

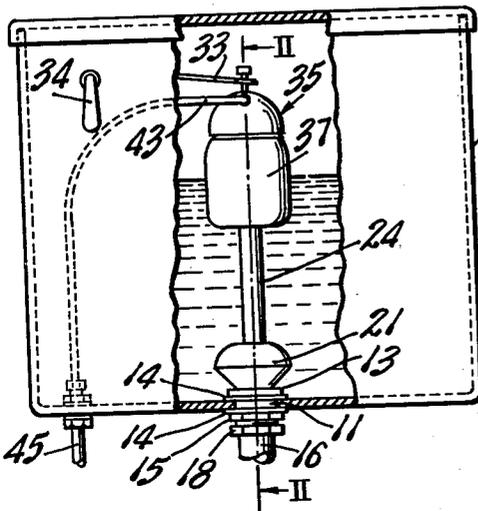
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L. M. BOWERS

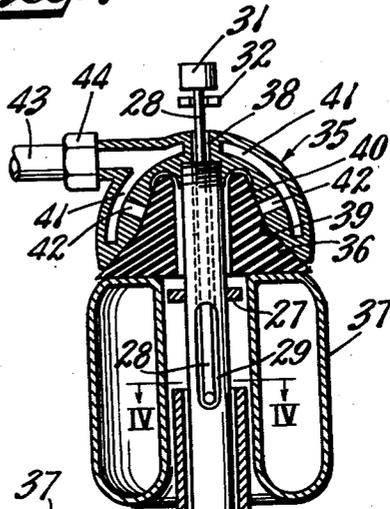
2,527,909

UNITARY VALVE ASSEMBLY FOR FLUSH TANKS

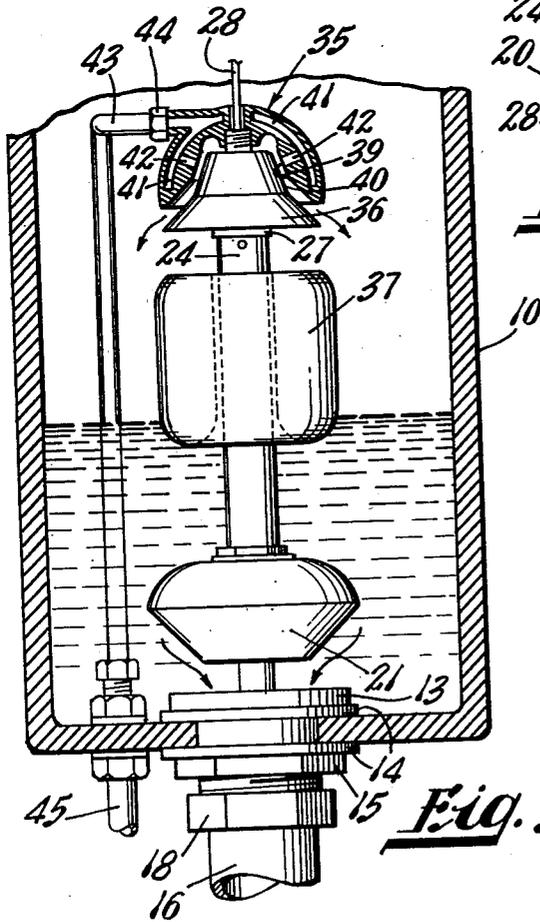
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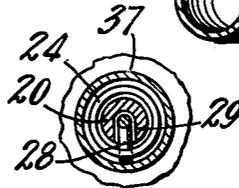
*Fig. 1*



*Fig. 2*



*Fig. 3*



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## UNITARY VALVE ASSEMBLY FOR FLUSH TANKS

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6 Claims. (Cl. 4-41)

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This invention relates to valves for flush tanks, such as are in common use on water closets and other devices, in which the tank is rapidly emptied through a relatively large flush valve, and refilled from a source of pressure water, under control of a float valve.

An object of the invention is to simplify the installation of valve structures in a flush tank.

A more specific object is to combine both the float valve and the flush valve into a single simple assembly having a single point of anchorage to the tank.

Another object is to eliminate the usual float lever arm that has heretofore been considered an essential component of a flush tank float valve.

Other more specific objects and features of the invention will appear from the description to follow:

Briefly, in accordance with the present invention, both the flushing valve and the inlet valve are supported on a single vertical guide that is anchored at its lower end to the flush valve seat. The guide slidably supports the flushing valve for vertical movement toward and away from its seat, and it also slidably supports the inlet valve and the float that controls the inlet valve. The necessity of the usual lever system between the float and the inlet valve is eliminated, in accordance with the invention, by providing conical faces on the valve and seat, with small water-inlet ports in the conical seat so that the water pressure forces are partially balanced and only a small vertical force component remains to be overcome by the float.

In the drawing:

Fig. 1 is a front elevational view of a conventional flush tank with a portion of the front wall broken away to show a valve assembly in accordance with the invention installed therein;

Fig. 2 is a vertical section through the valve assembly, the section being taken in the plane II-II of Fig. 1; the valves being shown in closed position;

Fig. 3 is a view similar to Fig. 2 but showing the tank in section and parts of the valve assembly in elevation, the valves being shown in open positions; and

Fig. 4 is a detail section taken in the plane IV-IV of Fig. 2.

As shown in Fig. 1, the unitary valve assembly in accordance with the invention is positioned in the center of a conventional flush tank 10, having a flushing outlet passage 11 in the bottom thereof, the assembly being in vertical alignment with the flushing passage.

Referring to Fig. 2, the flushing outlet passage 11 has a flushing valve seat 13 mounted therein in water-tight relation by means of gaskets 14 and a nut 15. A flushing pipe or

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fitting 16 having a flange 17 on its upper end may be secured to the lower end of the seat 13 by a flanged nut 18.

The seat 13 is provided with a spider 19 having a threaded aperture in the center thereof into which the lower end of a vertical guide 20 is screwed. Cooperating with the seat 13 and vertical guide 20, is a flushing valve member including a flushing valve 21 and a tubular support 24. The flushing valve 21 is of conventional shape and is secured as by nuts 22 and gaskets 23 in fluid-tight relation to the lower, threaded end of the tubular support 24, which is dimensioned to slide on and be guided by the guide 20. The lower end of the tubular support 24 is extended downwardly into the flushing valve 21 to define therewith an annular space 25 in which air is trapped to buoy up the flushing valve after it has been opened, and hold it open until substantially all the water has run out of the tank. Upward movement of the tubular support 24 is limited by contact of the upper end against a flange 27 on the guide 20, as shown in Fig. 3. Since the lower end of the tubular support 24 is in constant communication with the seat 13, the open upper end of the support constitutes an overflow outlet to limit the height of the water level in the tank.

The flushing valve may be opened by a link 28 which extends down through a passage 29 in the upper portion of the guide 20. The lower portion of the passage 29 is in the form of a slot, and the lower end of the link 28 is bent horizontally to extend out of the slot portion of the passage 29 and through an aperture provided therefor in the tubular support 24. The upper end of link 28 is provided with a head 31 for engagement by the bifurcate end 32 of a flushing lever 33 secured to the usual flushing handle 34 (Fig. 1).

The float valve mechanism for controlling flow of water into the tank comprises an inlet valve seat 35, an inlet valve 36, and an annular float 37. The seat 35 is anchored to the upper end of the guide 20, as by screwing it onto the threaded upper end of the latter, and it is provided with a central passage 38 through which the link 28 extends. The seat has an internal conical face 39 cooperating with a complementary external, conical face 40 on the valve 36. The seat contains a water passage 41 from which two diametrically opposite ports 42 extend through the face 39. The passage 41 is connected by a compression fitting 44 to a tube 43, which may extend to a source of water under pressure. Thus the tube 43 may extend to the usual water inlet fitting 45 in the bottom of a conventional flush tank.

The inlet valve 36 is annular in shape to encircle the guide 20 in freely slidable relation

thereto, and may be limited in its downward, opening, movement by the same flange 27 (Fig. 3) that limits upward movement of the flushing valve tubular support 24.

The annular float 37 is dimensioned to slide along and be guided by the tubular support 24. It floats on the water in the tank, and lifts the valve 36 against the seat 35 to shut off the inflow of water when the water reaches a predetermined level.

It will be observed that because of the conical shape of the seat and valve faces 39 and 40, the water pressure in the ports 42 exerts forces on the valve 36 having both vertical and horizontal components. The horizontal forces balance out, because the ports are diametrically opposite to each other, leaving only the vertical component to be overcome by the float 37. The vertical force component due to the water pressure in the ports 42 can be reduced by making the conical faces 39 and 40 steeper. The number of the ports 42 can be larger than two, provided they are symmetrically disposed about the vertical axis to maintain balance of the horizontal force components. However, since the pressure force exerted on the valve 36 when it is closed is a function of the total area of the ports 42, it is desirable to keep the number and size of the ports as small as will give the desired rate of inflow into the tank.

It will be observed that the entire valve structure shown in Fig. 2 can be assembled prior to installation in the tank 10, thereby eliminating the necessity of performing any assembly operations within the narrow confines of the tank. By simply removing the nuts 15 and 16, and breaking the connection 44, the unit can be removed from the tank, and another unit substituted.

Although for the purpose of explaining the invention, a particular embodiment thereof has been shown and described, obvious modifications will occur to those skilled in the art and I do not desire to be limited to the exact details illustrated.

I claim:

1. A unitary valve assembly for a flush tank having a supply water inlet connection and having a flushing outlet passage in the bottom thereof, said assembly comprising: A flushing valve seat member adapted to be mounted in said outlet passage and having a passage terminated by a seat at its upper end; a stationary vertical

guide anchored to said seat member below the seat therein and extending up through said seat in concentric relation thereto; a flushing valve member slidable on said guide toward and away from said seat; an inlet valve seat member supported on said guide above said flushing valve member and adapted to be connected to said supply water inlet connection; an inlet valve slidable vertically on said guide; a float for moving said inlet valve into and out of seating relation with said inlet valve seat member in response to raising and lowering of the water level in said tank; and means for lifting said flushing valve member away from said flushing valve seat.

2. An assembly according to claim 1 in which said flushing valve member, inlet valve seat, and inlet valve and float are axially symmetrical and axially aligned with respect to said vertical guide.

3. An assembly according to claim 2 in which said flushing valve member comprises a tubular support slidable on said guide and a flushing valve anchored to said support.

4. An assembly according to claim 3 in which said float is annular and said tubular support is slidable in telescoping relation within said float.

5. An assembly according to claim 3 in which said inlet valve seat and valve have cooperating conical sealing faces and said seat has a plurality of symmetrically disposed inlet ports in its said conical face.

6. An assembly according to claim 1 in which said flushing valve member comprises a tubular support slidable on said guide, and said guide has a vertical slot therein and a passage communicating the slot with the upper end of the guide, and said means for lifting said flushing valve member comprises a link extending down through said passage and out through said slot into engagement with said tubular support.

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