Feb. 19, 1952 E. PAILLE 2,586,249

FLUID CONTROL VALVE

Filed Nov. 26, 1946

Fig. 1

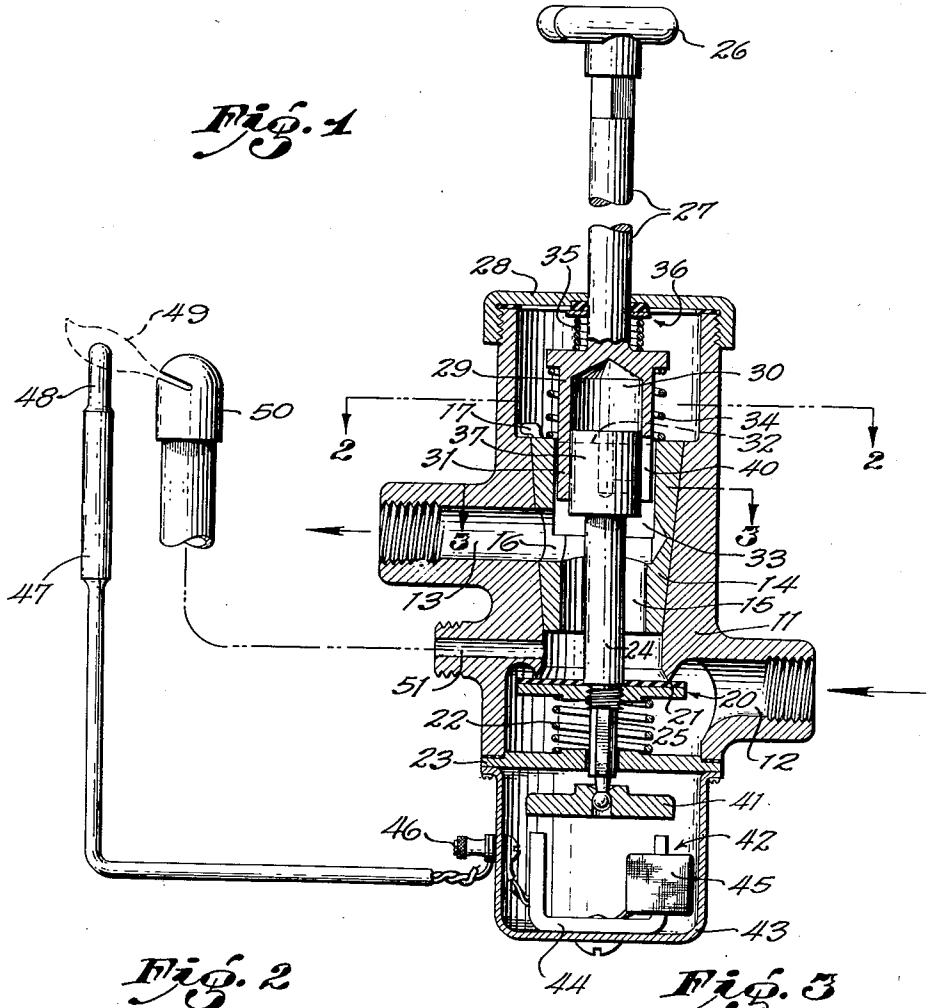


Fig. 2

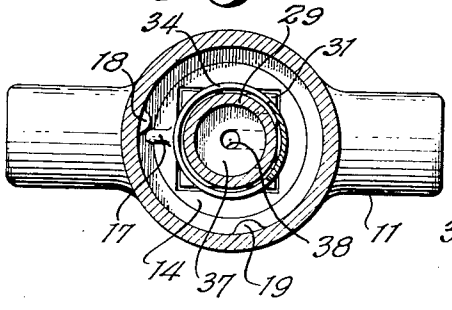


Fig. 3

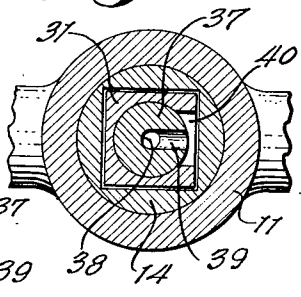
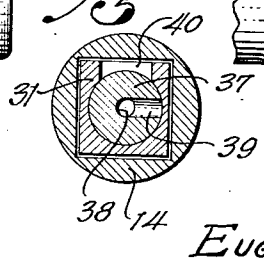


Fig. 4



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FLUID CONTROL VALVE

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5 Claims. (Cl. 137—44)

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My present invention relates to fluid control valves, and more particularly to those of the type which include a plug rotatable to normally control flow through the valve, and a safety shut-off valve normally 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 connected to the valve structure between the shut-off valve and the plug 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 of the character described which includes means for opening the shut-off valve only while the plug is in closed position, so that (in the example cited) the pilot burner can be lighted only while flow to the main burner is obstructed.

A more specific object of the invention is to provide, in a valve of the character described in the preceding object, means for generating fluid pressure for opening the safety shut-off valve; the arrangement being such that the plug must be in its closed position before the requisite fluid pressure can be generated.

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;

Figures 2 and 3 are transverse sections taken, respectively, along the lines 2—2 and 3—3 of Fig. 1; and

Figure 4 is a view corresponding to that of Fig. 3, showing the parts in moved positions.

In 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 in its bottom an opening 15 from which branches a side opening 16 adapted to be placed into and out-of register with the outlet passage 13 by rotation of the plug to control fluid flow through the casing; a lug 17 on the plug cooperating with abutments 18 and 19 (Fig. 2) in the casing to limit the rotation of the plug to approximately 90°.

Also controlling flow through the casing is a

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safety shut-off valve comprising a disk-shaped closure 20 cooperable with an annular seat 21 formed in the casing below the plug 14. The closure 20 is biased toward closed position by a spring 22 compressed between it and a plate 23 covering the bottom of the valve casing; the closure being threadedly secured to a rod 24 having a hexagonal lower portion 25 freely fitting a corresponding opening through the plate 23.

For operating the valve there is a handle 26, the stem 27 of which extends through an opening in a cover 28 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 from the floor-level when the valve is located adjacent a floor-furnace. The inner portion 29 of stem 27 is enlarged in diameter and bored to provide a cylindrical cavity or cylinder 30; the lower part 31 (below the broken line 32) of the stem-portion 29 being squared to fit freely in a square opening 33 in the upper part of plug 14. The stem 27 is urged upwardly by a spring 34 compressed between the plug 14 and a shoulder formed at the top of stem-portion 29; a light spring 35, compressed between the portion 29 and a sealing gland 36, limiting upward movement of the stem.

A close sliding fit in the cylinder 30 is a piston 37 formed by an enlargement of the shut-off valve rod 24. As is best seen in Figs. 3 and 4, this piston has an axial opening 38 and a communicating transverse opening 39, and the surrounding squared stem-portion 31 is slotted as indicated at 40, so that with the parts in the positions shown in Figs. 1 and 3 if the stem is depressed fluid escapes from cylinder 30 to the hollow interior of the plug 14 and thence to the outlet 13 of the valve—the piston, under the force of spring 22, remaining stationary. However, if the plug 14 is first rotated (by means of handle 26) from its open position as shown in Figs. 1–3 to its closed position as shown in Fig. 4, the piston-opening 39 will then be out of communication with the slot 40 (rotation of the piston being prevented by the hexagonal lower portion of rod 24) so that fluid is trapped in the cylinder 30 and depression of the operating stem or handle effects (through the compressed fluid) depression of the piston 37 and opening of the shut-off valve.

For retaining the shut-off valve in open position there is rockably mounted on the bottom of rod 24 a disk 41 which is of magnetic material and constitutes an armature cooperable with an electromagnet 42 mounted in a cup-shaped hous-

ing 43 secured to the bottom of the valve casing; the electromagnet comprising a U-shaped core 44 having around one of its side arms an energizing coil 45 the leads of which are connected to terminals 46 insulatingly mounted in the side wall of the housing. Also connected to these terminals is a thermoelectric generating device or thermocouple 47 of conventional construction and having a hot-junction portion 48 adapted to be heated by the flame 49 of a pilot burner 50 which, when the valve is employed in a gas-burner control system, is supplied with fuel by way of a passage 51 in the valve casing between the shut-off closure 20 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.

With the parts in the positions shown in Figs. 1–3, to initiate operation of the burner system the plug 14 is rotated by means of the handle 26 in a counterclockwise direction through 90° so that the position of the cylinder-body 31 with respect to the piston 37 is as shown in Fig. 4; depression of the handle then effecting (as described above) downward movement of the piston and rod 24 so that the shut-off closure 20 is unseated and the armature 41 brought into engagement with the pole-faces of the electromagnet 42. While holding the handle in depressed position the gas then flowing to the pilot burner is lighted so that after a brief interval the thermocouple 47 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 can 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 prevented. 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 associated with it return, under the force of spring 22, to their elevated positions as shown in Fig. 1; it then being necessary to manually-reset the valve in the manner hereinbefore described.

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; an apertured plug seated in said casing and rotatable to control flow therethrough; a safety shut-off valve also controlling the flow through said casing, said shut-off valve being biased to closed position and adapted to be opened by fluid pressure; a system for generating said fluid pressure and for operatively applying it to said shut-off valve; a handle rotatable to operate said plug, said handle also forming part of said pressure-generating system and being reciprocable to generate said fluid pressure; and means, effective only while said plug is in open position, for permitting said pressure-fluid to escape so as to prevent opening of the shut-off valve.

2. In combination: a valve casing; an apertured plug seated in said casing and rotatable to control flow therethrough; a reciprocable safety shut-off valve in said casing and also controlling the flow therethrough, said shut-off valve being biased to closed position; a fluid-pressure-generating system for operating said shut-off valve to open position, and comprising a cylinder member and cooperating piston member, one of said members being operatively connected to said shut-off valve; a handle rotatable to operate said plug, said handle having for that purpose a noncircular portion received in a conforming opening axially disposed in the plug, said handle-portion being reciprocable in said opening and being so associated with the other of said pressure-generating members that reciprocation of the handle effects reciprocation of that member to normally generate pressure in said system; and means, effective only while said plug is in open position, for permitting fluid to escape from said pressure-system so as to prevent opening of the shut-off valve by reciprocation of the handle.

3. In combination: a valve casing; an apertured plug seated in said casing and rotatable to control flow therethrough; a reciprocable safety shut-off valve in said casing and also controlling the flow therethrough, said shut-off valve being biased to closed position; a fluid-pressure-generating system for operating said shut-off valve to open position, and comprising a cylinder member cooperating piston member, one of said members being operatively connected to said shut-off valve; and a handle rotatable to operate said plug, said handle having for that purpose a noncircular portion received in a conforming opening axially disposed in the plug, said handle-portion being reciprocable in said opening and being rigidly connected to the other of said pressure-generating members so that the same is reciprocable by the handle to normally generate pressure in said system, as well as being rotatable along with the plug; and means for preventing rotation of said one of the members; said members having openings, so disposed that they are in register only when the plug is in open position, through which fluid can then escape from said pressure-system so that opening of the shut-off valve is prevented.

4. In combination: a valve casing; an apertured plug seated in said casing and rotatable to control flow therethrough; a reciprocable safety shut-off valve in said casing and also controlling the flow therethrough, said shut-off valve being biased to closed position; a fluid-pressure-generating system for operating said shut-off valve to open position, and comprising a cylinder member and cooperating piston member; a handle for rotating said plug and having a noncircular portion reciprocable in a corresponding axial opening in the plug and forming one of said pressure-generating members, the other of the members being operatively connected to said shut-off valve; and means for preventing rotation of said other of said members; said members having openings, so disposed that they are in register only when the plug is in open position, through which fluid can then escape from said pressure-system so that opening of the shut-off valve is prevented.

5. In combination: a valve casing; a plug seated in said casing and rotatable to control flow therethrough, said plug having for that purpose an opening in one end thereof and a communicating transverse opening; said casing pro-

viding a safety shut-off valve-seat adjacent and surrounding said end-opening of the plug; a safety shut-off closure movable along the axis of said plug into and out-of engagement with said seat and biased to seat-engaging position; a fluid-pressure-generating system for operating said shut-off closure to open position, and comprising a cylinder member and cooperating piston member; a handle for rotating said plug and having a noncircular portion reciprocable in a corresponding axial opening through the plug and forming one of said pressure-generating members, the other of the members extending through said axial plug-opening and being connected to said shut-off closure; and means for preventing rotation of said other of said members; said members having openings, so disposed that they are in register only when the plug is

in open position, through which fluid can then escape from said pressure-system so that opening of the shut-off closure is prevented.

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