Oct. 1, 1957 L. K. WATKINS 2,807,806

POP-UP VALVE

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Fig. 1

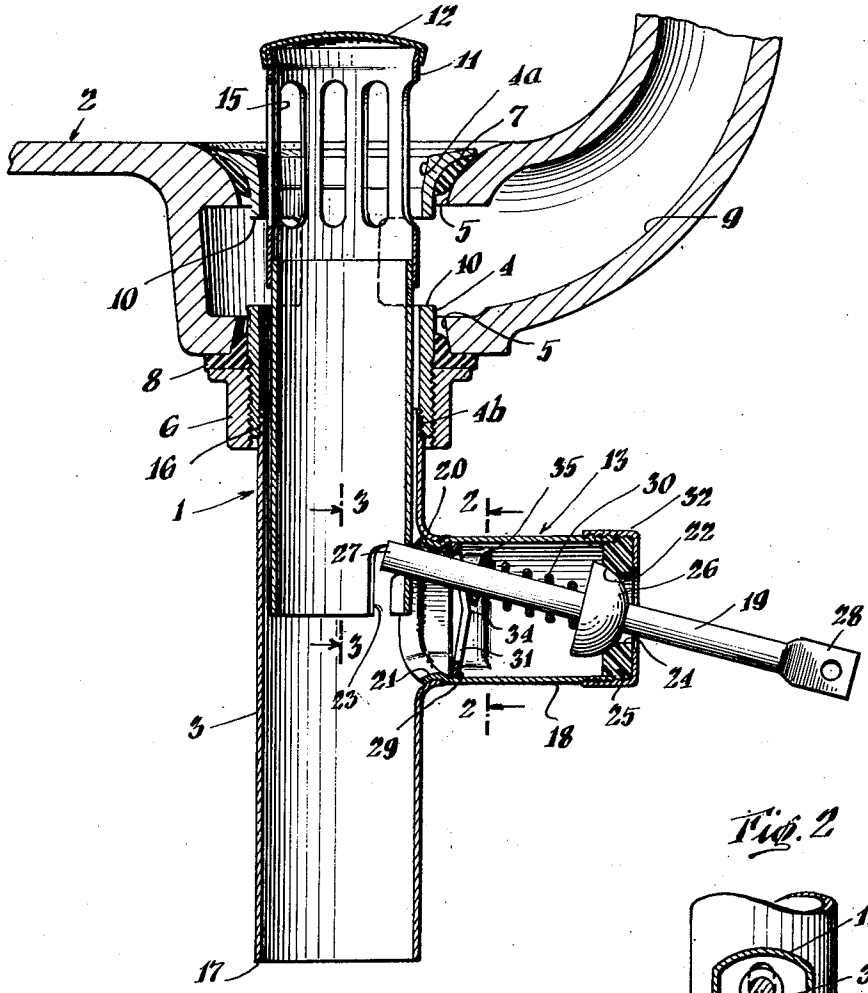


Fig. 2

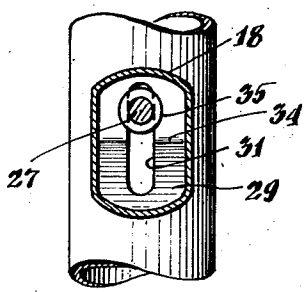
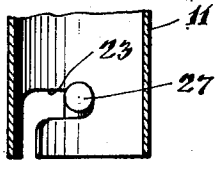


Fig. 3



INVENTOR
Lee K. Watkins
BY
Andrew K. Foulds
ATTORNEY

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POP-UP VALVE

Lee K. Watkins, Louisville, Ky., assignor to American Radiator & Standard Sanitary Corporation, New York, N. Y., a corporation of Delaware

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1 Claim. (Cl. 4—203)

The present invention relates to pop-up drain valves for wash bowls, bathtubs, and the like and more particularly to an improved tail piece and actuator for such a valve.

There are many forms of pop-up drain valves now in use which are adapted to be opened and closed by a suitable actuator remote from the valve; however the known types of actuators have proven to be either unduly complex and expensive or to have an unreliable and irregular opening and closing action.

Pop-up valves are used extensively in both home and commercial bath and washroom installations. Reliable and efficient valve operation is a necessity. The valve actuator should be positive and rugged so that even with long wear and rough usage the valve may be quickly and simply moved from a tightly closed position to a fully opened position. Even slight irregularities in the valve opening or closing action impair its usefulness. A valve which fails to open adequately results in slow drainage, time loss and further stoppages due to the accumulation of dirt and sediment in the slow moving drain water.

An object of the present invention is to provide a pop-up drain valve having an improved actuator mechanism.

Another object of the present invention is to provide a simplified and more reliable pop-up valve actuator and tail piece assembly.

Another object of the present invention is to provide an easily assembled pop-up drain valve with an actuator adapted for remote control.

Another object of the present invention is to provide a rugged and long wearing pop-up drain valve actuator.

A further object of the present invention is to provide a pop-up drain valve actuator having improved means for snapping the valve into fully closed or fully open position.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claim, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a sectional view vertically through the pop-up valve mounted in a wash bowl;

Figure 2 is a sectional view of the actuator casing taken along the line 2—2 of Fig. 1; and

Fig. 3 is a sectional view of the slot in the stopper taken along the line 3—3 of Fig. 1.

Referring to the drawing, the pop-up valve 1 is shown attached by its tubular drain plug 4 to the outlet 5 of a wash bowl 2 by a nut 6 with suitable rubber sealing washers 7 and 8. The drain plug 4 has a tubular tail piece 3 threadedly connected to its lower end 4*b* by threads 16 so that the drain plug 4 and the tail piece 3 combine

to form a tubular outlet for connection at its outlet 17 to a drain piping system (not shown), A conventional stopper 11 is slidably mounted within the drain plug 4 and the tail piece 3. The stopper 11 has an imperforate head 12 adapted to be seated in the top opening or valve seat 4*a* of drain plug 4 when the stopper 11 is in a downward or closed position to shut the valve and has apertures 15 below the imperforate head 12 to admit fluid to the drain plug 4 when the stopper is in its upward or open position. The apertures 15 cooperates with a conventional wash bowl overflow conduit 9 and overflow apertures 10 in the drain plug 4 to admit overflow water to the drain system when the stopper 11 is in its closed position.

The movement of stopper 11 is controlled by an actuator 19 which is pivotally mounted by an actuator assembly indicated generally at 13 on the tail piece 3. A tubular actuator casing 18 is fastened at its inner end about an opening 20 in tail piece 3. In the preferred embodiment, aperture 20 has outwardly flared edges which are shaped to conform to the cross section of the actuator casing 18 and actuator casing 18 is provided with an integrally formed flange 21 which engages the flared edge of aperture 20 and which is soldered, welded or otherwise fastened thereto. The actuator 19 is pivotally mounted on actuator casing 18 with its inner end 27 within tail piece 3 and engaging a bayonet slot 23 in stopper 11 and with its outer end 28 extending beyond the outer end of actuator casing 18 and adapted for connection to a suitable knob or lever on the side of the wash basin or tub.

The actuator 19 pivots on an enlarged bearing portion 26 intermediate its ends which is seated on the edge 22 of aperture 24 in bearing piece 25. The bearing piece 25 is removably mounted on the outer end of actuator casing 18 by screw cap 32 and is preferably made from a relatively hard material such as hard rubber or plastic. Polyethylene or 75 durometer rubber has proven satisfactory. The edge 22 of aperture 24 in the bearing piece 25 is preferably beveled to fit the shape of the actuator bearing portion 26 and to form a watertight seal therewith.

In order to guide the pivot motion of the actuator 19 to provide for the reciprocal motion of the stopper 11 between its open and its closed positions, a guide and cam plate 29 is inserted into the end of the actuator casing 18 adjacent to the tail piece 3 having an elongated slot 31 surrounding and guiding inner end 27 of the actuator 19. The guide and cam plate 29 is also used to provide a snap action to hold the actuator 19 in positions corresponding to the closed or opened positions of the stopper 11. The snap action is provided by giving the guide and cam plate 29 a V-shape so that its slopes from both ends of the slot 31 toward a projecting center 34 directed toward the actuator bearing portion 26. A cam ring 35 is slidably mounted on the actuator 19 and it is urged against guide and cam plate 29 by a spring 30 compressed between cam ring 35 and the actuator bearing portion 26. As the actuator 19 moves the cam ring 35 to either side of the center 34 of the guide and cam plate 29, the force of the spring 30 urges the edge of cam ring 35 to slide outwardly to end of the slot 31 and to thus carry encircled actuator 19 with it. The cam ring 35 is given a close sliding fit on the actuator 19 to keep it generally perpendicular thereto. This insures a uniform contact between the spring 30 and the cam ring 35 and prevents lost motion between the cam ring 35 and the actuator 19 due to the cam ring 35 rocking on the actuator 19.

The cam plate 29 is preferably made from a relatively thin piece of material bent to have the V-shaped cross section to provide the above described cam surface. In the preferred embodiment the cam plate 29 is mounted by having its upper and lower edges (Fig. 1) seated against the flange 21 of the actuator casing 18 by the

force of the compressed spring **30** on the actuator **19**. Although the actuator casing **18** may have a circular cross section throughout its length, the preferred embodiment as shown in Fig. 2 has the end attached to the tail piece **3** formed with an unsymmetrical cross section such as a generally oval one to initially seat and to hold the correspondingly oval shaped guide and cam plate **29** with the slot **31** correctly oriented. Where a circular guide and cam plate **29** is used in a circular actuator casing other suitable stop or fastening means are used to orient and lock the guide and cam plate from turning.

The actuator assembly **13** may be disassembled for repair, replacement of parts, or cleaning without disturbing the remainder of the pop-up valve installation with the valve in either its closed or open position. This is done by unscrewing the cap **32** to thereby release the bearing piece **25** and the atcuator **19**. Actuator **19**, together with the spring **30** and the guide and cam plate **29**, may now be slipped out of the actuator casing **18**.

It will be seen that the present invention provides an improved pop-up valve having a relatively simple, positive acting actuator unit. The actuator unit has relatively few parts, is reliable in action, and is readily assembled and disassembled. A positive opening and closing action is assured by the spring assisted actuator action. Due to the relative simplicity of the actuator construction and due to the small number of parts required, the actuator may be ruggedly constructed to insure a long operating life.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

In a drain valve assembly, a sheet metal drain tube having a side wall opening, a flange surrounding said opening, a tubular sheet metal actuator casing having an open end, said casing having an inwardly bent surrounding portion at its open end forming inner and outer shoulders, said inwardly bent portion extending within said flange with the end edge of said flange abutting said outer shoulder, a cam plate within said casing and abutting said inner shoulder to limit movement of said plate toward said casing open end, said plate having an aperture therethrough, an actuator rod extending through said aperture, means pivotally supporting said rod in said casing, a spring-urged cam follower member slidable on said rod and engaging said plate, and valve means controlling flow into said drain tube and operatively connected to said actuator rod.

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