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BALL COCK VALVE SILENCER

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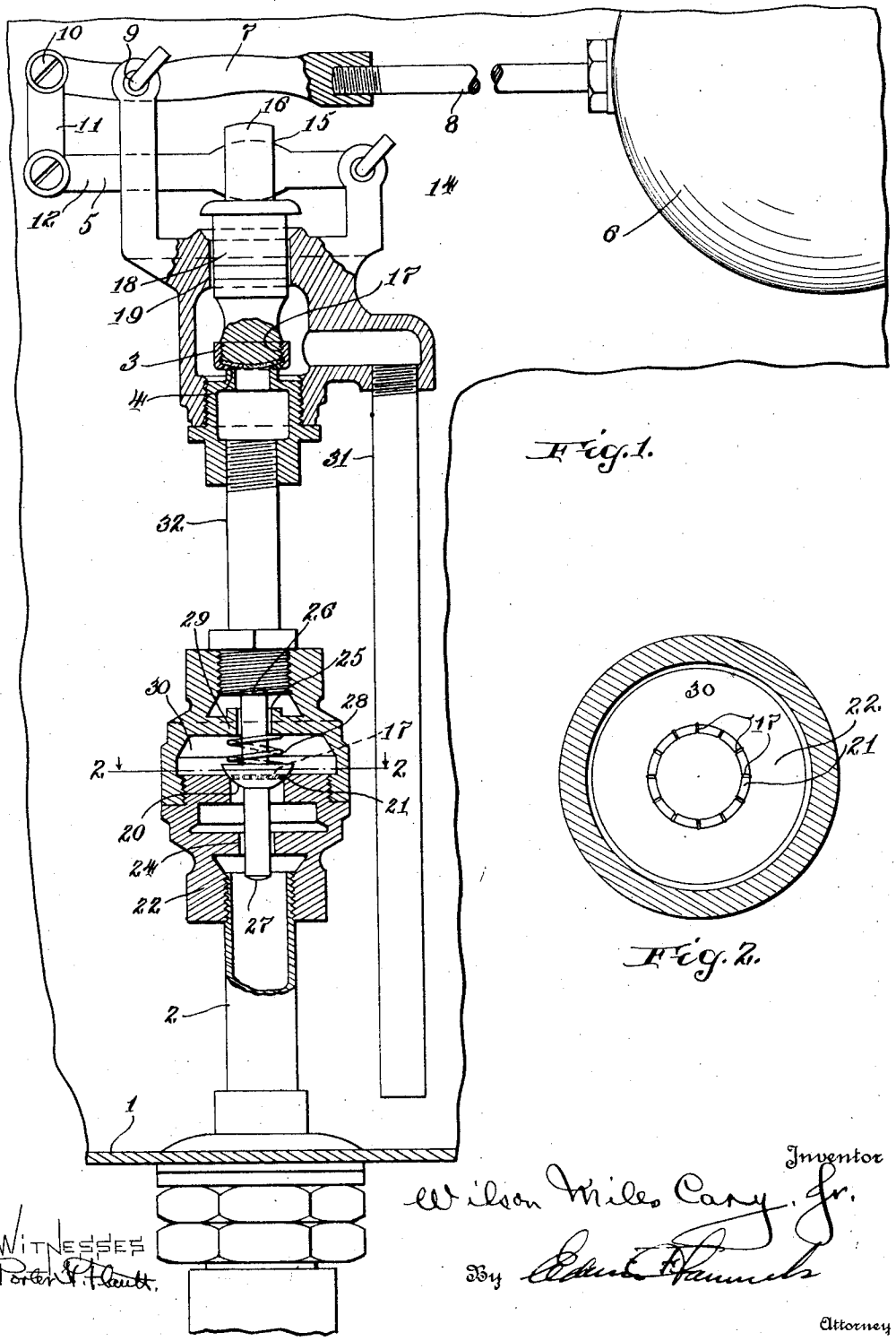


Fig. 1.

Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

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BALL-COCK-VALVE SILENCER.

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In the operation of the ball cock valves of flush tanks and the like, the objectionable whistling sound which occurs just prior to the final and complete closure of the valve as the float approaches full position is familiar to all, and numerous attempts have been made to overcome this difficulty or defect.

The invention relates to the provision of a silencer valve in the water supply pipe. This valve is opened by the pressure of the water supply when the ball cock valve is wide open on account of the release of the water from the tank, and as the ball cock valve approaches closed position the silencing valve closes to a sufficient extent to cut down the pressure of the water by throttling and reducing the velocity of flow between the ball cock valve and its seat, whereby the whistling effect is completely eliminated.

In the preferred form of the invention the silencer or check valve seat is scored slightly, the score marks being exceedingly fine so as to provide for a minute seepage past the silencer valve in the position which it assumes when the tank is almost full and the ball cock valve almost closed, whereby the final level of the tank is reached by a gradual influx of water, the pressure between the silencer valve and the ball cock valve being thus reduced, giving a consequent reduction of the velocity of the water as it passes between the ball cock valve and its seat and, as aforesaid, a complete elimination of the objectionable noise.

In the accompanying drawings I have illustrated fragmentarily a ball cock valve for flush tanks and the like equipped with a silencer valve in accordance with my invention in what is at present regarded as the preferred form.

In the drawings:

Figure 1 is a vertical central section through the ball cock valve and silencer valve on a plane of the axis, the ball float and link motion being shown in elevation, the float ball arm being broken away to indicate indefinite length for convenience of illustration.

Figure 2 is a section on line 2—2 of Figure 1 including a plan view of the silencer valve seat.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the illustration includes more or less fragmentarily a flush tank 1 to which water under supply pressure is led from a suitable source by way of water supply pipe 2, 32 the admission of water from the supply pipe to the tank being controlled by means of ball cock valve 3 cooperating with ball cock valve seat 4, the ball cock valve being operated by link and lever system 5 of any preferred type, the operation of the link and lever system shown being obvious and also familiar to those skilled in the art.

This link and lever system is, in turn, controlled by a float or ball 6 connected to the upper arm 7 of the link and lever system by a ball or float arm 8 which acts as an extension of the lever arm 7. The upper arm 7 is pivoted on a suitable upright bracket at 9 and is connected at its end 10 remote from the ball 6 and beyond the pivot by a suitable connecting link 11 to the corresponding end of a lever 12 which is pivoted to a stationary bracket at its opposite end at 14 extending intermediately through a slot 15 in the upright stud 16 carrying the ball cock valve 3, the same being, in the form shown, guided by a central cylindrical guiding portion 18 which has a loose sliding fit in a guide bearing 19 above the valve seat 4.

The silencer valve 20 is located or inserted in a suitable casing 22 in the water pipe 2, 32 between the supply and the ball cock valve 3. The silencer valve 20 is shown in the form of a poppet valve which cooperates with a seat 21 in said casing 22 in the position already indicated.

The casing 22 is formed in any suitable manner whereby it may be inserted in pipe 2, 32 intermediately thereof and is provided with suitable guides 24 below and 25 above the seat. These, as shown, are cylindrical guiding surfaces formed in the body of the casing and the valve is provided with guide

members 26 and 27 above and below cooperating with said guide surfaces, said guiding members, which may be pins of circular cross section, extending through and secured to the center of the valve 20.

In the preferred form of the invention illustrated, the silencer valve seat is apertured or scored at 17 on lines preferably extending across the seat surface on the line of the intersection of any radial planes therewith, though the exact configuration of the scores is not material.

A tendency of the valve to enter into and remain in contact with its seat is imparted thereto by a short helical spring 28 coiled about the upper guiding member 26 and bearing at its lower end against the top surface of the valve and at its upper end against the lower surface of an abutment 29 extending across the cavity 30 of the valve casing and in which the guide bearing surface 25 is formed.

The silencer valve is moved to throttling position near or in contact with its seat by the spring 28, assisted by the back pressure in the upper pipe section 32 beyond the silencer valve as the ball cock valve approaches closed position.

In operation the valve is guided in the direction of the axis of the chamber to and from its seat by the guide members 26 and 27 cooperating with guide bearing surfaces 24 and 25 and is normally, i. e., in the closed position of the ball cock valve, held in close contact with its seat by the spring 28. When the water is released from the tank and the ball cock valve 3 is opened by the depression of the float or ball 6, the pressure of the water supply to which the spring of the silencer valve 20 is adjusted, opens the silencer valve 20 and the water supply flows freely through the pipe 2 between the valve seat 21 and the silencer valve 20 and into the tank by way of the ball cock valve. As the level of the water in the tank rises and approaches the full condition, the ball 6 being raised to a position approaching the closed position, the ball cock valve 3 comes nearly in contact with its seat, and the final completion of the filling of the tank from this position of the parts requires a relatively small quantity of water.

It will be understood that the water flows freely from the ball cock valve by way of any suitable passage, as the pipe 31, so that the ball cock valve, in effect, discharges into the atmosphere and the escape of the water under considerable pressure through the small orifice between the ball cock valve 3 and the seat 4 as the valve approaches closed position, results in the objectionable hissing or whistling noise described.

This objectionable whistling is eliminated by the silencer valve which, while it opens freely to permit the full supply of water to pass when the ball cock valve is wide open, has a throttling effect reducing the pressure of the water between the silencer valve and the ball cock valve when the latter approaches seating position, i. e., the pressure of the spring 28 urging the silencer valve toward its seat cuts down the flow of water past the ball cock valve so that it is less than that which would be normally passed by the ball cock valve in the closing position of the latter, so that the velocity at this point is greatly reduced and there is no high speed flow of the water through a narrow orifice in the ball cock valve, which has resulted in the objectionable hissing or whistling, the objectionable feature being thus overcome.

I have thus described specifically and in detail a single embodiment of my invention in order that the nature and operation of the same may be clearly understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a ball cock valve for flush tanks of a supply pipe leading water under pressure to the tank by way of the ball cock valve, and a silencer valve in said pipe between the ball cock valve and the supply, said silencer valve being in the form of a poppet valve opening in the direction of flow, a seat therefor and a spring tending to close said valve against the water pressure, the spring being of such strength as to be overcome by the water pressure when the ball cock valve is open.

2. The combination with a ball cock valve for flush tanks of a supply pipe leading water under pressure to the tank by way of the ball cock valve, and a silencer valve in said pipe between the ball cock valve and the supply, said silencer valve being in the form of a poppet valve opening in the direction of flow, a seat therefor and means tending to close said valve against the water pressure, said means being of such strength as to be overcome by the water pressure when the ball cock valve is open.

3. The combination with a ball cock valve for flush tanks of a supply pipe leading water under pressure to the tank by way of the ball cock valve, and a silencer valve in said pipe between the ball cock valve and the supply, said silencer valve being in the form of a poppet valve opening in the direction of flow, a seat therefor and a spring tending to close said valve against the water pressure, the valve and seat constituting cooperating members, one of which is scored in a direction approaching the direction of

flow to provide for the passage of a small quantity of fluid when the valve is in contact with its seat.

4. The combination with a ball cock valve for flush tanks of a supply pipe leading water under pressure to the tank by way of the ball cock valve, and a silencer valve in said pipe between the ball cock valve and the supply, said silencer valve being in the form of a poppet valve opening in the direction of flow, a seat therefor and a spring tending to close said valve against the water pressure, the valve and seat forming cooperating members one of which is apertured to provide a slight flow when the valve is closed.

Signed by me at Baltimore, Maryland, this 22nd day of July, 1927.

WILSON MILES CARY, JR.