

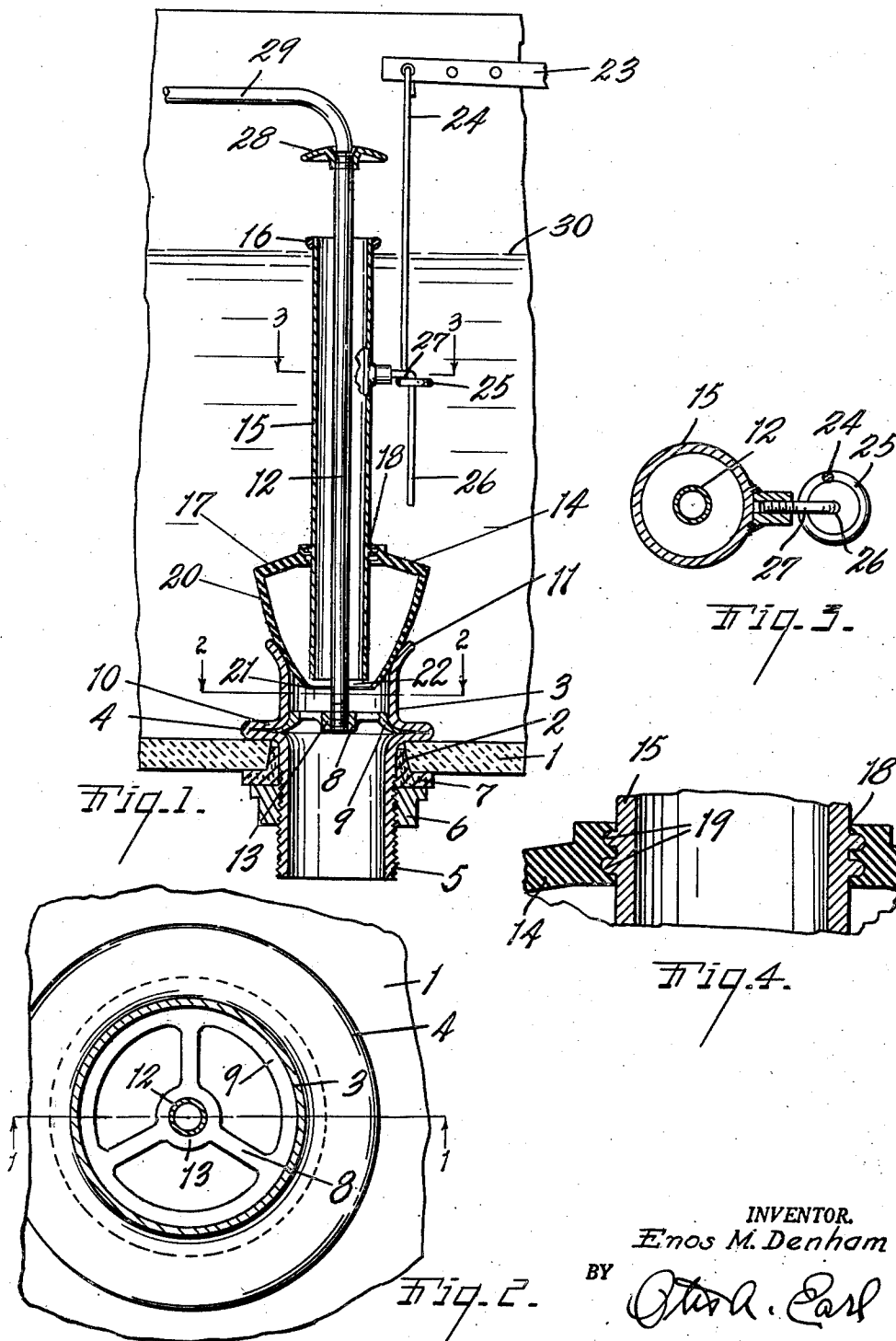
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FLUSHING VALVE

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FLUSHING VALVE

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This invention relates to improvements in flushing valves.

The main objects of this invention are:

First, to provide a flushing valve which is quiet in its operation, efficient in that it does not leak even when it has been in use for a long period of time, and prevents siphoning.

Second, to provide a flushing valve having these advantages which is economical in its parts, and one in which the parts are easily assembled and installed.

Third, to provide a combined reservoir outlet and valve seat member which is formed of a piece or section of tubing.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary view of a flushing valve embodying my invention installed in a reservoir, mainly in vertical section on a line corresponding to line 1—1 of Fig. 2.

Fig. 2 is an enlarged fragmentary view in section on a line corresponding to line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary view mainly in transverse section on a line corresponding to line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary sectional view corresponding to that of Fig. 2, showing details of the mounting of the valve upon the stem.

In the accompanying drawing, 1 represents a porcelain reservoir or tank provided with an opening 2 in the bottom thereof. This opening receives the combined outlet and valve seat member 3 which is formed of a section of tubing having a transverse bellows fold therein intermediate its ends providing a supporting flange 4 seated upon the inner side of the tank. The outer end of the member 3 is threaded at 5 to receive the nut 6 which is opposed to the flange 4 in clamping the member 3 in place. A gasket 7 is provided.

The bridge or spider 8 is provided with a peripheral edge portion 9 clamped in the fold 10 of the member 3. The upper end of the tube section forming the member 3 is spun or flared outwardly to provide an upwardly facing valve seat 11 which is preferably upwardly curved as illustrated. Preliminary to the insertion of the bridge member 8 into the bellows fold 10 as shown in Fig. 1, the bellows fold 10 is first formed with the upper and lower walls of the fold axially spaced a considerable distance from each other, that is a distance great as compared to that shown in Fig. 1

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and the bridge member 8 is of elongated shape with a width slightly less than the interior diameter of the tube to permit the seat member to be moved somewhat endwise from the outer end of the tube 3 into the bellows fold. The distance between the upper and lower walls of the fold then permits the bridge member to be turned in the bellows fold from a somewhat endwise position to a position at right angles to the length of the tube. The upper and lower walls of the fold are then pressed towards each other into gripping relation with the upper and lower surfaces of the bridge member. Or the bridge member 8 may be positioned in the bellows fold 10 by bending the peripheral edge of the bridge member from the general plane thereof to reduce the diameter thereof to the interior diameter of the tube 3 so that the bridge member may be moved from the outer end of the tube to the plane of the bellows fold after which the bridge member is somewhat flattened to force its peripheral edge into the bellows fold. The guide rod 12 is threaded at its lower end into a hub-like portion 13 of the bridge member or spider 8.

The valve 14 is provided with a tubular stem 15 loosely and floatably embracing the rod 12, it being of a diameter substantially greater than that of the guide rod. This stem is formed of a piece of tubing, desirably a relatively light gauge of copper tubing or it may be formed of a plastic. In the embodiment illustrated, it is provided with a reinforcing collar 16 at its upper end.

The valve 14 of the embodiment illustrated is formed of rubber, either natural or synthetic, and comprises a top 17 having an opening 18 therein receiving the stem 15. The stem is provided with annular beads 19 which retainingly engage the edges of the opening 18. The side wall 20 of the valve tapers downwardly and is of generally elliptical curvature. The side wall is of downwardly tapering thickness. The valve has an opening 21 in the bottom thereof of a diameter exceeding the diameter of the valve stem, the lower end of which is positioned closely adjacent but somewhat above the edge of the opening 21 coacting therewith to provide an annular opening designated by the numeral 22 for the ingress and egress of water to the valve. The valve wall being of downwardly tapering thickness results in a somewhat resiliently yieldable valve seat engaging portion permitting conformation and fitting to the seat. This, together with the free lateral floating of the valve and its stem relative to the guide rod, results in an effective wiping action of the valve across the seat, thus preventing the accumulation of sediment on the valve seat or on the valve which might prevent

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effective sealing. The guide rod 12 guides the valve stem 15 during the opening and closing movements of the valve, and the difference between the exterior diameter of the guide rod and the interior diameter of the stem adjacent the lower ends thereof is less than the difference between the exterior diameter of the valve at the lower end thereof and the interior diameter of the valve seat at the upper end thereof, whereby the lower end of the valve is guidingly received within valve seat when moved from a position outside the valve seat to a position within the same.

The valve wall which, as stated, is of downwardly tapering, generally elliptical curvature also has a wiping action as it seats upon the outwardly curved valve seat, thus further assuring an effective seal and keeping the seat and the valve itself free from sediment. The portion of the valve engaging the valve seat when the valve is closed is substantially spaced from the lower end of the valve which projects substantially into the outlet fixture when the valve is seated.

The valve and its stem being free to float on the guide rod also permits effective seating as well as freedom of movement. The valve is opened or lifted from its seat by means such as the flushing lever indicated at 23, which is provided with a link 24 pivotally engaged with the lever and terminating in an eye 25 of considerable diameter which loosely engages the downwardly projecting end 26 of the arm 27 secured to the side of the stem. This connection for the stem to the actuating lever permits substantially free floating movement of the valve and its stem.

The guide rod is provided with a disk-like stop 28 which limits the opening stroke of the valve and also serves as a baffle for water which may be projected through the stem when the valve is opened. The guide rod 12 is tubular and open at both ends, the refill tube 29 being associated with the upper end thereof. The valve stem serves as an overflow conduit so that the reservoir cannot overflow even though the inlet valve should fail to close. The stem being open at both ends also prevents siphoning. The water is indicated by the lines 30.

When the valve is raised from its seat it serves as a float. The water flows through the annular space into the valve and sometimes there is a limited gush of water discharged from the top of the tubular stem. The valve remains open until there is insufficient water to maintain it in floating position. It then drops to its seat and, as stated, forms an effective seal or closure with the seat. As the valve opens downwardly it does not become inoperative as a result of a leak as is the case with sealed ball valves. The valve has the further advantage of being relatively quiet in operation.

I have illustrated and described my invention in a highly practical embodiment thereof. I have not attempted to illustrate or describe the various adaptations which I contemplate as it is believed that this disclosure will enable those skilled in the art to embody or adapt my invention as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A flushing valve comprising a tubular valve seat member having an upwardly facing inwardly inclined valve seat, a bridge carried by said valve seat member disposed below its valve seat, an open tubular guide rod disposed on said bridge to

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project above said valve seat, an open tubular valve stem of a diameter substantially greater than that of said guide rod loosely and floatingly embracing the rod, a hollow valve of resilient material open at the bottom thereof but otherwise closed and comprising a top secured to the stem and through which the stem extends and curved downwardly tapering side walls, the lower end of the tubular stem being adjacent but above the edge of the opening of the valve and coacting therewith to provide an annular opening to the hollow valve around the stem, a stop on said guide rod coacting with the upper end of the stem limiting the opening stroke of the valve, said stop constituting a baffle for water discharged upwardly through the stem, an arm on the stem having a downwardly projecting portion, an actuating link having an eye loosely receiving said downwardly projecting portion of said arm, and a refill tube opening to the upper end of said guide rod, said stem constituting an overflow passage opening to within said valve seat, said valve when lifted from its seat being open to the discharging water and constituting a float.

2. A flushing valve comprising a tubular valve seat member having an upwardly facing inwardly inclined valve seat, a bridge carried by said valve seat member disposed below its valve seat, a guide rod disposed on said bridge to project above said valve seat, an open tubular valve stem of an interior diameter substantially greater than the exterior diameter of said guide rod loosely and floatingly embracing the rod and guided thereby, a hollow valve of resilient material tapering downwardly and open at the bottom thereof but otherwise closed and comprising a top secured to the stem and through which the stem extends and curved downwardly tapering side walls, the difference between the exterior diameter of the guide rod and the interior diameter of the valve stem adjacent the lower ends of said guide rod and valve stem being less than the difference between exterior diameter of the valve at the lower end thereof and the interior diameter of valve seat at the upper end thereof whereby the lower end of the valve is guided to engage within the valve seat upon a closing movement of the valve, the lower end of the tubular stem being adjacent the edge of the opening of the valve and coacting therewith to provide an annular opening to the hollow valve around the stem, said valve when lifted from its seat being open to the discharging water and constituting a float, and means for opening said valve permitting floating movement thereof.

3. A flushing valve comprising an annular valve seat, a guide rod disposed centrally of and projecting above said valve seat, an open tubular valve stem of an interior diameter substantially greater than the exterior diameter of said guide rod loosely and floatingly embracing the rod and guided thereby, a hollow valve of resilient material open at the bottom thereof but otherwise closed and comprising a top secured to the stem and through which the stem extends and curved downwardly tapering side walls tapering downwardly in thickness to a thin relatively flexible resilient portion adapted to seat on said valve seat with the opening at the bottom of the valve within the valve seat, the difference between the exterior diameter of the guide rod and the interior diameter of the valve stem adjacent the lower ends of said guide rod and valve stem being less than the difference between exterior

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diameter of the valve at the lower end thereof and the interior diameter of valve seat at the upper end thereof whereby the lower end of the valve is guided to engage within the valve seat upon a closing movement of the valve, the lower end of the tubular stem being adjacent but above the edge of the opening of the valve and coacting therewith to provide an annular opening to the hollow valve around the stem, said valve when lifted from its seat being open to the discharging water and constituting a float, and means for actuating said valve permitting floating movement thereof.

4. A flushing valve comprising an annular valve seat, an open tubular guide rod disposed centrally of and projecting above said valve seat, an open tubular valve stem of an interior diameter substantially greater than the exterior diameter of said guide rod loosely and floatingly embracing the rod and guided thereby, a hollow valve open at the bottom thereof but otherwise closed, the top thereof being secured to the stem and through which the stem extends, and side walls adapted to seat on said valve seat with the opening at the bottom of the valve within the valve seat, the difference between the exterior diameter of the guide rod and the interior diameter of the valve stem adjacent the lower ends of said guide rod and valve stem being less than the difference between exterior diameter of the valve at the lower end thereof and the interior diameter of valve seat at the upper end thereof whereby the lower end of the valve is guided to engage within the valve seat upon a closing movement of the valve, a refill tube opening to the upper end of said guide rod, said stem constituting an overflow passage opening to within said valve seat, said valve when lifted from its seat being open to the water discharging across the valve seat and constituting a float, and means for actuating said valve permitting floating movement thereof.

5. A flushing valve comprising an annular valve seat, a guide rod disposed centrally of and projecting above said valve seat, an open tubular valve stem of an interior diameter substantially greater than the exterior diameter of said guide rod loosely and floatingly embracing the rod and guided thereby, a hollow valve open at the bottom thereof but otherwise closed, the top thereof being secured to the stem and through which the stem extends, and side walls adapted to seat on said valve seat with the opening at the bottom of the valve within the valve seat, the difference between the exterior diameter of the guide rod and the interior diameter of the valve stem adjacent the lower ends of said guide rod and valve stem being less than the difference between exterior diameter of the valve at the lower end thereof and the interior diameter of valve seat at the upper end thereof whereby the lower end of the valve is guided to engage within the valve seat upon a closing movement of the valve, said valve when lifted from its seat being open to the water discharging across the valve seat and constituting a float, and means for actuating said valve permitting floating movement thereof.

6. A flushing valve comprising a valve seat, a guide rod disposed centrally of the valve seat, a tubular valve stem of an interior diameter substantially exceeding the exterior diameter of the guide rod and loosely embracing the same and guided thereby, a hollow valve mounted on said

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valve stem and adapted to seat on said valve seat and having an opening in the bottom thereof but being otherwise closed, the difference between the exterior diameter of the guide rod and the interior diameter of the valve stem adjacent the lower ends of said guide rod and valve stem being less than the difference between exterior diameter of the valve at the lower end thereof and the interior diameter of valve seat at the upper end thereof whereby the lower end of the valve is guided to engage within the valve seat upon a closing movement of the valve, means for opening said valve permitting floating movement thereof relative to said guide rod, said valve constituting a float when lifted from its seat.

7. In combination an outlet and valve seat for reservoirs formed of a tube having an annular bellows fold therein intermediate its ends providing a supporting flange, the tube having an outturned flange at its upper end constituting a valve seat, the tube below said flange being externally threaded to receive a clamping nut, and a guide rod supporting bridge having a peripheral flange engaged in the said fold in said tube, an upwardly projecting guide rod supported by said bridge and disposed centrally of said valve seat, a tubular valve stem loosely embracing said guide rod and guided thereby, and a valve mounted on said stem and adapted to seat on said valve seat, a stop on said guide rod coacting with the upper end of said stem for limiting opening stroke of the valve, the upper member of said bellows fold receiving through said stop, guide rod and bridge the upward thrust of the valve stem against said stop upon opening movement of said valve.

8. A combined outlet and valve seat for reservoirs formed of a tube having an annular bellows fold therein intermediate its ends providing a supporting flange, the tube having an outturned flange at its upper end constituting a valve seat, the tube below said flange being externally threaded to receive a clamping nut.

9. A combined outlet and valve seat for reservoirs formed of a tube having an annular bellows fold therein intermediate its ends providing a supporting flange, the tube having a valve seat at its inner end, and a valve guide supporting bridge supportingly engaged in the said fold in said tube.

10. A combined outlet and valve seat for reservoirs formed of a tube having an annular bellows fold therein intermediate its ends providing a supporting flange, the tube having a valve seat at its inner end, the tube below said flange being externally threaded to receive a clamping nut.

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