TOILET TANK FLUSH VALVE

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3 Claims

ABSTRACT OF THE DISCLOSURE

A toilet tank flush valve which can be operated to provide a complete or partial discharge of the fluid contents of the tank. An operating handle is provided which is rotated in one direction to provide complete discharge and is rotated in the opposite direction to provide for partial discharge. A trip rod is carried by the valve and is operated by the handle to swing into the plane of oscillation of the conventional float arm to transfer the weight of the float to the valve for closing the valve after the partial discharge.

This invention pertains to a toilet flush valve applicable to toilets with tanks to store the flushing water.

My U.S. application, Ser. No. 492,524, entitled “Two Volume Flush Valve,” covers a two volume flush valve with a lesser volume released to the toilet when the handle is turned one way and released over the volume released when the handle is tripped in the opposite direction by the use of two separate floats.

This application uses the regular float valve to control the flow of water from the main to the reservoir and the same float is used to control the reduced volume release to the toilet when the trip handle is turned in one direction by tripping the dump valve by the weight of the main float and supporting rod.

Another feature of this invention involves a simple mechanism that employs the main float that controls the water flow to the tank from the water pressure source and also uses the same float and associated parts to trip the tilt up type valve that controls the flow from the tank to the bowl.

Another feature involves the weight of the main float to trip the conventional ball dump valve closed at part tank volume flush without holding the trip handle tripped.

Another feature of this invention uses the conventional single trip handle on the tank with simple modifications to the added mechanism that intercepts the rod of the main float valve and supporting arm to tilt up the tilted back flow control valve that controls the flow from the tank to the toilet. This control by the motion of the main float and arm trips the flow control valve to close off the flow to the toilet after a greatly reduced volume of water flow such as 1½ gallons vs. 3½ to 5 gallons on a full flush when the tilt up valve is not tripped by the action of the main float arm and stays open until the liquid level in the tank is almost at the bottom of the tank when the water in the past center bucket of the tilt up valve runs out the port and the tilt up valve tilts back and closes.

Another feature of this invention uses conventional tanks, tilt up flow control valves, inlet valves, float and arm to control the water inlet valve and conventional trip handle with some added parts in the tank the cause the intercept of the main float and arm to close the tilt up dump valve when the trip handle is tripped in one direction but not to intercept when the trip lever is tripped in the other direction.

Another feature is the mechanism on the inside of the tank modified so that the arm that tilts up the tilt flow control valve at the bottom of the tank is tilted to tilt back the tilt valve to dump water to the bowl when the trip handle on the outside of the tank is turned clockwise or counter-clockwise.

Another feature of this invention is the auxiliary mechanism that shifts a link under the main float arm only when the outside trip lever is moved counter-clockwise so that before the main float reaches its limited motion (much less than the travel of the surface of the water in the tank between full and normal full flush). The tilt up dump valve is tilted back to closed position. This is accomplished by the link that has been shifted under the main float arm by the trip handle and thereby picks up motion from the main float arm and transmits it to the tilt up valve and causes it to trip closed while the water in the tank is well above the top of the tilt up valve and its counter-balance water cups. This would cause the tilt up valve to close after passing about 1½ gallons while a full flush might be 3½ to 5 gallons as controlled by the same outside trip handle when turned clockwise.

Another feature is the means by which a conventional tank toilet trip handle can control the discharge of two different volumes of flow from the tank to the toilet depending on which direction the trip handle is rotated by the use of the motion of the main float and supporting arm, without having to hold said handle in the partial flush trip position.

Another feature is the use of a simple trip lever and the use of the motion of the float to control a two volume selective discharge by the use of a conventional ball dump valve, without having to hold the trip handle in the partial flush position after tripping said handle.

Another feature is that once tripped, the trip lever can be released and need not be held in tripped position to control said different flows.

Another feature is the saving of cost and parts by using only the main float and arm instead of the second float required in said other application of Frank W. Kertel, Ser. No. 492,524, entitled “Two Volume Flush Valve,” filed Oct. 4, 1965.

Other objects will be pointed out in the accompanying specification and claims.

I have illustrated my invention by way of example in the accompanying drawings, in which:

FIG. 1 is a side elevation partly in section of one form of our invention.
FIG. 2 is an enlarged perspective view partly in section of the trip mechanism of FIG. 1.
FIG. 3 is an enlarged section through 3—3 of FIG. 1.
FIG. 4 is an enlarged plan view of the trip link of FIGS. 1 and 2.
FIG. 5 is a plan view of the structure shown in FIG. 1.
FIG. 6 is a side elevation partly in section showing the trip up outlet valve in the closed position.
FIG. 7 is a plan view of another form of the invention using a ball type dump valve rather than the trip up valve of FIG. 1 through FIG. 6.
FIG. 8 is a side view partly in section of the structure shown in FIG. 7 taken at section 8—8.
FIG. 9 is an enlarged sectional view of the lever shifting mechanism.

In all figures like numerals of reference refer to corresponding parts.

In FIGS. 1, 2, 3, 4, and 5 I have shown a tank 10 with a cover 11. Inside the tank is a water inlet valve 12 which is controlled by lever 16 pivoted at 17 with stop 18 and actuated by float 21 and rod 20. An auxiliary weight, such as 22, may be added if necessary for the operation of this invention.

A trip lever 25 is supported on shaft 26 which is rotatably supported in sleeve 27. Sleeve 27 is secured to tank 10 by nut 28. Nut 28 also supports bracket 40 which has pivots 41 and 42 to support one end of arm 43. The
outer end of arm 43 is secured to flexible strap 44 which is secured to extension 50a of tip up dump valve 50. Tip up valve has two cups—one, 54, on the right, as viewed in FIGS. 1, 5, and 6, and a rear cup 55 with a slapping wall to the left with a bleed hole 56 to allow cup 55 to drain slowly after water in tank 10 has fallen below the top lip of cup 55, to allow tip up valve 50 to close after the water has almost flowed out of tank 10 on a full flush.

Cam 30 is connected to trip arm 25 by shaft 26 and has three ends—30a, 30b, and 30c. Arm 43, as stated, is pivoted at pins 41 and 42 to bracket 40. Arm 43 rests on ends 30a and 30c of cam 30 so that when trip lever 25 is tripped up or down (clockwise or counterclockwise, as viewed in FIGS. 2 and 3), lever 43 will be raised and through strap 44 will tilt valve 50 to the dump position shown in FIG. 1 with water flowing from tank 10 to pipe 62 which leads to the toilet bowl not shown through fitting 60. Fitting 60 supports arms 63 which support pivot pins 51 that form the pivot for tilt up valve 50.

Shift lever 70 is pivoted at pin 71 to bracket 40 at extension 40a. End 70a supports trip rod 75, the lower end of which rests in cup 54 and the looped end 75b passes through a hole and slot in the end 70a of shift lever 70. End 75a is held in position fore and aft, as viewed in FIG. 5, by shift lever 70. When trip lever 25 is rotated in one direction, valve 20 will be tilted back and cam end 30b moves shift lever counterclockwise, as viewed in FIGS. 2 and 5, causing cam end 75a of rod 75 to move under rod 20 that is attached to float 21. In this position, as water flows past tilted valve 50 and float 21 lowers to the position shown in FIG. 6, arm 20 will cause rod 75 to move down tilting valve 50 closed at about the position of the water in tank 10, as shown in FIG. 6. This is due to the intercept of rod 75a with end 75b of rod 75 as controlled by shift lever 70 as controlled by cam end 30b when trip lever 25 is raised.

Shift lever 70 will stay in this partial flush position by friction of bearing 71 until shifted to the neutral full flush position of end 75a, being out of the path of motion of float rod 20 when lever 25 is moved down so cam end 30b moves against shift lever portion 70b. Friction again holds shift lever 70 in this full flush position until cam end 30b moves to the right, as viewed in FIG. 4, when cam end 30b and end 75c causes shift lever 70 to move to the partial flush position shown dotted in FIG. 4.

When trip lever 25 is lowered, arm 43 will be moved up by cam 30c to tilt valve 50 to the dump position. Shift lever will stay in the neutral position, as shown in FIG. 4, with end 75a out of the path of rod 20 that supports float 21 so that float arm 20 and rod 75 will not trip tilt up valve 50. Valve 50 will stay open until the water in cup 55 drains out through port 56 to allow valve 50 to close.

Shift lever 70 will stay in the full flush position after trip handle 25 is lowered or in the partial flush position after the trip valve 25 is raised, as shown in FIG. 4 dotted or FIG. 6, without holding the lever 25 in either position, due to the friction of the support of shift lever 70, as previously stated.

In FIGS. 7 and 8 the trip handle 80 is mounted on the front of the tank 10 under the edge of cover 11. Handle 80 is supported by bearing 81 which is secured to tank 9 by nut 82 which also supports and positions bracket 85 which carries pivot 86 on which shift lever 87 pivots. Cam finger 88 extends downwardly into cam slot 90. Slot 90 is so formed that when lever 80 is raised, as shown in FIG. 7, or moves clockwise, as viewed in FIG. 8, cam finger 88 will move to the left in FIGS. 7, 8, and 9 and shift lever 87 will stay in full flush position so that arm 20 will not intercept end 92a of rod 92 for a full flush operation.

If lever 80 is moved down, as viewed in FIG. 7, or counter-clockwise, as viewed in FIG. 8, cam finger 88 will move to the right, as viewed in FIGS. 7 and 8 and cam slot 90 will cause shift lever 87 to rotate counter-clockwise slightly so that rod 92 moves the float rod 20. In this position float 21 and rod 20 will cause rod 92 to move down and through looped end 92b cause float ball valve 100 to sink and seat when the water has reached about the level shown in FIG. 8.

If trip lever 80 is moved up, float ball valve 100 will not seat until the water level in tank 10 is lower than rod 92, as shown in FIG. 8, so that rod 92 will not cause cam 30 to close and cam end 30b will not cause float valve 100 to sink and seat. Cam 95 operates on cam slot 96 of trip arm 97 which through rod 98 and float ball rod 99 will raise float 100 to start a full flush when lever 80 is raised or a part flush when lever 80 is lowered.

I have illustrated my invention in these various forms; however, many other variations may be possible within the limits of the invention.

claim as my invention:

1. A tank of the class described, having in combination: an inlet valve for controlling the flow of fluid into the tank, an outlet valve for controlling the flow of fluid from the tank, an oscillation float means for operating the inlet valve in accordance with the level of the water in the tank, and means carried by the outlet valve and selectively shiftable into the plane of oscillation of the float means for transferring sufficient weight from the float means to the outlet valve to close said outlet valve.

2. A device as defined in claim 1 wherein the means carried by the valve comprises a rod having one end in bearing engagement with the outlet valve and a lateral extension at the other end for engagement with the float means.

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