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CHECK BALL GUIDE FOR FLUSH TANKS

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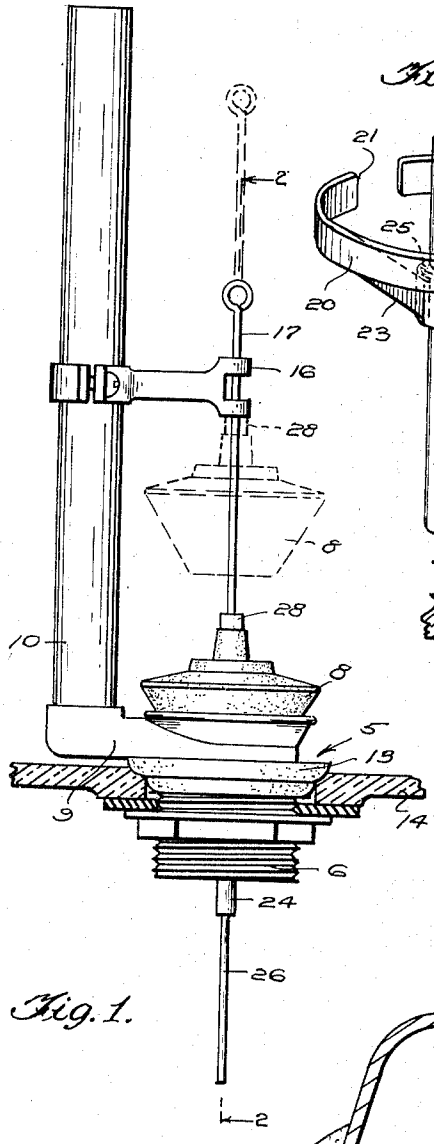


Fig. 1.

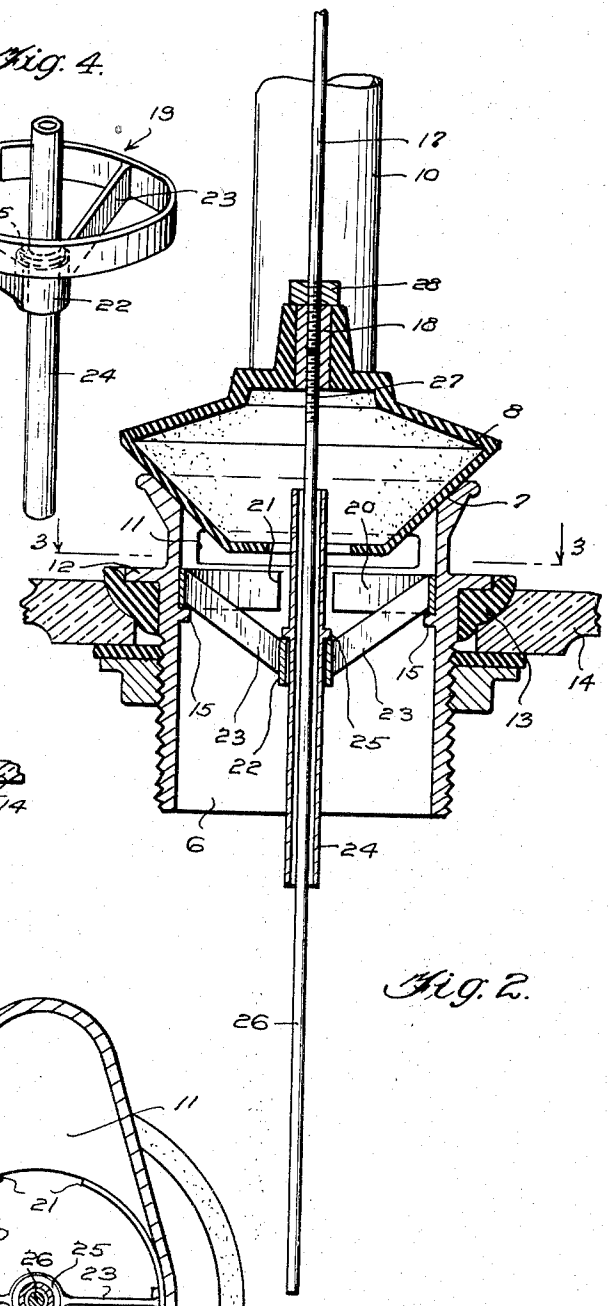


Fig. 2.

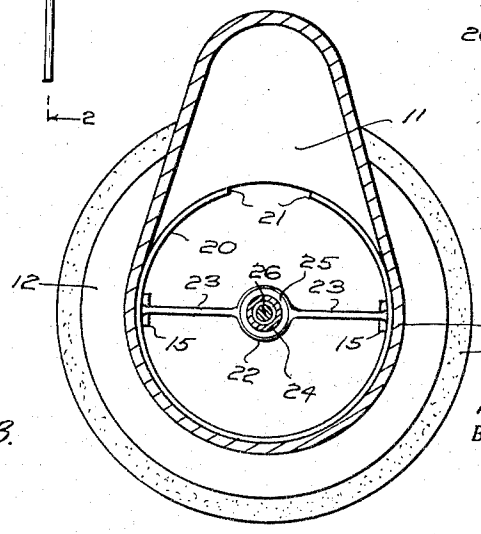


Fig. 3.

INVENTOR.
ANTHONY LIMONGELLI,
BY
James A. Glen
ATTORNEY.

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CHECK BALL GUIDE FOR FLUSH TANKS

Anthony Limongelli, Miami, Fla.

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3 Claims. (Cl. 4—57)

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This invention relates to an improvement in guide means for the accurate seating of the water discharge flush valve employed in the conventional toilet flush tanks.

It is an object of the invention to provide a simple guide means that may be easily and quickly installed in the discharge coupling of the flush tank without altering the conventional ball, coupling or associated parts and assures that the ball will accurately be guided to its seat.

Flush tank balls frequently fail to their seat and are cocked thereon, due in some cases to the turbulence of the water and, in some cases, the exposed thread of the trip rod will cause the rod and its supported ball to remain elevated, due to the threads catching in the upper rod guide, in each instance resulting in a considerable waste of water.

The device of the present invention contemplates an expansible guide carrying ring that is installed in the discharge pipe below the ball seat and accurately guides a rod that is connected with the ball, whereby the ball after being released by the usual trip lever, falls with the level of the water as it is discharged and will not be shifted laterally by the turbulence of the water, since the ball will be guided above and below by the rods operating in the upper and lower guides.

A further object of the invention resides in the extreme simplicity of the structure and its low cost, coupled with the ease of installation.

Other objects and advantages of the invention will be readily apparent during the course of the following description, reference being had to the accompanying drawings, wherein has been illustrated a preferred example thereof and wherein like characters of reference are employed to denote like parts throughout.

In the drawings—

Figure 1 is a side elevation of a conventional flush tank coupling and associated ball seat and ball, with the invention applied thereto,

Figure 2 is a vertical section, taken on line 2—2 of Figure 1,

Figure 3 is a horizontal section taken on line 3—3 of Figure 2 and,

Figure 4 is a perspective view of the guide prior to installation.

Referring specifically to the drawings, the numeral 5 designates a conventional coupling employed as the water discharge of toilet flush tanks. The coupling consists of a relatively large cylindrical member 6, carrying at it upper end a tapered ball seat 7 for the seating reception of a water flush ball 8. The member 6 has an integral lateral extension 9, connected with a vertically arranged overflow pipe 10, as is customary. The extension 9 is provided with the usual water passage 11, opening into the bore of the member 6, as clearly shown in Figures 2 and 3. The member 6 is further provided with the usual gasket flange 12, serving to compress a gasket 13 within the opening of the flush tank, indicated fragmentarily at 14. The member 6 is externally threaded for the reception of the usual clamping nut and for the threaded coupling of the usual discharge pipe, not shown. Arranged upon the inner wall of the member 6, at diametrically opposite points, are inwardly projecting studs 15, cast integral with the member 6 and normally serving to limit the inner extension of the discharge pipe. The studs 15 are arranged below the opening of the passage 11, as shown. The overflow pipe 10 supports the usual guide 16, for the conventional trip rod 17. The ball 8 is substantially frusto-conical in shape and is formed hollow, with its lower wall provided with a relatively large central opening. The head portion of the ball 8 has molded therein, a metal stud 18, axially bored and threaded for the usual reception of the threaded lower end of the trip rod 17. The structure so far described is conventional and well known.

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The present invention consists of a guide member, designated as a whole by the numeral 19, including a flat sided ring 20, split at one side, as at 21. The ring 20 supports a centrally arranged tubular guide sleeve 22, through the medium of preferably integral webs 23. As shown, the guide sleeve is arranged below the ring 20. Vertically positioned in the sleeve 22, is a cylindrical guide tube 24, extending above and below the sleeve 22 and maintained against downward displacement by a collar 25. The diameter of the sleeve 22 is somewhat larger than the diameter of the tube 24, permitting freedom of movement of the tube in its guiding action. Slidable through the tube 24, is a pilot rod 26, the upper end of which is threaded at 27 for engagement with the threads of the stud 18. The diameter of the rod 26 is relatively smaller than the inner diameter of the tube 24, providing freedom of sliding movement and lateral motion within limits to properly direct the ball 8 to its seat.

In the assembly of the structure, it being assumed that the conventional coupling 5 has already been placed in the tank 14, the operator removes the ball 8, by first unscrewing the trip rod 17. The ring 20 of the guide 19, is then compressed and inserted into the bore of the member 6 to a point where it rests upon the lugs 15. Upon release, the ring 20 will expand and firmly grip the side walls of the coupling. The placing of the guide 19 offers no obstruction to the insertion of the discharge pipe within the member 6. After the guide is in position, the tube 24 is next engaged within the sleeve 22, resting upon its collar 25. A nut 28 is then screwed upon the threaded end of the trip rod as far as it will go and the trip

rod is then again screwed into stud 18. However, prior to attaching the trip rod, the pilot rod 26 is screwed into the stud 18 to a depth substantially half of the stud and the ball and the suspended pilot rod are moved into position, with the pilot rod 26 traversing the tube 24 and the ball in seating position upon the seat 7. The trip rod 17 is then engaged within the threads of the stud 18 to a point of contact with the inner end of the rod 26. The entire check and guide device is now ready for operation.

When the ball is raised by the trip rod 17, there will be no tendency for the ball to shift sidewise under the turbulent action of the water, since the ball is maintained in a vertical course of travel, being guided at the upper end by the trip rod and at the lower end by the pilot rod 26. The nut 28 serves to completely cover any exposed threads upon the rod 17 to insure that the rod and the ball will not be accidently caught by the threads upon possible rough edges of the upper guide 16, as sometimes occurs in the conventional flush devices. The limited play of the tube 24 within the sleeve 22 and the limited play of the pilot rod 26 in the tube 24, is for purposes of overcoming any possible irregularity within the coupling member 6 that might tend to prevent accurate seating of the ring 20. However, the limited play in the parts is such as to insure that the ball will be accurately guided to a full and even seat. The rod 26 is of such a length that it will have full guiding action in the tube 24 at all elevations of the ball. It might be found desirable in practice to eliminate the tube 24 and extend the guide sleeve 22 in length. However, the use of the tube 24 presents an elongated guide for the rod 26, regardless of the slight irregular seating of the ring 20 and its freedom of movement within the sleeve 22 avoids any possible tendency of the rod 26 frictionally binding in the tube 24, with the movement being entirely free in all directions.

It will be apparent that a very simple and novel guide means has been provided that will assure of the check ball being accurately directed to its seat. The device is applicable to forms of couplings now in use and can be installed without the use of tools.

While a specific form of the device has been shown and described, various changes in the shape, size and arrangement of parts may be resorted to as fall within either the spirit or the scope of the subjoined claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a water discharge coupling and ball valve for toilet flush tanks that is provided with a ball valve seat and a resilient frusto-conical ball valve open upon its bottom and having an axially threaded stud molded in its top centrally and axially thereof, a trip rod for the valve that is vertically arranged and having its lower end threaded partially into the stud, guide means for the vertical shifting movement of the trip rod for control of the valve, a pilot rod threaded into the stud from the bottom of the valve to abut the end of the trip rod and arranged in axial alignment with the trip rod, the pilot rod being of a length to extend through the coupling, the pilot rod moving in a vertical plane under the influence of the valve movement, guide means for the pilot rod throughout its vertical movement, that consists of a flexible split ring adapted to be frictionally positioned within the coupling against shifting movement and arranged below the valve seat, a centrally arranged guide sleeve carried by the ring that is axially arranged in alignment with the guide means for the trip rod, an elongated guide tube loosely supported in the sleeve and adapted to loosely slidably receive the lower portion of the pilot rod and means formed within the coupling that limits the downward positioning of the ring.

2. Guide means for the vertical shifting movement of a resilient ball valve as employed in toilet flush tanks and that is adapted to seat upon a valve seat formed upon a cylindrical coupling embodied in the tank discharge, the valve provided with an axially threaded stud molded therein with a trip rod threaded into the upper end of the stud and a pilot rod threaded into the lower end of the stud with the rods in vertical axial alignment, the pilot rod projecting downwardly through and centrally of the cylindrical coupling, guide means for the pilot rod that consists of a relatively wide split ring that is expansible and adapted to be positioned in fixed frictional spanning relation to the coupling, the coupling provided with cast lugs that limit the downward positioning of the ring, webbing formed upon the ring that extends inwardly and downwardly, the inner ends of the webbing supporting a cylindrical sleeve axially of the valve and the rods, an elongated guide tube loosely vertically supported within the sleeve and extending above and below the sleeve, a collar formed on the tube to limit its downward movement in the sleeve, the pilot rod loosely slidably engaging through the tube, the tube forming a guide for the pilot rod throughout its vertical movement.

3. A guide device that is removably fixed within the bore of a flush tank discharge coupling to control the seating action of a resilient ball valve upon a valve seat formed on the coupling, the valve provided with a trip rod to lift the same from the seat and a pilot rod to guide the valve to its seat, the rods extending above and below the valve, respectively, with the pilot rod extending downwardly centrally of the coupling, guide means for the pilot rod that consists of relatively wide flexible ring split at one side to be compressed and installed within the coupling with the sides of the ring frictionally engaging the bore of the coupling, the coupling provided with inwardly directed lugs that limit the downward positioning of the ring, oppositely arranged and inwardly and downwardly directed flat web sections carried by the ring, the webs terminating in a cylindrical sleeve below the ring, with the sleeve arranged axially of the rods, an elongated tube loosely supported within the sleeve to project above and below the ring, a collar formed upon the tube intermediate its length for resting engagement upon the upper end of the sleeve, the pilot rod loosely and shiftably guided in the tube throughout its travel under the influence of the rise and fall of the valve, the fixed position of the ring being below the valve seat and below an overflow inlet to the coupling.

ANTHONY LIMONGELLI.

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