Aug. 2, 1938. E. W. ROUCH 2,125,585

IRONING MACHINE

Filed Nov. 19, 1934 6 Sheets-Sheet 1

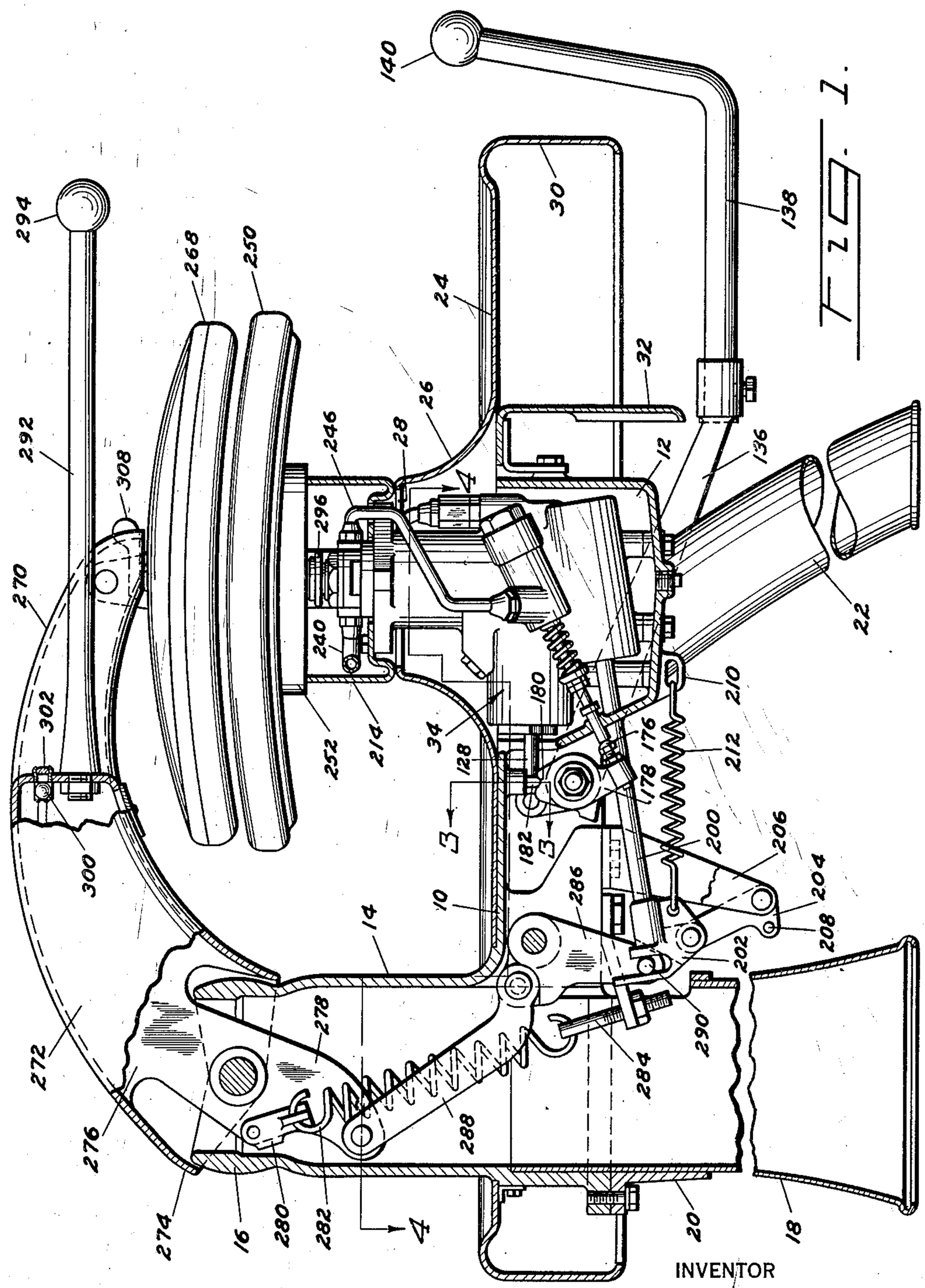

FIG. 1.

INVENTOR
EVERETT W. ROUCH
BY O. H. Fowler
ATTORNEY

Aug. 2, 1938. E. W. ROUCH 2,125,585

IRONING MACHINE

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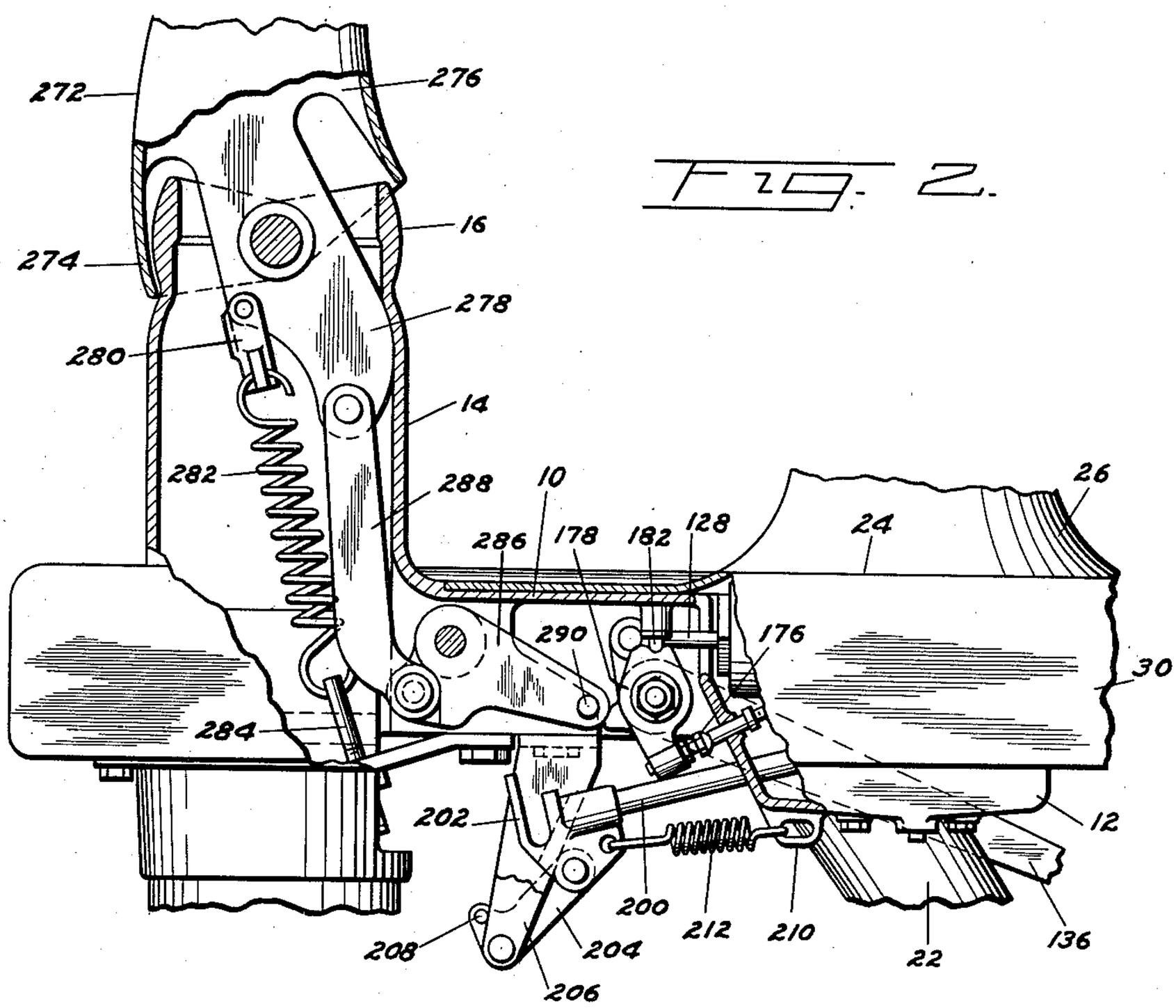

FIG. 2.

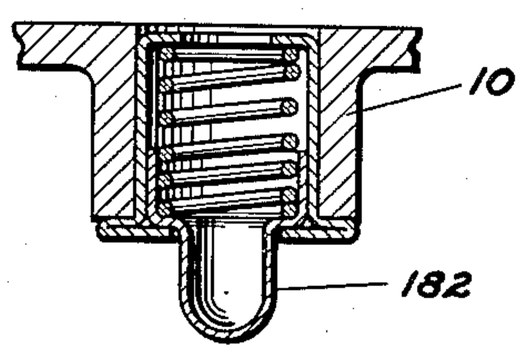

FIG. 3.

INVENTOR
EVERETT W. ROUCH
BY O. H. Fowler
ATTORNEY

Aug. 2, 1938. E. W. ROUCH 2,125,585

IRONING MACHINE

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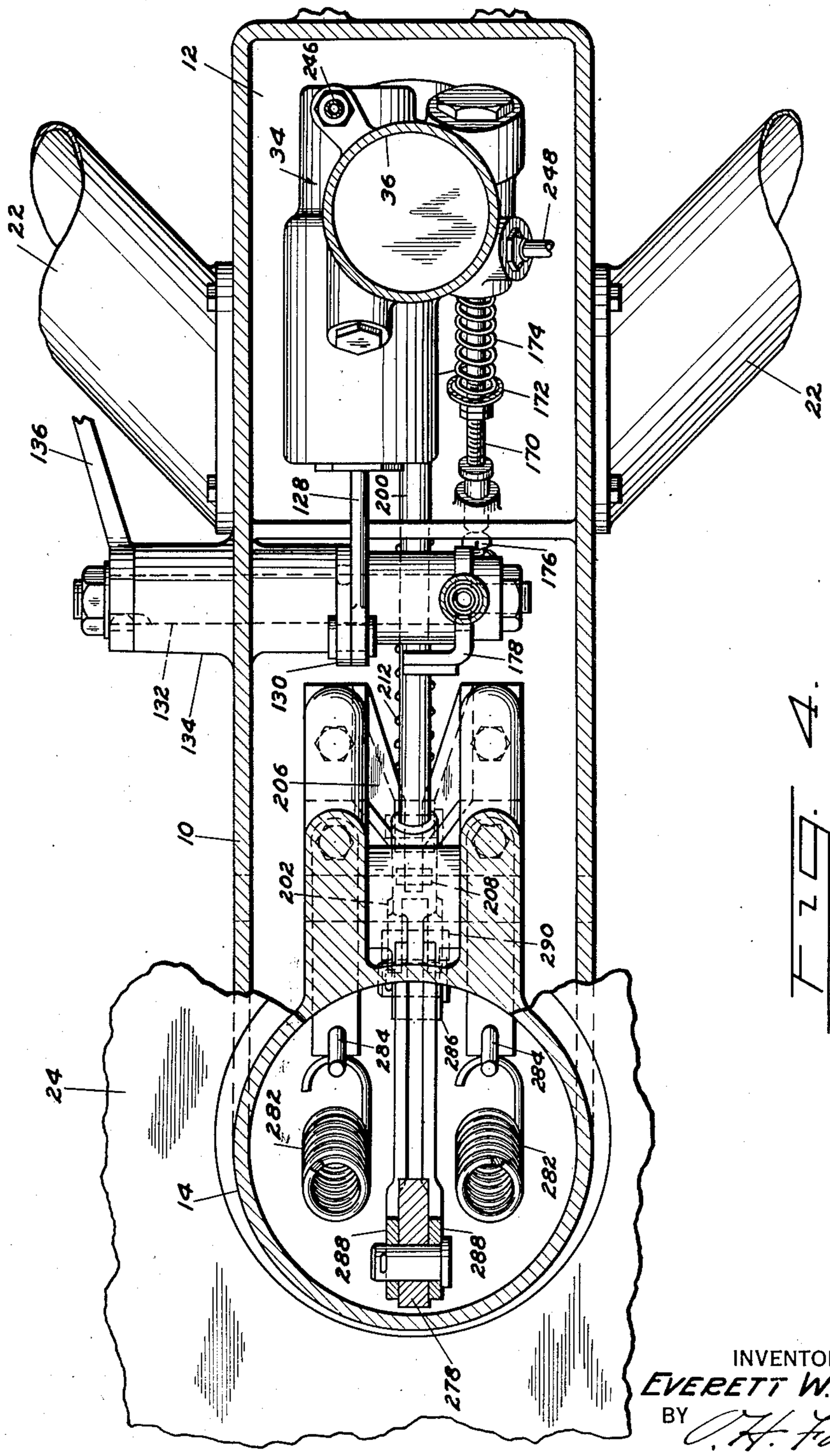

FIG. 4.

INVENTOR
EVERETT W. ROUCH
BY C. H. Fowler
ATTORNEY

Aug. 2, 1938. E. W. ROUCH 2,125,585

IRONING MACHINE

Filed Nov. 19, 1934 6 Sheets-Sheet 4

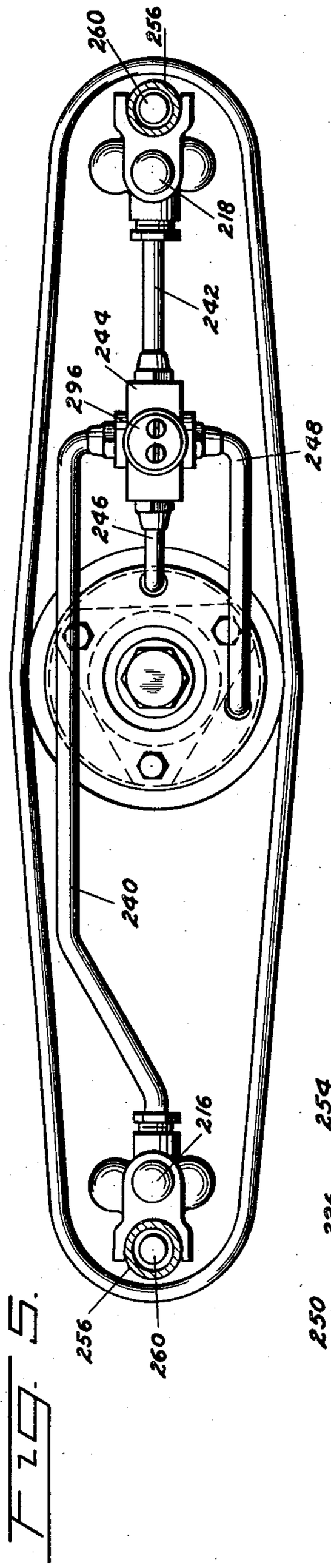

FIG. 5.

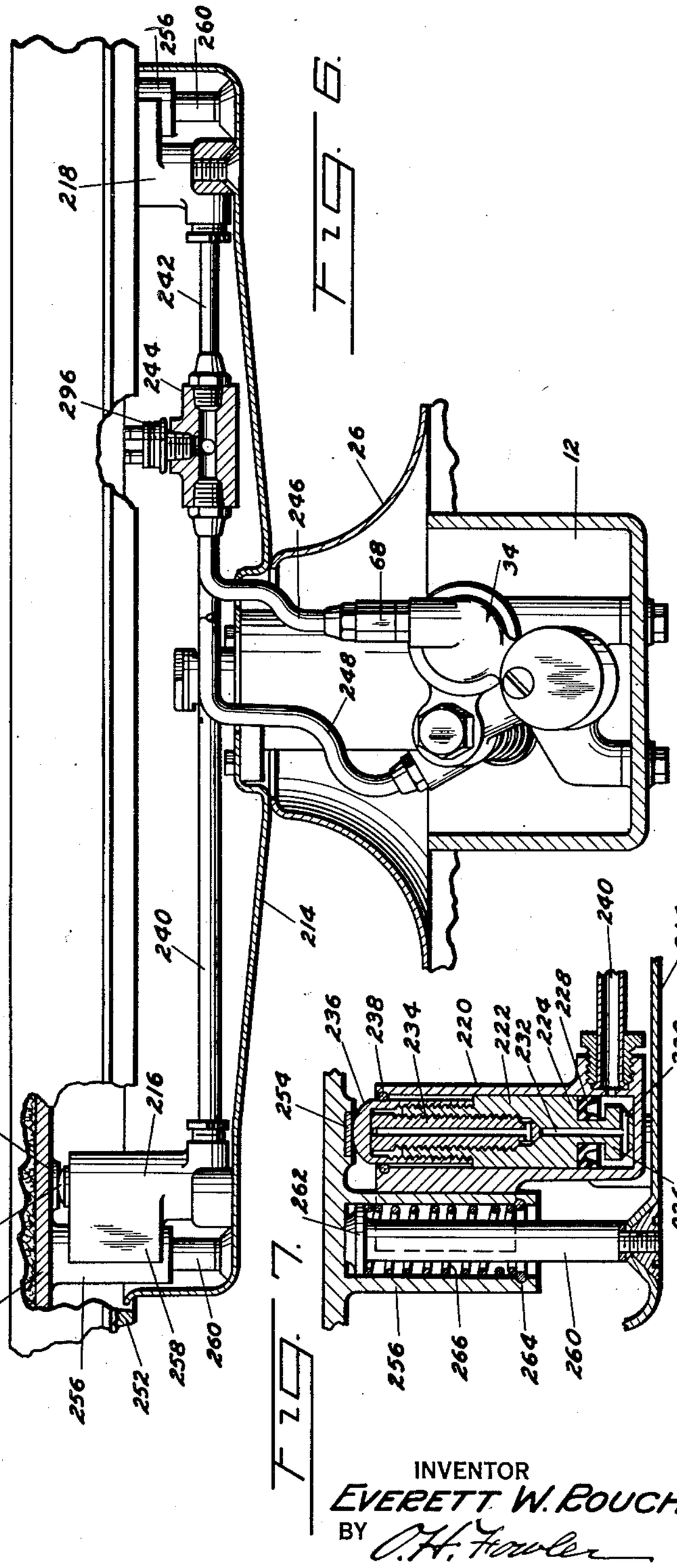

FIG. 6.

FIG. 7.

INVENTOR
EVERETT W. ROUCH
BY O. H. Fowler
ATTORNEY

Aug. 2, 1938. E. W. ROUCH 2,125,585

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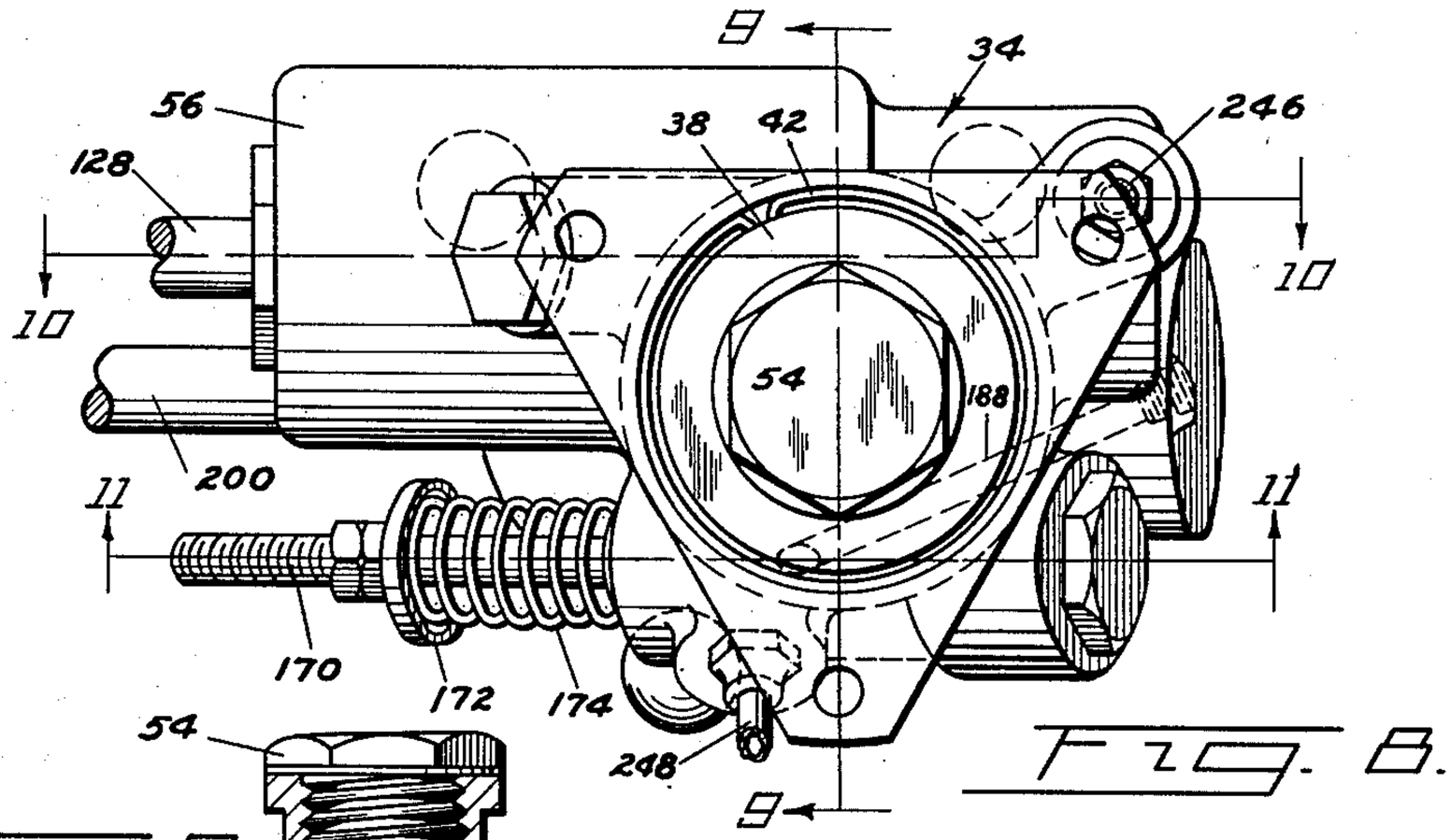

Fig. 8.

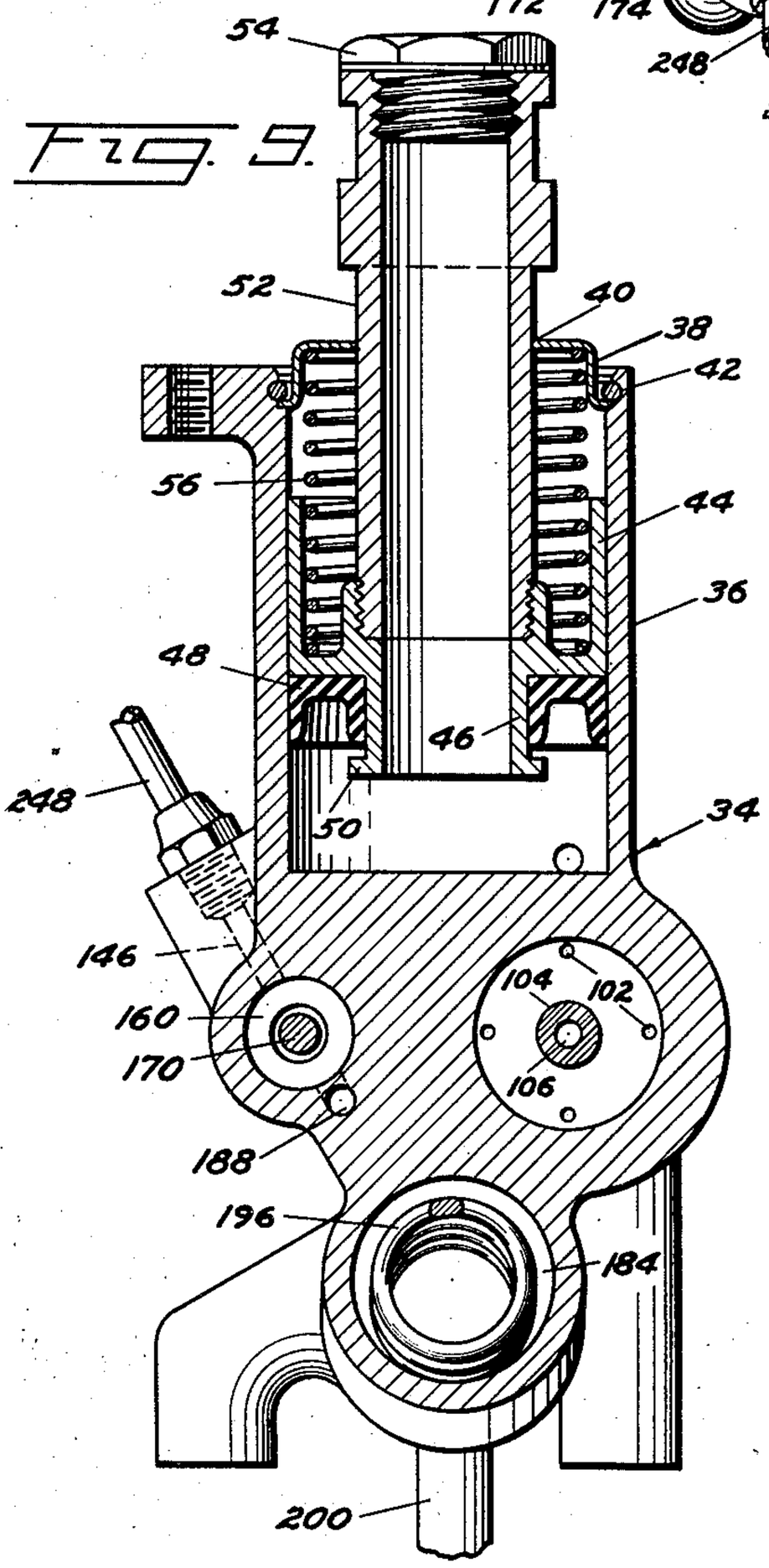

Fig. 9.

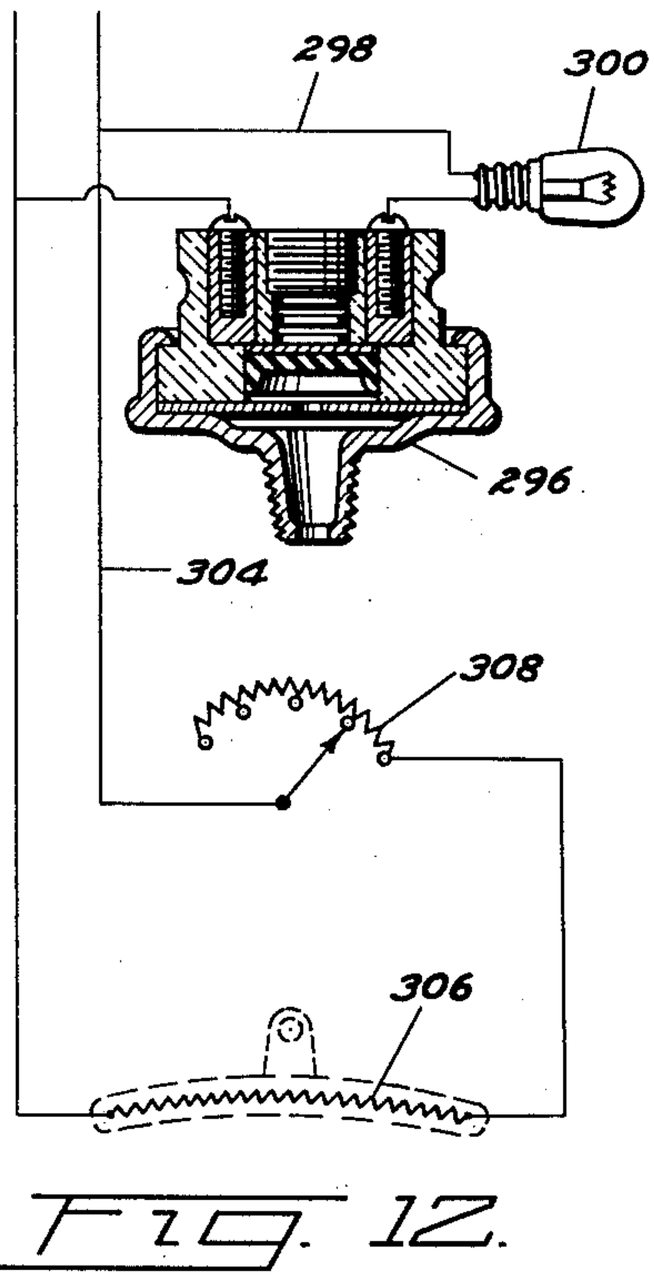

Fig. 12.

INVENTOR
EVERETT W. ROUCH
BY O. H. Fowler
ATTORNEY

Aug. 2, 1938. E. W. ROUCH 2,125,585

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Fig. 10.

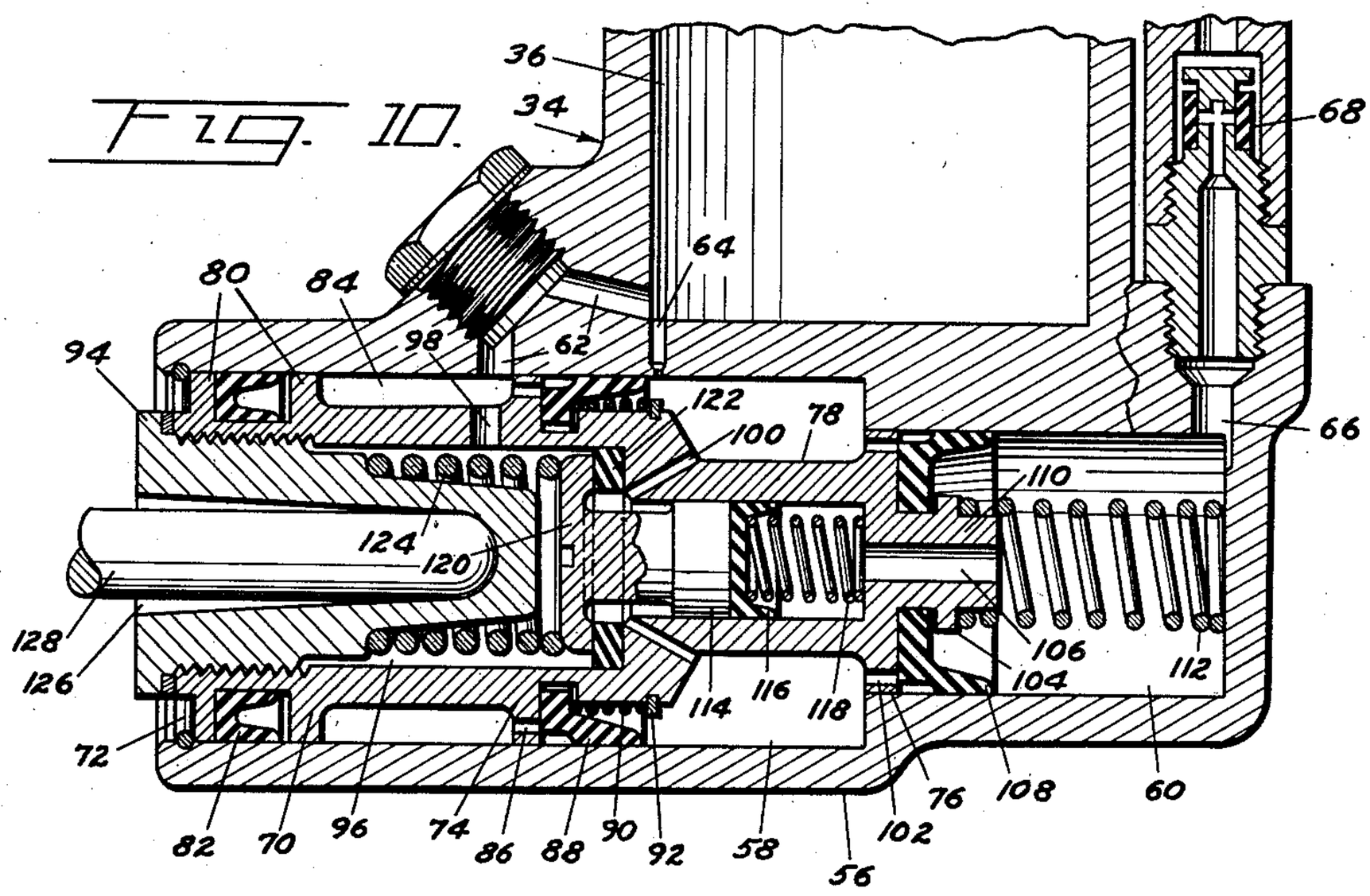
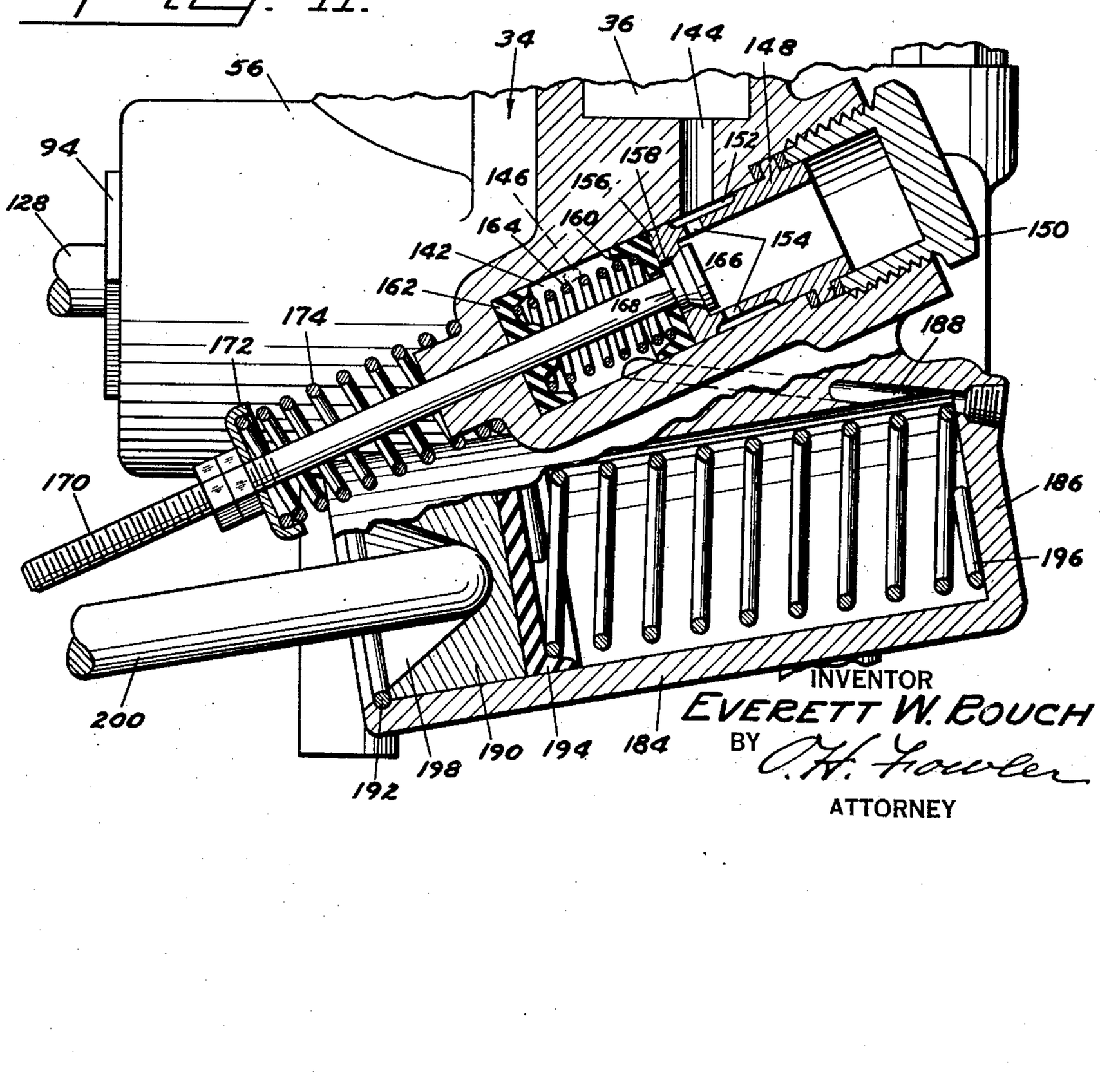


Fig. 11.



INVENTOR
EVERETT W. ROUCH
BY O. H. Fowler
ATTORNEY

Patented Aug. 2, 1938

2,125,585

UNITED STATES PATENT OFFICE

2,125,585

IRONING MACHINE

Everett W. Rouch, Detroit, Mich., assignor to Hydraulic Brake Company, Detroit, Mich., a corporation of California

Application November 19, 1934, Serial No. 753,756

5 Claims. (Cl. 38—25)

This invention relates to ironing machines and more particularly to ironing machines for domestic purposes.

Broadly the invention comprehends an ironing machine including cooperative ironing elements and a fluid pressure system for actuating both elements.

In the illustrated embodiment an ironing head is manually movable into operative position, a buck is arranged for cooperation with the head, and the head and buck are actuated by a hydraulic system including a pair of fluid pressure motors for actuating the buck and a fluid pressure motor for actuating the head and a fluid pressure producing device for actuating the motors.

An object of the invention is to provide an ironing machine including cooperative ironing elements, and fluid pressure means for actuating both elements.

Another object of the invention is to provide an ironing machine including cooperative ironing elements, fluid pressure means for actuating both elements, and manually operative means actuated by the fluid pressure means.

Another object of the invention is to provide an ironing machine including cooperative ironing elements, one manually movable into and from operative position, and fluid pressure means for simultaneously actuating both elements with equalized force to create an ironing pressure between the elements.

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

Figure 1 is a vertical sectional view of an ironing machine embodying the invention;

Figure 2 is a fragmentary view in section illustrating the mechanism for locking the head in any one of a plurality of operative positions.

Figure 3 is a detail view on line 3—3, Figure 1;

Figure 4 is a longitudinal sectional view, partly broken away, on line 4—4, Figure 1;

Figure 5 is a top plan view of the buck support;

Figure 6 is a side elevation, partly in section and partly broken away, illustrating the assembly of the buck support and the buck and the fluid pressure motors for actuating the buck;

Figure 7 is an enlarged detail view illustrating one of the fluid pressure motors and associated parts;

Figure 8 is a top plan view of a fluid pressure producing device;

Figure 9 is a vertical sectional view substantially on line 9—9, Figure 8;

Figure 10 is a sectional view substantially on line 10—10, Figure 8;

Figure 11 is a sectional view substantially on line 11—11, Figure 8; and

Figure 12 is a diagrammatical illustration of the electrical circuit for the machine.

Referring to the drawings for more specific details of the invention, 10 represents a frame having a sump 12 at one end and a hollow upwardly extending column 14 at its other end. The upper end of the column 14 terminates in a spherical portion 16, the object of which will hereinafter appear. The frame is supported by a column 18, fitted in a sleeve 20 suitably secured to the frame concentric to the column 14, and corresponding legs 22 secured respectively to the sides of the frame.

A top 24 supported by the frame has an opening for the reception of the column 14, and an upwardly extended frustro-conical portion 26 having an opening 28 in the top thereof registering with the sump 12. The top also has an apron 30 which together with a shield 32 suitably secured to the frame conceals from view the operating mechanism of the machine.

A fluid pressure producing device, indicated generally at 34, is suitably mounted in the sump 12. This device includes a reservoir 36 having a cover 38 provided with a concentric opening 40. The cover is held against displacement by a retaining ring 42 seated in a circumferential groove in the wall of the reservoir adjacent the open end thereof.

A piston 44 reciprocable in the reservoir has a concentric sleeve 46 extending through its head. A leak-proof cup 48 on the head of the piston is retained against displacement by a circumferential flange 50 on the sleeve, and a hollow rod 52 threaded in the sleeve extends upwardly through the opening 40 in the cover of the reservoir, and this rod is closed as by a plug 54. A spring 56, interposed between the cover 38 and the back of the piston 44, urges the piston toward the bottom of the reservoir and imposes pressure on the fluid in the reservoir. By removing the plug 54 and retracting the piston, the reservoir may be filled through the rod 52.

Formed in the base of the reservoir is a compound cylinder 56 including a large chamber 58 and a small chamber 60, arranged coaxially to and communicating with one another. The large chamber 58 has ports 62 and 64 providing communications between the large cham-

ber and the reservoir, and the small chamber has a discharge port 66 controlled by a check valve 68.

A reciprocable piston 70 is fitted in the compound cylinder 56. This piston is held against displacement by a retaining ring 72 fitted in a groove in the wall of the cylinder adjacent the open end thereof. The piston 70 has a head 74 and a head 76 spaced apart by a sleeve 78. The head 74 has a skirt provided with radial flanges 80 between which is fitted a leak-proof cup 82, which inhibits the passage of fluid from the open end of the cylinder 56. As shown, a portion of the skirt is reduced in diameter to provide in conjunction with the wall of the cylinder an annular chamber 84. This chamber communicates with the reservoir 36 by way of port 62.

The head 74 of the piston 70 has a plurality of ports 86 providing communications between the annular chamber 84 and that portion of the chamber 58 forward of the head 74, and a collapsible leak-proof cup 88 fitted in a circumferential groove in the piston controls the ports 86. The cup 88 is normally held against the head 74 by a relatively light spring 80 interposed between the cup and a stop 82 fitted in a circumferential groove in the piston.

A plug 94 suitably secured in the skirt of the piston provides in conjunction with the skirt of the piston a chamber 96 which communicates with the sleeve 78. The chamber 96 has a port 98 providing a communication between the chamber 96 and the annular chamber 84. The chamber 96 also has a plurality of ports 100, providing communications between the chamber 96 and that portion of the chamber 58 forward of the piston head 74.

The head 76 of the piston is fitted in the small chamber 60. This head has a plurality of ports 102 providing communications between the larger chamber 58 and the smaller chamber 60. The head 76 has an extension 104 provided with a passage 106. The passage 106 provides a communication between the sleeve 78 and the smaller chamber 60. A collapsible leak-proof cup 108 on the piston head 76 is retained against displacement by a flange 110 on the extension 104, and interposed between the flange 110 and the head of the smaller chamber 60 is a spring 112 for urging the piston to its retracted position.

A reciprocable piston 114 in the sleeve 78 has on its head a leak-proof cup 116 held against displacement by a spring 118 interposed between the cup and the back of the piston head 76. The piston 114 carries a valve 120 held against its seat 122 by a heavy spring 124.

A recess 126 in the plug 94 threaded in the skirt of the piston receives one end of a thrust rod 128, the other end of which is pivotally attached to an arm 130 keyed or otherwise secured to a shaft 132 journaled in a suitable bearing 134 on the frame 10. An operating lever 136, keyed or otherwise secured to the shaft 132, has suitably attached thereto an extension 138, and secured to the free end of this extension is a knob or hand grip 140. Upon depressing the lever 136 the shaft 132 is moved through an angle, and this movement is transmitted through the arm 130 and thrust rod 128 to move the piston 70 on its compression stroke.

A valve chamber 142 formed in the base of the reservoir has a port 144 which provides a communication between the valve chamber and the reservoir, and a port 146, the purpose of which will hereinafter appear. A valve cage 148 is fitted in the chamber 142 and is retained against displacement by a plug 150 threaded in the open end of the chamber. This valve cage has a circumferential groove 152 and a plurality of ports 154 providing communications between the circumferential groove 152 and the interior of the cage. As shown, the cage has a head 156 located between the ports 144 and 146, and the head has a concentric port 158. A leak-proof cup 160 on the head 156 of the valve cage has a concentric opening, and the perimeter defining this opening overhangs the perimeter defining the port 158. Another leak-proof cup 162 is seated on the head of the valve chamber and a spring 164 interposed between the cups 160 and 162 retains the cups against displacement to effectively seal that portion of the chamber 142 between the cups 160 and 162.

A valve 166 has a portion 168 adapted to enter the port 158 in the head 156 of the valve cage and engage the overhanging perimeter of the leak-proof cup 160 to effectively seal the valve when it is in closed position. The valve has a stem 170 which extends through the head of the valve chamber 142. This stem has suitably secured thereon a collar 172, and sleeved on the valve stem between the collar and the head of the valve chamber 142 is a spring 174 which urges the valve to its closed position.

The free end of the valve stem abuts a screw 176 threaded in an arm 178 keyed or otherwise secured to the shaft 132. As shown, the arm 178 has a notch 180 for the reception of a spring-pressed plunger 182 suitably mounted on the frame 10. When the plunger 182 engages the notch 180 the operating lever 136 is retained in neutral position.

A cylinder 184 formed at the base of the reservoir 36 is closed at one end as by a head 186 and open at its other end. This cylinder has a port 188 providing a communication between the valve chamber 142 and the cylinder 146. A piston 190 reciprocable in the cylinder 184 is held against displacement by a retaining ring 192 fitted in a circumferential groove in the wall of the cylinder adjacent the open end thereof. A leak-proof cup 194 on the head of the piston 190 is held against displacement by a spring 196. This spring also serves to return the piston to its retracted position. Formed in the back of the piston is a recess 198 for the reception of one end of a thrust rod 200, the other end of which is suitably secured to a forked member 202. This forked member is pivotally connected to one end of a link 204, the other end of which is pivotally connected to a bracket 206 mounted on the frame 10. The link 204 is limited in its movement by a pin 208 adapted to engage the bracket, and connected between the forked member 202 and a fixed support 210 is a spring 212. This spring actuates the thrust rod 200 to normally retain the piston 190 in its retracted position.

A buck support 214 bolted or otherwise secured to the reservoir 36 includes an elongated receptacle. This receptacle has mounted in the respective ends thereof fluid pressure actuator motors 216 and 218. Each of the motors includes a cylinder 220 and a piston 222 reciprocable in the cylinder. The piston is provided with a head 224 having an extension 226 on which is fitted a leak-proof cup 228. The extension 226 has a diametral bore 230 communicating with an axial bore 232 extending through the piston and the extension. A bleeder screw 234 is threaded in the bore 232 in the piston and fitted on the back of the piston is a cap 236 enclosing the bleeder screw 234. As

shown, the piston is held against displacement by a retaining ring 238 seated in a circumferential groove in the wall of the cylinder adjacent the open end thereof.

The motors 216 and 218 are connected respectively by conduits 240 and 242 to a coupling 244, and the coupling is connected by a conduit 246 to the discharge port of the compound cylinder 56 with the check valve 68 interposed, and by a conduit 248 to the port 146 in the valve chamber 142.

A buck 250 has formed on the back thereof a flange 252 telescoping the buck support, and pressure plates 254 are arranged on the back of the buck to provide bearing surfaces for the caps 236 on the pistons of the fluid pressure motors 216 and 218. The buck also has suitably arranged on the back thereof corresponding sleeves 256 embraced by suitable guides 258 formed on the wall of the cylinders of the respective fluid pressure motors 216 and 218.

Rods 260 suitably secured in the bottom of the receptacle or buck support 214 extend upwardly into the sleeve 256. As shown, the rods have heads 262, and sleeved on the rods between the heads 262 and retaining rings 264 seated in circumferential grooves in the sleeves adjacent the open ends thereof are coiled springs 266. The springs 266 serve to retain the buck 214 on the caps 236 on the back of the pistons 222 in the cylinders 220 and to return the pistons 222 to their retracted positions.

An ironing head 268 adaptable for cooperation with the buck 250 is pivotally connected to oppositely disposed horns 270 formed on one end of a hollow arm 272, the other end of which is flared as indicated at 274 for the reception of the spherical portion 16 of the column 14. The arm 272 has an internal web 276 and this web has an integral arm 278. This arm extends downward into the column 14 and is pivoted to the spherical portion 16 of the column 14. A yoke 280 is pivoted on the arm 278 and is connected by coil springs 282 to an adjustable member 284 mounted on the frame 10.

Upon the completion of an ironing operation, the springs 282 actuate the arm 272 to move the head 268 to the elevated or inoperative position. A bell crank lever 286 is pivoted on the frame 10. One leg of this bell crank lever is pivotally connected to one end of a link 288, the other end of which is pivotally connected to the arm 278. The other end of the bell crank lever carries a pin 290 adapted to enter the forked member 202 when the head is lowered into operative position. To facilitate in lowering the head into operative position, a rod 292 is attached to the arm 272 between the horns 270, and suitably secured to the free end of the rod is a knob or hand grip 294.

A fluid pressure switch 296 communicates with the coupling 244 and is connected in a circuit 298 including a lamp 300 housed in the arm 272 back of an opening having therein a colored glass 302. The circuit 298 is tapped off of a circuit 304 including a heating element 306 arranged within the ironing head 268 and a rheostat 308 mounted on the head 268. The circuit 302 may be connected to any suitable source of electrical supply.

In operation, assuming that the fluid pressure system is filled with fluid, that the circuit 304 is connected to a suitable source of electrical supply, that the ironing head is in the elevated or inoperative position, and that the buck is in the position of rest wherein the pistons 222 of the fluid pressure motors 216 and 218 are in retracted position in which position the buck is held against the pistons by the springs 266; under these conditions, the operator places the work upon the buck and lowers the head 268 into operative position, which position varies according to the thickness of the work.

Upon movement of the head into operative position, the arm 272 and the arm 278 integral therewith is moved through an angle. This movement of the arms 272 and 278 places the return springs 282 under tension and transmits force through the link 288 to the bell crank lever 286 to move this lever through an angle. As the bell crank lever moves, the pin 290 thereon engages the forked member 202 and retracts the thrust rod 200, resulting in releasing the piston 190.

After moving the head into operative position, the operator applies force to the lever 136 by pressing downward on the hand grip 140. This movement of the lever 136 rocks the shaft 132 and moves the arm 130 through an angle. This movement of the arm 130 transmits force through the thrust rod 128 to move the piston 70 on its compression stroke. Simultaneously therewith, the arm 178 is rocked through an angle, and this movement of the arm 178 disengages the spring-pressed plunger 182 from the notch 180.

During the initial movement of the piston 70 on its compression stroke, the leak-proof cup 88 on the head 74 of the piston covers the port 64, and the fluid in the chamber 58 is displaced therefrom through the ports 102 in the head 76 of the piston, past the leak-proof cup 108 into the chamber 60, thence through ports 66 and past the check valve 68 through conduit 246, coupling 244, and conduits 240 and 242, into the motors 216 and 218, also through conduit 246 into valve chamber 142, thence through port 188 into cylinder 184, resulting in actuation of the fluid pressure motors 216 and 218.

Further increase of pressure results in actuation of the pistons 222 in the motors 216 and 218 and the consequent movement of the buck 250 against the head 268. Simultaneously therewith, pressure is built up in the cylinder 184 against the face of the piston 190, resulting in applying force through the thrust rod 200 to the bell crank lever 286 retaining the lever 286 against movement, thus effectively retaining the head in operative position. Movement of the buck is the result of displacement of fluid due to initial movement of the piston 70, and further movement of the piston 70 creates sufficient pressure between the buck and the head to effectively iron the work. The buck is moved against the resistance of the springs 266, resulting in compressing the springs between the heads 262 on the rods 260 and the retaining rings 264.

As the piston 70 is moved upon its compression stroke, a predetermined pressure is obtained whereupon the piston 114 is actuated by fluid under pressure in the chamber 58 resulting in tripping the valve 120 and thereby rendering the head 74 of the piston ineffective for producing pressure, the fluid forward of the head 74 being returned to the reservoir by way of the ports 100, chamber 96, port 98, chamber 84 and port 62. As the piston proceeds on its compression stroke the fluid under pressure in the chamber 60 operates against the piston 114 to retain the valve 120 in open position.

This transition of pressure occurs over a relatively wide range depending entirely upon the relation of the area of the piston 114 to the area

of the valve 120. Because of the restricted openings 100 providing communications between the chamber 58 and the valve 120, sudden movement of the piston 70 on its compression stroke will not cause actuation of the valve 120.

When the pressure between the ironing elements reaches a predetermined degree, the fluid under pressure in the system actuates the fluid pressure switch 296 to close the circuit 298. This results in lighting the lamp 300 which gives a visual indication that the required pressure between the ironing elements has been attained.

Upon release of the applied force the check valve 68 maintains 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 136. This movement of the lever 136 is transmitted to the shaft 132, resulting in moving the arm 130, and this movement of the arm retracts the thrust pin 128. As the thrust pin 128 is retracted, the piston 70 is returned to its normal or retracted position under the influence of the spring 112.

As the piston 70 returns to its retracted position the cups 88 and 108 collapse, and fluid is drawn from the reservoir 36 through the port 62, chamber 84, ports 86, past the cup 88 into the chamber 58 forward of the head 74, thence through ports 102 in the piston head 76, past the cup 108, into the chamber 60, filling the chambers 58 and 60 for subsequent operation. When the piston 70 is fully retracted, the cup 88 uncovers the port 64 and any surplus fluid in the cylinder is returned through this port to the reservoir.

Upon further movement of the operating lever 136 in the same direction the shaft is moved through an angle, and this movement is transmitted to the arm 178 on the shaft 132 to trip the valve 166, whereupon pressure on the fluid in the motors 216 and 218 and in the cylinder 184 is released. Upon tripping the valve 166 the fluid in the cylinder 184 and the motors 216 and 218 is returned from the cylinder 184 and the motors 216 and 218 to the reservoir. The fluid is returned from the cylinder 184 through the port 188 to the valve chamber 142, and from thence past the valve 116 through port 144 to the reservoir, and from the motors 216 and 218 through the conduits 240 and 242 and coupling 244 and conduit 246 to the valve chamber 142, thence past the valve 166, through the port 144 to the reservoir. Due to the tension on the springs 266 connected between the buck and the support, these springs serve to retain the buck on the pistons of the fluid pressure motors and to return the buck to its normal position.

Upon release of pressure on the fluid in the cylinder 184, the springs 282 become effective to return the head 268 to elevated or inoperative position. As the head returns to inoperative position the pin 290 on the bell crank lever 286 disengages the fork 202 on the end of the thrust pin 200, whereupon the spring 212 becomes effective to actuate the thrust rod 200 to partly discharge fluid from the cylinder 180 through port 188 into valve chamber 144, past the valve 166, and through the ports 154, circumferential groove 152, and port 144, into the reservoir.

While the invention has been described in connection with certain specific embodiments, the principles involved are 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.

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

1. An ironing machine comprising cooperative ironing elements, a fluid pressure actuated motor operatively connected to one of the elements, a fluid pressure actuated motor yieldingly supporting and operative to actuate the other element, and a fluid pressure producing device operatively connected to the motors for simultaneous actuation thereof.

2. An ironing machine comprising an ironing head, a buck for cooperation with the head, means supporting the head for movement into and from operative position, means tending to move the head from operative position, fluid pressure motors for actuating the buck, a fluid pressure motor for actuating the head, a fluid pressure producing device for actuating the motors concomitantly, and manual means for operating the fluid pressure producing device.

3. An ironing machine comprising an ironing head, a buck for cooperation therewith, means supporting the head for movement into and from operative position, means tending to move the head from operative position, force multiplying means connected to the supporting means, fluid pressure motors for actuating the buck, a fluid pressure motor for actuating the force applying means, a fluid pressure producing device for actuating the motors, and manual means for actuating the fluid pressure producing device.

4. An ironing machine comprising an ironing head, a buck for cooperation therewith, means supporting the head for movement into and from operative position, manually operative means for moving the head into operative position, means tending to move the head from operative position, force multiplying linkage connected to the supporting means, fluid pressure motors for actuating the buck, a fluid pressure motor for actuating the force applying linkage, a fluid pressure producing device for actuating the motors, and a manually operative means for actuating the fluid pressure producing device.

5. An ironing machine comprising an ironing head, a buck for cooperation therewith, means supporting the head for movement into and from operative position, manually operated means for moving the head into operative position, means tending to move the head from operative position, a bell crank lever, linkage connecting the lever to the supporting means, fluid pressure motors for actuating the buck, a fluid pressure motor for actuating the bell crank lever, a fluid pressure producing device for actuating the motors, and manually operative means for actuating the fluid pressure producing device.

EVERETT W. ROUCH.