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W. L. HUNTINGTON
CONTROL DEVICE AND VALVE

2,667,897

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2 Sheets-Sheet 1

Fig. 1.

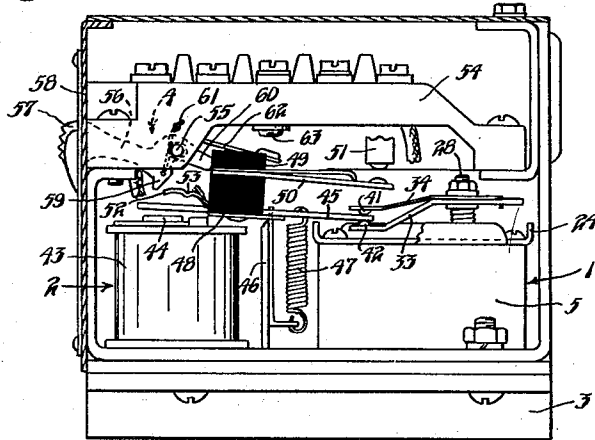


Fig. 2.

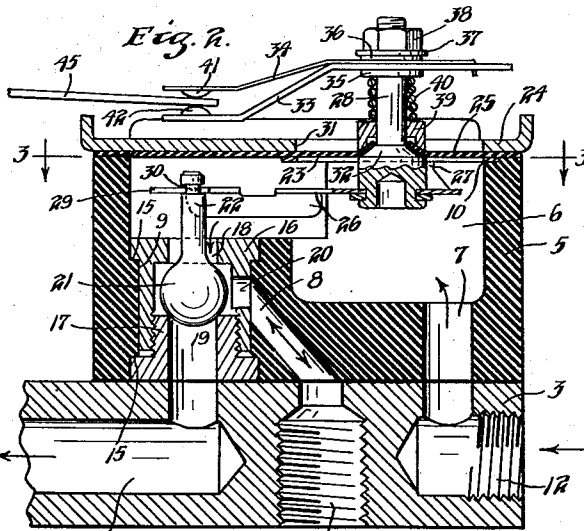


Fig. 5.

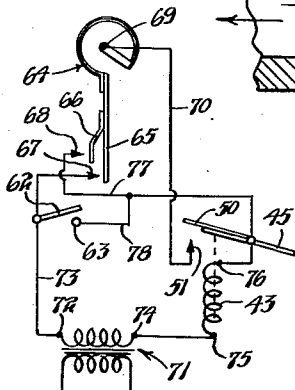


Fig. 3.

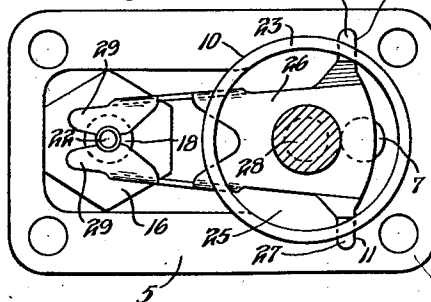
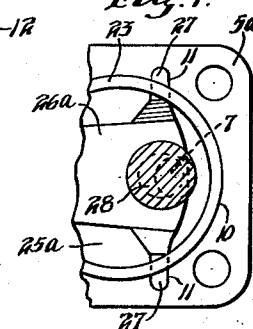


Fig. 4.



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FIG. 6

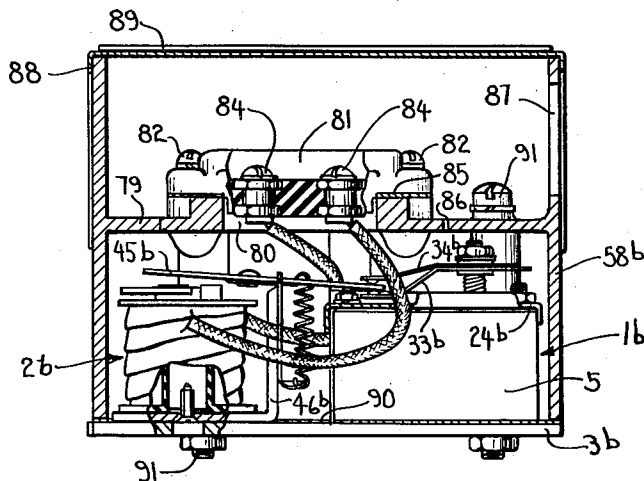
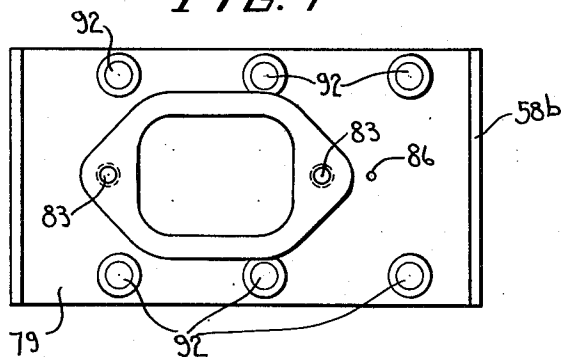


FIG. 7



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2,667,897

CONTROL DEVICE AND VALVE

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Application December 27, 1948, Serial No. 67,454

9 Claims. (Cl. 137—620)

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This application is a continuation in part of application No. 749,493, filed May 21, 1947, which is now abandoned.

The present invention relates to a control device and control valve for fluid motors generally and for diaphragm gas valves in particular. The device is preferably of the type that embodies both an automatic and a manual control means for actuating the control valve, and suitable mechanism actuated by the manual means that adapts the device to automatically transfer to the automatic control means upon the supply of electrical power thereto. The manual control and transfer mechanism may be omitted however. The control valve's function is to control the flow of pressure fluid to and from a fluid motor or diaphragm valve.

One of the objects of the invention is to provide an inexpensive control valve that is so easily operated that only a very small amount of power is required to actuate it, such as the electrical power that may be developed by a small thermoelectric generator heated by a pilot flame, or by a battery or by any other suitable means.

Another object of the invention is to provide a control valve that is easy to assemble and repair.

Another object is to provide a control valve that is pressure balanced.

Another object is to provide a pressure balanced valve that will not open when there is a leak therein, thus providing a signal that a leak is present that should be fixed.

An additional object of the invention is to provide a diaphragm pressure balanced valve with an apertured cover that normally tends to maintain atmospheric pressures in said cover; but the aperture therein being of such size that a rupture in said diaphragm will cause the cover to assume substantially valve pressure, thus cancelling the balancing effect of the valve so as to prevent normal opening of the valve by its power means.

A further object of my invention is to provide a control device of the above noted type wherein the automatic and manual means for actuating the control valve cooperate in a simpler and more efficient way than the prior art arrangements.

Still further objects and advantages of the invention will become apparent upon reading the following detailed description of the invention in conjunction with the accompanying sheet of drawing wherein:

Figure 1 is an elevational view of the control apparatus with the cover shown in cross-section;

Figure 2 is a cross-sectional view taken along the longitudinal axis of the valve;

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Figure 3 is a cross-sectional view taken along the line 3—3 in Figure 2;

Figure 4 is a fragmental view of a valve similar to that shown in Figure 3, but showing a slightly modified arrangement of the valve parts;

Figure 5 is a schematic wiring diagram of the control system;

Figure 6 is an elevational view of another modification of the invention with parts thereof shown in cross-section and parts broken away; and

Figure 7 is a plan view of the cover shown in cross section in Figure 6, with its cap removed.

The illustrated embodiment of the control unit of the system shown in Figure 1 comprises a control valve, designated generally by the reference numeral 1, and an electric relay, indicated generally at 2, both mounted on an adapter base plate 3, and a manual controller indicated generally at 4.

The details of the valve can best be seen in Figure 2. It comprises a main body portion 5 having an elongated chamber 6 therein open at its top, three openings 7, 8 and 9 in the bottom thereof, and recesses 10 and 11 in the upper edge thereof. Opening 7 connects chamber 6 with conduit 12 in the adapter plate 3, which conduit is connected to a source of fluid under pressure. Opening 8 extends from the side wall of opening 9 to connect said opening 9 with conduit 13 in the adapter 3, which conduit is adapted to be connected to the fluid motor that is desired to be controlled, such as the diaphragm valve shown at 36 in the McGoldrick Patent No. 2,304,268. The fluid motor or diaphragm valve forms no part of this invention and is, therefore, not illustrated. Opening 9 extends from chamber 6 to conduit 14 in said adapter 3, which conduit forms an exhaust or bleed to the atmosphere or any suitable low pressure area. The opening 9 also has the intermediate portion of its length of reduced diameter forming shoulders 15 therein near each end thereof.

Mounted in the above mentioned opening 9 in the valve body, are two telescopic valve seat members 16 and 17 suitably secured together as by screw threads so as to have portions thereof rest on the above mentioned shoulders 15. The member 16 has a valve seat opening 18 and an opening 20 in the side wall thereof in communication with the opening 8 in the valve body 5. The member 17 has a valve seat opening 19, of the same diameter as opening 18, in communication with the conduit 14 in the adapter 3.

Positioned between the valve seat openings 18 and 19 is a ball valve 21 having a stem 22 extending upwardly through opening 18.

Mounted in the recess 19 of the valve body 5 is a washer 23. A plate 24 clamps a sheet of flexible material 25, such as rubber or the like, down against the top edge of the valve body 5 and the washer 23.

An arm 26, having pivots 27 formed on one end thereof, is mounted in the chamber 6 with the pivots 27 in the recesses 11 under the washer 23. The other end of arm 26 is bifurcated at 29 and engages in an annular groove 30 in the valve stem 22. A stem 28, which has one end connected to arm 26 near pivots 27, extends through a small opening in the flexible member 25 and through an opening 31 in the plate 24, the opening 31 being of substantially the same diameter as the opening in the washer 23. The area of the opening 31 is of such size that the force of the fluid against the bottom of the stem 28 and the flexible member 25, multiplied by the distance between the longitudinal axis of the stem 28 and the axis of the pivots 27, equals the moment of force about the pivots' axis due to fluid pressure on the top of valve 21. This latter moment of force is equal to the transverse area of opening 18 multiplied by the distance between the longitudinal axis of the valve stem 22 and the axis of the pivots 27. It is thus seen that no matter what fluid pressure exists in chamber 6, the fluid force on the valve is balanced by the fluid force on the flexible member 25 and the bottom of stem 28.

The angle through which the pivots 27 must rotate is very small due to the fact the valve movement is very small. However, it is desirable that the top and bottom surfaces of the pivots be rounded somewhat to permit easy rocking thereof. It is to be noted that the ring 23 serves the dual function of an upper bearing surface for the pivots and a transverse support for the central portion of the flexible material 25. The removable cover 24, flexible material 25, ring 23, pivots 27 and sealing means 39 and 40 thus provide a low cost and easily repaired valve assembly.

The stem 28 has a beveled shoulder 32 near the lower end thereof and below the member 25 and a screw-threaded upper end. Mounted on the upper end of the stem 28 are two opposed actuating arms 33 and 34 clamped between abutment members 35 and 36 locked in position by washer 37 and nut 38. Slidably mounted on the stem 28 between the member 25 and the abutment member 35 is a cup-shaped clamping member 39 and a spring 40. The flexible member 25 is thus clamped between member 39 and the shoulder 32 on the stem 28 to form a fluid tight seal.

The arm 34, which has a struck-up friction reducing member 41 thereon, is flexible to provide a strain release enabling the arm 34 to continue its movement upwardly after the valve 21 has seated and closed the opening 18. The necessity for such a strain release will be explained hereinafter. The arm 33 is comparatively rigid and also has a struck-up friction reducing member 42.

Referring now to Figure 1 of the drawing, the power means for moving the arms 33 and 34, namely, the relay 2, comprises an electromagnet 43 having a core 44, an armature 45, a pivot member 46 and a spring 47 secured at one end to the pivot member 46 and at the other end to the armature 45.

The armature is pivoted near its center with one end thereof positioned between the members 41 and 42 on arms 34 and 33, respectively, and the other end thereof is positioned over the core 44.

Mounted on the armature 45 between suitable insulating spacer members 48 and 49 is a switch

arm 50 adapted to engage a fixed contact member 51. Also mounted on the armature 45 is a stiff spring latching member 52 having a detent 53 with all of the above mentioned elements mounted on the armature on the relay side of the pivot 46, it is obvious that the sum of their moments of force are equal to, or exceed, the sum of the moments of force (exclusive of the tension of spring 47) acting in the opposite direction on the valve side of said pivot 46. With this balancing of the masses of the pivoted members, it is apparent that "drop-out" and "pull in" forces of the relay armature will be constant and regulated solely by the tension of spring 47.

Pivotally mounted to a frame member 54 by means of a pivot 55 is the manual control member 4 having an arm 56 with a finger grip end 57 extending through an opening in the casing 58 and having cams 59 and 60 extending radially from the pivoted end thereof. A torsional spring 61 anchored at one end in the frame 54 and at the other end in cam 59, is so strained that it tends to rotate the arm 56 and cams 59 and 60 in a clockwise direction.

Also pivoted to the frame 54 is a switch arm 62 adapted to engage fixed contact member 63.

Referring now to the schematic wiring diagram of Figure 5, a bimetallic thermostat, generally designated by the reference numeral 64, comprises a flexible contact arm 65 and a comparatively rigid contact arm 66. The contact arm 65 is adapted to engage fixed contact 67 before contact arm 66 engages fixed contact 68. The other end of the thermostat is connected through line 70 with fixed contact 51. A source of electrical power, generally designated by the reference numeral 71, is illustrated as being a transformer but, it is to be understood, said source may consist of a thermoelectric generator or a storage battery or any other suitable source of electrical energy. Terminal 72 of the secondary of said transformer is connected through line 73 to the fixed contact 67 while the other terminal 74 of the secondary is connected to terminal 75 of the relay 43. The other terminal 76 of the relay is connected through line 77 to the fixed contact 68. The switch arm 50 is adapted to complete a circuit from line 70 through contact 51 to line 77 while switch arm 62 is adapted to complete a second circuit from line 73 through contact 63 and line 78 to line 77.

Operation

With the elements of the apparatus in the position shown in all the figures of the drawing, fluid under pressure is being delivered through conduit 12, opening 7, chamber 6, opening 13, opening 8 and conduit 13 to the fluid operated motor. The ball-shaped valve head 21 is held seated against the opening 19 solely by the action of the spring 47 inasmuch as the fluid pressure acting on the ball valve head is counterbalanced by the fluid pressure acting on the flexible wall 25. Now, assuming that a condition arises calling for the release of pressure to the pressure motor and calling for the contact arms 65 and 66 of the thermostat 64 to move toward the left, it is readily seen that nothing will happen when contact arm 65 engages fixed contact 67 due to the open circuit at 50 and 51. When contact arm 66 comes into contact with fixed contact 68, a circuit will be completed from the secondary terminal 72 of the transformer through line 73, fixed contact 67, contact arm 65, contact arm 66, fixed contact 68, line 77, terminal 76, relay

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43, terminal 75 and terminal 74 at the other end of the secondary. This will cause relay 43 to become energized drawing the arm 45 down against the core 44, lifting of valve end 21 to seal opening 18 and unseal opening 19, and bringing contact arm 50 into engagement with fixed contact 51 and, thereby, completing a holding circuit. This holding circuit extends from line 73, fixed contact 67, arm 65, line 70, contact 51 and arm 50 to line 77, in parallel with the circuit from contact arm 65 through contact arm 66, fixed contact 68 and line 77. With the control elements in this position, the fluid under pressure in chamber 6 will be unable to flow through opening 18 but the fluid under pressure in the pressure motor is free to bleed out through conduit 13, opening 8, opening 20, opening 19, and conduit 14 to the atmosphere or a low pressure area. If the pressure motor were a diaphragm valve of the type mentioned above, the valve would now be in its open position. It is to be noted that, here again, the force tending to move the valve head 21 downwardly is counterbalanced as described above. It is therefore apparent that the spring 47 causes movement of the valve in one direction upon deenergization of the relay 43 and that the relay only has to overcome the force of said spring 47 to cause the valve to move in the other direction.

Now, should the condition reverse, requiring that the thermostat arms 65 and 66 move toward the right and that pressure be supplied to the pressure motor, it is seen that nothing will happen when contact arm 65 separates from fixed contact 67, due to the holding circuit still being closed. However, when contact arm 66 leaves fixed contact 68, the circuit through the relay will be broken permitting the spring 47 to raise the armature off of the core 44 and to move the valve head 21 against opening 19. This will permit the flow of fluid to again build up the pressure in the pressure motor and, in the case of a diaphragm valve, to close said valve.

Should there be a power failure or should it be desired to operate the pressure motor regardless of the position of the contact arms 65 and 66, it is possible to move the valve head 21 from opening 19 to opening 18 by moving the end 57 of manual control lever 56 to its lowermost position. In moving said end to its lower position, the cam 59 will engage spring 52 and move it and the armature 45 downwardly to a position wherein the armature 45 is slightly spaced from the core 44 but the valve head 21 is seated on opening 18. Also, as said end is moved downwardly, the cam 60 engages and moves contact arm 62 into engagement with fixed contact 63 closing a shunt circuit around the thermostat from line 73 through contact arm 62, contact 63 and line 78 to line 77. The cam 59 holds the manual lever 56 in its lower position against the action of spring 61 by engaging in detent 53 in the spring member 52. The valve head 21 obviously may be moved in the other direction by manually moving the end 57 upwardly or it may be returned to the control of the thermostat upon the initial supply of current or resumption of current supply. Irrespective of the position of contact arms 65 and 66, upon the supply of current to the device, the relay 43 will become energized and draw the armature 45 the rest of the way to engage core 44 and thereby release cam 59 from detent 53 permitting it to move upwardly and disengage contact arm 62 from fixed contact 63. The continued movement of the arma-

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ture downwardly against the core 44 is permitted by the strain release action of flexible arm 34 mentioned above. It is to be noted that contact arm 62 is moved only upon movement of the manual control lever 56.

The valve modification shown in Figure 4 discloses a valve body 5a which is similar to the valve body of Figures 2 and 3. The differences between this modification and the one shown in Figures 2 and 3 lies in the shorter length of the arm 26a and body 5a, the position of the stem 28 on the arm 26a, and the position of the small opening in the flexible member 25a through which the stem 38 passes. It is to be noted that in Figure 4 the stem 28 is centered on the axis of the pivots 27 and spaced from the center of the washer 23 and opening 31 in the member 24 while, in Figures 2 and 3, the small opening in the member 25 and the stem 28 is centered with respect to the washer 23 and opening 31 and spaced from the axis of the pivots 27. The Figure 4 modification relies upon the unbalanced areas of the diaphragm for rocking the arm 26 in valve balancing direction. The larger area of the flexible wall 25 to the left of the pivots' axis will exert a greater pull on the left hand edge of member 39 than will be exerted on the right edge by the much smaller area of said member 25 to the right of said pivots, due to the fluid pressure acting on said portions. In view of the fact that the resultant moment of force tending to rock the valve clockwise about pivots 27 is obviously less, for any given pressure, than the rocking moment for the valve of Figure 2, the effective length of arm 26a (Figure 4) must be shorter than that of 26 (Figure 2) to balance the moment of force tending to rock the valve of Figure 4 counter-clockwise due to fluid pressure on said valve. The structure and operation of the valve of Figure 4 is otherwise the same as that of Figure 2.

Modification

The modification of the invention shown in Figures 6 and 7 comprises a control valve 1b which is the same as the control valve 1 of Figures 1, 2 and 3 with the exception that the flanges on the plate 24b are bent downwardly at the ends of the valve rather than upwardly as in the plate 24. The relay 2b is substantially the same as the relay 2 of Figures 1 through 3. The base plate 3b is slightly different from the base plate 3 of Figures 1 through 3 but has passages therein (not shown) for communicating with the passages 7, 8 and 19 in the valve body 5 which is identical with that shown in Figures 1 through 3. Valve 1b and the relay 2b, along with its associated armature pivot member 46b, are secured to the base plate 3b by any suitable means, as in the modification of Figures 1 through 3.

The armature 45b does not carry insulating spacer members, such as those shown at 48 and 49 in Figure 1, as this modification does not provide for manual actuation of the armature and, therefore, does not require control means for transferring the device from a manual control to the automatic control. The valve actuating arms 33b and 34b engage the right hand end of the armature 45b as in the modification of Figures 1 through 3.

In order to provide means to prevent the escape of fuel into the surrounding atmosphere, if the diaphragm 25 should become ruptured, which would create an undesirable if not a dangerous condition, the casing 58b is provided. This cas-

ing has a sealing partition 79 extending transversely across the interior of said casing intermediate its end. The partition 79 is apertured at 80 to provide for the passage of lead wires from the relay to a terminal block 81. The terminal block is made of insulating material and is secured to the partition 79 by means of screws 82 threaded into tapped holes 83 in the partition. Lead terminals 84 are adapted to releasably clamp lead wires (not shown) from a suitable power source and are connected to the lead wires from the relay 2b at their lower ends. To prevent leakage of gas through the opening 80, a gasket 85 is clamped between terminal block 81 and the partition 79.

A very small (pin hole) opening 86, approximately 0.0312 of an inch in diameter, is formed through the partition 79. This opening is to provide for very slow passage of gas or air into and/or out of the space below the partition 79. This enables the pressure in said chamber or space to be the same as the pressure (normally atmospheric) in the chamber above the partition 79, provided there is no rapid flow of fluid under relatively high pressure into either one of said chambers. Opening 87 is provided in the side wall of the upper chamber to provide for the passage of said power lead lines to the terminals 84.

A cap 88, carrying a nameplate 89, has downwardly extending flanges which frictionally hold the cap over the top of the casing 55b, but does not seal the opening 87. The housing is secured to the top surface of the plate 3b, with a sealing gasket 90 therebetween, by means of bolts 91 passing through bores 92 in the housing and through aligned bores (not shown) in the base plate 3b.

Operation

The operation of the modification of Figures 6 and 7 differs from that of Figures 1 through 5 in that as no holding circuit is used with this modification, a two wire, single contact room thermostat may be used to control the flow of current from a thermopile or other source of power to the relay 2b. Otherwise, the operation of the control valve and its actuating relay is the same as in the other modification. Inasmuch as the chamber in which the relay 2b and control valve 1b are located is sealed from the atmosphere except through opening 86, it is apparent that the pressure in said chamber would increase and decrease with changes in the surrounding temperature if it were not for said opening. Also, it is apparent that if the pressure in the above mentioned chamber were permitted to increase with a rise in temperature, the increased pressure bearing against the upper surface of the diaphragm 25 would act through the valve actuating lever 26 to hold the valve 21 in its closed position even though the relay were energized and there were gas pressure under said diaphragm tending to open said valve. The necessity for the opening 86 is therefore apparent. By making the opening 86 no larger than is absolutely necessary, a safety feature is provided which provides a dual function. Should the diaphragm 25 become accidentally punctured, or the valve body 5 cracked, so as to permit fairly rapid escape of gas from the chamber 6, the small opening 86 would prevent said escaping gas from entering the surrounding atmosphere of the control device at a rate which would create a dangerous condition either from the standpoint of explosion or inhalation of the gas by people or

animals. While the worst part of the presence of escaping gas is thus overcome, it is highly desirable that no gas be permitted to escape from the standpoint of economy. Therefore, a second function of providing a suitable signal to the operator or householder that a leak is present, is provided by the failure of the control valve to open and supply fuel to the furnace when there is a demand for heat. The operator or householder, noting that the temperature of the space being heated by the furnace has dropped below the normally maintained temperature, will obviously know that there is improper furnace operation. This of course will lead to the correction of the difficulty.

While the safety shutdown of the furnace and the escape of gas to the atmosphere has been described only with respect to the simple relay operated control valve of Figures 6 and 7, it is to be understood that the same principle of operation could be applied to the modifications of Figures 1 through 4. That is, by simply making the terminal block 54 of Figure 1 in the form of a sealing partition between the space above and below said block and by substituting an exteriorally disposed crank type of actuating arm for the cams 59 and 60 and extending the crank arm's shaft 55 through the wall of the casing for securing said crank type of manual actuating lever, and by eliminating the lever 56 and the slot in the casing through which it extends, and by providing a small opening through the terminal block 54 similar to the opening 86 in Figures 6 and 7, the modifications of Figures 1 through 4 would operate in the same manner as that of Figures 6 and 7. Of course the casing 58 would have to be sealingly connected to the base plate 3.

It will be apparent from the above description of the preferred embodiments of this invention that a very simple, easily operated, inexpensive and efficient control device and valve is provided that permits both automatic and manual control of a pressure motor and which provides a simple arrangement of parts that enables an automatic return from the manual control to the automatic control upon the resumption of the power supply to the device. Furthermore, the device provides a simple safety casing construction that prevents dangerous quantities of gas from escaping to the atmosphere, should a break occur in a valve wall, and prevents the furnace from operating, to serve as a signal of said break.

It will also be apparent to those skilled in the art to which this invention appertains that numerous changes in construction and design may be made therein without departing from the spirit or scope of the invention. It is, therefore, to be understood that the scope of the invention is not to be limited by the particular disclosure but only by the appended claims.

I claim:

1. A control device comprising a hollow body having an inlet and an outlet and a flexible exterior wall portion, a valve seat between said inlet and outlet, a valve member, a pivoted lever connected to said member and extending through and secured to said flexible wall portion at a point that causes the fluid pressure on said portion to substantially counterbalance the same pressure acting on said valve member in an opposite direction, arms mounted in opposed relationship on one end of said lever, one of said arms being resilient so as to enable further movement of a portion thereof beyond a position where said valve seats, a pivoted power arm having one

end thereof positioned between said arms, manually operable means disengaged from said power arm but movable to actuate said power arm a distance sufficient to move said arms to said position, power means adapted to actuate said power arm beyond said position, and means on said power arm cooperating with said manually operable means to hold it in said position but adapted to release it to its disengaged position upon actuation of the power arm by said power means.

2. A pilot valve for a fluid motor comprising a valve body having an inlet and an outlet, a three-way valve between said inlet and outlet having spaced apart and opposed valve seats and a constantly open passage terminating between them, a valve head positioned between said seats and having a stem thereon extending through the valve seat at the inlet side of the three-way valve, said valve body having a flexible wall portion, an actuating lever extending through and connected intermediate its ends to a central part of said wall portion and connected at one of its ends to said valve stem, said lever being pivoted to said valve body at a point where the distance from said point to said central part of said wall portion times the area of said flexible wall portion substantially equals the distance from said point to said valve stem times the fluid pressure area of said valve head, which enables inlet fluid pressure on said flexible wall portion to substantially balance the force acting on said valve head by the same fluid pressure so as to aid the moving of the valve head against said pressure.

3. A pilot valve as defined in claim 2 in combination with a cup-shaped casing having a pin hole opening therethrough, said casing being sealingly secured to said valve body so that there would be no rapid flow of fluid from said valve to the atmosphere should said flexible wall portion rupture destroying the balancing action thereof on said valve.

4. A valve comprising a valve body having an inlet and an outlet, a valve seat between said inlet and outlet, said body having a movable wall portion on the inlet side of said valve seat, a valve head cooperating with said valve seat and being urged toward closed position thereon by inlet fluid pressure thereon, and a lever operably connected at a first portion thereof to said valve head and pivotally connected at a second portion thereof to the valve body on the inlet side of said valve seat and connected at a third portion thereof to said movable wall, the length of said lever from its pivotal connection with said body to said valve head times the pressure area of said valve head being substantially equal to the pressure area of said movable wall times the distance from its connection with said lever to the pivotal connection of said lever with said body.

5. A valve as defined in claim 4 in combination with a housing extending over said movable wall portion and sealingly connected to said valve body, said housing having a pin hole therethrough to provide restricted fluid flow between the interior and the exterior of said housing.

6. A valve comprising a hollow open-top body having an inlet and an outlet and a partition

wall between said inlet and outlet, a cover therefor having an opening therein, a sheet of flexible material clamped between the open top of said body and said cover, a passage through said wall, a valve seat in said passage, a valve head having a stem thereon extending into the interior and the supply side of said body, and an actuating lever extending from said stem through said material and pivoted on pivots in said body, the point at which the lever passes through the flexible material lying between said stem and said pivots and the area of said flexible material over said opening times the distance between the center of said opening and said pivots being substantially equal to the area of said valve head times the effective length of said actuating lever.

7. A valve as defined in claim 6 in combination with a housing sealingly covering the opening in said cover from the atmosphere, said housing having a pin hole therethrough for restricting fluid flow between the interior and the exterior of said housing.

8. A valve comprising a hollow open-top body having an inlet and an outlet and a partition wall between said inlet and outlet, recesses in edges of said open top, a cover having an opening therein, a sheet of flexible material spanning said opening, a passage through said wall having a valve seat therein, a valve head cooperating with said seat and having a stem extending into the interior of said body, and an actuating lever extending from said stem through said material and pivoted on pivot means in said recesses and inwardly of said material, the point at which said lever passes through said material lying between said recesses and said stem, said lever having an annular shoulder thereon on one side of said material and a spring pressed washer thereon on the other side of said material for resiliently clamping said material against said shoulder and the area of said flexible material over said opening times the distance between the center of said opening and said pivots being substantially equal to the area of said valve head times the effective length of said actuating lever.

9. A valve as defined in claim 8 in combination with a housing sealingly covering the opening in said cover from the atmosphere, said housing having a pin hole therethrough for restricting fluid flow between the interior and the exterior of said housing.

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