

Aug. 28, 1956

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2,760,205

FLUSH BASIN BALL VALVE GUIDE

Filed Nov. 9, 1953

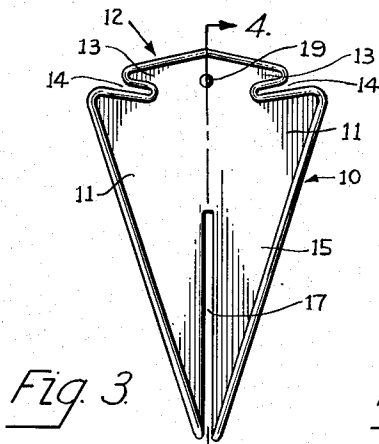
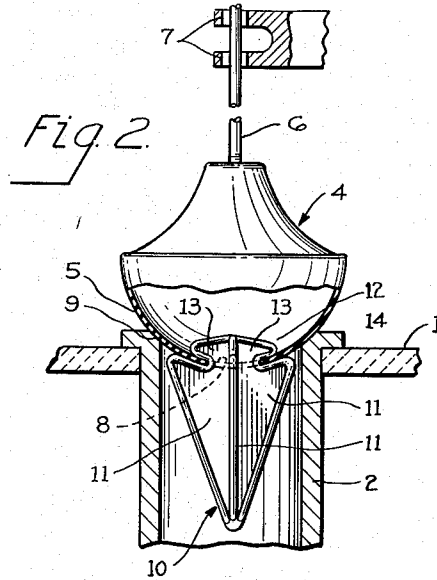
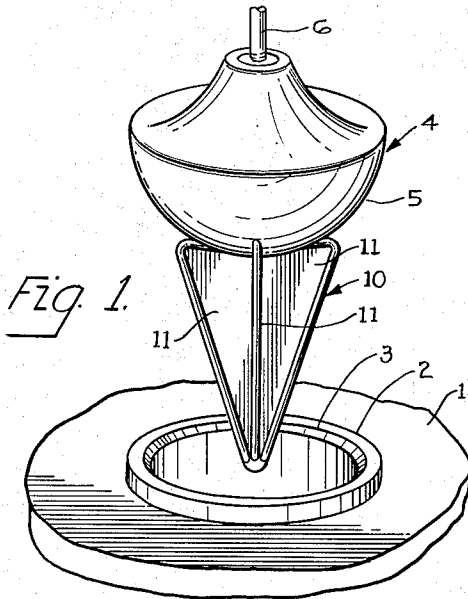


Fig. 4.

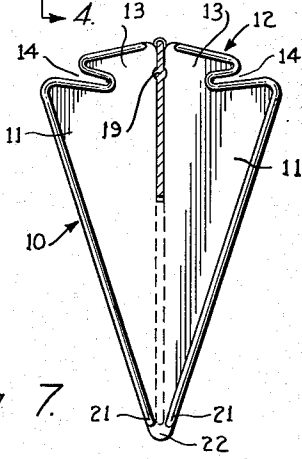
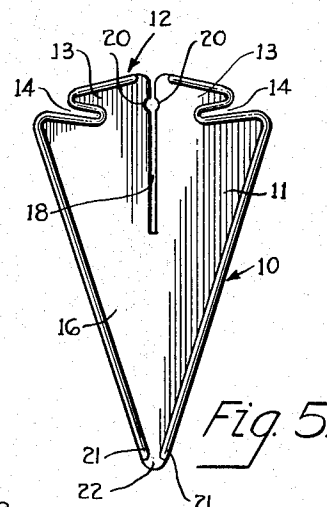
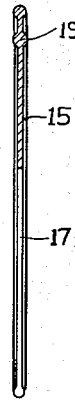
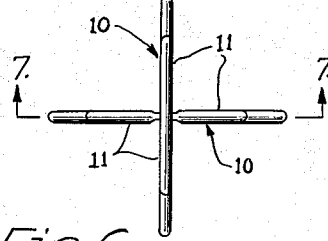


Fig. 6.



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FLUSH BASIN BALL VALVE GUIDE

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Application November 9, 1953, Serial No. 390,780

1 Claim. (Cl. 4—56)

This invention relates to a flush basin ball valve structure and to a guide for use in connection therewith for assuring the proper seating of the valve ball.

In the ordinary domestic type of toilet flush basins the flow of water through the downwardly directed discharge pipe is controlled by means of a rubber ball valve, the under surface of which is generally spherical in shape.

In general, the ball of such a valve is hollow, and has a relatively thin but self-restoring resilient rubber bottom wall provided with an axial opening at the base so that any water entering the interior of the ball, can drain out after the valve seats. The ball is lifted from its seat by means of a generally upright lift rod connected to its upper end. The lift rod is connected through suitable means to an external lever so that it can be lifted yet, when the lever is released, it is freed to permit the valve to return to seated position initially by gravity and finally by suction of the water.

Generally the rod passes through a lift rod guide which is in the form of one or more eyelets spaced above the ball and loosely accommodating the lift rod for axial movement so as not only to guide the rod but limit the movement of the ball vertically.

Occasionally it happens that the ball of the valve sways or shifts laterally out of alignment with the seat so that when it returns, it does not seat properly. Sometimes, likewise, it pinches in the guide and does not return satisfactorily. This is particularly true if there is a slight bend in the lift rod.

The present invention has to do with a guide device which has a portion arranged to be inserted into the interior of the valve ball of the type described through the opening in the bottom of the ball so as to connect the guide to the ball in relatively fixed position and with a downwardly tapered portion of the ball guide dependent from the ball and in coaxial alignment therewith, the axial projection of outermost radial limits of the tapered portion lying wholly within the inner diameter of the seating area of the ball, and the depending portion being of such length that when the ball is in fully raised position as limited by the lift rod guide, the lower end of the tapered portion is below the level of the seat of the discharge pipe.

The principal object of the present invention is to provide a ball valve and a ball valve guide combination such as above described.

Another object is to provide for such a combination a ball guide which can readily be attached and detached from the conventional flush basin valve ball.

Another object is to provide a ball guide which is composed of relatively flat sheet-like elements which are adapted to be assembled readily but which in unassembled condition can be packaged and shipped conveniently and economically.

Other objects and advantages will become apparent from the following description wherein reference is made to the drawings, in which

Figure 1 is a fragmentary perspective view of a flush basin and ball valve combination embodying the principles of the present invention and showing the ball guide of the present invention secured to the valve ball;

Figure 2 is a front elevation, partly in section, of the ball valve with the guide of the present invention attached,

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the lift rod and lift rod guide of the valve being indicated for convenience in description;

Figure 3 is a front elevation of one of the elements of which the valve ball guide is formed;

Figure 4 is a cross sectional view of the element illustrated in Figure 3 and taken on the line 4—4 thereof;

Figure 5 is a front elevation of the other one of the elements forming the ball guide;

Figure 6 is a top plan view of the elements of Figures 3 and 5 in assembled relation with respect to each other; and,

Figure 7 is a cross sectional view of the assembled elements illustrated in Figure 6, taken on the line 7—7 of Figure 6, part thereof being shown in elevation for clear-
ance in illustration.

Referring to the drawings, there is illustrated in Figures 1 and 2 a typical flush basin and ball valve combination such as provided on domestic toilets.

As these illustrated, the basin has a bottom wall 1 from which depends a gravity flow discharge pipe 2 having its upper end disposed within the basin and provided with an upwardly facing annular valve seat 3.

The valve plug is a so-called ball, indicated generally at 4, having its bottom portion in the form of a hemisphere as indicated at 5.

The ball 4 is provided with a suitable lift rod 6 which extends through one or more eyelets 7 of a lift rod guide, the eyelet or eyelets 7 being adapted for guiding the lift rod loosely for vertical movement and limiting the upward movement of the ball 4 by engagement with the upper end thereof.

The ball is lifted by suitable linkage mechanism connected to the lift rod and operable in turn by a suitable external lever on the flush basin, this operating structure being well known in the art.

As is customary with such valves, the ball 4 is hollow. Its portion 5 has a relatively thin, resilient, self-restoring wall which is provided at the bottom with a central opening 8. The opening 8 is coaxial with the lift rod 6. The diameter of the hemispherical portion 5 is somewhat greater than that of the seat 3 so that the ball seats thereon when in closed position on an annular seating area, such as indicated at 9, leaving the opening 8 exposed for draining the interior of the ball into the discharge pipe 2.

During the seating operation the ball is floating and has a tendency to sway laterally of the seat. In order to assure that the ball will be brought back to coaxial relation to the seat 3 when it is thus lowered by drainage of the water and also to prevent the lift rod 6 from cocking and binding in the guide 7 when the valve is lifted to its fully raised position or is being lowered, a ball guide 10 with which the present invention is particularly concerned is provided.

As illustrated, the ball guide 10 comprises an elongated body in the form of a plurality of fins 11 which extend radially from a common axis and preferably are angularly disposed relative to each other about the common axis, four such fins spaced at 90° to each other being preferred. The body is provided at its upper end with means for connecting it to the valve ball 4. The preferred form of connecting means for this purpose is a shank, indicated generally at 12, which is adapted to be received through the opening 8 in the bottom of the ball by stretching the resilient side walls of the ball. The shank 12 preferably is in the form of a plurality of radially extending fins 13 corresponding in number to the fins 11 and correspondingly arranged. The upper edge of each fin 11 and the lower edge of its corresponding fin 13 are spaced apart in a direction generally endwise or axially of the ball so as to provide connecting slots 14 which open outwardly generally radially

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of their associated fins. The slots 14 are of sufficient width so as to snugly accommodate the margins of the rubber wall of the valve ball defining the opening 8 so as to support the ball guide body by the shank 12 from the lower end of the valve ball in substantially fixed and coaxial relation thereto. The common axis of the fins 11 and of the fins 13 is a continuation of the axis of the guide rod 6.

This ball guide 10 as a whole is relatively wide adjacent its upper end and at its outer edges tapers inwardly downwardly to the lower end. The maximum width of the ball guide radially of each fin 11 is less than the inner radius of the annular valve seat 3 of the discharge pipe and of the discharge pipe itself. Preferably there is only a slight clearance between the outermost edges of the fins 11 at their upper ends and the inner wall of the pipe 2, about $\frac{1}{8}$ " clearance being preferred.

The length of the fins 11 is such that when the valve ball 4 is in a fully raised position, the lower end of the fins, or the guide 10, is below the level of the seat 3. Thus the ball guide 10 can engage the inner wall of the pipe 2 and thereby prevent lateral swaying of the ball out of alignment with the seat 3 beyond the point at which it can return and seat properly and operates as the ball is lowered with the lowering of the water level to urge the ball back to coaxial position with respect to the seat.

A guide for this purpose preferably should be made of material which is not adversely affected by the water or by corrosion and deposits which would adversely affect the free flow of water therepast. For this purpose, the guide is made of suitable synthetic resin such as the thermo-plastic or thermo-setting materials commonly available on the market.

Furthermore, it is desirable that the ball guide be made in the form which is economical to produce and which can be packaged readily for sale. For this purpose, the ball guide is preferably made of two elements which are assembled together into a single guide, the elements and their assembly being best illustrated in Figures 3 to 6.

As there illustrated, two elements are provided and designated at 15 and 16, respectively. Each of the elements preferably is of generally flat sheet-like material and is relatively stiff though somewhat resilient. Each is generally triangular in outline with a base less than the altitude, the triangular outline being inverted in the operating position of the guide.

The element 15 is provided with a slot 17 which extends from its apex partway toward its base or upper end in Figure 3.

The element 16 is provided with a slot 18 which extends from its base or upper end in Figure 5 partway toward its apex or lower end.

The two elements are assembled as illustrated in Figures 6 and 7 by sliding them together endwise with the apex of the element 15 toward the apex of the element 16 so that that portion of the element 15 between its base and the inner end of its slot 17 is received in the slot 18 of the element 16 and that portion of the element 16 between its apex and the inner end of its slot 18 is accommodated in the slot 17 of the element 15. The slots 17 and 18 preferably are of such length that when the inner ends are abutting each other, the elements 15 and 16 are in the position as illustrated in Figures 6 and 7.

In order to secure the elements 15 and 16 detachably in the assembled position described, the element 15 is provided on one or both faces with a boss, or bosses, 19. Correspondingly, the walls defining the slot 18 are provided with notches 20 which are shaped to snugly accommodate the bosses 19, respectively. During assembly, the slotted portion of the element 18 can be stressed transversely of the slot to widen it, or the portions adjacent the slot can be flexed flatwise of the element, so as

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to permit the elements to be moved to fully seated position and dispose the boss or bosses 19 in position for engagement in the slot or slots 20 upon resilient restoration of the elements, thus locking the elements against axial separation from each other.

Furthermore, the element 16 is provided near its apex with abutments or bosses 21 which are spaced apart laterally of the element so as to define at each face a passage 22 aligned with the slot 18. The operating portions of the bosses or abutments 21 are spaced axially of the element 16 from the inner end of the slot 18 and are spaced apart laterally of the element a sufficient distance to receive endwise of the elements, and to accommodate snugly, the portions of the element 15 adjacent its apex, thus constraining these portions from movement out of position laterally of the element 16.

It is apparent from the foregoing description that a simple effective ball valve and guide combination and a guide for the valve ball of an open end ball valve are provided and that the ball guide is one which can be installed readily, will withstand the action of the water, remain free from corrosion and any deposits tending to interfere with the flow of the water therepast, and which may be economically manufactured and packaged for shipment and display.

Having thus described my invention, I claim:

A guide for the purposes described and comprising a pair of members, each member being of relatively thin stiff resilient sheet-like material and of generally triangular outline with its base less than its altitude, one of the elements having a slot extending from its apex partway toward its base and the other element having a slot extending from its base partway toward its apex, said elements being assembled together, the said one with that portion between the inner end of its slot and its base accommodated in the slot of the other and with that portion of the other element between the inner end of its slot and its apex being accommodated in the slot of said one, said elements being angularly disposed with respect to each other about a common axis extending from the base to the apex of each, said other element having marginal ribs on both edges of both faces adjacent its apex, said ribs terminating in spaced relation to each other laterally of the element and defining therebetween at the apex of said other element passages respective to the faces of said other element and which passages are aligned endwise of the slot of the other element with the slot of the other element and portions of said one element at each side of the slot of said one element being accommodated in said passages, respectively, for securing said portions from displacement laterally of said other element and said one element having bosses on opposite faces, notches in the side walls of, and opening laterally of, the slot of said other element, respectively, said other element being resiliently deformable for permitting said bosses to pass into position for reception in said notches when the elements are assembled, and each of said elements having oppositely disposed notches near its base extending laterally of the element and adapted to receive therein the margins of a rubber flush basin ball valve for securing the guide to a ball valve near the base of the guide and with the guide tapering away from the ball valve.

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