March 24, 1953 O. STADER 2,632,182

FLUSH VALVE GUIDE DEVICE

Filed Sept. 19, 1949

FIG. 1

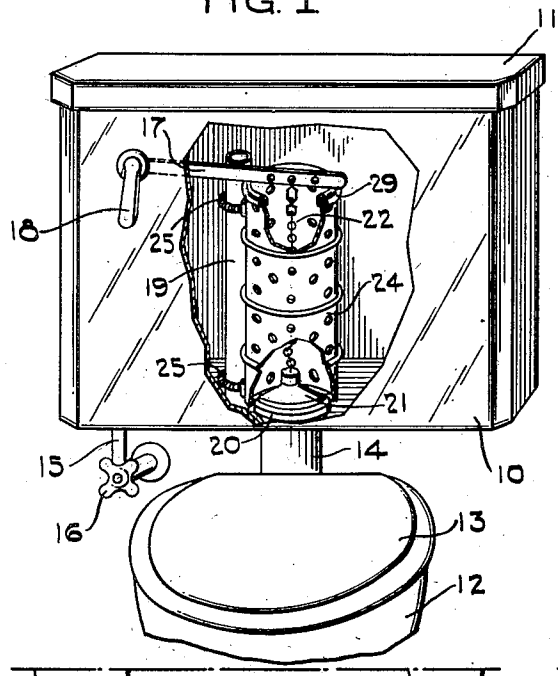
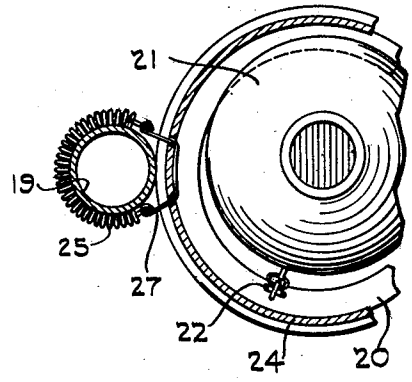


FIG. 2.



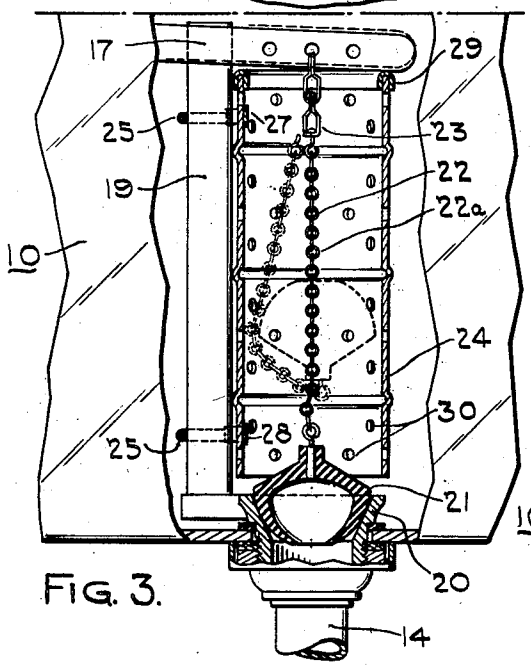


FIG. 3.

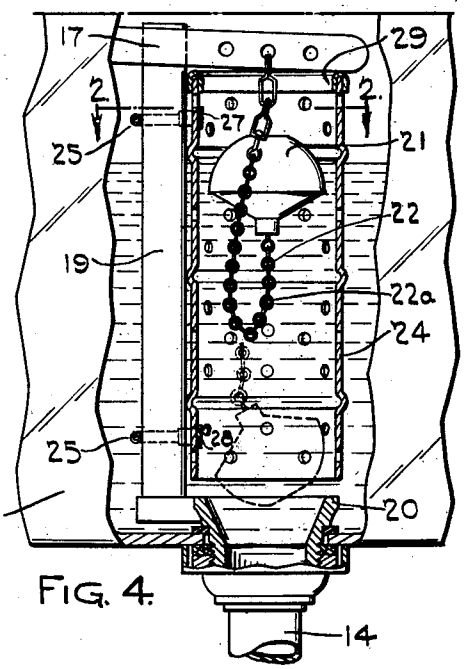


FIG. 4.

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FLUSH VALVE GUIDE DEVICE

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4 Claims. (Cl. 4—57)

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This invention relates to flush tank valving apparatus of the type commonly used in water closets.

A primary object of the invention is to provide an improved flush tank valve actuating mechanism which includes a guide for the flush tank valve.

A further object of the invention is to provide a cylindrical guide for a flush tank valve which may be readily installed and which may be slidably and resiliently positioned on the overflow stand pipe in the tank.

A still further object of the invention is to provide a slidable spring mounting for a cylindrical flush tank valve guide.

Further objects will be apparent from the specification and drawings in which:

Fig. 1 is a perspective partly broken away, of a water closet tank showing my improved valve assembly installed therein;

Fig. 2 is an enlarged sectional view, as seen at 2—2 of Fig. 4;

Fig. 3 is an enlarged transverse section of the valve actuating assembly shown in Fig. 1; and

Fig. 4 is a view similar to Fig. 3 with the valve immediately after being opened.

The invention comprises essentially the provision of a perforated cylindrical guide for the conventional flush tank valve. The valve actuating connection is flexible rather than one or more rigid links as in general construction. The guide serves as a positioning and limiting stop for the valve actuating lever and may be adjusted in such a way that the length of the flexible connection is just sufficient to permit seating of the valve before the connection becomes taut.

Referring now more particularly to the drawings, a conventional water closet has a tank 10, cover 11, bowl 12 and lid 13. The tank 10 is connected to the bowl 12 by means of an elbow 14 and water is admitted to the tank by means of a suitable pipe 15 and valve 16. A lever 17 is pivotally mounted in the front face of tank 10 and may be actuated in the well known manner by means of the handle 18.

Tank 10 is also provided with an overflow stand pipe 19 and a flush valve seat 20 secured in the bottom of the tank. A semi-spherical hollow valve 21 is adapted to close valve seat 20 when in the position shown in Fig. 3. Valve 21 is connected to lever 17 by means of a flexible connection such as a chain 22. In the preferred form, I employ round links 22a for chain 22 and I also employ a swivel connection 23 between chain 22 and lever 17. A hollow cylindrical guide 24 is mounted on overflow pipe 19 by means of

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resilient springs 25 and 26 which clamp the guide 24 securely to the overflow pipe. Springs 25 and 26 are attached to the guide by means of clips 27 and 28 which extend through suitable perforations in the periphery of the guide. It will thus be understood that the guide 24 may be readily installed merely by slipping the springs 25 and 26 over the top of pipe 19 and then sliding the springs and the guide to the desired vertical height. The top of the guide is provided with a reinforcing U-shaped edge 29 which serves as a limit stop or abutment for lever 17. The bottom of the guide terminates somewhat above the top of seat 20 to provide ample flow of water from the tank 10 into elbow 14. Furthermore, the guide has a plurality of perforations 30, 30 to facilitate the flow of water into and out of the guide.

The height to which the guide 24 is adjusted on pipe 19, and the length of chain 22, are both important in properly seating and installing the present device. I have found that it is desirable to have approximately $\frac{1}{16}$'' free play between the edge 29 and lever 17 before chain 22 becomes taut. This is shown in the dotted-line position of lever 17 in Fig. 3. When the lever rests on the top of the guide, there will be a very slight amount of slack in chain 22 so that the valve 21 will seat properly in the seat 20 without danger of leakage. When the device is installed, it is a simple matter to slide the guide on pipe 19 until this adjustment has been achieved.

In operation when the tank 10 is full of water, lever 17 is raised by means of handle 18, whereupon valve 21 immediately turns upside down and floats on the surface of the water (as shown in Fig. 4). For this purpose, it is of course, essential that the inside diameter of the guide 24 be sufficient to permit clearance between the side of the valve and chain 22. As the water flows into elbow 14, the water level lowers until the valve and chain are in approximately the position shown in broken lines in Fig. 3. This is the lowest point that the valve 21 can reach in a completely inverted position. At this time, chain 22 becomes taut and as the water further lowers, valve 21 is automatically righted by means of the chain. Since the length of chain 22 is sufficient to provide a slight amount of slack even when the valve 21 is completely seated, it will be understood that the righting action of the chain serves only to partly turn the valve. Fig. 4 illustrates this position in broken lines and shows the chain in a slack condition immediately after this partial righting. However, since the valve after having been partially righted is in close proximity to

the rapidly flowing water, the valve will be further righted to assume a substantially vertical position when it closes seat **20**. Due to the fact that the bottom of valve **21** is of a spherical shape, it is immaterial whether the valve completely rights itself and this limited freedom for the valve without lateral control has been found very effective in preventing leakage.

The present construction is inexpensive to manufacture and may be readily installed without the necessity for using tools or other equipment, in any water closet. It is extremely effective in operation and in preventing leakage.

Having thus described my invention, I claim:

1. In a flush tank having a flush valve seat, an overflow pipe adjacent said seat, and a lever for actuating a flush valve to rapidly lower the level of liquid in the tank, a valve assembly comprising: a hollow valve guide positioned above the valve seat, a buoyant tiltable valve loosely contained in said guide, a flexible connection between the valve and the lever, and the inside diameter of the guide with respect to the diameter of the valve being sufficiently great to permit the valve to turn over in the guide and to rise quickly past the flexible connection to the surface of the liquid when the valve is unseated.

2. In a flush tank having a flush valve seat, an overflow pipe adjacent said seat, and a lever for actuating a flush valve, the combination that comprises: a free floating hollow resilient valve, a flexible connection between the valve and the lever whereby the valve is raised from the seat by operation of the lever and whereby the valve is permitted to quickly rise to the surface of water in the tank and to float inverted on the surface without hindrance from the flexible connection, and a hollow cylindrical valve guide supported on the overflow pipe in which the valve rises and falls vertically, the diameter of the guide being sufficiently great to eliminate any interference with the free floating and turning of the valve as it rises and falls.

3. In a flush tank having a flush valve seat, an overflow pipe adjacent said seat, and a lever for actuating a flush valve, the combination that comprises: a free floating hollow resilient valve, a flexible connection between the valve and the lever whereby the valve is raised from the seat by operation of the lever and whereby the valve is permitted to quickly rise to the surface of water in the tank and to float inverted on the surface without hindrance from the flexible connection, a hollow cylindrical valve guide supported on the overflow pipe in which the valve rises and falls vertically, the diameter of the guide being sufficiently great to eliminate any interference with the free floating and turning of the valve as it rises and falls, an abutment on the upper end of said guide for limiting the downward travel of the lever, and at least one helical spring loop secured to the guide and surrounding the overflow pipe whereby the guide may be adjusted vertically to vary the slack in the flexible connection.

4. For a flush tank having a valve seat defining a water outlet from the tank and a vertical overflow pipe adjacent thereto together with a valve actuating lever disposed above said valve seat; valve and guide apparatus comprising a free floating hollow resilient valve element constructed to engage the valve seat and close the water outlet, said valve element being operable upon disengagement from the valve seat to turn upside down and rise to the surface of the water in the tank and float thereon as said water flows out of the tank through said outlet, a flexible member connected to the valve element and adapted to be connected to the actuating lever, said flexible member having a length operable to disengage the valve element from the valve seat upon actuation of the lever and operable as the water empties from the tank and the valve element approaches the valve seat to turn the valve element substantially rightside up in position to engage the valve seat, and a cylindrical sleeve adapted to be mounted substantially in alignment with said valve seat, said sleeve constituting a friction-free guide for the valve element and having a diameter slightly greater than the valve element to provide clearance for said element to turn upside down and then rightside up as said element moves upwardly and downwardly within the sleeve adjacent the flexible member.

OTTO STADER.

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