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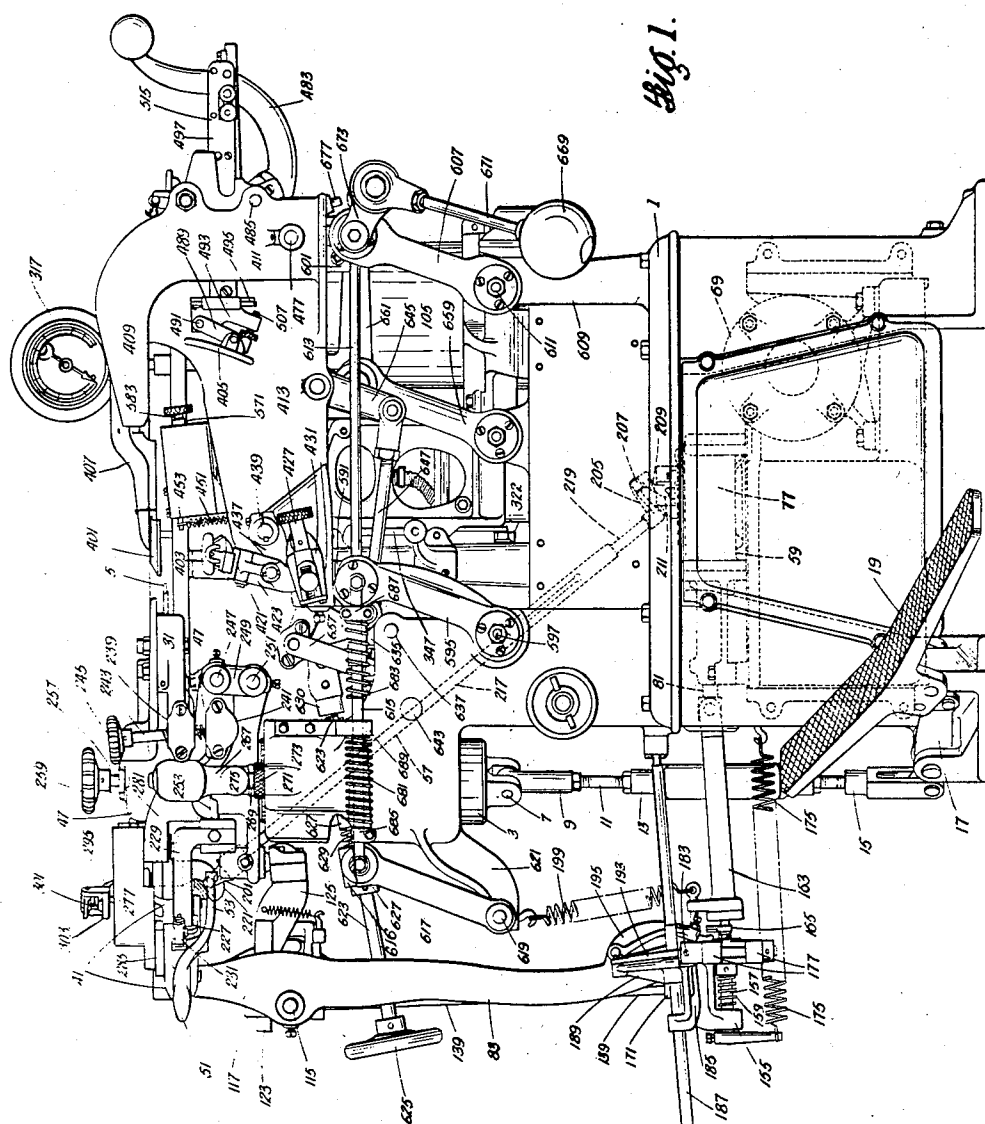
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2,097,567

LASTING MACHINE

Filed June 23, 1936

6 Sheets-Sheet 1



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LASTING MACHINE

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6 Sheets-Sheet 2

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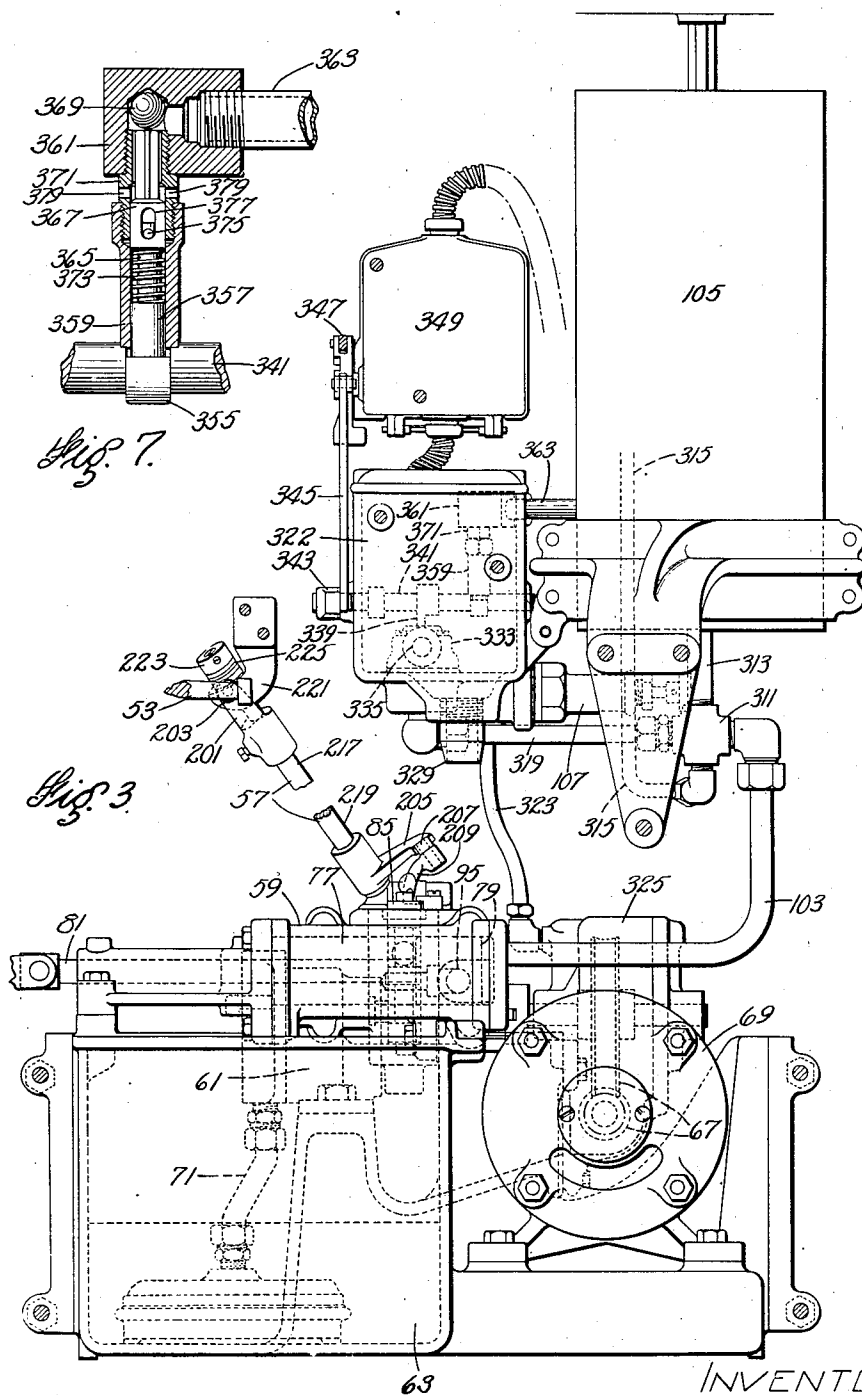
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LASTING MACHINE

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6 Sheets-Sheet 3



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LASTING MACHINE

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6 Sheets-Sheet 4

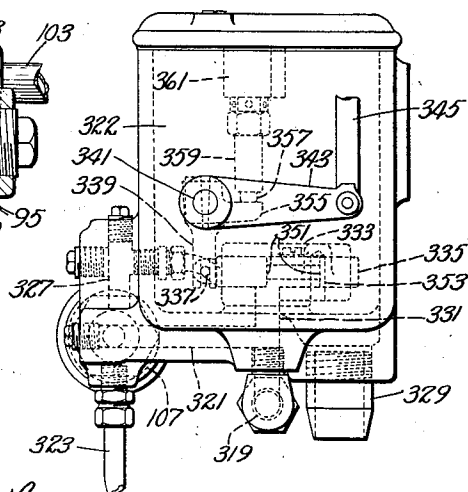
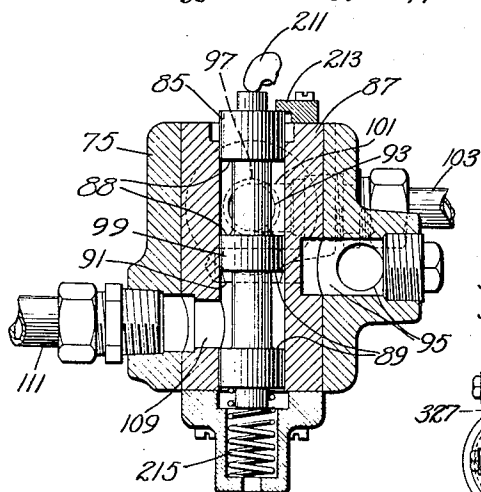
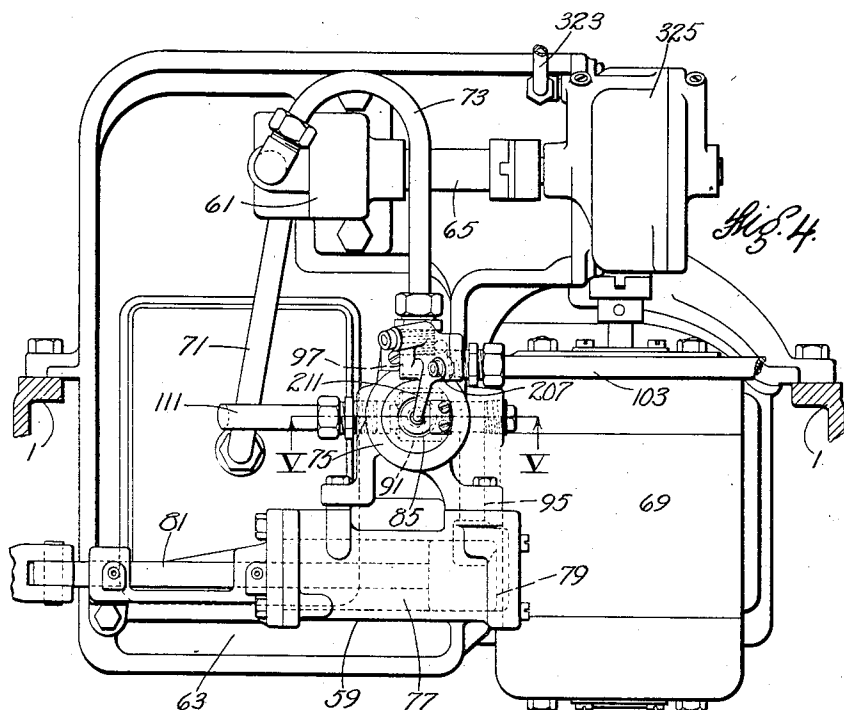


Fig. 5.

Fig. 6.

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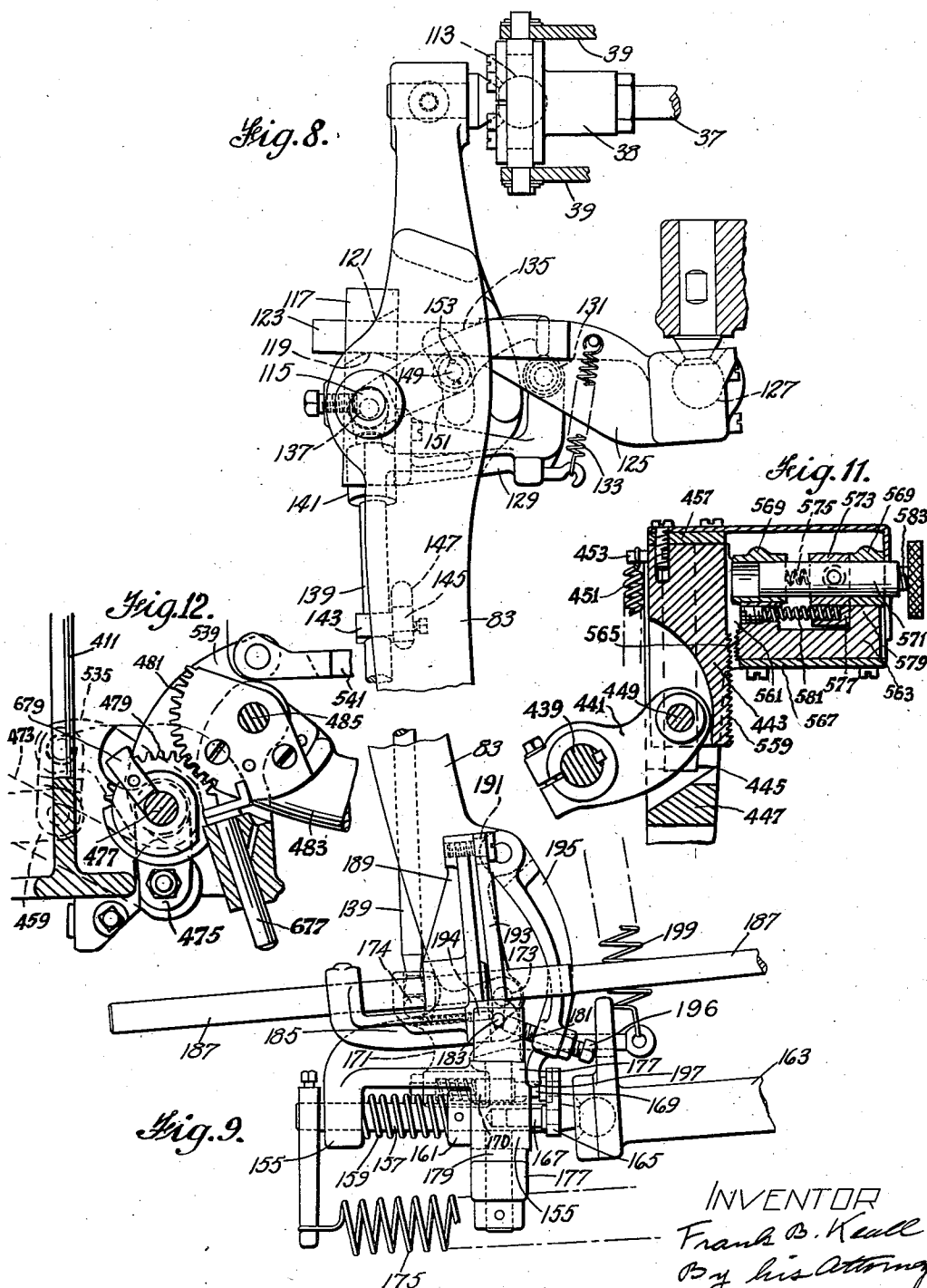
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LASTING MACHINE

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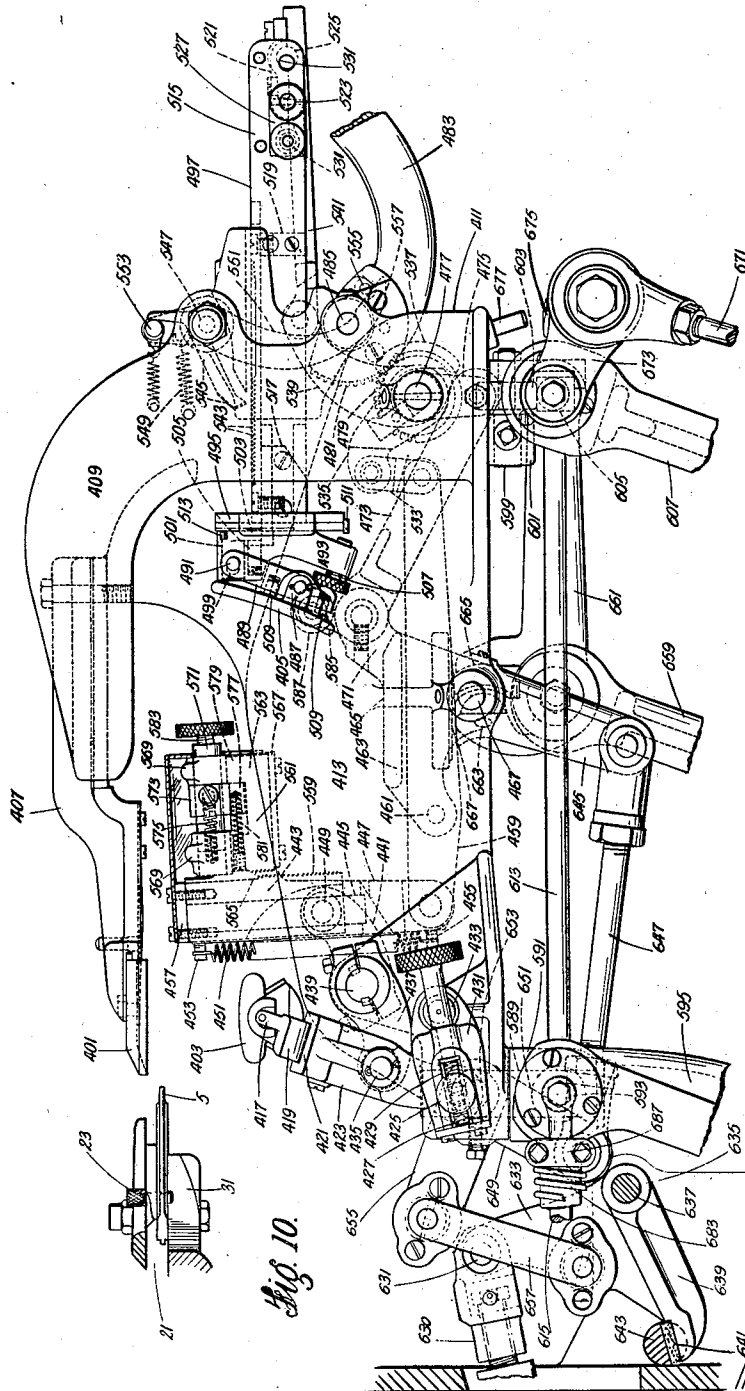
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LASTING MACHINE

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6 Sheets-Sheet 6



UNITED STATES PATENT OFFICE

2,097,567

LASTING MACHINE

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Application June 23, 1936, Serial No. 86,828
In Great Britain August 13, 1935

23 Claims. (Cl. 12—14)

This invention relates to lasting machines, and is herein illustrated as applied to a machine for lasting the toe ends of boots and shoes (hereinafter generally referred to inclusively as shoes), although it is to be understood that it is not limited to toe-lasting machines.

In lasting machines of the bed type having toe-embracing wipers a hand lever is commonly provided for advancing and closing the wipers to wipe the marginal portion of the toe end of upper materials inwardly over an insole on a last. Such machines are also commonly provided with a treadle for raising the wipers to wipe the upper heightwise of the last and for thereafter forcing them downwardly to increase their pressure on the margin of the upper as they wipe it inwardly over the insole. The resistance of the shoe to the inward wiping movements of the wipers, which is increased by reason of the downward pressure of the wipers on the upper, requires that the hand lever be operated with a substantial amount of force. There are, however, substantial advantages in the use of manual means for advancing and closing the wipers, at least in beginning the wiping of the margin of the upper over the edge of the insole, combined with means also under direct control of the operator for raising the wipers to wipe the upper heightwise of the last, by reason of the opportunity thus afforded for controlling the wipers in the manner best suited to the requirements of each particular shoe.

In view of the above and other considerations, the present invention provides a novel organization whereby the wipers, while under such control of the operator as has been found advantageous heretofore, are yet so operated as to relieve the operator of much of the labor heretofore required to advance and close them over the shoe bottom. In the construction herein shown the wipers are advanced and closed by a hand lever to begin, at least, the wiping of the margin of the upper inwardly over the insole, after which power-operated means becomes effective to supplement the force applied to the wipers by the operator. Conveniently the power-operated means, herein shown as fluid-pressure means, is rendered effective in response to resistance of the shoe to the movement of the wipers by the operator when that resistance becomes substantial near the end, for example, of the wiping operation, so that without any special attention on the operator's part he is relieved of much of the labor involved in operating the wipers at

the time when their movement becomes comparatively difficult to effect.

In accordance with a further feature of the invention the power-operated means which acts on the wipers as above described is so related to them as not to oppose any substantial resistance to their movement by the operator. The construction shown comprises a piston movable by fluid pressure to operate the wipers through a lever connected at one end to the wipers and at its other end to the piston, and the arrangement is such that as the wipers are either advanced and closed or retracted from over the shoe by the operator the lever swings idly about a fulcrum located substantially at the end thereof remote from the wipers without imparting any substantial movement to the piston. When the piston, however, is operated by the fluid pressure the lever swings about a fulcrum between its opposite ends, and conveniently mechanism controlled by the piston is provided for establishing this fulcrum for the lever as the piston begins its movement. In the construction shown the piston, after operating on the wipers, is returned by a spring, and in so far as the spring acts to swing the lever, the movement of the latter is about a fulcrum at the end thereof connected to the wipers. Accordingly neither the piston nor the lever operated thereby increases to any substantial degree the labor of the operator in operating the wipers by means of the hand lever or restricts the speed of their movement by the hand lever.

The above and other features of the invention, including various novel details of construction and combinations of parts, will now be more particularly described with reference to the accompanying drawings and thereafter pointed out in the claims.

In the drawings,

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

Fig. 2 is a plan view of the machine;

Fig. 3 is a view in front elevation, on a somewhat larger scale than Fig. 1, of portions of the fluid-pressure means with which the machine is provided for supplementally operating the wipers;

Fig. 4 is a plan view on the same scale as Fig. 3 of a portion of the structure shown in Fig. 3;

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

Fig. 6 is a view in left-hand side elevation on an enlarged scale of certain parts shown in Fig. 3;

Fig. 7 is a view partly in section and partly in front elevation, on a still larger scale, of certain parts shown in Figs. 3 and 6;

Fig. 8 is a front elevation on an enlarged scale

of certain wiper-operating parts shown in Fig. 1;

Fig. 9 is a similar view of certain other wiper-operating parts shown in Fig. 1;

Fig. 10 is a front elevation, on a larger scale than Fig. 1, showing in greater detail a shoe support or jack with which the machine is provided;

Fig. 11 is a vertical sectional view of certain parts shown in Fig. 10; and

Fig. 12 shows partly in front elevation and partly in section certain other parts shown in Fig. 10.

The machine in which the invention is herein illustrated as embodied is in some respects similar to the machine shown in United States Letters Patent No. 1,993,117, granted on March 5, 1935 upon an application of W. T. B. Roberts. The machine comprises a frame 1 which at the upper end of its left-hand side portion is provided with a bearing for a vertically movable cylindrical trunk 3 on the upper end of which toe wipers 5 are supported in a manner hereinafter described. Pivoted on a horizontal pin 7 in the lower end of the trunk 3 is socket member 9 in which is threaded a downwardly extending rod 11, this rod being threaded at its lower end in a second socket member 13, connected through a short rod and a third socket member 15 to a two-armed lever 17. This lever is connected to a double-acting treadle 19, so that by depressing the opposite ends of the treadle alternately the wipers will be raised and lowered.

As in the machine disclosed in the above-mentioned Letters Patent, the wipers 5 are detachably secured to wiper carriers 21 (Fig. 2) by removable pins 23, and the carriers have in them cam slots 25 in which are mounted rolls freely rotatable on relatively fixed pins 29 secured in a box 31 (Fig. 1) in which the wiper carriers are housed. The construction is accordingly such that by movement of the wiper carriers in one direction the wipers are advanced lengthwise of the shoe and are swung or closed toward each other laterally of the shoe and by movement of the carriers in the opposite direction the wipers are retracted. For imparting the movements to the wiper carriers each of them is connected by a link 33 to one end of a cross-bar 35 which is secured to the right-hand end of a horizontal sliding rod 37 on the left-hand end of which is secured a socket member 38. This socket member has extending around it a groove in which lies a ring coupled by links 39 (Fig. 8), one above the rod 37 and one below it, to a forwardly extending wiper-operating lever 41 which is bifurcated at its rear end portion to straddle the rod and is pivotally mounted at its rear end on a relatively fixed pin 43. This pin is secured in a lug 45 projecting from a casting 47 which supports the wiper box 31, the casting being adjustably supported on the vertically movable trunk 3 in a manner hereinafter described. The lever 41 is bifurcated also at its forward end and has pivotally mounted on a vertical pin 49 therein a handle 51 provided with a tail portion 53 which extends rearwardly beneath the lever 41, the rear end of this tail portion lying substantially at the axis of the pin 43 on which the lever 41 is mounted. The handle 51 is normally urged about its pin 49 in a clockwise direction, as viewed from above, to a predetermined position by a spring hereinafter referred to which acts to rock in the appropriate direction a rod 57 in a manner and for a purpose also hereinafter described.

When the wipers are advanced and closed by a pull on the handle 51 the handle remains in the

position relatively to the lever 41 in which it is held by the above-mentioned spring until a predetermined resistance is offered to the continued movement of the wipers, and when this occurs continued pull on the handle causes it to swing in a counterclockwise direction about its pivot 49 against the resistance of the above-mentioned spring. Preferably the spring is of such strength as to maintain the handle in its normal position relatively to the lever 41 as the wipers are advanced and closed around the toe portion of the shoe prior to and during the upwiping operation and until the resistance offered by the marginal portion of the upper materials as the latter are wiped inwardly over the insole becomes substantial. Thereupon the spring yields and permits the handle to swing about its pivot 49, and this swinging movement of the handle is utilized for purposes of this invention to bring into operation means which then imparts a more forcible thrust to the wipers to assist them to overcome the resistance of the upper materials.

The means for thus forcibly operating the wipers comprises a hydraulic piston and cylinder device, indicated generally at 59 (Fig. 1), connected to the wiper-operating rod 37. This device is housed in a box-like portion of the frame 1 which also incloses a rotary gear pump 61 (Figs. 3 and 4) and an oil reservoir 63. The gear pump may be of any well-known construction and is mounted on a horizontal shaft 65 driven through a reduction gear 67 (Fig. 3) by a constantly operating electric motor 69. An inlet pipe 71 to the pump leads to a filter submerged in the oil in the reservoir 63, and an outlet pipe 73 from the pump leads to a valve chamber 75 at one side of the cylinder 77 of the device 59. The cylinder 77 is secured on the top of the oil reservoir 63 and houses a piston 79 from which extends through the left-hand end of the cylinder a piston rod 81. The left-hand end of this piston rod is connected, in a manner hereinafter described, to the lower end of an upwardly extending lever 83 which is connected at its upper end to the wiper-operating rod 37.

A cylindrical valve 85 (Fig. 5) is slidably mounted in a sleeve member 87 secured in the valve chamber 75 and has two circumferential grooves 88 and 89 formed in it. Two ducts lead from spaced ports 91, 93 in the sleeve member 87, one of these ducts 95 (Fig. 4) extending from the port 91 to the right-hand end of the cylinder 77 and the other duct 97 extending from the port 93 to the pipe 73 connected to the gear pump. Accordingly, when the valve 85 is in the appropriate position, with a head 99 thereon sufficiently lowered to provide direct communication between the ports 91 and 93, oil under pressure can pass directly from the pump into the cylinder 77 at the right-hand end of the piston 79 to force the piston toward the left. A third duct 101 communicates with the duct 97 and leads into a pipe 103 which is in direct communication with a pressure accumulator 105 and also leads to a pressure relief valve 107 hereinafter referred to. Accordingly when the valve 85 is not in such a position as to permit oil to pass to the cylinder 77, i. e., when the head 99 prevents communication between the ports 91 and 93 as shown in Fig. 5, the oil passes through the valve directly to the pressure accumulator 105 in which there is a body of air under more or less compression above the oil. Oil under pressure is therefore stored in the accumulator during the time in the operation of the machine when the hydraulic piston and cylinder device 59

is not in actual use, and accordingly when communication is afforded between the ports 91 and 93 the accumulator assists the pump to maintain the desired pressure substantially uniform on the piston 79 as the latter moves along its cylinder.

The sleeve 87 has a third port 109 formed in it near its lower end, below the head 99 of the valve 85, and this port communicates by a pipe 111 with the oil reservoir 63. When the valve 85 is in the position indicated in Fig. 5, which position it occupies during the return movement of the piston 79 toward the right, the head 99 cuts off communication between the ports 91 and 93 and opens communication between the ports 91 and 109, so that as the piston moves toward the right the oil will be forced from the cylinder 77 directly back into the reservoir.

The lever 83 through which the wiper-operating rod 37 is connected to the piston 79 has projecting horizontally from its upper end (Fig. 8) a ball-ended pin 113 which is mounted in the socket member 38 on the rod. The lever is connected at its lower end, through means hereinafter described, to the piston rod 81 which, as will be understood, moves from right to left to operate the wipers. To provide a fulcrum about which the lever 83 may swing in operating the wipers by power, the upper portion of the lever is bifurcated, and in its bifurcated portion are provided bearings for a horizontal forwardly and rearwardly extending pin 115. On this pin is mounted, between the opposite sides of the bifurcated portion of the lever, a block 117 which normally lies in substantially parallel relation to the length of the lever, the pin 115 passing through the block substantially midway between the upper and lower ends of the block. A rectangular bore extends from left to right through the upper part of the block 117, and the lower face of this bore is beveled at its right and left end portions, as shown in Fig. 8, to provide a substantially V-shaped ridge 119. The upper face of the bore is beveled at its right end portion only, to provide a corner 121 between the right and left ends of this face, the left end portion extending in substantially perpendicular relation to the length of the block. The block 117 is accordingly formed to serve as a friction pawl which, when swung in a clockwise direction, grips or becomes locked frictionally to a rectangular bar 123 extending through the bore in the block, this bar comprising a left-hand extension of an arm 125 mounted at its right-hand end on a fixed ball-ended pin 127 depending from an arm on the vertically movable trunk 3. When the block 117 has thus become locked to the bar 123 the pin 115 provides a pivot or fulcrum about which the lever 83 may swing as its lower end is moved toward the left by the hydraulic means. An arm 129 extends to the right from the lower portion of the block 117 between the opposite sides of the bifurcated portion of the lever 83 and at its right-hand end is curved upwardly and carries a roll 131 which bears against the lower face of the bar 123. This arm and the roll accordingly serve to prevent the block 117 from being swung to an undesired extent in a counterclockwise direction, a spring 133 connecting the arms 125 and 129 serving to maintain the roll normally in contact with the bar.

For swinging the block 117 in a clockwise direction to cause it to bind upon the bar 123 a relatively short lever 135 is mounted at the rear of the lever 83. The left-hand end of the lever 135 is connected by a pivot pin 137 to the upper end of a slidable rod 139 which lies substantially par-

allel to the lever 83 and is guided for lengthwise movement in a bearing 141 on this lever. A block 143 secured to the rod 139 has a tongue 145 projecting into an upwardly and downwardly extending slot 147 formed in the lever 83 to prevent rotation of the rod about its axis. The means for operating the rod 139 will be hereinafter described. The right-hand end of the lever 135 is bent forwardly to overlie and engage the right-hand end of the arm 129. Between its ends the lever 135 carries a pin 149 projecting through a slot 151 in the rear side of the bifurcated portion of the lever 83, and a roll 153 mounted on this pin abuts against the lower face of the bar 123 to provide a fulcrum on which the lever 135 may swing in a clockwise direction, as its left-hand end is raised, to cause its right-hand end to rock the block 117 in a clockwise direction so that it binds upon the bar 123.

The block 117 is arranged to bind upon the bar 123, so that the pin 115 serves as a fulcrum about which the lever 83 may swing, only when the piston 79 is forced toward the left, the lever 83 being mounted to swing at other times about another fulcrum near its lower end as hereinafter described. For raising the rod 139 to rock the block 117 into position to bind on the bar 123, the lower end of the lever 83 has a pair of downwardly extending spaced lugs 155 (Fig. 9) which provide coaxial bearings for a rod 157. A comparatively strong spring 159 positioned on this rod between the left-hand lug 155 and a collar 161 fast on the rod tends to force the rod toward the right and holds it normally with the collar 161 in abutting relation to the right-hand lug 155. The rod 157 has a ball-shaped right-hand end mounted in a bearing in the left-hand end of a thrust link 163 which is connected by a universal joint at its right-hand end to the piston rod 81. A short arm 165 is fast on the rod 157 to move therewith and is prevented from swinging by a pin 167 which extends therefrom into a hole in one of the lugs 155. A second pin 169 also extends to the left from the arm 165 and is arranged, as soon as the piston 79 starts to move toward the left, to engage a spring plunger 170 mounted in a depending arm of a small bell-crank lever 171 which is mounted on a pin 173 extending rearwardly from the lever 83. At this time the lower end of the lever 83 is prevented from moving toward the left by a second friction lock hereinafter described. The lower end of the rod 139 rests upon a ball 174 in a recess formed in the upper face of a substantially horizontal arm of the bell-crank lever 171 and is held against this ball by the previously mentioned spring 133. When the pin 169 is moved toward the left and engages the spring plunger 170 as above described, it rocks the bell-crank lever 171 in a clockwise direction and thereby lifts the rod 139 to cause the block 117 to bind on the bar 123. As soon as this action takes place continued movement of the rod 157 serves to release the above-mentioned second friction lock, through means hereinafter described, so that the lower end of the lever 83 may be swung toward the left, and continued movement of the piston 79 then causes the lever 83 to swing about the pin 115 and thus to operate the wipers.

After the wipers have been operated by the hydraulic mechanism and the operator wishes to back them off the shoe, either at the end of the lasting operation or between successive wiping movements thereof on the same shoe, the lever 83 is arranged to swing in a counterclockwise di-

rection about a pivot or fulcrum near its lower end in response to movement of the hand lever 41, as hereinafter described, and the piston 79 is returned to its starting position by a spring 175 connected at one end to the frame and at the other end to a finger depending from the left-hand end of the rod 157. This spring acts at the time when the wiper-operating handle 51 is no longer pulled toward the right to maintain the oil pressure in the cylinder 77 through the mechanism hereinafter described. That is, when the operator ceases to pull the handle in that direction, or when he swings it in the reverse direction, the valve 85 is moved automatically to exhaust position so that the pressure of the oil on the piston is relieved. Thereupon the spring 159 immediately expands to move the rod 157 toward the right until its collar 161 engages the right-hand lug 155. This movement of the rod 157 permits the small bell-crank lever 171 which controls the block 117 to swing in a counterclockwise direction so that the block ceases to bind on the bar 123. The spring 175 in returning the piston accordingly acts to swing the lever 83 about an axis or fulcrum at the spherical end of the pin 113. A suitable stop may, if desired, be provided to arrest this swinging movement of the lever 83 before the piston 79 actually engages the right-hand end of the cylinder 77.

The above-mentioned movement of the rod 157 toward the right serves additionally to cause the previously mentioned second friction lock near the lower end of the lever 83 to establish a fulcrum for the lever near its lower end about which it may swing in a counterclockwise direction as the operator backs the wipers off from over the shoe by the wiper-operating handle and about which it may swing in a clockwise direction when the wipers are operated by the handle in lasting the next shoe. For this purpose the lever 83 has on its lowermost portion a pair of forwardly extending ears 177 having formed therein coaxial bearings for a short substantially vertical rod 179 which is freely rotatable in the hearings. A head 181 on the upper end of the rod is seated on the upper face of the upper ear 177 and a collar on the lower end of the rod engages the lower ear to hold the rod against lengthwise movement in the two ears. The head 181 is provided at its front and rear sides with a pair of upstanding ears in which are secured a pair of coaxial pins 183 which project somewhat inwardly from the ears and may serve as a fulcrum for the lever 83. Freely pivoted on these pins between the ears is a yoke member 185 a portion of which extends toward the left and is provided with a pair of bearings for an approximately horizontal rod 187 the right-hand end of which is connected by a ball joint to the frame of the machine. The yoke member 185 has also an upwardly extending arm 189 in the upper end of which is screwed a short stud 191 having a head spaced a short distance from the right-hand side of the arm. At the right-hand side of the arm is a locking plate 193 the upper end portion of which is slotted to embrace the stud 191 between the arm and the head of the stud, the thickness of the plate being somewhat less than the distance between this head and the arm. Near its lower end the plate 193 has in it a circular hole through which the rod 187 extends, the hole being of substantially the same diameter as the rod. A spring plunger 194 bearing against the left-hand side of the plate 193 at its lower end tends to rock the plate toward the right about its upper end so that its

lower end binds upon the rod. Any tendency therefore for the lower end of the lever 83 to move toward the left along the rod 187 further tends to cause the plate 193 to bind upon the rod and thus to prevent the lever from moving in that direction, but any tendency for the lower end of the lever to move toward the right will not be substantially opposed by the plate, since the friction between the plate and the rod will merely tend to swing the plate into a position of parallelism with the arm 189.

In the operation of the hydraulic means on the wipers it is necessary for the plate 193 to be moved to such a position as to permit the lower end of the lever 83 to move easily toward the left. For this purpose there is freely pivoted on the lever 83, substantially behind the plate 193, a downwardly extending arm 195 which at its lower end extends forwardly to a position opposite the right-hand face of the plate, and in this lower end of the arm there is a screw 196 arranged to engage the lower end of the plate 193 below the rod 187 and to rock the plate toward the left to relieve its binding action on the rod as soon as the block 117 has become locked to the bar 123. For rocking the arm 195 toward the left it has a downwardly projecting finger 197 which lies at the left of the previously mentioned arm 165 on the rod 157, and is arranged to be engaged and operated by this arm. When the rod 157 is moved toward the right by the spring 159 after the operation of the hydraulic means, the arm 195 releases its pressure on the plate 193 and the latter then becomes operative to prevent movement of the lower end of the lever 83 toward the left along the rod 187, although permitting it to move toward the right. It will be understood that the lower end of the lever and the plate 193 are moved a substantial distance toward the right along the rod 187 as the lever 83 is swung as described about an axis at its upper end in the return of the piston 79 to its starting position.

The above described means for supporting the lever 83 and for connecting it to the wiper-operating rod 37 permits the wipers to be adjusted in various ways as hereinafter described without restraint by the lever. In order to relieve the pin 113 from the necessity of supporting the weight of the lever 83, a spring 199 of appropriate strength is preferably connected at its lower end to an eye bolt in the lever and at its upper end to a fixed hook, as shown in Fig. 1.

The handle 51, mounted to swing about the pin 49 on the wiper-operating lever 41, is arranged to control the valve 85 through means which will now be described. The rear end of the tail 53 of the handle, when the handle is swung to the right relatively to the lever about the pin 49, is arranged to impart swinging movement, in a clockwise direction as seen from above, to an arm 201 (Figs. 1 and 3) which carries a roll 203 engaged by a contacting face on the left-hand side of the tail 53. The arm 201 is fast on and projects forwardly from the upper end portion of the rod 57 which extends downwardly and toward the right to a position close to the valve 85. The lower end of the rod has fast thereon a short arm 205 extending upwardly and toward the right, and when the rod is turned in the clockwise direction this arm engages and moves forwardly a roll 207 carried by an upwardly extending arm of a bell-crank lever 209 mounted for swinging movement on a pivot pin supported by the valve casing 87. A forwardly and substantially horizontally extending arm 211 of the bell-crank lever

209 bears upon the upper end of the valve 85, so that in response to the above-described movement of the arm 205 the arm 211 moves the valve downwardly from the position indicated in Fig. 5 to such a position that oil can pass to the cylinder 77. The valve is urged upwardly and is held normally against a lug 213 on the sleeve 37 by a spring 215 located beneath it, and this spring acts through the rod 57 to swing the handle 51 to the left about its pin 49.

The diameter of the piston 79 and the size of the pump 61 are so selected that although the pressure exerted on the piston will be adequate to overcome the resistance of the upper to the continued movement of the wipers, it will not cause them to move at a high speed but only at a speed comparable to that at which the operator would normally move them. The operator continues to pull on the handle 51 after the piston has begun to exert its thrust on the wipers and by so doing insures that the valve 85 will be maintained in its depressed position so that the fluid-pressure means will continue to act on the wipers. This arrangement presents the advantage that the operator still feels that he has control over the thrust on the wipers and that he is, in fact, exerting directly upon them through the handle a definite portion of this thrust. When the operator considers that the wipers have been moved far enough, so that in operating, for example, on a welt shoe they have pressed the margin of the upper firmly against the lip of the insole, he may release his pull on the handle 51, whereupon the spring 215 acts to swing the handle in a clockwise direction while lifting the valve 85 to such a position as to interrupt the communication between the pump and the cylinder 77 and to bring the exhaust port 109 into communication with the cylinder.

The rod 57 actually comprises two telescoping members 217, 219 connected together by a key. The upper end of the member 217 is somewhat reduced in diameter and extends upwardly through a substantially hemispherical bearing member resting in a cup-like depression formed in the upper side of a small bracket 221 fast on the lug 45 projecting from the casting 47. To support the member 217 in the desired position there is fast on its upper end a collar 223, and interposed between the collar and the flat face of the hemispherical bearing member is a ball thrust bearing 225. The lower end of the member 219 projects only part way into a bore in the arm 205 and a fixed pin (not shown) having a ball-shaped upper end extends upwardly into the lower end of this bore to support the member 219 against displacement. The provision of the telescopic rod and the means described for supporting its opposite ends insures that notwithstanding the vertical movements of the trunk 3 and any angular adjustment which may be made of the position of the wiper box 31, the operative relation of the opposite ends of the rod to the handle 51 and the bell-crank lever 209 will not be interrupted.

A friction pawl indicated at 227 (Fig. 2), which is similar to the pawl 39 shown in the previously mentioned Letters Patent, is pivoted between a pair of lugs depending from the wiper-operating lever 41 and is urged by a spring (not shown) in a direction to bind upon a relatively fixed rail 229 (Fig. 1) which is curved concentrically with the axis of movement of the lever 41. This rail passes through an opening in the pawl, and as

the pawl binds thereon it prevents the lever and therefore the wipers from returning toward the left from any position to which they may have been moved toward the right until the operator wishes such return movement to take place. For moving the pawl against the action of its spring to release it from the rail, a finger 231 (Fig. 2) is pivoted to the lower side of the lever 41 and carries at its rear end an adjustable screw which, when the finger is moved in a counterclockwise direction, swings the pawl to release it from the rail. The forward end of the finger projects close to the right-hand side of a pin 233 which extends upwardly from the tail portion 53 of the handle 51. When the operator wishes to retract the wipers from the shoe and therefore moves the handle 51 toward the left, the handle swings in a clockwise direction about the pin 49 and thus causes the pin 233 to operate the finger 231 to release the pawl from the rail. An adjustable stop screw 235 is provided in the lever 41 to limit movement of the handle 51 toward the left about the pin 49, and when the handle abuts against this stop screw continued movement of the handle toward the left causes the lever 41 also to move in that direction to retract the wipers.

Experience in the use of the machine shown in the previously mentioned Letters Patent has indicated that, although the shoe is jacked with the toe portion of its insole lying in a substantially horizontal plane, it is desirable to provide means whereby the wipers may be tipped about axes extending lengthwise and laterally of the shoe to accommodate them to small variations in the contours of the bottoms of different shoes. Accordingly, a sleeve 237 (Fig. 2) extends toward the left from the wiper box 31 through a bore formed in the casting 47, the wiper-operating rod 37 being movable lengthwise in this sleeve. A lug 239 projects forwardly from the wiper box and a similar lug 241 (Fig. 1) projects forwardly from the casting 47 below the lug 239. Both lugs are provided with spherical bearings, and an upwardly extending spindle 243 has on its lower end a ball confined in the spherical bearing in the lug 241. Above this lug the spindle is threaded and extends through a threaded hole in a spherical member confined in the bearing in the lug 239, this member being held against rotation about the axis of the spindle by pins (not shown) projecting from the member into upwardly extending grooves in the lug 239. Fast on the upper end of the spindle is a hand wheel 245 for turning it. As the spindle is turned the spherical member in the lug 239 travels lengthwise of the spindle and thus rocks the wiper box 31 about the axis of the sleeve 237 to tip the wipers.

To permit the wipers also to be tipped about an axis extending laterally of the shoe the casting 47 is pivoted at its right-hand end at 247 on a pair of short depending links 249 which are pivoted at their lower ends on a pin 251 mounted in an arm projecting toward the right from the upper end of the vertically movable trunk 3. The pin 251 lies but little to the left of a vertical plane passing through the meeting point of the two wipers when the latter are fully retracted. At the front and rear sides of the casting 47 a pair of ears 253 extend upwardly from the trunk 3. Bosses project forwardly and rearwardly on the casting 47 near its left-hand end and pins 255 (Fig. 2) are pivoted in these bosses and have vertically flattened outer ends extending into vertical guideways formed in the ears 253. The rear

pin 255 has threaded in it a vertical spindle 257 provided with a hand wheel 259 for turning it. The spindle is held against vertical movement by two spaced collars thereon between which projects a shelf 261 secured to the rear upwardly extending ear 253. Rotation of the spindle accordingly swings the casting 47 about its pivotal connection with the links 249, these links being permitted to swing slightly about the pin 251 as the flattened pins 255 move along their guideways. However, such adjustments of the wipers as may be required by the turning of the spindle 257 do not alter substantially the position of the wipers lengthwise of the shoe.

It is desirable that the wipers be free to swing a short distance as a unit in their own plane to permit them to adjust themselves to bear with even pressure on the opposite sides of the toe of the shoe in the lasting operation. For this purpose the vertically movable trunk 3 is free to turn a short distance about its axis, and its upwardly extending ear 253 at the front of the casting 47 has thereon a depending boss 267 (Fig. 1) in which is threaded a vertical stud 269, the lower end of this stud extending downwardly into a bore of somewhat larger diameter than the stud in a lug 271 projecting forwardly from the bearing for the trunk 3. Thus the wipers are permitted to swing bodily as a unit about the axis of the trunk 3 within limits determined by this stud and bore. The stud 269 is also utilized to limit adjustably the downward movement of the trunk 3 and thus to determine the normal height of the wipers, the stud having formed thereon between its upper and lower ends a knurled head 273 arranged to rest on the lug 271. It will be understood that by turning the knurled head 273 the stud can be adjusted to vary the normal height of the wipers. After adjustment the stud 269 is held against accidental rotation by a screw 275 threaded in the boss 267 and arranged to bear at its inner end on the stud.

The machine herein shown is further provided with means for imparting to the wipers by the operation of the hand lever 41 a short bodily advancing movement in addition to their normal advancing and closing movements, so as to compensate in the overwiping operation for the small space which ordinarily is present between the extreme toe-end face of the shoe and the edges of the wipers during the upwiping operation, in general accordance with the disclosure of United States Letters Patent No. 2,073,028, granted on March 9, 1937 upon an application of W. T. B. Roberts, the present construction, however, differing somewhat from that disclosure. For the purpose in view there is provided a curved arm 277 (Figs. 1 and 2) extending horizontally toward the left and freely pivoted at its right-hand end on a vertical pin 279 fixed in a short lug 281 which extends toward the left from the casting 47. This arm is curved concentrically with the pivot 43 of the lever 41 and has extending lengthwise thereof a slot 282 in which lies a roll 283 carried by the lever 41, the roll being mounted on a small plate 285 adjustable to the left or right along a short guideway on the upper face of the lever 41. When this lever is at the left-hand end of its movement the left-hand end portion of the slot 282 is concentric with the pivot 43, and nearly half-way along the slot toward the right it is curved sharply to the rear, as indicated at 284. Accordingly, as the roll 283 passes this rearwardly curved portion of the slot in the operative movement of the lever 41 it acts to swing the arm 277

in a forward direction. After the arm has thus been swung forwardly the right-hand portion of the slot 282 is concentric with the pivot 43.

A T-shaped guideway 287, opening toward the rear of the machine, is formed along the arm 277 and is concentric, when the lever 41 is at the left-hand end of its movement, with the pivot 43. A bell-crank lever 289 is pivotally mounted on a pin 291 secured in the lug 45 which carries the pin 43, the pin 291 being spaced toward the right from the pin 43, and an arm of the bell-crank lever 289 extends toward the left and carries a pin 293 which in the initial positions of the parts is substantially coaxial with the pin 43, this arm extending over the upper face of the lever 41. Pivoted on the pin 293 is a forwardly extending link 295 the forward end of which is connected to a pin fast in a slide 297 mounted in the T-shaped guideway 287.

The slide 297 is normally held in a fixed position in the guideway 287 by means of a depending pin carried by a portion of the link 295 which overhangs the arm 277, the lower end of this pin being arranged to enter one or another of a series of holes 299 in the arm 277. The portion of the link 295 above this arm has pivoted between upwardly extending ears thereon a thumb piece 301 the rear end of which is connected to the upper end of the pin. By depressing the forward end of the thumb piece the pin may be raised out of any of the holes 299 and the slide 297 may then be adjusted along the guideway by means of a handle 303 formed on the forward end of the link 295. The bell-crank lever 289 has a pair of forwardly extending arms 305, arranged one above the other, which straddle the left-hand end portion of the sleeve 237 extending from the wiper box 31. A circumferential groove formed in this portion of the sleeve receives a ring-like block 307 which is connected to the two arms 305 by vertical pivot pins.

In the use of the above-described construction swinging movement of the wiper-operating lever 41 toward the right causes the arm 277 to swing forwardly, i. e., toward the operator, as the roll 283 passes the rearwardly curved portion 284 of the slot 282, and in its forward movement the arm exerts a pull on the link 295 and accordingly causes the bell-crank lever 289 to swing in such a direction as to move the sleeve 237 and the wiper box 31 toward the right. This causes the wipers to receive a short bodily advancing movement lengthwise of the shoe in addition to the advancing and closing movements normally imparted to them through the wiper carriers 21 in the movements of the latter relatively to the wiper box 31. After the roll passes the rearwardly curved portion of the slot 282 the arm 277 remains stationary during the remainder of the advancing and closing movements of the wipers. It will be understood that the amount of supplemental advancing movement thus imparted to the wipers may be varied by adjusting the slide 297 along the guideway 287, and the slide may, if desired, be moved to a position in vertical alignment with the pin 279 so that no movement of the bell-crank lever 289 will take place in response to the swinging of the arm 277. By adjusting the plate 285 along its guideway on the lever 41 the time in the movement of this lever when the roll 283 acts to swing the arm 277 may be varied.

Reference has been made to the fact that the pipe 103 is in constant communication with the pressure accumulator 105 and also leads to a pressure relief valve 107. As shown particularly

in Fig. 3, the pipe 103 leads to a four-way coupling 311 from which one pipe 313 leads directly to the accumulator, a second pipe leads to a pressure indicator 317 (Fig. 1) and a third pipe 319 leads to the relief valve 107 through a passage 321 (Fig. 6) drilled in the bottom of a casing 322 for a pressure release valve hereinafter described. The relief valve 107, the details of which are not herein illustrated, comprises a plunger backed up by a spring of adjustable strength and movable by the pressure of the oil against it, when a predetermined pressure is exceeded, to uncover ports which permit the oil to escape from the pipe 103 partly down a pipe 323 which leads into a casing 325 inclosing the previously mentioned reduction gearing 67 and partly upward along a passage 327 (Fig. 6) leading into the casing 322, such oil as enters this casing being conducted through a pipe 329 back to the oil reservoir 63 below it. It will be understood that adjustment of the spring in the relief valve serves to vary the amount of pressure maintained in the oil system during the normal operation of the machine.

In view of the tendency for the air under pressure in the accumulator 105 to be absorbed by the oil, it is desirable to empty the accumulator at times so that the proper amount of air may be maintained therein, and conveniently the construction shown is such that the oil in the accumulator is permitted to escape from it whenever the electric motor 69 which drives the oil pump is stopped. From the previous description it will be understood that the pipes 313, 319 (Figs. 3 and 6) lead from the accumulator to the casing 322. In order that when the pump ceases to operate the oil may escape freely from the accumulator into the casing 322 and thence down the pipe 329, there is provided within the casing a valve which, although normally preventing escape of oil into the casing except by way of the relief valve 107, is so controlled as to permit the oil to escape into the casing when the switch controlling the motor is operated to stop the motor. On the bottom of the casing 322 above a passage 331 which leads upwardly from the pipe 319 there is mounted a valve casing 333 in which is a piston valve 335. At its left-hand end (Fig. 6) this valve carries a pin 337 embraced by the forked end of an arm 339 which is fast on a short shaft 341 rotatably mounted in the walls of the casing 322. A second arm 343 also fast on the shaft 341 is connected, exteriorly of the casing 322, by a link 345 (Fig. 3) and a bell-crank lever to a rod 347 (see also Fig. 1) controlling a starter 349 for the pump-driving motor. The arrangement is such that when the rod 347 is pulled forwardly to start the motor the arm 339 is swung in a clockwise direction from the position indicated in Fig. 6 and thus moves the valve 335 to the left. In this movement a circumferential groove 351 in the valve is carried so far to the left that a port 353 in the valve casing 333, leading from the valve into the casing 322, no longer communicates with the circumferential groove. Accordingly oil cannot pass from the accumulator 105 into the casing 322 and thence to the reservoir 63 except through the pressure relief valve 107. When, however, the rod 347 is pushed rearwardly to stop the motor the valve 335 is moved to the right into the position shown in Fig. 6 and thus permits oil to pass freely from the accumulator and the pipe 319 into the casing 322 and back to the reservoir.

In order to permit air to enter the accumulator 105 to destroy any partial vacuum formed therein

by the escape of the oil when the motor is stopped, the shaft 341 carries a third arm 355 which engages the lower end of a plunger 357 (Figs. 6 and 7) housed within a sleeve 359 extending downwardly below a coupling 361, this coupling being screwed on the end of a pipe 363 which leads directly into the accumulator 105 near the lower end of the latter. The plunger 357 is provided with an upwardly extending stem 365 of reduced diameter, and on the upper end of this stem is slidably mounted a socket member 367, the stem having a pin 375 extending into a vertically elongated slot 377 in the socket member. The upper end of the socket member 367 engages a ball valve 369 which is normally forced downward by pressure of the oil thereon to close the upper end of a bore formed in a sleeve member 371 which connects the sleeve 359 to the coupling 361 and in which the socket member 367 is mounted. A comparatively light spring 373 is inclosed between the lower end of the socket member 367 and a shoulder on the plunger 357 and tends normally to separate the plunger and the socket member as far as permitted by the pin-and-slot connection 375, 377. When the shaft 341 is rocked in a counterclockwise direction (Fig. 6) in response to the movement of the rod 347 to stop the motor, the arm 355 raises the plunger 357 and tends through the spring 373 and the socket member 367 to lift the ball valve 369. Since, however, the pressure of the oil on the upper surface of the valve is substantial at this time, the valve remains in closed position and the only effect of the upward movement of the plunger 357 is to compress the spring 373. As the oil, however, escapes from the accumulator the pressure on the upper surface of the valve gradually diminishes until the spring 373 becomes effective to raise the valve. Air may then pass through ports 379 in the sleeve member 371 and upwardly along grooves formed in the sides of the socket member 367 and thus find its way into the accumulator as the oil continues to flow therefrom.

The machine is provided with a shoe support or jack so constructed as to receive and hold either riding boots with long legs or shoes with low uppers and which requires but little adjustment to adapt it for shoes of large and small sizes. The jack comprises an insole-engaging plate 401 which occupies a fixed position heightwise of the machine during the lasting operation and against which the toe portion of the insole is placed by the operator in presenting the shoe bottom upward to the machine, a toe rest 403 arranged to be raised to clamp the toe portion of the shoe against the lower face of the plate 401 and a heel rest 405 arranged to be moved into contact with the heel end of the shoe to support the shoe against heelward movement in the lasting operation. The insole-engaging plate, the toe rest and the heel rest are generally similar in their arrangement to corresponding parts shown in the previously mentioned Letters Patent No. 1,993,117.

The insole-engaging plate 401 is a rigid member curved in plan similarly to the toe end of an insole so as to fit closely within and support the lip of a welt shoe insole around the toe portion during the lasting operation and its lower face lies generally in a horizontal plane. The plate is secured in a quickly detachable manner to the left-hand end of a horizontal shank 407 the right-hand end portion of which is secured in a horizontal guideway formed in the upper face of

an overhanging arm 409 of an approximately U-shaped jack casting 411. The central portion of the lower horizontal arm 413 of this casting, in the construction herein shown, is offset rearwardly, as indicated at 415 in Fig. 2, so that the upper of a long-legged boot may hang downwardly at the front of this offset portion without being obstructed by it.

The toe rest 403 comprises a rubber pad supported with freedom for rocking movement on the rounded upper ends of lugs 417 extending upwardly at the front and rear portions of a member 419 (Fig. 10) mounted to swing about an axis extending lengthwise of the shoe in an arcuate guideway 421 formed in the upper end of a lever 423 which is pivotally supported between its upper and lower ends as hereinafter described. This lever is also pivotally supported at its lower end on a pin 425 adjustable by means of a screw 427 along a slot 429 formed in the left-hand portion of a short link 431, the screw being threaded in the pin 425 and having thereon a knurled head for turning it. The link 431 is pivoted at its right-hand end on a horizontal pin 433 secured in the left-hand end portion of the lower arm 413 of the jack casting 411. By adjusting the lower end of the lever 423 to the right or the left along the slot 429 and thereby swinging the lever the toe rest 403 may be adjusted in directions lengthwise of a shoe for shoes of different sizes or styles. About midway of its length the lever 423, as above suggested, is pivotally connected by a pin 435 to the left-hand end of a short curved lever arm 437 which is keyed at its right-hand end to the forward end of a rearwardly extending pin 439 rotatable in the lower arm of the jack casting. A second curved lever arm 441 is keyed at its left-hand end to the rear end of the pin 439, and the right-hand end of this arm extends into a slot formed in the lower end portion of a slide 443 which is mounted in upwardly extending guideways 445 formed in the inner sides of the upper portions of an upstanding bifurcated link 447. The arm 441 is pivotally connected to the slide 443 by a pin 449. The upper ends of tension springs 451 are connected to pins 453 projecting from the upper end of the slide 443 and to pins 455 projecting from the link 447 at the lower end of the latter. These springs tend to maintain the slide 443 in a definite lowered position relatively to the link 447 determined by a plate 457 which is fast on the slide and abuts against the upper end of the link, and they also provide yieldable means through which downward movement of the link 447 causes the toe rest 403 to be raised by the swinging of the arms 441 and 437.

For imparting downward movement to the link 447 its lower end is pivotally connected to the left-hand end of a substantially horizontal floating lever 459 which near its left-hand end is connected by a pivot pin 461 to the left-hand end of a bifurcated arm 463 of a three-armed lever 465. The lever 465 straddles the upper side of the floating lever 459 and is mounted below this lever on a pair of coaxial pins 467 fixed respectively in the front wall of the rearwardly offset portion of the lower arm of the jack casting and in a web 469 (Fig. 2) parallel to the front wall of the lower arm and spaced from this wall rearwardly of the machine. The two pins 467 are spaced somewhat toward the right from the pin 461 which connects the three-armed lever to the floating lever. A second arm 471 of the three-armed lever is curved upwardly and toward the right

and its right-hand end is pivotally connected by a pin to a double link 473 extending downwardly and toward the right. The lower end of the double link 473 is pivotally connected to the lower ends of a pair of short crank arms 475 secured to a shaft 477 rotatably mounted in bearings near the lower end of a substantially vertical portion of the jack casting which connects its overhanging arm 409 to its lower arm 413. On the shaft 477 is secured a toothed segment or gear member 479 engaging a second toothed segment or gear member 481 secured on a jack-operating lever arm 483 which is mounted to swing about a fixed shaft 485 in the jack casting. The arm 483 extends upwardly as indicated in Fig. 1 when the machine is idle, and by swinging this arm in a counterclockwise direction as viewed from the front of the machine the three-armed lever 465 is rocked also in a counterclockwise direction about the pins 467, thereby swinging the left-hand end of the floating lever 459 downwardly and thus through the springs 451 imparting upward movement yieldingly to the toe rest 403.

Swinging movement of the floating lever 459 is also utilized to cause the heel rest 405 to move into engagement with the shoe after the toe rest has clamped the toe end of the shoe against the plate 401. The heel rest has thereon a pair of ears 487 connected by a pivot pin to the lower end of a link 489 which at its upper end is pivotally connected at 491 to a slide 493 mounted in a vertical T-shaped guideway formed in a guide 495 on the left-hand end of a horizontal slide 497, the slide 497 being mounted in a guideway provided in the upstanding portion of the jack casting. The pin 491 actually passes through a slot 499 in the slide 493 and is fast in a plunger 501 slidingly mounted in the upper end of this slide. The right-hand end of the plunger 501 has a plate 503 depending from it and provided on its right-hand face with ratchet teeth to cooperate with teeth formed on the left-hand face of the guide 495. The plunger 501 is urged toward the right by a spring plunger 505 in the slide 493. By pulling the heel rest 405 toward the left the teeth on the plate 503 can be readily disengaged from the teeth on the guide 495 and the heel rest with the slide 493 may then be adjusted vertically to the most convenient position for engagement with any particular shoe.

A downwardly extending portion of the slide 493 has therein a screw 507 the head of which abuts against the lower end of the link 489. By turning this screw the heel rest may be swung about the pin 491 to accommodate it to the height-wise curvatures of the heel ends of different shoes. Spring-pressed plungers 509 located in the link 489 above and below the pivotal connection of the heel rest to the link provide means against which the heel rest may swing about this pivotal connection in one direction or the other in the jacking of a shoe to adjust itself better to the curvature of the heel end of the shoe. A vertical screw 511 threaded in the lower end of the guide 495 and a pin 513 in the upper end of the guide serve by contact with the slide 493 to prevent the slide from being moved vertically off its guideway.

The horizontal slide 497 for moving the heel rest toward the shoe comprises a pair of relatively long and narrow horizontal plates 515 spaced apart at their left-hand ends by a shank 517 on the guide 495, to which shank the plates are secured, the plates nearer their right-hand ends being spaced apart by a distance piece 519

to which also they are secured. Near its right-hand end the slide 497 has positioned between its plates 515 a pair of comparatively short arms 521 which at their left-hand ends, with the parts 5 positioned as shown in the drawings, have forwardly and rearwardly extending pins 523 mounted in holes formed in the plates 515. The right-hand ends of these arms are connected together by a pin 525, and that pin 523 which extends forwardly from the foremost arm has secured to it, at the front of the foremost plate 515, a crank arm 527 in which is mounted a spring-plunger 529 arranged to enter one or the other of two holes 531 formed in the plate 515 at 10 opposite sides of the pin 523, depending upon the positions of the arms 521 as hereinafter explained. The right-hand end of the floating lever 459 is connected by a short link 533 to the left-hand end of a curved arm 535 of a bell-crank 20 lever 537 mounted to turn on the shaft 477. A second arm 539 of this bell-crank lever, which is arranged to lie substantially beneath the slide 497, extends upwardly and toward the right and is connected by a link 541, located between the 25 two plates 515, to the pin 525 which connects the two short arms 521.

From the above description it will be understood that the toe rest and the heel rest are operatively connected respectively to the opposite ends of the floating lever 459. When the 30 floating lever is operated in the manner previously described by the three-armed lever 465 upon swinging movement of the arm 483 toward the left, the left-hand end of the floating lever is first swung downwardly, the lever swinging 35 about the connection at its right-hand end with the link 533, and by this movement of the lever the toe rest is moved upwardly toward and into engagement with the shoe. When the toe rest has clamped the shoe firmly against the plate 40 491 and its upward movement is stopped by the shoe, continued movement of the arm 483 causes the floating lever to swing downwardly about the pivotal connection of its left-hand end with the 45 link 447, and in this movement its right-hand end swings the bell-crank lever 537 in a counter-clockwise direction and thus imparts to the heel rest through the link 541 and the slide 497 a movement toward the left to cause it to abut 50 against the heel end of the shoe.

The arms 521 may be positioned to extend toward the right from their pivot pins 523, as shown in Figs. 2 and 10, or by swinging the crank arm 527 through an arc of 180 degrees may be 55 positioned to extend toward the left from the pins, the spring plunger 529 by entering the appropriate hole 531 maintaining them in either of these positions. Since the arms 521 are connected as described to the link 541, their swinging movement serves to move the slide 497 to the left or the right through a distance equal to twice the length of the arms 521. A simple and convenient means is thus provided whereby the heel rest 405 may be quickly adjusted to 65 operate more effectively on shoes of comparatively large sizes or shoes of comparatively small sizes. The crank arm 527 carries a small knob secured to the spring plunger 529 whereby this plunger may be withdrawn from either of the 70 holes 531.

In order to relieve the above-described heel-rest-operating mechanism from strain due to heelward thrust of the shoe against the heel rest in the lasting operation, the machine herein shown, in general similarity to the machine

shown in Letters Patent No. 1,993,117, is provided with a pawl-and-ratchet device arranged to act on the slide 497. This device comprises a series of ratchet teeth 543 formed on a plate secured to the slide 497 and a pair of staggered pawls 545 arranged to engage the ratchet teeth to 5 hold the slide against movement toward the right after the heel rest has engaged the shoe. The pawls are fast on a pin 547 rotatable in the upwardly extending portion of the jack casting 10 and they are urged toward the ratchet teeth by springs 549. In order to disconnect the pawls from the ratchet teeth when the arm 483 is swung toward the right to release the shoe from the jack, a lever 551 is secured on the rear end 15 of the pin 547. This lever carries a pin 553 which lies to the left of upstanding fingers on the pawls and acts when the lever 551 is swung in a clockwise direction to disconnect the pawls from the ratchet teeth. For swinging the lever 551 by 20 the movement of the arm 483 this arm carries a pin 555 arranged to engage a curved tail portion 557 of the lever 551.

As previously described, the toe rest 403 is forced yieldingly against the shoe through 25 springs 451 connecting the slide 443 to the left-hand end of the floating lever 459, and it will be evident that by reason of their relation to the floating lever these springs are also yieldable in response to resistance of the shoe to the pressure 30 of the heel rest against it. In order to afford increased insurance that shoes of different sizes will be firmly clamped by the toe and heel rests, the machine herein shown is further provided with means whereby the toe and heel rests are 35 thrust positively against the shoe after they have engaged it yieldingly. They are thereafter maintained in pressure-applying relation to the shoe by reason of the fact that by the operative movement of the arm 483 the double link 473, connected to the three-armed lever 465, and the 40 short arms 475 on the shaft 477 are moved into substantially parallel relation to provide what is in effect a straightened toggle to maintain the toe and heel rests in operative positions until the 45 arm 483 is swung reversely, i. e., to the right. Swinging movement of the arm 483 to its operative position is limited by a suitable stop (not shown).

The means for rendering the springs 451 ineffective, so that the toe rest and the heel rest will be forced positively against the shoe, is mounted on the upper end of the link 447 which carries the slide 443 to which the toe rest is connected. This means acts at a suitable time to render the link 55 447 positive in its action on the slide 443, as far as downward movement is concerned, so that further bodily downward movement of the floating lever 459 effected by the three-armed lever 465 will act positively both on the toe rest and 60 on the heel rest. The slide 443 has teeth 559 formed along its right-hand face and the link 447 has a bracket 561 extending toward the right from its upper end, in which bracket are slidably mounted three pawls 563, one only of which 65 is shown in the drawings. These pawls are arranged side by side and have teeth 565 on their left-hand ends. The teeth on the three pawls are in staggered relation heightwise of the machine and are arranged to engage the teeth 559 70 on the slide 443 at a certain time. The bracket 561 has a substantially horizontal guideway for the pawls 563, and a cover plate 567 fast on the bracket under the pawls supports them in the guideway. The bracket also has two coaxial 75

bearings 569 for a sliding rod 571, the bearings being spaced apart to provide room between them for a pawl-controlling yoke 573 secured by screws on the sliding rod. A pair of springs 575 between the left-hand bearing 569 and the yoke 573 tend to force the yoke and the rod 571 toward the right, and a depending portion 577 of the yoke acts on upstanding portions 579 of the pawls to move the pawls also in that direction, the movement of the yoke being limited by contact with the right-hand bearing 569. Springs 581 located between the ends of pockets formed in the yoke 573 and in the pawls 563 tend to force the pawls toward the left to engage their teeth with the teeth 559.

Until after the toe rest and the heel rest, however, have actually engaged the shoe the yoke 573 remains in the position shown in Figs. 10 and 11 with the pawls 563 out of engagement with the teeth 559, so that the toe and heel rests may be forced yieldingly against the shoe. At a suitable time thereafter the rod 571 is moved toward the left to permit the pawls 563 to engage the teeth 559 so that the slide 443 becomes connected to the floating lever 459 for positive downward movement. For this purpose there is threaded in the right-hand end of the rod 571 a stud 583 having an enlarged head, and the double link 473 which connects the three-armed lever 465 to the arms 475 on the shaft 477 has an ear 585 projecting upwardly from its left-hand end and provided with a pin having a roll 587 thereon. This roll lies in the same vertical plane, extending from right to left, as the head of the stud 583, this plane being far enough to the rear for the parts to clear the upper of a long-legged boot, and during the final portion of the movement of the link 473 toward the left in the jacking of the shoe the roll strikes against the head of the stud 583 and thus moves the yoke 573 toward the left to cause the pawls 563 to engage the teeth 559. The link 473 continues to move a little farther toward the left after the roll 587 has engaged the stud 583, as the arm 483 nears the position in which it remains while the shoe is clamped in the jack, and in this movement the link depresses the floating lever 459 a little farther through the three-armed lever 465. Since the heel rest 405 is connected by positive mechanism, including the bell-crank lever 537 and the links 533 and 541, to the right-hand end of the floating lever 459, and since the toe rest 403 is at this time positively coupled to the left-hand end of the floating lever as described, the further depression of this lever serves to force the toe rest and the heel rest positively against the shoe, whatever may be the size of the shoe, thus insuring against displacement of the shoe in the jack in the lasting operation. As previously stated, the toe rest and the heel rest are maintained in their operative positions by the straightening of the toggle device provided by the link 473 and the arms 475. The toe rest 403 is formed of rubber so that it may yield sufficiently to avoid damage to the shoe or the jack mechanism. The exact time in the jacking of the shoe when the toe rest and the heel rest are forced positively against it may be varied by adjusting the amount which the stud 583 is screwed into the rod 571, so as to vary the distance that the roll 587 has to travel before engaging the stud.

The above-described operating mechanism for the toe and heel rests is such as to permit them to engage and hold securely shoes of widely varying sizes and styles, the heel rest being adjustable in directions lengthwise of the shoe by the

crank arm 527 and the toe rest also being adjustable, if necessary, by the screw 427 in the manner previously explained. Portions of the operating mechanism for the toe and heel rests are displaced rearwardly of a vertical plane passing through these rests so as to permit the upper of a long-legged boot to hang freely down without being obstructed by any portion of this mechanism.

The left-hand end of the lower horizontal arm 413 of the jack casting has extending through it a vertical bore the axis of which is substantially in position to pass through the extreme toe end of the shoe clamped in the jack. A vertical pivot pin 589 extends upwardly into this bore from a socket member 591 which is supported by a pair of coaxial pins 593 in the upper end portion of a bifurcated link 595 the lower end portion of which straddles a part of the frame and is pivoted on a pin 597 in the frame (Fig. 1). The right-hand end of the lower horizontal arm of the jack casting carries a short pin 599 secured in a lug 601 depending therefrom, and a roll 603 is mounted on this pin. This roll rests on a flattened upper face of a forwardly and rearwardly extending rod 605 the opposite ends of which are secured to portions of the bifurcated upper end of an upstanding link 607 similar to the link 595 and substantially parallel to the latter. The lower end of the link 607 is bifurcated and straddles the top portion of an upstanding web 609 on the frame, and it is pivotally mounted on a pin 611 in the web. The jack casting may swing about the vertical pin 589 in a forward or rearward direction in the lasting operation in response to pressure of one or the other of the wipers 5 on the shoe so that the wipers may bear evenly on the opposite sides of the shoe. The two parallel links 595 and 607 are of the same length and their lower pivotal supports are at the same height. The links are tied together at their upper ends by means of a substantially horizontal rod 613 offset rearwardly from beneath the overhanging arm 409 of the jack casting. The rear end of the rod 605 extends through the right-hand end of the rod 613, and through the left-hand end of the latter extends the rear end of one of the pins 593 connecting the socket member 591 to the link 595.

Pivoted on the two pins 593 are the right-hand ends of a pair of substantially horizontal rods 615 extending to the left at the front and rear of the bearing through which the vertically movable trunk 3 extends, only one of these rods being visible in the drawings. The left-hand ends of these rods (Fig. 1) are pivoted on pins which extend from a trunnion member 616 into portions of the bifurcated upper end of a link 617 similar to the links 595 and 607 and parallel to them, the link 617 being pivoted at its lower end on a pin 619 secured in a lug 621 on the frame. A rod 623 extends toward the right and somewhat upwardly through the trunnion 616 and through vertical slots provided in the vertically movable trunk 3 and its bearing. The rod 623 also extends toward the left through the bifurcated portion of the lever 83 and has at its left-hand end a hand wheel 625 for turning it. Collars 627 are pinned to the rod 623 at the opposite sides of the trunnion 616. A coil spring 629 is located between the right-hand side of the trunnion and the corresponding collar 627 to provide a frictional resistance against undesired rotation of the rod 623. The right-hand end of the rod 623 is threaded into a socket member 630 which is pivotally mounted on a pin 631 secured in the upper end of an up-

wardly extending arm 633 of a bell-crank lever 635 mounted on a pin 637 in the frame. A second arm 639 of this bell-crank lever extends downward and toward the left and has an upper flat face covered by a leather pad 641. When no shoe is clamped in the jack this pad is arranged to engage a flattened lower face of a pin 643 which is secured in the frame. The two links 595 and 607 on which the jack is supported, and also the third link 617, are slightly inclined toward the right when there is no shoe in the jack, so that the weight of the jack acts through the rod 623 to maintain the arm 639 of the bell-crank lever 635 in contact with the pin 643. In this condition the jack is spaced to the right from the position which it occupies in the lasting operation a distance which may be varied by turning the rod 623 through its hand wheel 625. Since the rod 623 is prevented from moving lengthwise relatively to the trunnion 616 on the link 617 and is threaded in the socket member 630 the position of which is determined by the bell-crank lever 635 and the pin 643, the link 617 is necessarily swung by the turning of the rod and causes equal swinging movements of the jack-supporting links 595 and 607.

The jack is moved a predetermined distance toward the wipers simultaneously with the clamping of the shoe by the toe and heel rests. For this purpose the three-armed lever 465 has a downwardly extending arm 645 the lower end of which is connected by a link 647 to the lower end of a depending arm 649 of a bell-crank lever 651 which is mounted on a pin 653 located in the jack casting in substantially the same forward and rearward vertical plane as the pin 589 about which the jack swings. The second arm 655 of this bell-crank lever extends toward the left and is connected by a ball joint to the upper end of a link 657. The lower end of this link is connected, also by a ball joint, to the previously mentioned bell-crank lever 635, the point of connection between this link and the bell-crank lever being located substantially between the two arms of the latter. Accordingly, as the three-armed lever 465 is operated to clamp a shoe by means of the toe rest and the heel rest as previously described, it acts at the same time to swing the bell-crank lever 651 in a counter-clockwise direction and thereby to impart a similar movement to the bell-crank lever 635. It will be evident that this movement of the bell-crank lever 635 causes the link 617 to be swung toward the left, and since this link is connected to the links 595 and 607, these links are swung in the same direction and carry the jack with them. The jack is maintained in the position to which it is thus carried by the links through the same means which maintains the toe and heel rests in operative positions, i. e., by the toggle arrangement provided by the link 473 and the arms 475 connecting this link to the shaft 477.

Since the arm 483 is always moved to the same position in jacking a shoe of whatever size, the amount of movement of the jack toward the wipers will always be the same. This may, for example, be about two inches, so as to provide sufficient clearance between the wipers and the plate 401 to permit the shoe to be readily positioned against the plate without interference by the wipers. It will be evident, however, that the exact position to which the jack is moved may be varied as desired by means of the hand

wheel 625 which by its rotation varies the initial or starting position of the jack.

The links 595 and 607 supporting the jack may be, for example, about seven inches in length, and they swing but a short distance in moving the jack toward the wipers as above described. The links, moreover, are initially inclined but little from the vertical, and in moving the jack they swing substantially to vertical positions. In this operation, therefore, the upward movement of the upper ends of the links is so slight as to impart but a very small heightwise movement to the jack and shoe. Since the links are parallel, no tipping of the shoe takes place in the movement of the jack.

In order to provide further support for the jack an additional link 659, of the same length as the links 595 and 607 and parallel thereto, is pivoted on the frame between these links but is offset rearwardly therefrom. The link 659 has secured in spaced ears at its upper end a pin on which is pivoted an arm 661 extending toward the right and pivoted at its right-hand end on the rear end of the rod 605 to which the link 607 is connected as previously described. This insures that the link 659 will always remain parallel to the other jack-supporting links. The arm 661 has extending upwardly from it above the link 659 a pair of ears in which is secured a horizontal pin 663 (Fig. 2) which is substantially radial to the pin 589 on which the jack swings laterally, and on this pin 663 is mounted a roll 665 which bears against a track face 667 (Fig. 10) extending rearwardly and toward the left from the lower arm of the jack casting so that the roll and track face maintain their engagement during swinging movements of the jack about the pin 589.

The machine is further provided with a knee-operated jack release device 669 which the operator may use instead of the arm 483 to cause the jack to withdraw from the wipers and to release the shoe. This device includes a depending rod 671 secured adjustably in a bifurcated yoke 673 which is pivoted on the ends of the rod 605. The yoke 673 has a face 675 so arranged that when the device 669 is swung toward the right to unjack the shoe this face strikes against the lower end of a plunger 677 slidably mounted in the jack casting. On its upper end (Fig. 12) this plunger has a head arranged to strike against a finger 679 secured on the gear sector 479 and thus to turn the shaft 477 in a counter-clockwise direction to break the toggle 473, 475. When this occurs the toe and heel rests are returned to their starting positions and the weight of the jack parts, assisted by a spring hereinafter referred to, causes the jack to be returned toward the right to its inoperative position. As the link 447 to which the toe rest is connected rises during the unjacking of the shoe and as the roll 587 which causes the pawls 563 to engage the teeth on the slide 443 moves toward the right, these pawls are moved out of engagement with the slide by the action of the springs 575 on the yoke 573.

In order to assist the operator in beginning to move the jack toward or away from the wipers there is provided means which gives an impulse to the jack in the desired direction when the operator swings the arm 483 in the appropriate direction. This means comprises springs 681, 683 mounted loosely on the more forward one of the two previously mentioned rods 615 (Fig. 75

1) , these springs bearing respectively at their outer ends against collars 685, 687 clamped on the rod. A lug 689 fixed on the bearing for the trunk 3 surrounds the rod 615 between the inner ends of the springs, and the springs are spaced so far apart that when the jack is in its inoperative position the left-hand end of the right-hand spring 683 is spaced somewhat from the lug 689, while the right-hand end of the left-hand spring 681 abuts against the lug and is under compression. When the jack begins to move toward the wipers, therefore, the spring 681 expands and assists in such movement of the jack, and since the jack rises slightly as it moves in this direction this spring may conveniently be somewhat stronger than the spring 683. As the jack approaches its operative position the spring 681 moves out of engagement with the lug 689 and the spring 683 engages it and becomes somewhat compressed. Therefore, when the jack later begins to move toward inoperative position the spring 683 expands to assist in such movement of the jack.

By reason of the arrangement of the gear sectors 479, 481 and the length of the arm 483, this arm operates the jacking mechanism with considerable mechanical advantage, thus lightening the work of the operator. This arrangement, moreover, gives the desirable result that movement of the jack toward the left and toward the right is effected by swinging movements of the arm 483 in those same directions.

In the operation of the machine, briefly summarized, after clamping a shoe in the jack and advancing the jack to operative position by movement of the arm 483 in the manner described, the operator swings the lever 41 to the right by means of the handle 51 to advance and close the wipers about the toe below the edge of the shoe bottom, and then by use of the treadle 19 raises them to effect the upwiping operation. Thereafter, by further movement of the lever 41 and the handle 51 in the same direction the operator advances and closes the wipers over the shoe bottom to wipe the margin of the upper inwardly over the insole. As the wipers are thus advanced and closed prior to and after the upwipe, the rod 157 in the lower end of the lever 83 occupies such a position that the block 117 near the upper end of the lever does not bind on the bar 123, but the locking plate 193 near the lower end of the lever does bind on the rod 187 to prevent the lower end of the lever from moving toward the left. Accordingly, as the wipers are advanced and closed the lever 83 swings idly about the axis or fulcrum afforded by the two pins 183 upon which is mounted the yoke 185 carrying the locking plate 193. The lever 83 continues to move in this manner until the shoe offers such resistance to the movement of the wipers as to cause the handle 51 to swing relatively to the lever 41, by which movement of the handle the valve 85 is operated to admit oil to the cylinder 77 behind the piston 79. As the piston begins to move, it moves the rod 157 to the left and thereby acts through the bell-crank lever 171 to cause the block 117 to bind on the bar 123, so that the lever 83 will thereafter swing about the axis of the pin 115. Substantially at the same time also the locking plate 193 is released from binding upon the rod 187 so that the lower end of the lever 83 may move easily toward the left along the rod. Continued movement of the piston accordingly swings the lever

83 in a clockwise direction about the axis of the pin 115 to impart a more forcible thrust to the wipers, the spring 175 being tensioned as the lever thus swings.

When thereafter the operator wishes to retract the wipers from over the shoe bottom he begins to move the handle 51 toward the left. As soon as he begins to move the handle in this direction, or even ceases to pull it toward the right, the valve 85 ceases to admit oil to the cylinder 77 and opens the exhaust passage therefrom. The spring 159 then immediately acts to move the rod 157 and the piston a short distance toward the right to release the block 117 from binding on the bar 123, so that the spring 175 may act to swing the lower end of the lever 83 toward the right about the connection of the upper end of the lever with the rod 37, afforded by the pin 113. The locking plate 193 is also released at this time to the action of its spring plunger 194 so that it prevents any movement of the lower end of the lever 83 toward the left, although permitting it to move toward the right. If the operator swings the handle 51 to the left immediately after the wipers have been advanced and closed over the shoe bottom, he also swings the upper end of the lever 83 to the left at the same time that the spring 175 is acting to swing the lower end of the lever to the right as above described. Since the locking plate 193 at this time prevents movement of the lower end of the lever 83 toward the left, the swinging movement of the lever effected through the handle 51 takes place about the axis of the pins 183. This causes the rod 157 to move a little more rapidly toward the right with a pushing action on the piston, but since the spring 175 is also operating to move the piston in that direction the actual resistance thus offered to the movement of the lever 83 is likely to be so slight as to be negligible. In view, moreover, of the length of the lever 83, the relations of the parts to one another, and the fact that the wipers receive only a comparatively short retractive movement, the amount that the rod 157 is actually moved by the handle 51 is very small. If the operator permits the wipers to remain over the shoe bottom a substantial time, for example while applying a binder wire to hold the upper in lasted position, the spring 175 will in all probability have substantially completed the exhaust of the oil from the cylinder 77 before the lever 83 begins to swing about the axis of the pins 183. Therefore, the lever will at this time move the piston only very slightly farther toward the right, and the oil will not oppose any substantial resistance to this movement of the lever because the spring 175 will still be tending to move the piston in the same direction.

It will be understood from the foregoing description that when the operator advances and closes the wipers manually the lever 83 swings about a fulcrum so near its lower end as to make it easy to effect the movement of the wipers and the parts connected therewith without any substantial resistance from the hydraulic means, and it will also be understood that when this means becomes effective to impart a more forcible thrust to the wipers the lever 83 swings about another fulcrum near its upper end. It will further be evident that when the wipers are retracted the lever 83 swings once more about the fulcrum at its lower end and thus lightens the work of the operator as described.

Novel features of the jack herein disclosed are

the invention of William T. B. Roberts and are claimed in a copending application Serial No. 86,838, filed on June 23, 1936.

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

1. In a lasting machine, the combination with wiping means for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to operate said wiping means, and power-operated mechanism arranged to become effective after the wiping means has been forced inwardly against the upper by the operator to supplement the force applied to said means by the operator.

2. In a lasting machine, the combination with wiping means for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to operate said wiping means, and power-operated mechanism automatically operative in response to resistance of the shoe to the movement of the wiping means to supplement the force applied to said means by the operator.

3. In a lasting machine, the combination with end-lasting wipers for wiping the toe-end portion of upper materials into lasted relation to a last and to an insole on the last, of means movable by the operator to impart to said wipers wiping movement heightwise of the last and also advancing and closing movements to wipe the marginal portion of the upper materials inwardly over the insole, and power-operated mechanism for also imparting advancing and closing movements to the wipers after the operator has begun to move them inwardly over the insole.

4. In a lasting machine, the combination with end-lasting wipers for wiping the toe-end portion of upper materials into lasted relation to a last and to an insole on the last, of means movable by the operator to impart to said wipers wiping movement heightwise of the last and also advancing and closing movements to wipe the marginal portion of the upper materials inwardly over the insole, and fluid-pressure means for increasing the force with which the wipers are advanced and closed after the operator has begun to move them inwardly over the insole.

5. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to advance and close said wipers, and fluid-pressure means arranged to become effective after the wipers have been advanced and closed against the shoe by the operator to supplement the force thus applied to the wipers by the operator.

6. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to operate said wipers, and fluid-pressure means arranged to be rendered effective in response to resistance of the shoe to the movement of the wipers to supplement the force thus applied to the wipers by the operator.

7. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member arranged to be pulled by the operator to operate said wipers, and power means arranged to be rendered operative by the pull of the operator on said member to supplement the force thus applied to the wipers by the operator.

8. In a lasting machine, the combination with

end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member arranged to be pulled by the operator to operate said wipers, fluid-pressure means for also operating the wipers, and mechanism controlled by the pull of the operator on said member for admitting fluid to said fluid-pressure means to render it operative.

9. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by force applied thereto by the operator to advance and close said wipers, fluid-pressure means for also advancing and closing the wipers, and mechanism for admitting fluid to said fluid-pressure means in response to the force applied by the operator to said member and for releasing the fluid from said means as soon as the operator ceases to apply force to said member.

10. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a handle movable by force applied thereto by the operator to advance and close said wipers, fluid-pressure means comprising a member movable by pressure of fluid against it for also advancing and closing the wipers, mechanism for admitting fluid to said fluid-pressure means in response to force applied to said handle by the operator and for releasing the fluid from said means as soon as the operator ceases to apply force to the handle, and a spring for imparting return movement to said member when the fluid is released from the fluid-pressure means.

11. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a lever movable by the operator to advance and close said wipers, a handle by which the operator moves said lever, the handle being movable relatively to the lever in response to resistance of the shoe to the advancing and closing of the wipers, and fluid-pressure means arranged to be rendered operative by such movement of the handle relatively to the lever to supplement the force applied to the wipers by the operator.

12. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a lever movable by the operator to advance and close said wipers, a handle by which the operator moves said lever, the handle being movable relatively to the lever in response to resistance of the shoe to the advancing and closing of the wipers, fluid-pressure means for also advancing and closing the wipers, and a valve movable to admit fluid to said fluid-pressure means in response to the movement of the handle relatively to the lever.

13. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a lever movable by the operator to advance and close said wipers, a handle by which the operator moves said lever, the handle being movable relatively to the lever in response to resistance of the shoe to the advancing and closing of the wipers, fluid-pressure means comprising a cylinder and a piston therein for supplementing the force applied to the wipers by the operator, a valve for admitting pressure fluid to said cylinder, and mechanism for moving said valve to admit the fluid in response to the movement of the handle relatively to the lever.

14. In a lasting machine, the combination with

end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a lever movable by the operator to advance and close said wipers, another lever for also advancing and closing the wipers, and power means for operating said other lever after movement of the wipers by said first-named lever alone.

15. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a hand lever for advancing and closing said wipers, another lever for also advancing and closing the wipers, power means for operating said other lever, and mechanism for rendering said power means effective after the wipers have been advanced and closed against the shoe by the hand lever.

16. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a manually operated lever for advancing and closing said wipers, another lever for also advancing and closing the wipers, fluid-pressure means for operating said other lever, and mechanism controlled by resistance of the shoe to the movement of said manually operated lever for rendering said fluid-pressure means operative.

17. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to advance and close said wipers, a lever connected to the wipers to swing as they are operated by said member, and power means for operating said lever to apply additional force to the wipers after they have been forced against the shoe by said member, said lever being movable idly about one fulcrum as the wipers are advanced and closed by said member and being movable about a different fulcrum in the operation of the power means thereon.

18. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a manually operated member for advancing and closing said wipers, a lever connected to the wipers to swing as they are operated by said member, and fluid-pressure means for operating said lever to apply additional force to the wipers after they have been forced against the shoe by said member, said lever being movable idly about a fulcrum located substantially at one end thereof as the wipers are advanced and closed by said manually operated member and being movable about a different fulcrum located between its opposite ends in the operation of the fluid-pressure means thereon.

19. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a manually operated member for advancing and closing said wipers and for retracting them, a lever connected at one end to the wipers and movable about a fulcrum located substantially at its other end as the wipers are advanced and closed and are later retracted from the shoe by said member, fluid-pressure means arranged to act through said lever to apply additional force to the wipers after they have been forced against the shoe by said member, and means to cause the lever to swing about a different fulcrum located between its opposite ends in its operation by said fluid-pressure means.

20. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a manually operated member for advancing and closing said wipers, a lever connected at one end to the wipers and movable about a fulcrum located substantially at its other end as the wipers are operated by said member, and fluid-pressure means arranged to act on said other end of the lever to swing it about a fulcrum located between its ends for applying additional force to the wipers after they have been forced against the shoe by said member, said lever being movable about a fulcrum at the end thereof connected to the wipers in response to return of the fluid-pressure means to starting position.

21. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to advance and close said wipers, a lever connected to the wipers and arranged to swing about a fulcrum comparatively remote from its connection with the wipers as they are operated by said member, power means for operating said lever to apply additional force to the wipers after they have been forced against the shoe by said member, and mechanism controlled by said power means for establishing a fulcrum for said lever nearer its connection with the wipers than said first-mentioned fulcrum in the operation of the power means thereon.

22. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to advance and close said wipers, a lever connected to the wipers and arranged to swing about a fulcrum comparatively remote from its connection with the wipers as they are operated by said member, fluid-pressure means for operating said lever to apply additional force to the wipers after they have been forced against the shoe by said member, a bar along which the lever is movable as the wipers are operated by said member, a device carried by the lever for gripping said bar to establish a different fulcrum for the lever in the operation of the lever by the fluid-pressure means, and mechanism arranged to be operated by the fluid-pressure means to cause said device to grip the bar.

23. In a lasting machine, the combination with end-lasting wipers for wiping the marginal portion of upper materials into lasted position, of a member movable by the operator to advance and close said wipers, a lever connected at one end to the wipers and arranged to swing about a fulcrum located substantially at its other end as the wipers are operated by said member, fluid-pressure means for operating said lever to apply additional force to the wipers after they have been forced against the shoe by said member, mechanism controlled by said fluid-pressure means for establishing a fulcrum for said lever between its opposite ends in the operation of the fluid-pressure means thereon, and additional mechanism controlled by said fluid-pressure means for locking the end of said lever more remote from the wipers against swinging in one direction as the wipers are operated by said member and for unlocking it to permit it to swing as the fluid-pressure means operates thereon.

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