Jan. 14, 1947. L. V. McCARTY 2,414,236

MOUNTING MEANS

Original Filed April 25, 1941 3 Sheets-Sheet 1

Fig. 1.

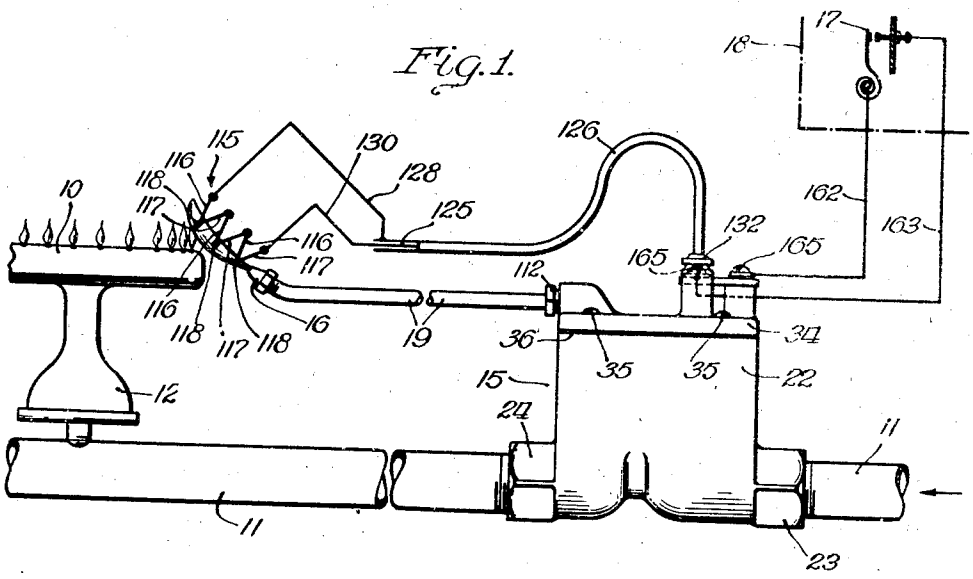


Fig. 2.

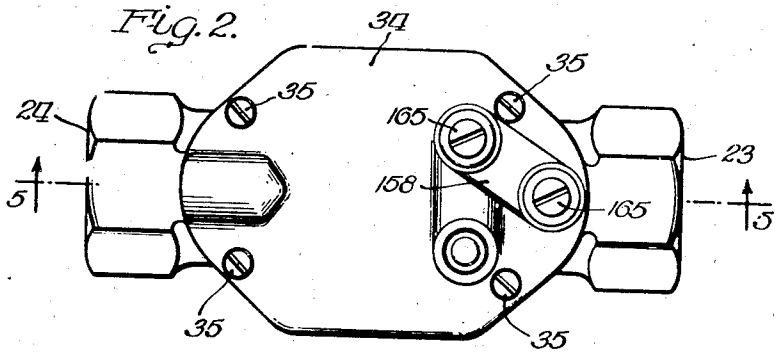
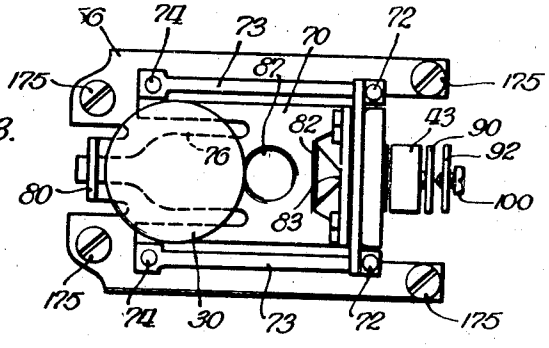


Fig. 3.



INVENTOR.
Lourdes V. McCarty

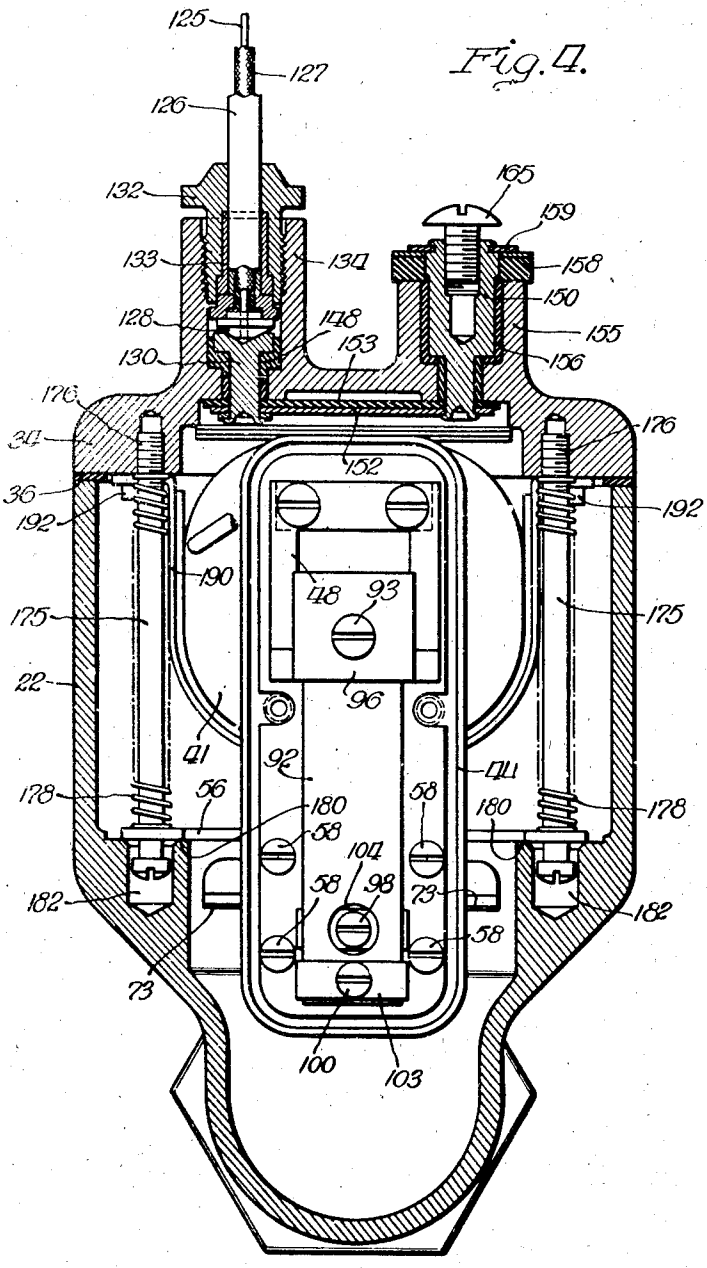
BY
Brown, Jackson, Boettcher & Dunn
Attys.

Jan. 14, 1947. L. V. McCARTY 2,414,236

MOUNTING MEANS

Original Filed April 25, 1941 3 Sheets-Sheet 2

Fig. 4.



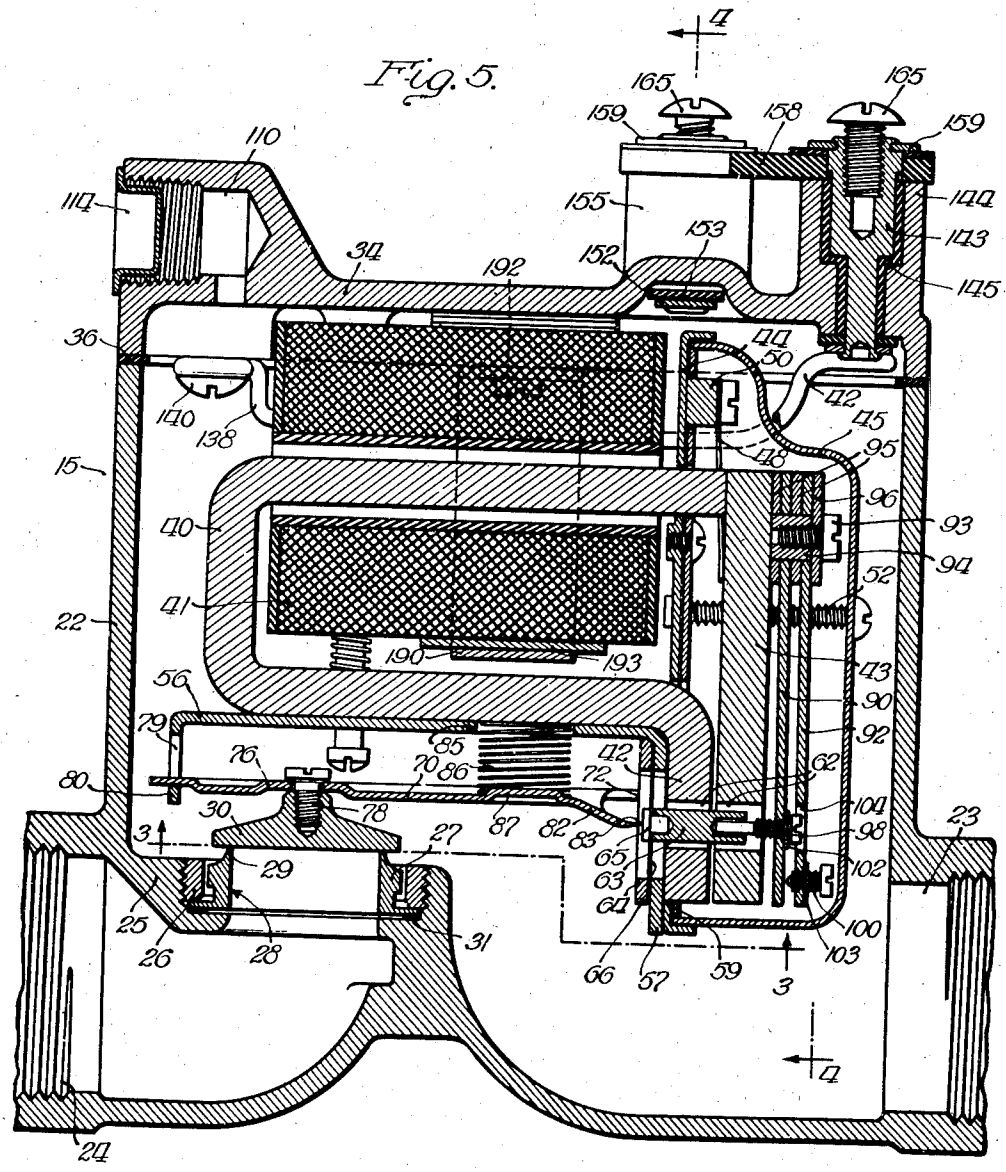
INVENTOR.
Lourdes V. McCarty
BY
Brown, Jackson, Boettcher & Dienner
Atty's.

Jan. 14, 1947. L. V. McCARTY 2,414,236

MOUNTING MEANS

Original Filed April 25, 1941 3 Sheets-Sheet 3

Fig. 5.



INVENTOR.
Lourdes V. McCarty
BY
Brown, Jackson, Boettcher & Dienner
Attys.

Patented Jan. 14, 1947

2,414,236

UNITED STATES PATENT OFFICE

2,414,236

MOUNTING MEANS

Lourdes V. McCarty, Milwaukee, Wis., assignor to Milwaukee Gas Specialty Company, Milwaukee, Wis., a corporation of Wisconsin

Original application April 25, 1941, Serial No. 390,247, now Patent No. 2,349,443, dated May 23, 1944. Divided and this application March 24, 1944, Serial No. 527,903.

4 Claims. (Cl. 137—139)

1

This invention relates to controlling means and has to do more particularly with the mounting thereof.

More specifically, my invention has to do with apparatus comprising a controlling member or valve disc movable from one position to another and operated by means of an electromagnet energized by an electric current of slight power, such as that generated by a thermoelectric generator heated by a pilot light of a burner control apparatus, in which the electromagnet and controlling member and associated parts are disposed within a suitable housing.

Because of the minute power available for operating a unit of this kind, it is necessary to maintain an accurate relationship between the component parts thereof. Since it is desirable to obtain ready access for assembly and servicing, it is preferable to construct a device of this kind in such a manner that separating the housing exposes the parts involved in usual servicing and adjustment without further disassembling.

The instant invention is directed to the provision of an improved mounting for the electromagnetic operating unit and valve or controlling member assembly, and, more particularly, an improved form of resilient mounting for assuring accurate positioning of the valve disc or other controlling member with respect to the valve seat or cooperating part. Further objects and advantages of my invention will appear from the detail description.

In the drawings:

Figure 1 is a fragmentary and more or less diagrammatic view showing an embodiment of the invention in a pilot burner and main burner gas supply system;

Figure 2 is a top plan view of the thermoelectric control and safety shut-off device shown in Figure 1;

Figure 3 is a bottom plan view of the electromagnetic operating unit taken substantially on the line 3—3 of Figure 5 and showing the valve member, its operating lever, and the hinge mounting for the valve operating lever;

Figure 4 is a vertical transverse section on an enlarged scale and taken substantially on the line 4—4 of Figure 5, with the sealing cover for the energy storing means removed; and

Figure 5 is a vertical longitudinal section, also on an enlarged scale, taken substantially on the line 5—5 of Figure 2.

This application is a division of my copending application for Burner control apparatus,

2

Serial No. 390,247, filed April 25, 1941, now Patent No. 2,349,443, granted May 23, 1944.

Referring to the drawings, in Figure 1 the burner 10 is any suitable or preferred main burner. It may be the main burner for a room or space heater, or it may be the burner for a water heater, or for a floor furnace, an oven burner, one or more top burners for a gas range, or any other burner. A fuel supply pipe 11 leads to the burner 10 for the delivery of gaseous or other fuel thereto—for example, through a mixing chamber 12 to which air is admitted in the usual way, as well understood in the art.

Interposed in the fuel supply pipe 11 is the thermoelectric control and safety shut-off device indicated in its entirety at 15 in Figure 1. The device 15 is responsive to the pilot burner 16. It may also be responsive to a control device 17 shown, for purposes of illustration in Figure 1, as a thermostatically actuated switch which, in the case of a hot water heater, may be subject to the temperature of the water in the tank, or, in the case of a room or space heater or floor furnace, may be mounted in appropriate position within the room or other space heated by the burner 10. Instead of being in the form of a thermostatically actuated switch, the control device 17 may be of a character to operate, for example, upon the occurrence of an abnormal pressure in the tank of a hot water heater, or upon the occurrence of any other abnormal, defective, or insufficient functioning of the apparatus. The room or space or portion of the apparatus or system to the temperature or other condition of which the control device 17 is subject is indicated more or less diagrammatically by dot and dash lines 18 in Figure 1.

The pilot burner 16, which is located in juxtaposition to the main burner 10 to maintain a pilot flame for igniting the main burner, is supplied with gaseous fuel by a pilot supply pipe 19 which is shown as leading from the housing or case of the thermoelectric control and safety shut-off device 15. This may vary within the scope of the present invention.

Referring now in detail to the thermoelectric control and safety shut-off device 15, the housing or case 22 for this device has an inlet at 23 and an outlet at 24. The inlet 23 opens into the interior of the housing, and a partition or wall 25 separates the interior of the housing from the outlet 24. The partition 25 has an opening into which is threaded a retaining ring 26 which secures a valve seat member 27 in place. The valve seat member 27 defines an opening 28 for placing

the interior of the housing 22 in communication with the outlet 24. The upper end of the valve seat member 27 is provided with an annular valve seat 29 upon which the shut-off valve disc 30 is adapted to seat to shut off the supply of fuel to the burner 10. A gasket may be provided at 31.

Contiguous sections of the fuel supply pipe 11 are connected to the inlet at 23 and to the outlet at 24, as shown in Figure 1. A cover 34 is removably secured upon and closes the top of the housing 22. The cover 34 is shown as secured to the housing 22 by screws 35, and a cover gasket may be provided at 36.

The electromagnetic operator for the valve or controlling member and the valve, valve lever, and energy storing means constitute a unitary assembly which is carried by the cover 34, preferably resiliently, as will hereinafter appear. This assembly is enclosed within the housing 22 when the cover 34 is applied, and is removable from the housing by removing the cover.

The electromagnetic operator includes an electromagnet consisting of a magnet frame 40 shown as of generally U-shaped form, although this may vary. The coil 41 is shown as wound around one leg of the magnet frame, and the end of the other leg of the magnet frame is shown as turned at 42 to position generally parallel to the armature 43 to present a relatively large pole face to the armature.

The ends of the magnet frame 40 extend through openings in a sealing plate 44, the margin of which is turned or flanged laterally to receive a sealing cover 45 between which and the plate 44 the pole faces of the magnet frame 40, the armature 43, and the energy storing means are enclosed and sealed. The armature 43 is hinged by hinge means 48 to a spacer 50 fixed to or integral with the sealing plate 44. The hinge means 48 hinges the armature 43 in position adjacent the pole faces of the magnet frame, and the hinge means 48 is preferably of spring character to maintain the armature in the desired position. The cover 45 is removably secured to the sealing plate, for example, by screws 52, and the cover, when in place, may limit movement of the armature away from the electromagnet.

The magnet frame 40 is mounted on and carried by a mounting plate 56 which has a downturned lug 57 positioned against the back of the downturned end 42 of the magnet frame. Screws 58 secure the sealing plate 44 to the downturned lug 57 on the mounting plate 56. A sealing gasket is preferably provided at 59.

The armature 43 and the downturned end 42 of the magnet frame have registering openings 62. A plunger 63, movable endwise in these openings, is secured to the center of a flexible diaphragm 64 by a diaphragm pin 65. The diaphragm 64 is clamped in place to the back of the downturned lug 57 on the mounting plate 56 by a retaining plate 66 which may be secured in place by the lower screws 58 and cooperating nuts (not shown), or otherwise as desired. The retaining plate 66 and the downturned lug 57 of the mounting plate 56 have registering openings and the diaphragm 64 seals the space between the sealing plate 44 and the cover 45 against the entry of deleterious matter through the openings 62.

A valve or controlling member operating lever 70 is hinged at 72, 72 (Figure 3) by a pair of hinge springs 73 to lugs on the sealing plate 44, or to lugs on a mounting plate secured in place

with the sealing plate. The opposite ends of the hinge springs 73 are secured, for example, at 74 to lateral lugs on the operating lever 70. The lever 70 has a lug 76 offset upwardly therefrom, and the valve disc member 30 or controlling member is secured to this lug 76 by a valve disc screw 78. The reduced outer end of the lug 76 engages in a slot 79 in the downturned lug 80 on the mounting plate 56. Engagement of the reduced outer end of the lug 76 with the lug 80 at the bottom of the slot 79 serves to prevent undue separation of the valve disc 30 from the mounting plate 56 and electromagnetic operator assembly, particularly when the assembly is removed from the housing 22.

At its opposite end the lever 70 is provided centrally between its opposite sides with a downwardly offset lug 82 having a pointed end for engagement at 83 with the adjacent end of the diaphragm pin 65. The lever 70, being hinged or fulcrumed close to pointed engagement at 83 with the plunger 63, provides for imparting relatively great movement to the valve disc 30 with relatively slight movement of the plunger 63. The mounting plate 56 has an opening 85, and a relatively light coiled spring 86 is disposed through this opening between the magnet frame 40 and the lever 70 for returning the valve disc 30 to closed position upon deenergization of the electromagnet. The thermoelectric control and safety shut-off device is preferably positioned vertically in use, as shown in Figures 1 and 5, in in which case I contemplate returning the valve disc 30 to closed position by gravity and without the use of a spring, such as the spring 86, or by gravity in conjunction with the spring 86, or otherwise as desired. A circular raised portion 87 on the lever 70 engages in the lower end convolution of the spring 86 for holding the lower end of the spring in place and against lateral displacement.

It will be noted that the gas pressure within the housing 22, acting upon the top of the valve disc 30, holds the valve disc to its seat 29. When the valve is closed, it requires the greatest force to lift it or move it from its seat 29, and as the valve disc 30 is lifted or moved away from its seat the drop in pressure across the valve causes a rapid drop in the force required to continue movement of the valve disc 30 to full open position.

The energy storing means is shown as comprising a pair of flat leaf springs 90 and 92 normally disposed in substantially parallel relation. The upper ends of these leaf springs 90 and 92 are attached to the armature 43, for example, by a screw 93 threaded into an armature bushing 94, which bushing 94 in turn is suitably secured or fixed to the armature 43. Spacers are provided at 95, one between the armature 43 and the spring 90, and the other between the spring 90 and the spring 92. A retaining clamp 96 is provided between the spring 92 and the head of the screw 93.

An adjusting pressure screw 98, threaded through the spring 90 near its lower end, has endwise engagement with the plunger 63, preferably extending into an axial opening in the plunger as shown in Figure 5. A second adjusting pressure screw 100 is threaded through the spring 92 near its lower end, and the pointed inner end of the screw 100 is adapted to engage or contact the spring 90 after initial tensioning of the spring 90, as will presently appear. In that the spring 90 alone is tensioned in the initial movement of the armature from retracted to attracted position,

the pointed inner end of the screw 100 is normally spaced from or out of contact with the spring 90 as shown, for example, more or less diagrammatically in Figure 5. The screws 98 and 100 are adjustable to adjust the action of the device, and may be locked in adjusted positions as desired, tension clamps being indicated more or less diagrammatically at 102 and 103 respectively. The spring 92 has an opening 104 which operates over the head of the screw 98 to permit movement of the spring 92 toward the spring 90 and free of the spring 90 in the initial movement of the armature to attracted position.

The top of the housing 22 is shown as provided with an outlet 110 to which the pilot supply pipe 19 is adapted to be connected by a threaded coupling or union member 112 for delivering gaseous fuel to the pilot burner 16. The outlet 110 is shown as provided with a pipe cap 114 which, of course, is removed in connecting the pilot supply pipe 19 to the outlet 110.

For the purposes of illustration, the thermoelectric generator, which is energized by the heat of the pilot flame for supplying thermoelectric current to the thermoelectric operating circuit for energizing the electromagnet, is shown more or less diagrammatically as a thermopile 115 comprising a plurality of thermocouples—three being shown—connected in series. This, of course, may vary within the scope of the present invention, any thermoelectric generator which will generate the required thermoelectric current being contemplated within the scope of the appended claims.

Suffice it for purposes of the present application to state that each of the three thermocouples of the thermoelectric generator 115 comprises the usual or any suitable elements 116 and 117 of different thermoelectric characteristics, each pair of said elements being joined at 118 to provide the "hot junctions" which are placed in position to be heated by the pilot flame as long as the pilot flame is burning. Any other suitable thermoelectric or electric generator may be employed.

The lead conductors for the thermoelectric generator may be of the type more fully disclosed in Oscar J. Leins Patent No. 2,126,564, granted August 9, 1938, or the construction of the thermoelectric leads may be of any other suitable or preferred form.

For the purpose of this description, suffice it to state that the thermoelectric lead conductors comprise an inner lead conductor 125 and an outer tubular lead conductor 126 surrounding the inner lead conductor. The inner lead conductor is insulated from the outer leader conductor, for instance, by a wrapping of insulation 127 (Figure 4) on the inner lead conductor. One terminal of the thermoelectric generator is shown more or less diagrammatically as connected at 128 to the outer tubular lead conductor 126. The other terminal of the thermoelectric generator is shown as connected at 130 to the inner lead conductor 125.

A quick detachable or removable connection is preferably provided between the electromagnet of the thermoelectric control and safety shut-off device and the ends of the leads 125 and 126 opposite the ends which are connected to the thermoelectric generator. The inner lead 125 has a connector cone 128 which seats in the correspondingly recessed outer end of the terminal tip 130, and is clamped in contact therewith by a connector sleeve 132. The adjacent end of the

outer tubular lead conductor 126 is grounded to the cover 34 of the housing 22 through a bushing 133 and the connector sleeve 132 to the internally threaded boss 134 on the cover 34.

One end of the coil 41 (Figure 5) is secured to the under side of the cover 34 by a binding screw 140, and thereby is grounded to the cover 34 and thus connected to the outer lead conductor 126. The other end 142 of the coil 41 is connected to a terminal post 143 fixed in a boss 144 on the cover 14 and insulated therefrom by a terminal bushing 145. The terminal tip 130, which is insulated from the cover by an insulator bushing 148, is connected in circuit with a second terminal post 150 by a connector strip 152. An insulator strip is provided at 153 (Figure 4). The terminal post 150 is fixed in a boss 155 on the cover 34 and is insulated therefrom by a terminal insulator 156. An insulating terminal board 158 is mounted across the tops of the bosses 144 and 155, suitable washers being provided at 159, and the upper ends of the terminal posts 143 and 150 being peened over or otherwise formed to secure the terminal board in place.

Where a thermostat or other condition responsive device is employed as indicated at 17 in Figure 1, the leads 162 and 163 for this device are connected to the terminal posts 143 and 150 by suitable binding screws 165. The thermostat or other condition responsive device 17 is thus placed in series circuit relation with the thermoelectric generator and the coil 41 of the electromagnet.

To assure accurate positioning of the valve disc 30 or other controlling member with respect to the valve seat 29 or cooperating part and independently, for example, of the attachment of the cover 34 to the housing 22, I provide a resilient mounting for the electromagnetic operator assembly. This resilient mounting comprises four vertically elongated screws or posts having their heads disposed beneath the mounting plate 56 and their shanks extending up relatively loosely through openings in the mounting plate. The upper ends of the screws or posts 175 have threaded engagement at 176 with the cover 34, and springs 178 are coiled about the respective posts and interposed between the cover 34 and the mounting plate 56. When the cover 34 is applied, the electromagnetic operator is positioned within the housing 22 and the mounting plate 56 seats upon horizontal seating surfaces 180 on the interior of the housing 22, thus assuring accurate positioning of the valve disc with respect to its valve seat 29. The cover 34 may be clamped in place, and any improper fit of the cover or non-uniformity in the clamping of the same in place will not disturb the proper positioning of the valve disc 30. The heads at the lower ends of the screws or posts 175 are shown in Figure 4 as spaced below the mounting plate 56 and as positioned in recesses 182 in the housing 22.

The operation of the control system of Figure 1 is described in detail in my above identified copending application and need not be stated here.

The embodiment of the invention shown in the drawings is for illustrative purposes only, and it is to be expressly understood that said drawings and the accompanying specification are not to be construed as a definition of the limits or scope of the invention, reference being had to the appended claims for that purpose.

I claim:

1. In combination, a housing, a controlling member within said housing, a cover for said housing, operator means within said housing,

having mechanical connection with the controlling member for supporting said controlling member and operable to operate the controlling member; a supporting member for mechanically supporting said operator means, and means resiliently mounting said supporting member on said cover and including abutment means within the housing upon which said supporting member is adapted to seat to assure accurate positioning of the controlling member and independently of the attachment of the cover to the housing.

2. In a device of the class described, a valve housing having an inlet and an outlet, a partition wall separating said inlet from said outlet and having a valve opening provided with a valve seat, a valve member adapted to close against said seat, a cover for said housing, operator means within said housing having mechanical connection with the valve member for supporting said valve member and operable to open the valve member, a supporting member for mechanically supporting said operator means, and means resiliently mounting said supporting member on said cover and including abutment means within the housing upon which said supporting member is adapted to seat to assure accurate positioning of the valve member with respect to said valve seat and independently of the attachment of the cover to the housing.

3. In combination, a housing, means carried by said housing and defining a valve opening provided with a valve seat, a valve member within said housing and adapted to close against said seat, a cover for said housing, operator means within said housing having mechanical connection with the valve member for supporting said valve member and operable to open the valve member, a supporting member for mechanically supporting said operator means, and means resiliently mounting said supporting member on said cover and including abutment means within the housing upon which said supporting member is adapted to seat to assure accurate positioning of the valve member with respect to said valve seat and independently of the attachment of the cover to the housing.

4. In combination, a housing, a controlling member within said housing, a cover for said housing, operator means within said housing having mechanical connection with the controlling member for supporting said controlling member and operable to operate the controlling member, a supporting member for mechanically supporting said operator means, means carried by said housing for cooperation with said controlling member, and means resiliently mounting said supporting member on said cover and including abutment means within the housing upon which said supporting member is adapted to seat to assure accurate positioning of the controlling member with respect to said cooperating means.

LOURDES V. McCARTY.