June 30, 1942. E. PAILLE 2,288,417

MANUAL RESET VALVE

Filed March 4, 1940 2 Sheets-Sheet 1

Fig. 1

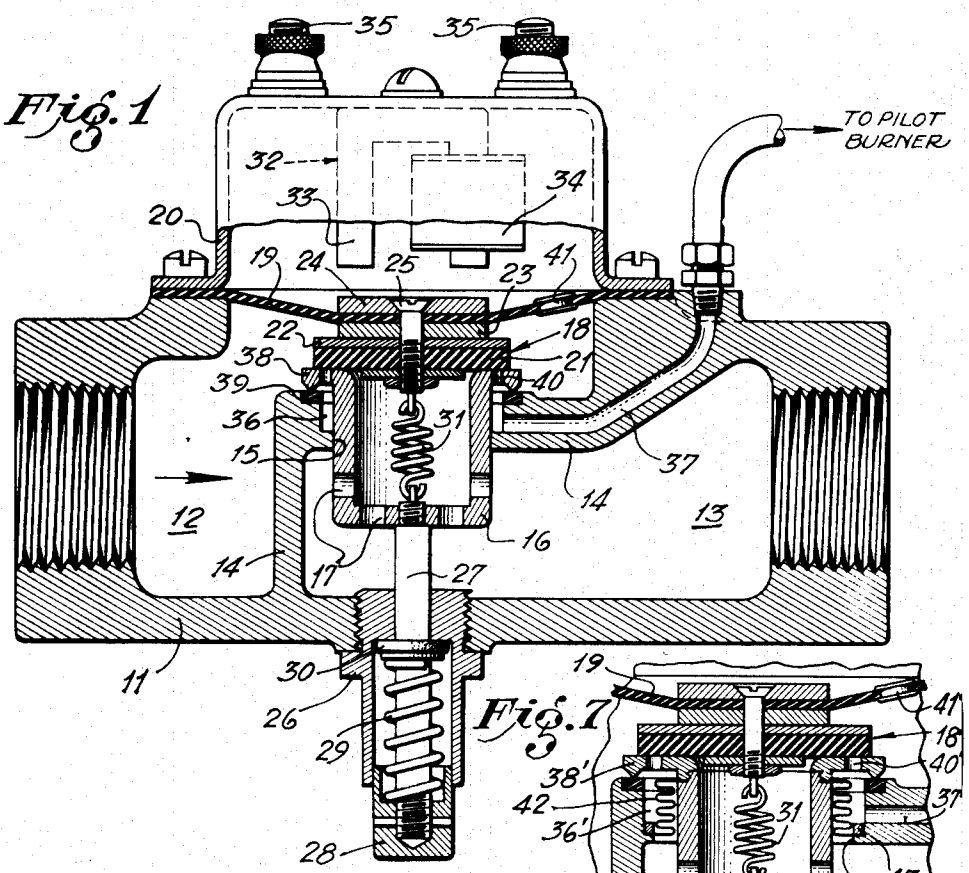


Fig. 7

Fig. 2

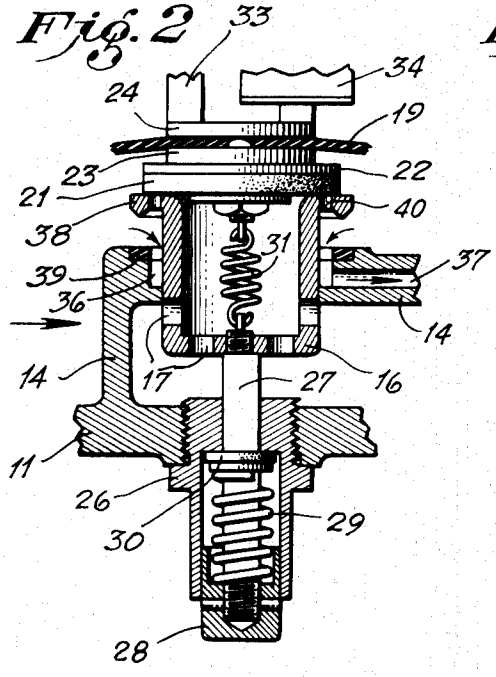
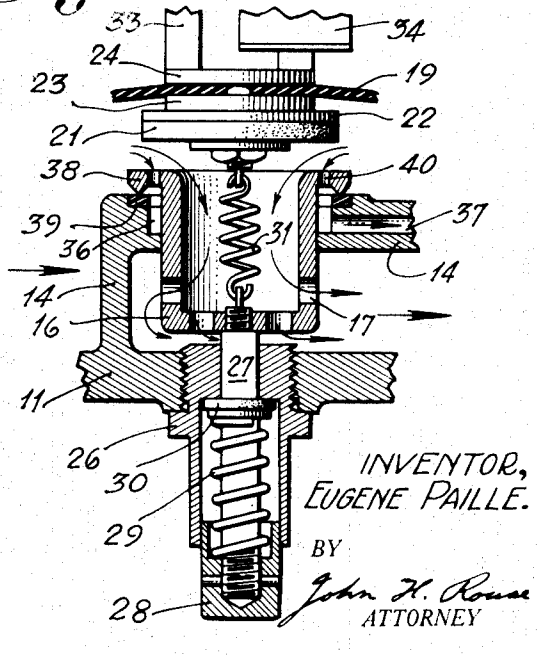


Fig. 3



INVENTOR,
EUGENE PAILLE.

BY

John H. Rouse

ATTORNEY

June 30, 1942. E. PAILLE 2,288,417

MANUAL RESET VALVE

Filed March 4, 1940 2 Sheets-Sheet 2

Fig. 4

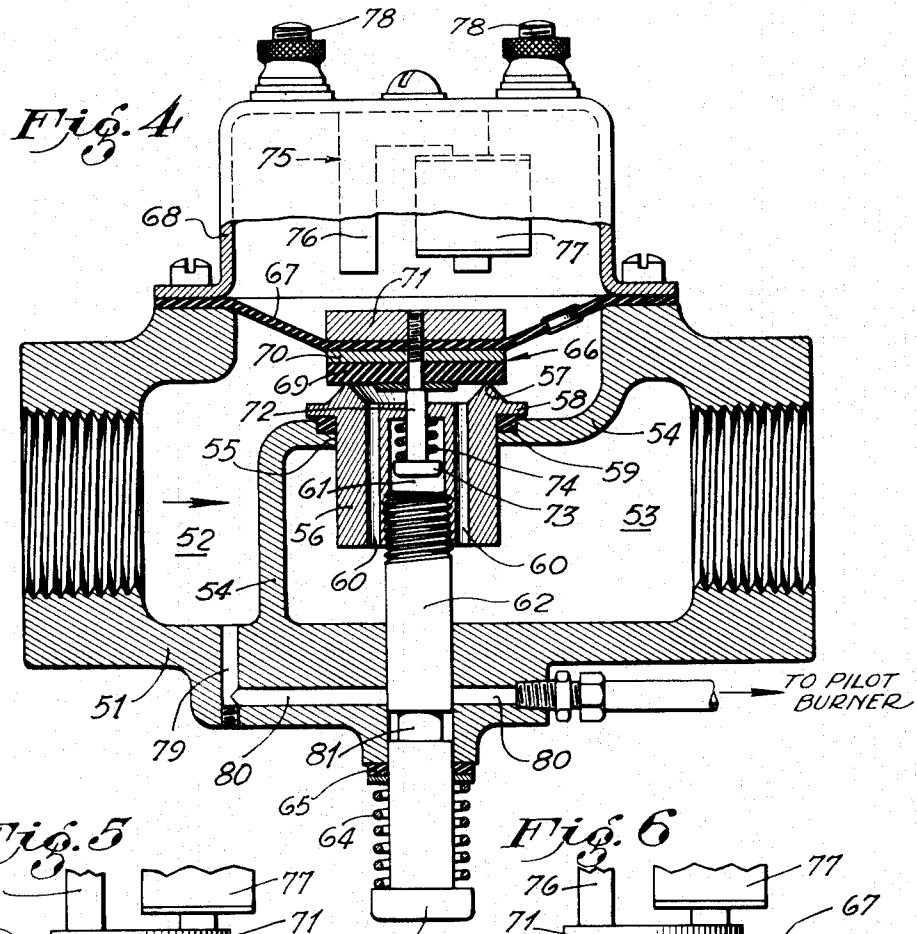


Fig. 5

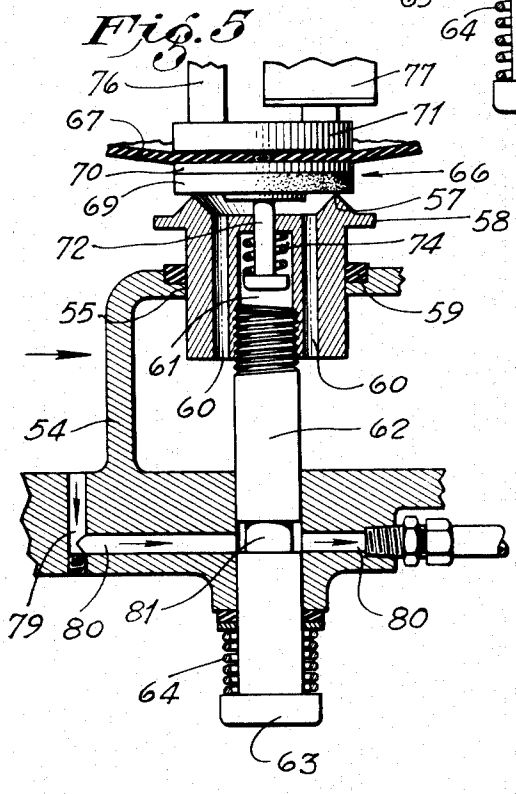
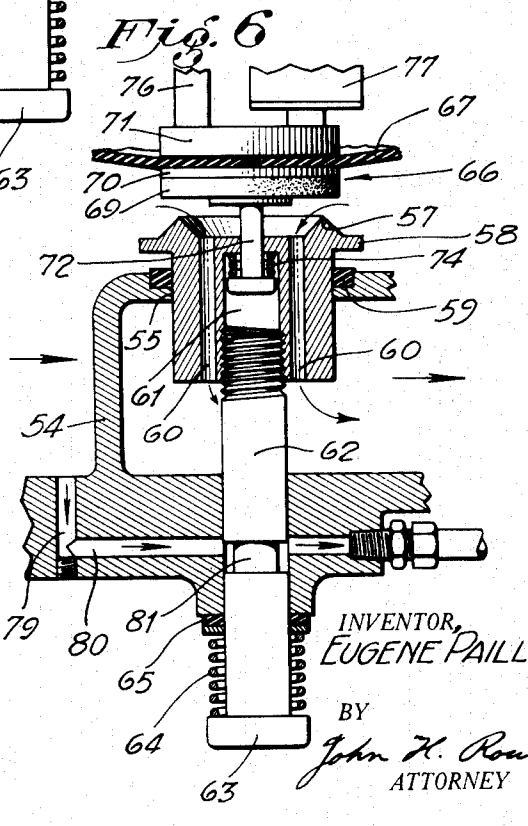


Fig. 6



INVENTOR,
EUGENE PAILLE.

BY
John H. Rouse,
ATTORNEY

Patented June 30, 1942 2,288,417

UNITED STATES PATENT OFFICE

2,288,417

MANUAL RESET VALVE

Eugene Paille, Los Angeles, Calif., assignor to General Controls Co., Glendale, Calif., a corporation of California

Application March 4, 1940, Serial No. 322,101

10 Claims. (Cl. 137—139)

My present invention relates to fluid control valves and particularly to those of the "manual reset" type wherein electromagnetic means are provided for maintaining a valve member in open position, against a bias, only after it has first been manually brought to that position. Manual reset valves of the type described have particular utility for the control of fuel to a fluid fuel burner, means responsive to the flame of the burner usually then being provided for controlling the energization of the electromagnetic means. Such flame responsive means may consist of a thermoelectric generating device or a thermal cut-out controlling any suitable source of electric energy. Upon extinction of the burner flame the electromagnetic means are deenergized and the valve closes, manual resetting of the valve then being required for subsequent operation of the burner.

It is an object of my invention to provide, in a valve of the type described, means for moving the valve member, while maintaining the same closed, into a position wherein it will be retained by the electromagnetic means if the same are energized.

In the prior art it has been proposed to provide an additional valve member for closing the valve while moving the main valve member into the position where it normally will be magnetically retained. In distinction, by my invention, the valve member is maintained in closed position during its movement both toward and away from the normal retaning position if the electromagnetic means are not energized.

Another object is the provision, in a valve of the type described, of a movable partition separating the inlet and the outlet of the valve and carrying a valve member, and means for moving the partition so that the valve member is brought into the normal retaining position without opening the valve.

Another object is the provision of a supplemental outlet for the valve which is opened when the main valve member is moved toward the normal retaining position, whereby, for example, a pilot burner may be supplied with fuel.

Other objects and advantages of my invention will be found in the description, the drawings, and the appended claims.

For complete understanding of the invention, reference may be had to the following detailed description and accompanying drawings, wherein:

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

Figures 2 and 3 are fragmentary sectional views of the valve shown in Fig. 1, showing the parts in the positions which they assume in operation;

Figure 4 is a mainly sectional view of a modified form of valve embodying my invention;

Figures 5 and 6 are fragmentary sectional views of the valve shown in Fig. 4, showing the parts in the positions which they assume in operation; and

Figure 7 is a fragmentary sectional view of another modified form of valve embodying my invention.

In Figs. 1, 2 and 3 of the drawings, the numeral 11 indicates a valve casing having an inlet 12 and an outlet 13 separated by a partition 14 having a cylindrical opening 15 therethrough in which a hollow piston 16, a close sliding fit therein, is reciprocable. The piston 16 is provided in the lower portion of its side wall and in its bottom wall with a plurality of openings 17, and its open upper end is normally closed by a valve member, generally indicated at 18, guided by a flexible diaphragm 19, the marginal portion of which is secured between the upper surface of the casing and the flange of a housing 20. Differential of fluid pressure on the sides of the diaphragm is prevented by an eyelet 41 fastened in an opening in the diaphragm and provided with a fine mesh screen (not shown). The valve member 18 comprises a disk 21 of resilient material backed by metal disks 22 and 23 and an armature 24 of magnetic material; these members being held together and to the diaphragm by a screw 25.

Threaded in the bottom wall of the piston 16 and extending through a bushing 26 threaded in the bottom wall of the casing is a rod 27, provided on its outer end with a button 28. A spring 29, compressed between the button and the bushing, urges the rod 27, and therewith the piston, downward, a sealing washer 30 being interposed between the spring and the bushing. Connected to the upper end of rod 27 and to the lower end of screw 25 is a contractile spring 31 which urges the valve member 18 into engagement with the upper surface of the piston.

Mounted on the upper wall of the housing 20 is an electromagnet 32 comprising a U-shaped core 33 and an energizing coil 34, for external connection to which terminals 35 are provided. The core 33, when energized, is adapted to magnetically hold the armature 24 only when the same is first mechanically brought into engagement therewith; attraction through space of the armature by the electromagnet not being contemplated.

The upper portion of the partition 14, surrounding the piston 16 and above the opening 15, is provided with an annular recess 36, communicating with which is a passageway 37 providing a supplemental outlet for the valve. With the piston in the position shown in Fig. 1, fluid flow from the inlet 12 to the supplemental outlet passage 37 is prevented by a flange portion 38

of the piston which is in engagement with a seat ring 39 provided in an enlargement of the recess 36. Also communicating with the recess 36 are openings 40 formed in the flange 38, these openings now being closed from the valve inlet by the valve member 16.

Assuming that the valve is connected to supply fuel to a main burner and that a pilot burner for the main burner is connected to the supplemental outlet, with the parts in the positions shown in Fig. 1 fuel flow to the main burner is obstructed by the valve member 16, and to the pilot burner by the flange 38 and valve member 16. If the piston is now moved upward by manual pressure on the button 28 so that the armature 24 engages the core 33, as shown in Fig. 2, fuel can flow from the inlet 12, through recess 36 and passageway 37, to the pilot burner where it may be lighted. Assuming that a thermocouple or thermopile, electrically connected to the electromagnet 32, is positioned so as to be heated by the flame of the pilot burner, after a short period of time current will be generated in an amount sufficient to energize the core 33 to magnetically hold the armature 24 in engagement therewith against the force of the expanded spring 31 when the piston is returned to its normal position by release of button 28, as shown in Fig. 3. It will be understood that spring 29 is designed to exert considerably greater force than spring 31 and so the downward movement of the piston is not appreciably impeded.

With the parts now in the positions shown in Fig. 3, the valve member 16 is raised from the piston and fuel can flow from the valve inlet, through the open mouth of the piston and openings 17, to the outlet 13 and thence to the main burner where it will be ignited by the pilot burner flame. Also, fuel can now pass to the pilot burner through the unobstructed openings 40. If automatic operation of the main burner is desired, any conventional electrically operated valve may be connected between the outlet 13 and the main burner.

If the pilot burner flame is extinguished, upon cessation of current generation by the thermocouple, the electromagnet is deenergized and the valve member under the force of spring 31 falls to the position shown in Fig. 1, closing fuel flow to both the main and the supplemental outlets.

It will be noted that, if the electromagnet is not energized, the piston may be moved both upward and downward without affecting the condition of the main valve. Only when a "safe" condition exists, i. e., when the pilot burner is alight, can the main valve be opened.

The modified form of valve shown in Fig. 7 is similar to that shown in Figs. 1–3, the only essential difference being that closeness of fit of the piston in the partition opening is not depended on for preventing escape of fuel to the main burner around the piston when the same is held in elevated or reset position. In Fig. 7 the reference characters, indicating parts corresponding to those in Figs. 1–3, are primed. The opening 15' is enlarged and a flexible corrugated bellows member 42 is provided to seal the opening around the lower end of the piston. The lower marginal end portion of the bellows member is secured to the partition by a ring nut 43 threaded in the opening 36'. The flange 38' of the piston is made as a separate piece threaded onto the body of the piston with the upper marginal end portion of the bellows member therebetween. The operation of this modified form of valve is identical with that of the valve shown in Figs. 1–3.

Referring now to Figs. 4–6 of the drawings, wherein another modified form of valve is disclosed, the numeral 51 indicates a valve casing having an inlet 52 and an outlet 53 separated by a partition 54 having a cylindrical opening 55 therethrough in which a piston 56 is a close sliding fit. The piston 56 is provided at its upper end with an annular valve seat 57 and a flange 58, the underside of which, when the parts are in the positions shown in Fig. 4, is in engagement with a ring 59, of resilient material, provided in an annular recess formed in the upper surface of the partition surrounding the piston. Communicating with the recess formed by the inner surface of the valve seat 57, and extending to the outlet 53 of the valve, are passages 60. Threaded at its upper end in a concentric opening 61 formed in the piston is a rod 62, the lower end portion of which extends through an opening formed in the bottom wall of the valve casing and is provided at its extremity with a button 63. Compressed between this button and the underside of the valve casing is a spring 64 which urges the rod 62, and therewith the piston 56, downward, a sealing washer 65 being interposed between the casing and the upper end of the spring.

Cooperable with the seat 57 is a valve member, generally indicated at 66, guided by a flexible diaphragm 67, the marginal portion of which is secured to the upper surface of the valve casing by the flange of a housing 68. The valve member 66 comprises a disk 69, of resilient material such as artificial rubber, backed by a metal disk 70 and an armature 71, of magnetic material; these parts being held together and to the diaphragm by a threaded rod 72. The lower portion of this rod extends through a hole in the top of the piston into the opening 61 and is provided with a head 73. Compressed between this head and the piston is a spring 74 which urges the valve member 66 into engagement with its seat.

Mounted on the upper wall of the housing 68 is an electromagnet 75 comprising a U-shaped core 76 and an energizing coil 77, for external connection to which terminals 78 are provided. The core 77, when energized, is adapted to magnetically hold the armature 71 when the same is first mechanically brought into engagement therewith.

Formed in the bottom portion of the valve casing is a vertical passageway 79, communicating with the inlet 52, and a horizontal connecting passageway 80 which provides a supplemental outlet for the valve.

With the parts in the positions shown in Fig. 4, valve member 66 being in closed position, fluid flow to the main outlet 53 is obstructed; engagement of the flange 58 with the ring 59 preventing any possible leakage around the piston. Also, fluid flow to the supplemental outlet through passageway 80 is prevented by the rod 62.

If the piston is now moved upward by manual pressure on button 63 so that armature 71 is brought into engagement with core 76, as shown in Fig. 5, fluid flow through the passageway 80 to the supplemental outlet will be permitted around the recessed portion 81 of the rod 62. When the button 63 is released, the piston will be moved downward by the force of spring 64, and, if the core 76 is sufficiently energized, the valve member 66 will be retained in elevated

position against the force of spring 74, permitting fluid flow to the main outlet 53 through passages 60; the parts assuming the positions shown in Fig. 6. The force of spring 64 is considerably greater than that of spring 74 and so the latter is fully compressed and limits the downward movement of the rod so that the recessed portion thereof still registers with the passageway 80, permitting fluid flow to the supplemental outlet. If the electromagnet is deenergized, the parts reassume the positions shown in Fig. 4 and the valve is completely closed. It will be noted that unless the electromagnet is energized, the main valve cannot be opened by manipulation of the reset button.

While I have herein shown and described, by way of illustration, specific embodiments of my invention, I wish it to be understood that modifications may be made without departing from the spirit of my invention and that I intend therefore that my invention be limited only by the scope of the appended claims.

I claim as my invention:

1. In a fluid control valve, a valve body having an inlet and an outlet, means separating said inlet and said outlet and including a movable partition having a passage therethrough, a closure member for said passage and biased to closed position, mechanical means for moving said partition while maintaining said passage closed and therewith said closure member between a first and a second position, and electromagnetic means effective when energized to retain said closure member in said second position against its bias when said partition is returned to said first position whereby said passage is opened.

2. In a fluid control valve, a valve body having an inlet and an outlet, means separating said inlet and said outlet and including a movable partition having a passage therethrough, a valve seat at the inlet end of said passage, a valve member movable away from and toward said seat and biased to closed position, manually operable means extending exteriorly of said valve body for moving said partition and therewith said valve member from a first to a second position while maintaining said passage closed, means biasing said partition to said first position, and electromagnetic means effective when energized to retain said valve member in said second position against its bias when said manually operable means is returned to its unmoved position whereby said passage is opened.

3. In a fluid control valve, a valve body having an inlet and a main outlet, means separating said inlet and said main outlet and including a movable partition having a passage therethrough, a valve seat at the inlet end of said passage, a valve member movable away from and toward said seat and biased to closed position, electromagnetic means including a core member and an armature member, one of said electromagnetic members being connected to said valve member, said core member being adapted when energized to magnetically hold said armature member after said electromagnetic members are first mechanically brought into engagement with each other, mechanical means for moving said partition and therewith said valve member and said one of said electromagnetic members in one direction so that said electromagnetic members engage with each other, means for moving said partition in an opposite direction whereby said passage is opened when said electromagnetic members are magnetically held in engagement with each other and the mechanical moving means is released, means defining a supplemental outlet for said valve, and supplemental valve means for controlling fluid flow from said inlet to said supplemental outlet and moved to open position by the movement of said partition in said one direction.

4. In a fluid control valve, a valve body having an inlet and an outlet, a partition separating said inlet and said outlet and having an opening therethrough, a movable member cooperable with said opening and having a passage therethrough interconnecting said inlet and said outlet, a closure member for said passage and biased to closed position, said movable member closing communication between said inlet and said outlet when said passage is closed, electromagnetic means including a core member and an armature member, one of said electromagnetic members being connected to said closure member, said core member being adapted when energized to magnetically hold said armature member after said electromagnetic members are first mechanically brought into engagement with each other, mechanical means for moving said movable member so that said electromagnetic members engage with each other, and means for returning said movable member whereby said passage is opened when said electromagnetic members are magnetically held in engagement with each other and the mechanical moving means is released.

5. In a fluid control valve, a valve body having an inlet and an outlet, a partition separating said inlet and said outlet and having an opening therethrough, a movable member cooperable with said opening and having a passage therethrough interconnecting said inlet and said outlet, a closure member for said passage and comprising a member movable away from and toward said movable member and biased to closed position, said movable member within the limits of its movement closing communication between said inlet and said outlet when said passage is closed by said closure member, electromagnetic means including a core member and an armature member, one of said electromagnetic members being connected to said closure member so as to move therewith, the other of said electromagnetic members being fixed with respect to said body, said core member being adapted when energized to magnetically hold said armature member only after said electromagnetic members are first mechanically brought into engagement with each other, manual means extending exteriorly of said valve body for moving said movable member while maintaining said closure member in closed position so that said electromagnetic members engage with each other, and means for returning said movable member whereby only when said core is sufficiently energized to magnetically hold said electromagnetic members in engagement and the manual moving means is released is said closure member retained in open position against its bias.

6. In a fluid control valve, a valve body having an inlet and an outlet, a partition fixed in said body and separating said inlet and said outlet, said partition having an opening therethrough, a member reciprocable in said opening and having a passage therethrough interconnecting said inlet and said outlet, a valve seat at the inlet end of said passage, a valve member cooperable with said seat and movable away from and to-

ward the same, spring means urging said valve member to closed position, said reciprocable member within the limits of its movement closing communication between said inlet and said outlet when said valve member is in closed position, manually operable means extending exteriorly of said valve body for moving said reciprocable member and therewith said valve member between a first and a second position, and electromagnetic means effective when energized to retain said valve member in said second position against its bias when the reciprocable member is returned to said first position whereby said passage is opened.

7. In a fluid control valve, a valve body having an inlet and an outlet, a partition fixed in said body and separating said inlet and said outlet, said partition having an opening therethrough, a member reciprocable in said opening and having a passage therethrough interconnecting said inlet and said outlet, a valve seat at the inlet end of said passage, a valve member cooperable with said seat and movable away from and toward the same, spring means urging said valve member to closed position, said reciprocable member within the limits of its movement closing communication between said inlet and said outlet when said valve member is in closed position, electromagnetic means including a core member and an armature member, one of said electromagnetic members being connected to said valve member so as to move therewith, the other of said electromagnetic members being fixed with respect to said body, said core member being adapted when energized to magnetically hold said armature member only after said electromagnetic members are first mechanically brought into engagement with each other, manual means extending exteriorly of said valve body for moving said reciprocable member in one direction while maintaining said valve member in closed position so as to bring said electromagnetic members into engagement with each other, and means biasing said reciprocable member in an opposite direction whereby upon return of said manual moving means said reciprocable member is retracted and said valve member is retained in open position against its bias only when said core is sufficiently energized so as to magnetically hold said electromagnetic members in engagement.

8. In a fluid control valve, a valve body having an inlet and an outlet, a partition fixed in said body and separating said inlet and said outlet, said partition having an opening therethrough, a member reciprocable in said opening and having a passage therethrough interconnecting said inlet and said outlet, a valve seat at the inlet end of said passage, a valve member cooperable with said seat and movable away from and toward the same, spring means urging said valve member to closed position, said reciprocable member within the limits of its movement closing communication between said inlet and said outlet when said valve member is in closed position, manually operable means extending exteriorly of said valve body for moving said reciprocable member and therewith said valve member from a first to a second position, means biasing said reciprocable member to said first position, electromagnetic means effective when energized to retain said valve member in said second position against its bias after it has first been brought to that position by said manual means and the reciprocable member is returned to said first position whereby said passage is opened, and means connected to said reciprocable member and cooperable with the portion of said partition surrounding said opening for additionally sealing said opening.

9. In a fluid control valve, a valve body having an inlet and a main outlet, a partition fixed in said body and separating said inlet and said main outlet, said partition having an opening therethrough, a member reciprocable in said opening and having a passage therethrough interconnecting said inlet and said outlet, a valve seat at the inlet end of said passage, a valve member cooperable with said seat and movable away from and toward the same, spring means urging said valve member to closed position, said reciprocable member within the limits of its movement closing communication between said inlet and said main outlet when said valve member is in closed position, manually operable means extending exteriorly of said valve body for movng said reciprocable member and therewith said valve member from a first to a second position, means biasing said reciprocable member to said first position, electromagntic means effective when energized to retain said valve member in said second position against its bias after it has first been brought to that position by said manual means and the reciprocable member is returned to said first position whereby said passage is opened, means defining a supplemental outlet for said valve, and supplemental valve means for controlling fluid flow from said inlet to said supplemental outlet and moved to open position by the movement of said manually operable means in a direction to move said reciprocable member to second position.

10. In a fluid control valve, a valve body having an inlet and a main outlet, a partition fixed in said body and separating said inlet and said main outlet, said partition having an opening therethrough, a member reciprocable in said opening and having a passage therethrough interconnecting said inlet and said outlet, a valve seat at the inlet end of said passage, a valve member cooperable with said seat and movable away from and toward the same, spring means urging said valve member to closed position, said reciprocable member within the limits of its movement closing communication between said inlet and said main outlet when said valve member is in closed position, manually operable means extending exteriorly of said valve body for moving said reciprocable member and therewith said valve member from a first to a second position, means biasing said reciprocable member to said first position, electromagnetic means effective when energized to retain said valve member in said second position against its bias after it has first been brought to that position by said manual means and the reciprocable member is returned to said first position whereby said passage is opened, means defining a supplemental outlet for said valve, a portion of the inlet side of said partition adjacent said opening being recessed, a passageway interconnecting said recess and said supplemental outlet, and means connected to said reciprocable member and cooperable with said recess for controlling fluid flow from said inlet to said supplemental outlet, said recess being opened when the reciprocable member is moved to its second position.

EUGENE PAILLE.