Nov. 6, 1934. S. U. SIENA ET AL 1,980,144

VALVE CONSTRUCTION

Filed Feb. 9, 1933

Fig. 2.

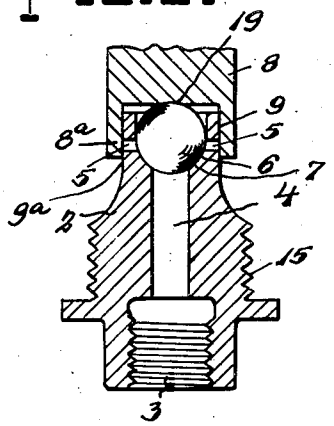
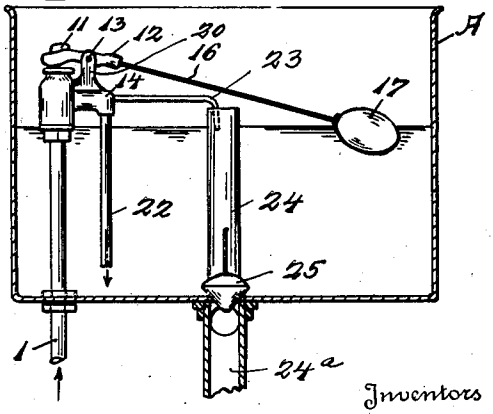


Fig. 5.

Fig. 3.

Fig. 4.



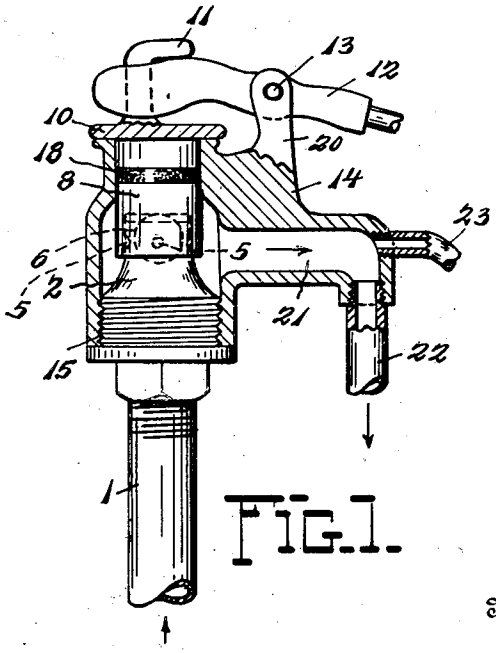


Fig. 1.

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Patented Nov. 6, 1934 1,980,144

UNITED STATES PATENT OFFICE

1,980,144

VALVE CONSTRUCTION

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Application February 9, 1933, Serial No. 656,008

10 Claims. (Cl. 251—167)

The improved valve construction represented by the present invention is designed to eliminate rattling or "chattering" often noted in valve installations, especially where a ball type valve is employed, which rattling produces an objectionable noise when the valve is operated.

Valves employing a ball type of valve member usually comprise a seat for the valve, in which the valve rests, and from which it is adapted to be lifted by fluid pressure beneath the valve. A compression member or plunger is arranged to act upon the valve so as to compress the same upon its seat for controlling the flow of fluid through the valve structure.

Such types of valves are frequently employed in water lines, to control flow of water therethrough, and as usually constructed, there will be a certain amount of play between the upstanding walls of the valve seat and the valve to enable ready lifting of the valve by the water pressure when the valve actuating member or plunger is released. Because of this play, a certain amount of water may enter between the valve and the plunger, circulating, as it were, behind the valve member, producing a rapid vibration of the member with the objectionable noise or chattering above referred to resulting from this entry and circulation of water between the valve and its operating plunger.

The present invention eliminates this objectionable feature, since the valve member is sufficiently tight to prevent water passing around it, while at the same time being sufficiently freely movable relative to its seat as to enable a free lifting of the valve from the seat under the action of water pressure. By rendering the valve water-tight between its periphery and the sides of the valve seat, entry of water between the valve and its operating plunger is prevented and the objectionable noise above referred to is eliminated.

The valve of the present invention may be employed in a wide variety of installations, such as, for example, in faucets, for the control of the water intake supply of flush tanks, or anywhere where a flow of fluid or liquid is to be controlled.

Referring more particularly to the drawing, Figure 1 represents an installation of the valve of the present invention in the intake line of the flush tank, the view being partly in section and partly in elevation.

Figure 2 is a detail section through the valve seat, showing the valve in closed position.

Figure 3 is a fragmentary sectional view, similar to Figure 2, but showing the valve in open position.

Figure 4 is a sectional view of a flush tank showing the arrangement of water inlet and outlet, the inlet being provided with the improved valve construction.

Figure 5 is a view partially in section and partly in elevation of a faucet provided with the improved valve construction.

Referring more particularly to the drawing, and especially first to the form of construction illustrated in Figures 1 to 4 inclusive, the intake 1 is provided with the valve seat member 2, the seat member 2 being threaded as indicated at 3 for the reception of the inlet 1. The seat member is provided with a channel 4, axially extending through the seat member, and communicating between the inlet 1 and the outlet openings 5, which openings are adapted to be controlled through the valve 6, illustrated as being a ball type valve of compressible material. This valve 6 rests within the recessed portion 7 of the seat member 2, the portion 7 having its wall curved similar to the curvature of the valve 6, the width of the recess 7 being substantially the diameter of the valve.

It will be seen that the valve 6 extends above the plane of the top of the seat member, and is adapted to be engaged for compression by the operating member or plunger 8 the top of the seat member 2 being restricted to be received within this plunger in a fluid-tight relation. The engagement of the operating member or plunger 8 with the side 9 of the valve seat member is such that there is virtually no friction between the areas of contact, while yet allowing tight engagement between the plunger 8 and the valve seat member wall 9. In the form of invention under consideration, the plunger 8 is provided with a cap 10 which is provided with a hook shaped arm 11 which is engaged by the forked actuating member 12 pivoted at 13 to the valve housing 14 threadedly mounted on the seat member 2 by means of the threads 15. To the actuating member 12 is connected the float rod 16 which carries the float 17. A packing 18 surrounds the plunger 8 and prevents passage of water around the plunger.

It will be noted that the valve contacting surface of the plunger 8 is provided with a slight concavity 19 for gripping the surface of the valve 6, and for compressing it against the outlet passages 5 to effect closing of these passages. In the complete installation of the valve, the valve seat member 2 and plunger 8 are enclosed in the

housing 14, which is provided with an upstanding arm 20 and the channel 21. This channel 21 receives the pipe 22, through which pipe water enters the tank A for filling the tank. A pipe 23 is also connected with the channel 21, this pipe leading into the overflow pipe 24, which is of usual construction.

It will be seen that the arm 20 carries the pivotal mounting 13 for the lever arm 12.

In the flush pipe 24*a* there is placed the control valve 25, which is operated in the usual manner for draining the flush tank A.

As the float 17 falls in conformity with the drop of level of the water when the valve 25 is open, the arm 12 pivots on 13 to lift the plunger 8 into the position shown in Figure 3, thus allowing the valve 6 to lift under pressure of the water in the channel 4, and the water will then flow from the intake pipe 1 through the channel 4 and the openings 5 into the passage 21, thence through pipe 22 and into the tank, the valve 25 of course closing in the usual manner. As the level of the water in the tank A rises, the float 17 is raised, correspondingly depressing the plunger 8 to close the valve 6 as shown in Figure 2. During the entire operation, owing to the close contact between the valve 6 and the wall 9 of its seat and between seat portion 9*a* and plunger portion 8*a*, no water can pass between the valve and wall so that the space 26 between the valve seat member and bottom of the plunger remains free from water. In this way the rattling of the valve which has been previously referred to as being the source of objectionable noise, very commonly noted in prior constructions of this kind, is eliminated.

In the construction shown in Figure 5, the valve seat member is illustrated as a plug 2*a* threadedly received in the dividing wall 27 separating the inlet 28 from the outlet 29 of the faucet B. The seat member 2*a* is shaped at its upper end to receive the ball valve 6*a* and has the water passages 4*a* and 5*a* therethrough, through which passages communication between the inlet 28 and outlet 29 is effected. Snugly fitting over the seat member 2*a* is the valve operating piston 8*a*, the end of which is suitably recessed to fit over this valve seat member 2*a* in water-tight relation therewith, and to engage the valve 6*a* for controlling flow of water through the faucet upon actuation of the handle 30. As in the previously described modification, the recessed end of the plunger is provided with a slight concavity 19*a* into which the valve 6*a* fits closely. Also, as in the previously described modification, the valve 6*a* engages the side of the seat in water-tight relation, the contact being such, however, that the valve 6 is readily liftable under the pressure of water passing upwardly through the passage 4*a*.

It will be understood that the engaging, relatively movable surfaces of the structure are made very smooth, so as to virtually eliminate friction between the moving parts, while at the same time preserving the liquid-tight relation between these parts.

The operation of the parts of the construction of Figure 5 is the same as that of the corresponding parts of the modification previously described, and adapts the device for general use.

In the construction shown in Figure 5, the plunger is integral with the threaded portion 32 and stem 31 and it will be obvious from the said figure that upon operation of the handle 30 the plunger will be raised or lowered, thereby operating the ball valve in the manner previously described.

As in the modification previously described, no water can pass between the valve 6*a* and the walls of its seat so that the space 26 is maintained free from water.

It should be noted that the ball valve 6 in Figure 2, or 6*a* in Figure 5, performs only a very small upward or downward motion during its operation, and the amount of such motion may be easily adjusted by screwing the valve seat portion 2 in Figure 1, or 2*a* in Figure 5, more or less into the valve housing. The amount of water to be dispensed by this valve can be thereby readily adjusted.

It will be apparent from the foregoing that the seat member 2 may be readily removed and replaced without any difficulty.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States, is—

1. A valve construction of the character described, comprising, in combination, a valve casing, a valve seat member communicating with a fluid supply line for enabling passage of fluid through the seat member, the said valve seat member having outlet openings in its side and being provided with a recessed portion, a valve loosely positioned on the said seat member within said recessed portion for controlling flow of fluid therethrough, an operating member adapted to act upon the valve to compress the same for effective control of flow of fluid and for retaining the valve within said recessed portion of the seat member, the said valve being in continuous peripheral engagement with the side wall of the seat member to prevent entry of water between the said valve and operating member, while enabling the said valve to operate upon sufficient withdrawal of the operating member for enabling fluid to flow through the seat member upon release of the valve.

2. A valve construction of the character described, comprising, in combination, a valve casing, a fluid inlet, a valve seat member interconnected with the said inlet and provided with a cupped valve receiving end having outlet openings in its wall, a compressible valve seated in the cupped end in fluid-tight relation with the walls of the said end, and an operating member for the said valve, the said operating member enclosing the said cupped end of the valve seat member and being in fluid-tight engagement therewith, the said valve being liftable from its seat by fluid pressure beneath the valve upon release of the operating member to enable fluid to pass through the seat member, while preventing entry of fluid around the valve and between the valve and operating member.

3. A valve construction of the character described, comprising, in combination a valve casing having a fluid inlet, a valve seat member communicating with the said fluid inlet, the said valve seat member being cupped at one end and provided with fluid passages through the side of said cupped end, a compressible valve member positioned in the cupped end of the seat member in fluid-tight engagement with the side thereof, a piston for compressing the said valve to control flow of fluid through the seat member, means for operating the piston, the said piston having its valve engaging end recessed for snugly fitting against the valve seat member to enclose the same in fluid-tight relation, the said valve being freely liftable through fluid

pressure from its seat upon release of the said piston for enabling fluid to pass through the valve seat and said fluid passages while maintaining fluid-tight engagement with the said cupped end for preventing passage of fluid around the valve and between the seat member and piston.

4. A valve construction of the character described, comprising, in combination, a valve casing, a valve seat member within the casing and provided with a fluid inlet passage, the said valve seat member having an upstanding wall forming a cupped end with outlet passages therein, a compressible ball valve member positioned within said cupped end, a valve operating piston engaging said ball valve, the said piston being recessed at its end to enclose the cupped end of the valve seat member in fluid-tight relation and being adapted to compress the said ball valve within the cupped end to close the inlet and outlet passages for controlling the flow of fluid through said casing, the ball valve being continuously in fluid-tight relation with the upstanding wall of the cupped end of the valve seat member to prevent the passage of fluid between the piston and ball valve.

5. A valve construction of the character described, comprising, in combination, a valve casing, a valve seat member within the casing and provided with a fluid inlet passage, the said valve seat member having an upstanding wall forming a cupped end with outlet passages therein, a compressible ball valve member positioned within said cupped end, a valve operating piston engaging said ball valve for controlling the flow of fluid through the casing, the said piston being recessed at its end to enclose the cupped end of the valve seat member in fluid-tight relation to prevent the passage of fluid between the piston and ball valve.

6. A valve construction of the character described, comprising, in combination, a valve casing, a valve seat member within the casing and provided with a fluid inlet passage, the said valve seat member having an upstanding wall forming a cupped end with outlet passages therein, a compressible ball valve member positioned within said cupped end, a valve operating piston engaging said ball valve for controlling the flow of fluid through the casing, the said piston being recessed at its end to enclose the cupped end of the valve seat member in fluid-tight relation to prevent the passage of fluid between the piston and ball valve and to seal the outlet passages.

7. A valve construction of the character described, comprising, in combination, a valve casing, a valve seat member having an inlet passage and outlet passages, a compressible ball valve within the seat member for controlling the flow of fluid through said passages, and means for operating said ball valve and controlling the flow through said outlet passages, the said means and ball valve being in fluid tight relation to the valve seat member to prevent the passage of fluid between the said means and ball valve.

8. A valve construction of the character described, comprising, in combination, a valve casing, a valve seat member having a fluid inlet passage and outlet passages, a compressible ball valve, an operating piston having a sealing flange cooperating with said valve seat member for controlling the flow of fluid through the outlet passages and for operating the ball valve to thereby control the flow of fluid through the inlet and outlet passages of the valve seat member, the said ball valve being operated by the said piston.

9. In a valve, a valve casing, a valve seat member having a fluid passage therein and passages communicating with said fluid passage for the transmission of fluid therethrough, means for controlling the flow of fluid from said fluid passage to said passages, said means being interposed between said passages and means for controlling the flow of fluid at the outlet end of said passages.

10. In a valve, a valve casing, a valve seat member having a fluid passage therein and passages communicating with said fluid passage for the transmission of fluid therethrough, means for controlling the flow of fluid from said fluid passage to said passages, said means being interposed between said passages, means for controlling the flow of fluid at the outlet end of said passages, and instrumentalities for operating said first named means and being connected to operate said second named means simultaneouly therewith.

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