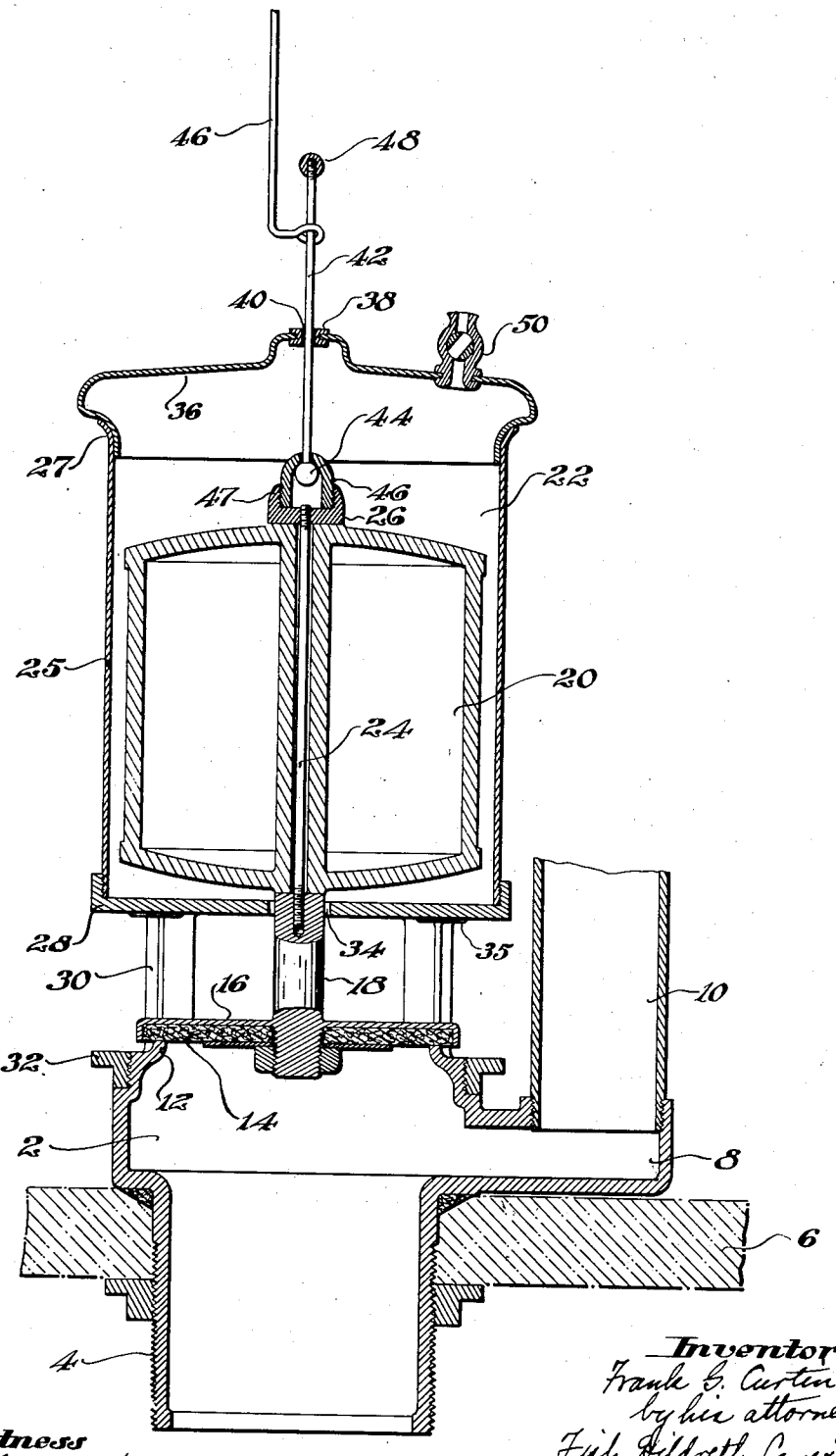
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FLUSHING VALVE

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FLUSHING VALVE

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The present invention relates to flushing valves.

The principal object of the present invention is to provide an improved flushing valve particularly constructed to assure positive flushing as well as accurate control of refill of the bowl following the flushing operation.

A further object of the invention is to provide a valve which is protected against entrance of dirt and consequent faulty operation.

With these and other objects in view, as will hereinafter appear, the present invention comprises the flushing valve hereinafter described and particularly defined in the claims.

The accompanying drawing is a sectional elevation of the preferred form of flushing valve embodying the present invention.

In the illustrated embodiment of the invention, the valve has a hollow outlet portion 2 provided with a spud 4 to project through the bottom of the tank 6 and to be connected in the usual manner with the flush pipe leading to the bowl. The outlet portion 2 is extended sidewise at 8 to receive an overflow pipe 10 of usual form. The upper part of the outlet portion 2 is formed at 12 as a valve seat against which is normally seated the washer 14 of the valve disk 16. The disk 16 is formed with a stem 18 connected to a hollow cylindrical float 20 contained within a float chamber 22. The float is attached to the stem 18 by means of a rod 24 threaded at one end into the stem and at the other end into a nut 26 at the top of the float.

The float chamber 22 comprises a cylinder 25 flared at the top, as indicated at 27, and threaded at the bottom to be received in a base member 28, the latter being provided with integral standards 30 forming a cage-like enclosure for the valve disk 16. The standards 30 are connected to a threaded ring 32 which is received on the upper part of the outlet portion 2. The stem 18 of the valve passes through an opening 34 in the base 28 of the float chamber. The base is provided with lugs 35 against which the top of the valve disk 16 strikes when the float is lifted. As described in the patent to Andrew F. Curtin, No. 1,536,078, the lugs serve to space the disk slightly away from the base and thereby prevent sealing of the disk against the base.

The float chamber is closed at the top by means of a cover 36 having a portion seated within the flared portion 27 of the cylinder. At the center of the cover is provided a bushing 38 having a small hole 40 to accommodate a wire 42 for lifting the valve. The wire 42 terminates at its lower end in an enlarged spherical portion 44 enclosed within a cap 46 which is externally threaded to be received in a cylindrical extension 47 of the nut 26, thereby permitting slight lateral play from the float with respect to the wire 42 and assuring proper seating of the valve even though the valve washer may not be exactly aligned with the float. The float is actuated by a wire link 46 having a loop surrounding the wire 42, the latter being provided at its upper end with a ball 48. The link 46 is connected in the usual manner to the flushing lever of the tank.

The opening 40, through which the wire 42 passes, serves the purpose of venting air into the float chamber, as will hereinafter be described. In order to permit control of the amount of air vented in the chamber, a petcock 50 may be inserted in the cover, thereby permitting adjustment of the rate of descent of the float following a flushing operation.

The cover 36 is of sufficient height at the center to prevent striking of the cap 46 against the cover on an upward movement of the float.

In normal operation, the parts are maintained in the position shown in the drawing by the water pressure acting on the top of the valve disk 16. It will be understood that the chamber 22 is full of water and the level of water in the tank is well above the top of the float chamber. To flush the closet, the float is lifted by the wire link 46 and since the water pressure now acts on both sides of the valve 16, the buoyancy of the float causes the float and valve to be held in raised position with the valve disk in engagement with the lugs 35. The tank then discharges through the outlet into the flushing pipe. During this discharge, the float chamber remains full or practically so, the water in the chamber being supported by the pressure of the atmosphere. There therefore is little or no descent of the float until the level of water in the tank drops below the bottom of the base 28 and uncovers the discharge hole 34. After the water in the tank has dropped below the discharge hole 34, the water in the float chamber remains supported by atmospheric pressure, and would continue to remain so indefinitely, if it were not for the vents provided by the hole 40 and the petcock 50 in the cover. Thereafter, due to this venting, water begins to flow out slowly through the opening 34. The float descends gradually at a rate dependent on the sizes of the openings in the top and bottom of the chamber.

At the time the valve starts to drop, the flushing operation is substantially completed and the

valve is to be kept open for a further period only for the purpose of refilling the bowl. During descent of the valve, water is being discharged into the tank by the normal operation of the ball cock and this water flows immediately through the flushing pipe into the bowl. When the valve 16 is eventually seated, the refilling is completed. By proper adjustment of the sizes of the discharge and vent openings, the rate of descent of the float and consequently the refilling of the bowl can be controlled within very close limits.

After seating of the valve, the tank continues to fill to the normal height determined by the ball cock. During the filling operation, water is forced upwardly into the float chamber through the hole 34 and air is displaced outwardly through the upper vent opening 40 and the petcock. This refilling of the float chamber can occur even after the entire float chamber has been submerged, since there is sufficient water pressure in the tank to force all the air outwardly through the vent openings. The valve is then in readiness for a subsequent flushing operation.

The opening 34 surrounding the valve stem 18 is preferably fairly large, in comparison to the opening used in a flushing valve of the type shown in the Curtin Patent No. 1,536,078. The opening, however, must not be so large as to permit discharge of water therethrough independently of displacement of air at the top. That is to say, the opening 34 should be small enough so that if there were no vent elsewhere in the float chamber, the valve would remain raised indefinitely after having been once lifted. The hole 40 surrounding the wire 42 is generally of somewhat smaller size than the hole 34. It will therefore be seen that any dirt which can enter the hole at the top of the chamber can freely pass out the hole 34 in the bottom. This is an important consideration, since it has been found that with open-top flush valves, the action is frequently erratic, due to the presence of small pieces of dirt or plaster which drop into the chamber during erection of the building.

The rate of refilling of the bowl depends on the rate of descent of the valve following the flushing operation, and the rate of descent in turn is largely determined by the rate at which air can flow in the ports in the cover to displace the water discharged at 34. The present invention provides an adjustable rate of descent by means of the petcock. In ordinary practice, however, wherein standard equipment can be made with fair precision, the provision for adjustment may be unnecessary and sufficient accuracy of refill can be obtained by use of a bushing 38 with a vent opening 40 of predetermined size.

It will be observed that the openings 34 and 40 are continuously cleaned by the reciprocation of the stem 18 and the wire 42 therein, and that the opening 40, as well as the passage of the petcock when one is used, is also kept clean by the forcing therethrough of air under pressure when the float chamber is refilled after a flushing operation. This continual cleaning of the openings is of especial importance in plumbing fixtures of copper or brass which are subject to a collection of verdigris when exposed to water and air.

Although the preferred embodiment of the invention has been illustrated and described, it will be understood that the invention is not limited to such illustrated embodiment, but may be varied within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, and a cover for the float chamber having a small opening to permit entrance of air and thereby to govern the descent of the float.

2. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, and a cover for the float chamber having a small opening to permit entrance of air and thereby to govern the descent of the float, the opening in the cover being smaller than the discharge opening.

3. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, a cover for the top of the float chamber having an opening, and means passing through the latter opening for lifting the float and valve, said opening being of small size to govern the rate of entrance of air and thereby to control the descent of the float.

4. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, a cover for the float chamber having means for admitting air to permit discharge of water from the float chamber, and means for manually adjusting the rate of admission of air to control the rate of descent of the float.

5. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, a cover for the float chamber, and a manually adjustable port for governing the entrance of air and consequent discharge of water from the float chamber.

6. A flushing valve having, in combination, a movable valve member, a float, a stem connecting the valve member with the float, a float chamber having a base provided with a small opening through which the stem reciprocates, and means for enclosing the float chamber, the chamber having at the top a small vent port admitting air to displace water discharged through said opening.

7. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, said opening being small enough to prevent simultaneous passage of water outwardly and air inwardly therethrough, and a cover for the float chamber having a small opening to permit entrance of air and thereby to govern the descent of the float.

8. A flushing valve having, in combination, a movable valve member, a float connected with the valve member, a closed float chamber enclosing the float and having a small opening in the bottom for discharge of water, said opening being small enough to prevent discharge of water outwardly therethrough except when air is admitted to another part of the chamber, and a cover for the float chamber having a small opening to permit entrance of air and thereby to govern the descent of the float.

9. A flushing valve having, in combination, a

movable valve member, a float chamber having a base with a small opening, a float in the float chamber, a stem connecting the valve member and the float and passing through the opening, the opening serving to discharge water around the stem after a flushing operation but small enough to prevent displacement of air inwardly during such discharge of water, a top for the float chamber, and means for lifting the valve member and float for a flushing operation, the top having a small opening to permit slow displacement of air into the float chamber after flushing and thereby to permit slow discharge of water through the opening in the base with consequent slow descent of the float.

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