March 6, 1956 O. WOLF ET AL 2,736,903

FLUSH TANK VALVE

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FIG. 1.

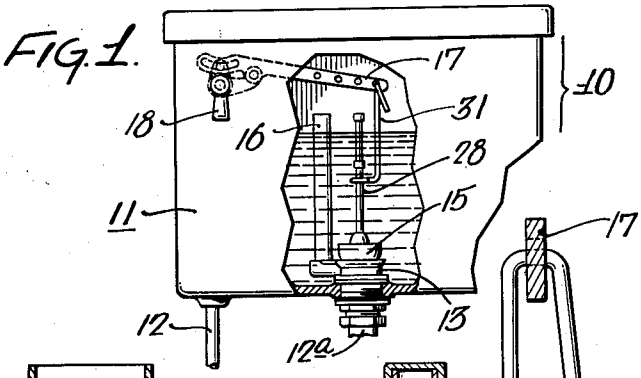


FIG. 2

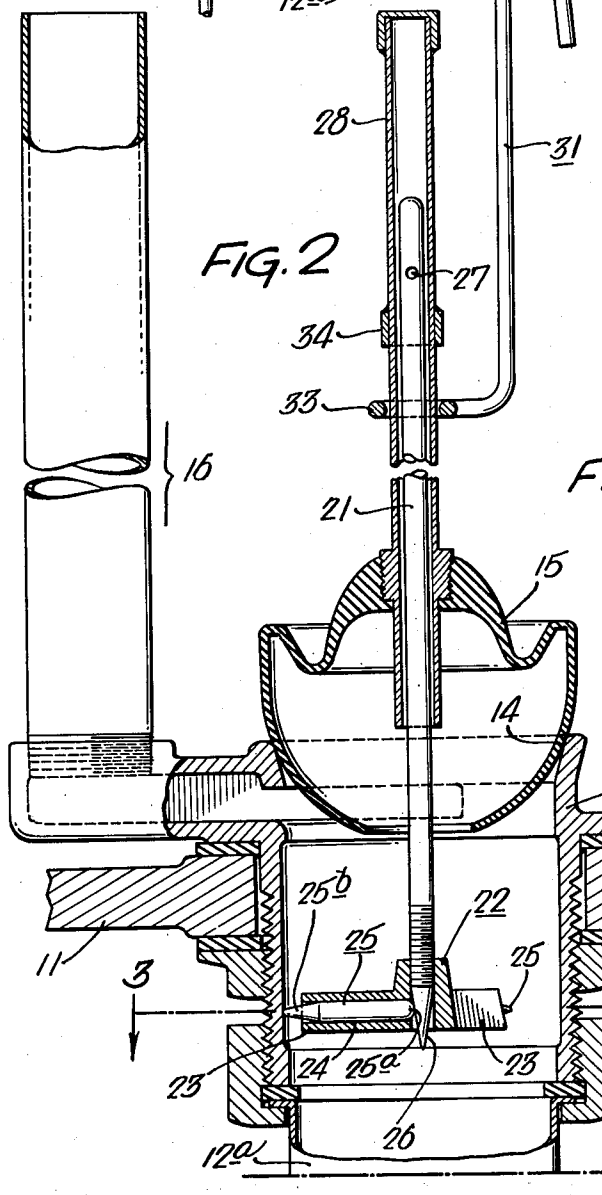


FIG. 4.

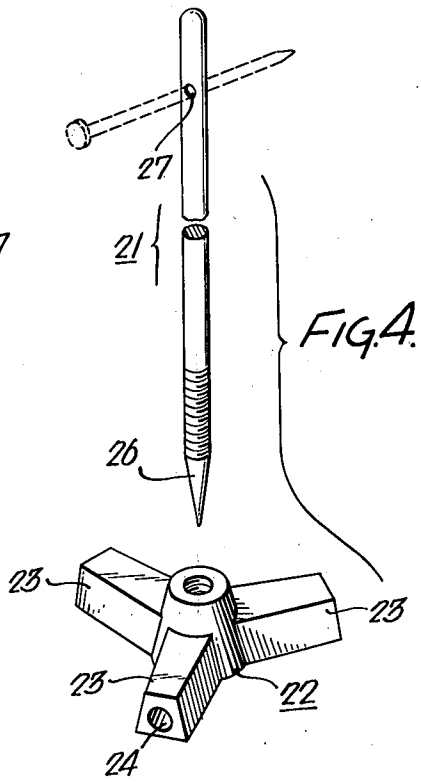
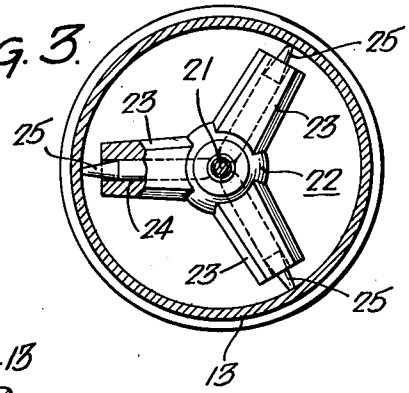


FIG. 3.



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FLUSH TANK VALVE

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4 Claims. (Cl. 4—57)

The present invention relates to new and useful improvements in flush tank valve apparatus of the type commonly used in water closets, and more particularly to new and useful improvements in apparatus for guiding the valve member into proper seating engagement with the valve seat.

Prior to the present invention considerable annoyance and trouble have been caused by the failure of toilet flush valves to seat properly after they have been opened. The great majority of flush valves comprise a resilient valve member supported by a stem which in turn is guided by a short collar. The supporting stem has a tendency to bind or become twisted in the collar with the result that the valve member does not properly re-engage the valve seat.

With the foregoing in mind, the principal object of the present invention is to provide a novel flush valve guide which operates effectively to center the valve with respect to the valve seat and insure correct reseating of the valve thereon after use. This is accomplished in the present invention by mounting the resilient valve member on a hollow stem which is telescopically carried upon an elongated guide rod that is centrally mounted in the discharge opening bounded by the valve seat. The guide rod is disposed perpendicular to the valve seat and centrally thereof, thereby insuring correct seating of the valve.

Another object of the present invention is to provide a novel flush valve guide which may be readily attached to existing water closets without the necessity of making any changes in the plumbing or the previously existing outlet fitting and valve seat.

A further object of the present invention is to provide a novel flush valve guide which may be manufactured easily and cheaply and which is highly efficient and effective in operation and use.

These and other objects of the present invention and the various features and details of the construction and operation thereof are hereinafter more fully set forth and described with reference to the accompanying drawings, in which:

Fig. 1 is a front elevational view partially in section of a water closet having installed therein a flush valve assembly and guide made according to the present invention;

Fig. 2 is an enlarged vertical sectional view of the flush valve assembly showing the construction of the valve guide of the present invention;

Fig. 3 is a transverse sectional view taken on line 3—3, Fig. 2; and

Fig. 4 is a perspective view showing the guide rod and spider in relatively separated relation.

The present invention comprises essentially the provision of a spider and guide rod which are adapted to be mounted centrally within the discharge outlet of the flush valve coaxially thereof. The guide rod is telescopically received within a hollow stem which carries the valve element and directs the valve element into proper seating engagement upon the valve seat.

Referring more particularly to Fig. 1 of the drawings, a conventional water closet is designated generally by reference numeral 10 and comprises a tank 11 having inlet and outlet pipes 12 and 12*a*, respectively. The outlet pipe 12*a* is secured to a valve sleeve 13 in the base of the tank 11, as illustrated in Fig. 2. The sleeve 13 at its upper end is provided with an annular wall portion 14 which provides a valve seat for a resilient valve 15. Communicating with the valve sleeve and outlet pipe is the usual overflow stand pipe 16 which prevents the tank 11 from overflowing. A lever 17 pivotally mounted in the front face of the tank and actuated by means of a handle 18 controls the flow of water in the tank in the usual manner.

In accordance with the present invention, means is provided for guiding the valve element 15 at all times into proper seating engagement upon the valve seat. To accomplish this, there is provided a guide rod 21 which is adapted to be supported within the valve sleeve 13 and extend vertically upward therefrom coaxially of the valve seat 14. The lower end of the guide rod is threaded in a central opening 22*a* in the body portion of a supporting spider 22. The spider 22 comprises a plurality of horizontal leg portions 23 arranged in equally spaced relation circumferentially of the spider. The spider legs 23 have longitudinally extending passages 24 therein which communicate at their inner ends with the central opening 22*a* in which the guide rod 21 is threaded. Slidably mounted in each of the passages 24 is a pin 25 which has a rounded rear surface 25*a* thereon and a pointed or tapered front end 25*b*. The pins 25 are of greater axial length than the passages 24 so that the outer ends of the pins can be engaged with the inner wall of the sleeve 13 by displacing or actuating the pins outwardly as hereinafter described to thereby support the spider 22 interiorly of the sleeve 13 in proper position. Relative outward movement of the pins 25 with respect to the spider 22 is effected by a tapered cam surface 26 which is provided on the lower end of the guide rod 21 and operates to engage and effect uniform outward displacement of all of the pins to engage their outer ends with respect to the inner wall of the sleeve 13 and support the spider and rod 21 coaxially with respect to the valve seat 14.

In order to position the guide rod 21 and spider 22 in the sleeve 13 the guide rod 21 is threaded outwardly of the spider 22 to permit retraction of the pins 25 into the passages 24 in the leg members 23. With the pins retracted, the spider is positioned interiorly of the sleeve 13 and the guide rod is threaded into the spider thereby outwardly displacing all of the pins 25 an equal distance to engage the outer ends of the pins with the inner wall surface of the sleeve 13. This is accomplished simply by manually rotating guide rod 21 and after the pins 25 are engaged with the inner sleeve wall as previously described to position the guide rod coaxially of the valve seat 14, a nail or similar instrument may be inserted in an opening 27 in the upper end of the guide rod 21 and used to tighten the guide rod thereby forcing the pins 25 into more firm engagement with the interior wall of the sleeve 13 and securely locking the spider and guide rod in place.

The purpose of the guide rod 21 is to direct the valve 15 into proper seating engagement with the valve seat 14. To this end the valve element 15 is fixedly secured upon the lower end of a tubular valve stem 28, for example, in the manner illustrated in Fig. 2. The tubular valve stem 28 is slidably mounted upon guide rod 21 so that the latter operates to guide and direct the valve to its seat 14. Clearance is provided between the valve

stem 28 and the guide 21 to assure freedom of movement of the stem on the guide rod and proper closing of the valve without any binding between the valve stem and guide rod.

A link 31 is connected at one end to the operating lever 17 and at its other end is provided with a ring portion 33 which slidably receives the valve stem 28. Fixedly secured to the valve stem 28 above the ring portion 33 is a shoulder 34 which is engaged by the ring portion 33 of the link when the handle 18 is actuated, thereby causing the valve member 15 to be lifted from the valve seat 14.

Upon opening of the valve, water flows out of the tank 11 and the raised valve element and valve stem float downwardly in the tank as the water level recedes until the valve element 15 again engages upon the valve seat 14 thereby shutting off the flow of water from the tank. Vertical movement of the valve element and valve stem is guided at all times by the guide rod 21 thereby assuring proper seating engagement of the valve element 15 upon the valve seat 14 after each operation of the flush valve.

From the foregoing it is apparent that the present invention provides a novel flush valve guide which is operable to center the valve with respect to the valve seat and at all times assure the correct reseating of the valve after use. In addition, the present invention provides a novel flush valve guide which may be readily adapted to presently existing water closets.

While a particular embodiment of the present invention has been illustrated and described herein it is not intended to limit the invention to such a disclosure and changes and modifications may be incorporated and embodied therein within the scope of the following claims.

We claim:

1. Valve and guide apparatus for a flush tank having an outlet sleeve providing an annular valve seat within the flush tank, comprising a support adapted to be mounted in the outlet sleeve and having a central opening coaxially of the valve seat, a plurality of movable members carried by said support at equally spaced intervals circumferentially thereof, a rigid guide rod threaded in the central opening of the support and adapted to extend coaxially through and beyond the valve seat, said guide rod having a cam portion arranged to engage said movable members as the guide rod is threaded further into the support and displace said members equidistant outwardly into clamping engagement with the inner wall surface of said outlet sleeve to thereby secure the support in position and dispose the guide rod coaxially of the valve seat, a resilient valve element adapted normally to rest upon the valve seat, and a tubular stem secured to said valve element centrally thereof and arranged to slide telescopically on said guide rod and positively guide the valve element at all times into proper seating engagement upon the valve seat.

2. In a flush tank having an outlet sleeve providing an annular valve seat at the base of the flush tank, valve actuating means above the valve seat, valve and guide apparatus in the flush tank comprising a support adapted to be mounted in the outlet sleeve and having a central opening coaxially of the valve seat, a plurality of movable members carried by said support at equally spaced intervals circumferentially thereof, a rigid guide rod threaded in the central opening of the support and adapted to extend coaxially through and beyond the valve seat and terminating in a free upper end portion, said guide rod having a cam portion arranged to engage

said movable members as the guide rod is threaded further into the support and displace said members equidistant outwardly into engagement with the inner wall surface of said outlet sleeve to thereby secure the support in position and dispose the guide rod coaxially of the valve seat, a resilient valve element adapted normally to rest upon the valve seat, and a tubular stem closed at its upper end secured to said valve element centrally thereof and arranged to slide telescopically on said free upper end portion of the guide rod and positively guide the valve element at all times into proper seating engagement upon the valve seat.

3. In a flush tank having an outlet sleeve providing an annular valve seat at the base of the flush tank, valve actuating means above the valve seat, valve and guide apparatus in the flush tank comprising a spider adapted to be mounted in the outlet sleeve, said spider having a central opening coaxially of the valve seat, and a plurality of radially extending legs positioned at equally spaced intervals, a plurality of pins slidably mounted in radial passages in said legs, said pins being longer than the passages and extending outwardly therefrom, a rigid guide rod threaded in the central opening of the spider and adapted to extend coaxially through and beyond the valve seat and terminating in a free upper end portion, said guide rod having a cam portion arranged to engage the inner ends of said pins as the guide rod is threaded further into the spider and displace said pins equidistant outwardly into engagement with the inner wall surface of said outlet sleeve to thereby secure the spider in position and dispose the guide rod coaxially of the valve seat, a resilient valve element adapted normally to rest upon the valve seat, and a tubular stem closed at its upper end secured to said valve element centrally thereof and arranged to slide telescopically on said free upper end portion of the guide rod and positively guide the valve element at all times into proper seating engagement upon the valve seat.

4. Valve and guide apparatus for a flush tank having an outlet sleeve providing an annular valve seat within the flush tank, comprising a support adapted to be mounted in the outlet sleeve and having a central threaded opening to be positioned coaxially of the valve seat, a plurality of movable members carried by said support at equally spaced intervals circumferentially thereof, a rigid guide rod threaded in the central opening of the support and adapted to extend coaxially through and beyond the valve seat, said guide rod having a cam portion arranged to engage said movable members as the guide rod is threaded further into the support and displace said members equidistant outwardly into engagement with the inner wall surface of said outlet sleeve to thereby secure the support in position and dispose the guide rod coaxially of the valve seat, a valve element adapted normally to rest upon the valve seat, and a tubular stem secured to said valve element centrally thereof and arranged to slide telescopically on said guide rod and positively guide the valve element at all times into proper seating engagement upon the valve seat.

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