

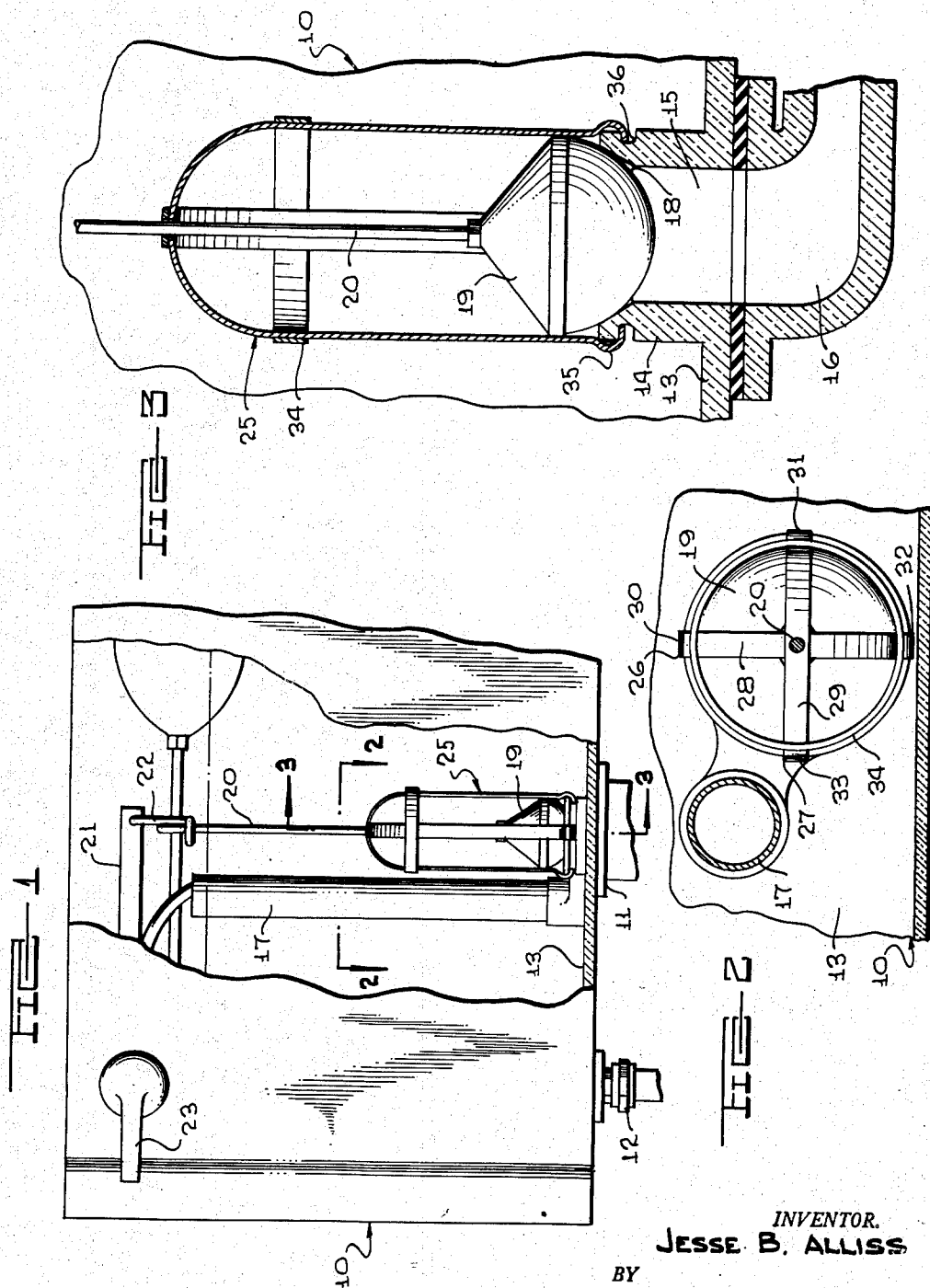
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FLUSH VALVE GUIDE

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FLUSH VALVE GUIDE

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This invention relates to flush valve guides and more particularly to a guide structure rigidly mounted in a flush tank to guide a ball valve in its movements toward and away from its seat.

It is among the objects of the invention to provide a flush valve guide in the form of a cage which can be rigidly mounted on the valve seat boss of an existing flush tank to receive the ball valve and guide the ball valve in its movements toward and away from the seat, which eliminates the usual guide arm and valve stem guide and the binding action frequently occurring between the valve stem and stem guide prohibiting free movement of the ball valve toward and away from the seat, which can be easily installed in an existing flush tank with no modification of the tank construction, and which is simple and durable in construction, economical to manufacture, and positive and effective in operation.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawing wherein:

Figure 1 is a front elevational view of a fragmentary portion of a flush tank with a portion broken away and shown in cross section to illustrate the installation therein of a flush valve and a flush valve guide illustrative of the invention;

Figure 2 is a fragmentary cross sectional view on an enlarged scale on the line 2-2 of Figure 1; and

Figure 3 is a fragmentary cross sectional view on an enlarged scale on the line 3-3 of Figure 1.

With continued reference to the drawing the numeral 10 generally indicates a hollow, ceramic flush tank of known construction mounted on the tank receiving flange 11 of an associated toilet bowl and having a water inlet connection 12 extending through an aperture in its bottom wall 13.

A flush valve seat boss 14 is provided in the tank surrounding an aperture 15 which communicates with a channel 16 in the toilet bowl through which water from the flush tank is admitted to the toilet bowl when the flush valve is opened.

An overflow pipe 17 extends upwardly from the bottom wall of the flush tank adjacent the valve seat boss 14 and communicates with the interior of the boss 14 below the beveled valve seat 18 provided in the upper end of the valve seat boss.

A hemispherical valve ball 19 cooperates with the seat 18 to close the flush valve and a stem 20 projects upwardly from the ball 19 and is connected by a lever 21 and a link 22, of known

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construction, to the valve operating handle 23 mounted in an aperture in the front wall of the flush tank near the upper end of the tank.

Ordinarily, a guide arm is mounted on the overflow pipe 17 and supports a valve stem guide at a location spaced from the overflow pipe to slidably receive the valve stem 20. It frequently occurs that the valve stem binds in the valve guide thus provided and this binding action inhibits free movement of the valve ball 19 toward and away from the valve seat 18, causing leakage of water through the valve. It also frequently occurs that the rush of water entering the tank through the water inlet fitting 12 tends to force the valve ball away from proper alignment with its seat, preventing the valve from seating properly and inducing leakage of water through the valve.

In accordance with the present invention the guide arm and valve stem guide are omitted and a valve guiding cage, generally indicated at 25, is mounted on the valve seat boss 14 to guide the valve ball 19 in its movements toward and away from the seat 18 and provide for the free movement of the valve ball in its valve opening and valve closing movements.

This valve guiding cage comprises two U-shaped members 26 and 27 formed of elongated flat strips of resilient and preferably corrosion resisting metal. These U-shaped members are joined together at the centers of their bight portions and have their bight portions disposed substantially perpendicular to each other. The U-shaped members thus joined together provide two perpendicularly disposed bands 28 and 29 of substantially semicircular shape at one end of the cage and four substantially straight and mutually parallel legs 30, 31, 32 and 33, disposed at angular intervals of approximately 90 degrees around the cage. The portions 28 and 29 are provided at their centers with mutually registering apertures which slidably receive the valve stem 20 and the length of the legs is sufficient to permit full movement of the valve 19 between its valve opening and valve closing positions without any interference between the valve and the cage. A circular ring 34 of flat metal strip surrounds the legs at the junctures of the legs with the corresponding semicircular portions 28 and 29 and is rigidly secured to the legs to secure the legs in their mutually parallel and angularly spaced apart positions. At their ends remote from the portions 28 and 29 the legs are provided with hook formations 35 which engage in the annular external groove 36 in the valve seat boss 14 near

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the upper end of this boss to rigidly secure the valve guiding cage onto the valve seat boss.

The U-shaped members 26 and 27 are preferably formed of a resilient material so that the hook formations 35 can be snapped over the rim or lip between the top end of the boss 14 and the groove 36 and will be resiliently retained in engagement with this lip or rim so that, while the cage will not be dislodged during normal use of the valve, it can be removed for the replacement of a new ball valve when necessary.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. The combination with a toilet bowl flush valve seat boss having an external groove, an annular seat on its upper end above said seat, and a ball valve engageable in said seat and having an upwardly projecting valve stem centered relative to the seat, of a guide cage comprising a pair of inverted U-shaped elements having arcuate bight portions, said bight portions intersecting at the middle thereof and being provided with a guide hole traversing the bight portions at the point at their intersection and slidably receiving the ball valve stem, said U-shaped elements further comprising straight legs depending from the ends of their bight portions, said legs being parallel to each other and equally circumferentially spaced around the valve seat boss, the facing sides of the legs being spaced from each other across the valve seat to slidably confine the ball valve to a vertical path of movement coinciding with the valve seat, said legs being long enough to provide for full opening and closing movements of the ball valve between said bight portions and the lower ends of the legs, and resilient inwardly directed hooks on the lower ends of the legs, said hooks including portions arranged to rest upon the upper end of the valve seat boss and laterally inwardly directed terminal end portions engageable in the valve

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seat boss groove for removably mounting the cage on the valve seat boss.

2. The combination with a toilet bowl flush valve seat boss having an external groove, an annular seat on its upper end above said seat, and a ball valve engageable in said seat and having an upwardly projecting valve stem centered relative to the seat, of a guide cage comprising a pair of inverted U-shaped elements having arcuate bight portions, said bight portions intersecting at the middle thereof and being provided with a guide hole traversing the bight portions at the point of their intersection and slidably receiving the ball valve stem, said U-shaped elements further comprising straight legs depending from the ends of their bight portions, said legs being parallel to each other and equally circumferentially spaced around the valve seat boss, the facing sides of the legs being spaced from each other across the valve seat to slidably confine the ball valve to a vertical path of movement coinciding with the valve seat, said legs being long enough to provide for full opening and closing movements of the ball valve between said bight portions and the lower ends of the legs, and resilient inwardly directed hooks on the lower ends of the legs, said hooks including portions arranged to rest upon the upper end of the valve seat boss and laterally inwardly directed terminal end portions engageable in the valve seat boss groove for removably mounting the cage on the valve seat boss, said legs being resilient, and a ring surrounding said legs at a point near and below said bight portions, said ring engaging the outer sides of said legs so as to retain the legs in place, said ring being sufficiently spaced from the lower ends of the legs to free the legs for flexing in applying and removing the hooks from the valve seat boss.

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