

May 28, 1940.

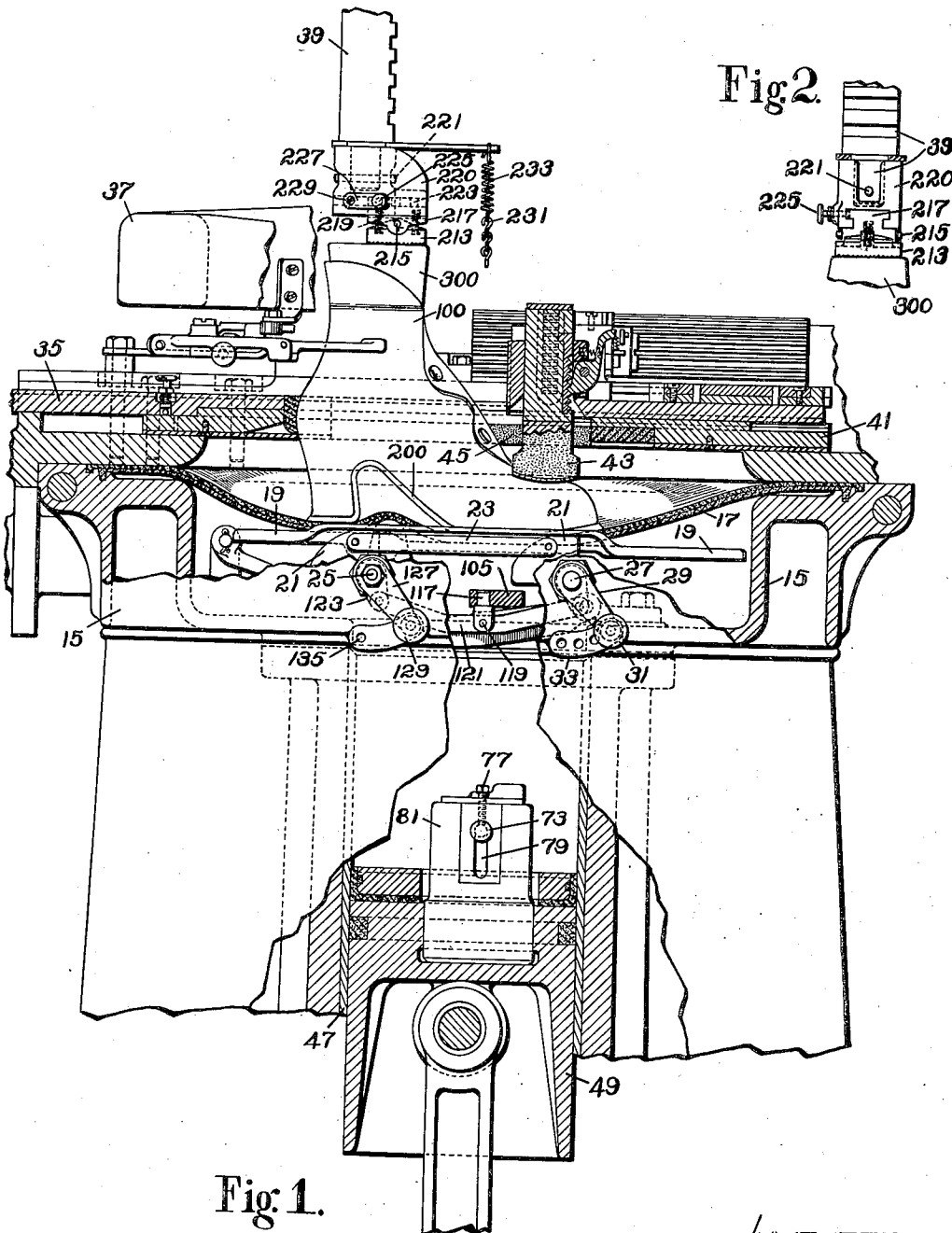
S. J. FINN

2,201,996

SOLE LAYING MACHINE

Filed April 4, 1938

6 Sheets-Sheet 1



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6 Sheets-Sheet 2

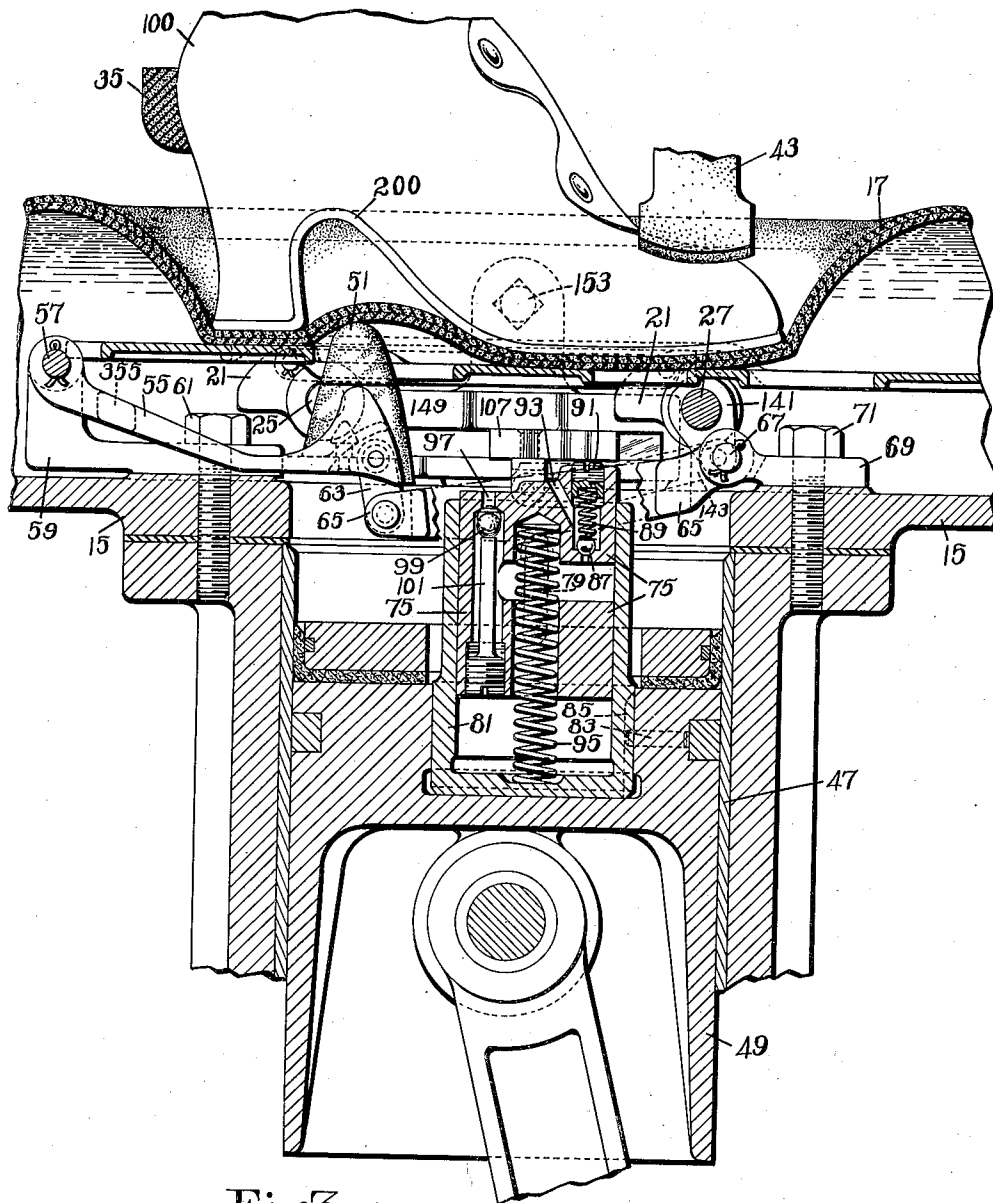


Fig. 3.

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6 Sheets-Sheet 3

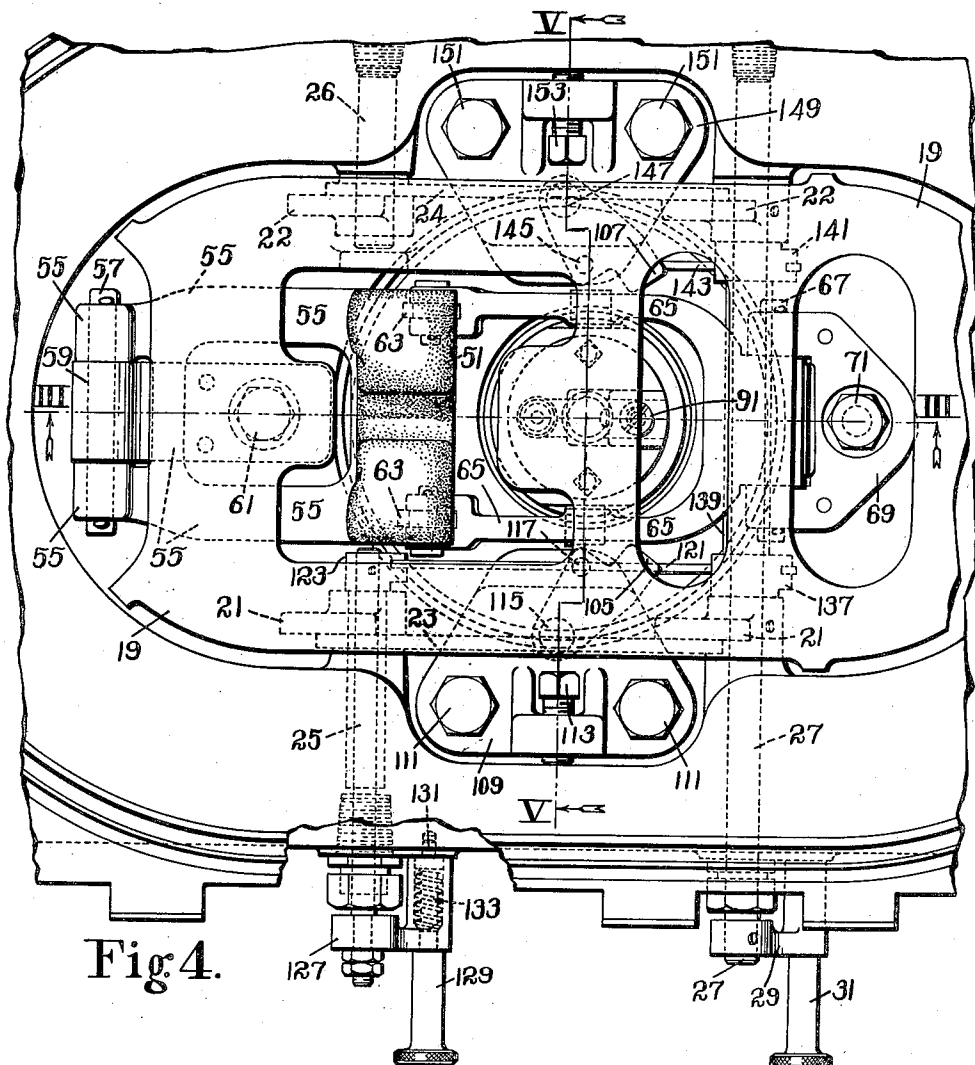


Fig. 4.

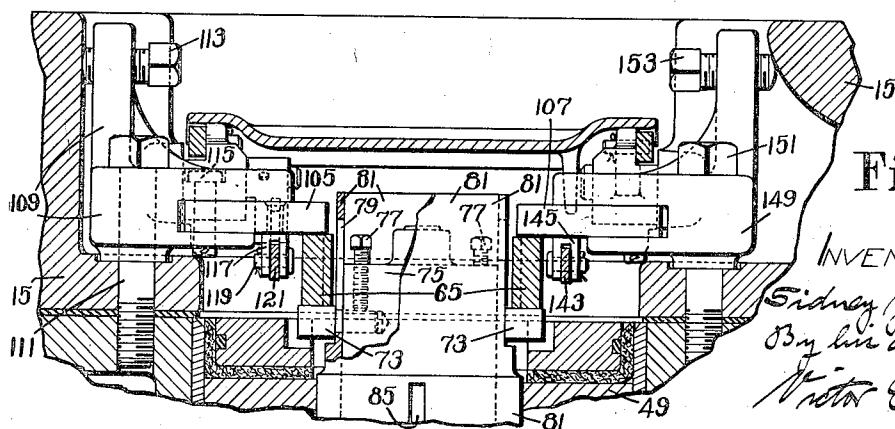


Fig. 5.

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6 Sheets-Sheet 4

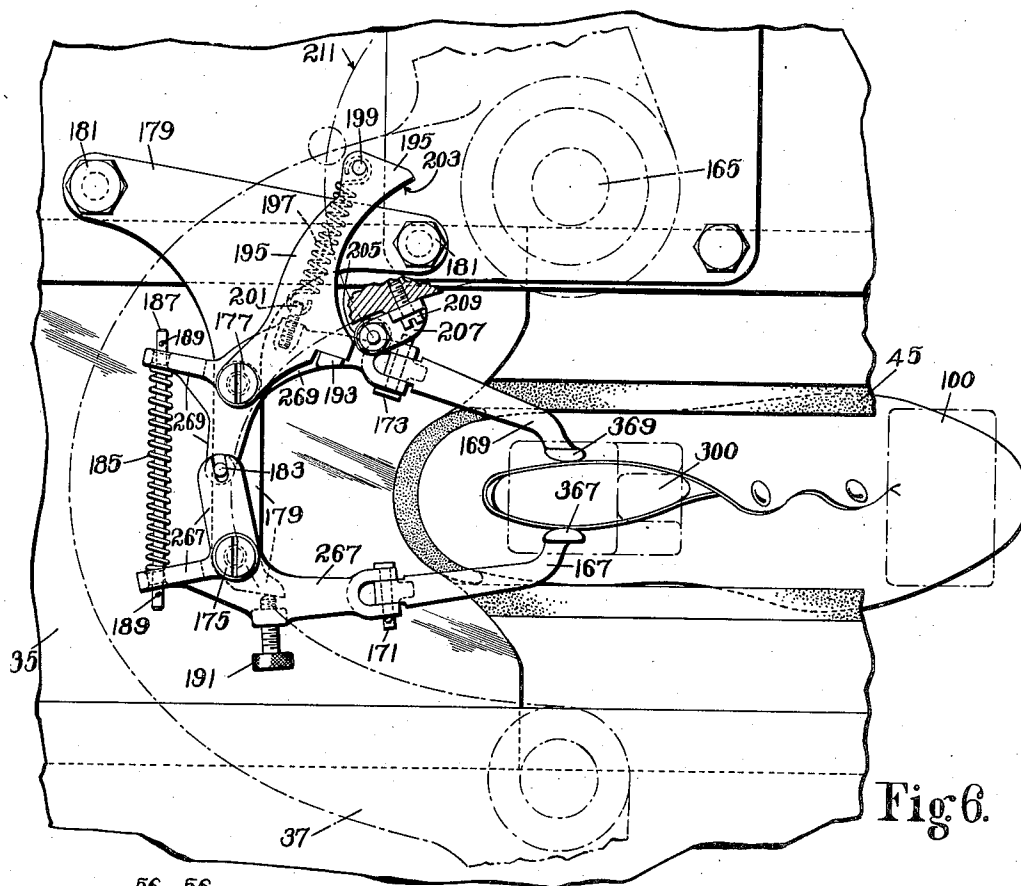


Fig. 6.

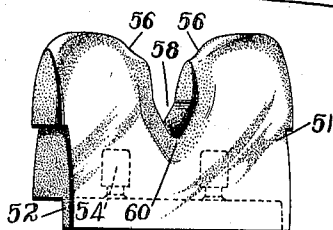


Fig. 10.

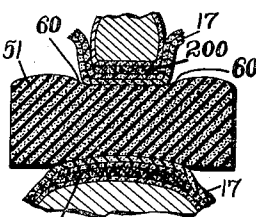


Fig. 9.

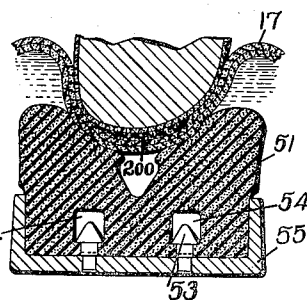


Fig. 8.

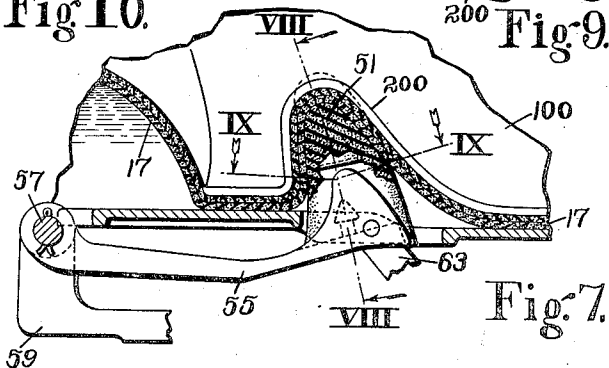


Fig. 7.

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SOLE LAYING MACHINE

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6 Sheets-Sheet 5

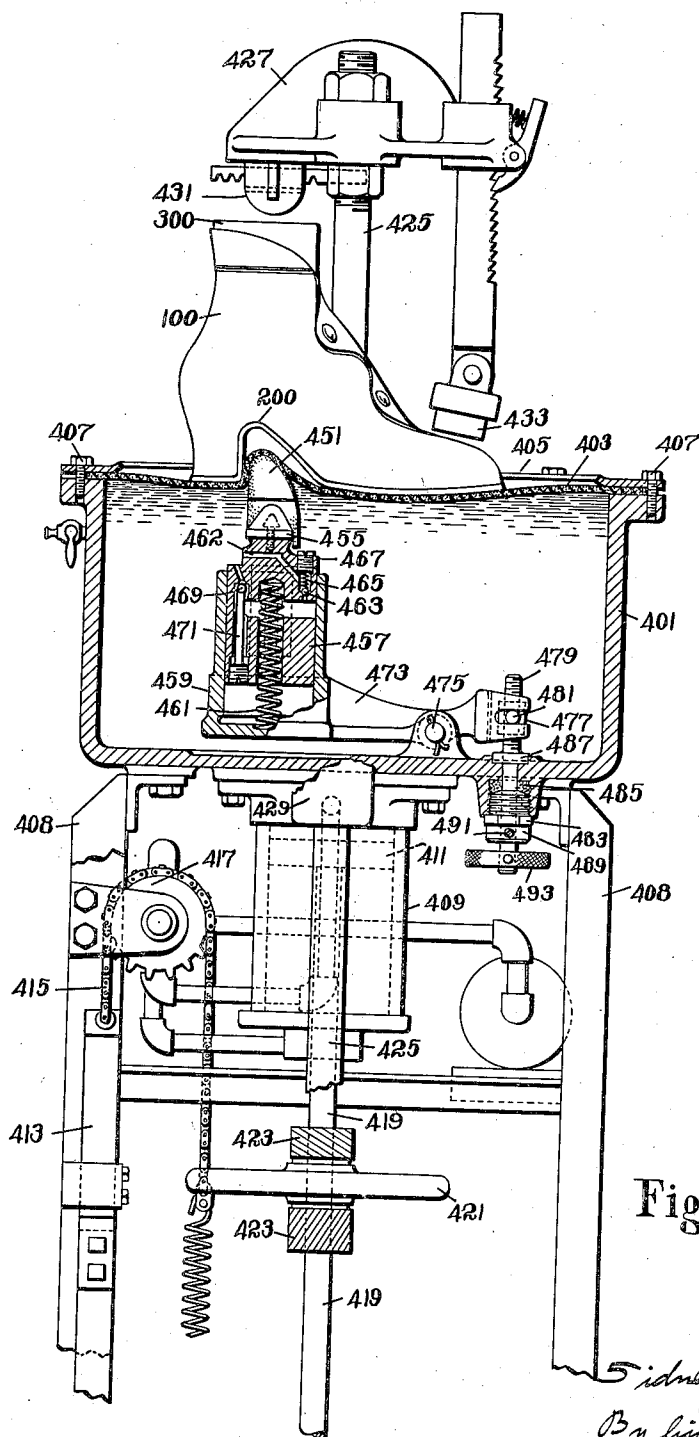


Fig. 11.

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SOLE LAYING MACHINE

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6 Sheets-Sheet 6

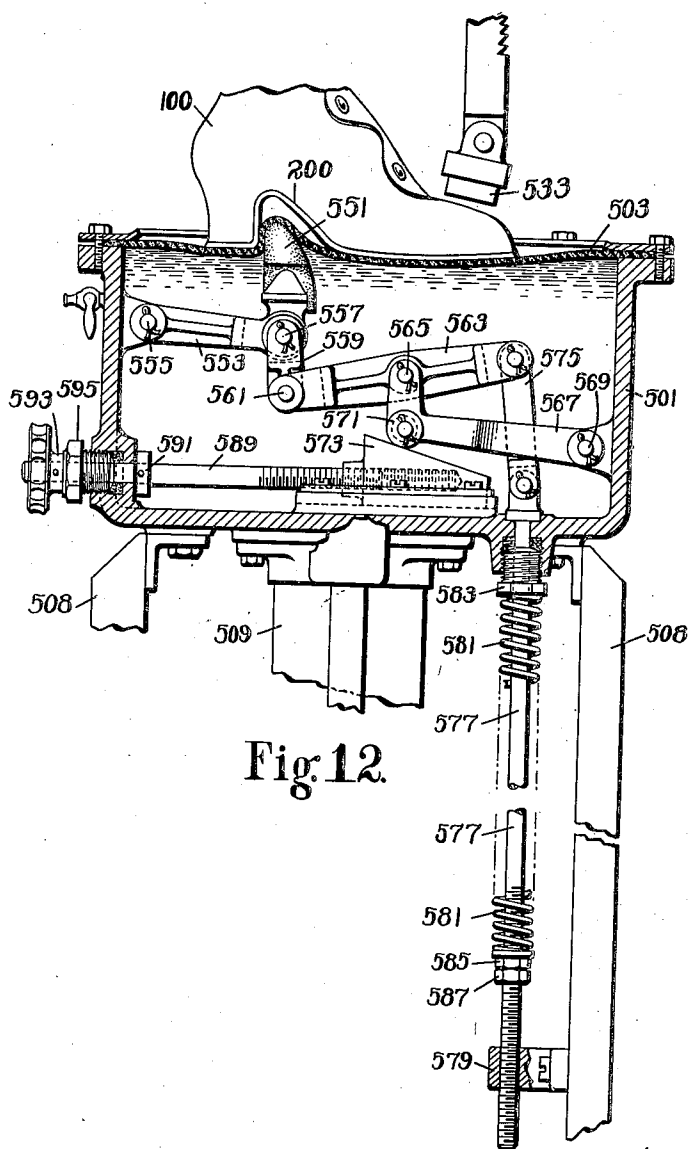


Fig. 12.

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UNITED STATES PATENT OFFICE

2,201,996

SOLE LAYING MACHINE

Sidney J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

Application April 4, 1938, Serial No. 199,794

48 Claims. (Cl. 12—33)

This invention relates to sole laying machines and is herein illustrated as embodied in a machine for laying or pressing an unvulcanized rubber sole upon the bottom of a lasted shoe.

In the manufacture of shoes having rubber soles it has been customary to employ machines having a pressure box or chamber for fluid one wall of which comprises a flexible rubber diaphragm, the shoe being supported against pressure exerted through the diaphragm upon the sole which is to be laid or pressed. In general such machines are of two types. In one type the volume of fluid in the box is constant, the fluid pressure necessary to distend the diaphragm being secured by relative movement of approach of the jack and the pressure box. In the other type, fluid is forced into the pressure box to distend the diaphragm. In either case, however, fluid pressure is applied through the diaphragm to the sole of the shoe.

Unvulcanized rubber soles commonly extend over the heels of the shoes to which they are attached, and the proper laying of the shank portions of the soles of high arched shoes presents difficulties which increase with the increase in the heights of the arches. When the arch of a shoe is high, a force of considerable magnitude must be applied to that portion of the diaphragm which bridges the arch from the bottom of the heel to the ball line of the shoe. It is difficult, if not impossible, to apply a force of sufficient magnitude by fluid pressure against the diaphragm, since there is danger that the diaphragm, which must be sufficiently flexible and whose strength is therefore limited, may burst at some locality, for example where it is forced up around the edge of the bottom of the shoe. Aside from this danger there is another circumstance which limits the fluid pressure which can be applied through the diaphragm, namely the liability of distorting the sole at localities other than the shank.

According to one feature of the present invention, means are provided for exerting, upon the shank portion of the sole, a force of comparatively great magnitude independent of the magnitude of the pressure of fluid exerted through the diaphragm against the remaining portions of the sole. In the illustrated construction, a shank presser is located beneath the diaphragm and is adapted to exert pressure upon the shank portion of the sole by reason of relative movement of approach between the shank presser and the shoe, the presser being adapted to yield when a certain predetermined pressure has been exerted by it

and to maintain this pressure substantially uniform during its yielding movement.

When pressure is applied to the bottom of a lasted shoe supported against such pressure by a jack or other support which engages the top of the last, there is a liability that the shoe may not be placed properly in the machine and may tip sidewise during the application of pressure. In order to avoid such an occurrence there is provided in accordance with another feature of the invention mechanism for sustaining the shoe against tipping. In the illustrated construction two supporting members are provided above the diaphragm between which a shoe is thrust when it is presented to the machine, these members being adjustable toward and from each other to provide for shoes of different sizes.

These and other features of the invention including certain details of construction and combinations of parts will be described as embodied in an illustrated machine and pointed in the appended claims.

Referring to the accompanying drawings,

Fig. 1 is a view partly in front elevation and partly in section of a machine in which the invention is embodied;

Fig. 2 is a detail in elevation of a portion of the jack post and the adjustable member carried by it for engaging the top of a last;

Fig. 3 is a vertical section upon an enlarged scale of a portion of the machine after the piston has begun its upward movement to force fluid into the pressure box;

Fig. 4 is a plan of that portion of the machine which is below the diaphragm;

Fig. 5 is a section on the line V—V of Fig. 4;

Fig. 6 is a view looking down upon the top of the machine, with the jack carrier shown in dot-and-dash lines, said figure showing more particularly the mechanism for preventing tipping of the lasted shoe;

Fig. 7 is a detail partly in section and partly in elevation showing the diaphragm distended and the shank presser in process of pressing the shank portion of the sole into place;

Fig. 8 is a section on the line VIII—VIII of Fig. 7;

Fig. 9 is a section on the line IX—IX of Fig. 7;

Fig. 10 is a perspective of the pad which forms the shank presser;

Fig. 11 is a view partly in front elevation and partly in section of a modified form of the invention embodied in a type of machine in which the volume of fluid in the pressure box is constant; and

Fig. 12 is a view similar to Fig. 11 of a second modification.

The general construction and mode of operation of the machine of Figures 1 to 10 is similar to that of the machine of United States Letters Patent No. 1,920,977, granted August 8, 1933, upon an application filed in my name; and before what is new is described a brief description of what is old will be given. Referring to Fig. 1 the machine comprises a pressure box 15, the upper wall of which is a flexible diaphragm 17 herein illustrated as consisting of two layers of rubber. Inside the box is a plate 19 supported by two pairs of cams 21, 22 all four cams being shown in dotted lines in Fig. 4, the two members of each pair being connected respectively by links 23, 24. The left-hand cam 21 is loose on a sleeve, which is integral with the hub of a small arm 123, said sleeve being mounted on a rockshaft 25. The left-hand cam 22 (Fig. 4) is loosely mounted on a horizontal stud 26 carried by the pressure box. The right-hand cam 21 and the right-hand cam 22 are pinned to a rockshaft 27. The rockshaft 27 protrudes through a wall of the box 15 and has fast to it the upper end of a crank 29 the lower end of which has slidably mounted in it a spring-pressed handle 31 provided at its inner end with a locking pin which, when the handle is pulled out and swung to the left, may be caused to enter any one of a plurality of holes in a stationary member 33. It is thus possible to adjust the plate 19 into various vertical positions so as to determine the vertical position of the shoe when it is placed upon the diaphragm preparatory to being operated upon. The plate adjusting mechanism differs slightly from the corresponding mechanism of the patented machine but forms no part of the present invention.

A lasted shoe 100, with an unvulcanized rubber sole 200 properly located on its bottom as indicated in Fig. 1, is placed upon the diaphragm with its rear end against the rubber covered edge of a rear plate 35. A treadle is then depressed, whereupon the following movements take place. A jack carrier 37, which carries a jack post 39, swings horizontally to bring the jack post above the top of the last; a toe plate 41, which carries a toe pad 43, moves in; and two side plates, the rubber covered edge of one of which is shown at 45, move into contact with or close to the sides of the shoe, and at the same time the toe pad 43 moves down into engagement with the top of the toe portion of the shoe. The parts of the machine are then in the positions shown in Fig. 1, and act both to hold the shoe against upward pressure presently to be applied and to afford a support for the marginal portions of the diaphragm which is about to be distended and wrapped about the lower part of the shoe. A fluid pressure device such as a water pump comprising a cylinder 47 and a piston 49 now acts to force water under pressure into the pad box to cause the diaphragm to press the sole against the shoe. The pressure, which can be regulated, is maintained for a short interval and then the piston moves away from the diaphragm to withdraw fluid from the pressure box; the side plates are withdrawn; the toe pad is lifted; the toe plate is withdrawn, and the jack carrier swings to one side to remove the jack post from above the top of the last. The shoe is now removed, another one put in place, and the machine is caused again to go through its cycle of movements. The stroke of the piston 49 is always the same, but the max-

imum pressure of the fluid in the box can be regulated, fluid being allowed to escape into a reservoir when the desired maximum predetermined pressure has been reached. No further description of what is old will be given, reference being made to the patent for details not herein described.

In the illustrated shoe, which is a women's gum gaiter having a high arch, the pressure applied to the forepart and to the heel end of the sole should be of the order of twenty pounds or less per square inch, since any markedly greater pressure is liable to distort the sole, for example by stretching it up about the rear edge of the heel. In this same shoe, however, the pressure necessary to lay the shank portion of the sole properly should be of the order of several times that which is necessary to lay the heel and forepart portions. The present invention as has been stated provides a construction whereby a pressure of comparatively great magnitude may be applied to the shank portion of the sole independent of the magnitude of the fluid pressure applied to the remaining portions of the sole.

To this end a shank presser in the form of a rubber pad 51 (Figs. 7 to 10) located beneath the diaphragm 17 is adapted to be pushed up into the arch at the shank portion of the shoe. This pad is preferably of resilient material such as rubber and of the shape shown best in Fig. 10, its forward end at the lower portion being formed with a downwardly extending flange 52 to fit over a shoulder formed at one end of an arm 55 which is provided with upturned sides to form a sort of socket to engage the ends of the pad. The pad is removably fastened in the socket so that it may readily be replaced. To this end the stems of studs 53, which have cylindrical portions surmounted by conical heads the bases of which are of greater diameter than that of the cylindrical portions, are riveted to the arm 55; and the pad 51 is provided in its lower part with two sockets each consisting of a small chamber 54 the diameter of which is approximately equal to the diameter of the bases of the conical heads of the studs 53. From the bottom of each chamber leads a hole having a flaring mouth, the diameter of the main portion of each hole being approximately equal to or slightly less than the diameter of the cylindrical portions of the studs 53. Since the pad is made of elastic material, it can readily be put in place by placing it with the flaring mouths of the holes over the tops of the conical heads of the studs 53 and exerting a downward pressure; and it can be removed by pulling it up. The pad (Fig. 10) is formed with two upstanding projections, the tops of which slope inwardly as indicated at 56 to the upright walls of an opening or notch 58. On that side of the pad which, when the pad is in the machine, presses the diaphragm against the breast of the heel of the shoe, there is a depression 60 along the edges of the notch or opening 53. Referring now to Figs. 8 and 9, which show the pad in the position it occupies when it is pressed into the arch of a shoe, Fig. 9 shows how the breast of the heel is received in the depression 60 so that the opposite edges of the sole 200 are firmly pressed against the corners of the breast of the heel. Fig. 8 shows how the pad is compressed until the pad exerts a pressure upon the greater part of the width of the sole, there being only a small area along the longitudinal middle of the sole where the diaphragm is not receiving pressure from the pad. As the pad

is forced up, the bottom of the shoe (covered of course by the diaphragm) encounters first the sloping surfaces 56 the area of which is comparatively small; but as the pressure increases the pad is deformed, as shown in Fig. 8, until the sole from its opposite edges to a narrow locality at its longitudinal middle is receiving pressure from the pad applied to all points in directions which are substantially perpendicular to the sole at those points.

The outer end of the arm 55 (the left-hand end as viewed in Fig. 4) is pivoted about a pin 57 carried by a bracket 59 which is fastened to the pressure box by a cap screw 61. The arm 55 is connected at its inner end by two links 63 with the ends of the arms of a yoke 65 the base of which is pivoted about a horizontal pin 67 carried by a bracket 69 which is fastened to the pressure box 15 by a cap screw 71. With this construction the shank presser may be swung up by swinging up the yoke 65 about its pivot 67 to cause the shank presser 51 to lay the shank portion of the sole.

The yoke is so swung up when the piston 49 of the pump moves up to force fluid into the pressure box and thereby to distend the diaphragm. In Fig. 3 the piston has begun its upward movement; the diaphragm is being distended, and the shank presser 51 is being moved up into the arch of the shoe but as yet has encountered little resistance. The yoke 65 is swung up by two pins 73, both shown in Fig. 5, which are held in sockets at opposite sides of a small plunger 75 by set screws 77, said pins extending through vertical slots 79 in a small cylinder 81 in which the plunger 75 is mounted. This small cylinder rests in a cylindrical socket formed in the top of the piston 49 of the pump and is held from turning by a pin 83 (Fig. 3) which extends into a vertical groove 85 formed in the wall of the cylinder 81. There is at all times in the cylinder 81 in the space beneath the plunger 75 a quantity of fluid, the amount varying according to the position of the plunger in the cylinder; and this fluid, which is trapped in the cylinder, causes the plunger to move up when the cylinder is moved up until the pressure of fluid rises to such a point that a relief valve 87 backed by a compression spring 89, the tension of which can be varied by a screw 91, is opened to permit fluid to flow from the cylinder 81 through a port 93 into the pressure box 15. Thus, as the piston 49 arises and carries with it the cylinder 81, the two pins 73 swing up the yoke 65 until the shank presser 51, through the diaphragm 17 has pressed the shank portion of the sole against the bottom of the shoe with sufficient force to raise the pressure of fluid in the cylinder 81 to a point at which the relief valve 87 is opened. With a shoe of the type illustrated, the compression spring 89 would be set to hold the valve 87 closed until a pressure of say 200 pounds per square inch had been reached by the fluid in the cylinder 81.

Assuming that the area of the end of the plunger 75 is five square inches, then the pressure on the lever would be one thousand pounds per square inch. The leverage is such that about five hundred pounds would be exerted by the shank presser upon the bottom of the shoe; and assuming that the area of contact of the presser and the diaphragm is about three square inches, the shank presser would exert about one hundred and sixty-six pounds per square inch. The maximum pressure of fluid in the pressure box

15, due to the rise of the piston 49, is regulated by varying the tension of a spring upon a valve, as in the patented machine and as described in detail in United States Letters Patent No. 1,902,399, granted March 21, 1933, upon an application filed in my name; and the pressure in the pressure box would be set in the present case at twenty pounds or less per square inch. It will be understood that the figures given above as to the magnitude of the pressure exerted by the fluid in the box and by the shank presser are not asserted to be accurate and have been given merely to illustrate that the two pressures may differ greatly in magnitude and that the pressure of the shank presser may be varied independently of that of the fluid in the pressure box.

It should be particularly noted that the plunger 75 which supports the shank presser is rigid with its cylinder 81 and does not yield with respect to it until the pressure of fluid in the cylinder 81 has risen to a predetermined magnitude such that the relief valve 87 opens; and that during the whole extent of the relative movement between the plunger 75 and the cylinder 81 the magnitude of this pressure remains uniform, being determined by the adjusted force exerted by the spring 89 on the relief valve 87.

When the relief valve 87 opens, some of the fluid in the cylinder escapes into the pressure box 15 through the small port 93. In order to raise the plunger with respect to the cylinder 81 so as to draw fluid into the cylinder 81 when the piston 49 of the pump moves down to withdraw fluid from the pressure box, the plunger is supported by a coiled spring 95 and is provided with an inlet port 97 controlled by a check valve 99 supported upon the upper end of the stem of a screw 101 which is threaded into a portion of the plunger. In the position of parts shown in Fig. 3, this valve is still open because the pressure of fluid in the cylinder 81 and in the ports and chambers in the piston 75 is the same as or differs very little from that in the pressure box. As soon, however, as the pressure of fluid in the cylinder 81 rises to any considerable extent over that in the pressure box 15 the check valve 99 will be closed and will remain closed during the application of pressure to the shoe. When the cylinder 81 is carried down with the piston 49, the valve 99 will open and permit fluid to flow into the cylinder 81. When the piston 49 comes to rest in its lowest position (Fig. 1), although some fluid has been withdrawn from the pressure box 15 to relieve the pressure on the diaphragm, there is a considerable amount of fluid in the lower portion of the box, and the cylinder of the pump above the piston is filled with fluid. Consequently, when the piston 49 starts its upward movement, the space below the plunger 75 in the cylinder 81 and the various ports and openings in the plunger are full of fluid.

Since in laying soles on shoes which have low arches, for example, tennis shoes, no shank presser is necessary, it is desirable to provide means for rendering it inoperative when desired. To this end, the illustrated machine is provided with two latches 105, 107 (Figs. 4, 5) which may be swung into positions respectively above the arms of the yoke 65 to prevent this yoke from being swung up. When these latches have been swung into operative position as shown in Fig. 5, the upward movement of the plunger 75 is arrested when the pins 73 encounter the under sides of the arms of the yoke 65, the yoke itself

being prevented from swinging up by the latches. The cylinder 81 can continue to move up because of the slots 79 through which the pins 73 project; and, when this upward movement of the cylinder raises the pressure of fluid within this cylinder sufficiently, the relief valve 87 (Fig. 3) opens. When the shank presser is being used, the latches 105, 107 occupy their inoperative position (Fig. 4) but at any time when the pump piston 49 is down at the end of a cycle of movement, these latches may be swung into their operative positions (Fig. 5) and the shank presser thereby rendered inoperative. The latch 105 (Figs. 4, 5) extends into a slot in a heavy bracket 109 fastened to the pressure box support by cap screws 111, said bracket having an upwardly extending portion through which passes a screw bolt 113 which is threaded through said portion and engages a wall of the pressure box so as to brace the bracket against the upward push of the yoke 65 when the latch is in the operative position shown in Fig. 5. The latch 105 is pivoted at its outer end to the bracket about a vertical stud 115. Near its inner end the latch has rotatably mounted in it the stem of a small yoke 117 between the arms of which a horizontal pivot 119 holds the middle portion of a bent link 121 (Fig. 1). This link is pivoted at its left-hand end to the small arm 123, the hub of which has integral with it a sleeve, said hub being pinned to the inner end of the rockshaft 25 which is mounted in bearings in the pressure box 15. This rockshaft (Fig. 4) extends out through a wall of the pressure box and has fast to it the upper end of a crank 127 the lower end of which carries a handle 129 having at its inner end a pin 131. The handle is horizontally slidable in the crank 127, being normally held in its innermost position by a spring 133 with the pin 131 in a hole in a stationary member; but the handle may be pulled out at any time and swung to the left (Fig. 1) until the pin is in register with a second hole 135 into which it is thrust by the spring when the handle 129 is released. When the handle is so swung to the left, the latch 105 is swung from its inoperative position (Fig. 4) to its operative position (Fig. 5); and the other latch 107, through various connections, is also swung in the same manner. To this end, the right-hand end of the bent link 121 (Fig. 4) is pivoted to a small arm 137 the hub of which has integral with it one end of a sleeve 139 with the other end of which is integral the hub of another short arm 141, the hubs of the two small arms 137, 141 and the sleeve 139 being mounted for rocking movement on the rockshaft 27. To the short arm 141 is pivoted one end of a link 143, the other end of which is pivoted between the arms of a small yoke 145 (Fig. 5) the vertical stem of which is rotatably carried by the latch 107 in the same manner that the small yoke 117 is carried by the latch 105. The latch 107 is mounted in a manner similar to that of the latch 105. It extends into a slot in a heavy bracket 140 which is held in place by cap screws 151 and pressed by a set screw 153. With the above construction, when it is desired to render the shank pressing device inoperative, the handle 129 (Fig. 1) is pulled out and swung to the left until the pin at its inner end is opposite the hole 135 whereupon the handle is released. When this has been done the latches 105, 107 have been swung into their operative positions (Fig. 5) in which they arrest the upward movement of the plunger 75 when the pins 73 which

project from the sides of the plunger and extend through the slots 79 in the cylinder 81 engage the yoke 65. As the piston 49 of the pump continues its upward stroke the cylinder 81 rises with the piston, and when the pressure of fluid inside the cylinder rises sufficiently the valve 87 opens and permits fluid to escape.

When pressure is applied to the bottom of a lasted shoe supported against such pressure by a jack or other member which engages the top of the last, there is a liability that the shoe may not be placed properly in the machine and may tip sidewise when pressure is applied. In order to facilitate proper placing of the shoe in the machine prior to the application of pressure and to support the shoe against sidewise tipping during the application of pressure, there is provided a device for this purpose. The machine, as has been explained, is provided with a jack carrier 37 (Fig. 1) which carries the jack post 39. Referring to Fig. 6, this jack carrier is mounted to swing about a vertical pivot 165 as in the patented machines and is automatically swung during the operation of the machine first to bring the jack post 39 into operative position above the top of the last 300 prior to the application of pressure to the sole of the shoe; and, after the pressure has been withdrawn, it is swung to inoperative position so as to permit the finished shoe to be removed and another shoe placed in the machine. In Figs. 1 and 6 the jack carrier 37 is shown in its operative position in which the jack post 39 is above the top of the last. The shoe locating and supporting device comprises two arms 167, 169 which are opened when the jack carrier 37 is swung into inoperative position and are caused to move toward each other until there is a proper space between them when the jack carrier is swung into operative position. These arms are pivoted respectively to arms 267, 169 about horizontal pivots 171, 173 so that the enlarged ends 367, 369, which engage the shoe, may partake of the slight up-and-down movement of the shoe and may therefore not be liable to drag over the shoe and thereby mar it. The arms 267, 269 are pivoted respectively about the stems of screws 175, 177 which are threaded into a stationary bracket 179 fastened to the frame of the machine by cap screws 181. The arm 267 has a notch in its rear end to receive a pin 183 carried by the rear end of the arm 269 so that the arms are geared together and are compelled to swing equally in opposite directions; and the arms have rearwardly projecting tails which are continually urged to move apart by a coiled spring 185 surrounding a rod 187 which passes loosely through openings in the tails and is held in place by cotter pins 189. A set screw 191 which passes through a lug on the arm 267 engages the end of the bracket 179 and limits the extent of approach of the shoe engaging members 367, 369. In the position of parts shown these members are engaging the sides of a shoe. After the shoe has been operated upon, the jack carrier will be swung to the left (Fig. 6) about its pivot 165 to move the jack post 39 to one side so as to permit removal of the shoe, and this swinging of the jack carrier opens the arms 167, 169 so as to facilitate such removal. In order to cause such opening of the arms as well as to permit the arms to be opened by hand at any time if desired, the arm 269 is provided with a lug 193 which is engaged by an arm 195, said arm being pivoted about the stem of the screw 75

177 and being connected with the arm 269 by a tension spring 197 the upper end of which extends about a pin 199 driven into the arm 195 and the lower end of which extends through the eye of an eyebolt carried by the arm 269. The arm 195 is provided with a curved cam surface 203 which forms a track for a cam roll 205 rotatably mounted in a small bracket 207 which is fastened to the jack carrier 37 by a screw 209, the path of bodily movement of the axis of the roll 205 being shown in Fig. 6 by the dot-and-dash line 211. The spring 197 is stronger than the spring 185. Consequently when the jack carrier 37 is swung to the left about the pivot 165 and the roll 205 moves from its full to its dot-and-dash line position, the arms 167, 169 are opened to permit ready removal of the shoe. When the jack carrier 37 is swung back into the position shown, these arms are swung together into the positions shown so that the upper portion of the shoe may be engaged by them. Inasmuch as the upper portions of shoes differ in width it is necessary that the arms, when their operative ends are nearest to each other, should be the proper distance apart. The adjustment for this is accomplished while the arms 167, 169 are in the position shown by turning the screw 191 to separate the arms.

The jack post 39 (Figs. 1, 2) carries at its lower end a contact block 213 which is pivoted at 215 to a block 217. Two small compression springs 219 are located in sockets in the blocks, one spring at each side of the pivot pin 215, to maintain the operative face of the contact block 213 substantially horizontal when it is not above the top of a last. Otherwise the block might tip and engage the side of the last near the top when the jack carrier 37 was swung into the position shown. The block 217 has an upper end which is T-shaped in cross-section and is slidable horizontally in a suitably shaped guideway formed in a small casting 220, said casting being fastened to the lower reduced end of the jack post 39 by a taper pin 221. In one side of the upper portion of the block 217 is a horizontal row of slots 223 adapted to receive the end of a locking pin 225 which is slidable in a horizontal bore in the casting 220 and is urged inward at all times by a leaf spring 227 the forked right-hand end of which (Fig. 1) engages a collar on the pin and the left-hand end of which is fastened to the casting 220 by a screw 229. The contact member 213 may thus be adjusted horizontally forward and back in the direction of the length of the shoe. This adjustment is particularly desirable when the shank presser is being used, since the contact block 213 can be adjusted into a position to oppose the upward thrust of the shank presser in such manner that the tendency which the shoe would otherwise have to tip up at its toe portion may be counteracted. In fact, it is possible with this adjustable contact member to do away with the use of the toe pad 43 when the shank presser is being used.

In Fig. 11 a modified form of shank pressing mechanism is shown as embodied in a machine in which fluid pressure is applied to a sole on the bottom of a shoe, not by forcing fluid into the pressure box as in the machine of Figs. 1 to 10, but by causing relative movement of approach between the shoe and the pressure box; and in which the shank presser is operated by this relative movement and not as in the machine of Figs. 1 to 6, by a moving part of the machine which is outside the pressure box. The machine, aside from the shank pressing device is or may be sub-

stantially the same as the machine disclosed in United States Letters Patent No. 1,988,772, granted January 22, 1935, upon an application filed in the name of William S. Ashton, except that the patented machine employs two spaced diaphragms both fluid supported, whereas the present machine has a single diaphragm, which may, of course, consist of several layers if desired, the pressure box being indicated at 401 and the diaphragm at 403, said diaphragm being held in place over the open top of the box by an apertured plate 405 and cap screws 407.

Before describing in detail the construction and operation of the shank pressing mechanism, the general construction and mode of operation of what is old will be briefly described. The pressure box is filled to the desired level with a fluid, preferably a substantially incompressible fluid such as water, and the volume of the fluid in the box remains constant during the sole pressing operation. The pressure box 401 is supported upon standards two of which are shown at 408. Bolted to the bottom of the box is a compressed air cylinder 409 in which a piston 411 is slidable. When a treadle (not shown) is depressed to pull down a slide rod 413, a chain 415 rotates a sprocket wheel 417 in one direction, and this acts to turn a valve (not shown) into a position to permit compressed air to be forced into the cylinder above the piston 411 and to connect the space below the piston with the atmosphere. The piston is thus moved down. When the treadle is released, compressed air is forced into the space beneath the piston 411, and the space above it is connected with the atmosphere. The piston is then moved back into the position shown. Threaded on the piston rod 419 is a hand wheel 421 the hub of which is received between cross bars 423 at the lower portion of a vertically slidable frame which includes these two bars, two upright rods 425 and a cross-head 427 which is carried at the upper ends of the rods. These rods are vertically slidable in bearings formed in heavy lugs which are integral with the sides of the pressure box, one of these lugs being shown at 429. The cross-head 427 carries a jack or shoe support having a member 431 which contacts with the top of the last 300 and a toe rest 433 which contacts with the top of the toe portion of the shoe. When now the treadle rod 413 is pulled down to cause the piston 411 to descend, the lasted shoe is pulled down, the water in the pressure box is displaced to an extent; the diaphragm is deformed, and fluid pressure is applied throughout the sole 200 on the bottom of the shoe, the extent to which the piston moves down being adjustably controlled by a stop device (not shown) which is threaded on the lower part of the piston rod 419 and contacts with a part of the frame of the machine. When the treadle rod rises, the parts return to the positions shown. The machine is provided with a pressure gage (not shown) located in a pipe which is connected with the interior of the pressure box so as to indicate the pressure caused by the descent of the shoe, and there may be in this pipe a relief valve which may be adjusted so that a desired maximum pressure can not be exceeded. No further description of the machine as thus far described will be given, reference being made to the patent for details of construction not herein shown or described. It will be understood, however, that the machine outlined above is intended merely as an example of sole-laying machines in which the pressure box contains a predetermined con-

stant volume of fluid, and relative movement of approach between the box and the shoe support causes the diaphragm to be distended and pressed against the bottom of the shoe.

In order to apply to the shank portion of the sole a predetermined pressure which is independent of the pressure of the fluid in the pressure box so that a considerably greater pressure and one of a chosen magnitude can be applied at this locality while maintaining a lower maximum pressure in the box, a shank pressing device similar to that of the machine of Figs. 1 to 10 is employed. A shank pad 451 like that of Figs. 7 to 10 is removably mounted in the same manner upon a carrier 455 of rigid material. This carrier is fast to or integral with the top of a plunger 457 slidably mounted in a cylinder 459, said plunger being supported upon a coiled spring 461. The space in the cylinder beneath the plunger communicates through openings in the plunger with an outlet port 462 controlled by a ball valve 463 held in place by a compression spring 465 the tension of which may be varied by turning a screw 467. This space also communicates with an inlet port controlled by a ball valve 469 supported on the upper end of a screw 471, all of this construction of plunger and cylinder being substantially like the corresponding construction shown in the machine of Figs. 1 to 10. In the machine of Fig. 11, the cylinder 459 has formed integral with it a lever 473 pivoted at a point near its outer end about a pin 475 carried by lugs which are integral with the bottom of the pressure box 401. The outer end of the lever is forked to receive between its arms a nut 477, square in horizontal cross-section, through which is threaded a screw 479. Projecting from opposite sides of the nut 477 are two pins, one shown at 481, which are received in horizontal slots formed in the arms of the forked lever 473. The stem of the screw 479 passes through a hole in the bottom of the box, leakage of water being prevented by a stuffing box the gland 483 of which may be screwed against a packing 485. A collar 487 integral with the screw 479 prevents downward movement of the screw, and an adjustable collar 489 which is held in place against the gland 483 by a set screw 491 prevents upward movement of the screw. When therefore the screw is turned by means of a handhold 493, which is threaded on its lower end and fastened by a set screw, the shank pressing device is raised or lowered.

In the position of parts shown in Fig. 11 before the shoe has been pulled down, the space below the plunger 457 and the channels and passageways in the plunger are full of water since the spring 461 has raised the plunger and thereby drawn water into the cylinder and plunger; and the water in the pressure box is not under pressure. When a shoe 100 is put in place as shown and the jack moves down until the pressure of fluid in the cylinder 459 becomes greater than that in the pressure box, the valve 469 closes. Thereafter, until a certain predetermined pressure (determined by the adjustment of the screw 467) has been attained in this cylinder, the shank pad is rigidly supported. It continues to be so supported, so that the only effect of further pressure of the shoe against the pad is to deform the pad, until the pressure in the cylinder rises to the predetermined pressure and the outlet valve 463 opens to relieve the pressure by allowing fluid to escape into the pressure box. The time at which this predetermined pressure is reached relative to the extent of downward movement of the shoe

may be predetermined by manipulating the screw 479 to cause the shank pad to assume a higher or a lower initial position.

In the operation of the machine the two factors which determine the maximum pressure to be applied to the forepart and heel of the sole, namely the amount of fluid in the pressure box and the extent of downward movement of the jack will be so regulated that the desired maximum pressure of fluid in the box will be attained when the shoe reaches its lowest position; and the valve 463 will be set to open at a predetermined pressure of greater magnitude than that of the maximum fluid pressure attained in the pressure box.

In the embodiments shown respectively in Fig. 1 and in Fig. 11, a uniform pressure of predetermined magnitude is applied to the shank portion of the sole, during relative movement of approach of two parts of the machine one of which is the jack, by means of a fluid-pressure controlled support for the shank presser. In Fig. 12 there is shown a third embodiment of the invention in which the same result is obtained by the use of a spring the length of which is so great relative to the extent to which it is compressed that the magnitude of the force exerted by it during such compression is substantially uniform.

The machine, aside from the means for supporting the shank presser in the pressure box is substantially the same as the machine shown in Fig. 11 and therefore only a small portion of the machine has been shown. The pressure box 501 has a flexible diaphragm 503 extending across its top and is supported on standards two of which are shown at 508. Bolted to the bottom of the box is a cylinder 509 which contains a fluid operated piston which acts to pull down a jack, the toe rest of which is indicated at 533, to force down a lasted shoe 100 having located on its bottom a sole 200 of unvulcanizable rubber. As thus far described the machine is the same as the one shown in Fig. 11 and shown and described in detail in United States Letters Patent No. 1,938,772 referred to above.

A shank presser 551 of rubber and of the same shape as the shank pressers of the machines of Figs. 1 and 11 is mounted at the right-hand end of an arm 553, the left-hand end of which is pivoted about a pin 555 carried by a lug formed on a wall of the pressure box. The arm 553 has at its right-hand end a pivot pin 557 upon which is pivoted the upper end of a link 559, the lower end of which is pivoted at 561 to the left-hand end of a lever 563 which is pivoted at its middle at 565 to the upwardly turned end of an arm 567 pivoted at its other end at 569 to a lug formed on a wall of the pressure box, said arm near its left-hand end carrying a roll 571 which rests upon a wedge 573. The lever 563 at its right-hand end is connected by a link 575 with the upper end of a long rod 577 which passes down through a hole in the bottom of the pressure box and a stuffing box, and the lower threaded end of which passes freely through a guide bore in a lug 579 carried by one of the standards 508. A long heavy coiled spring 581 is confined between the gland 583 of the stuffing box and a nut 585 threaded on the rod 577, a check nut 587 being provided to hold the nut 585 from turning. The wedge 573 is slidable lengthwise of the box and the shoe in a guideway formed in a projection on the lower wall of the box, and this wedge may be adjusted by turning a screw 589 which is threaded into the wedge. The smooth stem of the screw passes through a

hole in a wall of the pressure box and through a second stuffing box, and is held from longitudinal movement by a collar 591 and the hub of a handle 593, both these members being fastened to the stem. The collar engages a boss formed on a wall of the box and the hub engages the gland 595 of the stuffing box.

When now the shoe is pulled down to cause the pressure of fluid in the box to press the sole against the bottom of the shoe, the lever 553 remains stationary until the pressure exerted by the downwardly moving shoe upon the shank presser is sufficient to overcome the resistance of the spring 581, after which the supporting lever 553 and the shank presser move down with the shoe. The extent of this downward movement of the shank presser and its support is small being of the order of about one inch; and, with the connection shown, the spring 581 is compressed only through this small extent. The spring is a heavy one and its length, which may be several feet, is such, in comparison to the extent to which it is compressed, that the pressure exerted by the shank presser from beginning to end of the compression of the spring is substantially uniform. The initial position of the shank presser may be varied by adjusting the wedge 573 to the right or left; and the shank presser may thus be lowered into an inoperative position if desired to provide for shoes having arches so low that no pressure other than that of the fluid in the pressure box is desirable.

Although the invention has been set forth as embodied in machines in which the flexible sole-pressing members are diaphragms constituting one wall of a pressure box containing fluid, it should be understood that the invention is not limited in the scope of its application to the machines which have been shown and described.

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

1. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, means for causing the shank presser to be forced against the diaphragm, and means for varying said force irrespective of the fluid pressure in the box.

2. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, and means for causing the shank presser to be forced against the diaphragm with a force of predetermined and adjustable magnitude irrespective of the fluid pressure in the box.

3. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser and means for causing the presser to press the shank portion of the sole against the shank portion of the shoe, said means including a support for the presser capable of bodily yielding movement, and means for causing the support to prevent such movement until a predetermined pressure is exerted by the presser upon the sole, and for thereafter per-

mitting such movement while maintaining the pressure substantially unchanged.

4. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, and means for causing the presser to press the shank portion of the sole against the shank portion of the shoe, said means including a support for the presser capable of bodily yielding movement, and means for causing the support to prevent such movement until a predetermined pressure is exerted by the presser upon the sole, and for thereafter permitting such movement while maintaining the pressure substantially unchanged.

5. A machine of the class described having, in combination, a fluid supported flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a member, means for producing relative movement of approach between the jack and the member to cause the diaphragm to press the sole against the bottom of the shoe, a shank presser carried by said member and connecting means between said member and presser for causing said presser to exert a pressure of predetermined magnitude when a certain part of said relative movement has taken place and for exerting substantially the same magnitude of pressure during the remainder of said relative movement.

6. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, means for causing relative movement of approach between the presser and the shoe, and means capable of yielding for supporting the presser constructed and arranged to cause a pressure of a predetermined magnitude to be applied by the presser irrespective of the extent of the yielding movement of said supporting means.

7. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, means for causing the presser to press the shank portion of the sole against the bottom of the shoe, said means including a support for the presser which is capable of yielding, means constructed and arranged to cause the presser to exert during the whole of the yielding movement of the support a substantially uniform pressure of predetermined magnitude, and adjusting means for varying the magnitude of the pressure independent of the pressure of fluid in the pressure box.

8. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser mounted in the box for movement toward that wall of the box which is opposite the diaphragm, means for causing relative movement of approach of the shoe and the presser, and means for causing the presser during the whole extent of its movement to exert upon the shank portion of the sole a substantially uniform pressure.

9. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser mounted in the box for movement toward that wall of the box which is opposite the diaphragm, means for causing relative movement of approach between the shoe and the presser, means for causing the presser during the whole extent of its movement to exert upon the shank portion of the sole a substantially uniform pressure, and means for adjusting the presser into different initial positions in the pressure box.
10. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser mounted in the box for movement toward that wall of the box which is opposite the diaphragm, means for causing the presser during the whole extent of its movement to exert upon the shank portion of the sole a substantially uniform pressure, and means for varying the magnitude of the pressure independent of the pressure of fluid in the pressure box.
11. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser located in the pressure box, means for causing the presser to press the shank portion of the sole against the bottom of the shoe, said means including a yielding support for the presser constructed and arranged to cause the presser to exert during the whole of the yielding movement of its support a substantially uniform pressure of predetermined magnitude, and means for adjusting the presser into different initial positions.
12. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, and means for causing it to press the diaphragm against the sole of the shoe, said means including mechanism for supporting the presser against movement with respect to the box until a certain predetermined pressure has been exerted by it and for thereafter permitting it to move while maintaining said pressure substantially unchanged.
13. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser located on the opposite side of the diaphragm from the shoe, a moving part outside the box, and means for actuating the presser from the moving part.
14. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser located on the opposite side of the diaphragm from the shoe, a moving part outside the box, and means including a member capable of yielding for actuating the presser from the moving part.
15. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser located on the opposite side of the diaphragm from the shoe, and means for moving the shank presser toward and from the shoe.
16. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser located on the opposite side of the diaphragm from the shoe, means for moving the shank presser toward and from the shoe, and means for varying the force applied by the presser to the sole.
17. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser located on the opposite side of the diaphragm from the shoe, a support for the shank presser which is capable of yielding, and means for moving the support toward and from the shoe.
18. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, and a shank presser the pressure exerted by which is fluid-controlled for exerting pressure through the diaphragm upon the shank portion of the sole.
19. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser the pressure exerted by which is fluid-controlled for exerting pressure through the diaphragm upon the shank portion of the sole, and means for varying the pressure exerted by the shank presser independent of the pressure of fluid in the box.
20. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser and a fluid-controlled member responsive to relative movement of approach between it and the bottom of the shoe for supporting the shank presser.
21. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser and a fluid-controlled member responsive to relative movement of approach between it and the bottom of the shoe for supporting the shank

presser, said member including a cylinder, a plunger, an outlet port connected with the interior of the cylinder beneath the plunger, and a relief valve for permitting escape of fluid from the cylinder.

22. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser and a fluid-controlled member responsive to relative movement of approach between it and the bottom of the shoe for supporting the shank presser, said member including a cylinder, a plunger, an outlet port connected with the interior of the cylinder beneath the plunger, a relief valve for permitting escape of fluid from the cylinder, and means for varying the magnitude of fluid pressure in the cylinder necessary to open the relief valve.

23. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, means for causing the shank presser to press the diaphragm against the shank portion of the sole of a high-arched shoe, and means for rendering the shank presser inoperative when a sole is to be pressed on a low-arched shoe.

24. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, means for operating the shank presser to press the diaphragm against the shank portion of the sole of a high-arched shoe, and a member manipulation of which renders the shank presser operating means ineffective so as to adapt the machine to press the sole on a low-arched shoe.

25. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for forcing fluid into the box to press the diaphragm against the sole, a shank presser, and means operated by the fluid-forcing means for operating the shank presser.

26. A machine of the class described having, in combination, a pressure box one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure exerted through the diaphragm, said machine including a member which moves with respect to the pressure box, a shank presser located on the opposite side of the diaphragm from the shoe, and means for operating the shank presser from the moving member.

27. A machine of the class described having, in combination, a pressure box one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure exerted through the diaphragm, said machine including a member which moves with respect to the pressure box, a shank presser located on the opposite side of the diaphragm from the shoe,

and means carried by the moving member for operating the shank presser.

28. A machine of the class described having, in combination, a pressure box one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure exerted through the diaphragm, said machine including a member which moves with respect to the pressure box, a shank presser, and fluid-controlled means for transmitting movement from the moving member to the shank presser.

29. A machine of the class described having, in combination, a pressure box one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure exerted through the diaphragm, said machine including a member which moves with respect to the pressure box, a shank presser, and fluid-controlled means for transmitting movement from the moving member to the shank presser, said fluid-controlled means comprising a cylinder, a plunger in the cylinder and a valve adapted to permit escape of fluid from the cylinder when a force of predetermined magnitude has been applied to the shank presser.

30. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a shank presser adapted to be forced against the diaphragm by said relative movement, and means for varying said force irrespective of the fluid pressure in the box.

31. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a shank presser located on the opposite side of the diaphragm from the shoe, and means for adjusting the shank presser into different initial positions.

32. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a yielding shank presser adapted to be moved by said relative movement, and means for causing the presser, during the whole extent of its yielding movement, to exert upon the sole a substantially uniform pressure.

33. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a shank presser rendered operative by such relative movement, and fluid-controlled supporting means for the presser constructed and arranged to yield when a certain predetermined pressure has been exerted upon

the sole of the shoe, and to maintain this pressure substantially unchanged during the whole of the yielding movement.

34. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a shank presser located on the opposite side of the diaphragm from the shoe and rendered operative by such relative movement, and means for varying the initial position of said presser.
35. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a shank presser located on the opposite side of the diaphragm from the shoe, and means including a spring for supporting the presser.
36. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, means for causing such pressure by relative movement of approach of the jack and the box, a shank presser located in and movable with respect to the box, and yielding means for supporting the presser including a spring the length of which is sufficiently great in comparison with the extent of the yielding movement of the presser so that the pressure exerted by the presser during the whole of its yielding movement is substantially uniform.
37. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, and means for causing the shank presser to exert pressure against the shank portion of the sole, said means including a rigid supporting member for the presser and a spring for sustaining the supporting member.
38. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser, and means for causing the shank presser to exert pressure against the shank portion of the sole, said means including a rigid supporting member for the presser and a spring for sustaining the supporting member, said spring being of sufficient length in comparison to the extent to which it is compressed as to exert a substantially uniform pressure during its compression.
39. In a sole laying machine having a pressure box for fluid one wall of which comprises a flexible diaphragm, a shank pressing device adapted to press the diaphragm against the shank portion of the sole of a shoe, said device comprising a pad of resilient material mounted on a carrier of rigid material.

40. In a sole laying machine having a pressure box for fluid one wall of which comprises a flexible diaphragm, a shank pressing device adapted to press the diaphragm against the shank portion of the sole of a shoe, said device comprising a pad of resilient material mounted on a carrier of rigid material, the pad having in one of its faces a depression to accommodate the breast of the heel of the shoe.

41. In a sole laying machine having a pressure box for fluid one wall of which comprises a flexible diaphragm, a shank pressing device adapted to press the diaphragm against the shank portion of the sole of a shoe, said device comprising a pad of resilient material mounted on a carrier of rigid material, the pad having spaced projections adapted to engage the diaphragm at localities where the diaphragm overlies opposite edges of the sole.

42. In a sole laying machine in which a carrier for a jack is swung into operative and inoperative position, mechanism for sustaining the shoe against tipping during the subsequent application of pressure, said mechanism comprising two supporting members movable toward and from each other, and means operated by the swinging of the jack carrier to inoperative position for moving the supporting members away from each other and by the swinging of the jack carrier into operative position for moving the supporting members toward each other.

43. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm, a jack for supporting a shoe against pressure applied through the diaphragm, a shank presser located beneath the diaphragm, and means for distending the diaphragm and for causing the presser to press the shank portion of the sole against the shank portion of the shoe, said jack comprising a jack post having at its operative end a last-contacting member adjustable lengthwise of the shoe to balance the shoe against pressure applied by the shank presser.

44. A machine of the class described having, in combination, a flexible member for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the flexible member, a shank presser located on the opposite side of the flexible member from the shoe, means for moving the shank presser toward the shoe, and means for varying the force applied by the presser.

45. A machine of the class described having, in combination, a flexible member for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the flexible member, a shank presser mounted for swinging movement, said shank presser being located on the opposite side of the flexible member from the shoe, and means for swinging the shank presser toward the shoe.

46. A machine of the class described having, in combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser of flexible resilient material adapted to exert pressure entirely across the shank portion of the sole, a driven part of the machine independent of the jack and the pressure box, and means for actuating the presser from the driven part.

47. A machine of the class described having, in combination, a pressure box for fluid one wall of

which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser of resilient material adapted to exert pressure entirely across the shank portion of the sole, a driven part of the machine independent of the jack and the pressure box, and means including a yielding member for actuating the presser from the driven part.

48. A machine of the class described having, in

combination, a pressure box for fluid one wall of which comprises a flexible diaphragm for pressing a sole against the bottom of a shoe, a jack for supporting the shoe against pressure applied through the diaphragm, a shank presser of resilient material adapted to exert pressure entirely across the shank portion of the sole, and means for moving the shank presser toward and from the shoe.

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