

Aug. 2, 1960

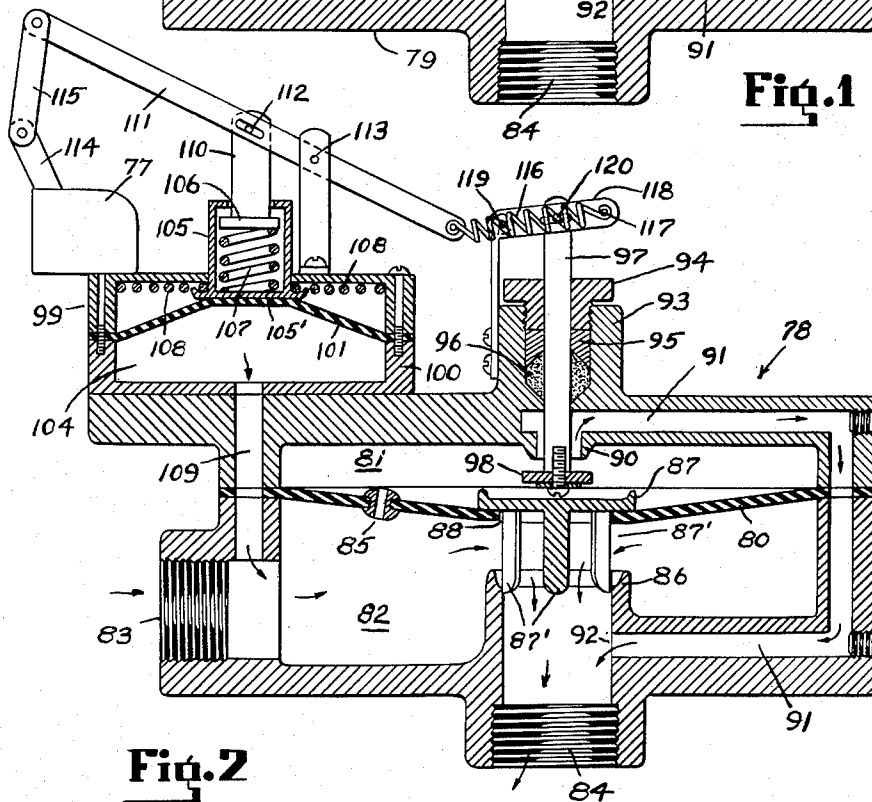
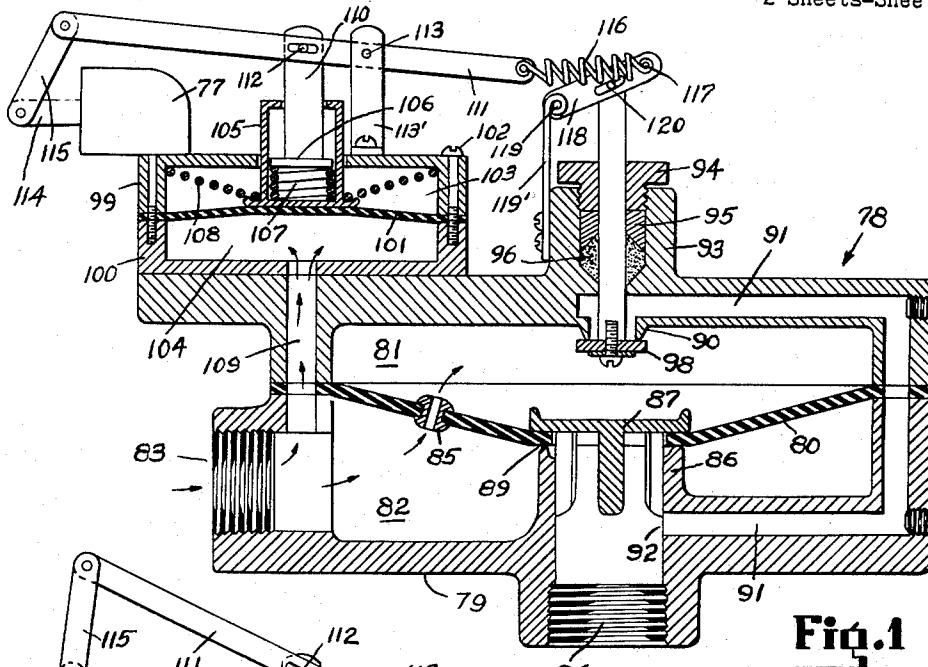
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2,947,323

FLUSH VALVE CONTROL FOR PLUMBING FIXTURES

Filed May 6, 1955

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

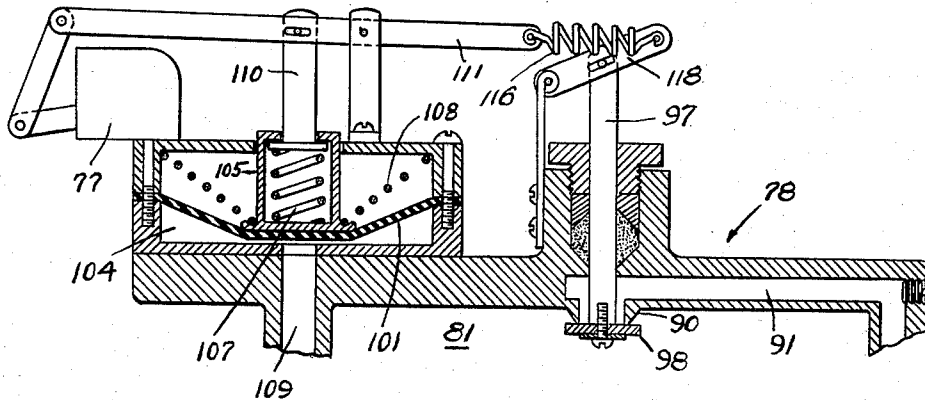


Fig.3

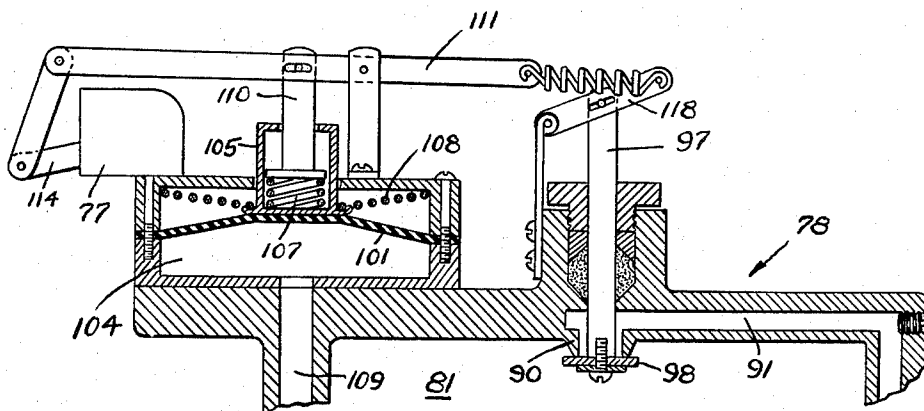


Fig. 4

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FLUSH VALVE CONTROL FOR PLUMBING
FIXTURES

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3 Claims. (Cl. 137-624.14)

My invention relates to a flush valve control and more particularly to a means of controlling periodically the flushing of plumbing fixtures by means of a flush valve.

The principal object of my invention is to provide a flush valve control with a timing mechanism actuated by the water pressure so as to be actuated automatically.

A further object of my invention is to provide a device of the character described which needs no winding or servicing for and during its performance.

As is well known to anyone familiar with the operation and function of plumbing fixtures, such as urinals or the like, the public is not dependable, and for sanitary reasons periodical flushing of such fixtures is imperative. In carrying out my invention, I provide a device for this purpose which is positive in its operation, is easy to install, and is equipped with a timing or escape movement which determines each successive time of operation. The operation of the device is entirely automatic and is actuated by means of the water pressure.

Other and further objects of my invention will become more apparent as the description proceeds.

Referring now to details of the embodiment of the invention disclosed in the drawings:

Figure 1 is a longitudinal section of the device, with the valves in a closed position.

Figure 2 is a similar section of the device shown in Figure 1, with the valve in open position for flushing.

Figures 3 and 4 are fragmentary detail sections of the control mechanism in two successive intermediate positions of operation.

Referring now to details of the embodiment of the invention shown in the drawings:

The main valve housing consists of an upper body portion 78 and a lower body portion 79, separated by a main diaphragm 80 of pliable sheet material dividing the main valve body into an upper chamber 81 and a lower chamber 82.

The lower chamber 82 has an inlet 83 at one side and a centrally disposed outlet 84 at the bottom thereof. The diaphragm 80 has a small port 85 therethrough.

The outlet 84 includes an upstanding seat 86 engageable by the diaphragm 80. A guide member 87 rests on the diaphragm 80 and has prong extensions 87' passing downwardly through a central opening 88 in said diaphragm, which prongs are slidably engaged in the outlet port 84.

The upper body portion 78 has a centrally disposed valve seat 90 forming the inlet to a by-pass 91 communicating through the walls of the upper body portion 78 and lower body portion 79 and opening through an outlet 92 into the outlet 84 of the lower body portion. The upper body portion 78 has an upwardly extending boss 93 through which a valve stem 97 extends. Said valve stem is sealed by a stuffing nut 94 which holds a packing ring 95 against a packing 96 surrounding said valve stem. Said valve stem projects downward through the valve seat and has a valve member 98 at its lower end adapted to close said valve seat.

An auxiliary enclosure is mounted on the upper face

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of the main valve body, said enclosure consisting of a cap 99 and a lower body portion 100 separated by an auxiliary diaphragm 101. The cap may be secured to the lower body 100 by bolts 102.

The diaphragm 101 separates the auxiliary enclosure into an upper chamber 103 and a lower chamber 104. A hollow upstanding cylindrical member 105 rests on the top face of the auxiliary diaphragm 101, with the upper end of said cylindrical member projecting upwardly through a central opening in the cap 99. A piston 106 is slidably mounted in the cylinder 105 and has a stem 110 projecting upwardly therefrom through the flanged top of said cylinder. A coil spring 107 is inserted between the closed bottom of the cylinder 105 and the under face of the piston 106. A conical spring 108 is inserted in the upper chamber 103 between the top of cap 99 and the flanged bottom 105' of cylinder 105, so as to normally urge said cylinder and the diaphragm 101 downwardly. The lower chamber 104 is provided with a tubular port 109 communicating with the inlet 83 of the main chamber 82.

The vertical stem 110 of piston 106 is slidably connected to a generally horizontal lever arm 111 by pivot pin 112. The lever arm 111 is pivoted at 113 to an upright support 113' fixed on the cap 99. One end of the lever arm 111 is pivotally connected by a link 115 to the control arm 114 of a conventional timing mechanism 77. The opposite end of the lever arm 111 stops short of the stem 97 and has a coil spring 116 attached thereto, which extends beyond said stem and is fastened by pin 117 to a toggle arm 118 pivotally mounted at one end on an upright support 119 and slidably connected to the upper end of the stem 97 by a pivot pin 120. Thus it will be seen that the spring 116 is so positioned with relation to the pivotal movement of the link 118, pressure responsive movement of the member 110 and valve opening movement of the valve 98 that during the initial phase of movement of the member 101, the spring 116 holds the valve 98 closed upon the seat 90. After a predetermined range of movement of the member 101, as to a position corresponding to that position just prior to the position illustrated in Figure 2, the spring 116 moves over center with relation to the connection 120, and further movement of the member 101 is such as to apply a valve opening force to link 118. During the aforesaid initial range of movement, the spring 116 applies a valve closing force to valve 98 and link 118.

The use and operation of the device is as follows:

When the main valve is in closed position as shown in Figure 1, the water pressure at inlet 83 communicating through upright passage 109 will exert upward pressure on the diaphragm 101 in the upper chamber 104 to force said diaphragm upwardly and compress the conical spring 108 to raise the cylinder 105. This movement causes upward pressure through the spring 107 to the piston 106 to exert an upward pressure on the toggle link 111 at 112. Upward movement of the adjacent end of the lever 111 is restrained by the timing mechanism 77, so that the opposite end of lever 111 carrying spring 116 will move slowly downward, carrying the spring 116 toward the position shown in Figure 2 so as to exert a downward pull on the toggle link 118 at the upper end of the valve stem 97. When the spring 116 has reached an angle to exert sufficient downward pressure upon the toggle link 118 to open the valve 98 on valve stem 97, the water in the upper chamber 81 will be by-passed through passage 91 and port 92 to the outlet 84. This relieves pressure on the top of diaphragm 80 to the extent that said diaphragm will raise the guide member 87 and the inner periphery of the diaphragm 80 from the seat 86 to cause the water from the lower passage 82 to discharge freely through the outlet 84, as indicated by the

arrows in Figure 2. At this point in the cycle, pressure on the auxiliary control diaphragm 101 will be partially relieved, to the extent that the conical spring 108 may return said diaphragm to the lowered position shown in Figure 3, carrying the cylinder 105 and stem 110 downward with it. This downward movement of stem 110 moves the adjacent end of lever 111 downwardly to reset the timing mechanism 77 through its conventional ratchet mechanism (not shown) and also raises the spring 116 at the opposite end of the lever to its initial position to close the valve member 98 on valve stem 97.

When the valve member 98 closes the by-pass part 90 from upper chamber 81 of the main valve, water entering said upper chamber through the port 85 will gradually increase the pressure on the upper face of the main diaphragm 80 to a point where it counterbalances the pressure on the under face of said diaphragm, so that said main diaphragm will close the outlet 84.

When the outlet valve 84 is closed, pressure will again be increased in the inlet 83 to a sufficient degree to move the auxiliary diaphragm 101 upwardly as indicated in Figure 4 (and also in Figure 1) so as to repeat the valve-opening cycle of the mechanism under control of the timing mechanism.

Although I have shown and described certain embodiments of my invention, it will be understood that I do not wish to be limited to the exact construction shown and described but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. An automatic periodically operated valve including a valve body having an inlet, an outlet, and a valve seat between said inlet and outlet, a valve member movably supported within said body and adapted to close upon said seat, a pivotal link interconnected with said valve member for opening and closing said valve member in response to movement of said link, a pressure chamber and a pressure responsive member therein, said chamber being in communication with said inlet whereby the pressure in said inlet biases said pressure responsive member in one direction, a spring interconnected with said link and pressure responsive member, said spring being positioned, with relation to the direction of pressure biased movement of said responsive member and the pivot point of said link to apply a valve closing force to said link during a predetermined initial range of movement of said responsive member under the influence of the pressure in said chamber and to apply a valve opening force to said link during further movement whereby said valve is positively closed during said initial range of movement and

positively opened thereafter, and means biasing said pressure responsive member in the other direction to thereby slow the valve opening action thereof and for returning said pressure responsive member and thereby said valve member, to valve closed position upon a pressure drop in said inlet attendant to opening of said valve.

2. An automatic periodically operated valve including a valve body having an inlet, an outlet, and a valve seat between said inlet and outlet, a valve member movably supported within said body and adapted to close upon said seat, a pivotal link interconnected with said valve member for opening and closing said valve member in response to movement of said link, a pressure chamber and a pressure responsive member therein, said chamber being in communication with said inlet whereby the pressure in said inlet biases said pressure responsive member in one direction, a spring interconnected with said link and pressure responsive member, said spring being positioned, with relation to the direction of pressure biased movement of said responsive member and the pivot point of said link to apply a valve closing force to said link during a predetermined initial range of movement of said responsive member under the influence of the pressure in said chamber and to apply a valve opening force to said link during further movement whereby said valve is positively closed during said initial range of movement and positively opened thereafter, means biasing said pressure responsive member in the other direction to thereby slow the valve opening action thereof and for returning said pressure responsive member and thereby said valve member, to valve closed position upon a pressure drop in said inlet attendant to opening of said valve, and a timing mechanism interconnected with said pressure responsive member for retarding the valve opening movement thereof.

3. The structure of claim 2 wherein a second pivotal link is pivoted to a stem of said pressure responsive member and connected to said spring to thereby interconnect said spring and pressure responsive member.

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