

Feb. 23, 1960

P. J. GRESHAM
FLUSH TANK VALVE

2,925,608

Filed Oct. 17, 1957

2 Sheets-Sheet 1

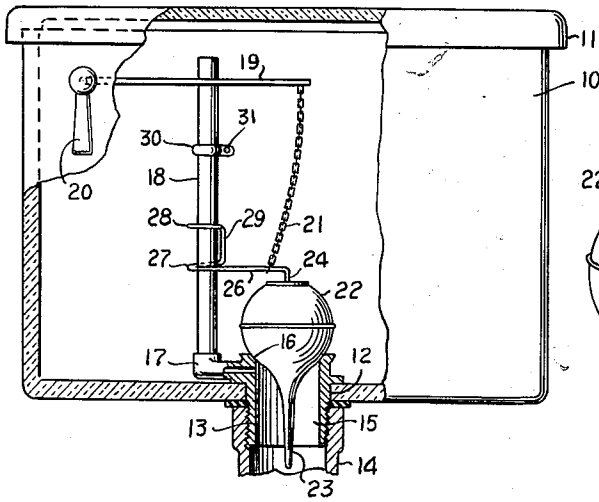


Fig. 1

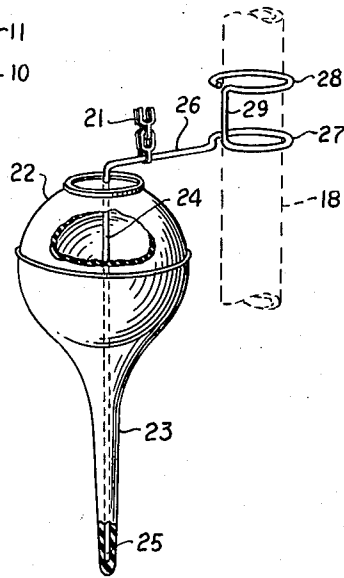


Fig. 2

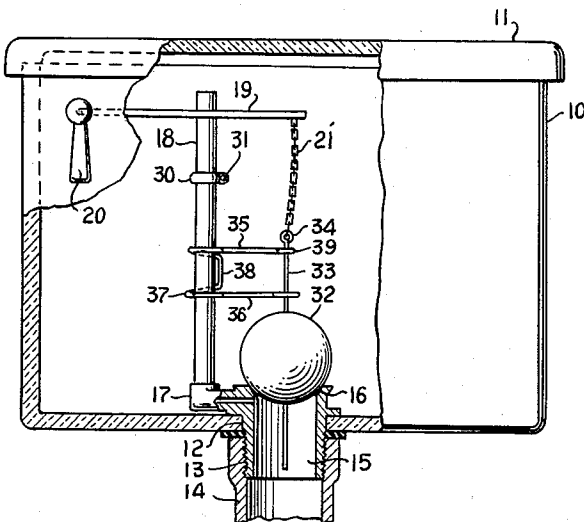


Fig. 3

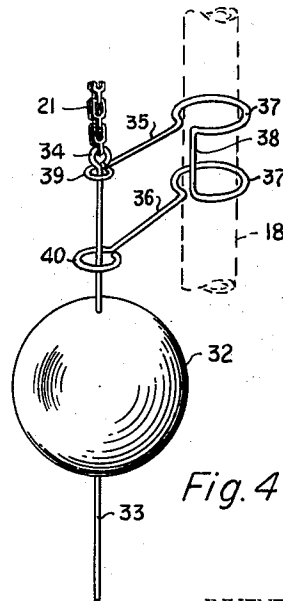


Fig. 4

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2 Sheets-Sheet 2

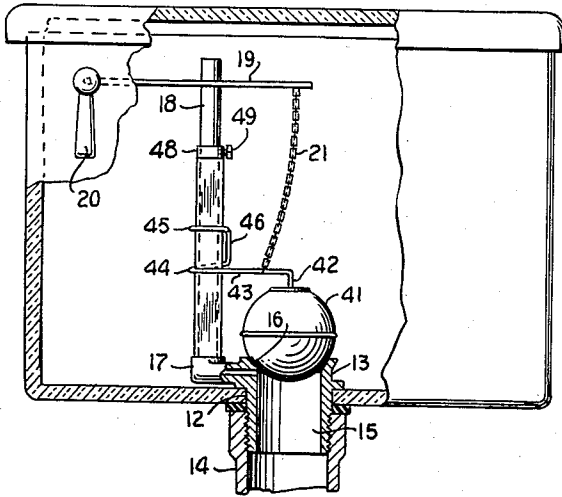


Fig. 5

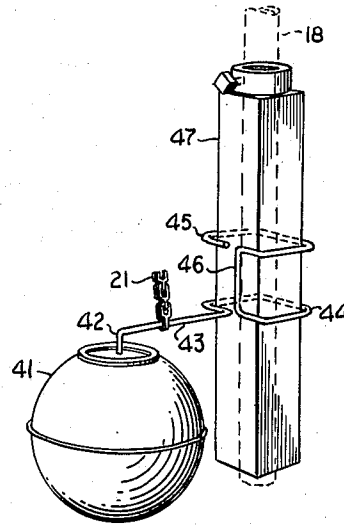


Fig. 6

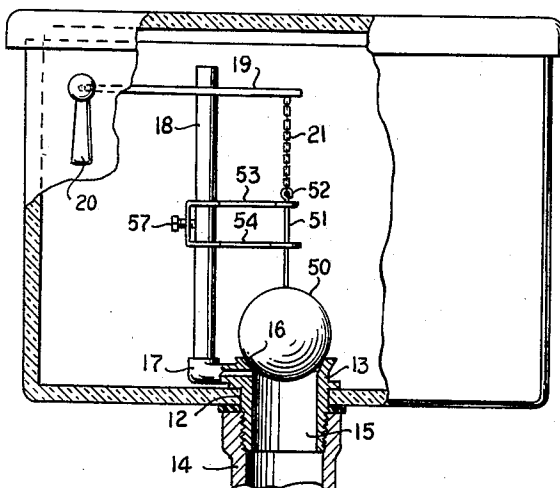


Fig. 7

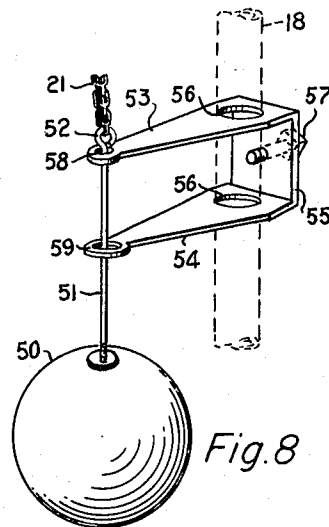


Fig. 8

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2,925,608

FLUSH TANK VALVE

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2 Claims. (Cl. 4—57)

This invention relates to new and useful improvements in flush tank valves.

One object of the invention is to provide an improved valve for a flush tank which is of economical, efficient construction and of such arrangement that the valve is positively guided into seating engagement with an outlet opening upon emptying of the tank.

Another object of the invention is to provide an improved flush tank valve which is slidably supported for reciprocal movement relative to its seat and which has coaxing means for guiding the valve toward the seat and maintaining said valve in position for sealing engagement with said seat.

A further object of the invention is to provide an improved flush tank valve, of the character described, which includes means depending from the valve through the seat and into the outlet opening and means for limiting upward movement of said valve to maintain the depending means in the opening and guide said valve into sealing position.

Still another object of the invention is to provide an improved flush tank valve, of the character described, which includes guide means for maintaining the valve in axial alignment with the outlet opening to insure positive sealing engagement of the valve.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, wherein examples of the invention are shown, and wherein:

Fig. 1 is a longitudinal, vertical, sectional view, partly in elevation, of a flush tank having a valve constructed and mounted in accordance with the invention,

Fig. 2 is an enlarged, perspective view of the valve,

Fig. 3 is a view, similar to Fig. 1, showing a modified valve,

Fig. 4 is an enlarged, perspective view of the modified valve,

Fig. 5 is a view, similar to Fig. 1, showing a modified valve mounting,

Fig. 6 is an enlarged, perspective view of the valve mounting of Fig. 5,

Fig. 7 is a view, similar to Fig. 1, showing another valve mounting, and

Fig. 8 is an enlarged, perspective view of the valve mounting of Fig. 7.

In the drawings, the numeral 10 designates a flush tank having a removable lid 11 for closing its upper end and an outlet opening 12 in its bottom for receiving a drain fitting 13 which connects a discharge pipe 14 to the tank. The drain fitting 13 is conventional and has a large bore or opening 15 with an annular seat 16 surrounding its upper end and spaced from the bottom of the tank. A hollow extension 17 extends laterally from the upper portion of the fitting for supporting an upright, overflow pipe 18 in communication with the bore 15 between

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the tank bottom and the seat 16. The tank includes an operating arm or lever 19 having an external handle 20 at one end with a chain 21 depending from its opposite end portion.

For controlling the discharge of water through the outlet opening 12, a hollow or buoyant valve ball 22, of rubber or suitable material, is adapted to sealingly engage the annular seat 16 of the drain fitting 13 and is suspended from the lower end of the chain 21. The valve ball 22 is substantially spherical and has an elongated, axial extension 23, which is of reduced diameter and tapered, depending from its underside to provide a guide element therefor (Figs. 1 and 2). An upright, axial rod or stem 24 extends through the valve ball and its depending extension 23, terminating adjacent the lower end of said extension as shown by the numeral 25 in Fig. 2, whereby said extension is reinforced and of greater rigidity than said ball. The upper end of the stem 24 projects from the valve ball and is bent laterally at substantially a right angle to provide a horizontal guide member 26, to which the lower end of the chain 21 is slidably connected. A pair of annular loops or rings 27 and 28 are formed on the outer end of the guide member 26 by bending said member upon itself. The rings 27 and 28 are disposed in spaced, vertical alignment by an upright connecting portion 29 and are of greater diameter than the overflow tube 18 for slidable engagement thereupon, the diameter of said rings being sufficiently greater to permit limited lateral movement of the valve ball. A stop collar 30 is clamped on the upper portion of the tube by means of a screw 31 for engagement by the upper ring 28 to limit upward movement of the guide member and valve ball.

Upon manipulation of the handle 20 and counter-clockwise pivoting of the lever 19, the valve ball 22 is lifted out of engagement with the seat 16 by the chain 21. The guide member 26 and its rings 27 and 28 slide upwardly on the overflow tube 18 without interfering with the raising of the valve ball. Although the valve ball and guide member are freely rotatable relative to the overflow tube and may undergo limited lateral movement, the collar is positioned so as to be engaged by the upper ring 28 before the guide element or ball extension 23 moves out of the bore 15 of the fitting 13. As a result, the valve ball is maintained in overlying relation to the seat 16 and is directed into engagement therewith by its guide element or extension upon substantially emptying of the tank. The guide member 26 coacts with the extension and supports the valve ball in an upright position so that its movement is substantially vertical or axially of the bore 15.

A modified valve is shown in Figs. 3 and 4 and includes a hollow, spherical ball 32 of rubber or other suitable material. An upright rod or stem 33 extends axially through the valve ball 32 for projection thereabove and therebelow. The upper end of the stem 33 has an eye 31 for pivotal connection with the lower end of the chain 21, while the lower end of said stem depends within the bore 15 of the outlet fitting 13 to provide a guide element similar to the ball extension 23. A guide member 35 slidably connects the upper portion of the stem to the overflow tube 18 and includes a pair of superimposed, horizontal arms or legs 36. An annular loop or ring 37, similar to the rings 27 and 28, is formed on the inner end of each arm 36 by bending the member 35 upon itself. The rings 37 are connected to and spaced from each other by upright portion 38 of the member which is disposed between said rings and which is similar to the portion 29 of the guide member 26. An annular loop or ring 39 is formed on the free or outer end of the upper arm for encircling the stem 33, while the lower arm has an axially aligned loop or ring 40 of

somewhat greater diameter for permitting limited pivotal or swinging movement of the valve ball 32 and stem 33 relative to the guide member. Disengagement of the lower portion of the stem from the bore 15 of the outlet fitting 13 is prevented by engagement of the upper ring 37 with the stop 30 whereby the valve ball is maintained in overlying relation to said bore. Manifestly, the modified valve functions in substantially the same manner as the valve ball.

Another modification is shown in Figs. 5 and 6 and includes a hollow, spherical valve ball 41 similar to the valve ball 32. Instead of the stem 33, the valve ball 41 includes an axial rod or stem 42 which is bent laterally upon itself to provide a horizontal, guide member 43, similar to the guide member 26, and slidably connected to the chain 21. Axially alined, spaced loops or rings 44 and 45 are formed on the free or outer end of the guide member 43 and are connected by an upright portion 46 of said member. It is noted that the loops 44 and 45 are polygonal or square for slidable engagement upon a polygonal or square sleeve 47 which is confined upon the overflow tube 18 between the lateral extension 17 of the fitting 13 and a clamp collar 48 which is similar to the collar 30 and has a similar screw 49. Due to the polygonal shape of the loops and sleeve, the guide member 43 is adapted to maintain the valve ball 41 in axial alinement with the bore 15 of the drain fitting 13 so as to insure positive sealing engagement of said valve ball with the seat 16.

A further modification is shown in Figs. 7 and 8 and includes a hollow, spherical valve ball 50 similar to the valve balls 32 and 42. An axial, upright rod or stem 51 is screw-threaded in the upper surface of the valve ball 50 and has an eye 52 at its upper end for pivotal connection with the lower end of the chain 21. For maintaining the valve ball in axial alinement with the bore 15 of the drain fitting 13, a guide member or yoke 53 is provided and includes a pair of horizontal, spaced arms or legs 54 which are connected at one end by an upright web 55. Each arm 54 has a circular opening 56 adjacent the web 55 for slidable engagement with the overflow tube 18. A suitable screw 57 extends through the web for engagement with the tube to secure the guide member in adjusted positions. The outer end of the upper arm has a circular opening for slidably receiving the stem 51, while an opening 59 of somewhat larger diameter is formed in the outer end of the lower arm to permit limited pivotal or swinging movement of said stem relative to the guide member. Except for its screw 57, the guide member 53 is very similar to the guide member 35.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

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

1. In a flush tank having an outlet opening in its bottom and an upright overflow tube, a valve ball for seating engagement with the outlet opening, means for lifting the valve ball out of engagement with the opening, a horizontal guide member having connection at one end with said valve ball for directing the same into engagement with the outlet opening, a pair of alined spaced rings on the other end of the member slidably engaged on the overflow tube at spaced points whereby said member and valve ball are supported for upright reciprocal movement, said valve ball having an axial reduced extension depending into the outlet opening, and means on the tube for limiting upward movement of said member so as to maintain the depending extension in the opening for substantially centering said valve ball relative to the opening.

2. In a flush tank having an outlet opening in its bottom and an upright overflow tube, a valve ball for seating engagement with the outlet opening, means for lifting the valve ball out of engagement with the opening, a stem upstanding from said valve ball, a horizontal guide member having one end connected to the stem for directing said valve ball into engagement with the outlet opening, a pair of alined spaced rings on the other end of the member slidably engaged on the overflow tube at spaced points whereby said member and valve ball are supported for upright reciprocal movement, said valve ball having an axial reduced extension depending into the opening, and means on the tube for limiting upward movement of said member so as to maintain the depending extension in the opening for substantially centering said valve ball relative to the opening.

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