

Feb. 16, 1954

H. BARRETT-LENNARD

2,668,960

VALVE ARRANGEMENT FOR FLUSH TANKS

Filed April 13, 1951

Fig. 1

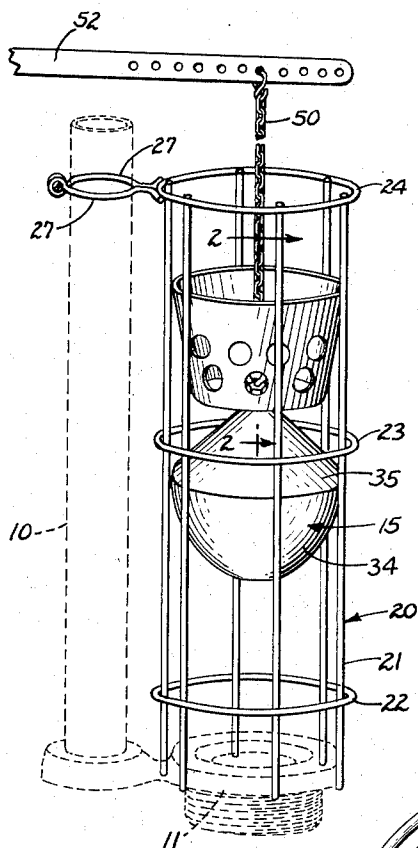


Fig. 2

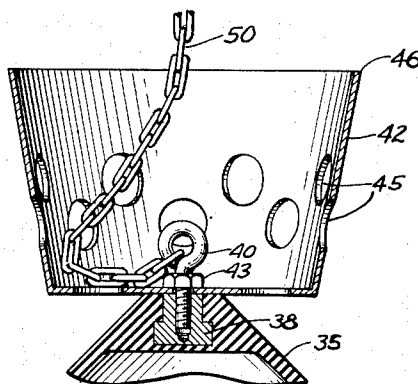
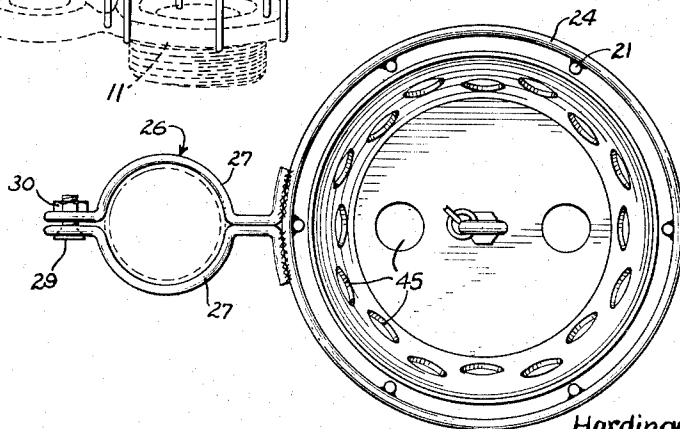


Fig. 3



INVENTOR.
Hardinge Barrett-Lennard
BY *Warwick Specter*
att'y.

UNITED STATES PATENT OFFICE

2,668,960

VALVE ARRANGEMENT FOR FLUSH TANKS

Hardinge Barrett-Lennard, Lyons, III.

Application April 13, 1951, Serial No. 220,900

5 Claims. (Cl. 4-57)

1

This invention relates to outlet valves for flush tanks, particularly to flush valves of the type that are kept closed by the head of water above a tank ball which, when raised to permit a comparatively small opening of the valve, will float upwardly in the water to leave the valve fully open and, as the tank empties and the water level drops, the tank ball again reseats on the valve seat or spud to close the valve, and remains seated thereon as the tank is refilled. This is a conventional type of valve used in flush tanks for water closets.

Tank balls for valves of the above type are generally provided with a wire lift rod that extends upwardly therefrom, and with a guide for the rod to guide it in its vertical movement, with the intent that the flush ball upon descending as the water level drops will always land in seating position on the valve seat. The usual wire lift does not always accomplish this result. Sometimes it binds and thereby holds the flush tank ball in elevated position. At other times it skews angularly so that the tank ball descends to a position slightly displaced from its proper valve seating position. It is an object of the present invention to provide a guiding means for the tank ball which will assure proper guidance of the tank ball at all times. In accordance with the principles of the present invention the guide is provided in the form of an open cylindrical frame or cage that consists of a number of vertical wires held together by a series of spacer wire rings. The cage is positioned vertically above and around the closet valve seat, and the tank ball is freely movable vertically within the cage. In order to keep the tank ball in proper vertical position there is provided a light-weight guide that is secured to the top of the tank ball and is guided within the cage or cylindrical frame to prevent tilting of the tank ball with respect to its normal proper vertical axis or with respect to the vertical axis of the cage. The guide consists of a perforated cup-shaped member that extends upwardly from and is secured to the tank ball and is of a diameter at its upper end only slightly less than the internal diameter of the cage or cylindrical frame so that it is freely slidable within the cage, but together with the ball forms a unitary structure which is of a height considerably greater than the diameter of the cage whereby that structure cannot tilt an appreciable amount. In normal use the tank is flushed by raising the tank ball, which is accomplished by a pivoted upward lever that is connected to the ball by a chain or other flexible pull. As the ball rises the chain becomes

2

slack, and the bottom of the chain accumulates in the cup-shaped guide member, whereby the chain does not become entangled with or interfere with the rise or fall of the tank ball.

It is a further object of the present invention to provide a valve guide structure that may be easily and quickly secured to the overflow tube of conventional closet flush tanks and thereby be held in proper position around and extending upwardly from the spud of the valve outlet of the closet tank.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

Figure 1 is a perspective view of the valve of the present invention;

Figure 2 is a longitudinal sectional view through the tank ball and ball guide member; and

Figure 3 is a top view of the valve of Figure 1.

Reference may now be had more particularly to the drawing wherein like reference numerals designate like parts throughout.

In Figure 1 of the drawing there is shown, in dotted lines, a part of a conventional toilet flush tank including the usual overflow tube 10 and a circular closet valve spud 11 which terminates at its top in a valve spud gasket that provides a seat for a conventional hollow rubber tank ball 15, which when seated closes the valve and when lifted off of its seat opens the valve.

In accordance with the principles of the present invention there is provided a wire guide frame 20 for guiding the tank ball 15 in its vertical movement. In this instance the frame 20 consists of six identical vertical wires 21 held in assembly by three wire rings 22-23-24 to which they are welded. The rings are on the outside of the vertical wires which are uniformly spaced apart, in this instance 60°. All six wires 21 are of the same length and parallel to one another and at right angles to the planes of the rings 22-23-24. The six wires are adapted to straddle the closet valve spud 11 and be supported either by the valve spud or rest on the flush tank. The upper wire ring 24 has a wire supporting clip 26 secured thereto. The supporting clip consists of two similarly bent wires 27 each of which is welded to the ring 24 and curved to embrace the overflow tube 10 and then bent to provide eyelets for receiving a screw 29 that threads into a nut 30 to draw the two bent members 27-27 tightly together around the overflow tube 10. This firmly supports the top of the guide frame

20 in position with its vertical axis in line with the center of the opening in the closet valve spud 11.

The flush ball 15 is a conventional closet tank flush ball and comprises a unitary hollow rubber body hemispherical at the bottom half 34 and frusto-conical at the top half 35 and open at the bottom. The top half has an internally threaded metal insert 38 therein, as is conventional, which in the conventional flush ball structure receives the threaded end of a conventional lift wire. In lieu of the lift wire there is threaded into the insert 38 the threaded shank of an eye hook 40 that passes through the base of a cup-shaped metal member 42 on top of the tank ball 15. A lock nut 43 threaded on the shank of the eye hook 40 locks the cup member to the ball and serves also as a lock nut to lock the eye member 40 from becoming loose. The member 42 has a series of holes 45 therein. The wall of the cup-shaped member is outwardly flared so that at its top 46 it is of an external diameter only slightly less than the diameter of the maximum sized circle that can be circumscribed within the frame 20 between the vertical wires 21. The maximum diameter of the tank ball 15 is of approximately the same diameter as that of the top 46 of the cup member 42. Since the ball and the ball member 40 are secured together with their vertical axes coincident, it is clear that the assembly of the ball 15 and the member 42 is guided within the wire frame by the vertical wires 21, and is free to move up and down within that frame 20. The longitudinal axis of the assembly of the members 15 and 42 cannot tilt but remains always parallel and substantially coincident with the longitudinal axis of the frame 20.

A ball chain or flexible cord 50 is connected at its lower end to the eye 40 and is connected at its upper end to a conventional actuating lever 52. When the lever 52 is in its lowermost position it permits the chain of the flush tank to drop into its conventional valve closing position. As the ball drops it is guided by the wire frame 20 so that it always seats perfectly upon the closet valve spud. When the lever 52 is raised a very small amount it pulls upwardly on the eye 40, thus lifting the tank ball from the valve seat 11 to permit flushing of the closet. As soon as the ball 15 has been lifted a predetermined distance above the valve seat 11 the ball 15 floats upwardly in the water of the closet to a position adjacent to the top of the guide frame 20, which top 24 may be above the water level in the closet, or a stop may be provided to limit the rise of the ball 15. During this rising action the chain 50 becomes slack and gathers within the cup-shaped ball cap member 42. As the water level in the closet drops the ball 15 drops with it, being guided by the wires 21, until the ball again seats on the closet ball spud. At this time the slack in the chain is taken up from within the cup 42.

While I have herein shown the present invention as applied to a conventional water closet, it is, of course, to be understood that the invention is not thus limited since it is equally applicable to other types of valves wherein a floatable rubber ball is maintained in its valve closed position on a valve seat or the like by the hydrostatic pressure exerted thereagainst, and wherein a predetermined lifting of the ball results in opening of the valve which then floats away from the valve seat, whereby the valve remains open

until the liquid level has dropped sufficiently to result in automatic reseating of the valve ball.

In compliance with the requirements of the patent statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative of the principles of the invention. What I consider new and desire to secure by Letters Patent is:

1. In combination, an open cylindrical frame for guiding a floating type ball valve, said frame comprising a number of vertical wires and spaced apart rings surrounding the wires and holding them in assembly, a ball valve freely movable vertically within the frame and guided in its vertical movement by the frame, ball tilt preventing means secured to the top of the ball for holding it upright, said tilt preventing means being movable within and guided by the frame to hold the ball valve against tilting, and a flexible cord type pull member secured to the ball and tilt preventing means assembly for raising it, said means for preventing tilting of the ball valve being cup-shaped and said pull member extending upwardly from the bottom of the cup whereby upon rising of the tank ball the cup acts as a receptacle for slack produced in the flexible pull member and prevents entanglement of the pull member with the rings.

2. In combination, an open cylindrical frame for guiding a tank valve ball and adapted to be mounted with its longitudinal axis vertical, a tank valve ball freely movable vertically within the frame and guided in its vertical movement by the frame, means secured to the top of the tank ball for holding it upright, said means being movable within and guided by the frame for preventing tilting of the valve ball, and a flexible cord type pull member secured to the assembly of the ball and guide member for raising it, said tank ball guide member being cup-shaped and said pull member extending upwardly from the bottom of the cup whereby upon rising of the tank ball the said means acts as a receptacle for slack produced in the flexible pull member thereby preventing tangling of the flexible member with the frame.

3. In combination, an open cylindrical frame for guiding a flush tank ball, said frame having means for securing it to the flush valve overflow tube of a closet flush tank and holding it in position extending vertically upwardly from the closet spud of the flush tank valve, a tank ball freely movable vertically within the frame and guided in its vertical movement by the frame, a tank ball tilt preventing member secured to the top of the tank ball for holding it upright, said member being movable within and guided by the frame, and a flexible cord type pull member secured to the assembly of the ball and ball tilt preventing member for raising it, said tank ball tilt preventing member being cup-shaped and said pull member extending upwardly from the bottom of the cup whereby upon rising of the tank ball the member acts as a receptacle for slack produced in the flexible pull member.

4. In combination, a flush tank valve having a closet spud including a seat for a tank ball and an overflow tube adjacent to the spud, an open frame for guiding a tank ball, said frame comprising spaced apart vertical wires secured together by vertically spaced rings and having means for securing it to the flush valve overflow tube and holding it in position extending vertically upwardly from the closet spud, a tank ball freely movable

5

vertically within the frame and guided in its vertical movement by the frame, and means for preventing tilting of the valve comprising a cup-shaped member secured to the top of the tank ball and extending upwardly therefrom and movable within and guided by the frame, and a flexible cord type pull member secured to the assembly of the ball and cup-shaped member for raising it, said pull member extending upwardly from the bottom of the cup whereby upon rising of the tank ball the cup-shaped member acts as a receptacle for slack produced in the flexible pull member and prevents entanglement of the pull member with the vertically spaced rings.

5. In combination, a perforated cylindrical frame for guiding a floating type ball valve, said frame having means for securing it to the flush valve overflow tube of a closet flush tank and holding it in position extending vertically upwardly from the closet apud of the flush tank valve, a ball valve freely movable vertically within the frame and guided in its vertical movement by the frame, a ball valve tilt preventing member secured to the top of the ball valve for holding it upright, said member being movable within and

6

guided by the frame, and a flexible cord type pull member secured to the assembly of the ball valve and ball valve tilt preventing member for raising it, said ball valve tilt preventing member being an open top, cup-shaped member and having perforations in the walls thereof to provide passageways for the flow of fluid therefrom, and said pull member extending upwardly from the bottom of the cup whereby upon the rising of the tank ball the member acts as a receptacle for slack produced in the flexible pull member.

HARDINGE BARRETT-LENNARD.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,334,136	Delany	Mar. 16, 1920
1,396,133	Libbey	Nov. 8, 1921
2,113,205	Winkelspecht	Apr. 5, 1938
2,121,362	Marten	June 21, 1938
2,214,439	Robertson	Sept. 10, 1940
2,260,078	Kurkjian	Oct. 21, 1941
2,328,701	Woodrum	Sept. 7, 1943