Jan. 15, 1957 A. W. HARKNESS 2,777,136

GUIDE AND BALL FLUSH VALVE

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Fig. 1

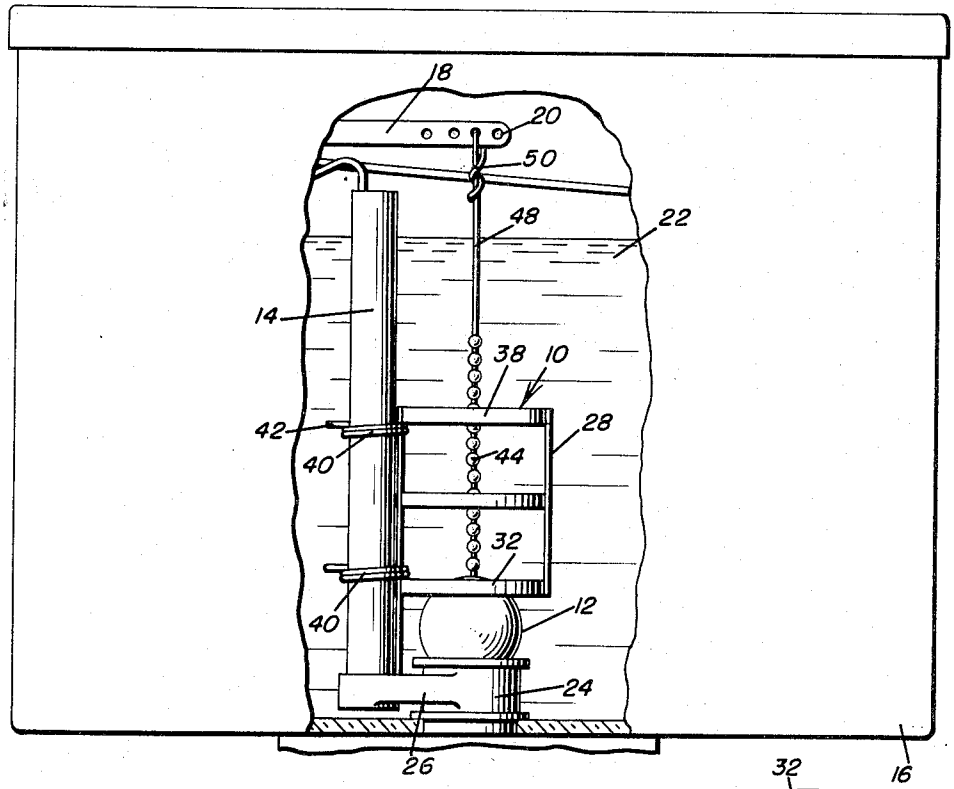
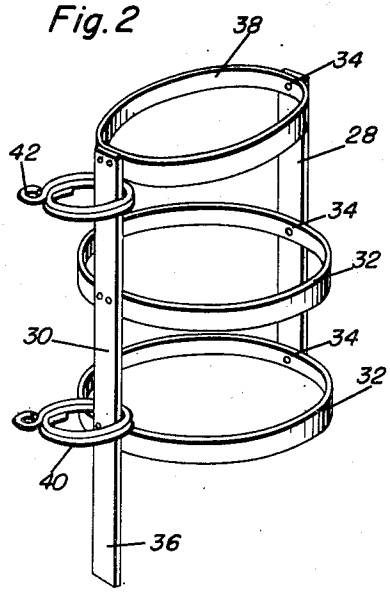



Fig. 2



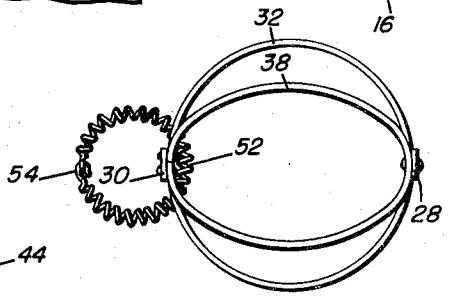




Fig. 4

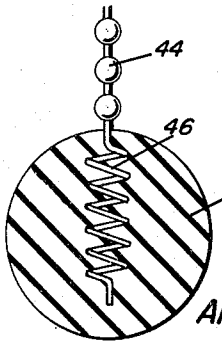



Fig. 3

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# GUIDE AND BALL FLUSH VALVE

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3 Claims. (Cl. 4—57)

This invention relates to an improved guide and ball flush valve for use in a flush tank having a vertical overflow pipe, a discharge opening, a drain opening and a valve seat for closing the discharge opening.

An object of this invention is to provide an improved guide and ball flush valve having a flexible lifting line for easy attachment to the lift arm in the flush tank and includes easily attachable support means for attaching the guide to the vertical overflow pipe.

Another object of this invention is to provide an improved guide and ball flush valve having a novel attaching means between the ball valve and the lifting member, and having a novel means for attaching the guide to the vertical overflow pipe.

A further object of this invention is to provide an improved guide and ball flush valve wherein the guide is constructed of a skeletonized cage-like member for permitting vertical movement of the ball valve, discharge of the water and preventing the ball valve from becoming misaligned with the valve seat.

Yet another object of this invention is to provide an improved ball flush valve and guide therefor wherein the guide is positioned a predetermined distance above the valve seat and permits the ball valve to be raised a predetermined distance away from the valve seat.

A still further object of this invention is to provide an improved guide and ball flush valve which is simple in construction, easy to assemble, maintain and repair, accurate and long wearing in construction and constructed of readily obtainable material, thereby enhancing the economic feasibility of the device.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view showing a portion of the flush tank broken away and the improved guide and ball flush valve of this invention mounted in operative position on the vertical overflow pipe;

Figure 2 is a perspective detail view showing one form of the improved guide and its supporting means;

Figure 3 is a transverse, vertical section, taken substantially through the center line of the ball flush valve showing the novel attaching means of the flexible lift line to the ball flush valve; and

Figure 4 is a top plan view of the improved guide and a modified form of support or attaching means for mounting the improved guide on the vertical overflow pipe.

Referring now specifically to the drawings, it will be seen that the numeral **10** generally designates the improved guide, and the numeral **12** generally indicates the improved ball flush valve used in conjunction with the guide of this invention. The guide **10** is secured to a vertical overflow pipe **14** mounted in the usual flush tank **16**. A swingable lift arm **18** having longitudinally spaced apertures **20** at one end thereof is secured to the usual



lifting lever on the outside of the flush tank. As shown in Figure 1, the water **22** in the flush tank **16** will be discharged through the valve seat member **24** when the ball valve **12** is removed from the valve seat, and it will be seen that the overflow pipe is rigidly connected to the discharge opening by the transverse portion generally indicated by the numeral **26** and it will be understood that a passage is in communication with the pipe **14** wherein any overflow may be discharged through the discharge opening **24**.

Referring now in detail to Figure 2, it will be seen that the improved valve guide of this invention generally denoted by the numeral **10** includes a pair of elongated side members **28** and **30** with the side member **30** being longer than the member **28** for a purpose described hereinafter. A pair of vertically spaced circular rings **32** are secured to the elongated members **28** and **30** by suitable fastening means such as rivets **34** and the lowermost of the circular rings **32** is flush with the lower end of the elongated member **28**, and the elongated member **30** has a portion indicated by the numeral **36** projecting below the lowermost circular ring **32**. An uppermost ring **38** is secured to the upper ends of the elongated members **28** and **30** by fastening means **34** and the upper end of the elongated members **28** and **30** are substantially flush with the upper edge of the ring **38**. The uppermost ring **38** is generally oval in shape and the minor diameter or axis of the oval shaped ring **38** is less than the diameter of the circular rings **32** for a purpose described hereinafter. A pair of vertically spaced supporting loops **40** encircle the elongated member **30** and each of the loops **40** are constructed of a coil of wire having the coils thereof in adjacent relation and longitudinally aligned substantially in the nature of a coil. One free end of each of the wire members **40** includes a projecting eye **42** forming a finger abutting member for imparting a tangential force to the coils of the wire member thereby increasing the inside diameter of the loops **40**. It will be understood that by pressing against the eye members **42** the wire loops **40** may be slipped over the vertical overflow pipe **14** and upon release of the eye members **42** the resilient nature of the wire loops will contract the wire loops, thereby decreasing the diameter and frictionally engaging the overflow pipe **14**. As seen in Figure 1, when the valve guide **10** is mounted upon the overflow pipe **14**, the extending portion **36** of the elongated member **30** engages the upper surface of the transverse member **26**, thereby spacing the lower circular ring **32** a predetermined distance from the discharge opening **24** and the valve seat thereon.

Referring now specifically to Figures 1 and 3, it will be seen that the ball flush valve is generally spherical in shape and a flexible lift chain **44** having a corkscrew end portion **46** is embedded or inserted in the ball flush valve **12** and a flexible member **48** extends from the chain portion **44** and includes a bendable portion **50** for return bending upon itself and looping in the nature of a wire splice. It will be noted that the corkscrew portion **46** inserts only partially through the ball valve **12** and the ball valve **12** may be made of any suitable buoyant rubber or rubber-like material having long wearing characteristics.

Referring now specifically to Figure 4, it will be seen that the elongated member **30** is attached to the overflow pipe **14** by two elongated coil springs **52** having hooked end portions **54** which are detachable from each other in an obvious manner. Obviously, the elongated members placed alongside the pipe **14** and the elongated coil springs **52** are positioned around the member **30** and the pipe **14** and the hook portions **54** are engaged with each other wherein the resiliency of the springs **52** will maintain the elongated member **30** in position against the pipe **14** regardless of the size of the overflow pipe **14**.

The operation of the device will be readily understood. The valve guide **10** is positioned on the vertical overflow pipe **14** by expanding the wire loops **40** with pressure on the eye members **42** and the ball flush valve is positioned on the valve seat in the discharge opening **24** and the circular rings **32** are aligned with the discharge opening **24** in an obvious manner. The flexible line **44** is then secured to the lift arm **18** by inserting the upper portion **48** through the aperture **20** which is directly above the center of the discharge opening **24** and looped around itself generally, as shown in Figure 1 by the numeral **50**. The valve **12** may be lifted from the valve seat on the discharge opening **24** by manipulating the lift arm **18** by the lift lever (not shown) on the outside of the flush tank **16** in an obvious manner. It will be seen that the guide **10** guides the ball valve **12** in a vertical position and maintains the valve **12** directly over the discharge opening **24** wherein the valve **12** will reengage the discharge opening **24** when the water level **22** falls to a relatively low level. It will be seen that the oval shaped ring **38** at the upper end of the guide **10** prevents the ball valve **12** from becoming disengaged from the guide **10**, either due to the buoyant action of the water on the rubber valve **12** or due to the action of the lift arm **18**. It will be noted that the corkscrew portion **46** provides a secure attachment for the flexible member **44** to the ball valve **12** and the corkscrew portion **46** does not extend completely through the ball valve, thereby precluding any possible leaking around this attachment. As shown in Figure 4, the elongated member **36** may be secured to the vertical pipe **14** by utilizing the elongated flexible coil springs **52**, by encircling the pipe **14** and the elongated member **30** and engaging the hooked end portions **54** in an obvious manner. The round ball valve may be constructed of any suitable sponge rubber, or rubber-like material and the particular size will be determined by the individual needs. The valve guide **10** and the lift wire and chain are all constructed of a rust-proof and non-corrosive substance such as brass or the like, and the spring ring loops **40** and the coil springs **52** are also constructed of the corrosion-resistant material thereby enchancing the longevity of the device and also providing a device which will be readily removed as may become necessary in repair or replacing of various parts of the installation such as the ball valve or the discharge opening. The particular guide and ball of this invention assures that the ball valve will at all times remain in vertical alignment with the valve seat, wherein the water in the flush tank will be quickly, efficiently and effectively shut off when the water has reached a predetermined lower level.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.



What is claimed as new is as follows:

1. A ball valve guide comprising a pair of elongated members, a plurality of longitudinally spaced rings secured to said members, and a pair of longitudinally spaced supporting means positioned on one of said elongated members, said one of said elongated members projecting below the other of said members, the uppermost of said rings being generally oval shaped and having a minor axis of less length than the diameter of the other rings for limiting upward movement of a ball valve in a flush tank.

2. The structure as defined in claim 5 wherein each of said supporting means includes a circular spiral wire coiled loop with the coils thereof substantially in contact with each other, and a laterally projecting eye member on one end of said wire, said loop encircling and attached to one of said elongated members and adapted to be positioned over an overflow pipe, said wire being resilient and expansible to receive the pipe when tangential pressure is applied against the eye member thereby expanding the internal diameter of the coiled loop.

3. In combination, a flush tank valve having a discharge opening with an upwardly facing valve seat, an upstanding overflow pipe, a horizontally disposed transverse portion interconnecting the opening and the overflow pipe, a freely movable ball valve removably disposed on the valve seat, a flexible lift member for the ball valve, and a guide for the ball valve, said guide including a plurality of vertically disposed members with one of said members extending below the other for engagement with the upper surface of the transverse portion of the flush tank valve, a plurality of vertically spaced rings attached to said vertical members thereby forming an open frame in surrounding relation to the ball valve to permit free flow of water into the interior of the frame at various water levels, the lowermost ring being disposed at the lower end of the other member whereby the extending vertical member retains the lowermost ring in spaced relation to the valve seat to permit unobstructed flow of water into the opening and to prevent lateral movement of the ball valve, means for detachably supporting the one vertical member on the overflow pipe, the uppermost of said rings being oval-shaped and having an effective diameter less than the diameter of the ball valve thereby limiting the upward movement of ball valve.

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