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FLUSH VALVE ASSEMBLY

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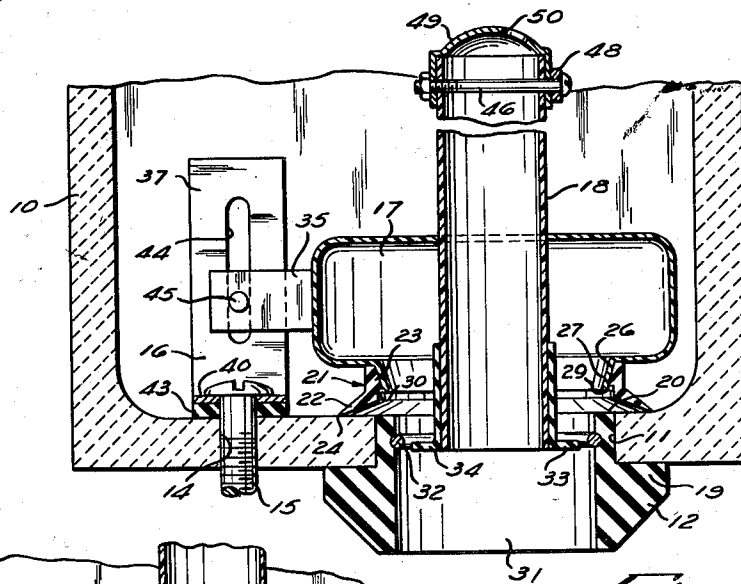
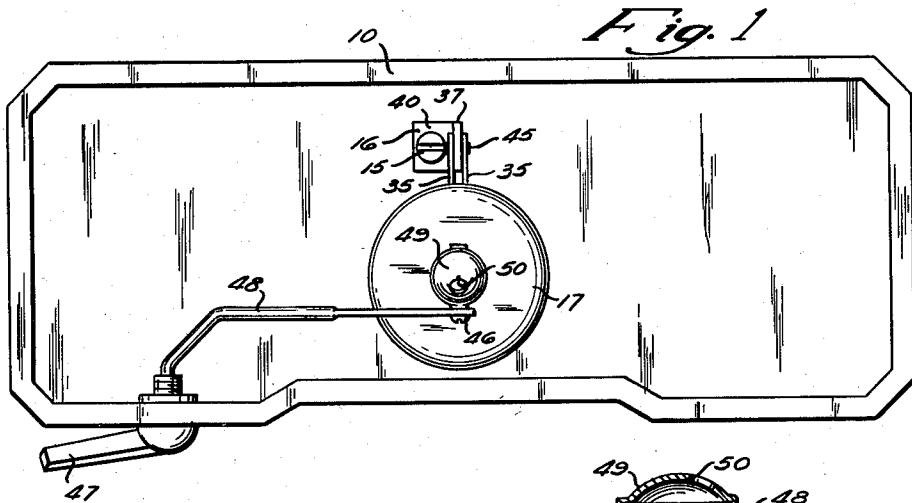


Fig. 2

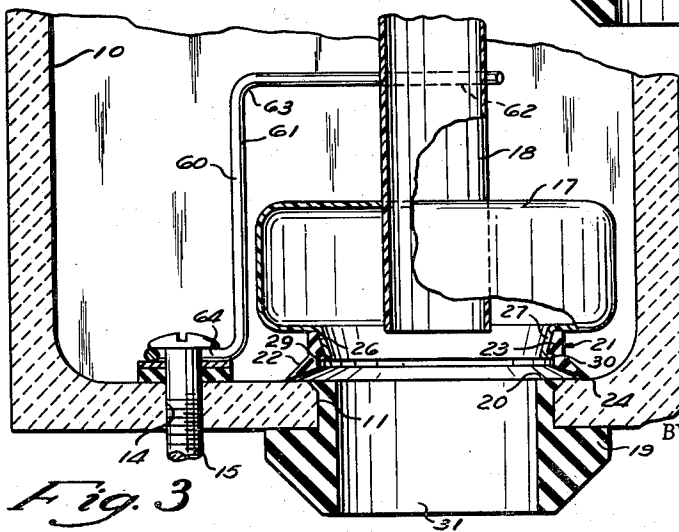


Fig. 3

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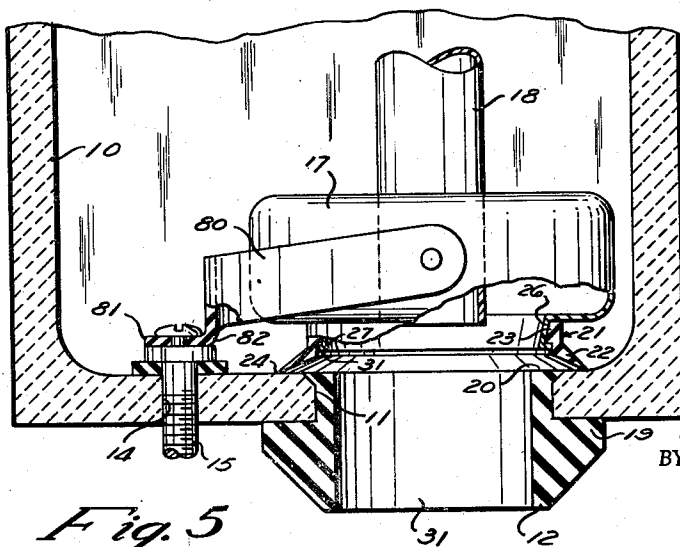
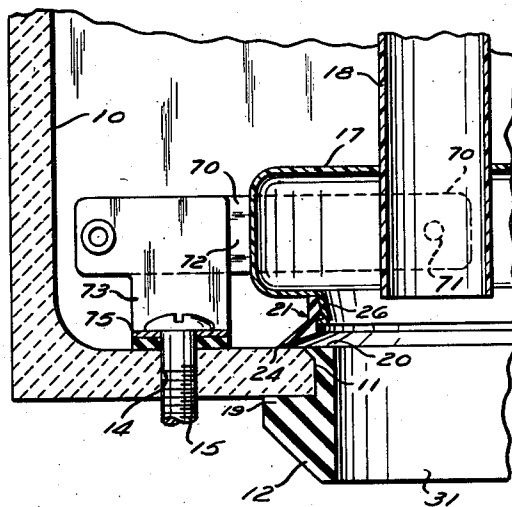
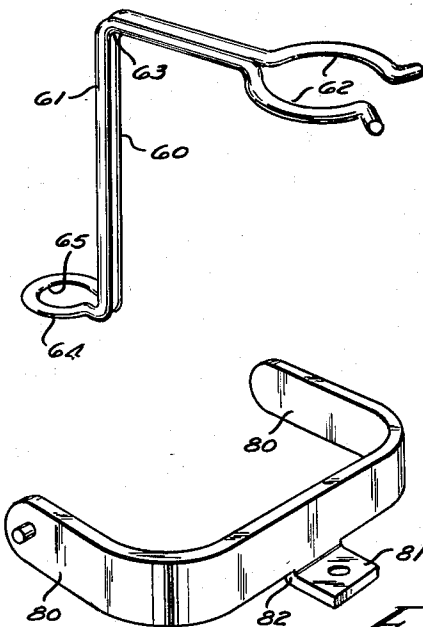
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Fig. 6



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FLUSH VALVE ASSEMBLY

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This invention relates broadly to water-closets, and more specifically to improvements in flush valves therefor.

One of the objects of the invention is to provide a valve which is constructed for seated engagement on the bottom wall or floor of the flush tank so the entire contents of the reservoir will be discharged when the valve is lifted to effect the flushing operation.

Another object of the invention is to provide a valve stem of tubular form which not only supports the valve plate, but also comprises an overflow pipe for the tank.

Another object of the invention resides in the provision of a guide frame for supporting the valve stem in a vertical position during the reciprocative movement thereof.

Further objects of the invention are to provide a flush valve assembly embodying fewer parts than like valves heretofore in use, a valve which is economic of manufacture, efficient of operation and an organization of parts that may be assembled with ease and dispatch.

Other objects and advantages more or less ancillary to the foregoing, and the manner in which all the various objects are realized, will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a plan view of a flush tank having the top removed therefrom, embodying the improved valve and valve stem supporting frame therefor;

Fig. 2 is a vertical sectional view of the tank illustrating the valve and associated parts;

Fig. 3 is a vertical sectional view of a fragmentary portion of a tank illustrating an alternate form of the improved valve stem supporting frame;

Fig. 4 is a view similar to Fig. 3 illustrating another modified form of the valve stem supporting frame;

Fig. 5 is a similar sectional view illustrating a further modification of the valve stem support;

Fig. 6 is a view in perspective illustrating the valve stem guide shown in Fig. 3; and

Fig. 7 is a view in perspective illustrating the valve guide frame shown in Fig. 5.

Referring first to Figs. 1 and 2, the improved water-closet comprises a porcelain tank 10, preferably of prismoidal form, having an opening 11 in the base thereof for a tubular rubber outlet thimble 12. The tank has a second smaller hole 14 for a bolt 15 that supports a guide bracket 16 a hollow plastic toric shell constituting a float 17 and a tubular valve stem 18. The lower end of the thimble is of frusto-conical form and protrudes beyond the lower face of the base of the tank, and the upper end thereof is cylindrical and formed with a shoulder 19 that is affixed in sealed relation in the opening 11 in the tank. The upper end 20 of the cylindrical portion of the thimble is flush with the inner face of the bottom wall of the tank. The valve 21 comprises a circular rubber disc constructed with a frusto-conical flange 22 which is tapered from its hub 23 to a paper

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thin circumferential edge 24. The lower concave face of the valve is normally engaged with the base of floor of the tank 10. The hub of the valve is formed with a boss on the upper face thereof having an inwardly tapered opening 26 therein which is retained by a frusto-conical ring 27 molded on the base of a toric float or shell 17 for the support of the valve in its elevated position when the valve stem 18 is actuated to lift the valve off its seat. The lower face of the ring 27 is formed with a lateral flange 30 thereon which is engaged with a shoulder 29 in the lower face of the valve hub 23. The ring 27 is integral with the hollow toric shell 17 and is rigidly secured to the valve stem 18 which is preferably formed of a molded plastic material such as Bakelite. The outlet opening 31 in the thimble 12 is provided with a split metal ring 32 to assure the securement of the thimble in the opening 11, and the lower end of the valve stem 18 is provided with a rubber sleeve 33 having a flange 34 on the lower end thereof to choke the inrush of water into the chamber within the shell 17. The valve stem 18 is guided for axial movement by horizontal arms 35 that straddle a vertical arm 37 on the bracket 16 secured to the lower wall of the tank 10. The lower leg 40 of the bracket 16 is pierced for the reception of the bolt 15, and a washer 43 is provided under the bracket to seal the opening 14. The bracket has a vertical slot 44 in its upper leg 37, and a cross pin 45 to guide the movement of the valve stem when the valve is lifted from its seat. The upper end of the valve stem is cross-drilled for the reception of a pin 46 threaded at one side into the side wall of the tube and pivotally connected at the other side of the tube to a handle 47 connected to the shank of an arm 48 in the side wall of the upper portion of the tank. The arm and lever comprise generally a bell crank structure of the form customarily employed in flush tanks of conventional form.

The upper end of the valve stem 18 is provided with a cap 49 having an opening 50 in the upper wall thereof that forms an overflow outlet. The cap is held in place by the pin 46 in the skirt of the cap on the upper end of the tube.

The modified form illustrated in Fig. 3 is similar in all respects to the disclosure in Fig. 1, save only that the bracket 60 for guiding the valve stem tube 18 comprises a rod 61 having arcuate end portions 62 that partially encircle the tube 18 with a slight clearance. The rod 60 is bent at a right angle 63 adjacent the upper end thereof and is rebent laterally adjacent the base of the tank to form a foot 64. The foot is formed with a circular loop or ring 65 for the reception of a machine screw or bolt secured in the manner shown in Fig. 1.

The bracket illustrated in the alternate form of Fig. 4 is similar to the guide bracket of Fig. 1, except in this case, a yoke 70 straddles the float 17 and the free ends of the yoke are fulcrumed on pintles 71 in the wall of the float shell 17. The center of the yoke 70 has a lateral arm 72 secured thereto which is pivoted adjacent its outer end to a vertical arm 73 of the right angle bracket 74. The lower leg 75 of the bracket is bolted to the base of the tank in the manner heretofore described in connection with Fig. 1.

The bracket shown in Figs. 5 and 7 is similar to the bracket of Fig. 4, but the arms 80 of the yoke are formed of molded rubber and the foot 81 thereof is clamped by a machine screw or the bolt 15 to the base of the tank. Flexure of the arms will occur in the right angle bend 82 adjacent the foot of the bracket when the tube is elevated by the trip lever 47.

In each case, the weight of the water in the tank will hold the valve 21 in sealed seated relation with the base or floor of the tank until the arm is actuated by lifting the valve stem tube 18. When the valve stem 18 is ele-

vated, water in the tank 10 will flow through the outlet opening 31 in the thimble 12 and the rush of water, together with the buoyancy of the float 17, will maintain the valve in its open position until all of the water is drained from the tank and the valve and stem 18 descend by gravity and effectuates the reseated position of the valve 21.

It is not necessary for the guide bracket assemblies to hold the valve stem in accurate vertical alignment with the axis of the discharge opening in the thimble, since the diameter of the valve 21 is greater than the diameter of the opening 31 and misalignment of approximately plus or minus one-eighth of an inch will not impair the functional operation of the valve.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

What is claimed is:

1. A flush valve assembly for a water closet comprising a water tank having an outlet opening in the base thereof, a smooth flat integral floor in the tank circumambient said outlet opening constituting a valve seat, a rubber valve disc of the poppet valve type seated on the portion of the floor surrounding said outlet opening, the lower face of said valve being normally concave and deformed into a substantially flat disc when the valve is disposed in its seated position, a hollow annular float secured upon the upper face of said valve, a tube having openings in each end thereof secured to said float, said tube constituting a valve stem and an overflow pipe, means pivotally connected to the top of said valve stem to lift said valve from its seat, a bracket affixed to the floor of said tank remote said outlet opening, and a horizontal arm pivotally connected to said float for and attached to said bracket guiding said valve stem in a substantially vertical path upon elevation of said valve stem.

2. A flush valve assembly for a water closet comprising a water tank having an outlet opening in the base thereof, a smooth flat integral floor in the tank circumambient said outlet opening constituting a valve seat, a rubber valve disc of the poppet valve type seated on the portion of the floor surrounding said outlet opening, the lower face of said valve being normally concave and deformed into a substantially flat disc when the valve is disposed in its seated position, a hollow annular float secured to the upper face of said valve, a tube having openings in each end thereof secured to said float, said tube constituting a valve stem and an overflow pipe, means pivotally connected to the top of said valve stem to lift said valve

from its seat, a bracket affixed to the floor of said tank remote said outlet opening, an arm movably connected to said float and affixed to the floor of said tank for guiding said valve stem in a substantially vertical path upon actuation of said valve stem.

3. A flush valve assembly for a water closet comprising a water tank having an outlet opening in the base thereof, a smooth flat integral floor in the tank circumambient said outlet opening constituting a valve seat, a rubber valve disc of the poppet valve type seated on the portion of the floor surrounding said outlet opening, the lower face of said valve being normally concave and deformable into a substantially flat disc when the valve is seated, a hollow annular float secured to the upper face of said valve, a tube having openings in each end thereof secured to said float, said tube constituting a valve stem and an overflow pipe, means pivotally connected to the top of said valve stem to lift said valve from its seat, a bracket affixed to the floor of said tank remote said outlet opening, a horizontal arm pivotally connected to said float and movable vertically in said bracket for guiding said valve stem in a substantially vertical path when said valve stem is lifted.

4. A flush valve assembly for a water closet comprising a water tank having an outlet opening in the base thereof, a smooth flat floor in said tank circumambient said outlet opening constituting a valve seat, a rubber valve disc of the poppet valve type seated on the portion of the floor surrounding said outlet opening, said valve being normally concave and deformable into a substantially flat disc when the valve is disposed in its seated position, a hollow annular float secured on the upper face of said valve, a tube having openings in each end thereof secured to said float, said tube constituting a valve stem and an overflow pipe, means pivotally connected to the top of said valve stem to lift said valve from its seat, a bracket affixed to the floor of said tank remote said outlet opening, and an arm on said bracket connected to said float for guiding said valve stem in a substantially vertical path upon elevation of said valve stem.

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