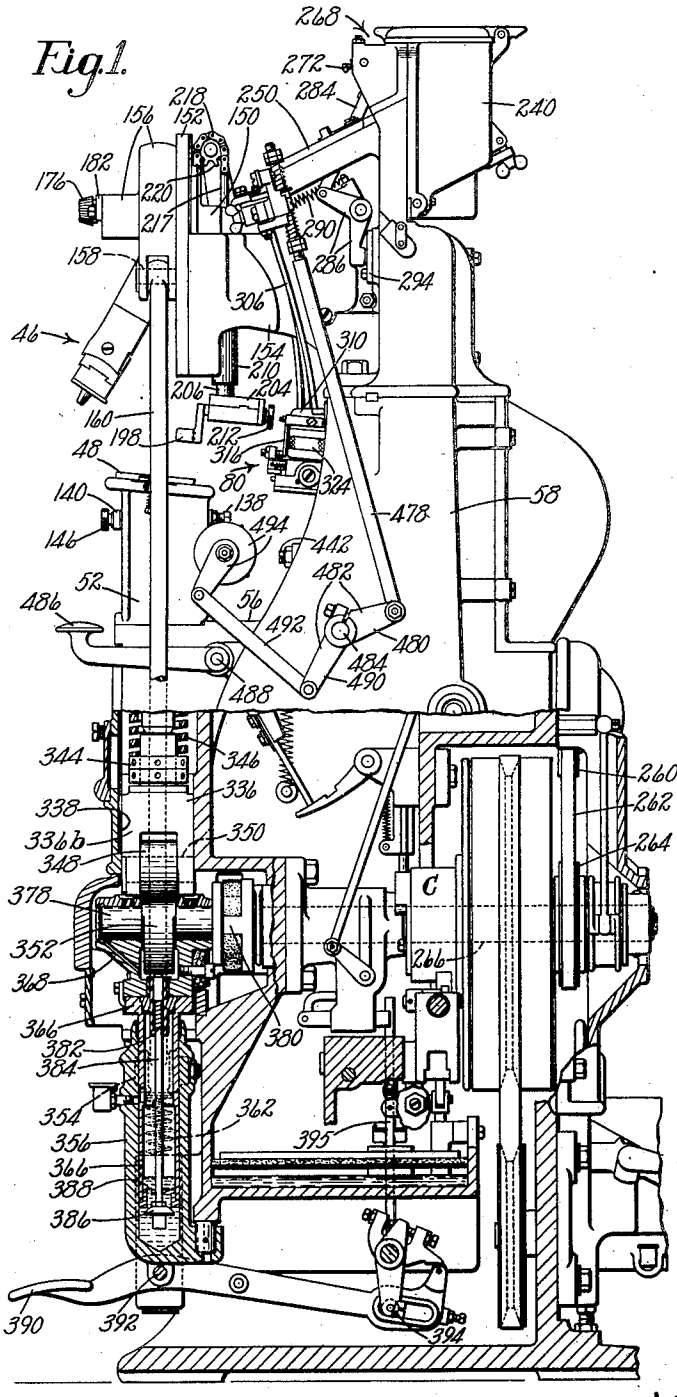
Fig. 1.



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HEEL ATTACHING MACHINE

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Fig. 2.

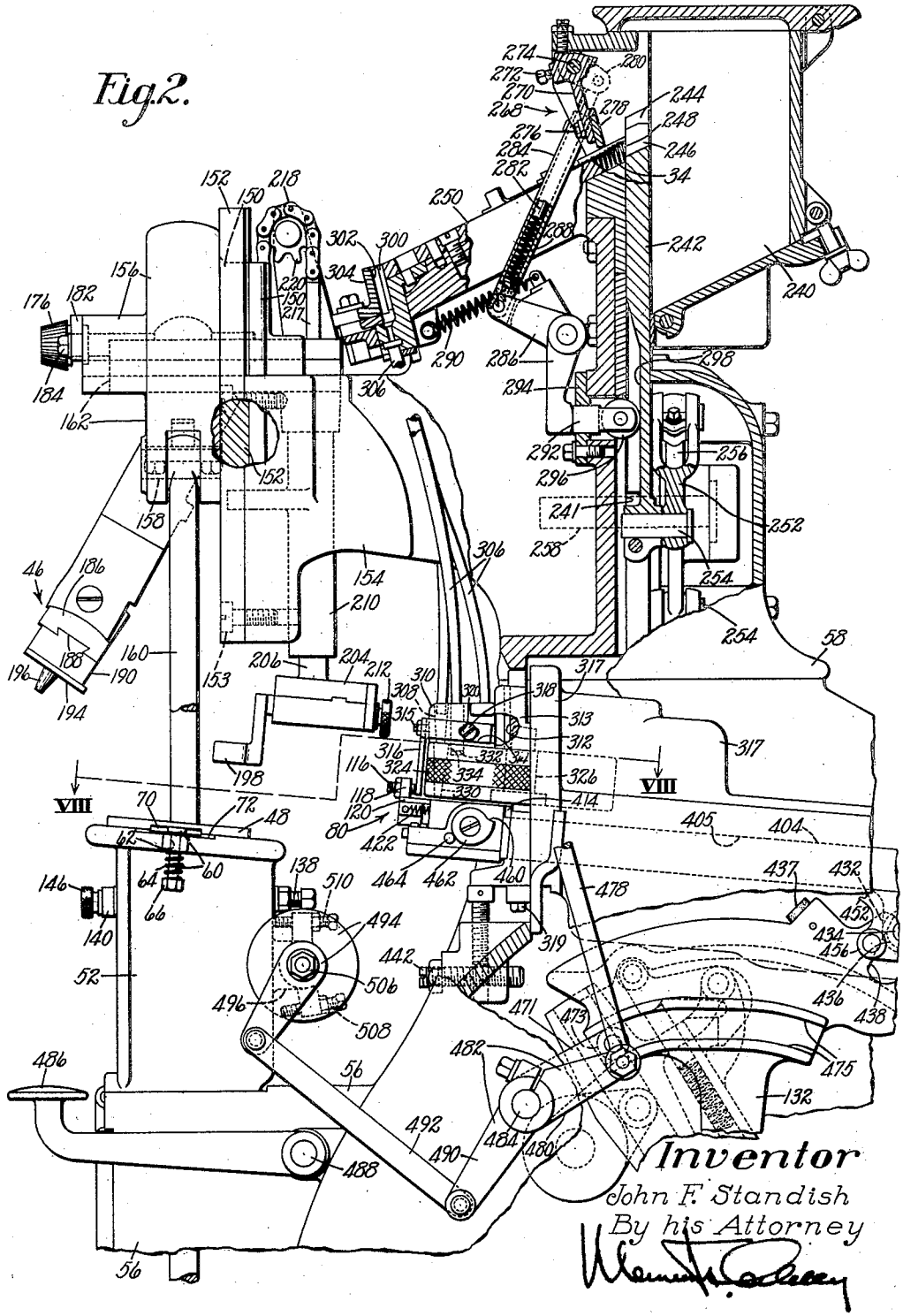

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Fig. 3.

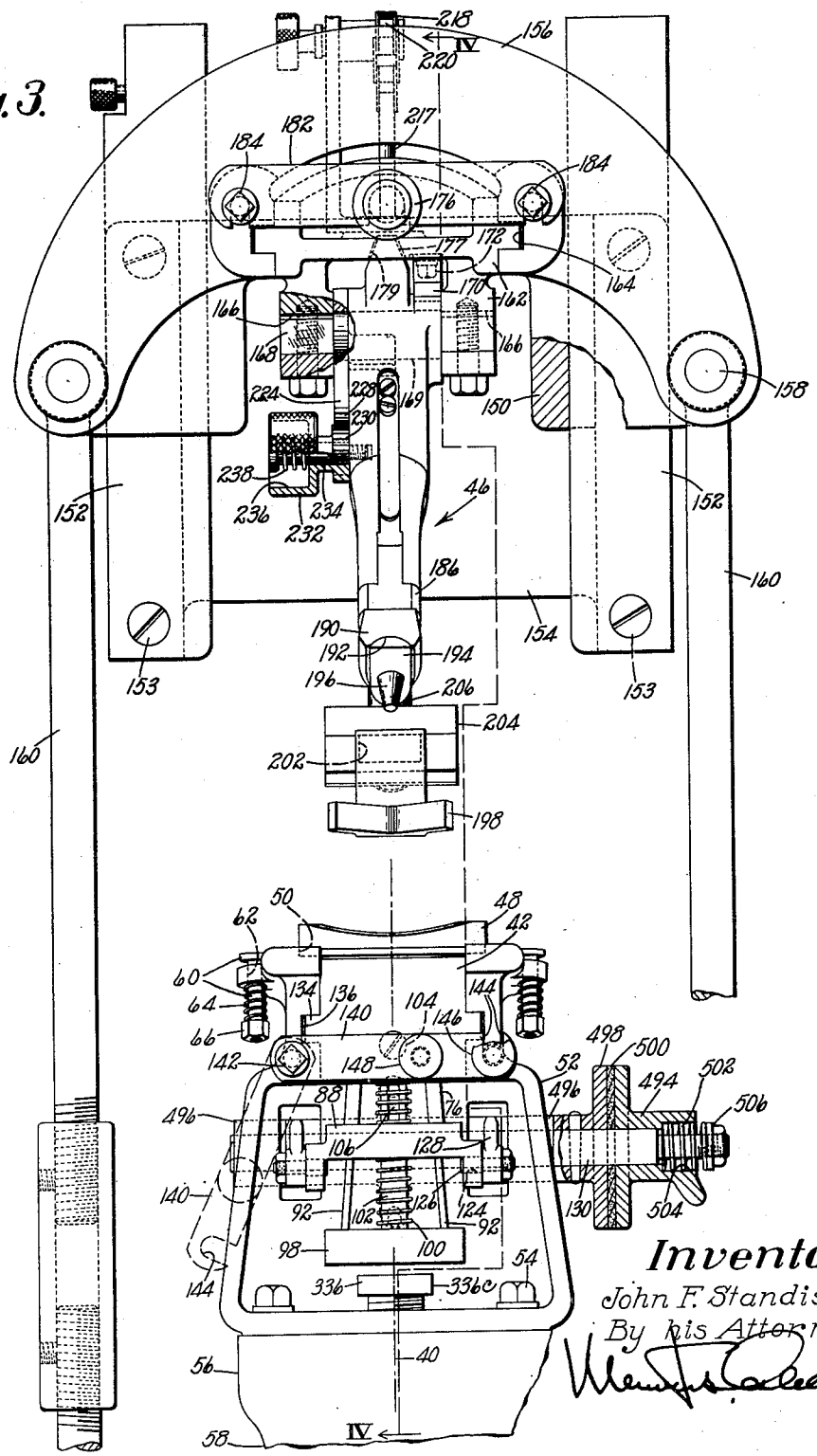

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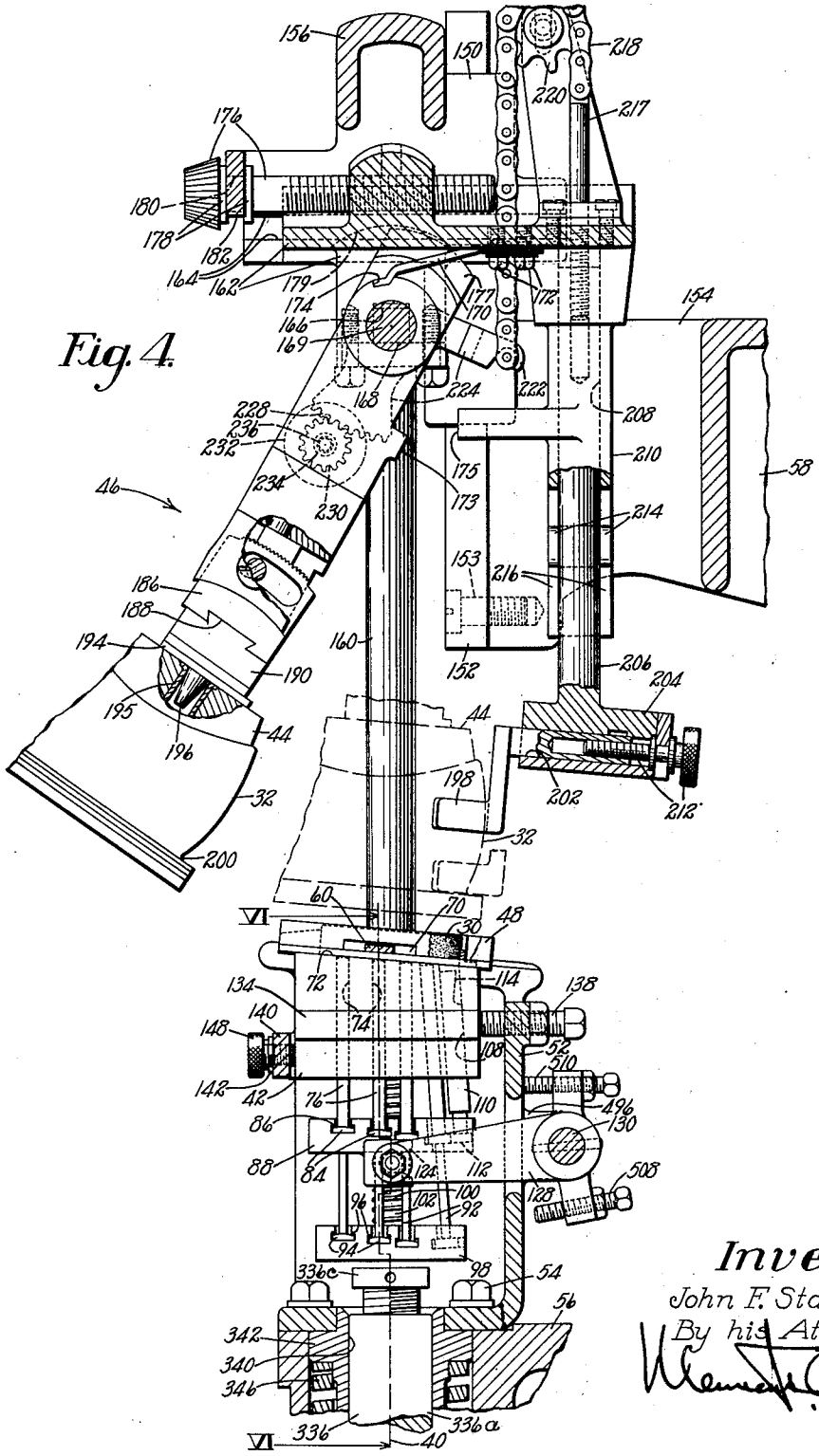
Fig. 4.



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HEEL ATTACHING MACHINE

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Fig. 5.

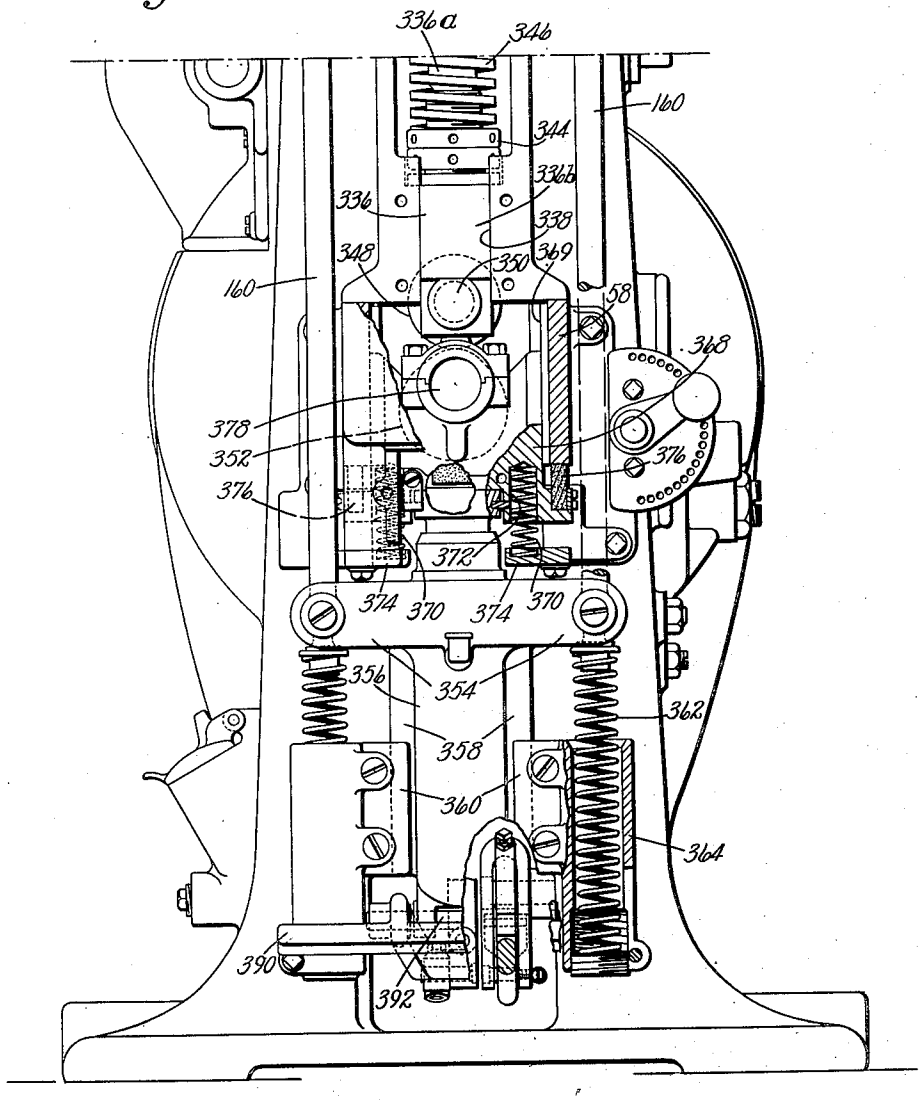

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Fig. 6.

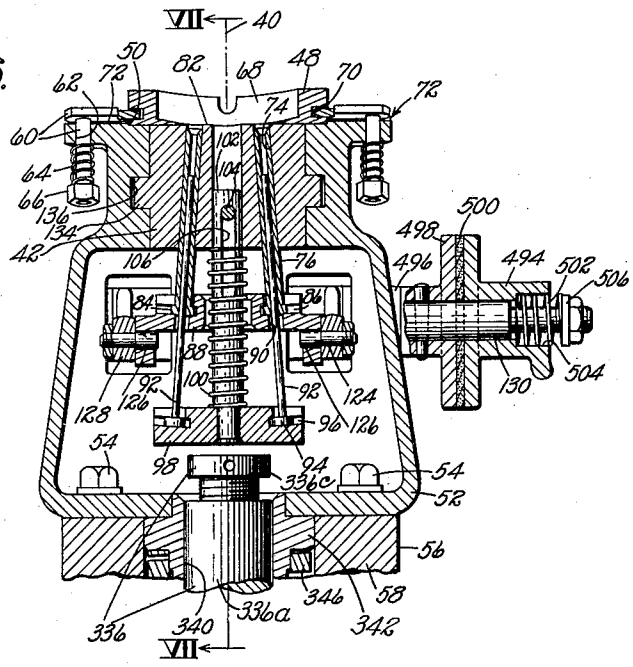
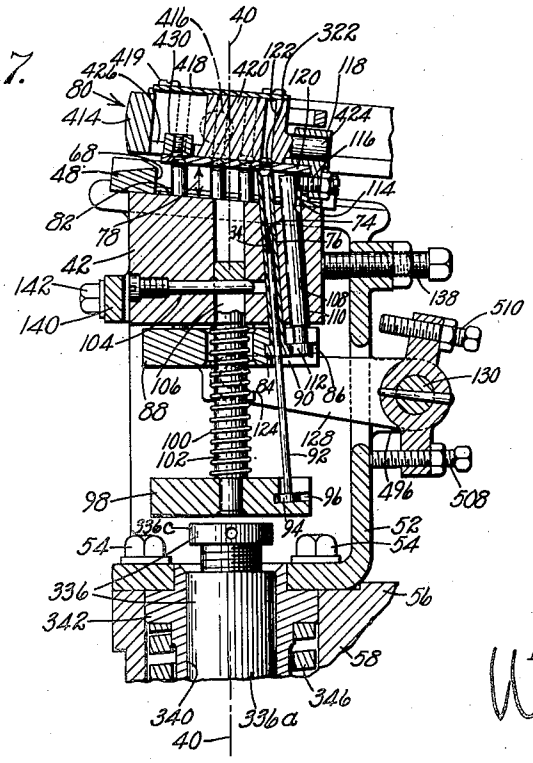


Fig. 7.



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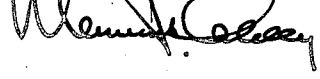

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Fig.8.

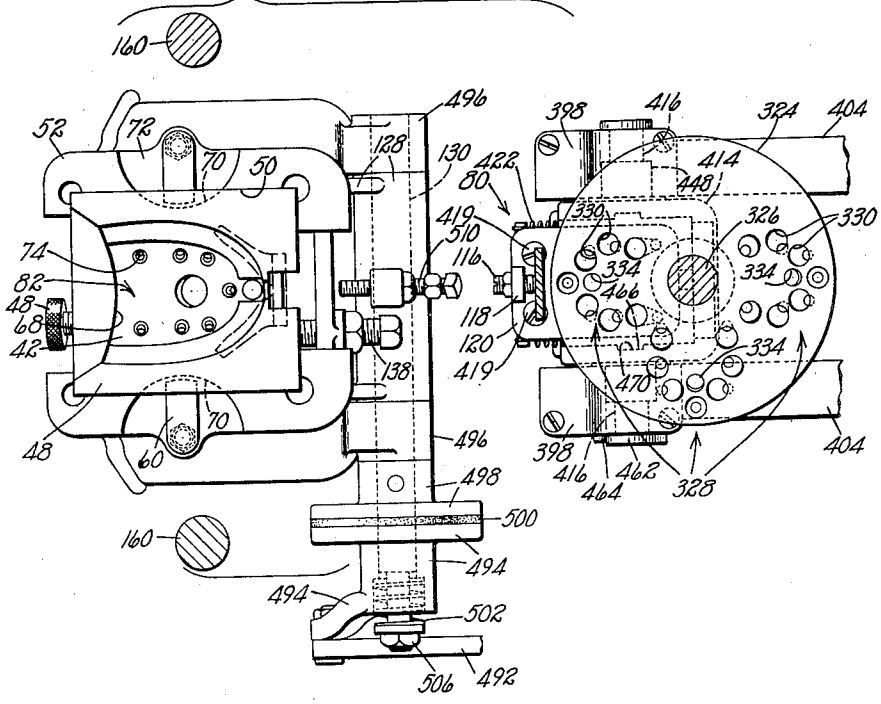
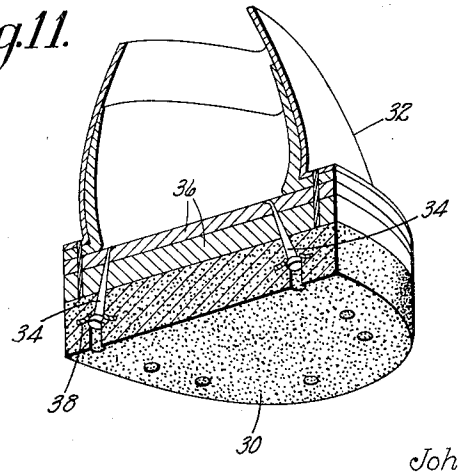


Fig.11.



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HEEL ATTACHING MACHINE

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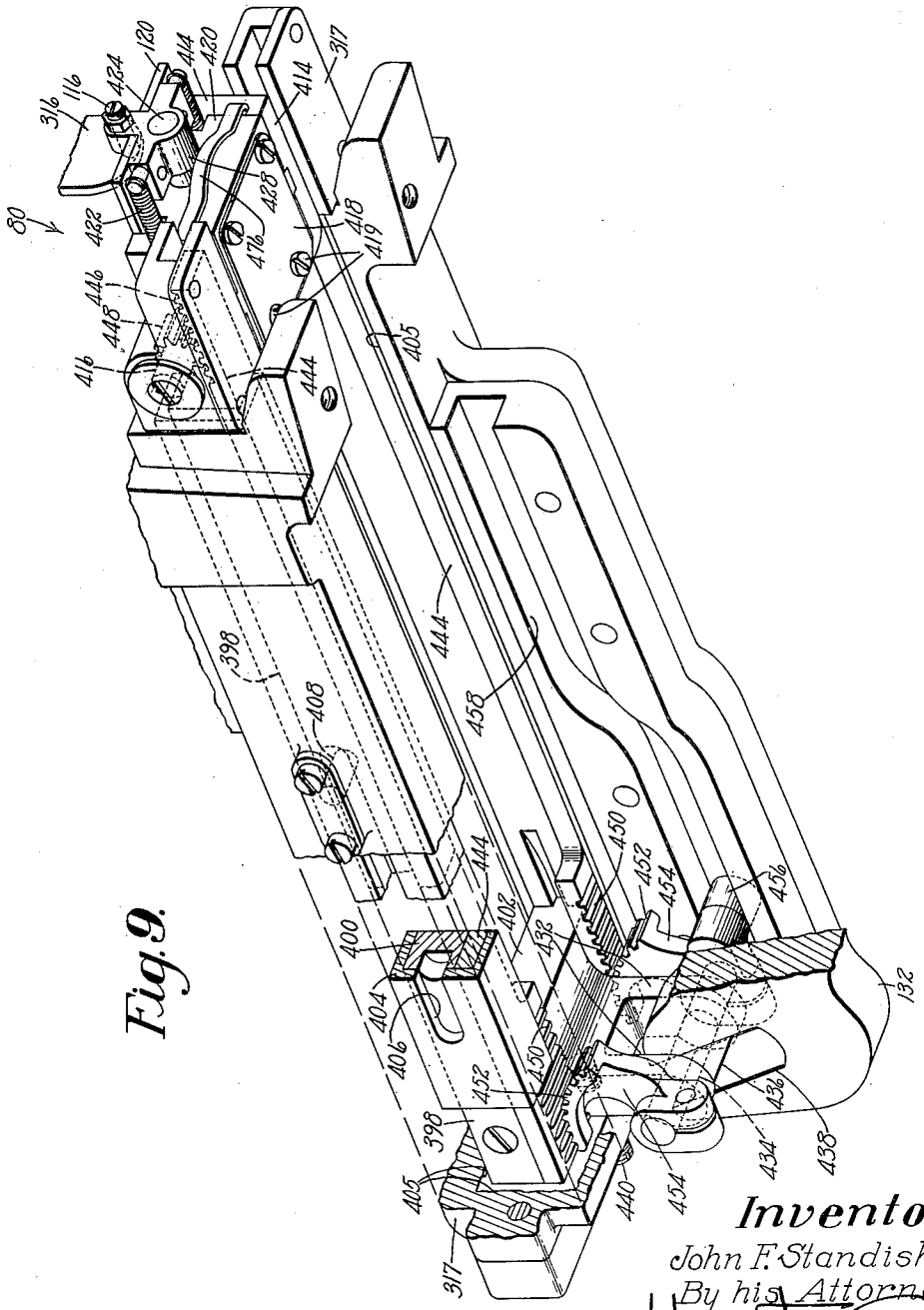

Fig. 9.

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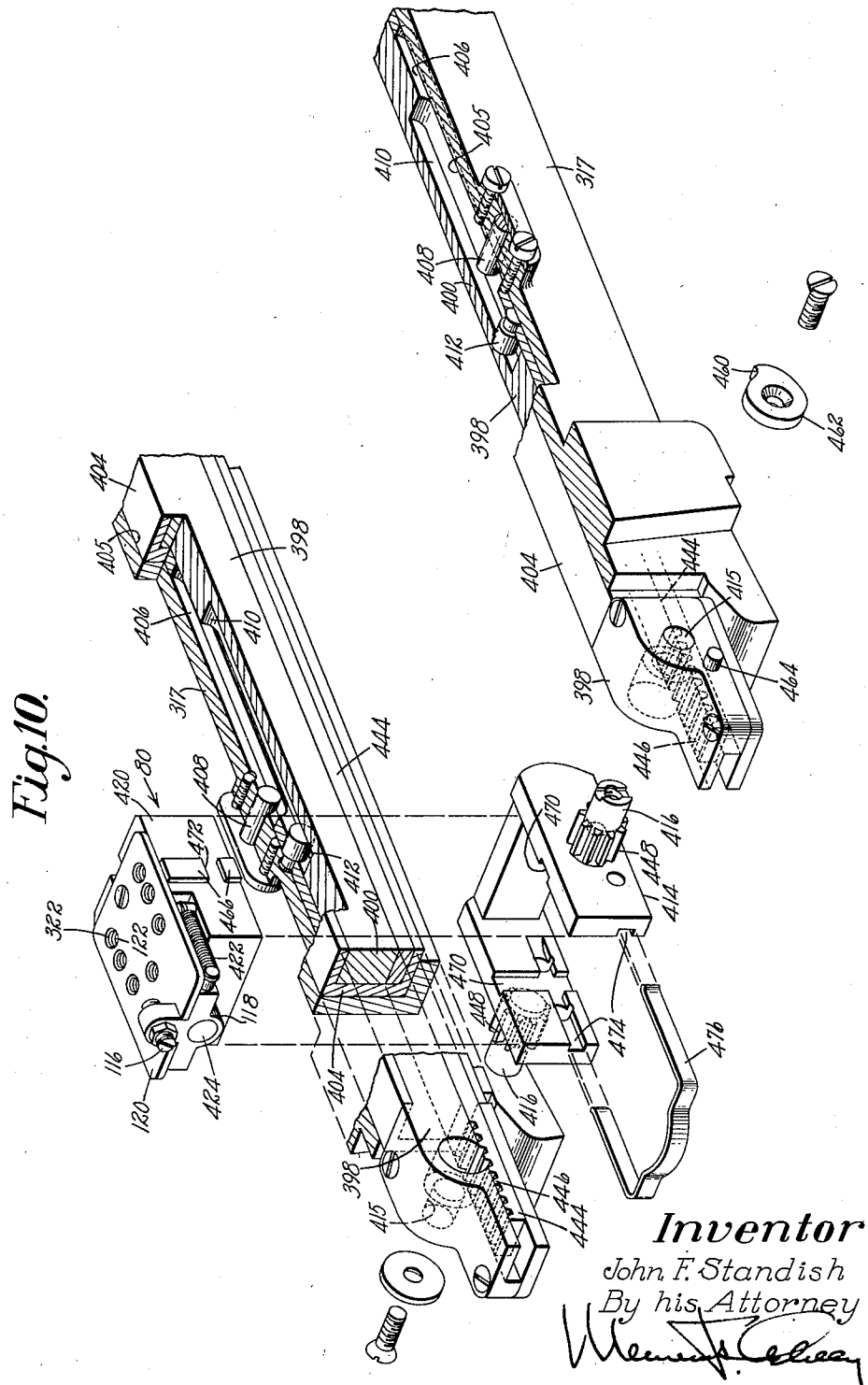

Fig. 10.

Patented Apr. 11, 1950 2,503,520

UNITED STATES PATENT OFFICE

2,503,520

HEEL ATTACHING MACHINE

John F. Standish, Waldoboro, Maine, assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application February 9, 1948, Serial No. 7,039

13 Claims. (Cl. 1—32)

1

This invention relates to fastening inserting machines and is illustrated as embodied in a heel attaching machine similar to the machine disclosed in United States Letters Patent No. 2,178,615, granted November 7, 1939, on an application filed in my name and in the name of Lester S. MacDonald.

It is an object of the present invention to provide a machine of the general type disclosed in said Letters Patent 2,178,615 for attaching heels to shoes by "outside" nailing. With the foregoing object in view, and in accordance with a feature of the present invention, there is provided a support having guides, a gage for positioning a work piece upon the support, fastening receiving means movable in said guides between a projected position, in which position said means occupies space normally occupied by the work piece upon the support and receives fastenings, and a retracted position in which said means is moved away from said space, and drivers movable in said fastening receiving means to drive the fastenings into the work piece upon the support.

In the illustrative construction the support is a nail block or nailing die and the guides have the form of cylindrical guideways extending heightwise through the block, the fastening receiving means, which are preferably tubes, being slidable along said guideways to their projected positions in which they are arranged adjacent to and in alinement with passages of a loader block movable to and from a nail delivering position above the nail block. Just before the loader block arrives at its nail delivering position a nail retaining shutter is actuated, with the result that nails which are head down in said block fall into the projected tubes into engagement with the drivers in said tubes. The tubes are moved in their associated guideways to their retracted positions below a heel engaging face of the nail block as the loader block is automatically moved to its nail receiving position beneath a foot plate of a nail supplying apparatus. After the nail block has been supplied with nails the operator places a heel in the heel gage and a shoe, which is mounted upon a last, upon a jack. The shoe upon the jack is then swung rearward to an upright position determined by the engagement of the shoe with a back gage, the jack thereafter being depressed by power, in response to movement of a clutch operated by a treadle, to force the heel seat of the shoe against the heel upon the nail block, subsequent actuation of the drivers in the tubes causing the nails

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arranged in the tubes and resting on the drivers to be driven through the heel and the heel seat of the shoe to attach the heel to the shoe.

By equipping the machine disclosed in said Letters Patent No. 2,178,615 with the above-mentioned nail block or nailing die, jack and heel gage and with the tubes which automatically receive nails from the loader block and deliver them into said block or die to be operated upon by the drivers, I have produced a machine which will effectively attach heels to shoes by outside nailing faster than machines now in use.

The above and various other features of the invention will be understood and appreciated from the following detailed description read in connection with the accompanying drawings, in which

Fig. 1 shows the illustrative heel attaching machine, partly in side elevation and partly in section;

Fig. 2 is a view corresponding to Fig. 1, showing on an enlarged scale, partly in side elevation and partly in section, the upper half of the machine;

Fig. 3 is a front view of portions of the machine illustrated in Fig. 2;

Fig. 4 is a section on line IV—IV of Fig. 3;

Fig. 5 is a front view, partly broken away, showing on an enlarged scale the lower half of the machine illustrated in Fig. 1;

Fig. 6 is a vertical section on line VI—VI of Fig. 4;

Fig. 7 is a vertical section on line VII—VII of Fig. 6;

Fig. 8 is a plan view on line VIII—VIII of Fig. 2;

Fig. 9 is an angular view of a loader block of the machine and portions of mechanism for operating said block;

Fig. 10 is an exploded view showing the various parts of the loader block and portions of the loader block operating mechanism shown in Fig. 9; and

Fig. 11 is a vertical transverse section through the rear portion of a shoe, the heel of which has been attached by the use of the above machine.

The illustrative machine is described with reference to attaching rubber heels 30 (Figs. 4 and 11), for example, to shoes 32 by nails 34 (Figs. 7 and 11) which are driven through said heels and the heel seats 36 of said shoes, the heads of the driven nails being in forced engagement with conical steel washers 38 embedded in the heels and the pointed ends of said nails being clinched in said heel seats. In order that a U-shaped line of nails 34 attaching the heel 30 to the shoe 32

shall be located as close as possible to the periphery of the heel and yet be effectively driven into the heel seat 36 of the shoe and clinched, said nails are preferably driven in converging paths toward an axis 40 (Figs. 3, 4, 6 and 7) extending vertically through a central portion of a nail block, nailing die or work support 42.

The major portion of the illustrated machine is identical with the machine disclosed in United States Letters Patent 2,178,615 which should be referred to for an understanding of the complete machine and its operation, only such parts of the machine as are necessary in disclosing the present invention being illustrated and described herein. The machine disclosed in said Letters Patent is described with reference to attaching wood heels to shoes by "inside" nailing, the shoe being positioned bottom up on a jack the top of which constitutes a die or nail block. In the present machine, however, the heel 30 is attached by "outside" nailing, the shoe 32 upon a last 44 (Fig. 4) being mounted right side up upon a depending jack or jack posts 46 which, after being swung rearward from its shoe receiving position shown in Fig. 4 to an operative position in which the shoe mounted on it is in the position shown in dash lines (Fig. 4), is forced downward to press the shoe against the heel 30 positioned in a heel gage 48 (Fig. 8) of the proper size secured to a platform 52 and engaging a heel engaging face of the nail block 42. In machines commonly used in the attachment of heels to shoes by outside nailing, nails are dumped from a movable loader block into passages of a nail block, it being common practice to move a heel gage corresponding to but of a construction different, from the gage 48, away from the nail block in order that passages of the nail block shall move into close proximity to the passages of the nail block thereby insuring that nails dropped from passages of the loader block shall fall into the then registering passages of the nail block.

In the illustrative machine the heel gage 48 of a selected size and shape positioned upon the platform 52, instead of being movable, is secured in operative position in a complemental recess 50 (Figs. 3, 6 and 8) of the platform 52 which is secured by bolts 54 to a forwardly projecting portion 56 of the machine frame 58. The securing of the heel gage 48 of the desired size and shape to the platform 52 is quickly effected by a pair of latches 60 (Figs. 2, 3, 4, 6 and 8) having shanks which are swiveled in bores 62 (Figs. 2, 3 and 6) formed in bosses at opposite sides of the platform 52 and which are normally urged downward by springs 64 interposed between the bosses and nuts 66 secured to said shanks. In order to insure against distortion of the heel 30 under pressure during its attachment to the shoe 32, the heel gage 48, which is preferably made in one piece, has a heel receiving recess 68 (Figs. 6, 7 and 8) complemental to the heel to be received. The heel gage 48 may be quickly and effectively replaced by another gage of a different size and/or shape after manually swinging portions of the latches 60 out of slots 70 which are formed at the lateral portions of the heel gage in the machine and are somewhat higher than surfaces 72 of the platform 52. The substituted heel gage 48, after being inserted in the recess 50 of the mount, is secured in its operative position therein by raising the latches 60 slightly against the action of the springs 64 and turning said latches into the slots 70 of the heel gage 48.

The nail block 42 is provided with a plurality of guides or cylindrical guideways 74 (Figs. 4, 6, 7 and 8) extending the full height of the block and converging toward or inclined to each other and toward and to the axis 40. Slidably movable in the guideways 74 are tubes 76 or conductors the purpose of which, as will be explained later, is to bridge a gap 78 (Fig. 7) existing between a fastening delivering or loader block 80 in its nail dumping or delivering position and an opposing heel engaging face 82 (Figs. 6, 7 and 8) of the nail block 42, in which face the guideways 74 terminate. The tubes 76, which serve to guide the nails 34 from the loader block 80 to the nail block 42 and which may be referred to as fastening guiding members, have at their lower ends flanges or collars 84 (Figs. 4, 6 and 7) fitting in undercut guideways 86 which are formed in an actuating bar or mount 88 and are disposed at approximately right angles to the axis 40 of the nail block 42.

Slidably fitting in the tubes 76 and extending through slots 90 (Figs. 6 and 7) in the actuating bar 88 are nail drivers 92 having at their lower ends flanges or collars 94 fitting in undercut guideways 96 of a driver carrier or mount 98, said guideways 96 being parallel to corresponding guideways 86 of the actuating bar 88. The driver carrier 98 is constantly urged toward and is normally moved to its lowered idle position best shown in Figs. 6 and 7 by a spring 100 which surrounds an upstanding stem 102 secured to said carrier and the upper and lower ends of which are in engagement with the nail block 42 and the carrier respectively. Downward movement of the driver carrier 98 with relation to the nail block 42 is limited by a threaded pin 104 (Figs. 3, 6 and 7) which is secured to the nail block and passes through an elongated slot 106 in the stem 102. Slidably mounted in a bore 108 (Figs. 4 and 7) in the nail block 42 is an abutment 110, the lower end of which is provided with a head 112 fitting in the rearmost undercut guideway 86 and the upper end of which has a face 114. The tubes 76 and the drivers 92 may be described as being slidably coupled to the mounts 88, 98 respectively and as being transversely shiftable in their mounts. As will be explained later, when the actuating bar 88 is in its raised position shown in Fig. 7 the face 114 of the abutment 110 is engaged by a threaded stud 116 (Figs. 2, 7, 8, 9 and 10) carried by a bored portion 118, hereinafter described, secured to and forming part of a shutter 120 of the loader block 80, to cause nails 34 then in passages 122 (Figs. 7 and 10) of the loader block to fall into the tubes 76 which at that time are in their projected positions shown in Fig. 7. The actuating bar 88 is provided at its sides with depending bosses having slots 124 (Figs. 3, 4, 6 and 7) for receiving a pair of trunnions 126 (Figs. 3 and 6) secured to a yoke 128 fixed to a shaft 130 which, together with the nail feeding mechanism, is operated, as will be hereinafter described upon movement of a cam lever 132 (Fig. 2).

Nail driving units adapted to operate upon different sizes and styles of shoes may be installed interchangeably in their operative positions in the platform 52, each of the nail blocks 42 being provided with a pair of lateral flanges 134 (Figs. 1 and 3) which fit in slots 136 of the platform by which the various parts of the unit are supported.

In installing the selected nail driving unit the nail block 42, upon which the various parts of the unit are mounted, is moved rearward along the slots 136 of the platform 52 until the rear

end of the block engages a stop screw 138 (Figs. 1, 2, 7 and 8) which may be adjustably secured in different positions in the platform. When the nail block is moved against the stop screw 138 a retainer plate 140 (Figs. 1, 2, 3 and 4), one end of which is swiveled upon a screw 142 (Fig. 3) secured to the platform 52, is swung counterclockwise from its dash line position shown in Fig. 3 to a position in which a slot 144 in the retainer straddles a screw 146 threaded into the platform, said screw then being tightened to clamp the retainer to the platform. A screw 148 (Figs. 3 and 4) threaded into the retainer 140 is then forced against the front face of the nail block 42 thus securing said block in its operative position in the platform 52 against the screw 138.

The jack post 46 is carried by a sliding pressure head 150 (Figs. 1, 2, 3 and 4) which is vertically reciprocable on vertical guides 152 secured by screws 153 to a forwardly extending bracket 154 of the machine frame. The pressure head 150 comprises a yoke 156 secured by pins 158 to the upper ends of vertically disposed actuating rods 160 which are operated by mechanism hereinafter described. Depending bosses formed on a jack post slide 162 (Figs. 3 and 4) mounted for sliding adjustment in guideways 164 of the pressure head 150, are provided with rectangular recesses 166 for receiving rectangular portions 168 of a fulcrum pin 169 upon which the jack post is pivotally mounted. The rectangular portions 168 of the fulcrum pin 169 are constructed and arranged for a slight amount of movement heightwise of the recesses 166 in order to permit vertical displacement of the jack post 46 with relation to the jack post slide 162. Upward movement of the jack post 46 with relation to the jack post slide 162 causes a segmental wedge or wedge portion 177 of the jack post 46 to be forced into a tapered notch 179 formed in the jack post slide, the construction and arrangement being such that when an abutment 173 (Fig. 4) of the jack post is in engagement with a shoulder 175 formed upon the jack post slide, and the shoe upon said post has been moved by downward movement of the pressure head 150 into forced engagement with the heel, the jack post is locked in vertical position. The jack post 46 is constantly urged downward with relation to the jack post slide 162 to force the rectangular portions 168 of the fulcrum pin 169 against the bottoms of the bores 166, by a leaf spring 170, the upper end of which is secured to the pressure head by screws 172 and the lower end of which is forced against a boss portion of the jack post. Forward swinging movement of the jack post 46 upon the fulcrum pin 169 is limited by the engagement of a shoulder 174 (Fig. 4) of said post with the forward end of the spring 170.

The jack post 46 may be moved into different adjusted positions along the guideways 164 of the pressure head 150 by a screw 176 threaded into the jack post slide 162 and having flanges 178 (Fig. 4) straddling a slot 180 in a retaining plate 182 normally secured by screws 184 (Fig. 3) to the yoke 156. The jack post 46 comprises a segment block 186 (Figs. 2, 3 and 4) which may be initially swung into different adjusted positions with relation to the shank of the jack post and has at its lower surface a laterally extending dovetail guideway 188 for receiving a correspondingly shaped guide of a thrust block 190. The thrust block 190 has at its bottom surface an arcuate face 192 (Fig. 3) constructed and arranged for engagement by an arcuate plate 194 having a depending last pin 196, said plate being shiftable from side to side to a limited extent and being mounted for limited swinging movement about an axis extending generally longitudinally of the shoe mounted on the jack. The plate 194 is also bodily shiftable lengthwise of the shoe to a slight extent with relation to the block 190. It will thus be clear that the shoe 32, which is mounted upon the last 44 with the cone of the last in engagement with the plate 194 and a thimble 195 (Fig. 4) receiving the last pin 196, may during its orientation in the machine be tilted and/or slid laterally to its desired position to be operated upon in the machine, such position being determined by a bifurcated back gage 198 which will now be described.

In order longitudinally to position in the machine the shoe 32 mounted upon the last 44, the slide 162, through mechanism presently to be described, carries the back gage 198 which is constructed to engage the rear counter portion of the shoe in the vicinity of its rand crease 200 (Fig. 4). The gage 198 is mounted for adjustment along ways 202 of a housing 204 formed integral with a rod 206 which fits slidably in a bore 208 (Fig. 4) of a column 210 forming part of the slide 162. Rotatably mounted in the housing 204 and in threaded relation with the gage 198 is an adjusting screw 212, rotation of the screw effecting longitudinal movement of the gage in the housing. Secured to the rod 206 is a key 214 (Fig. 4) which fits in slots 216 in the column 210 and prevents rotation of said rod.

It is desirable that the back gage 198 be raised during a predetermined portion of each cycle of operation of the machine so as not to interfere with forward and rearward movement of the loader block 80, the operation of which will be hereinafter described. Accordingly, there is threaded into the upper end of the rod 206 a threaded pin 217 connected to a chain 218 which passes over a sprocket 220 rotatably mounted upon a bracket secured by screws to, and forming part of, the slide 162, and which has its other end attached to a hooked end 222 of a bell crank lever 224 (Figs. 3 and 4) mounted for rotation upon the fulcrum pin 169. A depending gear segment 228 of the lever meshes with a gear 230 of a hand knob 232 rotatably mounted upon a pin 234 threaded into the jack post.

Interposed between a head of the pin 234 and the bottom of a recess 236 (Fig. 3) of the hand knob is a spring 238 which constantly forces the knob against the side of the jack post 46, friction between the knob and the jack post being sufficient to retain the knob in its set position upon the post.

When the jack post 46 is swung forward to its shoe receiving or full line position shown in Fig. 4 the back gage 198 is in its full line position. When the jack post 46 is swung rearward to its dash line position the gage 198 drops to its dash line work engaging position. In order that the back gage 198 may be initially set to accommodate shoes of different sizes and/or styles the knob 232 may be rotated against the action of the spring 238 to swing the bell crank lever 234 with relation to the jack post and, accordingly, to vary the heightwise shoe gaging position of the gage 198. As above stated, the lengthwise operating position of the gage 198 may be varied by turning the screw 212. The setting of the various parts of the jack 46 is such that the operator in presenting the shoe mounted upon the jack to its operating position in the machine,

swings the shoe against the back gage 198, the various parts of the jack yielding to permit the shoe to be properly positioned. At such time the abutment 173 of the jack will be substantially in engagement with the shoulder 175 of the column 210 the operator insuring such engagement by forcing the jack rearward until it engages said shoulder.

The nails 34 are supplied from a pair of nail pots 240 (only one shown) (Figs. 1 and 2) secured to the upper end of the machine frame. Mounted for vertical reciprocation along guideways 241 (Fig. 2) at the upper front end of each of the nail pots 240 is an elevating slide 242 which has at its upper end a plurality of V-shaped depressions 244 continued downward by narrow slots 246. The elevating slides 242 are lifted successively from points below the masses of nails in the pots 240 to points just above slots 248 at the upper end of a raceway 250. The raceway slots 248 receive the shanks of some of the nails 34 with their heads resting upon plates in the raceway, said nails being fed by gravity down the slots 248 to the lower end of the raceway 250. The elevating slides 242 are raised alternately by links 252 which are pivotally connected to pins 254 secured to the lower ends of the slides 242, said links being pivotally connected at their upper ends to a lever 256 fulcrumed upon a pin 258 secured to the machine frame. One of the links 252 is pivoted to the upper end of a slide (not shown) guided for vertical reciprocation in the machine frame, said slide being vertically reciprocated continuously by mechanism including a pulley 260 (Fig. 1), a belt 262 and a pulley 264 which is fixed to a drive shaft 266.

In order to remove the nails 34 which are dropped on the upper ends of the raceways 250 but do not fall into the slots 248 of said raceways, there are provided raceway clearers 268 which are slightly different from the raceway clearers illustrated in United States Letters Patent 2,718,615. Each of the illustrative raceway clearers 268 consists of a holder plate 270 (Fig. 2) which is secured by a screw 272 to a rocker shaft 274 journaled in the machine frame, and which extends across the upper face of the raceway and has secured to it by screws 276 a wiper 278 adapted to engage the nails which rest upon the upper end of the associated raceway and have not fallen into the upper ends of said raceway slots, and to sweep such nails back into the pot.

The wiper 278 is swung counterclockwise as viewed in Fig. 2 when the elevating slide 242 is near the lower end of its stroke, by the following mechanism. Pivotally connected to an arm 280 fixed to the rocker shaft 274 is a rod 282 which fits slidably in a bore of a sleeve 284 pivoted to one arm of an offset bell crank lever 286, a spring 288 being arranged between the bottom of said bore and the rod. The bell crank lever 286 has coupled to it the rear end of a spring 290 the forward end of which is secured to a stud secured to the machine frame, the construction and arrangement being such that the lower arm of the bell crank lever 286 urges a slide 292, which is mounted for reciprocation in a guide plate 294 secured to the machine frame, to the right as viewed in Fig. 2, causing a roll 296 journaled in the slide to be forced against a cam face 298 formed at the front of the elevating slide 242. As the elevating slide 242 is lowered, an incline of the cam face 298 causes, through the above described mechanism, the wiper 278 to be swung counterclockwise to "clear" the raceway 250.

The nails 34 in the lower ends of the raceway slots 248 pass into vertical slots (not shown) of a separator 300 which is moved laterally in response to movement of the cam lever 132 to transfer said nails into recesses 302 of a vertical wall 304, nail conducting tubes 306 being held in nail receiving positions below said recesses, the construction and arrangement being such that the nails 34 "picked" from the lower ends of the raceway slots 248 pass through the recesses 302 and drop heads uppermost through the tubes 306, the lower ends of which extend into passages 308 of a header or foot plate 310 having a T-shaped portion slidable vertically in a complemental vertical guideway 312 of a bracket 313 secured to a casing 317 which, in turn, is secured by screws 319 (Fig. 2) (only one shown) to the machine frame. The foot plate 310 is provided at its opposite sides with longitudinal grooves 314 for receiving an abutment 316 which may be secured in different forward and rearward positions in said grooves by screws 318 which are threaded into the foot plate and extend through elongated slots in the abutment. The adjusted abutment 316 is secured against displacement under the action of the threaded stud 116 of the loader block 80, as will be explained later, by a screw 315. The abutment 110 in the nail block 42 is engaged by the threaded stud 116 of the shutter 120 of the loader block 80, to move said shutter so that passages 322 (Figs. 7 and 10) of the shutter are in register with the passages 122 of the loader block 80.

The foot plate 310 normally rests upon the upper face of a nail distributing turret 324 (Figs. 1, 2 and 8) which is mounted for indexing upon a pivot pin 326 carried by the bracket 313 (Fig. 2). The illustrative turret 324 is provided with three different nail patterns or designs 328 (Fig. 8), the arrangement of passages 330 of the nail patterns being identical at the upper face of the turret but different at the bottom face of the turret in accordance with the size of the heel to be attached. The turret 324 in its selected position is held against rotation by a depending pin 332 (Fig. 2) of the foot plate 310 which fits in a recess 334 (Figs. 2 and 8) associated with each of the nail patterns 328. When the loader block 80 is in its loading position shown in Figs. 2 and 8 passages 322 and 122 in the shutter 120 and the loader block 80 are in register with the passages 330 of the selected design at the bottom face of the turret.

The driver carrier or mount 98 is raised to drive the heel attaching nails 34 resting upon the upper ends of the drivers 92, through the heel 30 and the heel seat 36 of the shoe, by a plunger 336 (Figs. 1, 3, 4, 5, 6 and 7) comprising upper and lower portions 336*a* (Figs. 4, 5, 6 and 7), 336*b* (Figs. 1 and 5) and a screw 336*c* (Figs. 3, 4, 6 and 7) threaded into said upper portion. The lower portion 336*b* of the plunger is mounted for reciprocation in a guideway 338 of the machine frame and the upper portion 336*a* of the plunger is mounted for reciprocation in a guideway 340 of a cap 342 interfitting with the mount 52 and portions of the machine frame. The plunger 336 is threaded to receive a nut 344 (Fig. 1 and 5) between which and the cap 342 is interposed a compression spring which normally maintains the plunger 336 in a lowered position and the cap 342 in its raised position against the mount 52, a roll 348 rotatable upon a pin 350 carried by the lower portion of

the plunger being forced by the spring 346 against an actuating cam 352.

The pressure head 150 and the driver plunger 336 are interconnected so that reaction produced by the resistance encountered by the plunger 336 during the driving of nails 34 into the work, is transferred to said head to force the shoe 32 mounted upon the jack post 46 against the heel 30. Such interconnecting mechanism is similar to that disclosed in United States Letters Patent 2,033,158, granted March 10, 1936, on an application filed in my name. The rods 160 which are secured to the yoke 156 of the pressure head 150 are joined to laterally extending lugs 354 (Fig. 5) of a cylinder 356 (Figs. 1 and 5) which is provided with lateral projections 358 guided for vertical movement along gibs 360 secured to the machine frame. Compression springs 362 at opposite sides of the cylinder 356 are interposed between the lugs 354 and supporting sockets 364 preferably formed integral with the gibs 360, the springs normally holding the rods 160 and the pressure head 150 elevated with the jack post 46 spaced a maximum distance from the nail block 42. There is movable in the cylinder 356 a tubular piston 366 secured to the underside of a bearing block 368 mounted for vertical movement in guideways 369 (Fig. 5) of the machine frame. The bearing block 368 is normally raised by springs 370 seated in bores 372 in the underside of the block and resting upon brackets 374 secured to the machine frame. Bumpers 376 secured to the bearing block 368 absorb the shock at the termination of the upper travel of said block. Rotatable in the block 368 is the actuating cam 352, a shaft 378 (Figs. 1 and 5) of which is joined by an Oldham coupling 380 (Fig. 1) to the main drive shaft 266 of the machine.

Upon the top of the cam 352 rests the roll 348 which is rotatable upon the pin 350 carried by the lower portion of the driving plunger 336. Against the bottom of the cam 352 is forced by a spring 382 the head of a rod 384 guided in the bearing block 368 and the piston 366 and carrying a valve 386 which, when released by the cam 352, closes a passage 388 through the piston. When the machine is operated the cam 352 makes a complete turn and allows the spring 382 first to raise the valve 386 and to close the piston passage 388. The actuating cam 352 thereafter by its action upon the roll 348 causes the drivers 98 to be raised to insert into the work the nails 34 which they carry. The resistance which this action offers, together with that of the spring 346 to compression and the weight of the parts elevated minus the lifting effect of the springs 362, 370 produces a reaction causing the lowering of the cam 352 and the bearing block 368. This motion is communicated through rods 160 to the pressure head 150 to apply a clamping effect on the work. Since that portion of the reactive effect coming from the spring 346 and the movable parts upon which it acts is immediately felt, this pressure is applied before the insertion of the nails begins. For this reason, there is substantial initial clamping pressure, and because the spring 346 is adjustable by the nut 344 such pressure may be varied as desired.

Preliminary lowering of the pressure head 150, until the shoe 32 upon the jack post 46 contacts the heel 30 in the heel gage 48 and until the starting of the power cycle of the machine, is caused by the depression of a treadle 390 pivotally connected to the cylinder 356 by a fulcrum pin 392 (Fig. 1). In the present machine, as in the machine disclosed in the above referred to Patent 2,178,615, depression of the treadle 390 causes lowering of the cylinder 356 and, accordingly, the pressure head 150 to clamp the shoe 32 against the heel 30 mounted upon the heel gage 48. When downward movement of the pressure head 150 is stopped by the work, the fulcrum of the treadle 390 which up to now has been a roll 394 shifts to the fulcrum pin 392 and the rear end of the treadle rises to elevate a bar 395 and to trip a clutch C.

The nails 34 are transferred from the passages 330 (Figs. 2 and 8) of the operative design 328 (Fig. 8) of the nail distributing turret 324 to the upwardly projected tubes 76 (Fig. 7), by the loader block 80 which is operated by mechanism now to be described. In the casing 317, which is secured to the machine frame, is mounted a main carrier slide 398 (Figs. 8, 9 and 10) having spaced side pieces 400 united at their rear extremities by a crossbar 402 (Fig. 9). The carrier slide 398 is movable telescopically within two channel shaped auxiliary carrier slides 404 guided in guideways 405 (Fig. 2) at opposite sides of the casing 317. Into longitudinal slots 406 (Fig. 10) in the auxiliary slides 404 project pins 408 fixed in the casing 317 and into longitudinal slots 410 in the opposite sides of the main carrier slide 398 extend pins 412 carried by the auxiliary slides.

Carried by a U-shaped frame 414 to which are secured trunnions 416 mounted for rotation in bores 415 (Fig. 10) at the forward extremities of the main slide 398, is the invertible loader block 80 which as above described has nail passages 122 arranged according to the particular nailing design 328 in use. The passages 122 are permanently closed at one end by a plate 418 (Figs. 7 and 9) secured by screws 419 to a body 420 of the loader block 80. Arranged at the opposite ends of the passages 122 of the loader block 80 is the nail retaining shutter 120 which has its nail passages 322 corresponding in pattern to the passages 122 of the body 420 of the block, the passages of the shutter being normally held out of register with the passages of said body by tension springs 422 (Figs. 2, 8, 9 and 10) opposite ends of which are fixed to studs carried by the body and the shutter respectively. The shutter 120 is guided for sliding movement with relation to the body 420 of the loader block 80 by a cylindrical extension 424 (Figs. 7, 9 and 10) and a guideway 426 (Fig. 7) of the body 420, the shutter having secured to it the bored portion 118 which fits slidably on said cylindrical extension and having a guide piece 430 (Fig. 7) which fits slidably in the guideway 426. The threaded stud 116 carried by the bored portion 118 of the shutter 120 alternately engages the abutment 316 carried by the header 310 and the face 114 of the abutment 110 to move the shutter into nail receiving and nail dumping positions respectively against the action of the springs 422. When the shutter is in its nail receiving position shown in Fig. 8 the nails 34 are admitted to the passages 122 in the body of the loader block 80 from the passages 330 of the nail distributing turret 324 and when the shutter is in its nail dumping position shown in Fig. 7 the nails are allowed to drop from the passages 122 of said body of the loader block into the projected tubes 76.

The loader block 80 is actuated to and from its nail delivering position shown in Fig. 7 by mechanism now to be described. Depending from the crossbar 402 of the main carrier slide 398 are short arms 432 (Figs. 2 and 9) spaced from

each other and in such arms is rotatable a spindle 434. Mounted upon the spindle 434 between the arms 432 is a block 436 (Fig. 9) slidably fitting in a slot 438 in the upper rear portion of the cam lever 132 which is driven through over-drive mechanism illustrated in Fig. 18 of said Patent No. 2,178,615. Forward swinging movement of the cam lever 132 is limited by the engagement of a fiber disk 437 on the lever with an adjustable screw 442 threaded into the machine frame, and rearward movement of the cam lever 132 is limited by the engagement of the crossbar 402 of the carrier slide 398 with a screw 440 threaded into the casing 317. Starting from its rear idle position the main carrier slide 398 moves out through the auxiliary carrier slide 404, the latter remaining at rest until the rear extremities of the slots 410 strike the pins 412, the slides thereafter traveling together to an extent permitted by the pins 408.

Between the main and auxiliary carrier slides 398, 404 are arranged bars 444 (Figs. 9 and 10) and at the forward ends of said bars below the loader block 80 are rack teeth 446 meshing with pinions 448 fixed upon the trunnions 416. The bars 444 at their rear extremities are provided with rack teeth 450 (Fig. 9) meshing with gear segments 452 upon levers 454 secured to the spindle 434. A roll 456 upon a depending arm of one of the levers 454 operates in a cam groove 458 at one side of the casing 317, the cam groove being so formed that during movement of the loader block 80 between the nail distributing turret 324 (Fig. 8) and the projecting transfer tubes 76 (Fig. 7) and reverse, the levers turn said block in opposite directions through 180° about the axis of the trunnions 416. As a result the body 420 of the loader block 80 with the shutter 120 held in its open position by contact of the stud 116 with the abutment 316 of the foot plate 310 first presents its passages 122 to receive a load of nails 34 from the turret 324. As the loader block 80 leaves the turret 324 the springs 422 close the shutter 120 and the block is inverted as above described during its forward travel so that when it arrives above the projected tubes 76 the shutter is at the under side, engagement of the stud 116 with the surface 114 of the abutment 110 causing the shutter to open and allowing the nails 34 to fall into the tubes as best illustrated in Fig. 7. A shoulder 460 (Figs. 2 and 10) of a disk 462 fixed to one of the trunnions 416 engages a pin 464 projecting from the main carrier slide 398 to determine the nail delivering relation of the loader block 80 to the tubes 76. Just before the crossbar 402 of the carrier slide 398 during its rearward travel engages the stop screw 440, the threaded stud 116 of the shutter 120 contacts the abutment 316 thereby stopping the loader block 80 in its retracted nail receiving position beneath the nail distributing turret 324.

Loader blocks 80 having different nailing designs may be quickly and effectively located in the U-shaped frame 414 by providing the body 420 of the loader block 80 at its opposite sides with vertical ribs 466 (Figs. 8 and 10) which are received by vertical slots 470 at opposite sides of said U-shaped frame. When the loader block 80 is arranged in its proper vertical position in the U-shaped frame 414, grooves 472 extending transversely of the ribs 466 are in register with grooves 474 extending longitudinally of the U-shaped frame, the construction and arrangement being such that when a horizontal retaining yoke 476 occupies the grooves 474, 472 the loader block is locked in the U-shaped frame.

A rod 478 (Figs. 1 and 2) which moves the separator 300 in timed relation with other operative parts of the machine, as disclosed in said Patent 2,178,615, has pivotally connected to its lower end an arm 480 of a lever 482 secured to a spindle 484 mounted for rotation in the machine frame. The actuation of the separator 300 and loader block 80 may be controlled directly by the operator or may be incident to the operation of the machine. In the first instance, the operator manually depresses either of two lever arms 486 (Figs. 1 and 2) (corresponding to lever arms 490 in said Letters Patent 2,178,615) located at opposite sides of the nail block 42 and both fixed on a horizontal spindle 488 rotatable in the machine frame. The operation of the nail supplying mechanism may be made independent of manual control by the operator, such operation being effected as a result of the action of the work pressing and nailing mechanisms disclosed in said United States Letter Patent 2,178,615. After the operator has released the treadle 390 to allow the pressure head 150 to rise at the end of an operating cycle, final elevation of a bracket (not shown) by the left side rod 160, as viewed from the front of the machine, causes a pin (not shown) to engage and tilt a lever (not shown) clockwise causing the tripping of a secondary clutch (not shown herein but shown in detail in Fig. 19 of said Patent 2,178,615). Operation of the secondary clutch through a cylinder causes the nail supplying means to deliver a load of nails to the nail block 42. Such automatic control of the nail supplying means substantially increases the speed of operation of the machine.

In order to operate the actuating bar 88 in proper timed relation so that tubes 76 will be in their raised or projected positions (shown in Fig. 7) when the loader block 80 arrives at the forward end of its nail transferring stroke, the lever 482 (Figs. 1 and 2) comprises an arm 490 operatively connected by a link 492 to a friction clutch driving member 494 (Figs. 1, 2, 3, 6 and 8) pivotally mounted upon the shaft 130 which is journaled in bosses 496 of the platform 52. Pinned to the shaft 130 is a friction clutch driven member 498 (Figs. 3, 6 and 8) against which a friction disk 500 is forced by the driving member 494 backed up by a spring 502 which is housed in a recess 504 (Figs. 3 and 6) of the driving member and has its opposite ends in engagement with the bottom of said recess and a nut 506 threaded onto a reduced portion of the rod.

The tubes 76 are raised to a predetermined height just before the loader block 80 is moved to its nail delivering position. Upward movement of the bar actuating yoke 128 and, accordingly, the tubes 76 is limited by the engagement of a stop screw 508 (Figs. 2, 4 and 7) threaded into a flange of the yoke with the platform 52. Retractive movement of the yoke 128 to lower the tubes 76 is limited by the engagement of a screw 510 threaded into another flange of the yoke with the platform 52, the arrangement being such that there is a slight slippage of the clutch formed by the members 494, 498 and the disk 500 at the ends of the tube projecting and retracting strokes of the yoke.

In the use of the above described machine the operator inserts and secures in position in the platform 52, an assembly comprising the nail block 42 and corresponding nail receiving and guiding tubes 76, drivers 92 and tube and driver

operating mechanisms adapted to operate on the work at hand. A loader block 80, the design or pattern of the nail passages 122, 322 of which correspond to the passages of the tubes 76 in their raised positions, is placed in the U-shaped frame 414 mounted in the carrier slide 393 and the nail distributing turret 324 is so rotated that the desired nailing design or pattern is arranged in its proper position over the retracted loader block, the tube receiving foot plate 310, which was previously raised to permit the proper design of the turret to be moved to operating position, then being lowered to lock the turret against rotation. Nails 34 of a chosen length are supplied to the nail pots 240 and the raceways and the various mechanisms including the nail feeding mechanism are arranged to supply nails to the passages 330 of the selected pattern of the nail distributing turret 324.

The pressure head 150 being raised, the operator depresses one of the lever arms 486 causing the above-mentioned secondary clutch to be tripped, with the result that the loader block 80, is caused by mechanism including the cam lever 132, to move forward from its nail receiving position adjacent to the turret 324, the spring actuated shutter 120 of the loader block being closed and said block during such movement being turned 180° upon the trunnions 416. The loader block 80 arrives over the tops of the raised tubes 76 with the shutter 120 down as illustrated in Fig. 7, the stud 116 of the shutter at such time being in forced engagement with the face 114 of the abutment 110 so as to have caused sliding of the shutter in order that the nails 34 in the passages 122 of the body 420 of the loader block 80 shall fall through passages 322 of the shutter into the tubes 76 with their heads resting on the drivers 92. Continued operation of the secondary clutch through its power cycle causes rearward movement of the cam lever 132 with the result that the loader block 80 is returned to its rest position below the nail distributing turret 324 for receiving a succeeding load of nails and the tubes 76 are moved to their retracted positions in the passages 74 of the nail block 42.

The operator next places a heel 30 in the heel gage 48 and a shoe 32 mounted on the last 44, upon the jack post 46 and then swings the jack post rearward until the abutment 173 on said post has engaged the shoulder 175 on the column 210. During the last part of the rearward movement of the jack post 46, the rear of the shoe engages the back gage 198 which positions the shoe lengthwise and widthwise. While holding the jack post 46 against the shoulder 175 the treadle 390 is depressed, said treadle turning about the roll 394 to lower the cylinder 356 and the side rods 160 and thus depressing the presser head 150 to force the heel seat 36 of the shoe 32 against the heel. During initial downward pressure of the shoe against the heel 30 rectangular portions 168 of the jack post fulcrum pin 169 are raised in the bores 166 of the pressure head causing the wedge 177 of the jack post 46 to be forced into the notch 179 of the pressure head 150 to insure against any tendency of the jack to swing forward during the heel attaching operation.

When downward movement of the treadle 390 is stopped by preliminary pressure of the shoe 32 against the heel 30, the fulcrum of the treadle shifts to the pin 392 to lift the roll 394 and, through mechanism disclosed in detail in said Letters Patent of the United States 2,178,615, to operate a main clutch C thus causing the main shaft 266 to make a complete revolution. Rotation of the cam shaft 378 causes rotation of the cam 352 through 360° in the bearing block 368. This immediately closes the passage 388 in the piston 366, said cylinder 356 and said piston which depends from the block 368, thereafter being connected for movement together and contact of the cam 352 with the roll 348 raising the plunger 336 and, accordingly, the drivers 92 to insert the nails into the work. The reaction produced by the nail driving operation is communicated through the bearing block 368, the piston 366, the cylinder 356 and the side rods 160 to the pressure head 150 which is thus caused to force the shoe 32 against the heel with a final pressure proportionate to, but not exceeding, that to drive the nails. The main clutch C is disengaged when its single rotation is completed.

As the actuating cam 352 returns to its initial position it allows the driver plunger 336 to be lowered by the spring 346 and the block 368 to be raised by the springs 370. The passage 388 is finally opened by depression of the valve 386 thus releasing the cylinder 356 for vertical movement. When the operator releases the treadle 390, the springs 362 raise the cylinder 356, the side rods 160 and the pressure head 150, and the shoe to which the heel has been attached is then removed from the jack post 46.

If instead of pressing one of the hand levers 486 to initiate delivery of nails to the tubes 76 the operator has set the machine so that the left side rod 160 exercises control over the nail supplying means there will be no necessity to operate said hand levers.

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

1. In a fastening inserting machine, a support having guides, a gage for positioning a work piece upon the support, fastening receiving means constructed and arranged for movement in said guides between a projected position, in which position said means occupies space normally occupied by the work piece upon the support and receives fastenings, and a retracted position in which said means is away from said space, and drivers movable in said fastening receiving means to drive said fastenings into the work piece upon the support.

2. In a fastening inserting machine, a work support, a carrier for delivering fastenings to a delivery position spaced by a gap from the work support, fastening inserting mechanism movable in the work support, conductors which are movable between retracted positions within the work support and projected positions in which they extend substantially across the gap and are positioned adjacent to said carrier in its delivery position, means for moving the conductors between projected and retracted positions to cause said conductors to guide fastenings to said fastening inserting mechanism and to cause the conductors to be removed from the gap to enable one of a plurality of work pieces which are to be secured together to be positioned upon said support, and means for operating said mechanism to drive fastenings into said work pieces to secure the work pieces together.

3. In a fastening inserting machine, a work support having guideways, a carrier for fastenings, means for moving said carrier to and from a fastening delivering position adjacent to but spaced a substantial distance from the work sup-

port, fastening inserting drivers, and means movable to and from a bridging position across a gap formed between the work support and the carrier in its delivering position for receiving fastenings delivered by said carrier and for guiding said fastenings to positions in which they may be acted on by the fastening inserting drivers.

4. In a fastening inserting machine, a support having guideways and a work engaging face, a work positioning gage mounted upon the work engaging face of said support, a carrier for fastenings, means for moving said carrier to and from a delivering position adjacent to but spaced a substantial distance from the work engaging face of the support, fastening inserting drivers, and means for bridging the space between the carrier in its delivering position and the work support and for receiving fastenings from said carrier and delivering them to the drivers.

5. In a fastening inserting machine, a work support having guides, tubes movable in the guides, drivers movable in the tubes, a fastening delivering block having passages, means for effecting relative movement of said block and said support to cause the block and the support to be relatively moved into predetermined spaced positions, and mechanism operated in timed relation with said means for causing said tubes to move into positions in which they guide fastenings to the drivers from the passages of said block.

6. In a heel attaching machine, a nail block, guides, tubes movable in said guides, drivers movable in said tubes, a loader block which has a plurality of passages and is movable between a nail receiving position remote from the nail block and a nail delivery position near the nail block, and means movable in timed relation with the loader block for moving the tubes to positions adjacent to and into register with the passages of the loader block to receive nails from the loader block and to guide them into positions to be operated upon by the drivers.

7. In a heel attaching machine, a nail block having a heel engaging face and guideways, a loader block, a plurality of tubes constructed and arranged for sliding movement in said guideways, a mount for said tubes, drivers movable in said tubes, means for actuating the mount to move the tubes along said guideways between positions in which they are retracted into the block and positions in which they are projected beyond the heel engaging face of said block into positions adjacent to said loader block to receive nails from the loader block and guide them to the drivers.

8. In a fastening inserting machine, a nail block having converging guideways, a loader block, a plurality of nail guiding tubes, nail drivers movable in said tubes, said tubes being mounted for sliding movement in corresponding guideways to positions in which they can receive nails from the loader block and guide them to the drivers, an actuating member movable in a rectilinear path, said tubes being coupled to said actuating member for sliding movement lengthwise of said guideways in response to movement of said member in said path and also for shifting movement laterally of said guideways with relation to said member as the tubes are moved lengthwise of said guideways, a mount, and means for moving the mount in a rectilinear path to move the drivers along said tubes in order to drive nails in a work piece on the nail block, said drivers being shiftable in said mount transversely of the path of movement of the mount as they are moved in said tubes.

9. In a heel attaching machine, a nail block which has an axis and which has extending through it a plurality of guideways inclined to said axis, a plurality of nail receiving and guiding tubes mounted for reciprocation in said guideways, a plurality of nail drivers mounted for reciprocation in the tubes in paths inclined to said axis, actuating members for the tubes and the drivers respectively, and means for moving each of said members lengthwise of said axis, each of said tubes and said drivers having a transverse collar and each of the actuating members having a plurality of undercut guideways which extend generally transversely of said axis and are constructed and arranged to receive collars of corresponding tubes and drivers, the construction and arrangement of the tubes, the drivers and their corresponding actuating members being such that movement of the actuating members lengthwise of said axis causes movement of the tubes and the drivers in paths inclined to said axis.

10. In a fastening inserting machine, a work support having guideways, a gage positioned upon and secured to the support, tubes which are movable in said guideways and have passages, fastening inserting drivers which are movable in the passages of said tubes, means for moving said tubes from retracted positions in the support through a space which is normally occupied by a work piece positioned by the gage upon said support, to projected positions in which the tubes serve as conduits for guiding fastenings to the drivers, and then back to said retracted positions, and means for moving said drivers through the passages in the retracted tubes to drive fastenings into the work piece.

11. In a fastening inserting machine, a work support having guides, a movable fastening delivering block having fastening receiving passages and having a fastening retaining shutter, tubes which are movable in said guides and have passages corresponding in design to the passages of said block, fastening inserting drivers movable in said tubes, said tubes being movable to projected positions to which they receive said fastenings from the block and guide them to the drivers, an abutment, said abutment being movable from an idle position to a projected position in which it operates the fastening retaining shutter during movement of said block to effect free passage between associated passages of the block and the tubes in their projected positions to enable fastenings in the block to drop into passages of the tubes, and means for operating the drivers to drive the fastenings into the work upon the support.

12. In a heel attaching machine, a nail block having a heel supporting face and a plurality of converging guideways, a heel gage, means for positioning the heel gage on and securing it to the nail block, means for forcing the heel seat of a shoe against a heel in the heel gage, a plurality of tubes which are movable in converging paths in the guideways of said block, a mount to which the tubes are slidably coupled, a plurality of drivers reciprocable in said tubes, a nail delivering block, means for operating said mount to move the tubes to projected positions above the heel supporting face of the nail block and into close proximity to the nail delivering block to receive nails from the nail delivering block and to guide them to the drivers, a second mount to which the drivers are slidingly coupled, and means for actuating the second-named mount to

drive said nails in the tubes through the heel and the heel seat portion of the shoe.

13. In a heel attaching machine, a nail block having a plurality of converging guideways, a heel gage, means for securing the heel gage to the nail block, means for forcing the heel seat portion of a shoe against a heel in the heel gage, a plurality of tubes reciprocable in said guideways and having converging passages, a nail delivering block, a mount to which the tubes are slidably coupled, means for operating said mount to move the tubes to projected positions in which they serve as conduits for guiding nails from said block to the drivers, a second mount to which the drivers are slidably coupled, and means for operating the second-named mount to drive the nails through the heel and the heel seat of the shoe.

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