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TOILET FLUSH VALVE ASSEMBLY

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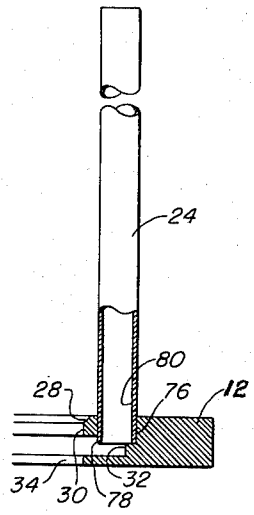


FIG. 3

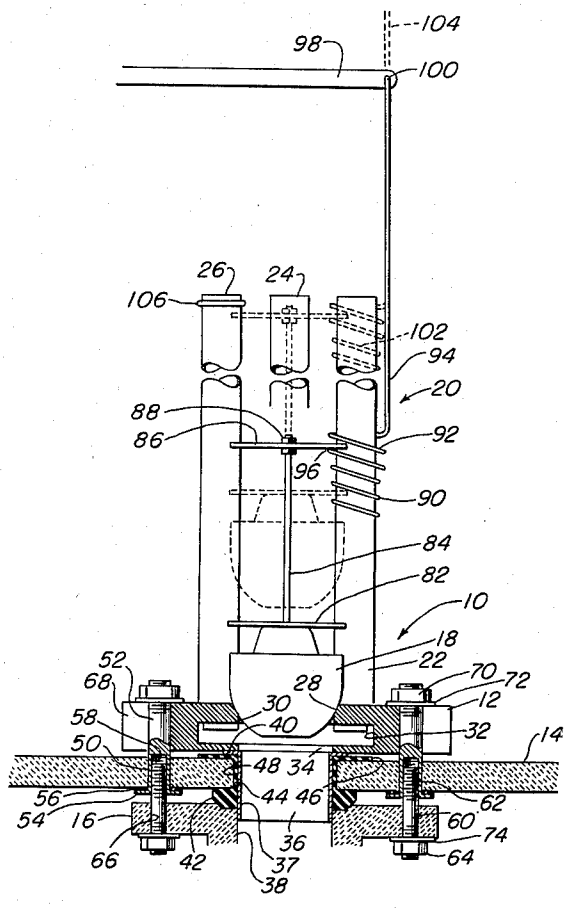


FIG. 1

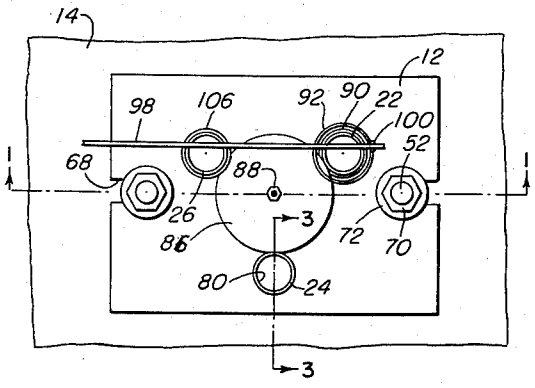


FIG. 2

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TOILET FLUSH VALVE ASSEMBLY

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4 Claims. (Cl. 4—57)

This invention relates to toilet flush valve mechanisms and has for its principal object the provision of an assembly which can be bolted directly to both the tank bottom and to the top flange of the toilet bowl, particularly to one which may be joined to the tank at the factory and later be ready for securing to the bowl by merely fastening a pair of threaded studs with their nuts.

A further object of the invention is to provide a toilet flush valve assembly in which the flush valve ball is guided by three or more overflow pipes in such manner that the ball will always be free to fall to closing position, may be readily replaced, and since it will fall in the identical position each time the toilet is operated, either full or partially, there will be no chance of leakage due to a slight angular seating of the valve ball, as the mechanism recited will always insure that the ball axis remain coaxial with the axis of the seat which receives it. A further object of the invention is to provide an assembly in which the flush ball is rigidly secured to a sliding spool, both end disks of which have just enough clearance on their vertical guides as to insure against sticking or other causes of waste of water, even where as preferred the spool and the rigidly attached ball are raised by an elevating mechanism touching only one of the spool ends with almost a point contact.

A still further object of the invention is to provide a loosely coiled lifting mechanism for attachment to a flush trip lever for raising a disk attached to the flush valve ball, such that in closed or seated position, the disk does not touch either of the proximate turns of the helix and consequently precise seating of the ball is insured as the coil will not interfere.

In the drawings:

Fig. 1 is a vertical section partly in elevation taken on line 1—1 of Fig. 2.

Fig. 2 is a plan view.

Fig. 3 is a vertical elevation taken on line 3—3 of Fig. 2.

The assembly has a base 12 which may be of metal or plastic although it will usually be made of ceramic material to be attached to the bottom wall 14 of the usual flush tank and the latter in turn will be secured to the top flange 16 of the toilet bowl. The flush ball 18 which may be of any of the usual materials, and is shaped preferably as shown, in falling will seat as at 28 in the round hole 30 in the valve body 12 which will be coaxial with the hole 48 in the bottom of the tank and with the usual hole 38 in the upper bowl flange.

A number of overflow pipes are provided, preferably three in number as shown, and numbered 22, 24 and 26, being firmly seated in the valve body 12 and only slightly spaced radially beyond the cylindrical portion 30 of the bore in the valve seat opening so that each of the overflow pipes will discharge into a cavity 32 which is circular in plan and preferably a bit short of the farthest margin of the overflow pipes as best seen in Fig. 3.

A gasket having a wide flange 46 at its top, a fairly plump hub 42 at its bottom which are joined by a connecting neck 44, is placed between the bottom of the valve body 12 and the top of the toilet bowl top flange 16 to embrace the bottom wall 14 of the tank, much in the nature of a grommet. The gasket is preferably supported by a short tube section 37 having a right angle annular flange 40. This element is inserted in place after the gasket has been snapped into place in the hole 48 and prevents the gasket from swelling out of shape and possibly even pulling away from the sealed surfaces.

The upper angular flange of the metal sleeve 37 is compressed against the gasket by a pair of bolts 52, in slots 68, each bolt internally threaded as at 62 near its head 54 at its lowest point which head preferably engages a rubber washer 56. A nut 70 and washer 72 are tightened to bind the valve body 12 to the tank bottom 14. The tank carrying the valve body 12 may be secured to the toilet bowl top flange 16 by means of studs 60 having threaded engagement with the bolts 52 and carrying at their bottoms washers 74 and nuts 64. It will be noted that this arrangement avoids the old style system, including threaded tube and nut.

The flush valve ball 18 is firmly secured in any desired manner to the bottom disk 82 of a spool which comprises a similar upper disk 86 and a central stem 84, which preferably is permanently secured to the lower disk 82 and may be secured to the upper disk 86 by means of a couple of nuts 88. The circular members 82 and 86 are spaced apart by the stem 84 at a distance greater than the axial length of the ball. If the spool is made of plastic, it will be an integral piece with an embedded threaded screw at the bottom to which the ball may be affixed.

One of the three overflow pipes, as 22, carries a lifting mechanism comprising a vertical portion 94 of a wire coiled loosely, as at 92, to engage the upper disk 86 and coiled with slight clearance only as at 90 to insure that the axis of the helix or coil is exactly coaxial with the outlet tube 22. At its upper end the straight portion 94 is connected in the usual fashion to a flush trip lever 98 of well known form. I prefer to mount a stop device, such as the rubber ring 106, on one of the three overflow tubes to prevent removal of the spool except when intended, as for example, when replacing the ball 18.

The total area of the three overflow tubes is preferably a slight bit the greater than the cross sectional area of the usual single tube. The three tubes serve the dual purpose of taking care of excess water in case something goes wrong with the valve (not shown) which discharges water into the tank and serving as an extremely accurate guide for the flush valve ball. Even though a slight groove is formed in time, even though the extent of the seat 28 is reasonably great, this will cause no harm because contrary to older equivalents there is no danger of the ball axis being at a slight angle to the axis of the seat which angular inaccuracy in other installations has frequently been the cause of a slight leakage at the groove.

While the flush valve assembly may be sold as a unit, it is preferably attached to the tank at the factory with the gasket in place and preferably, although not necessarily, with the studs 60, washers 74 and nuts 64 in place. The assembly with the tank may now be positioned over the top flange of the toilet bowl and the sealing connection made by compressing the bottom plug 42 of the gasket by tightening the nuts 64. When the flange trip lever 98 is in normal position, the parts are as shown in full lines. The larger convolutions 92 of the valve lifter coils are quite loose about the vertical tube and very slightly clear the upper disk 86 of the spool when the valve ball 18 is firmly in its seat 28. This construction permits the flush valve ball to seat firmly and accurately as all tendency of the raising mechanism to cause a side drag is completely eliminated. Upon movement of the flush trip

lever **98**, engagement is made at point **96** and the spool is lifted exactly vertical as the two disks of the spool touch the three guiding tubes with just enough clearance to insure against binding. The coils are then raised to position **102** and the straight portion rising as indicated at **104**.

To replace the flush valve ball, the stop ring **106** is first removed, then the spool is raised so as to free the coils **92** and **90**, whereupon the old ball may be removed and the new one secured in place as the bottom of the stem **84** will be threaded to fit the usual internal threads on the ball.

What I claim is:

1. In combination, a valve body having a central cavity and a valve seat communicating therewith, a series of overflow tubes equispaced about the axis of said seat to discharge into the cavity, a flush valve ball adapted to fall into the seat to close admission to the cavity, and means to raise the ball off its seat, said means including a circular member having peripheral sliding contact with at least three of the overflow tubes.

2. The combination of claim 1 in which the means includes a spool formed by the circular member and a similar coaxial member also having peripheral sliding contact with the three overflow tubes, said circular members of the spool being spaced apart by an integral central stem a distance greater than the axial length of the flush valve ball whereby the ball is kept at all times in exact

axial alinement with its seat to which the ball is firmly secured.

3. The combination of claim 1 in which the means includes a wire helically coiled about one of the overflow tubes with a portion of the circular member between two adjacent turns of the helical coil.

4. In combination, a valve body having a central cavity and a valve seat communicating therewith, a series of overflow tubes equispaced about the axis of said seat to discharge into the cavity, a flush valve ball adapted to fall into the seat to close admission to the cavity, and means to raise the ball off its seat, said means including a spool of two spaced circular members each having peripheral sliding contact with at least three of the overflow tubes and a helically wound wire which includes a series of loose coils to engage the spool to raise it and a series of smaller diameter turns snugly engaging one overflow tube, but permitting movement of the means and the spool, both up and down.

References Cited in the file of this patent

UNITED STATES PATENTS

1,396,133	Libbey	Nov. 8, 1921
1,440,469	Keller	Jan. 2, 1923
2,495,213	Drum	Jan. 24, 1950