Dec. 14, 1948. E. PAILLE 2,456,078

MANUAL RESET VALVE

Filed May 10, 1947

Fig. 1.

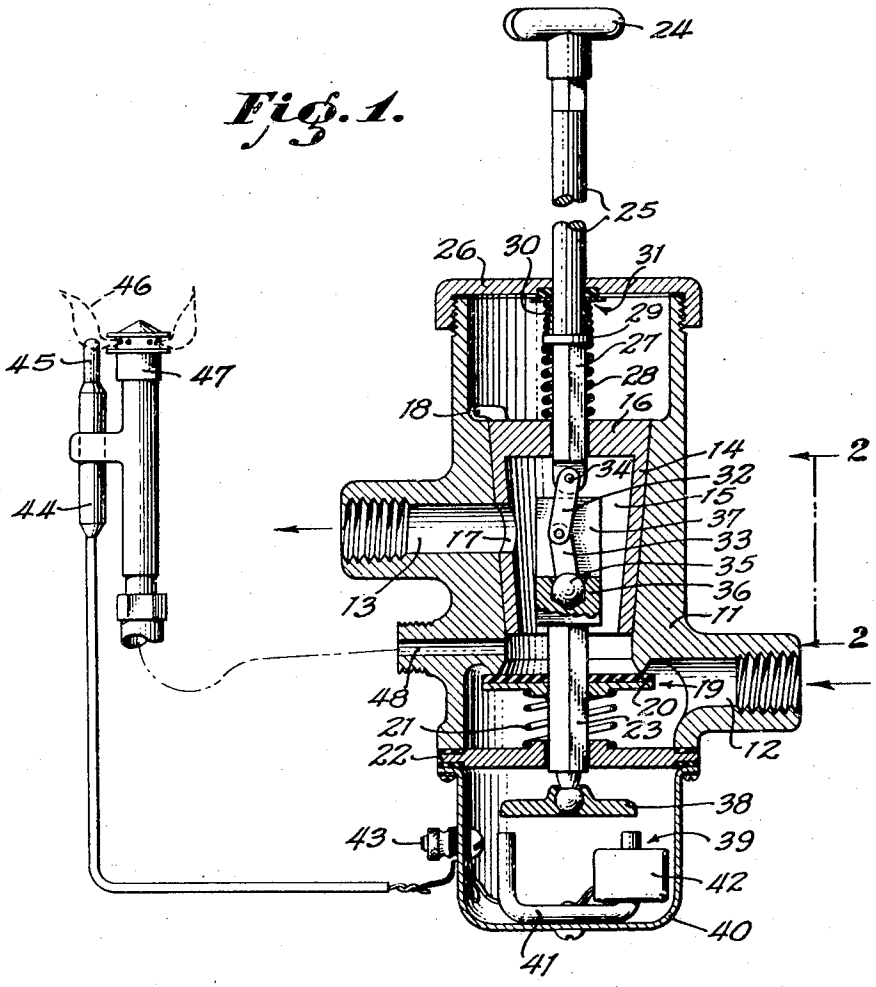


Fig. 3.

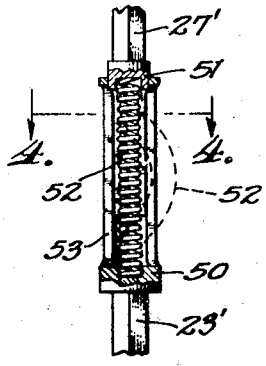


Fig. 4.

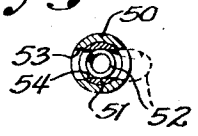


Fig. 5.

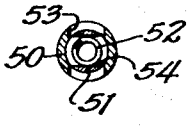
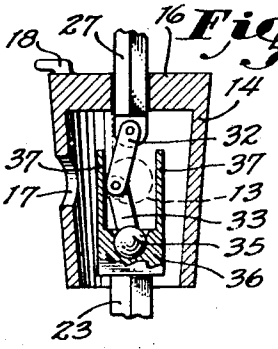


Fig. 2.



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MANUAL RESET VALVE

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8 Claims. (Cl. 277—8)

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This invention relates to manually-operable fluid-control valve structures, and more particularly to those of the type which include a plug rotatable to normally control flow through the structure, and a safety shut-off valve controlling all flow through the structure and retained in open position by means responsive to a controlling condition, such as temperature or pressure. Such an arrangement has particular utility in connection with a gas-burner system comprising a main burner and a pilot burner therefor; flow to the main burner being controlled by the plug valve, and the pilot burner being so connected to the valve structure that flow to this burner is controlled only by the shut-off valve; means responsive to the flame of the pilot burner being employed to maintain the shut-off valve open.

A general object of this invention is to provide a valve structure of the character described which includes means whereby the shut-off valve can be opened only while the plug is in a predetermined flow-controlling position. When the valve structure is employed in a gas-burner system of the type mentioned, the arrangement is such that the safety shut-off valve can be opened to supply gas to the pilot burner only while the plug is in closed position; obstruction of flow to the main burner minimizing the possibility of explosion when the pilot burner is lighted.

A more specific object of the invention is to provide, in a valve structure of the character described in the preceding object, a connection between the shut-off valve and the means for opening the same, which connection is so arranged and so cooperates with the plug valve that if an attempt is made to open the shut-off valve while the plug is in a position other than said predetermined flow-controlling position, the connection will yield or collapse so that it is ineffective to transmit the force required for opening the shut-off valve.

For full understanding of the invention, and further appreciation of its features and advantages, reference is to be had to the following detailed description and accompanying drawing, and to the appended claims.

In the drawing:

Figure 1 is a longitudinal sectional view of a valve structure embodying my invention;

Figure 2 is a sectional view of the mechanism, shown in Fig. 1, for operating the plug and the shut-off valve; this view being taken from the plane of the line 2—2 of Fig. 1 and with the plug rotated in counterclockwise direction through 90° from its position as shown in that figure;

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Figure 3 is a longitudinal sectional view of a modified form of collapsible connection; and

Figures 4 and 5 are transverse sections taken along the line 4—4 of Fig. 3; the parts being shown in relatively rotated position in Fig. 5.

Referring now more particularly to Figs. 1 and 2 of the drawing, the numeral 11 indicates a valve casing having an inlet passage 12 and a main outlet-passage 13. Seated in a tapered bore communicating with said passages is a plug 14 having a large cavity 15 extending from the bottom of the plug to the top wall 16 thereof. Branching from the plug-cavity 15 is a side opening 17 adapted to be placed into and out-of register with the outlet passage 13 by rotation of the plug; a lug 18 on the plug cooperating with abutments (not shown) in the casing to limit rotation of the plug to approximately 90°.

Also controlling flow through the casing is a safety shut-off valve comprising a disk-shaped closure 19 cooperable with an annular seat 20 formed in the casing below the plug 14. The closure 19 is biased toward closed position by a spring 21 compressed between it and a plate 22 covering the bottom of the valve casing; the closure being welded to a square rod 23 which fits freely in a conforming opening through a thickened middle portion of the plate 22.

For operating the valves there is a handle 24, the stem 25 of which extends through an opening in a cover 26 screwed on the hollowed-out top portion of the valve casing; the stem being shown broken to indicate that it may be long enough to reach the valve structure from the floor-level when the structure is located adjacent a floor furnace. The lower or inner portion 27 of the stem 25 is squared to fit freely in a square opening through the top wall 16 of the plug. A spring 28, compressed between the plug 14 and a shoulder 29 formed on the stem 25, urges the stem upwardly and also serves to maintain the plug properly seated; a light spring 30, compressed between the shoulder 29 and a sealing gland 31, limiting upward movement of the stem.

Forming a connection between the handle-stem 25, 27 and the closure-rod 23 is a toggle-joint consisting of a pair of flat arms 32 and 33 pivotally joined together. The upper arm 32 is pivoted on a pin 34 projecting from the flattened extremity of the stem-portion 27 so that the arm can rock thereon only in a plane at right-angles to the pin. Secured to the lower arm 33 is a ball 35 which fits freely in a socket formed in an enlargement 36 of the rod 23, the material of the socket being deformed around the

ball after assembly to hold it in place. A pair of plates 37 project upwardly adjacent the toggle-joint from opposite sides of the enlargement 36 (see Fig. 2). These plates 36 are in planes spaced from and parallel to the plane of movement of the toggle-joint when the parts are in the positions shown in Fig. 1, so that if downward force is then applied, through the handle 24, to the stem 25, 27 the toggle-joint collapses (downward movement of the stem being limited by full-compression of spring 28) and no movement is imparted to the rod 23 and the closure 19 carried thereby, which parts are retained in the position to which they are biased by spring 21.

However, if the plug 14 is first rotated, by manipulation of handle 24, in counterclockwise direction (as viewed from the top) through 90° to its closed position, the parts will then be in the positions shown in Fig. 2; it being borne in mind that this view is taken from the plane of line 2—2 of Fig. 1 and with the plug rotated through 90° (the relative position of the casing outlet passage 13 being indicated in broken lines). As seen in Fig. 2 (since the rod 23 is restrained from rotation by plate 22) the side-arm 37 is in the path of movement of the knee of the toggle-joint and therefore so limits the collapse of this joint that downward force on the stem-portion 27 then effects corresponding downward movement or drive of the closure-rod 23. From the foregoing it is clear that the connection between the handle-stem and the closure-rod is effective to transmit the desired operating force only when the plug is in closed position.

For retaining the shut-off closure 19 in open position, after it has been brought to that position by downward movement of rod 23 as described above, there is rockably mounted on the bottom of rod 23 a disk 38 which is of magnetic material and constitutes an armature cooperable with an electromagnet 39 mounted in a cup-shaped housing 40 secured to the bottom of the valve casing; the electromagnet comprising a U-shaped core 41 having around one of its side arms an energizing coil 42 the leads of which are connected to terminals 43 insulatingly mounted in the side wall of the housing. Also connected to these terminals is a thermoelectric generating device or thermocouple 44 of conventional construction and having a hot-junction portion 45 adapted to be heated by the flame 46 of a pilot burner 47 which, when the valve is employed in a gas-burner control system, is supplied with fuel by way of a passage 48 in the valve casing between the shut-off closure 19 and the plug 14; the pilot burner also serving to ignite a main burner (not shown) connected to the main outlet 13 of the valve structure.

With the parts in the positions shown in Fig. 1, to initiate operation of the burner system the plug 14 is rotated by means of the handle 24 to the position of Fig. 2, the handle then being depressed to open the closure 19 and bring the armature 38 into engagement with the pole-faces of the electromagnet 39. While maintaining the handle in fully-repressed position, the gas then flowing to the pilot burner is lighted so that after a brief interval the thermocouple is heated to a degree such that electricity is thereby generated in an amount sufficient to energize the electromagnet to hold the armature and connected parts, whereupon the handle may be released and subsequently rotated to control the supply of gas to the main burner. Since, by the arrangement described, the main burner cannot be supplied until after the pilot burner is lighted, the possibility of accumulation (as in a furnace) of gas in an amount sufficient to cause a dangerous explosion is avoided. In the event of extinguishment of the pilot burner, upon cooling of the thermocouple the electromagnet is deenergized so that the armature is released and it and the parts connected to it return, under the force of spring 21, to their elevated positions as shown in Fig. 1; it then being necessary to manually-reset the valves in the manner hereinbefore described.

Referring now to Figs. 3–5 of the drawing, the modified form of connection shown in these figures is adapted to serve the same purpose as the connection constituted by the toggle-joint and limiting-means shown in Figs. 1 and 2; the members in Figs. 3–5 corresponding to the stem-portion 27 and closure-rod 23 therefore having been assigned the same numerals with a prime-mark added. Extending integrally from the respective members 23′ and 27′ are telescopingly-arranged tubular elements 50 and 51, the inner element 51 being considerably shorter than the outer one. Within the elements, and bearing against the closed ends thereof, is a helical spring 52. In the side walls of the elements, and extending substantially the full length thereof, are slots 53 and 54 which, when the elements are in the relative angular positions shown in Figs. 3 and 4, are in register so that if compressive force is then applied between the members 23′ and 27′ the middle portion of the spring 52 is projected through the slots to its position shown in broken lines, thus effecting collapse of the connection. When the elements 50—51 are rotated through 90° relative to each other (as when the plug valve is turned to closed position) the elements assume the positions shown in Fig. 5 wherein the spring 52 is so confined by the elements that the connection is then effective to transmit compressive force.

The specific embodiment of my invention herein shown and described is obviously susceptible of modification without departing from the spirit of the invention, and I intend therefore to be limited only by the scope of the appended claims.

I claim as my invention:

1. In combination: a valve casing; a first valve comprising an apertured plug seated in said casing and rotatable to control flow therethrough; an additional valve also controlling flow through said casing; means for operating said additional valve comprising a pair of spaced members in axial alignment and movable along said axis; means disposed generally along said axis and forming a connection between said members, said connection normally being collapsible away from said axis when compressive force is applied between its ends so that it is ineffective to transmit said force from one of the members to drive the other; and means, operated by rotation of said plug, for so limiting the collapse of said connection when the plug is in a predetermined flow-controlling position that the connection is then effective to transmit compressive force between the members for operating said additional valve.

2. In combination: a valve casing; a first valve comprising an apertured plug seated in said casing and rotatable to control flow therethrough; an additional valve also controlling flow through said casing; means for operating said additional valve comprising a pair of spaced members in axial alignment and movable along said axis, one of said members being so connected to said plug that it rotates therewith, the other of said members being restrained from rotation; means

disposed generally along said axis and forming a connection between said members, said connection normally being collapsible away from said axis when compressive force is applied between its ends so that it is ineffective to transmit said force from one of the members to drive the other; and means, operated by the resultant relative rotation of said members when said plug is rotated to a predetermined flow-controlling position, for so limiting the collapse of said connection that the same is then effective to transmit compressive force between the members for operating said additional valve.

3. In combination: a valve casing; a first valve comprising an apertured plug seated in said casing and rotatable to control flow therethrough; an additional valve also controlling flow through said casing; means for rotating said plug and for operating said additional valve comprising a pair of elongated members, noncircular in cross-section and spaced from each other, one of said members being reciprocable in a conforming opening through said plug along the axis of rotation thereof, the other of said members being aligned with said one of the members and guided in a conforming opening in a fixed portion of said casing; means disposed generally along the axis of said members and forming a connection therebetween, said connection normally being collapsible away from said axis when compressive force is applied between its ends so that it is ineffective to transmit said force from one of the members to drive the other; and means adjacent said connection and secured to one of said members for so limiting the collapse of the connection, when the members are in a relatively-rotated position corresponding to a predetermined flow-controlling position of said plug, that the connection is then effective to transmit compressive force between the members for operating said additional valve.

4. The combination defined in claim 3, and wherein said collapsible connection is in the form of a toggle-joint.

5. The combination defined in claim 3, and wherein said collapsible connection comprises an elongated member of resilient construction.

6. In combination: a valve casing; a first valve comprising an apertured plug seated in said casing and rotatable to control flow therethrough; a safety shut-off valve also controlling flow through said casing and comprising a closure

biased to closed position; means for rotating said plug and for opening said safety-valve closure, comprising a pair of elongated members, noncircular in cross-section and spaced from each other; one of said members being reciprocable in a conforming opening through said plug along the axis of rotation thereof and provided with a handle; the other of said members being aligned with said one of the members and guided in a conforming opening through a fixed portion of said casing, said other of the members carrying said safety-valve closure; means disposed generally along the axis of said members and forming an elongated connection therebetween, said connection normally being collapsible away from said axis when compressive force is applied between its ends so that it is ineffective to transmit force from said one of the members to drive the closure-carrying member against the force of said closure-bias; and means, at the side of said connection and secured to one of said members, for so limiting the collapse of the connection, when the members are in a relatively-rotated position corresponding to the closed position of said plug, that the connection is then effective to transmit compressive force between the members for opening said closure.

7. The combination defined in claim 6, and wherein said connection is in the form of a toggle-joint; and said means for limiting collapse of said connection comprises means at the side of the connection defining, when said plug is in closed position, a surface engageable by the knee of said toggle-joint; said surface being in a plane parallel to and spaced from the plane of movement of the toggle-joint when the plug is rotated to open position.

8. The combination defined in claim 6, and wherein said connection comprises an elongated helical spring; and said means for limiting collapse of said connection comprises a pair of telescoped tubular elements secured individually to said members and arranged to confine said spring when said plug is in closed position; the side walls of said tubular elements having elongated slots brought into register when the plug is rotated to open position and through which slots the spring can then collapse when compressive force is applied between its ends.

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No references cited.