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J. F. LENGYEL ET AL
 DELAYED ACTION DRAIN VALVE

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Fig. 1

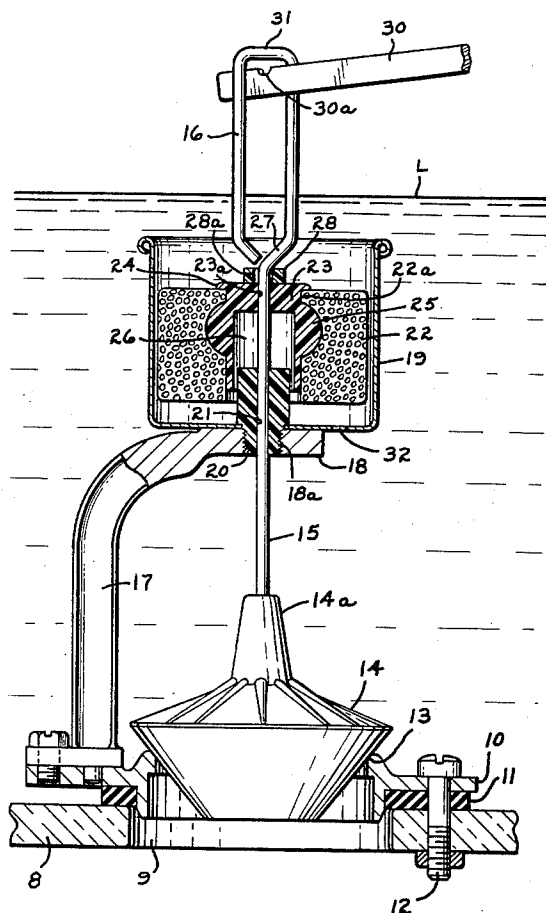
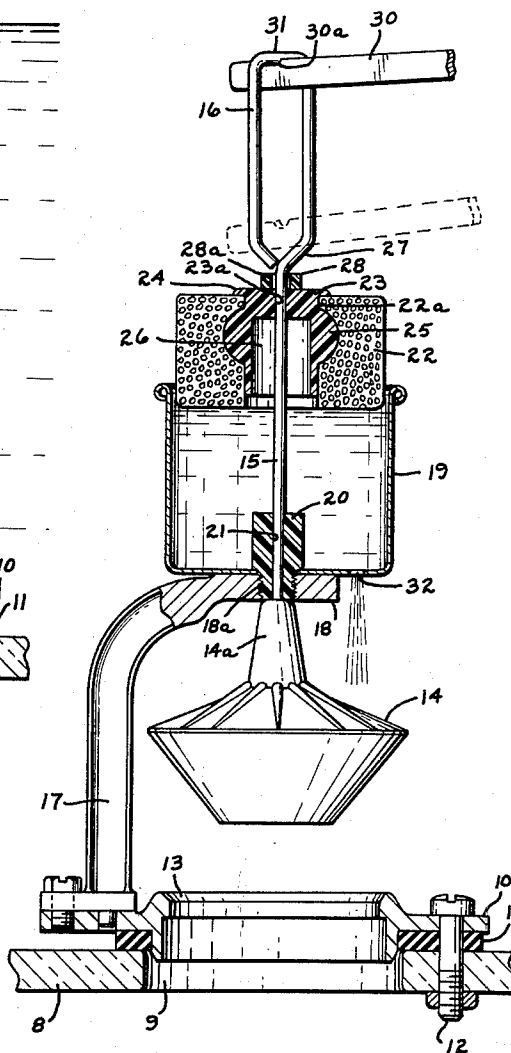


Fig. 2



INVENTORS
 John F. Lengyel
 Edward H. Barlow
 By *H. F. Johnston*
 ATTORNEY

1

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DELAYED ACTION DRAIN VALVE

John F. Lengyel, Cheshire, and Edward H. Barlow, Waterbury, Conn., assignors to Scovill Manufacturing Company, Waterbury, Conn., a corporation of Connecticut
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7 Claims. (Cl. 4—56)

This invention relates to toilet flush tanks and particularly to a delayed action flush valve.

In the practice of draining water from a storage tank for flushing purposes, it is customary to have a ball float outlet valve that immediately rises to a floating position on the water surface when the valve is lifted from its seat and then descends with the water level. Because of the suction force of the drain water on the outlet valve, it will always cause said valve to be drawn back into its seat long before the tank is fully exhausted, and leaving from two to three inches of water in the bottom of the tank above the drain outlet.

It is the purpose of this invention to provide a device that is not affected by the dropping level of the tank fluid and one which will hold the outlet valve in an elevated position until the tank is completely exhausted before the valve is returned to its shut-off position, and allow a sufficient flow of water into the toilet bowl for an odor seal.

One of the objects of the invention is to provide an improved float for holding the outlet valve in elevated position with a delayed action during the period the storage tank is being drained.

Another object is to provide an improved lift rod for the shut-off valve that operates independently of, and is not affected by the weight of the trip lever.

A further object is to combine a ball float valve and a float member on a common stem that together serve to hold a ball float valve in open position against a stop at a considerable distance below the water level, making use of the buoyant features of both the float and ball valve to hold the latter in elevated position coincident with the discharge of the flushing water.

Other objects and advantages will be apparent from the following description and accompanying drawing in which:

FIG. 1 is an elevational sectional view of a delayed action outlet valve embodying our invention, showing the valve in closed position; and

FIG. 2 is a similar view showing the valve in open position.

Referring now to the drawing, the numeral 8 designates the bottom of a flush tank (only a portion of which is shown) that has the usual drain opening 9 therein. The flange member 10 is mounted on the tank base in line with the opening 9 with a sealing ring 11 interposed therebetween and held in place by screws 12. The flange member 10 is formed with a valve seat 13 which is closed by a closure or outlet valve 14 which is here shown as a conventional ball float valve. The closure valve 14 is formed with an upward embossment 14a to which is attached a lift stem or rod 15 having an elongated eye 16 formed at its upper end.

The mechanism employed to delay the return sealing action of the closure valve 14 consists of an upright arm 17 attached to the flange member 10. The upper end of the arm 17 is bent inwardly and terminates in a platform base 18 having a tapped opening 18a in axial alignment with the axis of the drain opening 9. Supported on the base 18 is a cup-shaped float bowl 19 which is held in place by a stud bushing 20 threaded into the tapped opening 18a. The stud bushing 20 extends a considerable distance upwardly within the bowl 19 and has a central opening 21 through which the lift stem 15 passes in a free

2

sliding fit to assure an adequate bearing surface for the lift stem to prevent any abnormal tilting action of the closure valve 14.

A float 22 is provided in the form of a relatively thick cylindrical disc of cellular material, preferably made of "Styrofoam," a trade name for expanded polystyrene marketed by Dow Chemical Company. This material has the advantage of being very economical to produce and is a cellular material which will not become water logged, thereby assuring efficient operation over a long period of time.

The float 22 is of such a size to substantially fill the transverse inner diameter of the bowl 19 and is centralized within the bowl by a float bushing 23 fitted within a through opening 22a in said float, and formed with a flange 24 resting against the top surface thereof. The bushing 23 is provided with a pair of opposed radial wings 25 embedded within the float material to prevent relative twisting and axial separation of the parts. The float bushing 23 is formed with a central cavity 26 for loosely fitting over the stud 20 as shown in FIG. 1 when the ball valve is in closed position. The upper end of the bushing 23 has a central bearing opening 23a likewise having a free sliding fit on the lift stem 15 similar to the stud bushing 20.

It is to be noted that the lift stem 15 is joined to the elongated eye 16 by an upwardly inclined angled section 27. The fact that the bearing opening 23a in the bushing 23 has only a sliding fit on the lift stem 15 might cause the bushing to abut against the angled section 27 with sufficient force to become jammed and lodged thereagainst. To prevent this jamming, an abutment washer 28 is provided that normally rests on top of the bushing 23. The washer 28 has a central opening 28a somewhat larger than the opening in the bushing 23 and sufficiently large to prevent any danger of jamming at the angled section 27. The stud bushing 20, float bushing 23 and washer 28 are preferably made of plastic material such as Delrin, which is non-corrosive and non-absorbent to water, affords a lighter construction as to weight, and is more economical to produce. The float 22 (with its bushing 23 and non-jamming washer 28) in its normal buoyant state abuts upwardly against the angled section 27 of the lift stem or rod 15 as a stop.

The operation of the outlet valve 14 is initiated by an operating lever 30 which projects through the elongated eye 16, and is formed with a recess 30a in its upper surface that is adapted to engage the upper cross bar 31 of said eye.

In operating the valve, the valve mechanism will normally be in the state shown in FIG. 1, with the outlet valve 14 seated and the float 22 elevated as far as it can go within the bowl 19 as determined by the washer 28 abutting against the angled section 27. The water lever in the tank 8 is normally a short distance above the top of the bowl 19 as indicated by the water surface level L. When the lever 30 is lifted, the outlet valve 14, due to its buoyancy and that of the float 22, will immediately rise upwardly to its full limit as determined by the embossment 14a abutting against the underside of the platform base 18, as best seen in FIG. 2, and permit the tank water to flow out through the valve seat 13 and tank opening 9. As soon as the lever 30 is released, it will drop to the dotted line position shown in FIG. 2. The water will quickly drain out of the tank and drop the water level within the tank to the plane of the valve seat. The float 22 will permit the closure valve to drop slowly due to the fact that it is supported by the water within the bowl 19 which is exhausted therefrom through a relatively small drain opening 32 provided in the base of said bowl.

During the period that the valve is slowly returning to its closed position, the water that is flowing into the tank

3

will overflow the valve seat 13 and replenish the toilet bowl to an odor sealing height.

It is to be noted that because of the elongated eye 16 of the lift stem 15, the operating lever 30 can freely drop within the eye immediately after the tripping operation, and in no way is the weight of said lever imposed upon the lift stem 15.

One form of the invention is presented herein for the purpose of exemplification, but it will be appreciated that the invention is susceptible of other structural modified forms coming equally within the scope of the appended claims.

What we claim is:

1. An outlet valve mechanism for drain openings of flush tanks and the like, having in combination a ball float valve, a reservoir bowl held in elevated position in axial alignment with said drain opening and having a small drain opening in its base, a float operating within said bowl, a lift rod attached to said float valve and having a slidable connection with said float, a stop on said rod against which said float in its upward buoyant state normally abuts, and a stop on said bowl limiting the upward movement of said ball float valve during the flushing operation, the buoyancy factor of both the float and ball valve serving to hold the latter in elevated position against the downward drag force of the water passing through the tank drain opening during the flushing cycle.

2. An outlet valve mechanism as defined in claim 1 wherein a stud bushing is provided in the base of said bowl and another guide bushing is provided in said float through which said rod passes for maintaining said ball valve and float in axial alignment.

3. An outlet valve mechanism as defined in claim 2 wherein said stud bushing extends a considerable distance up into said bowl and said stud bushing and guide bushing have means to permit telescopic relation to each other when the float is located in the base of said bowl.

4. An outlet valve mechanism as defined in claim 2 wherein the float is a cellular material and the guide bushing has means for interlocking connection in the cellular material.

4

5. A flush valve unit for controlling the outlet flow through a drain opening in a storage tank, said valve unit comprising a flange member having a valve seat associated with said opening, a supplemental storage bowl open at its top and having a small drain opening in its base, means mounting said bowl in elevated position in said tank in axial alignment with said opening, a stud bushing securing said bowl to said mounting means and extending upwardly in said bowl, a ball float valve for closing said valve seat, a lift rod attached to said valve and passing through said stud bushing in vertically guided relationship, a float operating in said bowl, a guide bushing carried by said float and having slidable bearing connection on said rod, said guide bushing having a chamber opening through its lower end and adapted to loosely fit over the stud bushing when the float is disposed adjacent the base of said bowl, and a stop means on said stem limiting the upward movement of said float and serving to lift said stem and ball valve when the latter is tripped for flushing purposes.

6. A flush valve unit as defined in claim 5 wherein the lift rod is formed with an elongated eye at its upper end joined to said rod by an angled section serving as the stop means for the upward movement of said float on said stem.

7. A flush valve unit as defined in claim 6 wherein a supplemental anti-binding washer is carried by said lift rod and disposed between said rod angled section and float guide bushing.

References Cited in the file of this patent

UNITED STATES PATENTS

1,225,278	Schulte	May 8, 1917
1,304,432	Williamson	May 20, 1919
1,895,786	Cobb	Jan. 31, 1933
2,527,909	Bowers	Oct. 31, 1950
2,740,129	Braswell	Apr. 3, 1956
2,908,018	Petrie	Oct. 13, 1959