Aug. 29, 1950 H. F. SMITH 2,520,574

LATERALLY SWINGABLE FLUSH VALVE

Filed Nov. 4, 1948

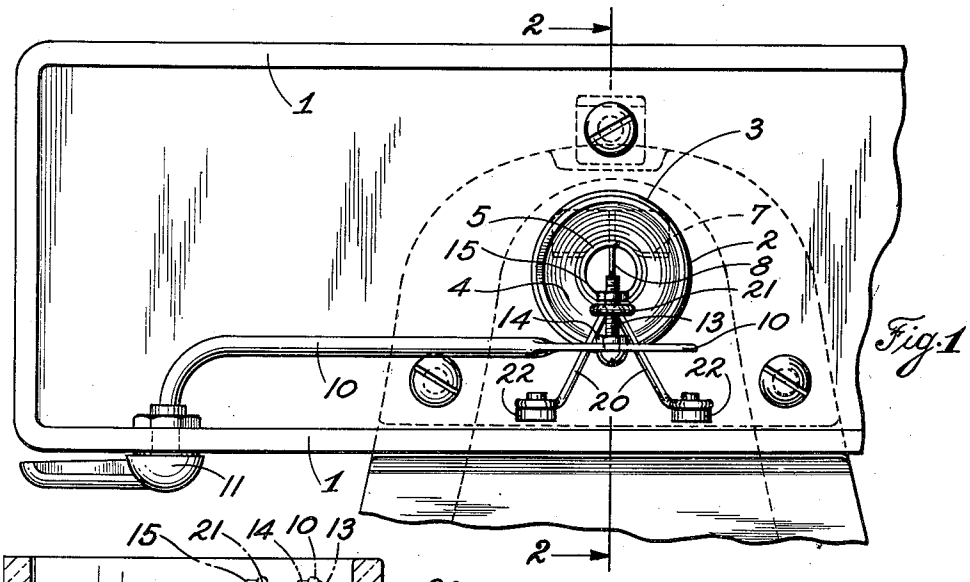


Fig. 1

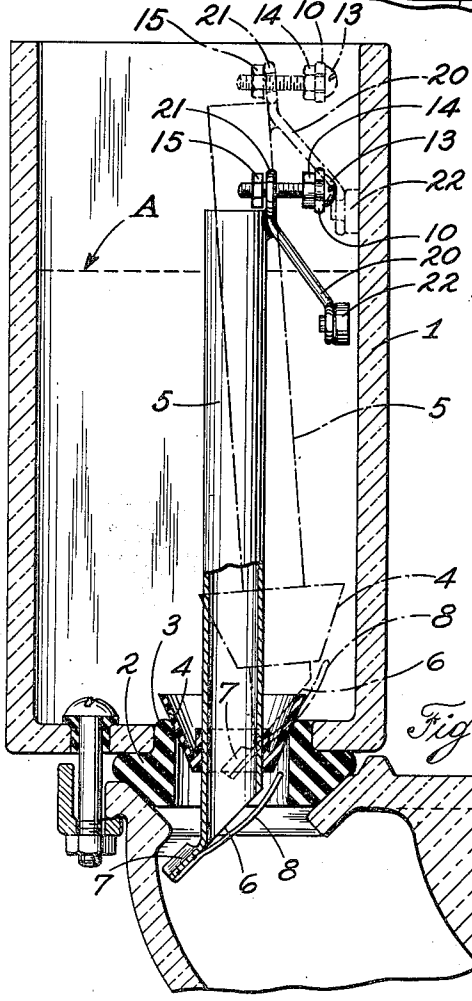


Fig. 2

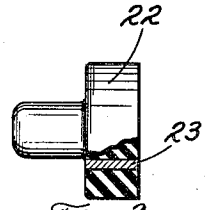


Fig. 3

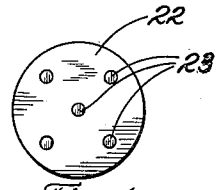


Fig. 4

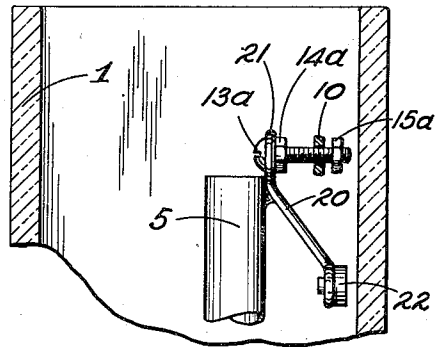


Fig. 5

INVENTOR.
HARRY FORD SMITH

BY

Richey & Watts
ATTORNEYS

Patented Aug. 29, 1950

2,520,574

UNITED STATES PATENT OFFICE

2,520,574

LATERALLY SWINGABLE FLUSH VALVE

Harry Ford Smith, Lexington, Ohio, assignor to Mansfield Sanitary Pottery, Inc., Perrysville, Ohio, a corporation of Ohio

Application November 4, 1948, Serial No. 58,341

9 Claims. (Cl. 4—58)

1

This invention relates generally to valves for flush tanks and particularly to a new vertically liftable, laterally swingable overflow pipe and flush valve.

Valves of the vertically liftable, laterally swingable type which I have devised heretofore have embodied several parts which I now find it possible to eliminate. The present invention provides a new and simplified combination of parts and affords a new mode of operation. This new combination of parts includes an overflow pipe which is supported at its upper end for adjustable lateral swinging movement of its lower end, a valve on the pipe near its lower end, a deflector at the lower end of the pipe, stop means intermediate the ends of the pipe to engage the adjacent vertical wall of the tank and hold the valve in open position when water is flowing out of the tank and means to guide the valve to its seat.

One embodiment of the present invention is disclosed in the drawings which accompany and form a part of this specification and in which,

Fig. 1 is a top plan view of the new flush valve assembly, the flush tank being shown fragmentarily;

Fig. 2 is a vertical, sectional view taken on line 2—2 of Fig. 1;

Figs. 3 and 4 are, respectively, side and face elevational views of one of the friction pads; and

Fig. 5 shows a modified form of the upper end mounting of the overflow pipe of Figs. 1 and 2.

In the figures, the tank 1 is provided with an outlet opening in its bottom wall in which is disposed a rubber-like annulus 2 having a curved valve seat 3 at its upper end to make sealing contact with a cup-like, conical valve 4 carried on an overflow pipe 5 near its lower end.

The lower end of the overflow pipe is inclined at an acute angle to the horizontal, as is indicated at 6, and at its lowermost end the pipe wall is bent outwardly to form a deflector 7 against which water flowing out of the tank may engage for a purpose presently to appear. A guide 8 in the form of a narrow metal strip is connected at its lower end to deflector 7 and extends upwardly past the lower end of pipe 5 to rest on seat 3 when the valve is open and to guide the pipe into valve seating position when the valve is being closed.

A horizontally extending flush lever 10 is positioned within the tank 1 and at one end is bent to extend through a side wall of the tank in which it is mounted for rotation. The flush

2

handle 11 is attached to this end of the lever. It is important that the portion of the lever within the tank should be substantially immovable laterally in a horizontal plane and yet should be freely swingable in a vertical plane. Near its free end lever 10 is provided with means for lifting pipe 5 and valve 4. As shown in Figs. 1 and 2, this means consists of a screw 13 which extends through the lever and is clamped in place by nut 14 and carries another nut 15 which may be adjusted thereon to regulate the amount of lateral movement of the lower end of the pipe. A stop 20, which may be stiff wire or a rigid member, is bent in the general form of an inverted V with a loop 21 near its midportion, and is attached near the loop to the upper end of pipe 5 opposite the side carrying deflector 7. The loop projects above the pipe 5 and receives screw 13 on which it is freely slidable but on which it is normally positioned to bear against nut 15.

The legs of the inverted V project downwardly and laterally toward the adjacent vertical tank wall while diverging from each other and from the pipe. At their lower ends these legs are provided with friction pads 22 which are shown in some detail in Figs. 3 and 4. Each of these pads has a plane surface to bear against the vertical surface of the adjacent wall tank and also has means in the form of copper inserts 23 embedded therein to prevent the formation of slimes thereon during use. Due to the shape and position of the legs of the inverted V, the pads 22 are disposed substantially symmetrically with respect to pipe 5 so that when the pipe is lifted and the pads come into contact with the tank wall, there will be no tendency for the pipe to twist or to bind loop 21 on screw 13. Since member 20 is preferably composed of metal wire, it absorbs any shock incident to movement of the pipe when the outflowing water moves it laterally and brings the pads into contact with and presses them against that wall. Thus the pressure of the pads on the tank wall varies with the force applied laterally to the pipe by the stream of water and hence the pads hold the pipe in its elevated position while most of the water in the tank is running out but does not prevent the pipe from moving downward when the rate of water flow decreases. Since the extent of lateral movement of the lower end of pipe 5 toward the adjacent vertical tank wall is governed by the position of nut 15 on screw 13, the level of water in the tank when the valve closes can be controlled by adjusting that nut.

When the adjusting nut is moved far to the right on the screw 13 then when the pipe 5 is lifted the lower end, including the vane 7, can swing only a little way toward the right and the vane is held in the heaviest flow of water through the opening leading to the bowl, and as a consequence the smallest flow and lowest water level suffices to hold the valve open. Contrawise when the nut 15 is moved to the left on the screw, the lower end of the pipe can swing far to the right, and the vane 7 is withdrawn from the heaviest stream flow and a heavier flow of water and consequent higher level in the tank exists at time of closing. Since the velocity of water outflow is a function of the depth of water in the tank, it follows that the height of the surface level when the valve closes can be controlled by adjustment of nut 15 on screw 13.

In Fig. 5, the general construction is quite like that shown in Figs. 1 to 4, the main difference being that the means for lifting the pipe 5 is attached fixedly to the wire 20 and is freely slidable in the lever 10. In this case the screw 13a extends through but is secured to the loop 21 in wire 20 and the shank of the screw is freely slidable in a hole in lever 10. A nut 15a is adjustably located on the shank of the screw outside of lever 10 to limit the movement of screw 13a in lever 10. Adjustment of nut 15a on screw 13a controls the level of water in the tank when the valve closes in the manner above described with respect to screw 13 and nut 15.

The operation of the device shown in Figs. 1 to 4 and described hereinabove is substantially as follows: Starting with the parts in the position shown in Fig. 2 and with water filling the tank up to the level indicated at A, the handle 11 is pushed down thereby lifting up the free end of lever 10. This lifting movement of lever 10 lifts pipe 5 and valve 4 vertically and permits water to flow through the opening in annulus 2. Some of this outflowing water engages deflector 7 and exerts a force on the pipe tending to move the lower end laterally. Such lateral movement brings the friction pads 22 into contact with the adjacent vertical surface of tank 1. The parts remain in this open position so long as the force of the water against the deflector 7 plus the frictional contact of the pads and tank wall are sufficient to hold the pipe in its actuated position. When water has run out of tank 1 to the extent determined by the position of nut 15 on screw 13, the force exerted by the water and tending to maintain the valve in open position decreases to such an extent that the force of gravity tends to restore the parts to their original position. At such time pipe 5 is guided downwardly and laterally by guide 8 and valve 4 seats on annulus 2. During this movement the friction pads 22 are moved away from the tank wall. The parts are then in position for retaining water in the tank until it has reached the desired level.

The operation of the apparatus of Fig. 5 is substantially the same as that just described with reference to the apparatus of Figs. 1 to 4 inclusive.

Having thus described my invention so that others skilled in the art may be able to practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. In a flush tank having an outlet opening, a flush valve lever freely swingable in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe connected at its upper end to said lever for vertical lifting movement and lateral swinging movement of its lower end, a valve around the pipe near its lower end, a deflector extending downwardly and laterally from said pipe and into a stream of water flowing through said outlet opening, a member connected to the pipe near its upper end and having portions projecting downwardly and laterally toward an adjacent vertical wall of the tank, and wall-engaging friction members at the lower ends of said portions.

2. In a flush tank having an outlet opening, a flush valve lever freely swingable in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe connected at its upper end to said lever for vertical lifting movement and lateral swinging movement of its lower end, a valve around the pipe near its lower end, a deflector extending downwardly and laterally from said pipe and into a stream of water flowing through said outlet opening, an inverted V-shaped member connected to the pipe near its upper end and having legs projecting downwardly and laterally toward an adjacent vertical wall of the tank and diverging from each other and from the pipe, and wall-engaging friction members at the lower ends of said legs engageable with said wall when the pipe is lifted and swung laterally at its lower end.

3. In a flush tank having an outlet opening provided with a valve seat, a flush valve lever freely swingable in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe extending into said opening and connected at its upper end to said lever for vertical movement and lateral swinging movement of its lower end, a cup shaped valve on said pipe to rest on said seat, a deflector extending downwardly and laterally from said pipe and into a stream of water flowing through said outlet opening, a member connected to the pipe near its end and having portions projecting downwardly and laterally toward an adjacent vertical wall of the tank, friction rubber pads at the lower ends of said portions engageable with said wall when the pipe is lifted vertically and shifted laterally, and slime retarding metallic inserts in said pads.

4. In a flush tank having an outlet opening provided with a valve seat, a flush valve lever freely swingable about one end in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe connected at its upper end to said lever for vertical movement and lateral swinging movement of its lower end, adjustable means engaging and laterally positioning the upper end of said pipe, a valve carried by the overflow pipe near its lower end to rest on said seat, a deflector extending downwardly and laterally from said pipe below said valve and into a stream of water flowing out of the tank when the valve is open, and means between the ends of said pipe and connected to the pipe to engage frictionally a vertical wall of the tank when the vertically elevated pipe is moved laterally by water flowing out of the tank.

5. In a flush tank having an outlet opening provided with a valve seat, a flush valve lever freely swingable about one end in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe, means connecting said pipe at its upper end to said lever for adjustable positioning relative to said lever and for lateral swinging movement of its lower end, a valve on

the overflow pipe near its lower end to rest on said seat, a deflector extending downwardly and laterally from said pipe below said valve and into a stream of water flowing out of the tank when the valve is open, and means connected to the pipe and offset laterally therefrom to engage frictionally with a vertical wall of the tank to restrain downward movement of the pipe and valve when the pipe has been lifted and swung laterally toward said wall.

6. In a flush tank having an outlet opening provided with a valve seat, a flush valve lever freely swingable about one end in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe connected at its upper end to said lever for vertical movement and for lateral swinging movement of its lower end, a valve on the overflow pipe near its lower end to rest on said seat, a deflector extending downwardly and laterally from said pipe below said valve and into a stream of water flowing out of the tank when the valve is open, a guide extending upwardly past the lower end of said cup to beyond the side opposite said projection to direct said valve onto said seat, and means connected to the pipe and offset laterally therefrom to engage frictionally with a vertical wall of the tank to restrain downward movement of the pipe and valve when the pipe has been lifted and swung laterally toward said wall.

7. In a flush tank having an outlet opening provided with a valve seat, a flush valve lever freely swingable about one end in a vertical plane and substantially immovable in a horizontal plane, a member projecting horizontally through and fixed to said lever near its free end, an overflow pipe connected at its upper end to said member for vertical movement and for lateral swinging movement of its lower end, an adjustable stop on said member to position the pipe relative to said lever, a cup valve on the overflow pipe near its lower end to rest on said seat, a deflector extending downwardly and laterally from said pipe below said valve and into a stream of water flowing out of the tank when the valve is open, and means connected to the pipe and frictionally engageable with an internal wall surface of the tank to restrain downward movement of the pipe and valve when the pipe has been lifted and swung laterally toward said wall.

8. In a flush tank having an outlet opening provided with a valve seat, a flush valve lever freely swingable about one end in a vertical plane and substantially immovable in a horizontal plane, a member projecting horizontally and freely through said lever near its free end, an overflow pipe connected at its upper end to said member for vertical lifting movement and for lateral swinging movement of its lower end, an adjustable stop on the free end of said member to limit the extent of its movement through said lever, a cup valve on the overflow pipe near its lower end to rest on said seat, a deflector extending downwardly and laterally from said pipe below said valve and into a stream of water flowing out of the tank when the valve is open, and means connected to the pipe and frictionally engageable with an internal surface of the tank to restrain downward movement of the pipe and valve when the pipe has been lifted and swung laterally toward said wall.

9. In a flush tank having an outlet opening, a flush valve lever freely swingable in a vertical plane and substantially immovable in a horizontal plane, an overflow pipe carrying a valve to close said opening, means connecting the lever to the upper end of said pipe for vertical lifting movement and lateral swinging movement of its lower end, a deflector extending downwardly and laterally from said pipe and into a stream of water flowing through said outlet opening, and means for controlling the surface level of water in the tank when the valve moves to close said outlet, said means including a deflector at the lower end of said pipe positioned to be contacted by water flowing through said outlet opening, means on the pipe frictionally engaging an adjacent wall of the tank when the valve is in open position and an adjustable stop on the pipe lifting means controlling the distance between the pipe and lever.

HARRY FORD SMITH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,444,959	Smith	July 13, 1948