May 23, 1967 W. E. WUSTNER 3,320,622

TOILET TANK FLUSH VALVE

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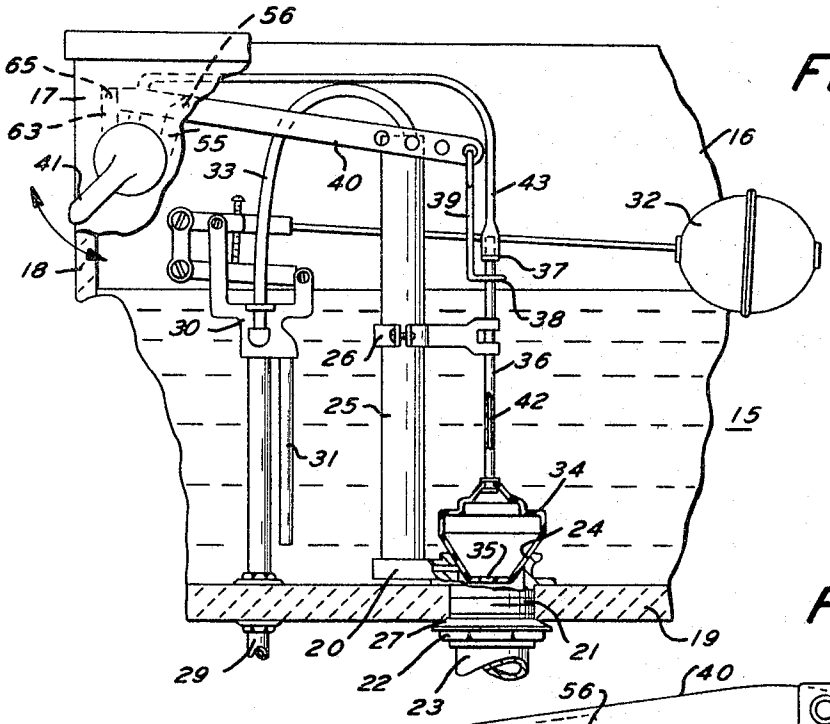



FIG. 1

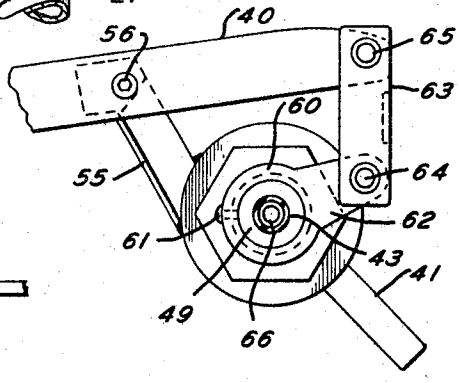



FIG. 3

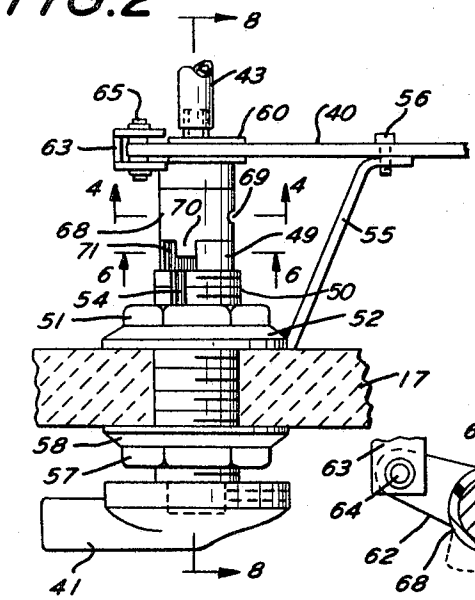



FIG. 2

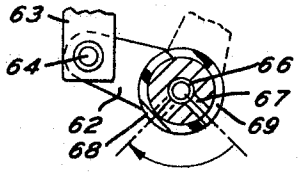



FIG. 4




FIG. 5

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FIG. 6

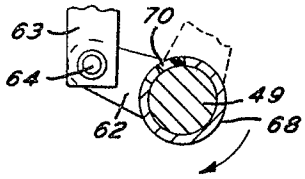



FIG. 7

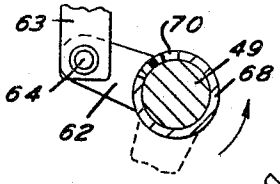



FIG. 8

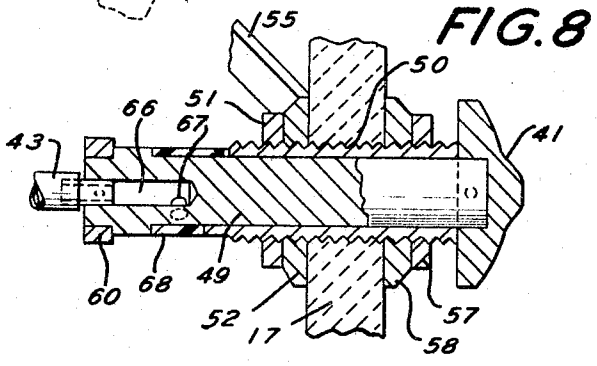



FIG. 11

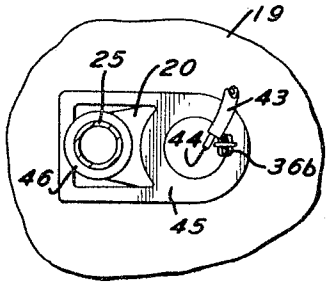



FIG. 10

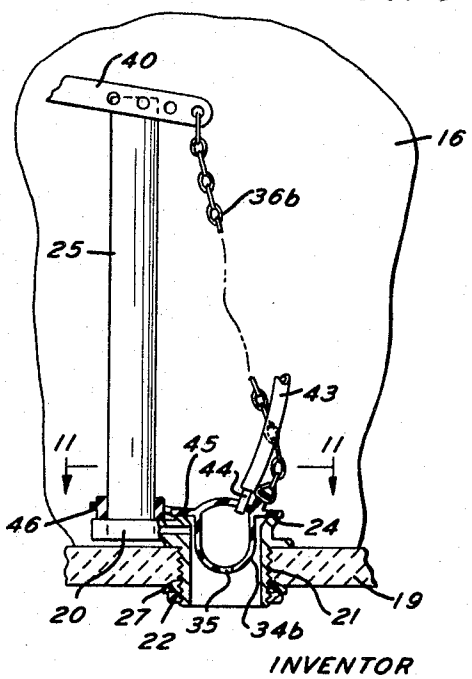
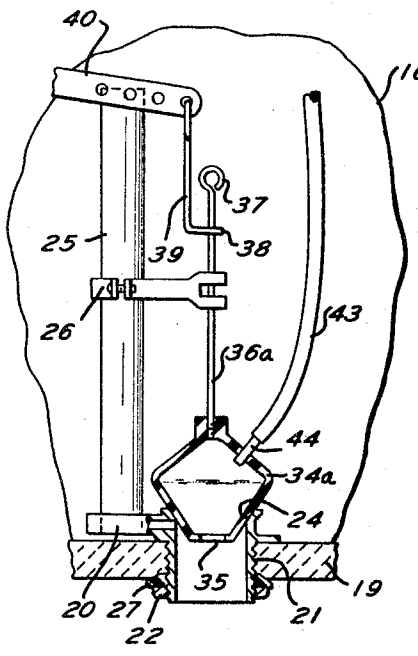



FIG. 9




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3,320,622

# TOILET TANK FLUSH VALVE

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7 Claims. (Cl. 4—67)

This invention relates to toilet tank flush valves.

In some areas and at some seasons of the year water shortages are serious and even necessitate imposing restrictions on water use.

It is the principal object of the present invention to provide a toilet tank flush valve which will permit of great saving of water by control of the discharge from the flush tank.

It is a further object of the present invention to provide a toilet tank flush valve which will permit of partial or complete discharge of the flush tank as desired.

It is a further object of the present invention to provide a toilet tank flush valve in which a ball valve is employed with an outlet fitting, the ball valve having controlled venting of the interior thereof to vary the buoyancy thereof and provide more rapid seating thereof.

It is a further object of the present invention to provide a toilet flush valve construction which can be employed with existing installations or which is adapted for new construction.

It is a further object of the present invention to provide simple but effective venting provisions for a ball valve controlling tank flushing whereby, upon venting, the ball valve tends to fall to a seated position.

It is a further object of the present invention to provide a toilet flush valve construction with a manually operable control handle which upon movement to one position provides full tank discharge or upon movement to another position provides only partial tank discharge.

Other objects and advantageous features of the invention will be apparent from the description and claims.

The nature and characteristic features of the invention will be more readily understood from the following description taken in connnection with the accompanying drawings forming part thereof, in which:

FIGURE 1 is a view partly in elevation and partly in vertical section of a toilet flush tank having one embodiment of the present invention incorporated therein;

FIG. 2 is a top plan view, enlarged, of the operator and vent control valve of the invention;

FIG. 3 is a rear elevational view of the structure of FIG. 2;

FIG. 4 is a vertical sectional view taken approximately on the line 4—4 of FIG. 2, and showing operation in one direction to attain venting position;

FIG. 5 is a view similar to FIG. 4 but showing operation in another direction with no venting;

FIG. 6 is a vertical sectional view taken approximately on the line 6—6 of FIG. 2 and in a position corresponding to that of FIG. 4;

FIG. 7 is a view similar to FIG. 6, but in a position corresponding to that of FIG. 5;

FIG. 8 is a vertical sectional view taken approximately on the line 8—8 of FIG. 2;

FIG. 9 is a fragmentary vertical sectional view of a portion of a toilet flush tank having a different ball valve and its operator in accordance with the invention;

FIG. 10 is a fragmentary vertical sectional view of a portion of a toilet flush tank having a hinged ball valve and its operator in accordance with the invention; and

FIG. 11 is a horizontal sectional view taken approximately on the line 11—11 of FIG. 10.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.



Like numerals refer to like parts throughout the several views.

The toilet flush tank valve construction of the present invention preferably includes, for use with a tank fitting, a hollow ball valve for controlling flow past a seat in the fitting. The valve ball, when raised from its seat tends to float. Provisions are made for venting the interior of the ball valve so that water from the tank can enter and the tendency of the valve ball to float is overcome so that it falls to its seat and shuts off further flow from the tank. The venting provisions could comprise merely a pipe communicating with the interior of the valve ball and with an open end of the pipe maintained above the normal water level in the tank so that as soon as the ball valve is raised from its seat water starts to enter the valve ball to cause it to fall. For full flushing of the tank it would then be necessary to retain the handle by the operation of which the valve ball is raised from its seat in a position to prevent falling of the valve ball until the entire contents of the tank have been discharged. It is preferred, however, in accordance with the present invention, to provide in conjunction with the operating handle a linkage and vent valve for venting the pipe to the ball valve so that upon movement of the handle in one direction venting is effected with only partial tank discharge and upon movement of the handle in the other direction no venting is effected, with full tank discharge.

Referring now more particularly to FIGS. 1 to 8 of the drawings, a toilet flush tank 15 is shown, having a rear wall 16, a front wall 17, a side wall 18 and a bottom wall 19.

A fitting 20 of well known type is provided having a threaded section 21 held in place by a nut 22 engaging a washer 27 and having a delivery pipe 23 communicating with the hopper (not shown) of the toilet, below the valve seat 24.

The fitting 20 has an upright overflow pipe 25 of well known type carried thereby and connected below the valve seat 24 for discharge. A guide bracket 26 is adjustably mounted on the pipe 25 in a well known manner.

The tank 15 can have a water supply pipe 29 connected to a water supply valve 30 with a water delivery pipe 31 carried thereby and controlled by a float 32 in a well known manner, with a hush tube 33 extending down into the overflow pipe 25.

The fitting 20, as shown in FIG. 1, has a hollow valve ball 34, of rubber or the like, which seats on the valve seat 24 to prevent delivery of water unless and until the valve ball 34 is raised from the seat 24. The valve ball 34 has an opening 35 in the bottom thereof to permit the entry into and discharge of water from the interior, depending upon its venting. A valve ball actuator 36 extending upwardly therefrom, guided by the guide bracket 26, has an abutment 37 for engagement by an eye 38 of a link 39 which is pivotally engaged at its upper end in a lever 40. The lever 40 can be actuated, as hereinafter explained, by a handle 41 exteriorly accessible at the front wall 17 of the tank 15 for manual operation.

In the embodiment of the invention shown in FIG. 1, the actuator 36 is preferably a metallic tube with a vent passageway 42 communicating with the interior of the valve ball 34 and has a flexible vent pipe 43 of synthetic plastic or the like carried on the upper end to provide for controlled air discharge from the valve ball 34, as hereinafter explained.

In the embodiment of the invention shown in FIG. 9, the valve ball 34*a* there shown has an actuator rod 36*a* extending therefrom, guided by the guide bracket 26, and actuated by the eye 38 of link 39, as before.

In this embodiment, the valve ball 34*b* has a vent tube 44 extending through the wall thereof with a flexible vent pipe 43 connected thereto.

In the embodiment of the invention shown in FIGS. 10 and 11 the valve ball 34*b* has a flexible carrying and seating plate 45 of rubber or the like carried on a mounting ring 46 on the pipe 25. The plate 45 provides a hinge for its own seating. An actuator chain 36*b* extends to and is connected to the lever 40.

In this embodiment, the valve ball 34*b* has a vent tube 44 extending through the wall thereof with a flexible vent pipe 43 connected thereto.

Referring again to FIGS. 1 to 8, inclusive, the handle 41 is secured to a shaft 49, the shaft 49 being carried in a fixed sleeve 50 with an inner nut 51 bearing against a collar 52 which is keyed to the sleeve 50 by a projection (not shown) engaging in a keyway 54 in the sleeve 50. A strut 55 extends from the collar 52 and provides for pivotally supporting the lever 40 on a pivot pin 56. An outer nut 57, engaging a washer 58 retains the sleeve 50 in place on the front wall 17.

The shaft 49 at the inner end thereof has a collar 60 adjustably secured thereto and held by a set screw 61. The collar 60 has an arm 62 to which a link 63 is pivotally connected by a pivot pin 64, the link 63 also being connected to the lever 40 by a pivot pin 65. It will be noted that upon turning the shaft 49 in either direction the lever 40 will be raised.

In order to control the venting upon predetermined directional movement of the shaft 49 it has a passageway 66 to which the flexible pipe 43 is connected. The passage way 66 has a radial passageway 67 extending therefrom to the periphery of the shaft 49. A rotary ported valve sleeve 68 is provided on the exterior of the shaft 49 and in light frictional engagement therewith and has a circumferentially elongated port 69, the sleeve 68 being relatively positioned either so that the passageway 67 is covered and venting prevented the port 69 is aligned with the passageway 67 for venting.

The sleeve 68 has a longitudinally extending finger 70 integral therewith movable to limit positions as determined by a slot 71 in sleeve 50 so that the port 69 is positioned either in or out of alignment with the passageway 67 depending upon the direction of turning of the handle 41.

The mode of operation will now be pointed out.

Assuming that the tank 15 is filled with water to a level determined by the float 32, if now it is desired to flush the toilet the handle 41 is operated for this purpose. The direction of turning of the handle 41 will determine the quantity of water discharge from the tank.

If complete discharge of the contents of the tank 15 is desired the handle 41 is turned in a clockwise direction as seen from the front of the tank 15 (FIG. 1). Movement of the handle 41 effects movement of the shaft 49 in a clockwise direction, rotating the collar 60, so that the arm 62 pulls the link 63 to move the lever 40 downwardly at the pivot 65. This causes the other end of the lever 40 to rise. The link 39, by engagement with the abutment 37, raises the actuator 36 and moves the valve ball 34 from its seat 24 to permit discharge of water for flushing.

Upon turning of the shaft 49 in a clockwise direction (see FIGS. 4 and 6) the sleeve 68, because of its light frictional engagement with the shaft 49, moves with the shaft 49 until the finger 70 engages with one end of the slot 71. The shaft 49 and the passageway 67 are turned so that the passageway 67 is beyond the slot 69 and the sleeve 68 covers the passageway 67 and no venting of the valve ball 34 can occur.

The water flowing past the seat 24, with the valve ball 34 separated therefrom and unvented, tends to cause the valve ball 34 to float so that it does not seat until the tank 15 is empty.



If however, only partial discharge of the contents of the tank 15 is desired, the handle 41 is turned in a counterclockwise direction.

Movement of the handle 41 effects movement of the shaft 49 in a counterclockwise direction, rotating the collar 60 so that the arm 62 pulls the link 63 to move the lever 40 downwardly at the pivot 65. This causes the other end of the lever 60 to rise. The link 39, by engagement with the abutment 37 raises the actuator 36 and moves the valve ball 34 from its seat 24 to permit discharge of water for flushing.

Upon turning of the shaft 49 in a counterclockwise direction (see FIGS. 5 and 7) the sleeve 68, because of its light frictional engagement with the shaft 49, moves with the shaft 49 until the finger 70 engages with the other end of the slot 71 and the port 69 is brought to and remains aligned with the passageway 67. Venting of the valve ball 34 is effected through the passageway 42, the flexible vent pipe 44, the passageway 66, the radial passageway 67, and the port 69. As water flows along the sides of the valve ball 34 a portion thereof enters the interior through the opening 35 because of the venting. When partial discharge from the tank 15 has been effected, and before complete discharge has occurred, the valve ball 34 will, by reason of its loss of buoyancy and by its weight, move to closed position on the seat 24, shutting off further flow. The water in the interior of the ball 34 will flow outwardly through the opening 35. The passageways 42, 66 and 67, and the vent tube 44 provide a restrictive action controlling the venting which can be varied if desired by changing the sizes of these components.

Upon the completion of the desired flushing action water will be supplied to the tank 15 through the valve 30 to bring the level in the tank 15 back to that determined by the float 32.

It will be noted that when water is discharged for partial delivery the maximum flow is available during the period the valve ball 34 is separated from its seat 24.

The operation of the embodiments shown in FIGS. 9 to 11 will be essentially the same as that previously described, the valve balls 34*a* and 34*b* being vented through the pipe 44 and flexible vent pipe 43, as controlled by the sleeve 68.

It will thus be clear that apparatus has been provided for effecting the objects of the invention.

I claim:

1. A toilet flush valve construction comprising
a discharge valve fitting having a seat,
a valve member for engagement with said seat and having a hollow interior portion and an opening in the bottom thereof,
manually operable actuating members for moving said valve member from its seat for flushing,
said actuating members including a handle and a linkage controlled by said handle interposed between said handle and said valve and moving said valve upon movement of said handle in opposite directions, and
means for controlling the buoyancy of said valve member,
said means including a vent connection to the interior of said valve member and a vent connection control member controlled by the movement of said linkage and effecting venting of said vent connection in one handle determined position of said linkage and nonventing of said vent connection in the opposite handle determined position of said linkage.

2. A toilet flush valve construction as defined in claim 1 in which
said linkage includes a shaft to which said handle is connected,
said shaft has a passageway to which said vent connection is connected, and

said vent connection control member includes a sleeve having a vent port for movement with respect to said passageway.

3. A toilet flush valve construction as defined in claim 2 in which

said sleeve is carried on said shaft and is movable between limit positions.

4. A toilet flush valve construction as defined in claim 1 in which

said vent connection includes a passageway in one of said members for moving said valve member.

5. A toilet flush valve construction as defined in claim 1 in which

said valve member is a ball, and

said vent connection is connected to the interior of said ball at the upper part thereof.

6. A toilet flush valve construction as defined in claim 1 in which

said valve member has a seating portion and a ball carried thereby, and



said vent connection is connected to the interior of said ball at the upper part thereof.

7. A toilet flush valve construction as defined in claim 1 in which

said vent connection control member includes a sleeve having a vent port movable into and out of communication with said vent connection.

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