Oct. 24, 1950 M. E. CRANDALL 2,526,936

FLUSH BALL GUIDE

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Fig. 1

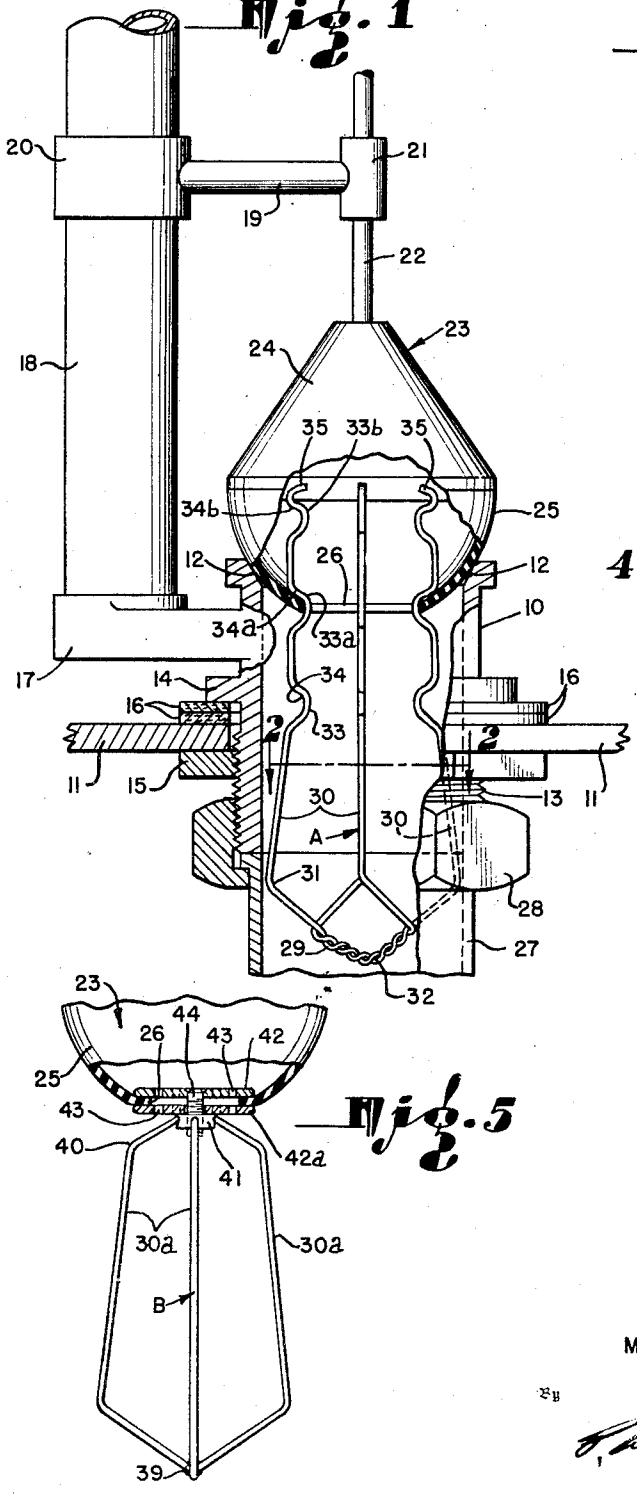
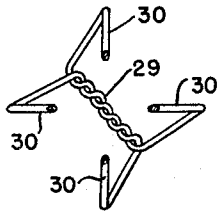


Fig. 2



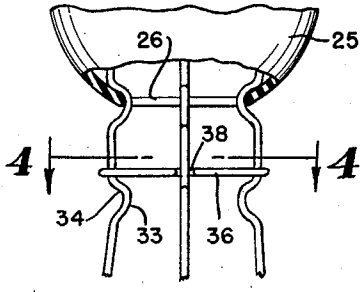


Fig. 3

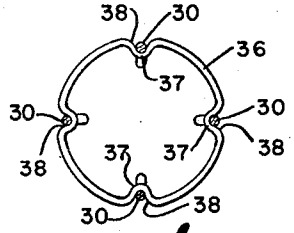


Fig. 4

Fig. 5

Inventor

MAX E. CRANDALL

By

Attorney

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FLUSH BALL GUIDE

Max E. Crandall, Kingfisher, Okla., assignor of one-half to Marsh T. Sanders, Kingfisher, Okla.

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4 Claims. (Cl. 4—56)

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The present invention relates generally to flush tank valves, and is more particularly concerned with improved attachable guide and seating means for such valves.

In the conventional flush valve arrangement utilizing the usual rubber ball valve with an upper guided stem, looseness which is provided in the guiding parts so that the ball valve may unseat and raise without being impeded, permits lateral swinging movement of the ball valve so that it is not unusual for the conventional guide stem to become tilted or worn in such a way that it will bind in its guide and prevent proper return of the ball to seating position to properly and efficiently close the outlet port.

Having the foregoing in mind, one important object of the herein described invention is to provide a valve guide of inexpensive, simple, construction, which may be readily attached to the conventional ball valve to augment and cooperate with the usually furnished parts to prevent the ball from swinging laterally from its seat, and assuring that the ball will positively engage the seat of the discharge port, and also assure free unbinding vertical movement of the standard valve stem in its guide.

A further object of the invention is to provide an auxiliary attachable ball valve guide of simple construction in which novel means are provided to enable selective adjustment of the valve guide length to accommodate the guide for operation for varied conditions of installation. For example, the active length of the valve guide may be increased or decreased, depending upon whether a long or short L connection is made to the discharge port fitting.

A still further object is to provide improved means for assuring that the legs of the guide are retained in attached position with the periphery of an opening in the bottom of the ball valve. In this connection, a retainer member is provided which may be removably positioned within the legs and is of such diameter that it will act to slightly spread the legs against the resilient force of the material at the periphery of the valve opening, this resilient force acting to retain the peripheral material in associated notches of the legs, and thus oppose inadvertent or accidental detaching of the valve guide from the valve.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing preferred embodiments of the invention, without placing limitations on the scope of the invention defined in the appended claims.

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Referring to the drawings which are for illustrative purposes only:

Fig. 1 is a fragmentary elevational view of an installation showing the invention applied to a conventional flush tank installation, certain parts being cut away and shown in section for clarity;

Fig. 2 is a sectional view through the valve guide, taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary elevational view showing a modification of the structure shown in Fig. 1;

Fig. 4 is a transverse section taken through the valve guide, substantially on line 4—4 of Fig. 3, and showing details of construction of the retainer member; and

Fig. 5 is a fragmentary elevational view, partly in section, of an additional modified form of construction.

Referring now to the drawings, the invention is shown in one form as being applied to a conventional flush tank installation wherein a water discharge port fitting 10 is installed in the bottom 11 of the conventional flush tank.

The discharge fitting 10 comprises a tubular body of the usual construction having an annular seat surface 12 formed at its uppermost end which is positioned within the tank. The opposite end of the fitting, as shown at 13, is externally threaded and projects through an opening in the tank bottom, a circumferentially extending intermediate flange 14 being provided to form an abutment and cooperate with a securing nut 15 threaded onto the end 13 to clampingly secure the fitting to the tank bottom. In accordance with the usual practice, one or more gaskets 16 may be positioned between the flange 14 and the adjacent tank bottom.

The body portion of the discharge fitting 10 includes a lateral extension 17 in which the conventional tank over-flow pipe 18 is supported and communicates through a passageway in the lateral extension (not shown) with the interior of the fitting below the annular seat 12.

Spaced above the discharge fitting, a stem guide 19 is supported on the over-flow pipe by means of a collar 20, and carries at its outermost end a tubular sleeve 21 within which there is vertically guided an elongate valve stem 22 secured at its lowermost end to a ball valve 23 of conventional construction.

This ball valve is of usual construction, being made of a resilient material, such as rubber or similar composition. The uppermost portion of the valve, as indicated by the numeral 24, is of frusto-conical shape and is of relatively thick

walled construction to give it a relatively rigid characteristic. Depending from the upper valve portion, the lower wall portion **25** of the valve is of substantially hemispherical shape with a relatively thinner wall than the upper portion. The lower wall portion of the ball valve is adapted to form a seating surface for seating upon the annular seat **12** of the discharge fitting, when the ball valve is closed. Centrally of the lower wall portion **25**, the ball valve is provided with an opening **26** which provides communication with the interior of the ball valve and drains off any water which may tend to accumulate therein and which would otherwise tend to waterlog and prevent efficient operation of the valve.

One constructional embodiment of the attachable guide of the present invention is generally indicated at A in Fig. 1, the guide being operatively attached to the ball valve and projecting downwardly into the end **13** of the discharge fitting, and extending into one leg of an attached outlet L **27** which may be attached to the end **13** by means of a coupling union **28**. In various installations, this L may be a so-called "short" or "long" L connection to meet varied installation conditions. As it is desirable and advantageous to have the valve guide A project downwardly as far as possible, there are definite advantages to be obtained in being able to vary or adjust the extent of this projection of the guide, depending upon the type of L connection utilized. The manner in which this adjustment is accomplished in the present invention will subsequently be described in detail.

The valve guide is of cage-like construction as shown in Fig. 1 and comprises a pair of elongate members, which may be of wire, plastic or other suitable material, interconnected intermediate their ends by any suitable means, that which is illustrated being by twisting the wire members together as shown at **29**. The opposite ends of the wire members are then bent upwardly to form legs **30** which are angularly spaced about and extend generally along the cage axis, being slightly inclined inwardly from the points of bend **31** in each case. It will be noted that the twisted portion **29** is downwardly bent substantially at its midpoint as shown at **32**.

The terminal end portions of each leg are of similarly undulated or waved formation, being provided at spaced intervals with inwardly offset portions **33**, **33***a*, and **33***b* which respectively define outwardly opening notches **34**, **34***a*, and **34***b*, which in effect form hooks which may be engaged over the periphery of the opening **26**. The corresponding notches of the respective legs form sets which may be selectively used to attach the guide to the ball valve, and while three sets have been illustrated, it will be apparent that as many sets may be provided as desired without departing from the present invention. With this arrangement, it is possible to adjust the extent of projection of the guide below the ball valve to meet varied installation conditions. The uppermost tip ends of the legs are turned back on themselves to form a blunt end as shown at **35** so as not to puncture or wear the inner surface of the ball guide wall.

For a given installation, if desired, projecting end portions of the legs within the ball valve may be cut off. For example, when mounted as shown in Fig. 1, the projecting ends of the legs could be cut off at the points as indicated by the numeral **35**, although this is not necessary so far as the arrangement disclosed is concerned. It might be necessary to sever the legs in this manner when going from an extremely long guide to an extremely short guide, and a considerable number of securing notches are provided in the legs.

The guide as described above forms in effect a cage-like structure, and will be constructed of a material having a slight amount of inherent resiliency. By constructing the leg spacing so that the terminal end portions will be spread slightly greater than the diameter of the opening **26**, the ends may be inserted into the opening by pressing them together sufficiently, and then, after insertion, the tendency of the legs to move outwardly under their inherent resiliency will maintain the notches and associated periphery of the opening in engagement and prevent displacement of the guide from the ball valve.

However, as a modification of the arrangement shown in Fig. 1, I may provide an additional retainer member **36**, which may be of generally annular or ring form, as shown in Fig. 4, this ring being formed with inwardly off-set portions **37** which result in outwardly opening peripheral notches **38** adapted to receive the leg portions **30** therein, when the retainer is mounted within the legs. This retainer is made of such size that, when the legs are in the associated notches **38**, the notches containing the periphery of the opening **26** will be spread outwardly slightly and pushed against the resilient pressure of the material of this portion of the ball valve, this pressure acting to forcibly hold the parts in engagement, and also tending to forcibly retain the legs in the notches **38**.

The retainer **36** thus opposes the tendency of the resilient forces acting against the legs, to prevent inward movement of the legs and retain the legs in properly spaced position. Moreover, the notches **38** also prevent angular shifting of the legs with respect to each other and produce a very rigid structure.

In the modification illustrated in Fig. 5, a cage B is provided in which the legs **30***a* are bent and crossed at an angle so as to overlie each other, the legs being secured by welding, as shown at **39**, or other suitable means. The end terminals in this construction are bent as shown at points **40**, so as to bring the tips of these ends together, the tips being secured into a common internally threaded member such as a nut **41**.

A slightly different arrangement is provided in this case for securing the cage B to the ball valve **23**. As shown, a pair of clamping members **42** and **42***a* in the form of discs are provided, these members being perforate and having a plurality of openings **43**. The member **42** carries a centrally fixed threaded stud **44** adapted to project through an opening in the member **42***a* and make threaded engagement with the nut **41**. The openings **43** permit free flow of fluid into and out of the ball valve so that it does not become waterlogged, and by screwing the nut **41** onto the stud **44**, the stud and nut may be cooperatively utilized to actuate the clamping members into clamped and unclamped position. In the clamped position, the clamping members engage the periphery of the ball valve opening and in this way, attaches the cage B in depending position to the ball valve.

While, for purposes of illustration, the ball valve guide of the present invention has been described as containing four legs, it will be ap-

preciated that a greater or less number of legs may be provided, and it will also be understood that various changes in form and construction may be made within the spirit of the invention without departing from the spirit of the invention or extended beyond the scope of the appended claims.

I claim as my invention:

1. An attachable guide for a tank ball valve having a bottom opening defined by an annular edge portion, comprising: a pair of flexible, resilient wire members twisted together intermediate their ends and bent adjacent their twisted portions to provide angularly disposed legs with free end terminal portions of the wire members adjacently disposed and extending substantially in parallel relation; and inwardly off-set portions at spaced intervals at corresponding positions along the end terminal portions of each leg defining outwardly opening notches, the correspondingly positioned notches of the respective legs forming selective sets adapted to mutually receive the annular edge of said ball valve therein and enable adjustable positioning of the guide with respect to the valve to which it is attached.

2. An attachable guide for a tank ball valve having a bottom opening defined by an annular edge portion, comprising: a plurality of flexible, resilient members connected intermediate their ends and bent adjacent said connection to form angularly positioned legs with said ends free; and sets of outwardly opening notches at spaced intervals and corresponding positions along the end terminal portions of said legs, the notches of each set being selectively engageable with the annular edge portion of said valve to support the guide and adjustably vary the position thereof with respect to the valve.

3. An attachable guiding device for a ball valve having a bottom opening, comprising: a cage structure having a plurality of interconnected angularly spaced legs of resilient material having free end portions adapted for insertion into said bottom opening; and sets of correspondingly positioned outwardly opening notches at intervals along said end portions, each set of notches being adapted to receive the periphery of the valve bottom opening therein and attach the device to the valve, whereby the projecting length of the guide from the ball valve may be varied to meet different installation requirements.

4. As an article of manufacture, an adjustable guide attachment for a flush tank ball valve having a bottom opening, comprising: a cage-like structure having a plurality of interconnected angularly spaced elongate legs of flexible resilient material extending generally along the cage axis and adapted to be inserted into the bottom opening of the ball valve, said legs having free terminal end portions spaced from the cage axis and similarly undulated in a radial direction at corresponding intervals with respect to said cage axis for simultaneously engaging the edge of said bottom opening.

MAX E. CRANDALL.

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