Dec. 16, 1952 C. J. GROSS 2,621,348

MACHINE FOR APPLYING PRESSURE TO SHOES

Filed April 9, 1949 7 Sheets-Sheet 1

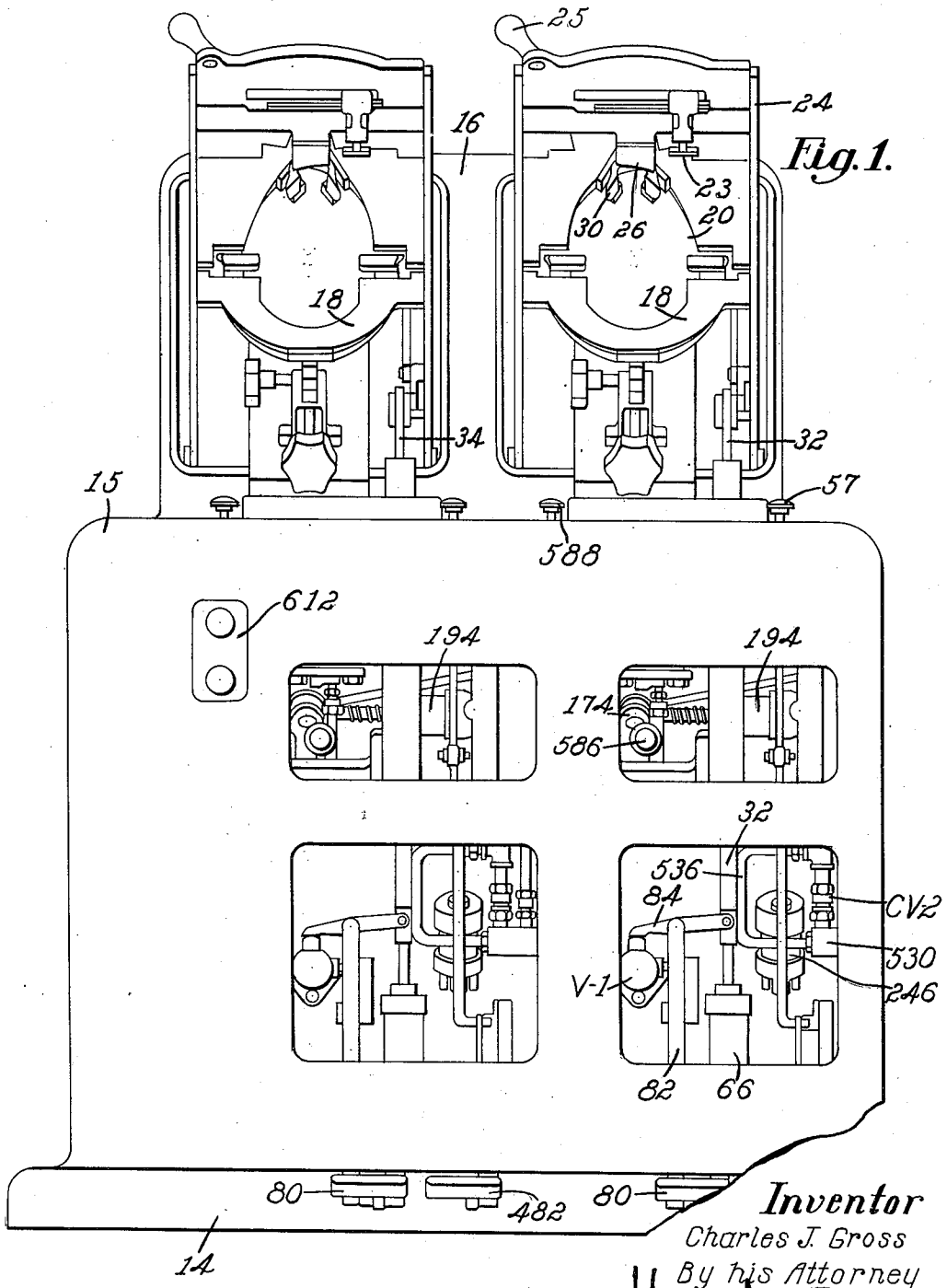


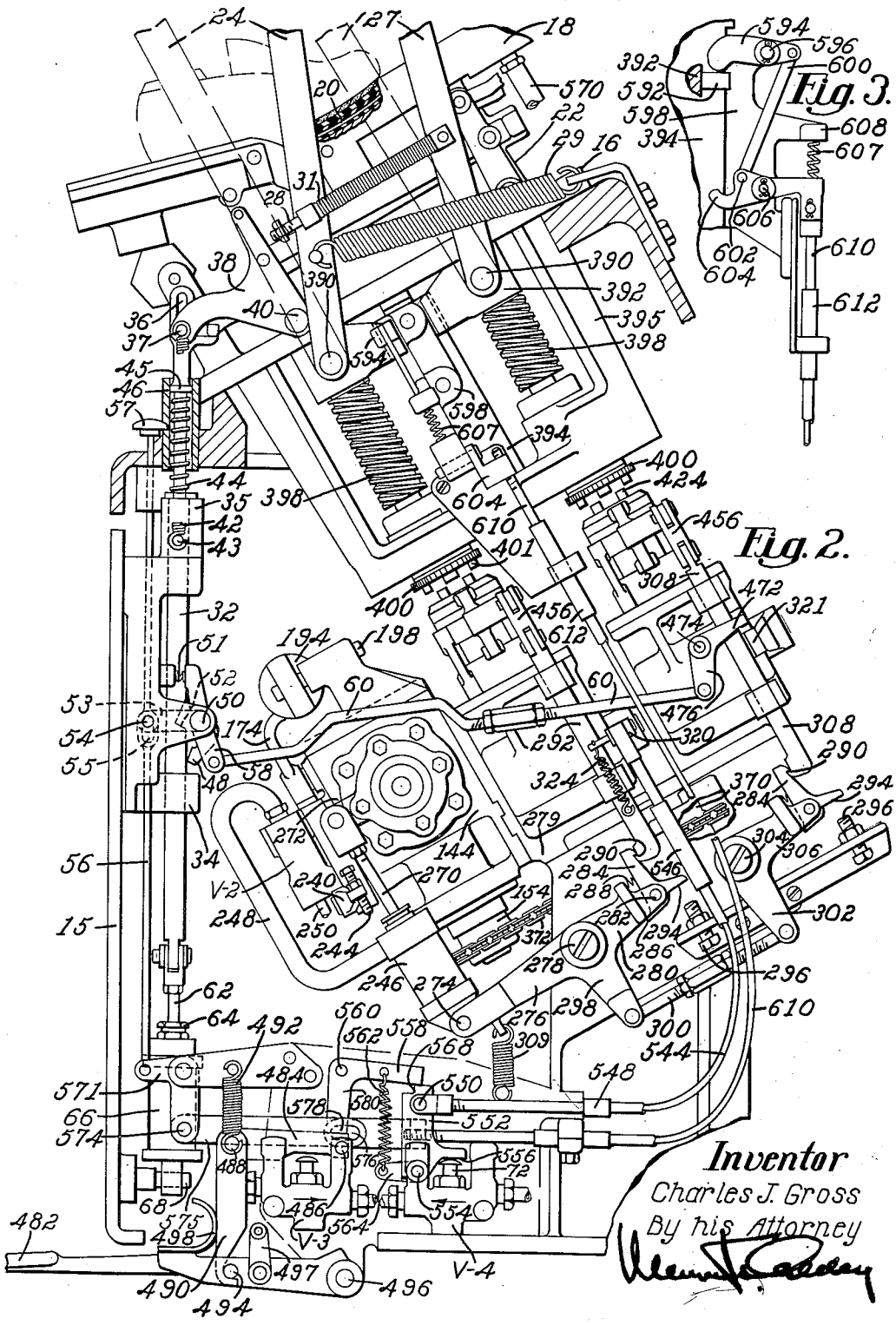
Fig. 1.

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MACHINE FOR APPLYING PRESSURE TO SHOES

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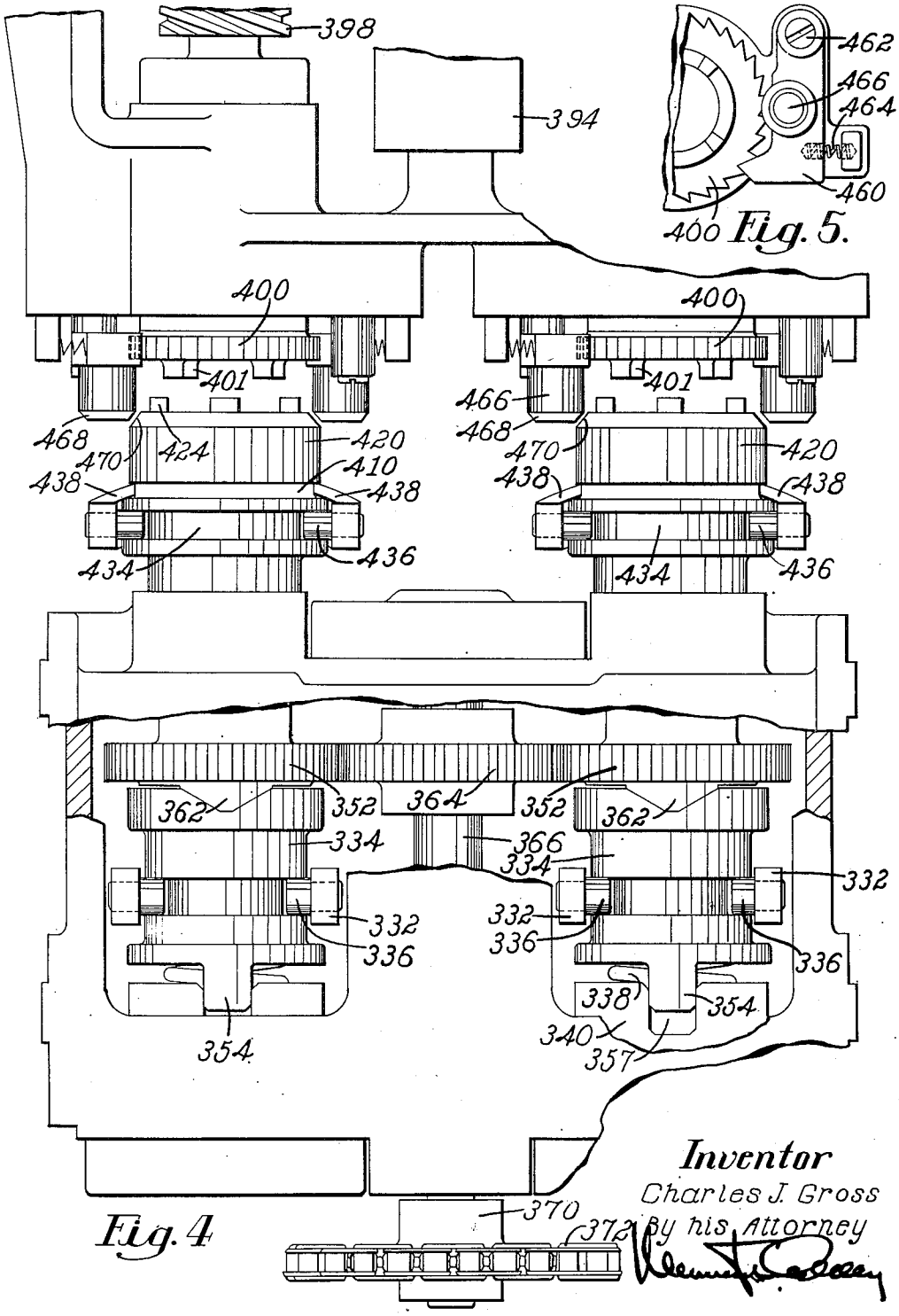


Fig. 5.

Fig. 4

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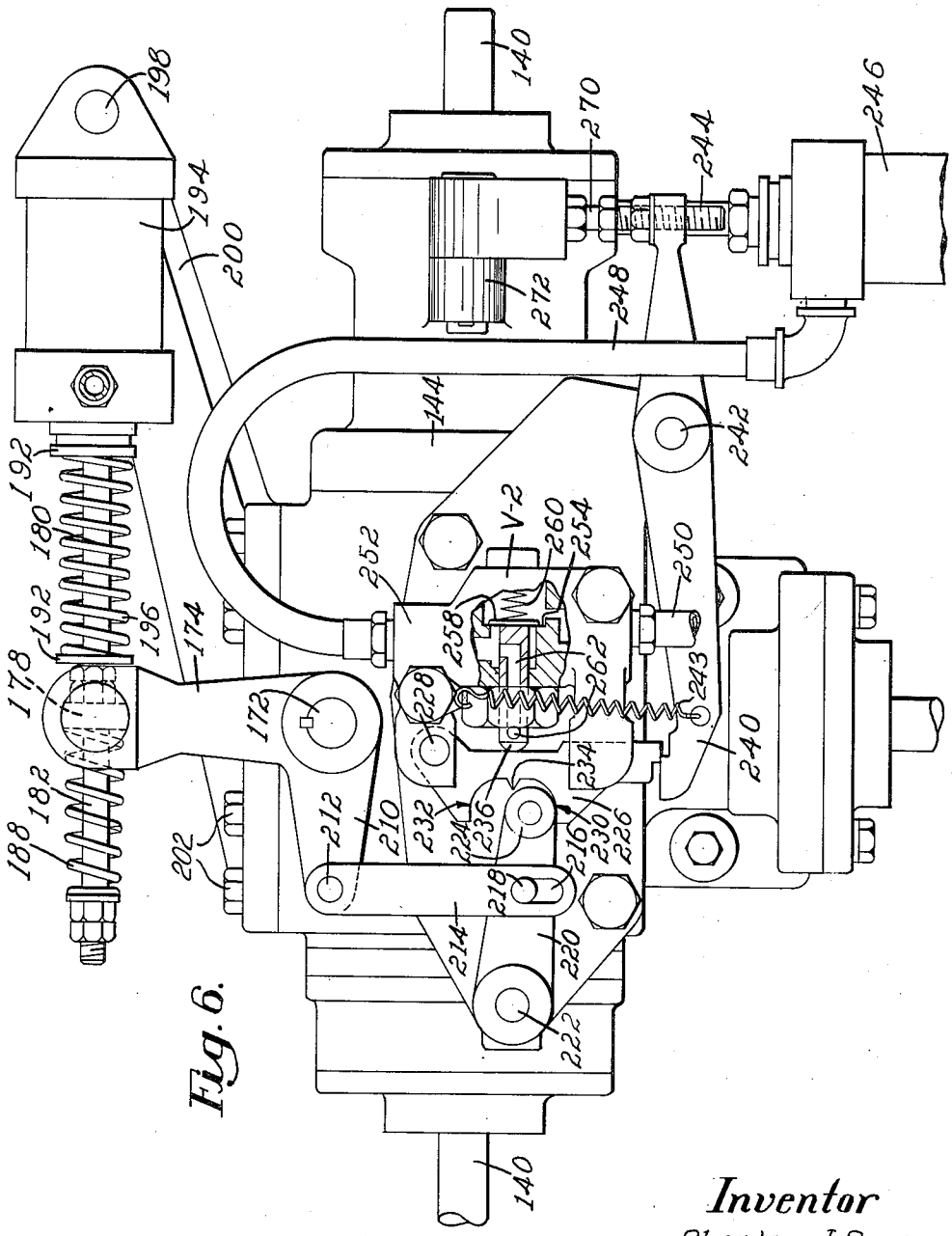


Fig. 6.

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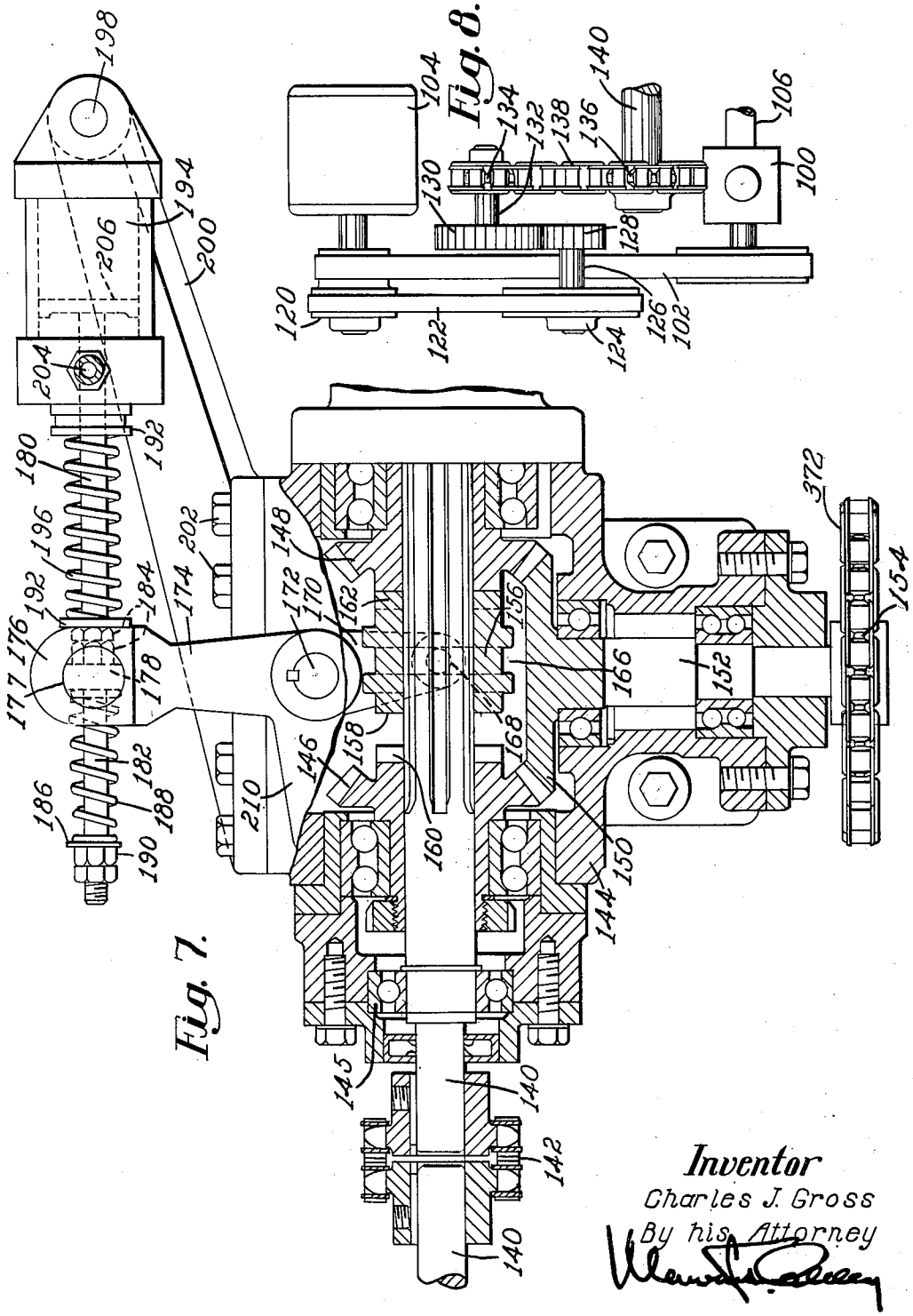


Fig. 8.

Fig. 7.

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MACHINE FOR APPLYING PRESSURE TO SHOES

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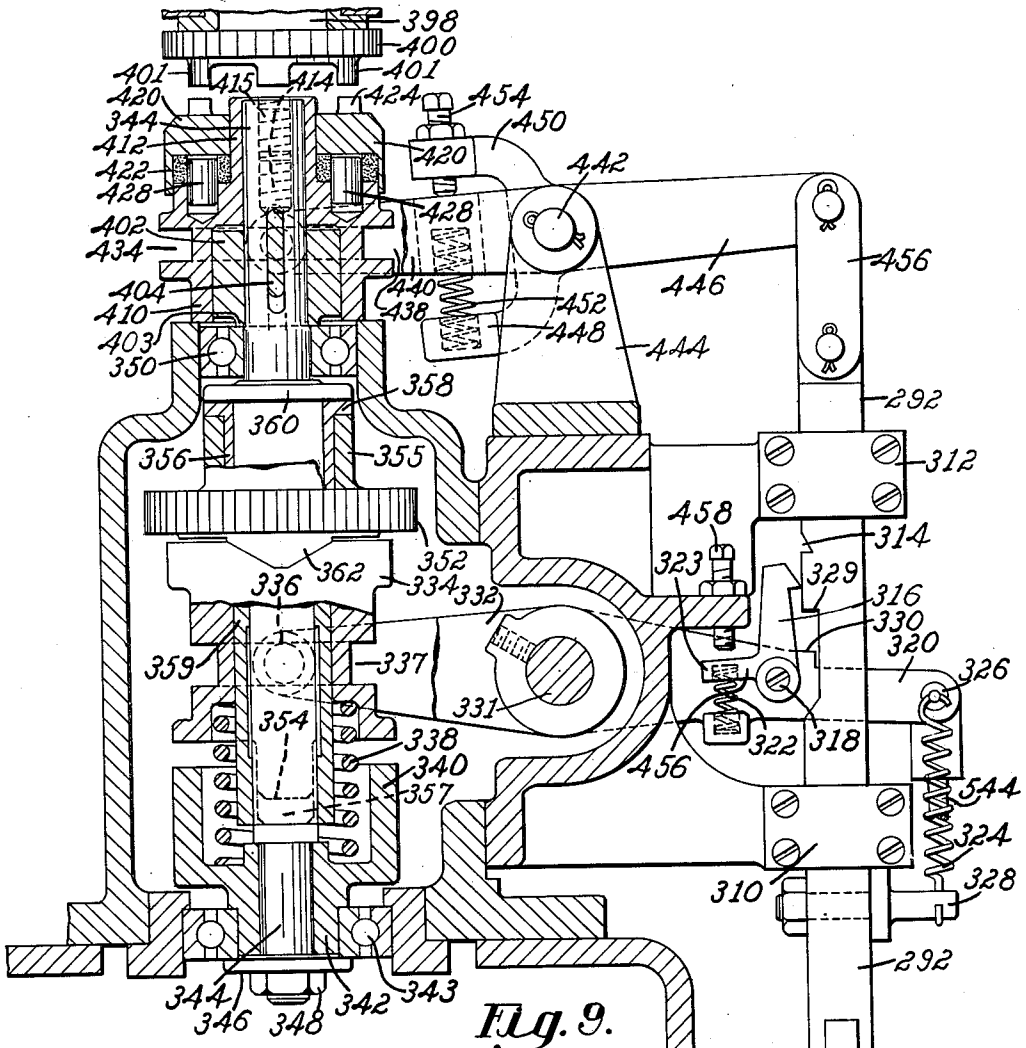


Fig. 9.

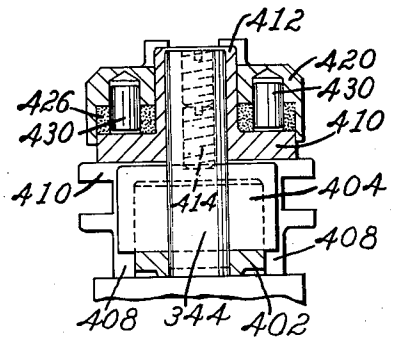


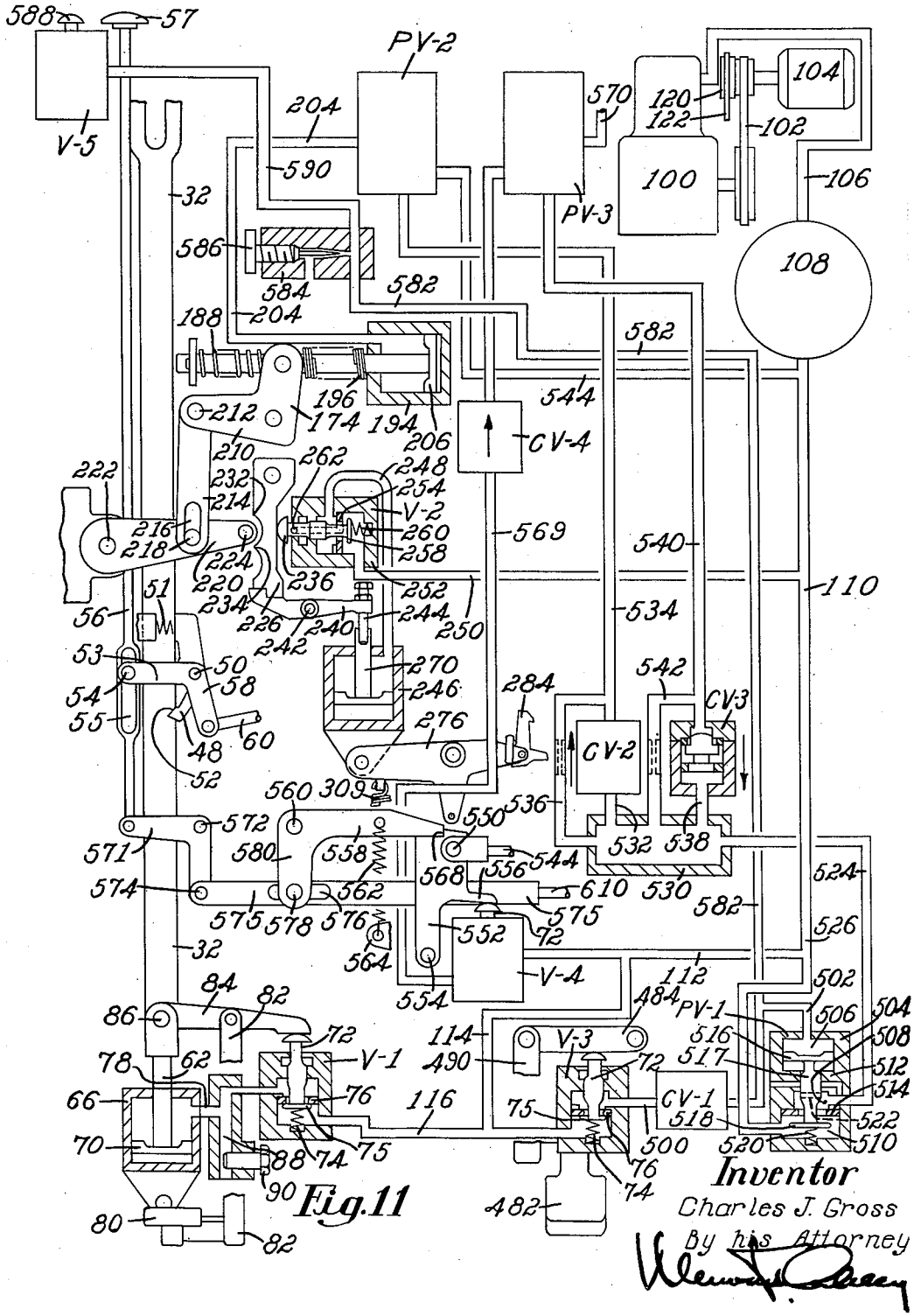
Fig. 10.

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MACHINE FOR APPLYING PRESSURE TO SHOES

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UNITED STATES PATENT OFFICE

2,621,348

MACHINE FOR APPLYING PRESSURE TO SHOES

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Application April 9, 1949, Serial No. 86,495

33 Claims. (Cl. 12—36)

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This invention relates to machines for applying pressure to shoes and is adapted for use in cement sole attaching operations.

Objects of this invention are to improve and perfect machines of this type without relinquishing any of the advantages of prior machines.

It is desirable, even when an inflatable pad is used, to apply heavy pressure to the shoe and sole. The illustrated machine, as a feature of the invention, provides mechanism for applying heavy pressure to the shoe mechanically and, as shown, by power-operated screws. Non-rotating nuts for the screws are connected to abutments for engaging the last and shoe, and adjacent to the screws are shafts which are being spun by connections to a source of power, for example an electric motor. Operator-controlled means is provided for connecting the shafts to the screws, the screws then rotating in a direction to move the nuts down on the screws and, through the abutments, to apply pressure to the shoe. Of course, an arrangement where the nut is the rotating member instead of the screw would be equally effective and is within the present invention.

To limit the pressure applied, means dependent on such pressure is provided for disconnecting the shafts from the screws, that is, rendering the shafts inoperative when the pressure reaches a predetermined amount. For this purpose each shaft is rotated by a driven member concentric therewith which has a wedge-like projection engaging a recess in a collar splined on the shaft and upheld by a spring. When the pressure on the shoe reaches an amount determined by the spring, the projections slip partly out of the recesses, causing axial movement of the collar against the spring, which movement is utilized to actuate means for disconnecting the shafts from the screw.

To relieve pressure on the shoe, means is provided for reversing the direction of rotation of the shafts which, after a predetermined time, is automatically actuated and the shafts again connected with the screws to run the nuts up.

The illustrated machine is provided with an inflatable pad, and compressed air is utilized not only to inflate the pad but also to control and operate various mechanical devices for effecting the above-indicated operations as well as inflation and deflation of the pad. These operations are controlled by valves of four different types, namely, check valves which allow passage of pressure fluid in one direction only, simple valves opened manually and closed by springs, valves herein called "pilot valves" which are opened by fluid

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pressure and closed by springs and which, when open, permit passage of pressure fluid through them and, when closed, permit exhaust or movement of the pressure fluid through them in the reverse direction, and a valve which is opened automatically, is latched open for a time and then automatically released to closure by a spring. When closed, it permits exhaust of pressure fluid which has passed through it when open. This valve will be referred to as an "automatic valve." The cycle of the machine is briefly as follows.

A sole is placed on the pad, a treadle is depressed which momentarily opens a valve admitting pressure to a cylnder the piston of which is operated to allow gages to engage the sole, a latch preventing return of the piston. A shoe is located on the sole, the abutments are located over the shoe, and a second treadle is depressed to open momentarily a valve admitting operating pressure to the first pilot valve. This valve admits fluid pressure to a chamber called a "distributor" from which one pipe leads to a second pilot valve and another pipe to a third pilot valve. In each pipe is a check valve, the one in the pipe leading to the second pilot valve opening in a direction away from the distributor, and the one leading to the third pilot valve opening in a direction toward the distributor. A by-pass with a restricted passage is provided around each check valve, that is, leading from the distributor to a point in the pipe beyond the check valve. By this arrangement pressure fluid passes quickly to the second pilot valve to open it and passes slowly to the third pilot valve to open it later. Pressure passing through the second pilot valve tensions a spring and operates first the reversing mechanism to drive the shafts in a direction to screw the nuts down and then opens, and latches open, the automatic valve pressure through which operates mechanism for connecting the shafts to the screws, completion of which movement trips the latch and allows the automatic valve to close.

When the pressure reaches such a point that a slip occurs between the shafts and the screws, they are disconnected, the gage latch is released, and a valve called an "inflating valve" is opened and latched open, this valve then allowing pressure fluid to pass through the third pilot valve (which has meantime been opened by pressure fluid passing through its restricted by-pass) to inflate the pad. The shoe is retained under pressure until the operator has placed a shoe and sole under pressure on the other side of the machine, a period, for example, of ten sec-

onds. This is effected by a needle valve in a pipe connected to the operating chamber of the first pilot valve, the needle valve being so set, for instance, that after ten seconds enough pressure has leaked out to permit the first pilot valve to close. Pressure in the distributor is thus exhausted through this valve, and the operating pressure on the third pilot valve quickly exhausts through its check valve, allowing it to close and open to exhaust the pressure in the pad. The operating pressure of the second pilot valve exhausts slowly through its by-pass and, when it opens, the tensioned spring in the reversing mechanism reacts first to place said mechanism in a position reversely to turn the screws and then opens the automatic valve to cause connection between the shafts and screws, whereupon the nuts are moved up to release the pressure of the abutments on the shoe. When the nuts reach their upper limit, their resistance to movement causes again a slip in the connections between the shafts and their driving mechanism which is utilized to disconnect the shafts from the screws, upward movement of the nuts operating mechanism to unlatch the inflating valve.

These and other features of the invention will appear more fully when read in connection with the accompanying drawings and will be pointed out in the appended claims.

In the drawings,

Fig. 1 is a front elevation of the machine;

Fig. 2 is a side elevation partly in section;

Fig. 3 is a detail view, in front elevation, of parts shown in Fig. 2;

Fig. 4 is an enlarged elevation of parts shown in Fig. 2 taken from the opposite side of the machine;

Fig. 5 is a plan view of parts shown in Fig. 4;

Fig. 6 is a front view of mechanism for reversing the direction of rotation of the pressure-applying screws partly in section;

Fig. 7 is a view, partly in section, of parts shown in Fig. 6;

Fig. 8 is a plan view of the motor and driving connections;

Fig. 9 is a view, partly in section, of parts shown in Fig. 4;

Fig. 10 is a sectional view of parts shown in Fig. 9 taken at right angles to that figure; and

Fig. 11 is a diagrammatic view showing a fluid-pressure system whereby the various mechanisms are operated or their operation controlled.

As indicated in Fig. 1, this machine is of the twin type, one side being adapted to operate on a right shoe and the other on a left. Since the mechanisms of the two sides are otherwise substantially identical, the right side only will be herein specifically described.

The machine has a base 14, a front plate 15 upon which some of the mechanism is supported, and an inclined table 16 upon which pad boxes 18 containing inflatable pads 20 are supported in a frame 22 (Fig. 2). Mechanism for applying pressure to the shoe comprises a heel abutment 23 (Fig. 1) carried by a bail 24 and movable into position over the cone of the last by a handle 25 and a toe abutment 26 carried by a bail 27 (Fig. 2) and connected to the bail 24 by a rod 28 for movement into position rearwardly with respect to the shoe. The bail 24 is connected by a tension spring 29 to the frame, and on the rod 28 is a compression spring 31 by which the bail 27 is pushed forwardly by the bail 24 when a shoe is to be removed. The pad box 18 and gage mechanism 30 are supported on the table 16, the gages being allowed to move into operative position on the pad by downward movement of a vertical bar 32. The bar is guided in bearings 34, 35 (Fig. 2) and has a slot 36 in its upper end engaged by a pin 37 in a lever 38 pivoted at 40 to the table 16. The above described mechanism is substantially like that disclosed in an application for Letters Patent of the United States Serial No. 751,560, filed May 31, 1947, in the names of H. Gulbrandsen et al., now Patent No. 2,558,847, granted July 3, 1951. The pin 37 is yieldingly held in the lower end of the slot by a spring 42 connected between the pin 37 and a pin 43 in the bearing 35. The bar 32 is sustained by a compression spring 44 located on the bar between the bearing 35 and a flange 45 on the bar, upward movement of the bar 32 being limited by the stopping of the gages in their withdrawn position. The slot 36 permits further downward movement of the bar after the gages 30 come in contact with the sole to cause the bar to be locked down by a latch 48 pivoted at 50 to a lug projecting rearwardly from the front plate 15, the latch being urged by a compression spring 51 to engage a notch 52 in the bar 32. The latch 48 has an arm 53 carrying a pin 54 which engages a slot 55 in a vertical rod 56 having at its upper end a knob 57 which can at any time be pushed down to release the latch. The latch also has an arm 58 which is connected to a rod 60 a pull on which will release the latch. Means for pulling on the rod at the proper time in the cycle of the machine to release the gages automatically will be later described.

To pull down the bar 32 without effort on the part of the operator, the lower end of the bar is pivoted to a piston rod 62 passing through a stuffing box 64 on the head of a cylinder 66, the lower end of which is pivoted on a pin 68 projecting from the front plate 15. As indicated in Fig. 11, a piston 70 on the rod 62 is pushed down by compressed air admitted by operation of a valve V-1 shown in section, the valve comprising a plunger 72 upheld by a spring 74, the plunger having a flange 75 held against a valve seat 76 by the spring. Depression of the plunger 72 will admit air through a pipe 78 above the piston 70 to move the bar 32 down. To operate the plunger a treadle 80 is connected by a link 82 to the mid portion of a lever 84 one end of which is pivoted at 86 to the bar 32 and the other end of which is over the plunger 72. Depression of the treadle moves the lever 84 about its pivot 86, depressing the plunger 72 and admitting air momentarily to the cylinder 66, causing the piston 70 to move down. This movement, however, moves the lever about its pivot to the link 82, allowing the valve to close, the bar being now held down by the latch 48. The air in the cylinder 66 is allowed to leak out through a passage 88 restricted by a screw 90.

Compressed air is provided by an air pump 100 (Fig. 11) driven by a belt 102 from a motor 104, the pump being connected by a pipe 106 to a tank 108 from which pipes 110, 112, 114, 116 lead to the valve V-1. The shaft of the motor 104 (Fig. 8) carries a pulley 120 connected by a belt 122 to a pulley 124 on a shaft 126 having a small gear 128 meshing with a large gear 130 on a shaft 132. A small sprocket 134 is connected to a larger sprocket 136 by a chain 138. The larger sprocket 136 is fixed to a shaft 140. There are two shafts 140, one for each side of the machine, which are

arranged in axial alinement and connected together by a flexible coupling 142 of known type (Fig. 7). The sprocket 136 is on the outer end of the left-hand shaft 140 through which the left side of the machine is driven by mechanism similar to that for the right-hand side, now to be described. The shaft 140 is mounted in a casing 144 on ball bearings 145, one of which is shown in Fig. 7, and mounted loosely on the shaft 140 are two opposed bevel gears 146, 148 both of which mesh with a bevel gear 150 on a shaft 152 carrying a sprocket 154. Either gear 146 or 148 may be driven from the shaft 140 by a collar 156 splined on the shaft 140 and having on one side teeth 158 which may mesh with similar teeth 160 on the gear 146 and on the other side teeth 162 shown in Fig. 7 as meshing with corresponding teeth on the gear 148. With the collar 156 in the position shown, the shaft 140 will drive the sprocket 154 in one direction and, when the collar is shifted leftwise to engage the teeth 158 with the teeth 160, the sprocket 154 will be driven in the opposite direction.

The collar 156 has a peripheral groove 166 which is engaged by rolls 168 on arms 170 fixed to a shaft 172 upon which outside the casing 144 is fixed an arm 174. The upper end of the arm 174 has bifurcations 176 between which is pivoted at 177 a collar 178 through which passes a piston rod 180 having a portion 182 of smaller diameter. On the larger portion nuts 184 are threaded to bear on the collar 178 and on the smaller portion between washers 186 is a light spring 188, the outer washer 186 being held on the rod by nuts 190. Between a washer 192 bearing on the bifurcations 176 and one bearing on the head of a cylinder 194 is a heavier spring 196. The cylinder is pivoted at 198 on a bracket 200 secured at 202 to the casing 144 and, when air is admitted through a pipe 204 to the cylinder, a piston 206 moves toward the right, compressing the spring 196 and, through the lighter spring 188, moving the arm 174 yieldingly to shift the collar 156 toward the left, releasing the teeth 162 and engaging the teeth 158, 160 to cause rotation of the sprocket 154 in the opposite direction. When the air is exhausted from the cylinder 194, the heavier spring 196 reacts and shifts the collar 156 back to its original position. Extending leftward from the arm 174 (Fig. 6) is an arm 210 pivoted at 212 to a link 214. The link has a slot 216 engaging a pin 218 on a lever 220 fulcrumed at 222 and carrying a roll 224 adjacent to which is a lever 226 fulcrumed at 228 and having two abutments 230, 232 for the roll 224 and between them a projection 234.

During the later portion of the movement of the piston 206 to the right in the cylinder 194 the lower end of the slot 216 engages the pin 218 and shifts the roll 224 upward against the abutment 232. As the roll passes the projection 234, it swings the lever 226 to the right against a plunger 236 of a valve V–2, the lower end of the lever 226 being caught by a latch lever 240 pivoted at 242 held up by a tension spring 243 and having an arm extending to the right through which is threaded a screw 244 in position to be engaged by upward movement of a cylinder 246 connected by a flexible tube 248 to the valve V–2 which is supplied with air from a pipe 250.

The valve V–2, as best shown in Fig. 6, comprises a casing 252 to which air is led by the pipe 250 and discharged when the valve is open through the pipe 248. In the casing is a valve seat 254 engaged by a disk 258 on the plunger 236 held by a spring 260 against the valve seat to close the valve. In its closed position, as shown, air can exhaust from the pipe 248 through a passage 262 which is closed when the valve is open.

The cylinder 246 has its piston connected by a rod 270 to a fixed lug 272 of the casing 144, the lower end of the cylinder (Fig. 2) being pivoted at 274 to an arm 276 of a three-armed lever fulcrumed at 278 on a frame 279. Another arm 280 of the lever has pivoted thereto at 282 a catch 284 the clockwise movement of which is limited to the position shown by an extension 286. The catch, however, can move counterclockwise to a limited extent against a spring 288 to engage a lug 290 on a bar 292. When air is admitted above the piston in the cylinder 246 through the pipe 248 the cylinder moves up, causing the lever 276, 280 to pull the bar 292 down until the catch 284 is tripped off by engagement of a projection 294 thereon with a stop screw 296.

A third arm 298 of the lever pivoted at 278 is connected by an adjustable link 300 to an arm 302 of an angle lever pivoted at 304 which has an arm 306 carrying a catch 284 similar to that on the arm 280, the catch engaging a projection 299 on a bar 308 similar to the bar 292. Thus, when the lever 276, 280, 298 is turned clockwise, the bars 292, 308 will be pulled down simultaneously and the catches tripped off by the stop screws 296. When the cylinder 246 reaches substantially the upper limit of its movement, it engages the screw 244 on the latch lever 240 and releases the lever 226, permitting the valve V–2 to close, whereupon the air in the cylinder will exhaust through the passage 262. Since the opening and closing of the valve V–2 are effected automatically, it is referred to as the "automatic valve."

Upon descent of the bars 292, 308, each operates a mechanism shown in Fig. 9. Since these mechanisms are identical only one need be described in detail. The bar 292 is guided for longitudinal movement in bearings 310, 312 and has a notch 314 which is engaged by a latch 316 pivoted at 318 to a lever 320 and urged toward the bar 292 by a compression spring 322 located between a lug on the lever and a projection 323 on the latch. The bar is upheld by a tension spring 324 connected to a pin 326 on the lever 320 and to a pin 328 on the bar. When the latch 216 is in engagement with the notch 214, a shoulder 329 on the bar is adjacent to a surface 330 on the lever 320. The lever 320 is fulcrumed between its ends on a shaft 331 the left-hand arm of which has two branches 332 embracing a collar 334, each branch carrying a roll 336 engaging a peripheral groove 337 in the collar. The collar is sustained by a compression spring 338 partly enclosed in a cup 340, the cup having a hub 342 rotating in a ball bearing 343. The inner ring of the ball bearing 343 is secured to the hub 342 and to a shaft 344 by a washer 346 engaging the ring and a nut 348 threaded on the end of the shaft, the shaft having a ball bearing 350 between its ends. The collar 334 and the cup 340 are connected for rotation together, as best shown in Fig. 4, the collar 334 having a downward projection 354 entering a slot 357 in the rim of the cup. There is a space between the collar and the rim of the cup and this can be closed by downward movement of the collar without disturbing the driving connections between the collar and the cup.

Above the collar is a gear 352 having a hub

355 (Fig. 9) rotatably mounted on a bushing 356 having a flange 358 engaging the end of the hub 355. There is also a bushing 359 forming a bearing for the collar 334 and the shaft 344. On the shaft 344 is a flange 360 bearing on the flange 356 of the bushing. The gear 352 has on its lower face a pair of wedge-shaped projections 362 which are received in correspondingly shaped recesses in the upper face of the collar 334 which is held yieldingly in engagement with the projections 362 by the spring 338 the upward pressure of which is opposed by the flange 360 on the shaft 344, the shaft being held by the ball bearings against vertical movement. For driving the gear 352 and a similar gear on the duplicate mechanism, a third gear 364 (Fig. 4) is mounted between the two gears 352 and in mesh with them on a shaft 366 mounted in suitable bearings in the frame and having at its lower end a sprocket wheel 370 which is connected by a chain 372 to the sprocket 154 (Fig. 2) which is, as already explained, driven by means of the reversing gearing. The abutment 29 for the last and the abutment 32 for the forepart of the shoe connected respectively to the bails 24, 27 are moved down to press the shoe upon the inflatable pad 20 in the pad box 26.

Below the table 16 each bail 24, 27 is pivoted at 390 to a nut 392, each nut having a groove engaging a strut 394 forming part of a frame 395, the nuts being thus confined to movement lengthwise of two multiple threaded screws 398 which they engage. The screws have lower cylindrical portions journaled in bearings in the frame through which they extend. The lower end of each screw has secured thereto a ratchet wheel 400 on which are clutch teeth 401, the screws 398 being each centralized over one of the shafts 344. Above the ball bearing 350 (Fig. 9) the shaft 344 is slightly reduced, and mounted thereon is a sleeve 402 having at its lower end a ridge 403 engaging the inner ring of the ball bearing 350. The sleeve is made to rotate with the shaft by a key 404 which lies in slots cut in opposite sides of the sleeve from the top nearly to the bottom and passes through a slot in the shaft. The key extends beyond the sleeve to engage at each end a slot 408 in a collar 410 (Fig. 10), the sides of the slot being parallel to the axis of the shaft 344. The upper portion of the collar is reduced, forming a sleeve portion 412 fitting the shaft 344. In the upper end portion of the shaft is a threaded hole in which is a screw 414 which engages the top of the key and presses it against the lower ends of the slots in the sleeve 402, thus clamping the sleeve against the inner ring of the ball bearing 350, which ring, together with the sleeve 402 and the collar 410, rotates with the shaft. A set screw 415 is located above the screw 414. The collar, however, can move upwardly endwise to the shaft because the ends of the key 404 lie in the vertical slot 408 which extends parallel to the axis of the shaft. Surrounding the sleeve portion 412 of the collar 410 is a cap 420 having a skirt 422 extending down to surround the upper end of the collar. The cap carries projections 424 which are to engage the projections 401 to drive the screws 398. If these projections were parts of the collar 410, the shock of engaging them with the projections 401 while the shaft 344 is in motion might be great enough to cause breakage. Therefore, a cushioning washer 426 is provided between the cap 420 and the upper end of the collar 410, and pins 428 (Fig. 9) are seated in the collar 410 with their upper portions extending into the washer 426. Other pins 430 (Fig. 10) are seated in the cap 420 and extend down into the washer 426. Thus, the cap is driven through the washer which, being of resilient material, will reduce the shock of engagement when the collar 410 is moved up to cause engagement of the projections 424 with the projections 401 to cause rotation of the screws.

The collar 410 has a peripheral groove 434 which is engaged by two rolls 436 (Fig. 4) one on each branch 438 of a yoke arm 440 the arm being pivoted at 442 (Fig. 9) to a bracket 444 on the frame. On the same pivot as the arm 440 is a lever 446 having branches 448, 450 extending one below and one above the arm 440. A compression spring 452 has its ends seated respectively in the branch 448 and in the arm 440, and through the branch 450 is threaded a screw 454 adjustably to engage the arm 440. The lever 446 is connected by a link 456 to the bar 292.

When, by upward movement of the cylinder 246 (Fig. 2), the two bars 292, 388 are drawn down as described, the lever 446 will move clockwise and, through the spring 452, will lift the arms 438 carrying the rolls 436 and lift the collars 410 which, of course, are being spun by the power connections described, thus causing the engagement of the projections 424 with the projections 401 to spin the screws 398, 398 to move the nuts down and hence the bails 24, 27 to press a shoe upon the inflatable pad 20.

The driving connection between each of the gears 352 and the collars 334 is constituted solely by the projections 362 engaging the corresponding recesses in the collars 334. Accordingly, when sufficient resistance to rotation of the shaft 344 is built up by the pressure applied to the shoe, which pressure is determined by the spring 338, the collar 334 will begin to slip with respect to the gear 352, causing the projections to slip partly out of the recesses and consequently to move the collar 334 down and hence the arm 320 up. This movement of the levers 320, 321 brings the surfaces 330 (Fig. 9) thereon into engagement with the shoulders 329 and positively turns the arms 446 counterclockwise and presses the screws 454 against the yoke arms 440 to move the projections 424 out of engagement with the projections 401. As the latch 316 moves upward with the lever 320, the projection 323 thereon engages a stop screw 458 which releases the latch and allows the lever to be returned by a reseating of the recess upon the projection 362 under the impulse of the spring 338. It is to be understood that the projections 362 never leave their recesses because the lower end of the collar 334 will engage the rim of the cup 340 before the projections 362 move entirely out of their respective recesses.

On each side of each of the ratchet wheels 400 is a pawl 460 (Fig. 5) pivoted at 462 to the frame and urged by a spring 464 toward the ratchet wheel. Each pawl carries a roll 466 having a beveled lower end 468 which coöperates with a beveled corner 470 of the cap 420. When the caps are lifted to cause engagement of the projections 424 with the projections 401, the bevels 470 engage the bevels 468 and move the pawls away from the ratchets while the screws are being turned. When the caps move down to disengage the teeth, the rolls are released and the springs 464 push the pawls into engagement with the ratchets to prevent reverse movement of the

screws. Each pair of pawls is differentially arranged so that practically no reverse movement of the screws can occur. When the right-hand lever 321 (Fig. 2) moves up, it lifts an arm 472 of an angle lever pivoted at 474 to the frame, causing the other arm 476 to pull on the rod 60 and release the gage latch 48.

After placing the sole upon the pad 20, the operator depresses the treadle 80 to allow the gages to engage the sole, the bar 32 controlling the gages being locked by the latch 48. Should it be desirable to release the gages, the operator may depress the knob 57 which releases the latch. He will then operate the treadle again to bring the gages in. The operator next places a shoe on the sole, the shoe being located relatively to the sole by the gages. Then, by grasping the handle 25 (Fig. 1) he swings the bail 24 toward him and locates the heel abutment 23 over the cone of the last. This movement of the bail 24, as in the machine of the application referred to, locates the forepart abutment 26 over the toe portion of the shoe.

To initiate the action of the screws 398 to apply preliminary pressure to the shoe by drawing down the bails 24, 27, the operator depresses a treadle 482 (Fig. 2) to open a valve V-3 the construction of which is identical with the valve V-1 already described. A lever 484 pivoted at 486 to the valve casing is connected by a pin 488 to a depending link 490, the link and lever being sustained by a tension spring 492 connected to the pin 488 and to the frame. The lower end of the link has a hook engaging a pin 494 on a treadle lever pivoted at 496. Upon depression of the treadle the pin 494 pulls on the link 490, causing the lever to engage the plunger 72 of the valve and open it. Further depression of the treadle causes a strut 497 on the treadle lever to push the hook of the link 490 off the pin 494, releasing the valve and permitting it to close. As the treadle rises, a leaf spring 498 insures that the hook of the link 490 will again engage the pin 494 as the treadle rises. The valve V-3 (Fig. 11) is supplied with air under pressure by the pipe 116 and, upon opening of the valve, the air passes through a pipe 500, a check valve CV-1 and pipe 502 to a pilot valve PV-1. Several of these valves are used in the system so that a description of one will suffice.

The valves PV-1, PV-2 and PV-3 are of identical construction and each comprises a casing 504 (Fig. 11) having three chambers 506, 508, 510, a portion 512 of the casing separating the chambers 506, 508, and a septum 514 separating the chambers 508, 510. The chamber 506 is cylindrical and contains a piston 516 connected to a plunger 517 which passes tightly through the portion 512 and loosely through the septum. Below the septum is a disk 518 on the plunger which, when the plunger is raised, closes the opening in the septum. The plunger and piston are normally raised by a compression spring 520 between the casing and the disk 518. The plunger has a hole 522 through it which alines, when the valve is closed, with two passages in the portion 512, one communicating with the outside of the casing and the other with the chamber 508 so that air from a pipe 524 may be exhausted through the passages alined with the hole 522. When the valve is open, the hole is out of line with the passages and air entering the chamber from the pipe 526 may pass through the septum to the pipe 524 leading to a distributor 530 but not through the hole 522. From the distributor a pipe 532 leads to a check valve CV-2, opening in the direction of the arrow to a pipe 534 leading to pilot valve PV-2. From the pipe 534 to the distributor is a restricted by-pass 536. A pipe 538 from the distributor leads to a check valve CV-3 which opens only in the direction of the arrow and prevents air from passing through it to a pipe 540 leading to pilot valve PV-3. However, air may pass slowly through a restricted by-pass 542 to the pipe 540. By this arrangement the pilot valve PV-2 will be opened immediately after pressure occurs in the distributor and the opening of the pilot valve PV-3 will be delayed. Opening of the pilot valve PV-2 allows pressure to flow from a pipe 544 leading to the reservoir 108 to the pipe 204 leading to the cylinder 194 the piston 206 of which will move to the right (Fig. 7), first shifting the collar 156 to the left to cause the gears 146, 150 to drive the sprocket 154 in a direction to turn the shaft 344 (Fig. 9) in a direction to run the nuts 392 down to apply pressure to the shoe and, when the movement of the slot 216 on the pin 218 (Fig. 6) is taken up, to shift the roll 224 on the lever 220 to its upper position, thus opening the valve V-2 and admitting air from the pipe 250 to the pipe 248 to actuate the cylinder 246 and pull down the bars 292, 398, thus causing engagement of the projections 424 with the projections 401 to cause rotation of the screws 398 in a direction to move the nuts 392 down.

When the nuts have been screwed down hard enough to cause the projections 362 (Fig. 9) to move partly out of their recesses in the collar 334, the lever 332, 320 is actuated to move the bar 292 up, and the bar 398 is also actuated at about the same time by the lever 321 of the duplicate mechanism. Thus, the projections 401, 424 will be disengaged and the latches 316 released. At the same time an upward pull will be given by the lever 320 to a Bowden cable 544 attached to the lever and leading to an inflation valve V-4. This valve is like the valves V-1 and V-3. The cable 544 is guided through brackets 546, 548 (Fig. 2) and connected at 550 to a lever 552 fulcrumed at 554 and having a projection 556 overlying the plunger 72 of the valve V-4. A pull on the cable swings the lever 552 clockwise to open the valve V-4 which is then locked in open position by a latch 558 having a fixed pivot at 560. The latch is impelled downwardly by a tension spring 562 connected to it and to a fixed lug 564. When the valve is opened by the pull of the cable, the latch engages a shoulder 568 on the top of the lever 552. By this time enough air has passed through the restricted by-pass 542 to open the pilot valve PV-3 so that air can pass from the pipe 112 through the valve V-4 to a pipe 569 leading through a check valve CV-4 to the pilot valve PV-3 and thence by a pipe 570 to the inflatable pad 28 under the shoe.

Should it be desirable for any reason to close the valve V-4, it may be done by depressing the knob 57 on the rod 56 which at its lower end is pivoted to an arm 571 of an angle lever pivoted at 572 and having another arm pivoted at 574 to a bar 575. The bar is slotted at 576 to receive a pin 578 on an arm 580 depending from the latch 558 so that movement of the bar to the right by depression of the knob 57 will lift the latch 558 and allow the valve V-4 to close.

It is desired that the shoe may remain under pressure for a predetermined time. Therefore, a pipe 582 connected to the piston chamber 508 of the pilot valve PV-1 leads to a needle valve 584 located in a position to be conveniently

adjusted by the operator by turning a thumb head 506. When, after a predetermined time, sufficient air has passed through the needle valve to allow the spring 520 to close the pilot valve PV–1, air in the distributor 530 will pass through the hole 522 in the plunger 517. Exhaustion of air from the distributor allows the operating pressure in the pilot valve PV–3 to exhaust quickly through the check valve CV–3. This causes pilot valve PV–3 to close but, since this valve is like PV–1, the air from the pad will exhaust from the pipe 570 through the valve PV–3. The operating pressure of the valve PV–2 will exhaust slowly since it must pass through the restricted by-pass 536 and not through the check valve CV–2. When later the pilot valve PV–2 closes, air from the cylinder 194 can pass through the pipe 204 and out through the exhaust passage of PV–2. This allows the compressed spring 196 to react and first move the collar 156 (Fig. 7) to connect the gears 148, 150 to the drive shaft 140 and cause the sprocket 154 to turn in a direction to move the nuts 392 up and relieve pressure on the shoe. Later the downward movement of the link 214 (Fig. 6), due to further expansion of the spring 192, will shift the roll 224 into the position shown in Fig. 6, thereby opening the valve V–2 which will be held open by the latch 240. Air will pass through the valve to operate the cylinder 246 which, of course, will pull down the bars 292, 308 again and connect the screws 398 with the spinning shafts 344. The nuts will thus be moved up as far as they can go, causing the projections 362 to actuate the levers 320, 321 to raise the bars 292, 308. Raising of the bars 292, 308 causes the screws 454 on the arms 450 of the levers 446 to depress the yoke arms 438 and disengage the projections 424 from the projections 401. Upward movement of the levers 320, 321 will release the latches 316. When the cylinder 246 reaches nearly the upper end of its upward movement, it hits the screw 244 and releases the latch 240. The automatic valve V–2 will then close and air in the cylinder will pass out through the passage 262 of that valve.

The pad may be deflated at any time by depressing a knob 598 of a valve V–5. Opening of this valve allows the operating pressure of the pilot valve PV–1 to pass quickly through the valve from a pipe 590 connected to the pipe 582 leading to the needle valve.

Near the end of the operation of the machine the inflating valve should be closed and, to protect the inflatable pad as well as the operator, it should be impossible to inflate the bag when no shoe is in the machine or when the abutments are up. For this purpose mechanism shown in Fig. 3 is provided. A projection 592 on one of the nuts 392, when near its raised position, engages the end portion of a lever 594 fulcrumed at 595 on a bracket 598 fixed to the strut 394. The outer end of the lever 594 has pivoted thereto a link 600 which is pivoted at 602 to a lever 604 fulcrumed at 606 on the bracket 598. The inner end of the lever 604 is in the path of the projection 592 and the outer end of the lever 604 is depressed by a compression spring 607 located between the lever and a projection 608 on the bracket 598. The outer end of the lever 604 is connected to a Bowden cable 610 guided in a sleeve 612 supported on the bracket 598 and extending down (Fig. 2) to the bar 575 to which it is connected. Therefore, when the nut 392 (Fig. 3) approaches its upper position, it will engage the lever 594 and move it to cause the link 600 to rock the lever 604 and pull up on the cable 610 to release the latch 558 of the valve V–4, whereupon the valve will be closed by its spring.

Should the nuts 392 be run down, when no shoe is in the machine, beyond their position where the abutments 23, 26 usually engage a shoe, the projection 592 on the nut will engage the lever 604 directly and actuate it to pull on the cable 610 to release the valve V–4 should it be open.

The operation of the machine will now be reviewed with particular reference to the diagram of Fig. 11. Assuming the motor 164 to have been started by operating a switch 612 (Fig. 1), the pump 100 will be supplying air to the tank 108 and the shafts 344 will be turning in a direction to run the nuts 392 up. Assuming further that the treadle 60 has been depressed to open valve V–1 and cause the bar 32 to be moved down and held by the latch 48, thus allowing the gages to engage a sole placed on the pad 20, a shoe has been placed on the sole and located, the bails 24, 27 have been swung into their dotted line position (Fig. 2) over the last and shoe, and the treadle 482 has been depressed momentarily to open the valve V–3 and introduce a shot of air into the chamber 506 of the pilot valve PV–1. Thus, air under pressure is allowed to pass from the pipe 526, through PV–1 to pipe 524, and to the distributor 530, from which it is passed quickly through check valve CV–2 to the pilot valve PV–2, allowing air pressure to pass from the pipe 544 to the pipe 204 and move the piston 206 toward the right, first to shift the reversing mechanism (Fig. 7) into position to drive the shaft 344 in the direction to screw the nuts down and then to open the automatic valve V–2 and allow air pressure to pass from the pipe 250 through the valve to the flexible pipe 248 and thence to the cylinder 246 to cause it to move up, this being the stage of operation indicated in the diagram (Fig. 11). As the cylinder 246 moves up, the catches 284 engage the lugs 290 to pull down the bars 292, 308, the nuts 392 being thus run down to apply pressure to the shoe. Meantime enough air has passed through the restricted by-pass 542 to open pilot valve PV–3. When the pressure on the shoe is sufficient to cause the projections 362 to move partly out of their recesses, the levers 320, 321 are operated to unclutch the shafts 344 from the screws, the lever 320 operating the cable 544 to open the valve V–4 and allow air pressure to pass from the pipe 112 through the valve V–4, the pipe 569, check valve CV–4 and the already open pilot valve PV–3 to the pipe 570 leading to the inflatable pad 20. At the same time the lever 321, similar to 320, operates the angle lever 472, 476 to pull on the rod 60 and release the latch 48 so that the gages will be withdrawn.

The shoe is now under sole-attaching pressure which should remain on for a time sufficient to enable an operator to put a shoe under pressure on the other side of the machine, for example ten seconds. This time is predetermined by the setting of the needle valve 584 connected by the pipe 582 to the chamber 506 of the pilot valve PV–1. When enough of this pressure on the piston 516 leaks through the needle valve 584, the valve PV–1 closes, allowing the pressure in the distributor 530 to exhaust through it. When this occurs, the operating pressure on pilot valve PV–3 quickly exhausts through the check valve CV–3, allowing the pad 20 to deflate through pilot valve PV–3. The operating pressure on pilot

valve PV–2 slowly passes through the restricted passage 536 and, when PV–2 closes, the pressure in the cylinder 194 exhausts through it, allowing the spring 196 to react and operate the lever 174, 210 counterclockwise first to restore the reversing mechanism to its original position and then opening the automatic valve V–2 to cause operation of the cylinder 246 which operates the levers 280, 306 to pull down the bars 292, 308 and clutch the shafts 344 to the screws to run the nuts up. When the nuts reach the upper limit of their movement and thus offer resistance to the rotation of the screws, the projections 362 will slip partially out of their recesses, thus causing operation of the levers 320, 321 to disconnect the shafts 344 from the screws 398. Meantime the projection 592 has operated the lever 594 to unlatch the valve V–4 and allow it to close.

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 machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging the shoe, a screw and nut for each abutment relative rotation of which operates the abutments to apply pressure to the shoe on the pad, power-operated means for relatively rotating the screw and nut, manually operated means for initiating action of the power-operated means, and means for disconnecting the power-operated means when the pressure on the screws reaches a predetermined amount.

2. In a machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw associated with each nut, relative rotation of the screws and nuts operating the abutments to apply pressure to the shoe on the pad, power-operated means for relatively rotating the screws and nuts, manually controlled means for initiating action of said power-operated means, and means controlled by the applied pressure for rendering the power-operated means inoperative.

3. In a machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw associated with each nut, a pair of shafts alined with said screws, power-operated means for rotating the shafts, clutches for connecting the shafts to the screws, operator-controlled means for engaging the clutches, means operated by resistance of the screws to rotation by said clutches for disengaging the clutches, and means operating after a dwell for a predetermined time to cause reversal of the shafts and re-engagement of the clutches.

4. In a machine for applying pressure to shoes, the combination of a pad, an abutment for engaging the shoe, a nut connected to the abutment, a screw associated with the nut rotation of which applies pressure to the shoe, a shaft associated with the screw, operator-controlled means for connecting the shaft and screw, and means responsive to the applied pressure for automatically disconnected the shaft and screw when the pressure applied reaches a predetermined amount.

5. In a machine for applying pressure to shoes, the combination of a pad, an abutment for engaging the shoe, a nut connected to the abutment, a screw associated with the nut, rotation of said screw applying pressure to the shoe, a power-operated shaft associated with the screw, operator-controlled means for connecting the shaft and screw, means for automatically disconnecting the shaft and screw when the pressure applied reaches a predetermined amount, and a timing valve acting after a predetermined time to cause reversal of the shaft and rotation of the screw in the opposite direction to relieve the pressure.

6. In a machine for applying pressure to shoes, the combination of a pad, an abutment for the shoe, means comprising a screw and nut for moving the abutment toward the shoe to apply pressure thereto by relative rotation of the nut and screw, a rotating shaft, connections from the shaft to effect relative rotation of the nut and screw, power-operated means for rotating the shaft in either direction, operator-controlled means for initiating the pressure-applying operation, means dependent on resistance of the shoe to further pressure for rendering the shaft inoperative, and automatic means for reversing the rotation of the shaft and rendering it again operative to relieve the pressure.

7. In a machine for applying pressure to shoes, the combination of a pad, an abutment for engaging a shoe on the pad, a screw and nut relative rotation of which operates the abutment to apply pressure to the shoe, power-operated means for relatively rotating the screw and nut, ratchet and pawl means to prevent reverse relative rotation of the screw and nut, and manually operated means for initiating the action of said power-operated means.

8. In a machine for applying pressure to shoes, the combination of a pad, an abutment for engaging a shoe on the pad, a screw and nut relative rotation of which operates the abutment to apply pressure to the shoe, power-operated means including a clutch for relatively rotating the screw and nut, manually operated means for initiating the action of the power-operated means, means responsive to resistance of the shoe to the pressure applied for rendering the power-operated means inoperative, and means rendered operative by disconnecting the clutch to prevent reverse relative rotation of the screw and nut.

9. In a machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw associated with each nut, rotation of the screws operating the abutments to apply pressure to the shoe, power-operated means for rotating the screws, manually operated means for initiating the action of said power-operated means, and means for preventing reverse rotation of the screws.

10. In a machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging a shoe on the pad, a nut for each abutment, a screw associated with each nut, a pair of shafts alined with said screws, power-operated means for rotating the shafts, clutches for connecting the shafts to the screws, operator-controlled means for engaging the clutches, means operated by resistance of the screws to rotation by said clutches for disengaging the clutches, and means operating upon disengagement of the clutches for holding the screws from reverse rotation.

11. In a machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw associated with each nut rotation of which applies pressure to the shoe,

a power-operated shaft associated with each screw, operator-controlled means for connecting the shafts and screws, means for automatically disconnecting the shafts and screws when the pressure applied reaches a predetermined amount, pawl means preventing reverse rotation of the screw, and means acting after a predetermined time for reversing the shafts, and releasing the pawl means whereby the screws are rotated in the opposite direction to relieve the pressure.

12. In a machine for applying pressure to shoes, the combination of a pad, an abutment for engaging a shoe on the pad, means comprising a screw and nut for relatively operating the abutment and pad to apply pressure to the shoe, power-operated means for relatively operating the screw and nut to move relatively the abutment and pad, manually operated means for initiating the action of said power-operated means, means responsive to resistance of the shoe to the pressure applied for rendering the power means inoperative, and means operating automatically after a predetermined time for causing the power-operated means to reversely relatively operate the screw and nut to relieve pressure on the shoe.

13. In a machine for applying pressure to shoes, the combination of a pad, an abutment for engaging a shoe on the pad, a nut connected to the abutment, a screw associated with the nut rotation of which applies pressure to the shoe, a power-operated shaft associated with the screw, operator-controlled means for connecting the shaft and screw, means for automatically disconnecting the shaft and screw when the pressure applied reaches a predetermined amount, means for reversing the direction of rotation of the shaft, and means operating after a predetermined time dwell to operate said reversing means and said means for connecting the shaft and the screw.

14. In a machine for applying pressure to shoes, the combination of an inflatable pad, a valve for controlling inflation of the pad, an abutment for engaging a shoe on the pad, a nut movable with the abutment, a screw for operating the nut, and means engaged by the nut when it is fully raised or when the abutment is moved down beyond the position where it would engage a shoe if a shoe were in the machine to cause the valves to close.

15. In a machine for applying pressure to shoes, the combination of an inflatable pad, a valve for controlling admission of fluid to the pad, a latch for holding the valve open, an abutment movable to press the shoe upon the pad, and connections between the abutment and the latch for releasing the latch when the abutment is raised.

16. In a machine for applying pressure to shoes, the combination of an inflatable pad, a valve for controlling admission of fluid to the pad, a latch for holding the valve open, an abutment movable to press the shoe upon the pad, and connections between the abutment and the latch whereby when the abutment is moved down beyond shoe-engaging position the latch is released.

17. In a machine for applying pressure to shoes, the combination of a pad, an abutment for the shoe, a nut connected to the abutment, a screw engaging the nut for moving the abutment toward the shoe to apply pressure thereto by rotation of the screw, a rotating shaft, releasable connections from the shaft to the screw to effect rotation of the screw, power-operated means for rotating the shaft in either direction, operator-controlled means for causing connection of the shaft to the screw, and means dependent on resistance of the shoe to further pressure for disconnecting the shaft.

18. In a machine for applying pressure to shoes, the combination of a pad, an abutment for a shoe on the pad, a nut connected to the abutment, a screw engaging the nut for moving the abutment toward the shoe to apply pressure thereto by rotation of the screw, a rotating shaft, a clutch for connecting the shaft to the screw, power-operated means for rotating the shaft, operator-controlled means for engaging the clutch to initiate the pressure-applying operation, means dependent on the resistance of the shoe to further pressure for disconnecting the clutch, and automatic means for reversing the rotation of the shaft and operating said clutch-engaging means to relieve the pressure.

19. In a machine for applying pressure to shoes, the combination of a pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw for each nut, rotation of the screws operating the abutments to apply pressure to the shoe, a pair of power-operated shafts, a clutch for each shaft for connecting it to one of the screws, manually controlled means for causing the clutches to engage the screws, and means responsive to resistance of the screws to being turned by the clutches as the pressure on the shoe increases for disconnecting the clutches.

20. In a machine for applying pressure to shoes, the combination of an inflatable pad, an abutment for engaging a shoe on the pad, means comprising a screw, a nut for relatively operating the abutment and pad to apply pressure to the shoe, power-operated means for relatively operating the screw and nut to move relatively the abutment and pad, and means controlled by the pressure applied to the shoe for causing inflation of the pad.

21. In a machine for applying pressure to shoes, the combination of an inflatable pad, an abutment for engaging a shoe on the pad, means comprising a screw and nut for relatively operating the abutment and pad to apply pressure to the shoe, power-operated means for relatively operating the screw and nut to move relatively the abutment and pad, manually operated means for initiating the action of the power-operated means, and means for disconnecting the power-operated means and for causing inflation of the pad.

22. In a machine for applying pressure to shoes, the combination of an inflatable pad, an abutment for engaging a shoe on the pad, means comprising a screw and nut for relatively operating the abutment and pad to apply pressure to the shoe, power-operated means for relatively operating the screw and nut to move relatively the abutment and pad, manually controlled means for initiating the action of said power-operated means, and means responsive to resistance of the shoe to the pressure applied for rendering the power means inoperative and causing the inflation of the pad.

23. In a machine for applying pressure to shoes, the combination of an inflatable pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw associated with each nut, rotation of the screws operating the abutments to apply pressure to the shoe, power-operated means for rotating the screws, manually operated means for initiating the action of said power-operated means, and means operating after a predetermined pres-

sure has been applied to the shoe for causing the inflation of the pad.

24. In a machine for applying pressure to shoes, the combination of an inflatable pad, a valve controlling admission of fluid pressure to the pad, a pair of abutments for engaging the shoe on the pad, a nut connected to each abutment, a screw associated with each nut, a pair of shafts alined with the screws, power-operated means for rotating the shafts, clutches for connecting the shafts to the screws, operator-controlled means for engaging the clutches, and means operated by resistance of the screws to rotation by said clutches for disengaging the clutches and opening the valve.

25. In a machine for applying pressure to shoes, the combination of an inflatable pad, a pair of abutments for engaging a shoe on the pad, a nut connected to each abutment, a screw associated with each nut, rotation of the screws applying pressure to the shoe, a shaft associated with each screw, operator-controlled means for connecting the shafts and screws, means for automatically disconnecting the shafts and screws when the pressure applied reaches a predetermined amount, and means responsive to said disconnection for causing inflation of the pad.

26. In a machine for applying pressure to shoes, the combination of an inflatable pad, an abutment for engaging a shoe on the pad, a nut connected to the abutment, a screw associated with the nut, rotation of the screw applying pressure to the shoe, a shaft associated with the screw, operator-controlled means for connecting the shaft and screw, means for automatically disconnecting the shaft and screw when the pressure applied reaches a predetermined amount, means responsive to such disconnection for inflating the pad, means acting after a predetermined time to deflate the pad, and automatic means for reversing the shaft and again operating said shaft and screw-connecting means to relieve pressure on the shoe.

27. In a machine for applying pressure to shoes, the combination of an inflatable pad, a pair of abutments for a shoe on the pad, means comprising a screw and nut for moving each abutment toward the shoe to apply pressure thereto by rotation of the screw, means responsive to pressure on the shoe for limiting said pressure and causing inflation of the pad, means operating after a predetermined time to exhaust the pad, and reverse the screws to relieve the pressure of the abutments on the shoe.

28. In a machine for applying pressure to shoes, the combination of an inflatable pad, a valve controlling its inflation, an abutment for a shoe on the pad, means comprising a screw and nut for moving the abutment toward the shoe to apply pressure thereto by relative rotation of the nut and screw, a rotating shaft, connections from the shaft to effect relative rotation of the nut and screw, power-operated means for rotating the shaft, operator-controlled means for initiating the pressure-applying operation, and means dependent on resistance of the shoe to further pressure for rendering the shaft inoperative and opening said valve to cause inflation of the pad.

29. In a machine for applying pressure to shoes, the combination of an inflatable pad, an abutment for a shoe on the pad, means comprising a screw and nut for moving the pad toward the shoe to apply pressure thereto by relative rotation of the nut and screw, a rotating shaft, disconnectible connections from the shaft to effect relative rotation of the nut and screw, power-operated means for rotating the shaft in either direction, operator-controlled means for initiating the pressure-applying operation, a lever, means dependent on resistance of the shoe to further pressure for operating said lever to disconnect the shaft, means operated by said lever for causing inflation of the pad, means for causing deflation of the pad after a predetermined time, and means operating thereafter to reverse said shaft and cause it again to relatively operate the nut and screw to move the abutment away from the shoe.

30. In a machine for applying pressure to shoes, the combination of a pad, an abutment for pressing a shoe upon the pad, fluid-pressure-controlled power-operated means for moving the abutment first in one direction to press the shoe upon the pad and then in the other to release the pressure, a pilot valve opened by pressure fluid and closed by a spring, the valve when open permitting passage of pressure fluid through it to cause the operation of the power-operated means to apply pressure to the shoe and when closed permitting exhaust of such fluid to cause reverse operation of the power-operated means to release the pressure on the shoe, operator-controlled means for admitting opening pressure to the pilot valve, and a timing valve controlling the release of opening pressure on the pilot valve, leakage of pressure fluid through the timing valve causing after a predetermined time reduction of opening pressure on the pilot valve, exhaust of fluid pressure through the pilot valve causing reverse actuation of the abutment by the power-operated means.

31. In a machine for applying pressure to shoes, the combination of a pad to receive a shoe, an abutment for pressing a shoe on the pad, a screw for operating the abutment, a power-driven shaft, means for reversing the direction of rotation of the shaft, a spring, fluid-pressure-operated means for operating the reversing means against said spring to tension it, an automatic valve, fluid-pressure-operated means for connecting the shaft to the screw, means for opening the automatic valve, after the reversing means is operated, to cause connection of the shaft to the screw, means for latching the automatic valve open, means for releasing the latch after the screw and shaft are engaged, and means dependent on pressure applied to the shoe for releasing the shaft from the screw, said spring when released acting to reverse the direction of rotation of the shaft and again opening the automatic valve to cause operation of the fluid-pressure-operated means for connecting the shaft to the screw reversely to turn the screw and relieve the pressure on the shoe.

32. In a machine for applying pressure to shoes, the combination of an inflatable pad to receive a shoe, an abutment for pressing the shoe upon the pad, fluid-pressure-controlled power-operated means for moving the abutment first in one direction to press the shoe upon the pad and then in the other to relieve the pressure and move the abutment away from the shoe, first, second and third pilot valves each opened by fluid pressure and closed by a spring, each valve when open permitting passage of pressure fluid through it and when closed permitting exhaust of the fluid that has been passed through it, manually controlled means for operating the first pilot valve to apply pressure to the second and third,

a first check valve permitting quick passage of pressure fluid to the second pilot valve, a restricted by-pass around the first check valve, a second check valve opposed to the passage of fluid to the third pilot valve, a by-pass around the second check valve allowing slow passage of fluid to the third pilot valve, quick passage of pressure fluid to the second pilot valve opening that pilot valve to cause operation of the abutment to apply pressure to the shoe, means operation of which is controlled by pressure applied to the shoe for permitting passage of fluid through the third pilot valve which meantime has been opened by passage of fluid through the by-pass around the second check valve to inflate the pad, and a needle valve for controlling pressure on the first pilot valve which after a predetermined time releases the pressure on all the pilot valves, the pressure on the third pilot valve passing quickly through the second check valve and causing deflation of the pad, and the pressure on the second pilot valve exhausting slowly through its by-pass and causing release of the abutment after the pad has been deflated.

33. In a machine for applying pressure to shoes, the combination of an inflatable pad to receive a shoe, an abutment for pressing a shoe upon the pad, a screw for operating the abutment, a power-operated shaft for turning the screw, a spring, fluid-pressure-operated means for reversing the direction of rotation of the shaft and compressing the spring, fluid-pressure-operated means for connecting the shaft to the screw, first, second and third pilot valves, an automatic valve, an inflating valve, manually controlled means for opening the first pilot valve to apply pressure to open the second and third pilot valves, a first check valve permitting quick passage of pressure fluid to the second pilot valve, a restricted by-pass around the first check valve, a second check valve opposed to the passage of fluid to the third pilot valve, a by-pass around the second check valve allowing slow passage of

fluid to the third pilot valve, quick passage of fluid to the second pilot valve opening it to supply fluid to the means for reversing the shaft, operation of the reversing means opening the automatic valve to supply fluid to the means for connecting the shaft and screw, means operation of which is controlled by pressure applied to the shoe for disconnecting the shaft and screw and opening the inflating valve to permit passage of fluid through the third pilot valve which meantime has been opened by the passage of fluid through the by-pass around the second check valve, a needle valve for controlling pressure on the first pilot valve which after a predetermined time releases the pressure on all the pilot valves, the pressure on the third pilot valve passing quickly through the second check valve causing deflation of the pad, and the pressure on the second pilot valve exhausting slowly through its by-pass and allowing reaction of the spring to operate the reversing means and then open the automatic valve to operate the means for connecting the shaft and screw to operate the screw in the reverse direction to release the pressure, and means operated by the screw to cause closing of the inflation valve.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
118,185	Blaney	Aug. 22, 1871
130,185	Perkins et al.	Aug. 6, 1872
1,427,940	Blake	Sept. 5, 1922
2,125,930	Lancaster	Aug. 9, 1938

FOREIGN PATENTS

Number	Country	Date
564,101	Germany	Nov. 14, 1932
679,207	France	Jan. 6, 1930