

March 20, 1945.

F. W. DE TOUR

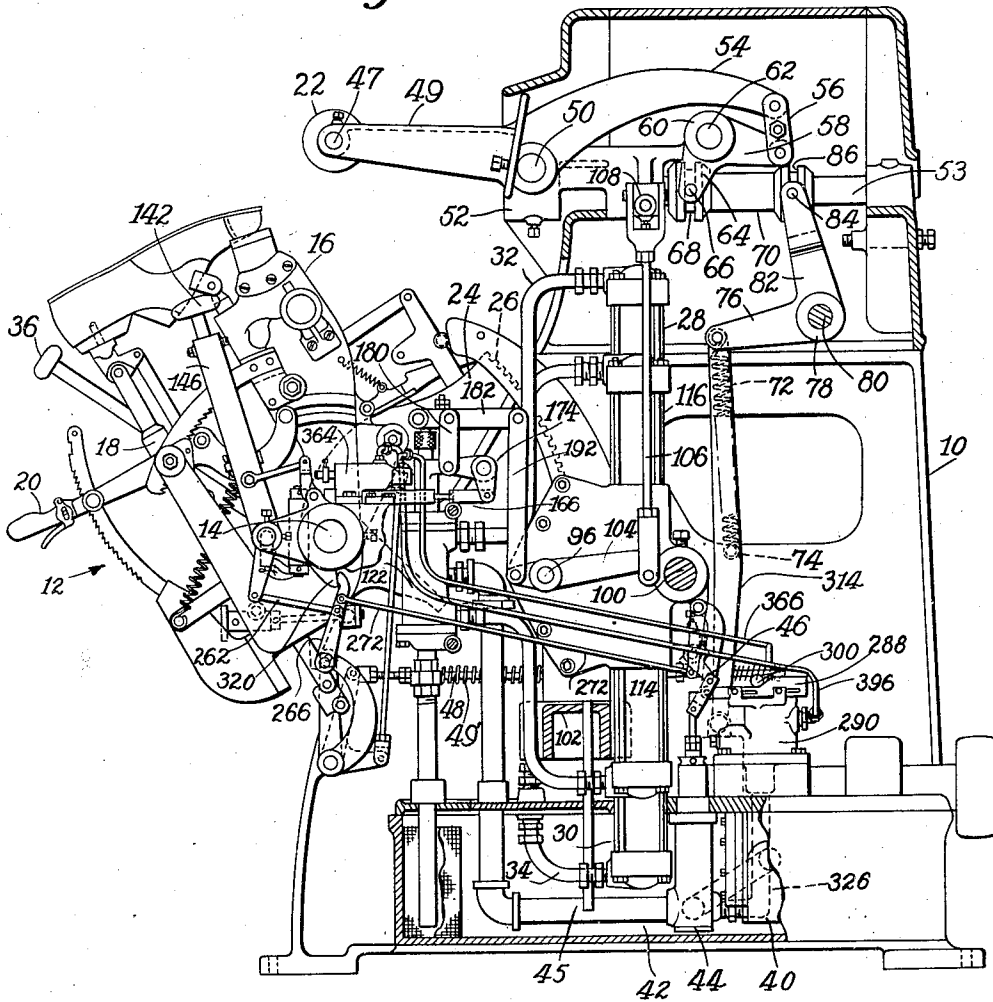
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MACHINE FOR OPERATING ON SHOES

Filed Aug. 20, 1943

5 Sheets-Sheet 1

Fig. 1



Inventor

Frank W. DeTour

By his Attorney

Wm. H. DeTour

March 20, 1945.

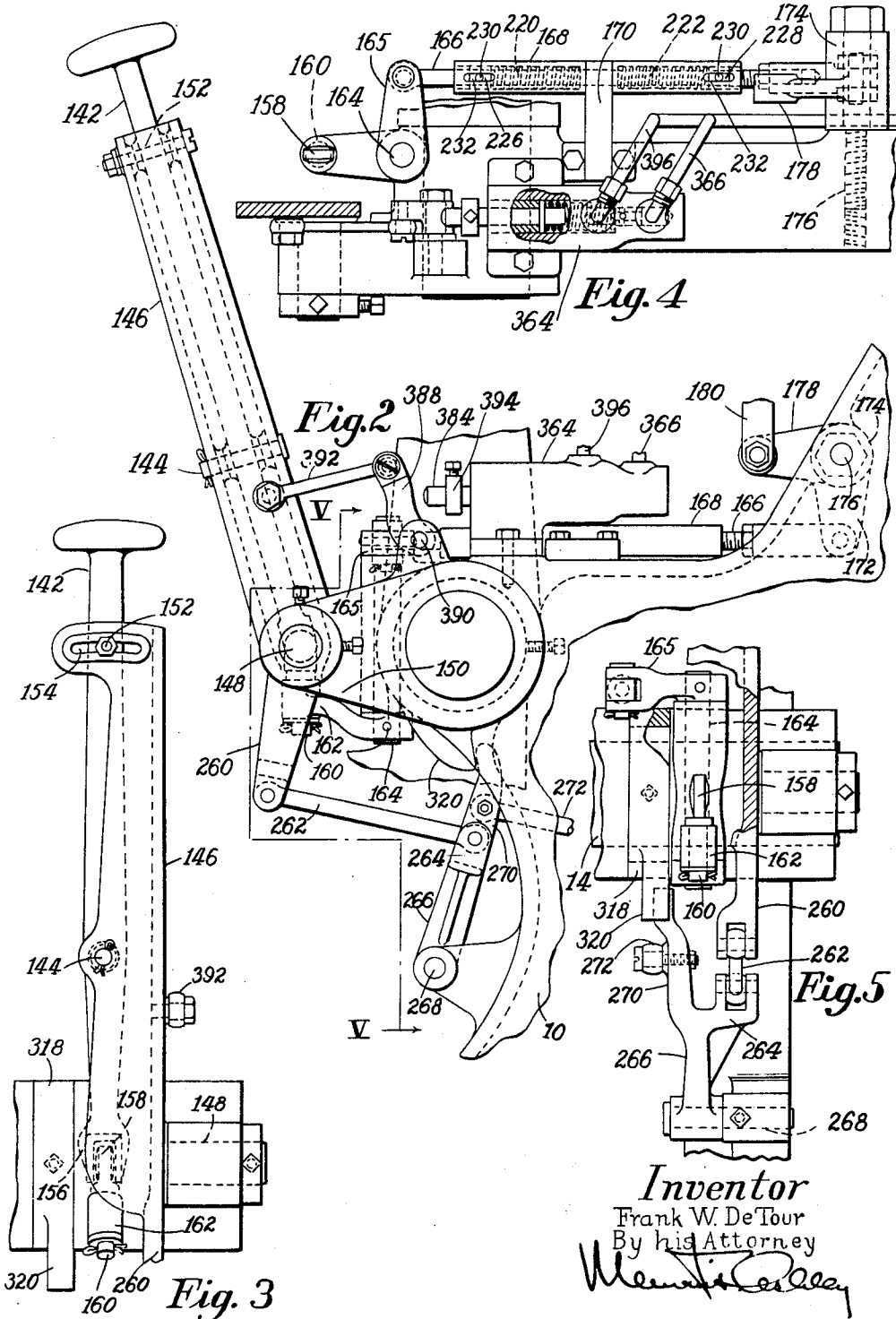
F. W. DE TOUR

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MACHINE FOR OPERATING ON SHOES

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Inventor

Frank W. DeTour

By his Attorney

Wm. H. Kelley

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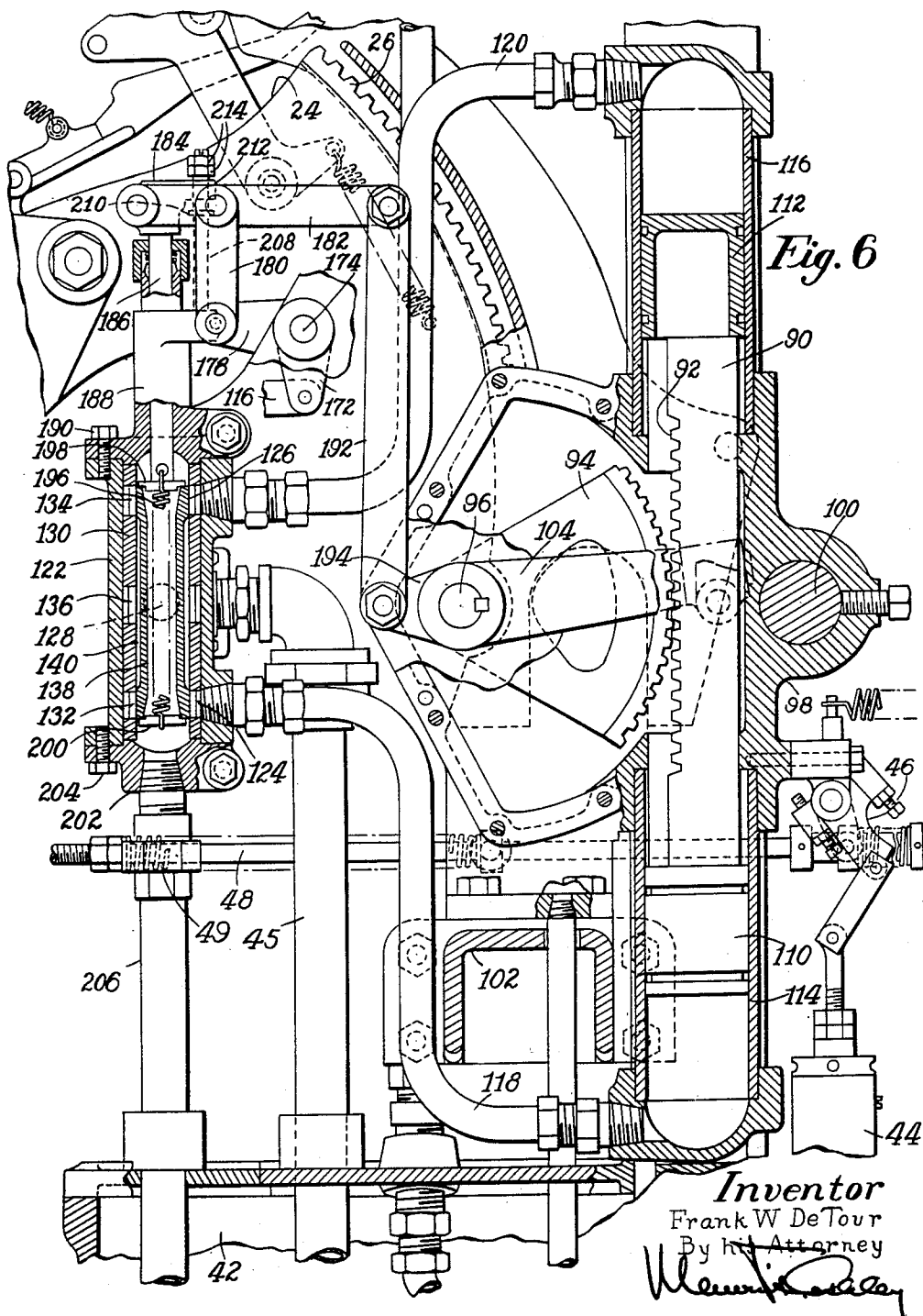
F. W. DE TOUR

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MACHINE FOR OPERATING ON SHOES

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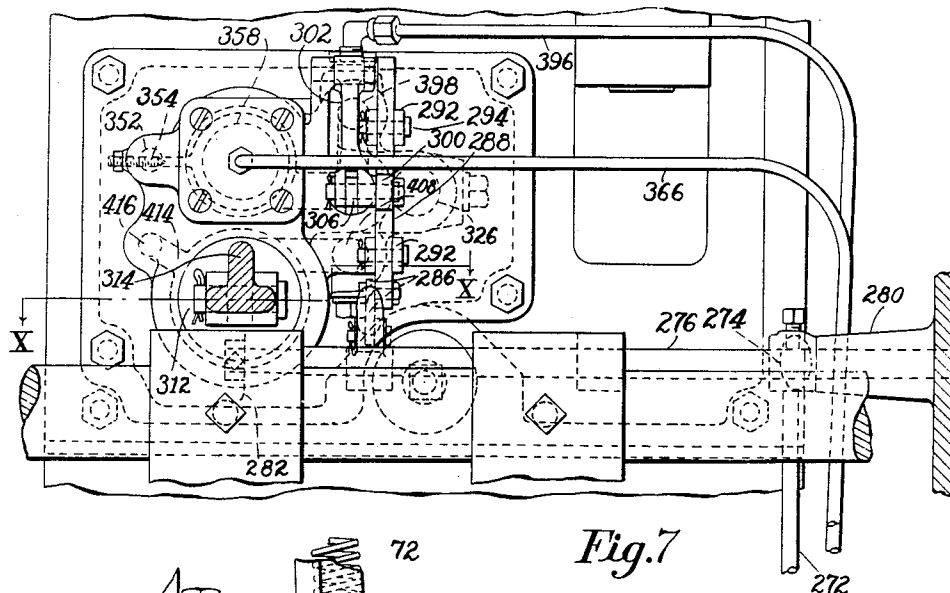


Fig. 7

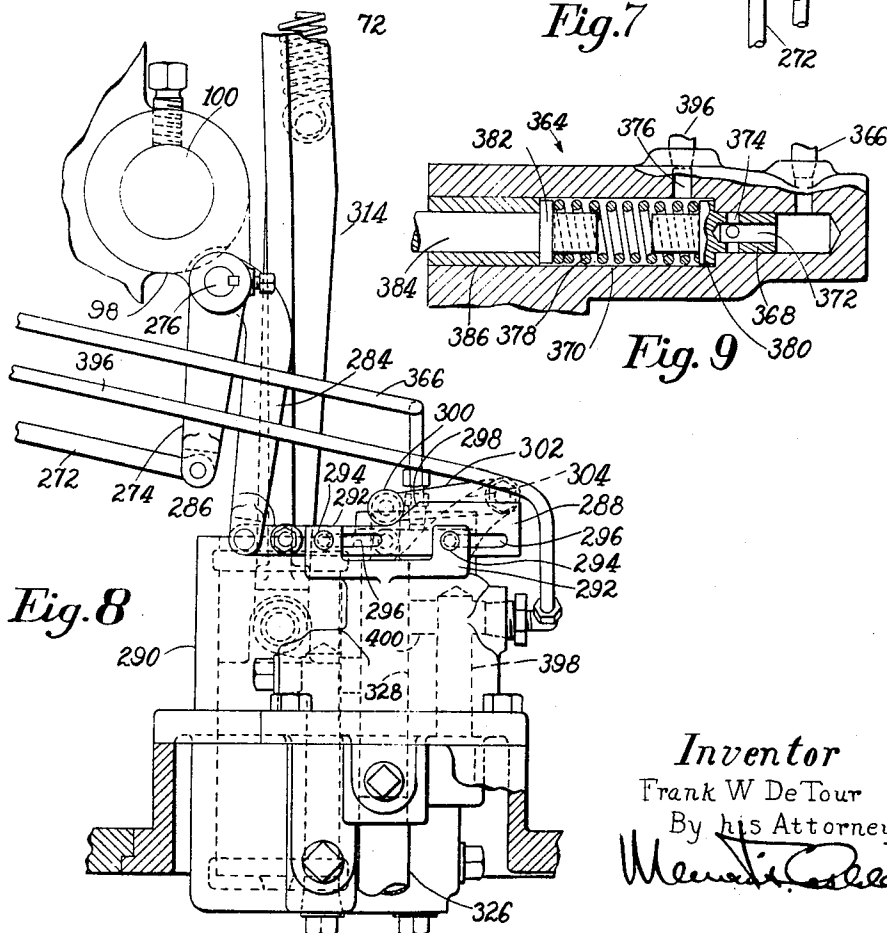


Fig. 8

Inventor
Frank W DeTour
By his Attorney
Wm. H. Carley

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F. W. DE TOUR

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MACHINE FOR OPERATING ON SHOES

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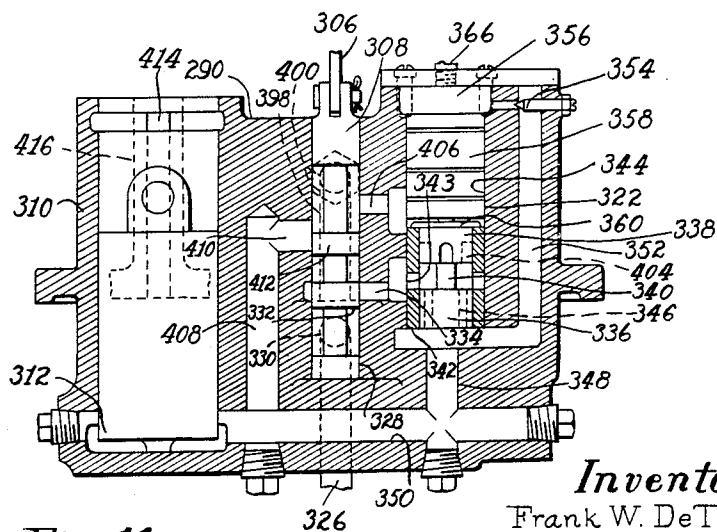
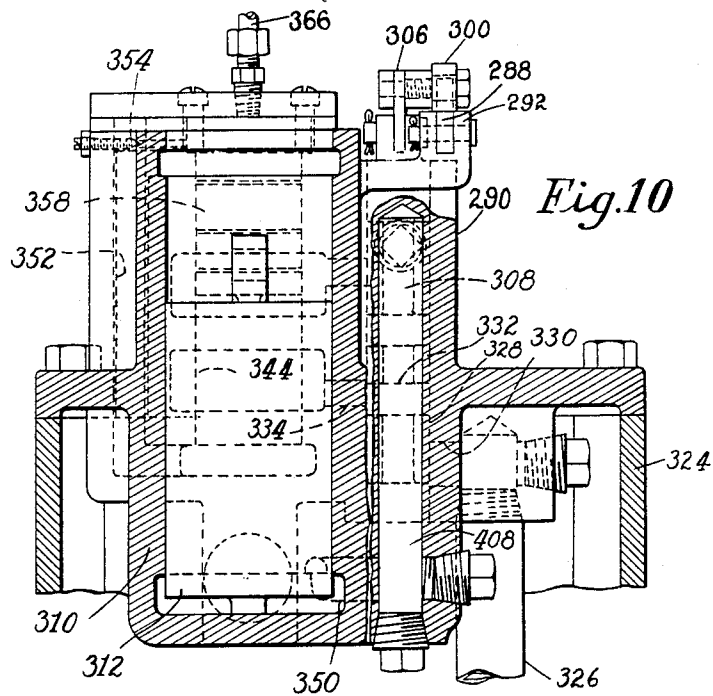


Fig. 11

Inventor

Frank W. DeTour

By his Attorney

UNITED STATES PATENT OFFICE

2,371,741

MACHINE FOR OPERATING ON SHOES

Frank W. De Tour, Beverly, Mass., assignor to
United Shoe Machinery Corporation, Flemington,
N. J., a corporation of New Jersey

Application August 20, 1943, Serial No. 499,348

35 Claims. (Cl. 12—34)

This invention relates to machines for operating on work pieces and, more particularly, to machines for leveling the bottoms of shoes. The invention is herein illustrated with reference to that type of machine having a shoe support arranged for swinging movements lengthwise of a shoe thereon to carry it below a leveling roll which thus acts progressively along the shoe bottom. The roll is arranged for movement heightwise of the shoe support and for tipping movements laterally of the support about an axis extending lengthwise of a shoe on the support. It will be understood, however, that the invention in some of its aspects is not limited to machines of the particular type illustrated.

An object of the invention is to provide a machine for operating on work pieces in which a tool is movable in angularly related paths relatively to a work support and in which the movement of the tool is governed by a single manually operated control member movable in different paths, movement of which in one path causes the tool to move along one path and movement of the control member in another path causes the tool to move along the other path.

More specifically, it is an object of the invention to provide a leveling machine having a leveling roll movable heightwise relatively to a work support and also arranged for tipping movements relatively to the work support, in which the heightwise and tipping movements of the roll are controlled by a single manually operated member.

For the purposes in view and in accordance with a feature of the invention, the tool or leveling roll is acted upon by two fluid-pressure-operated members, one of which effects movement of the roll toward the work support and the other one of which imparts tipping movements to the roll. These fluid-pressure-operated members are individually controlled by valves which are in turn controlled by a single manually operated member. This member moves along two different paths and is connected to the valves to operate one of them in response to movement of the member along one path and to operate the other valve in response to movement of the member along the other path.

In accordance with another feature of the invention, the leveling roll is normally held in an elevated position by a spring and is moved downwardly into engagement with a shoe bottom by a power-operated means under the control of the operator. As illustrated herein, the power-operated means is in the form of a fluid-pressure-operated member. The power applied to this member is readily varied by the operator thereby

to control the pressure applied by the roll to the shoe bottom. Provision is made for preventing downward movement of the leveling roll until the work support has been moved to carry the toe end of the shoe thereunder. Upon initial movement of the control member a predetermined extent the roll is moved down against the shoe bottom with a predetermined minimum pressure and upon further movement of the control member the pressure on the roll is increased in accordance with the extent of such further movement of the control member. Upon movement of the control member along a different path the leveling roll is tipped to an extent determined by the extent of such movement of the control member.

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

In the drawings,

Fig. 1 is a view in right-hand side elevation of a machine in which the invention is embodied, parts of the structure being broken away and other parts being shown in section;

Fig. 2 is an enlarged side elevation of the hand control member and associated parts for controlling the pressure of the leveling roll and the tipping of the roll;

Fig. 3 is a front elevation of the hand control member of Fig. 2;

Fig. 4 is a plan view partly in section of a portion of the mechanism shown in Fig. 2;

Fig. 5 is a section on the line V—V of Fig. 2;

Fig. 6 is a view, partly in right-hand side elevation and partly in section, showing the fluid-pressure means for imparting to the leveling roll its tipping movements with its controlling valve mechanism and operating connections;

Fig. 7 is a plan view partly in section of the fluid-pressure-operated mechanism for controlling the pressure of the leveling roll;

Fig. 8 is a side elevation partly in section of the mechanism shown in Fig. 7;

Fig. 9 is a vertical section through the control valve of Fig. 4;

Fig. 10 is a vertical section through the fluid-pressure-operated mechanism along the line X—X of Fig. 7; and

Fig. 11 is a sectional view through the fluid-pressure-operated mechanism, this mechanism being spread open better to show the arrangement of the parts.

The invention is illustrated herein as embodied in a machine of the type shown in Letters Patent

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of the United States 2,230,244 granted February 4, 1941, on an application filed in the names of F. V. Hart and J. J. Austin. As shown in that patent, the machine includes a main frame 10 within which is pivotally mounted a shoe support or jack 12 on a shaft 14. The jack includes a toe post 16 fast on the shaft 14 and a heel post 18 loosely mounted on the shaft 14. The toe and heel posts are locked together by an arm 20 after a shoe has been placed on the jack and after the heel post has been adjusted in position relatively to the toe post in accordance with the size of the shoe to be operated upon, as described more fully in the patent referred to above.

The jack 12 is moved by fluid-pressure mechanism to carry the shoe rearwardly and forwardly beneath a leveling roll 22 which is arranged to be held against the bottom of the shoe under a controllable heavy pressure by mechanism to be described. For thus moving the jack 12 an arm 24 surrounding the shaft 14 is secured to the toe post 16 of the jack and is provided with segmental teeth 26 formed on its rearward portion. The arm 24 is connected by gearing (not shown) with a fluid-pressure motor which includes cylinders 28 and 30 into which operating fluid is admitted selectively through pipes 32 and 34 from a valve controlled by a manually operated lever 36. Fluid under pressure is delivered to this valve from a pump 40 mounted in a reservoir 42 in the bottom of the frame 10, the fluid being delivered to the valve through a pressure-regulating valve 44 and a pipe 45. The valve 44 is set, when the machine is at rest, so that only a minimum pressure is delivered by the pump. Upon movement of the lever 36 rearwardly of the machine, fluid under pressure is delivered into the cylinder 30 to move the jack rearwardly of the machine. Suitable follow-up mechanism is provided so that the speed and extent of movement of the jack is proportional to the speed and extent of movement of the lever 36.

The pressure-regulating valve 44 is controlled by a toggle mechanism 46 which, upon being straightened, operates the valve so that fluid under high pressure is delivered therefrom. This toggle is arranged to be straightened by a rod 48 which is moved forwardly of the machine by a spring 49 upon the initial rearward movement of the jack. Accordingly, after a slight rearward movement of the jack, fluid under high pressure is available to move the jack further under the leveling roll 22. The mechanism which has been thus far briefly described is identical with that shown in the patent referred to above, to which reference may be made for a more complete disclosure of the construction.

The leveling roll 22 is mounted for turning movement on a rod 47 in a holder 49 pivotally connected at 50 to a carrier 52 mounted for tipping movements laterally of the machine about the axis of a forwardly and rearwardly extending shaft 53 supported in bearings at the top of the frame 10. The holder 49 has a rearwardly extending arm 54 connected by a short link 56 to the rearwardly extending arm 58 of a bell-crank lever 60 fulcrumed at 62 to the carrier 52. The bell-crank lever has a pair of downwardly extending arms 64 carrying trunnions 66 extending into a circumferential groove 68 formed in a bushing 70 slidably mounted on the shaft 53. The bushing 70 is normally held forwardly on the shaft 53, as shown in Fig. 1, with the leveling roll 22 in an elevated position by a spring 72 connected by a pin 74 to the machine frame 10 and

a forwardly extending arm 76 of a bell-crank-lever 78 pivotally mounted on a shaft 80 supported by suitable bearings in the frame 10. The bell-crank lever includes an upwardly extending arm 82 the upper portion of which is forked to straddle the bushing 70, the arms of the forked portion carrying trunnions 84 extending into a circumferential groove 86 in the bushing 70. The bushing 70 is moved rearwardly along the shaft 53 against the force of the spring 72 by fluid-pressure mechanism under the control of the operator to carry the roll into engagement with the shoe bottom by mechanism to be hereinafter described.

For imparting to the leveling roll 22 its tipping movements laterally of the shoe, there is provided a fluid-operated member 90 (Fig. 6) having formed thereon rack teeth 92 engaged by the teeth of the segment gear 94 fast to a laterally extending shaft 96 supported by suitable bearings formed in a bracket 98 which is supported by a laterally extending shaft 100 and a crossbar 102. Secured to the outer end of the shaft 96 is a lever 104 connected by an adjustable link 106 (Fig. 1) to a laterally extending arm 108 on the roll carrier 52 mounted for tipping movements laterally of the machine about the axis of the shaft 53. The member 90 has fast to its opposite ends pistons 110, 112 (Fig. 6) slidably mounted in cylinders 114, 116 supported by the bracket 98 and connected respectively at their lower and upper ends by pipes 118, 120 to a valve casing 122 in which there is valve mechanism movable by the operator to control the flow of fluid to one or the other of the cylinders 114, 116 and thus to control the direction of tipping movement imparted to the carrier 52 and the leveling roll 22. The pressure fluid is supplied from the pump 40 through the pressure-regulating valve 44 and the pipe 45.

The valve casing 122 is provided with ports 124 and 126 communicating respectively with the pipes 118 and 120 and a port 128 intermediate the ports 124 and 126 communicating with the supply pipe 45. A sleeve 130 in the casing 122 has ports 132, 134 opposite the ports 124, 126 and a port 136 opposite the port 128, each port in the sleeve 130 comprising an annular groove and holes connecting each groove with the interior of the sleeve. A hollow valve member 138 fitted to slide in the sleeve 130 has its opposite end portions flanged to close the ports 132, 134 and its intermediate portion reduced in thickness to form an annular chamber 140 communicating through the ports 136, 128 with the pipe 45.

The valve member is controlled manually by a hand lever 142 fulcrumed upon a pin 144 carried by the parallel walls of a U-shaped arm 146. This arm is in turn fulcrumed at its lower end on a shaft 148 carried by a boss 150 extending forwardly from the frame 10. For limiting the movements of the lever 142 within the arm, the lever, near its upper end, carries a bolt 152 which moves in slots 154 formed in the parallel walls of the arm 146. The lower end of the lever is forked at 156 to embrace the head 158 of a vertically extending pin 160 journaled in an arm 162 which is in turn secured to the lower end of a vertical shaft 164 journaled in the frame 10. The head 158 of the pin 160 is provided with spherical surfaces engageable with the forked end of the lever 142 to permit freedom of movement between the lever and the pin upon movement of the lever about its fulcrum 144 or upon movement of the arm 146 about the shaft 148.

To the upper end of the shaft 164 (Figs. 2, 4 and 5) is secured an arm 165 which is in turn connected to one end of an extensible link 166 which passes through a sleeve 168 held by a bracket 170 secured to the frame of the machine. The other end of the link 166 is connected to a downwardly extending arm 172 of a bell-crank lever 174 fulcrumed at 176 in the machine frame. The other arm 178 of the bell-crank lever is connected by a pair of links 180 to a lever 182, one end of which is pivotally connected to the head 184 of a rod 186 that extends downwardly through a bore in a cap piece 188 secured to the upper end of the casing 122 by screws 190. At its opposite end the lever 182 is connected to the upper end of a link 192, the lower end of which is pivotally connected to a forwardly extending arm 194 on the lever 104. The rod 186 is held by a relatively stiff spring 196 in engagement with a crossbar 198 that engages the top face of the valve member 138, the spring 196 extending downwardly through the hollow valve member 138 and being connected at its lower end to a crossbar 200 engaging the bottom face of the valve member. A cap piece 202 connected to the casing 122 by screws 204 for closing the lower end of the casing has downwardly extending therefrom a pipe 206 to provide a passage for the exhaust of the fluid from one or the other of the cylinders 114, 116 through the ports controlled by the valve member 138 and the interior of the casing 122 to the reservoir 42.

From the above description it will be evident that the operator may by movement of the hand lever 142 to the right move the valve member 138 downwardly in the casing 122 to open the ports 132, 124 and thereby admit pressure fluid into the cylinder 114 to cause upward movement to be imparted to the member 90 and thus to tip the leveling roll in a counterclockwise direction, as viewed from the front of the machine, about the axis of the shaft 53; or by movement of the hand lever 142 to the left he may move the valve member 138 upwardly to open the ports 134, 126 and thereby admit pressure fluid into the cylinder 116 to cause downward movement to be imparted to the member 90 to tip the leveling roll in a clockwise direction about the axis of the shaft 53. As previously pointed out, the member 90 is connected to the roll carrier 52 through the segment gear 94, rock shaft 96, lever 104 and adjustable link 106, and as the lever 104 is swung in either direction by the movement of the member 90 it tends to swing the lever 182 about its pivotal connection to the links 180 in a direction to return the valve member 138 to the position shown in Fig. 6 and thus to stop the tipping movement of the roll 22 unless the operator is at the same time moving the hand lever 142 in a direction to counteract this tendency to close the valve 138. It will thus be evident that, by means of the hand lever 142, the operator may cause the roll 22 to be tipped laterally of the shoe in either direction at any desired inclination in operating on any portion of the shoe bottom. It will also be evident that the roll may be tipped at different rates of speed depending upon how fast the hand lever 142 is swung by the operator to open the ports 124, 126. In order to limit the extent to which the valve 138 may be moved to open with the port 124 or the port 126, and thus to determine the maximum speed at which the roll may be tipped in either direction, there is threaded onto the cap piece 188 an adjustable rod 208 having formed thereon a collar 210 which limits downward

movement of the valve 138 to open the port 124 by engagement with an arm 212 on the head 184 of the rod 186. The rod 208 extends upwardly through an opening in the projection 212 and threaded on the upper end of the rod is a nut and lock nut 214 that limits upward movement of the valve 138 to open the port 126. If the rate of speed of the hand lever 142 is accelerated fast enough in either direction to move the arm 212 into engagement with one or the other of the stops 210, 214 the roll will be tipped at the maximum rate of speed. It will be evident also that in the event of an abnormal acceleration in the speed of movement of the hand lever in either direction, engagement of the arm 212 with one or the other of said stops will retard further movement of the hand lever.

Provision is made for insuring that the leveling roll will be moved to a substantially horizontal position when the lever 142 is released by the operator so that the roll will be properly positioned in its angular relation to the shoe bottom at the beginning of the leveling operation. For this purpose, springs 220 and 222 (Fig. 4) surround the link 166 within the sleeve 168 and at their adjacent ends engage shoulders formed within the central portion of the sleeve 168. The outer ends of the springs engage collars 226 and 228 respectively near the outer ends of the link 166. These collars carry pins 230 which extend through slots 232 in the sleeve 168 to prevent turning of the collars with respect to the link 166 when the operator releases the lever 142. At the end of the leveling operation, the springs 220 and 222 will cause the link 166 to assume a mid position with respect to the sleeve 168, in which the lever 142 is in a mid position with respect to its movements laterally of the machine. In this position of the lever the leveling roll is in a substantially horizontal position. From the foregoing, it will be seen that the operator may by movement of the hand lever 142 laterally of the machine control the direction, extent and speed of tipping movement of the leveling roll which is moved into positions corresponding to the position of the hand lever laterally of the machine; and the action of the springs 222, in moving the hand lever to a mid position upon its release by the operator, will cause a corresponding movement of the leveling roll to a mid or horizontal position.

Vertical movements of the leveling roll 22 and the pressure applied by the leveling roll to the shoe bottom are controlled by moving the control lever 142 and with it the arm 146 about the shaft 148 in the direction of movement of the jack. The arm 146 includes a depending portion 260 which is connected by a link 262 (Figs. 2 and 5) to an arm 264 of a vertically extending lever 266 pivoted at 268 to the machine frame. The lever 266 includes a second arm 270 connected by a rearwardly extending link 272 to an arm 274 (Figs. 7 and 8) secured to a shaft 276 extending transversely of the machine frame and supported by bearings 280 and 282. Also secured to the shaft 276 is a depending arm 284 connected by a link 286 to the forward end of a cam plate 288 constrained for horizontal sliding movements along the top of a fluid-pressure-motor housing 290 by U-shaped brackets 292 carrying pins 294 extending through slots 296 in the cam plate. This cam plate is provided with an inclined cam surface 298 against which bears a roll 300 journaled at the forward end of an arm 302 pivotally connected to a bracket 304 extending upwardly

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from the housing 290. Upon movement of the control lever 142 rearwardly of the machine from the position illustrated in Fig. 1, the cam plate 288 is moved forwardly by the aforescribed connections to the control member so that the cam surface 298 acts on the roll 300 to move it upwardly, thus moving the forward end of the arm 302 upwardly.

The forward end of this arm is connected by a link 306 (Fig. 11) to the upper end of a valve 308 which admits fluid under pressure, as will be fully explained, into a cylinder 310 below a piston 312, thus causing the piston to move upwardly. This piston is connected by an arm 314 (Figs. 1 and 8) to the forwardly extending arm 16 of the bell-crank lever 78. Consequently, as the control lever is moved rearwardly of the machine and the piston 312 is moved upwardly, it acts through the arm 314 and the bell-crank lever 78 to move the bushing 70 rearwardly along the shaft 53 which causes downward movement of the leveling roll 22 into engagement with the shoe bottom.

In order to prevent the leveling roll from being prematurely moved downwardly, provision is made for preventing sufficient rearward movement of the control lever 142 to cause the roll to move downwardly until the jack has been moved rearwardly from the position shown in Fig. 1 to a position in which the toe end of the shoe is beneath the leveling roll. For this purpose a sleeve 318 (Fig. 5), movable with the jack about the axis of the shaft 14, has a downwardly extending projection 320 engageable with the upper end of the arm 270 of the lever 266. When the jack is in its forward or loading position, the projection 320 holds the upper end of the lever 266 in its rearward position, as shown in Figs. 1 and 2, thus preventing the operator from moving the control lever 142 rearwardly of the machine to cause the leveling roll 22 to be moved downwardly. However, after the jack has been moved rearwardly a sufficient distance to carry the toe end of the shoe under the leveling roll, the control lever 142 may be moved rearwardly a sufficient extent to operate the valve 308 (Fig. 11) to admit pressure fluid into the cylinder 310 below the piston 312.

The fluid-pressure-operated motor for moving the leveling roll downwardly against the force exerted by the spring 72 includes in addition to the cylinder 310, piston 312 and the valve 308, a pressure-regulating valve 322 (Fig. 11) these being all contained in the housing 290 supported on walls 324 extending upwardly from the top wall of the fluid reservoir 42. Pressure fluid passes from the pressure-regulating valve 44 (Fig. 1) through a pipe 326 into a valve chamber 328 housing the valve 308, by way of an inlet opening 330. With the valve in the position shown in Fig. 11, pressure fluid is trapped in the lower portion of the valve chamber by an element 332 of the valve. However, upon upward movement of the valve in response to a rearward movement of the control lever 142 the pressure fluid passes from the valve chamber 328 through a port 334 to the pressure-regulating valve 322. This valve includes a pair of spaced cylindrical elements 336 and 338 connected by a stem 340 and slidable within a bushing 342 provided with inlet ports 343 and tightly received within a cylinder 344 forming the valve chamber. The lower valve element 336 of the pressure-regulating valve is provided with vertical ports 346 which permit the pressure fluid to flow downwardly through a

passageway 348 into a horizontally extending passageway 350 leading to the bottom of the cylinder 310. Consequently, upon upward movement of the valve 308 pressure fluid flows into the bottom of the cylinder 310 to elevate the piston 312 and depress the leveling roll.

The fluid passing through the ports 346 of the pressure-regulating valve also flows into a vertical passageway 352 past a needle valve 354 into a chamber 356 at the top of the cylinder 344. The fluid in the chamber 356 acts upon a piston 358 connected to the valve element 338 and tends to maintain the valve in its lowermost position with a flange 360 of the element 338 resting upon the top of the bushing 342. The fluid pressure also exerts a force against the under surface of the element 338 of the valve tending to move the valve upwardly, but the valve will stay in the position illustrated until this pressure rises sufficiently to overcome the pressure exerted downwardly on the piston 358. This pressure will never rise sufficiently as long as the fluid is trapped in the chamber 356, but if the fluid be permitted to escape from this chamber there will be sufficient pressure by reason of the pressure drop through the restricted orifice at the needle valve 354 to cause an upward movement of the pressure-regulating valve 322 until the inlet ports 343 are shut off by the lower element 336 of the valve. When this happens the flow of pressure fluid to the cylinder 310 is cut off and the pressure exerted on the leveling roll is thus regulated. The escape of fluid from the chamber 356 above the pressure-regulating valve is controlled by a valve 364 (Figs. 1, 4 and 9) connected by a pipe 366 to the chamber 356.

The control valve 364 includes a valve member 368 slidable within a reduced portion of a valve chamber 370. The valve member 368 is provided with a bore 372 extending partially therethrough and communicating with radial ports 374 which provide communication between the pipe 366 and an outlet opening 376 upon movement of the valve member to the left from the position shown in Fig. 9 to uncover the ports 374. The valve member is normally held in the position shown, in which the ports 374 are closed by the adjacent wall of the valve chamber, by a spring 378 acting between a flange 380 of the valve member and a flange 382 on a stem 384 slidable within a bushing 386 fitted into the left end of the valve chamber. This stem projects forwardly from the valve chamber, as shown in Fig. 2, to be engaged by an arm 388 pivoted at 390 to the frame of the machine. The upper end of the arm is connected by a link 392 to the U-shaped arm 146 so that upon rearward movement of the control lever 142 the valve stem 384 is moved rearwardly to compress the spring 378 of the valve 364. The amount that the spring may be compressed is limited by a collar 394 clamped to the valve stem 384 engageable with the forward face of the valve housing and this accordingly limits the rearward movement of the control lever 142.

From the foregoing it will be seen that the pressure fluid, upon being admitted to the cylinder 310 by upward movement of the valve 308 also passes through the pipe 366 to the control valve 364. The pressure acts upon the valve member 368 to move it to the left against the force of the spring 378 so that after the pressure has increased sufficiently the valve member is moved to the left permitting the fluid to pass to the exhaust opening 376. Accordingly, there is an immediate drop in pressure above the piston

358 of the pressure-regulating valve 322, whereupon the pressure exerted upon the lower surface of the cylindrical member 338 of the valve moves it upwardly until the ports 343 have been cut off, thus limiting the pressure exerted on the lower face of the piston 312. The exhaust opening 376 of the control valve 364 is connected by a pipe 396 to a vertical passageway 398 in the housing 290 (Fig. 8) which is open at its lower end to the fluid reservoir. This passageway is also connected by a port 400 with the upper end of the chamber 328 of the valve 308.

The element 338 of the pressure-regulating valve 322 is provided with ports 404 in its under side which provide communication between the space below the valve element and an exhaust port 406, when the valve is moved upwardly beyond the position in which the ports 343 in the bushing 342 are first cut off. The exhaust port 406 communicates with the upper portion of the valve chamber 328 which in turn communicates with the exhaust passageway 398. During the operation of the machine, when the stem 384 of the control valve 364 is moved from a position in which the spring 378 is compressed, to the left as viewed in Fig. 4, the valve member 368 will be moved to exhaust position by the pressure acting thereon thereby decreasing the pressure in the chamber 356, whereupon the pressure-regulating valve will be moved upwardly by the pressure acting on the element 338. Because of the excess of the pressure below the piston 312 and in the passageways 348 and 350, the valve member 322 will move upwardly until the exhaust ports 404 communicate with the port 406. This permits the pressure fluid to exhaust through the ports 346 of the element 336 and the ports 404 and 406 rapidly, so that the roll pressure will respond almost instantaneously to the operation of the control valve 364. Were it not for the exhaust ports 404 and 406, the pressure fluid below the piston 312 would all have to exhaust by way of the needle valve 354 and the control valve 364 and the response would not be sufficiently rapid for satisfactory operation.

In order to permit exhaust of the pressure fluid below the piston 312 when the valve 308 is moved back to closed position, as shown in Fig. 11, so that the roll may be lifted from the shoe bottom, a passageway 408 and a port 410 provide communication with the upper portion of the valve chamber 328. Fluid is prevented from passing from the port 410 into the exhaust port 400 by an element 412 of the valve 308 when the valve is moved upwardly to open the port 334 to the pressure fluid from the pipe 326 and the inlet port 330 so that the pressure fluid will flow through passageways 346 of the valve element 336 to the cylinder 310 and the pressure will build up below the piston 312 in accordance with the setting of the control valve 364. The upper end of the cylinder 310 is provided with an exhaust port 414 which leads to a pipe 416 by which any fluid which may leak past the piston 312 may return to the reservoir.

It will be noted in Fig. 2 that when the control lever 142 is in its forwardmost position the arm 388 is spaced from the adjacent end of the valve stem 384. Consequently, during the initial rearward movement of the control lever no movement is imparted to the valve stem. However, during this movement the valve 308 is lifted, as heretofore described, to admit pressure fluid into the cylinder 310 below the piston 312. The spring 378 of the control valve 364 is at this time

in its most expanded condition so that after the leveling roll is pressed against the shoe bottom with a predetermined minimum pressure, the valve member 368 of the control valve will move to exhaust position. Upon further rearward movement of the control lever 142 after the roll has been forced against the shoe bottom with the minimum pressure, the stem 384 of the control valve 364 is moved rearwardly to compress the spring 378 an amount determined by the extent of rearward movement of the control lever. Thus, the force required to move the valve member 368 to exhaust position will vary in accordance with the extent of movement of the control lever after its initial movement, which in turn controls the roll pressure in accordance with the extent of movement of the control lever.

It will thus be seen that the roll pressure is controlled by the forward and rearward movements of the control lever 142, the extent of which determines the pressure exerted by the roll upon the shoe bottom. By moving the lever 142 transversely of the machine, the roll is tipped with respect to the shoe bottom, the direction and extent of tipping movement depending upon the direction and extent of movement of the lever, as heretofore explained. Accordingly, by the use of a single manually operated lever the tipping of the roll and the pressure exerted by the roll on the shoe bottom are readily and individually controlled. Whereas a spring is provided for lifting the roll out of engagement with the shoe bottom when the control lever is in its forwardmost position, the roll is moved by fluid pressure against the shoe bottom in response to rearward movement of the control lever. By controlling the tipping of the roll and the roll pressure with a single hand lever, the operator with his other hand may control the movement of the jack, and no treadle or extra control member is required for lifting the roll from the shoe bottom, as in prior machines.

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

1. In a machine for operating on work pieces, a work support, a tool mounted for movement along two angularly related paths relatively to the work support in operating upon a work piece on the support, separate power-operated means for moving the tool along each of said paths, and means for controlling said power-operated means including a member carried by the machine independently of said tool and movable by the operator along one path for starting one of said power-operated means in operation to move the tool variably in one direction or the other along one path in accordance with the direction and extent of movement of the control member, said member being movable along a different path to start the other one of said power-operated means in operation.

2. In a machine for operating on work pieces, a work support, a tool mounted for movement along two angularly related paths relatively to the work support in operating upon a work piece on the support, separate power-operated means for moving the tool along each of said paths, and means for controlling said power-operated means including a member carried by the machine independently of said tool and movable by the operator laterally of the machine for starting one of said power-operated means in operation to move the tool variably in one direction or the other along one path in accordance with the

direction and extent of movement of the control member, said member being movable forwardly and rearwardly of the machine to start the other one of said power-operated means in operation.

3. In a machine for operating on work pieces, a work support, a tool mounted for movement along two angularly related paths relatively to the work support in operating upon a work piece on the support, separate power-operated means for moving the tool along each of said paths, means for controlling said power-operated means including a member carried by the machine independently of said tool and movable by the operator laterally of the machine for starting one of said power-operated means in operation to move the tool variably in one direction or the other along one path in accordance with the direction and extent of movement of the control member and being movable forwardly and rearwardly of the machine to start the other one of said power-operated means in operation, and means mounting said member for movement forwardly and rearwardly of the machine at any point in its movement laterally of the machine and for movement laterally of the machine at any point in its movement forwardly and rearwardly of the machine.

4. In a machine for operating on work pieces, a work support, a tool, means for moving said tool relatively to said work support to operate on different portions of a work piece thereon, means acting on said tool to vary the pressure exerted thereby on the work piece, and a single operating member carried by the machine independently of said tool for movement along two paths and arranged to control one of said means in response to movement of the operating member along one path and to control the other of said means in response to the movement of the operating member along the other path.

5. In a machine for operating on work pieces, a work support, a tool, means for moving said tool relatively to the work support to operate on different portions of a work piece thereon, means acting on said tool to vary the pressure exerted thereby on the work piece, a single operating member carried by the machine independently of the tool for movement along two paths, means operated by said member in response to its movement along one path for controlling said first means to move the tool a distance depending upon the extent of movement of said member, and means operated by said member in response to its movement along the other path to control the second-named means to vary the pressure of the tool on the work.

6. In a machine for operating on work pieces, a work support, a tool engageable with a work piece on the support, means for moving said work support relatively to said tool to cause the tool to operate progressively along the work piece, a control member movable along two angularly related paths, means for moving the tool to various angular positions relatively to the support in response to movement of the control member along one path, and means for moving the tool toward and away from the support to vary the pressure of the tool on the work in response to movement of the control member along the other path.

7. In a machine for operating on work pieces, a work support, a tool engageable with a work piece on the support, means for moving said work support relatively to said tool to cause the tool to operate progressively along the work piece, a

control member movable along two paths, means responsive to movement of the control member along one path for moving the tool angularly relative to the work support an amount dependent upon the extent of movement of the control member, and means for moving the tool toward and away from the support to vary the pressure of the tool on the work in response to movement of the control member along the other path.

8. In a machine for operating on work pieces, a work support, a tool engageable with a work piece on the support, means for moving said work support relatively to said tool to cause the tool to operate progressively along the work piece, a control member movable along two paths, means responsive to movement of the control member along one path for moving the tool angularly relative to the work support at a speed dependent upon the rate of movement of said member, and means for varying the pressure exerted by the tool on the work in response to movement of the control member along the other path.

9. In a machine for operating on work pieces, a work support, a tool, fluid-pressure-operated means for moving the tool relatively to the work support to operate on different portions of a work piece thereon, fluid-pressure-operated means acting on said tool to vary the pressure of the tool on the work piece, a control member carried by the machine independently of said tool and movable along different paths, means operated by the control member in response to its movement along one path for controlling the first fluid-pressure-operated means to move the tool a distance corresponding to the extent of movement of the control member, and means operated by the control member in response to its movement along another path to control the second fluid-pressure-operated means to vary the pressure of the tool on the work piece dependent upon the extent of movement of the control member.

10. In a leveling machine, a shoe support, a leveling tool, means for effecting relative movement of the shoe support and the leveling tool in directions lengthwise of the shoe on the support to cause the tool to operate progressively along the shoe bottom, spring means acting on said leveling tool to maintain it initially in a position above that occupied by it when in engagement with the shoe bottom, and fluid-pressure-operated means for moving the leveling tool against the force exerted by the spring means into engagement with the shoe bottom.

11. In a leveling machine, a shoe support, a leveling tool, means for effecting relative movement of the shoe support and the leveling tool in directions lengthwise of the shoe on the support to cause the tool to operate progressively along the shoe bottom, spring means acting on said leveling tool to maintain it initially in a position above that occupied by it when in engagement with the shoe bottom, fluid-pressure-operated means for moving the leveling tool against the force exerted by the spring means into engagement with the shoe bottom, and means for regulating the pressure of the operating fluid applied to said fluid-pressure-operated means to control the pressure exerted by the roll on the shoe bottom.

12. In a leveling machine, a shoe support, a leveling tool, means for effecting relative movement of the shoe support and the leveling tool in directions lengthwise of the shoe on the support to cause the tool to operate progressively along the shoe bottom, spring means acting on said

leveling tool to maintain it initially in a position above that occupied by it when in engagement with the shoe bottom, fluid-pressure-operated means for moving the leveling tool against the force exerted by the spring means into engagement with the shoe bottom, means for regulating the pressure of the operating fluid to said fluid-pressure-operated means to control the pressure exerted by the roll on the shoe bottom, and means for rendering said fluid-pressure-operated means inoperative in response to relative movement of the shoe support and the leveling tool to carry the shoe out from under the leveling tool.

13. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling tool to operate progressively along the shoe bottom, means for varying the position of the tool relatively to the support to operate on different portions of the shoe bottom, means for varying the pressure exerted by the tool on the shoe bottom, and a single manually operated member for controlling both of said means.

14. In a leveling machine, a leveling tool, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling tool to operate progressively along the shoe bottom, power-operated means for moving the tool relatively to the support to operate on different portions of a shoe bottom, power-operated means for controlling the pressure of the tool on the shoe bottom, a control member movable along different paths, means operated by the control member in response to its movement along one path to control the first power-operated means, and means operated by the control member in response to its movement along another path for controlling the operation of the last-named power-operated means.

15. In a leveling machine, a leveling tool, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling tool to operate progressively along the shoe bottom, means operated by the pressure of fluid against it for moving the tool relatively to the support to operate on different portions of the shoe bottom, means operated by pressure of fluid against it for controlling the pressure of the tool against the shoe bottom, and a single operating member in control of both said pressure-fluid-operated means.

16. In a leveling machine, a leveling tool, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling tool to operate progressively along the shoe bottom, means operated by the pressure of fluid against it for moving the tool relatively to the support to operate on different portions of the shoe bottom, means operated by pressure of fluid against it for controlling the pressure of the tool against the shoe bottom, a control member movable along two different paths, means operated by the control member in response to movement along one path for controlling said first-named means, and means operated in response to movement of the control member along the other path for controlling the second-named means.

17. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, means for tipping the leveling roll relatively to the shoe support, means for varying the pressure exerted by the roll on the shoe bot-

tom, and a single, manually operated member for controlling both said means.

18. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, power-operated means for tipping the roll relatively to the shoe support, power-operated means for pressing the roll on the shoe bottom, a control member movable along different paths, means operated by the control member in response to its movement along one path for operating the first-named power-operated means, and means operated by the control member in response to its movement along another path for controlling the second power-operated means.

19. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, means operated by the pressure of fluid against it for tipping the leveling roll relatively to the shoe support, means operated by the pressure of fluid against it for pressing the roll against the shoe bottom, and a single operating member in control of both said fluid-pressure-operated means.

20. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, means operated by the pressure of fluid against it for tipping the leveling roll relatively to the shoe support, means operated by the pressure of fluid against it for pressing the roll against the shoe bottom, a control member movable in opposite directions along different paths, means operated by the control member in response to its movement in either direction along one of said paths for controlling the flow of pressure fluid to the first fluid-pressure-operated means, and means operated by the control member in response to its movement in either direction along another one of said paths for controlling the flow of pressure fluid to the other of said fluid-pressure-operated means.

21. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, means for tipping the leveling roll laterally of the shoe support, and a manually operated member movable in the direction of tipping movement of the leveling roll in control of said tipping means to tip the roll in the direction of movement of said member in accordance with the extent of movement of said member.

22. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, means for tipping the leveling roll laterally of the shoe support, a manually operated member movable transversely to the direction of movement of the shoe support, and means operated by said member for controlling the tipping means to tip the roll in the direction of movement of said member in accordance with the extent of movement of said member.

23. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along

the shoe bottom, power-operated means for tipping the leveling roll laterally of the shoe support, and a manually operated member movable in the direction of tipping movement of the leveling roll in control of said power-operated means to tip the roll in the direction of movement of said member in accordance with the extent of movement of said member.

24. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, fluid-pressure-operated means for tipping the leveling roll laterally of the shoe support, and a manually operated member movable transversely to the direction of movement of the shoe support in control of said fluid-pressure-operated means and arranged to cause the roll to tip in the direction of movement of said member in accordance with the extent of movement of said member.

25. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, means for tipping the leveling roll relatively to the shoe support, means for controlling said tipping means enabling the operator at will to start, stop and reverse the tipping movements of the leveling roll, and means tending at all times to maintain the leveling roll in a substantially horizontal position.

26. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, fluid-pressure-operated means for tipping the leveling roll relatively to the shoe support, manual control means for said fluid-pressure-operated means to determine the direction and extent of the tipping movements of the leveling roll, and means acting on said fluid-pressure-operated means tending at all times to maintain the leveling roll in a substantially horizontal position.

27. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, fluid-pressure-operated means for imparting to said leveling roll tipping movements in opposite directions laterally of a shoe on said support, a lever for controlling said fluid-pressure-operated means to cause the direction of tipping movement of the roll to correspond to the direction of tipping movement of the control lever from an initial central position, and means acting on the control lever tending at all times to hold it in its central position with the leveling roll in a substantially horizontal position.

28. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, fluid-pressure-operated means for imparting to said leveling roll tipping movements in opposite directions laterally of a shoe on said support, a lever for controlling said fluid-pressure-operated means to cause the direction of tipping movement of the roll to correspond to the direction of tipping movement of the control lever from an initial central position, and means for returning the control member to its central position when released by the operator.

29. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve for controlling the flow of pressure fluid to said fluid-pressure-operated motor, a second valve for controlling the pressure of the operating fluid delivered to said motor, and a single manually operated member in control of both said valves.

30. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve for controlling the flow of pressure fluid to said fluid-pressure-operated motor, a second valve for controlling the pressure of the operating fluid delivered to said motor, means normally positioning the second valve to cause fluid at a predetermined minimum pressure to be delivered to said motor, a control member, and means operated by the control member first to open the first-named valve and secondly to adjust the second valve to increase the pressure of the operating fluid delivered to said motor.

31. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve for controlling the flow of pressure fluid to said fluid-pressure-operated motor, a second valve for controlling the pressure of the operating fluid delivered to said motor, means normally positioning the second valve to cause fluid at a predetermined minimum pressure to be delivered to said motor, a control member, and means operated by the control member first to open the first-named valve and secondly to adjust the second valve to increase the pressure of the operating fluid delivered to said motor, in accordance with the extent of further movement of the control member in the same direction.

32. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve for controlling the flow of pressure fluid to said fluid-pressure-operated motor, a second valve for controlling the pressure of the operating fluid delivered to said motor, means normally positioning the second valve to cause fluid at a predetermined minimum pressure to be delivered to said motor, a control member, means operated by the control member to open the first-named valve, and means arranged to be engaged by the control member after it has been moved to open the first-named valve for operating the second-named valve to increase the pressure of the operating fluid delivered to said motor.

33. In a leveling machine, a leveling roll, a shoe supported mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve controlling the flow of pressure fluid

to said fluid-pressure-operated motor, a pressure-regulating valve controlling the pressure of the operating fluid delivered to said motor, a third valve in control of said pressure-regulating valve, means for opening and closing the first-named valve, and means controlling the operation of said third valve to control the pressure-regulating valve.

34. In a leveling machine, a leveling roll, a shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve controlling the flow of pressure fluid to said fluid-pressure-operated motor, a pressure-regulating valve controlling the pressure of the operating fluid delivered to said motor, a third valve in control of said pressure-regulating valve, and a single manually operated member in control of the first and last-named valves.

35. In a leveling machine, a leveling roll, a

shoe support mounted for swinging movements in directions lengthwise of a shoe thereon to cause the leveling roll to operate progressively along the shoe bottom, a fluid-pressure-operated motor for moving the leveling roll toward the shoe bottom, a valve controlling the flow of pressure fluid to said fluid-pressure-operated motor, a pressure-regulating valve controlling the pressure of the operating fluid delivered to said motor, a third valve in control of said pressure-regulating valve, means normally positioning said third valve to cause fluid at a predetermined minimum pressure to be delivered to said motor, a control member, and means operated by the control member to open the first-named valve in response to movement of the control member from a starting position and thereafter to adjust said third valve in accordance with further movements of the control member thereby to vary the operation of the pressure-regulating valve to vary the pressure of the operating fluid delivered to said motor.

FRANK W. DE TOUR.