Oct. 12, 1937. W. F. OLIVER 2,095,512

IRONING MACHINE

Filed Aug. 6, 1934 5 Sheets-Sheet 1

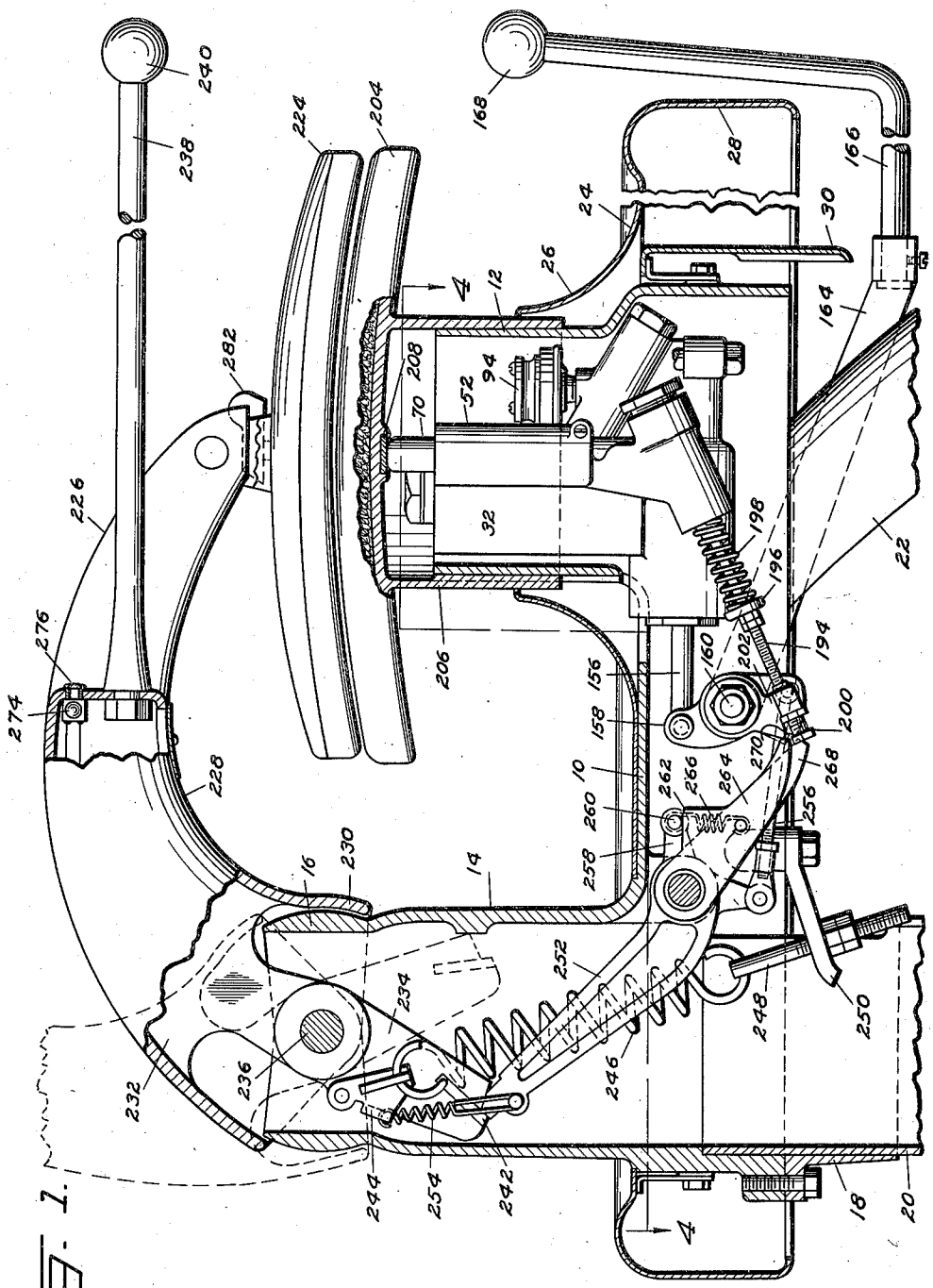


FIG. 1.

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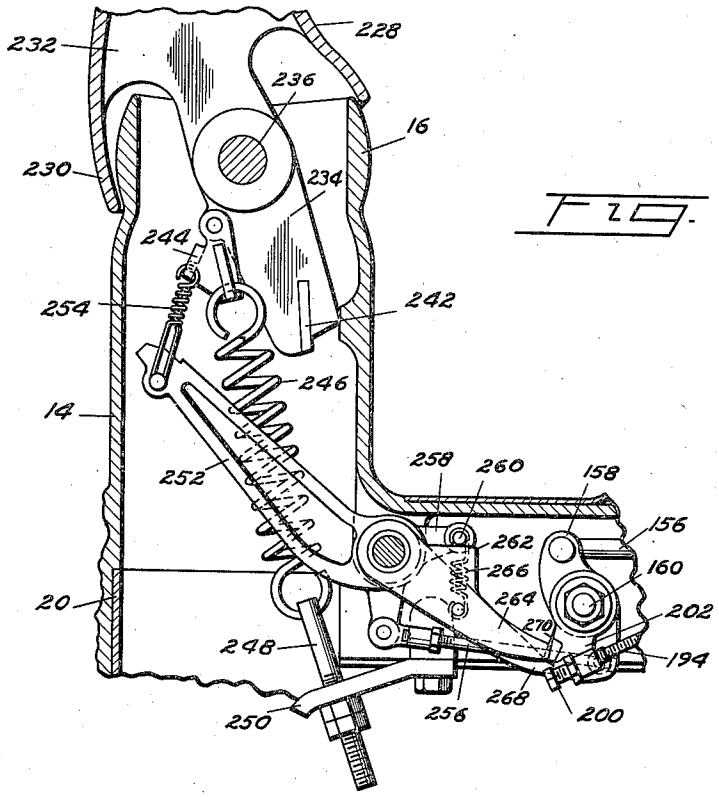


Fig. 2.

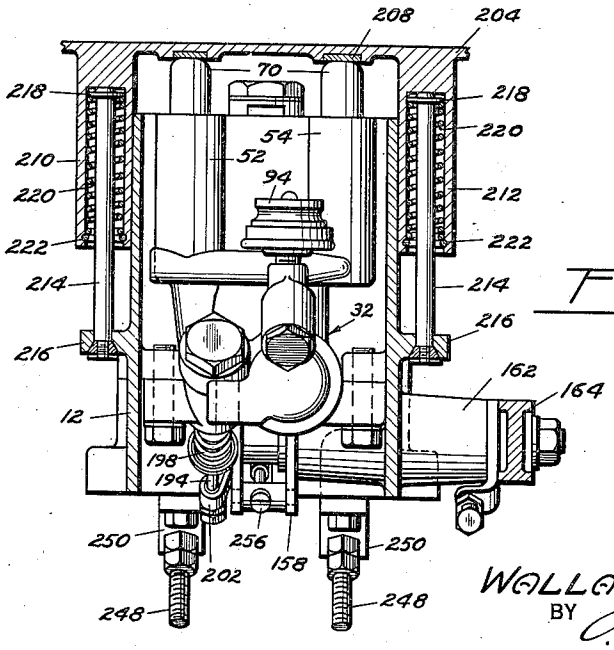


Fig. 3.

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IRONING MACHINE

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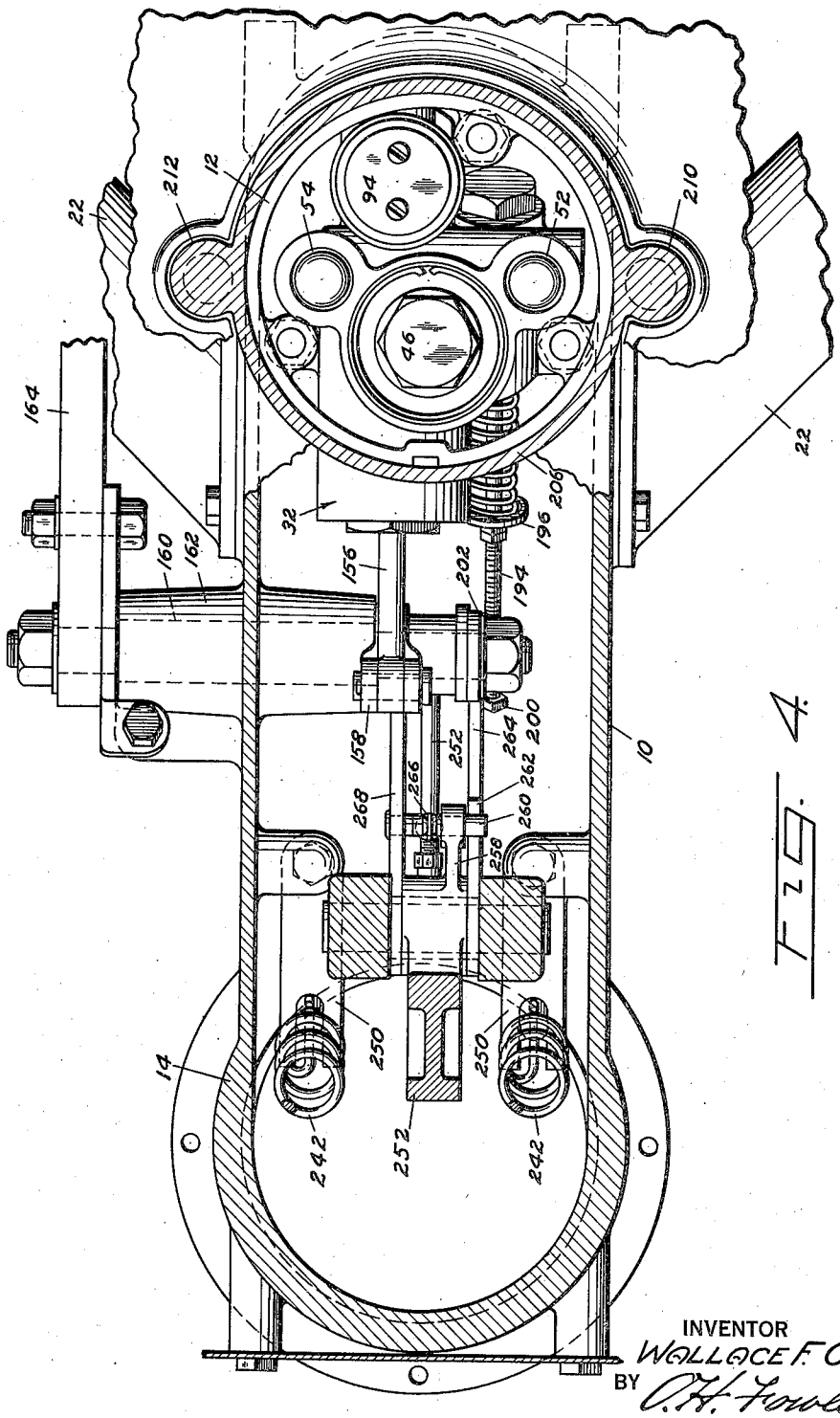


FIG. 4.

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IRONING MACHINE

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Fig. 5.

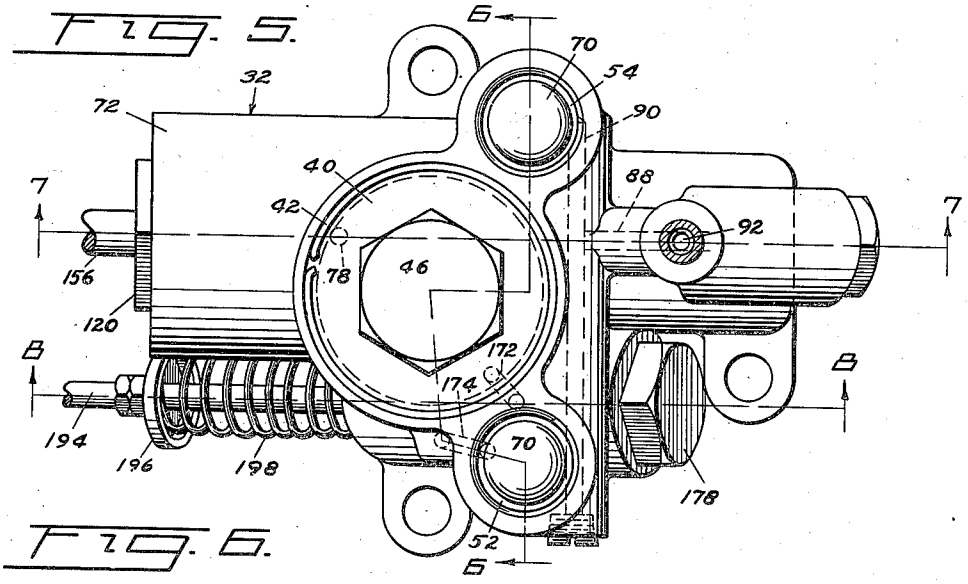


Fig. 6.

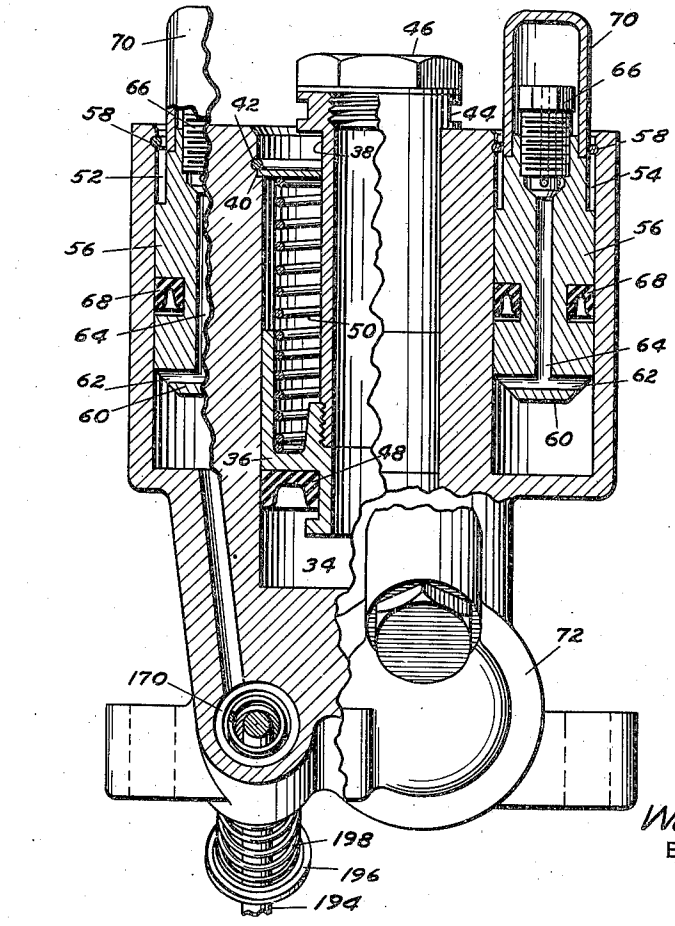
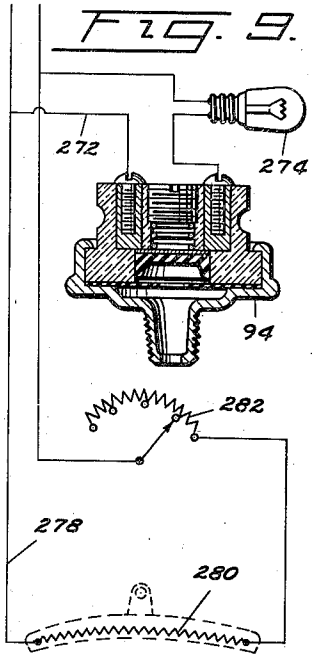


Fig. 9.



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Fig. 7.

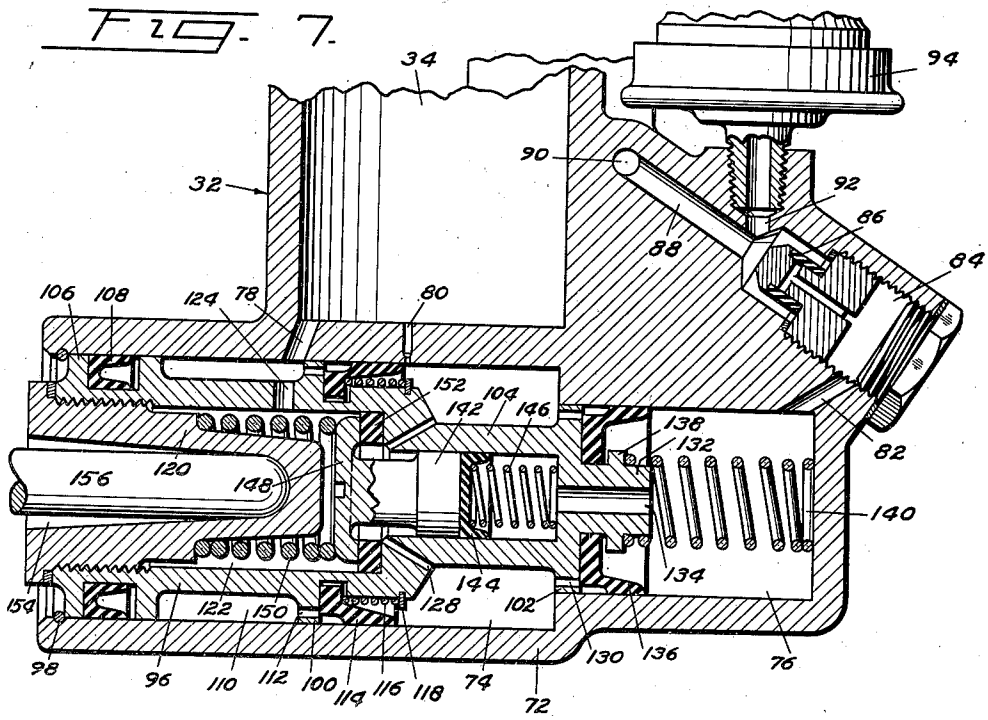
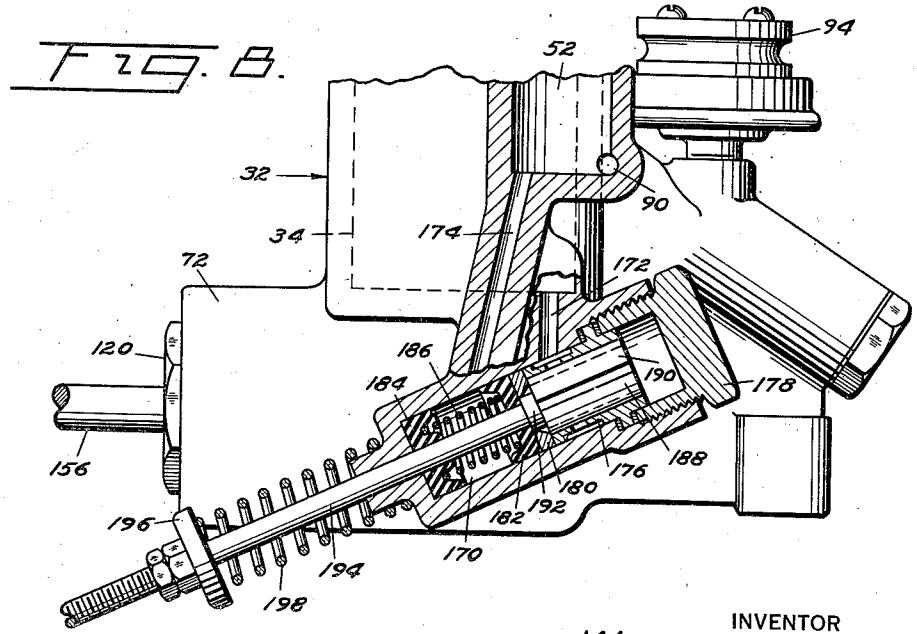


Fig. 8.



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Patented Oct. 12, 1937

2,095,512

UNITED STATES PATENT OFFICE

2,095,512

IRONING MACHINE

Wallace F. Oliver, Detroit, Mich., assignor to Hydraulic Brake Company, Detroit, Mich., a corporation of California

Application August 6, 1934, Serial No. 738,720

8 Claims. (Cl. 38—25)

This invention relates to ironing machines.

Broadly the invention comprehends an ironing machine including a pair of cooperative ironing elements, one manually movable into operative position and there automatically locked against movement, and the other actuated by a fluid pressure system including a fluid pressure producing device, fluid pressure actuating motors connected thereto and arranged to support and actuate the element, and means connected in the system yieldingly maintaining pressure on the fluid in the system so that the ironing element supported by the fluid pressure actuated motors may be displaced, upon movement of the manually movable element into operative position, proportionately to the thickness of the work to compensate for variations in the thickness of the work.

An object of the invention is to provide an ironing machine including cooperative ironing elements, one of which is actuated by a fluid pressure system including means for yieldingly supporting the element.

Another object of the invention is to provide an ironing machine including cooperative ironing elements, one movable manually into operative position and there automatically locked against movement, and the other operated by a fluid pressure system to create an ironing pressure between the elements.

Another object of the invention is to provide an ironing machine including cooperative ironing elements, one manually movable into operative position and there automatically locked, and the other actuated by a fluid pressure system including a fluid pressure producing device and a relief valve and manual means for actuating these instrumentalities including means for unlocking the manually moved element.

A further object of the invention is to provide an ironing machine including cooperative ironing elements, one manually movable into operative position and there automatically locked against movement, and the other actuated by a fluid pressure system operative to yieldingly retain the fluid in the system under pressure, to balance the pressure on the fluid, and to increase the pressure on the fluid to create an ironing pressure between the elements, and manually operative means for the fluid pressure system including means for unlocking the manually movable element.

Other objects and advantages of the invention will more fully appear from the following description taken in connection with the accompanying drawings forming a part of this specification, and in which,—

Figure 1 is a cross-sectional view of an ironing machine partly broken away and partly in elevation so as to better illustrate the invention;

Figure 2 is a fragmentary view of the head supporting and locking means;

Figure 3 is an end elevation of the fluid pressure producing device;

Figure 4 is a sectional view substantially on line 4—4, Figure 1;

Figure 5 is a top plan view of the pressure producing device;

Figure 6 is a sectional view substantially on line 6—6, Figure 5;

Figure 7 is a sectional view substantially on line 7—7, Figure 5;

Figure 8 is a sectional view substantially on line 8—8, Figure 5; and

Figure 9 is a diagrammatical illustration of an electrical circuit for the machine.

Referring to the drawings for more specific details of the invention, 10 represents a frame having at one end an upward extending hollow column 12 and at its other end an upward extending sleeve 14 terminating in a portion of a sphere 16. A hollow column 18, suitably secured to the frame concentric to the column 14, receives a hollow column 20, and corresponding legs 22 secured to the sides of the frame cooperate with the column 20 in providing suitable supports for the frame.

A top 24, supported on the frame, has an opening for the reception of the column 14, an upward extending frustro-conical portion 26 having an opening for the reception of the column 12, and an apron 28. Secured on the frame beneath the top is a shield 30 concealing from view the operating mechanism to be hereinafter described.

A fluid pressure producing device indicated generally at 32 is suitably mounted in the sleeve 12. This device includes a reservoir 34 having therein a reciprocable piston 36 provided with a concentric opening in which is fitted one end of a hollow rod 38, the other end of which extends outward from the reservoir through a closure plate 40 secured in the open end of the reservoir by a retaining ring 42. The outer or free end of the rod is provided with a flat 44 for the reception of a tool and is closed as by a cap 46.

A leak-proof cup 48 is fitted on the head of the piston 36 and interposed between the head of the piston and the cover plate 40 is a coil spring 50 normally urging the piston toward the bottom

of the reservoir. Upon removing the cap 46 and retracting the piston by means of a tool engaging the flat 44, the reservoir may be filled through the rod.

Formed on the wall of the reservoir parallel to the axis thereof and diametrically disposed to one another, are cylinders 52 and 54. Each of these cylinders has therein a reciprocal piston 56 secured against displacement by a retaining ring 58 fitted in a groove in the wall of the cylinder. The piston 56 has a conical head 60 provided with a diametral bore 62 communicating with an axial bore 64 through the body of the piston, and fitted in the axial bore is a bleeder screw 66. A leak-proof cup 68 is fitted in a circumferential groove in the body of the piston, and fitted on the back of the piston is a cap 70 enclosing the bleeder screw 66.

In the base of the reservoir is a compound cylinder 72 including a large cylinder 74 and a smaller cylinder 76 arranged co-axially to and communicating with one another. The larger cylinder 74 has ports 78 and 80 providing communications between the large cylinder and the reservoir, and the smaller cylinder 76 has a discharge port 82 communicating with a valve chamber 84 having therein a check valve 86 controlling a passage 88 providing a communication between the chamber 84 and a passage 90 connecting the cylinders 52 and 54, and the passage 88 has a branched passage 92 in which is suitably secured a fluid pressure switch 94.

A piston 96, reciprocable in the compound cylinder 72, is held against displacement by a retaining ring 98 seated in a circumferential groove in the wall of the cylinder adjacent the open end thereof. This piston has heads 100 and 102 spaced apart by a sleeve 104. The head 100 is fitted snugly in the large cylinder 74, and the head 102 is fitted snugly in the small cylinder 76. The skirt of the piston has spaced radial flanges 106 between which is fitted a leak-proof cup 108, and a portion of reduced cross-sectional area providing in conjunction with the wall of the cylinder 74 an annular chamber 110 communicating with the reservoir 34 by way of the port 78.

The head 100 has a plurality of ports 112 providing communications between the annular chamber 110 and that portion of the cylinder 74 forward of the head 100. A collapsible leak-proof cup 114 loosely fitted in a circumferential groove in the piston controls the ports 112, and this cup is normally held against its seat by a relatively light spring 116 interposed between the cup and a suitable stop 118.

A plug 120 threaded in the skirt of the piston provides in conjunction with the skirt a chamber 122 communicating with the sleeve 104, and a port 124 provides a communication between the chamber 122 and the annular chamber 110. The chamber 122 also has a plurality of ports 128 providing communications between the chamber 122 and that portion of the cylinder 74 forward of the piston head 100.

The head 102 of the piston 96 has a plurality of ports 130 providing communications between the cylinders 74 and 76, and an extension 132 having a reduced passage 134 providing a communication between the sleeve 104 and the cylinder 76. A collapsible leak-proof cup 136 on the head of the piston 102 controls the ports 130 and a radial flange 138 on the extension 132 retains the cup against displacement, and interposed between the flange 138 and the head of the cylinder 76 is a coil spring 140 for urging the piston to its retracted position.

A reciprocal piston 142 in the sleeve 104 has a leak-proof cup 144 on its head held against displacement by a spring 146 interposed between the cup and the back of the piston head 102. The piston 142 has formed integrally therewith a valve 148 urged by a relatively heavy spring 150 to a cushioned seat 152 in the chamber 122 to close the passages 128.

The plug 120 in the skirt of the piston 96 has a recess 154 receiving one end of a thrust pin 156, the other end of which is pivotally attached to a cross arm 158 keyed to shaft 160 journaled in a bearing 162 on the frame 10, and an operating lever 164 suitably secured to the shaft has an extension 166 provided with a knob or hand grip 168 easily accessible to the operator. Upon applying force to the lever 164, the shaft 160 may be moved through an angle and this movement is transmitted through the lever 158 and thrust pin 156 to move the piston 96 on its compression stroke.

A valve chamber 170 at the base of the reservoir 34 has a port 172 providing a communication between the chamber and the reservoir 34 and a port 174 providing a communication between the chamber and the cylinder 52. A valve cage 176, fitted in the valve chamber 170 is held in place by closure plug 178 threaded in the open end of the cylinder. This valve cage has an orificed head 180 positioned between the ports 172 and 174. A leak-proof cup 182 on the head 180 has a concentric opening and the perimeter defining the opening overhangs the orifice in the head to provide an effective seal. Another leak-proof cup 184 is seated on the head of the valve chamber, and a coil spring 186 interposed between the cups retains them against displacement.

A valve in the cage 176 includes a cylindrical body portion 188 having spaced ribs 190 for the purpose of guiding the valve and providing for the free passage of fluid, and a cylindrical portion 192 adapted to enter the orifices in the head 180 and to engage the overhanging perimeter of the cup 182. The valve has a stem 194 extending through the head of the valve chamber. This stem has thereon a collar 196, and a spring 198, interposed between the collar and the head of the valve chamber, normally retains the valve in closed position. The free end of the stem 194 abuts an adjustable screw 200 mounted in an arm 202 keyed or otherwise secured to the operating shaft 160.

A buck 204 of the conventional type has on its back a sleeve 206 telescoping the hollow column 12 on the frame 10, and bearing surfaces or inserts 208 in engagement with the cap 70 on the piston 56 in the cylinders 52 and 54. The sleeve 206 is locked against rotation by a conventional key. Arranged on the wall of the sleeve 206, diametrically disposed with respect to one another and parallel to the axis of the sleeve 206, are cylinders 210 and 212. Rods 214, slidably mounted in lugs 216 on the wall of the column 12, are received by the cylinders 210 and 212. These rods have heads 218, and coil springs 220 are sleeved on the rods between the heads and retaining rings 222 seated in circumferential grooves in the wall of the cylinders adjacent the open ends thereof. Because of this arrangement the buck is normally retained in a predetermined position.

An ironing head 224 adapted for cooperation with the buck is pivotally attached to correspond-

ing oppositely disposed horns 226 formed on a hollow arm 228 having a flared end 230 telescoping the spherical portion 16 on the column 14. The arm has an internal web 232 having a lateral arm 234 attached as by a pivot 236 to the spherical portion 16, and attached to the arm 228 is a rod 238 provided with a knob or hand-grip 240. The arm 234 extends downward into the column 14, and is provided on its free end with a case-hardened insert 242, and a yoke 244 pivoted on the arm has attached thereto the corresponding ends of coil springs 246, the other ends of which are attached to adjustable members 248 mounted in brackets 250 on frame 10.

Pivotally mounted on the frame 10 is a bell crank lever 252 adapted for cooperation with the arm 234 to lock the head in operative position. One end of this bell crank lever is connected by a rod 256 to the cross arm 158 on the shaft 160. The bell crank lever has an arm 258 carrying a pin 260 held in engagement with a lug 262 on a lever 264 by a spring 266 connected between the arm 258 and the lever 264. The lever 264 is pivoted on the frame 10 and its free end engages the arm 202 to retain the operating lever 164 in neutral position. The lever 264 carries a lever 268, the free end of which is adapted to engage a notch 270 in the arm 158 to lock the lever 164 against movement when the head 224 is in inoperative position.

The fluid pressure switch 94 is connected in a circuit 272 including a lamp 274 housed in the arm 228 back of an opening having therein a colored glass 276. The circuit 272 is tapped off of a circuit 278 including a heating element 280 in the ironing head 224 and a rheostat 282 associated with the heating element. The circuit 278 may be connected to any suitable source of electrical supply.

Assuming that the fluid pressure operated system is filled with suitable fluid, that the circuit 278 is connected to a source of electrical supply, that the ironing head 224 is in an elevated or inoperative position, and that the buck 204 is in the position of rest wherein the fluid pressure actuated motors 52 and 54 yieldingly support the buck due to pressure introduced on the fluid in the reservoir 34 by the spring-pressed piston 36. This pressure on the fluid is balanced by the springs 220 connected between the buck and a fixed support resulting in maintaining the buck in a predetermined position to which the buck is automatically returned at the end of each operation. Under these conditions the operator places the work upon the buck and lowers the head 224 into operative position by the hand-grip 240.

If the work is thinner than a predetermined space between the buck and the head there will be no movement of the buck upon movement of the head into operative position. However, if the work is thicker than the predetermined space between the buck and the head, the buck will be proportionately displaced resulting in actuation of the motors 52 and 54 and displacement of fluid from the motors back into the reservoir.

Upon moving the head into operative position, the arm 234 is moved through an angle. This movement of the arm 234 places the spring 254 under tension resulting in movement of the lever 252 to engage the case-hardened insert 242 in the end of the arm 234, resulting in locking the arm 234 against movement to retain the head 224 in operative position. This movement of the arm 234 also places the springs 246 under tension, the object of which will hereinafter appear.

As the lever 252 is moved into engagement with the arm 234, the arm 258 on the lever actuates the levers 264 and 268. This movement of the levers 264 and 268 is sufficient to disengage the lever 268 from the arm 158 but does not entirely disengage the lever 264 from the arm 202, thus maintaining the lever 164 in neutral position against its own weight.

After moving the head into operative position, the operator applies force to the lever 166 by pressing downward on the hand grip 168. This movement of the lever 166 rocks the shaft 160 and this movement of the shaft results in moving the arm 158 secured thereto through an angle to transmit the force through the thrust pin 156 to the piston 96 to move the piston on its compression stroke. Simultaneously with this movement of the lever 158, the lever 202 is moved to close the valve 192, and this movement of the lever 202 rides over and clears the lever 264.

During the initial movement of the piston 96 on its compression stroke, the leak-proof cup 114 on the head 100 of the piston covers the ports 112, and the fluid in the large cylinder 74 is displaced therefrom through the ports 130 in the head 102 of the piston, past the leak-proof cup 136 into the smaller cylinder 76, thence through port 82, past the check valve 86, through passage 88 into the fluid pressure actuated motor 54, and thence through passage 90 into the fluid pressure actuated motor 52, resulting in actuation of these motors with consequent movement of the buck 204 against the head 224.

This movement of the buck is against the resistance of the springs 220, and results in compressing the springs. Upon obtaining a predetermined pressure in the cylinder 74, the piston 142 is actuated by fluid under pressure in the cylinder 76 resulting in tripping the valve 148 and thereby rendering the head 100 of the piston ineffective for producing pressure, the fluid forward of the head 100 being returned to the reservoir by way of ports 128, chamber 122, port 124, and port 78. As the piston 96 proceeds on its compression stroke, the valve 148 alternately opens and closes as the pressure increases until the pressure in the cylinder 76 is sufficient to retain the valve 148 in open position. This transition of pressure occurs over a relatively wide range depending entirely upon the relation of the area of the piston 142 to the area of the valve 148. Because of the restricted opening 134 providing a communication between the cylinder 76 and the sleeve 104, sudden movements of the piston 96 on its compression stroke will not cause actuation of the valve 148.

When the pressure between the ironing elements reaches a predetermined degree, the fluid under pressure in the system actuates the switch 94 to close the circuit 272, resulting in lighting the lamp 274. This gives a visular indication that the required ironing pressure between the ironing elements has been obtained.

Upon release of the applied force, the check valve 86 closes to maintain the pressure at a predetermined degree, and after maintaining the pressure for a sufficient period of time to effectively iron the work, the operator raises the lever 166 by the hand-grip 168. This movement of the lever is transmitted to the shaft 160 resulting in movement of the arm 158, thereby retracting the thrust pin 156. As the thrust pin is retracted, the piston 96 is returned to its normal retracted position under the influence of the spring 140.

As the piston 96 returns to its retracted position, the cups 114 and 136 collapse and fluid is drawn from the reservoir 34 through the port 78, chamber 110 and ports 112, past the cup 114 into the cylinder 74 forward of the piston head 100, thence through ports 130 in the piston head 102, past the cup 136, into the cylinder 76, filling the cylinders 74 and 76 for subsequent operation. When the piston 96 is fully retracted, the cup 114 uncovers the port 80 and any surplus fluid in the cylinder is returned through this port to the reservoir.

Upon movement of the lever 166 in reverse direction, the shaft 160 is moved through a slight angle and this movement is transmitted through the arm 202 on the shaft and the valve stem 194 to trip the valve 192, whereupon pressure on the fluid in the fluid pressure motors 52 and 54 is released. Upon tripping the valve 192, the fluid in the motors 52 and 54 is returned therefrom through the passages 90 and 174, valve chamber 170, and passage 172 to the reservoir. This results in movement of the pistons 56 in the motors 52 and 54 and consequent movement of the buck to its normal or inoperative position.

Further movement of the operating lever in reverse direction moves the arm 158, and this movement is transmitted through the link 256 to move the bell crank lever 252, resulting in disengaging this lever from the arm 234, whereupon the springs 246 become effective to return the head 224 to elevated or inoperative position. This movement of the lever 252 is also transmitted through the spring 266 to move the levers 264 and 268 into engagement with the arms 158 and 202 to retain the operating lever 164 in its normal position and against movement while the head 224 is in elevated position.

While this invention has been described in connection with certain specific embodiments, the principle involved is susceptible of numerous other applications that will readily occur to persons skilled in the art. The invention is, therefore, to be limited only as indicated by the scope of the appended claims.

I claim:—

1. An ironing machine comprising a frame, spaced upward extended hollow columns on the frame, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head, a sleeve on the back of the buck telescoping the other column on the frame, and fluid pressure means supported on the frame for actuating the buck.

2. An ironing machine comprising a frame having spaced upwardly extended hollow columns, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head, a dependent sleeve on the back of the buck telescoping the other column, yielding members connecting the buck to said other column, and fluid pressure means in said other column for actuating the buck.

3. An ironing machine comprising a frame having spaced upwardly extended hollow columns, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head, a sleeve dependent from the back of the buck telescoping the other column, compression elements connected between the sleeve on the buck and said other column, and fluid pressure means in said other column for actuating the buck.

4. An ironing machine comprising a frame having spaced upwardly extended hollow columns, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head, a sleeve dependent from the back of the buck telescoping the other column, compression elements connecting the sleeve on the buck to said other column, fluid pressure actuated motors in the last mentioned column operatively connected to the buck, and a fluid pressure producing device for actuating the motors.

5. An ironing machine comprising a frame including spaced upwardly extended hollow columns, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head, a sleeve on the back of the buck telescoping the other column, means yieldingly retaining the sleeve against vertical movement, a fluid pressure system in the last-mentioned column comprising a reservoir, a spring-pressed piston in the reservoir, fluid pressure motors on the wall of the reservoir operatively connected to the buck, a cylinder in the base of the reservoir having ports providing communications between the reservoir and the cylinder, a piston reciprocable in the cylinder, a check valve connected between the cylinder and the motors, a relief valve connected between the reservoir and the motors, and means on the frame for actuating the piston in the cylinder and the relief valve.

6. An ironing machine comprising a frame including spaced upwardly extended hollow columns, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head, a sleeve dependent from the back of the buck telescoping the other column, means inhibiting angular movement of the sleeve, means yieldingly retaining the sleeve against vertical movement, a fluid pressure system in the second-mentioned column comprising a reservoir, a spring-pressed plunger in the reservoir, diametrically disposed fluid pressure motors on the wall of the reservoir connected to and adaptable for actuating the buck, a cylinder in the base of the reservoir having ports providing communications between the reservoir and the cylinder, a reciprocable piston in the cylinder, a check valve connected between the cylinder and the motors, a relief valve connected between the reservoir and the motors, and means on the frame for actuating the piston in the cylinder and the relief valve.

7. An ironing machine comprising a frame including spaced upwardly extended hollow columns, a head supported on one of the colums for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head supported on the other column for vertical reciprocation, a fluid pressure system in the last-mentioned column comprising a reservoir, means in the reservoir imposing pressure on fluid therein, diametrically disposed fluid pressure motors on the wall of the reservoir operatively connected to the buck, means connected to the buck for balancing the pressure on the fluid in the reservoir, a cylinder in the base of the reservoir having ports providing communications between the reservoir and

the cylinder, a check valve connected between the cylinder and the motors, a relief valve connected between the reservoir and the motors, a piston reciprocable in the cylinder, and means on the frame for actuating the piston in the cylinder and the relief valve including means for unlocking the locking means.

8. An ironing machine comprising a frame including spaced upwardly extended hollow columns, a head supported on one of the columns for movement into and from operative position, means for locking the head in operative position, a buck for cooperation with the head supported on the other column for vertical reciprocation, a fluid pressure system housed in the second-mentioned column comprising a reservoir, means in the reservoir imposing pressure on fluid therein, means for balancing at a predetermined pressure the pressure on the fluid in the reservoir, fluid pressure actuated motors arranged on the wall of the reservoir and operatively connected to the buck, a cylinder in the base of the reservoir having ports providing communications between the reservoir and the cylinder, a check valve connected between the cylinder and the motors, a relief valve connected between the reservoir and the motors, means on the frame for actuating the piston in the cylinder and the relief valve including means for unlocking the locking means, and means effective upon unlocking the locking means to return the head to inoperative position.

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