United States Patent

[11] 3,590,395

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[54] **TOILET TANK FLUSH VALVE APPARATUS**
2 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **4/56**
[51] **Int. Cl.** **E03d 1/34**
[50] **Field of Search** 4/1, 33, 34, 36, 37, 38, 42, 49, 52, 55, 56, 65

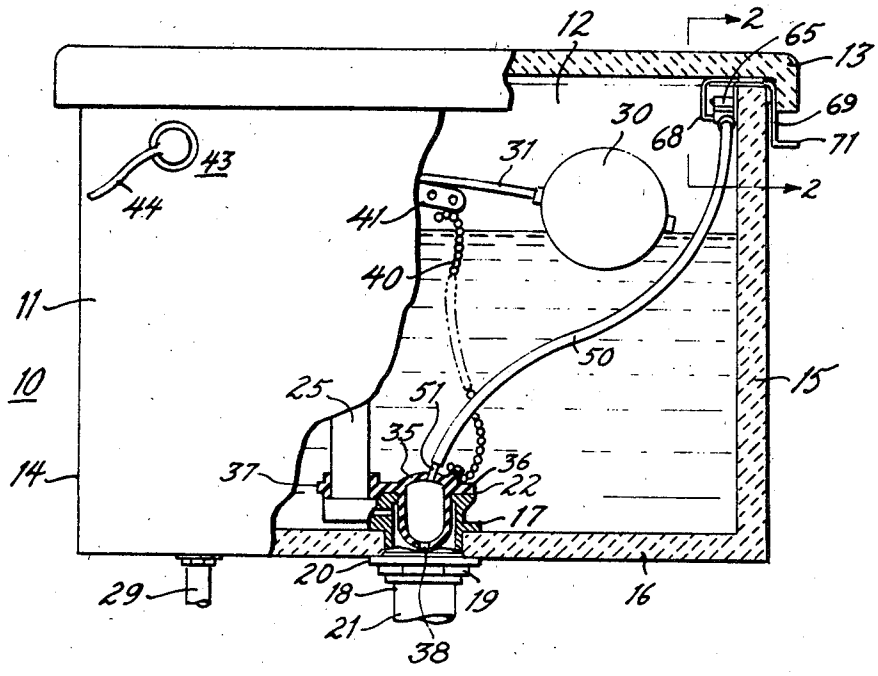
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ABSTRACT: An adjustable toilet tank flush valve apparatus is provided wherein the discharge of water from the tank is controlled by setting a control member connected to the flush valve whereby the flush valve buoyancy is selected to permit of full or partial tank discharge.



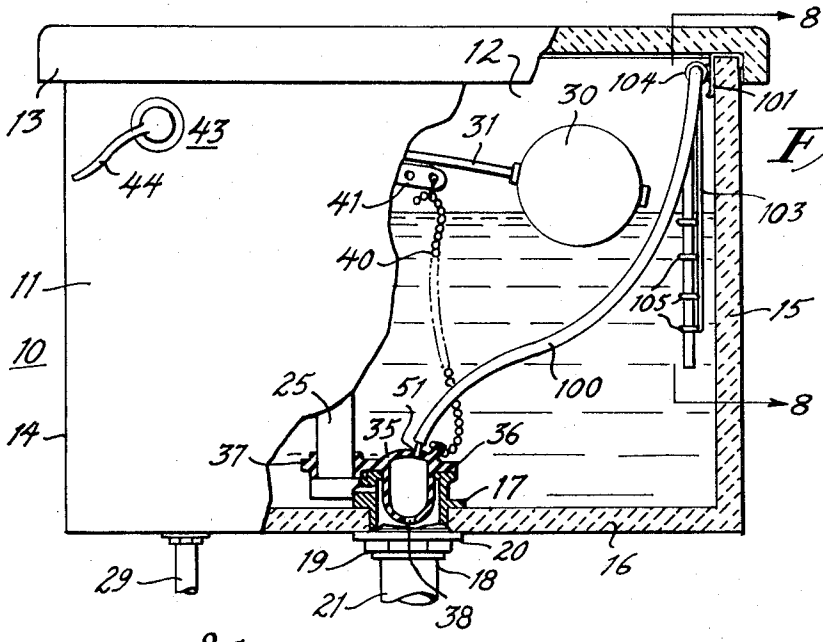


Fig.7.

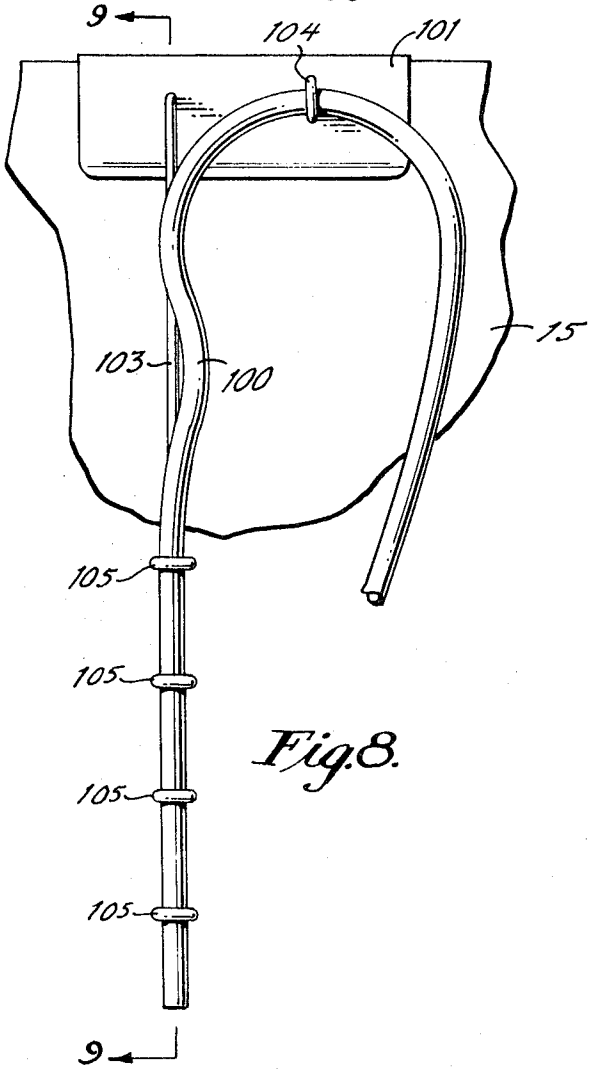


Fig.8.

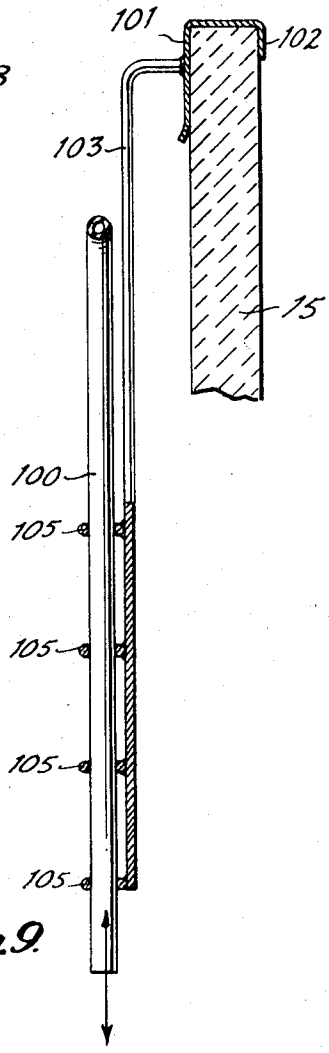


Fig.9.

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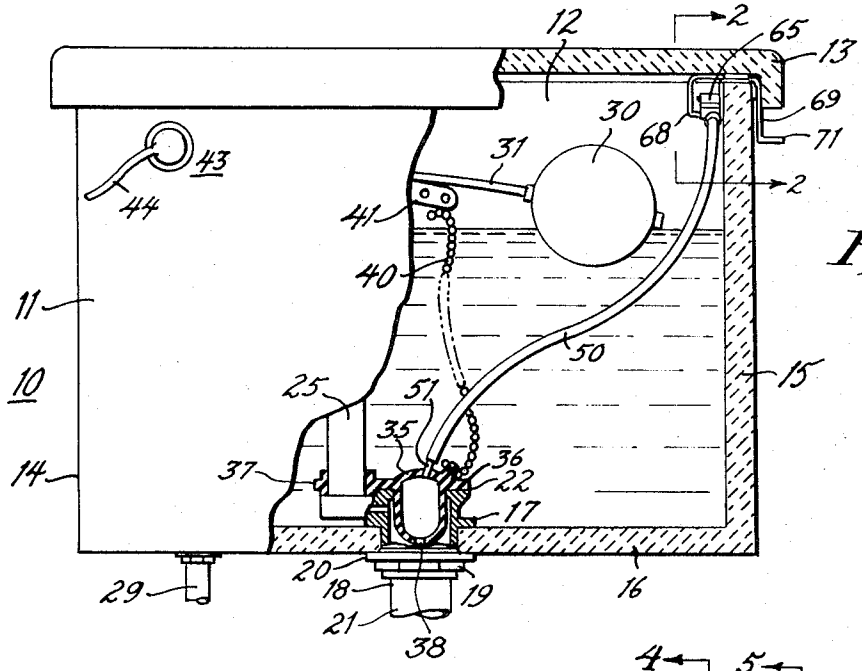


Fig. 1.

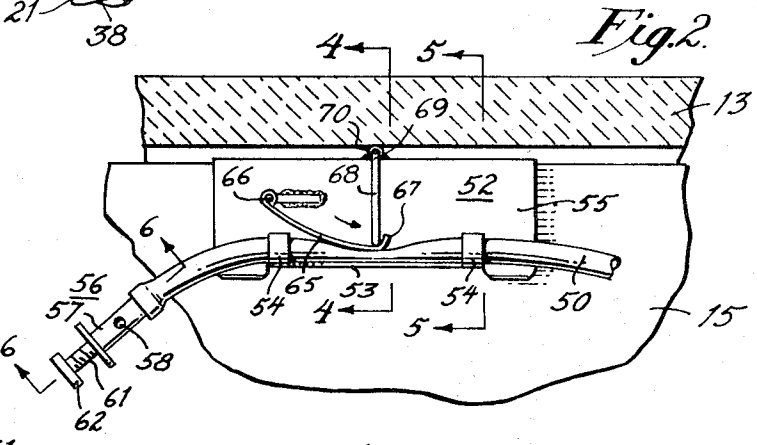


Fig. 2.

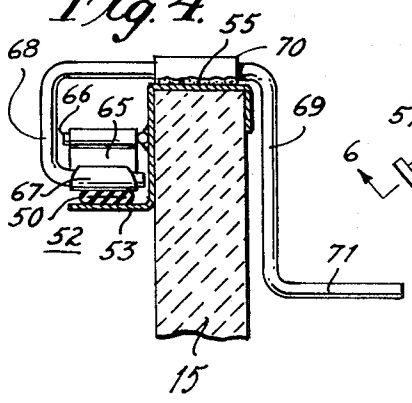


Fig. 4.

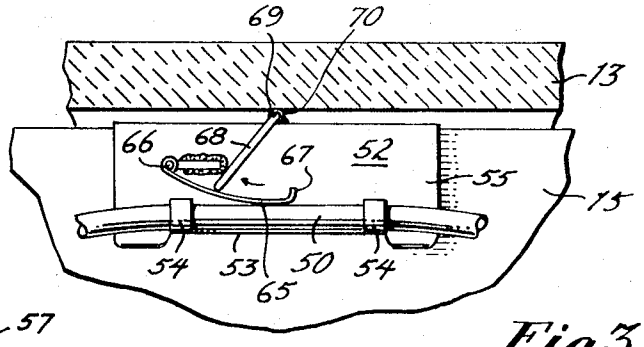


Fig. 3.

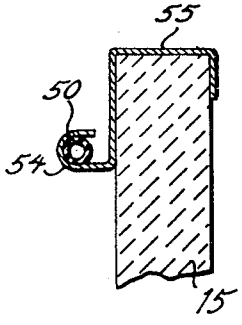


Fig. 5.

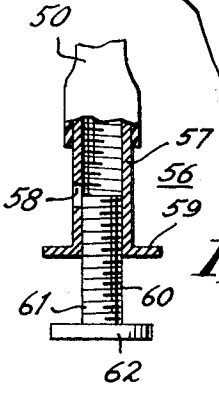


Fig. 6.

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TOILET TANK FLUSH VALVE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to adjustable toilet tank flush valves and more particularly to such valves with manual adjustment for adjusting the buoyancy of the valve to provide full or partial discharge of water from the tank.

2. Description of the Prior Art

In many areas and during certain seasons of the year water shortages have become quite serious and it is desirable to conserve water usage to the maximum extent possible.

Toilet tanks consume considerable quantities of water during each flushing. Many times a full flushing is not required due to the small amount of material present in the toilet bowl, however most tanks do not permit of less than a full flush each time they are discharged which results in considerable excess water use.

Various valves have heretofore been proposed to control the tank discharge so as to reduce unnecessary discharge of water from the toilet tank but none of them has proven wholly satisfactory.

In my prior application Ser. No. 769,335, filed Oct. 21, 1968, an adjustable valve is shown in which adjustment is made at the operating handle which controls the buoyancy of the valve ball to select full or partial discharge as desired. This structure is relatively complex to construct and assemble in comparison with the valve assembly of the present invention.

SUMMARY OF THE INVENTION

In accordance with the present invention an adjustable toilet tank flush valve apparatus is provided, with a simple but effective adjustable venting control member to control the buoyancy of the valve ball providing a full or partial tank discharge.

It is the principal object of the present invention to provide an adjustable toilet tank flush valve apparatus for partial or full toilet tank discharge, which is simple to construct but highly effective in operation.

It is a further object of the present invention to provide an adjustable toilet tank flush valve apparatus for partial or complete toilet tank discharge which can be easily installed on toilets now in use and on new installations.

It is a further object of the present invention to provide an adjustable toilet tank flush valve apparatus wherein the buoyancy of the valve ball is controlled at a location not associated with the valve ball operating mechanism.

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

BRIEF DESCRIPTION OF THE DRAWINGS

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

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

FIG. 2 is a fragmentary sectional view, enlarged, taken approximately on the line 2–2 of FIG. 1, and showing the setting for complete toilet tank discharge;

FIG. 3 is a fragmentary view of a portion of the structure shown in FIG. 2, showing the setting for partial tank discharge;

FIG. 4 is a fragmentary vertical sectional view, taken approximately on the line 4–4 of FIG. 2;

FIG. 5 is a fragmentary vertical sectional view, taken approximately on the line 5–5 of FIG. 2;

FIG. 6 is a fragmentary sectional view, taken approximately on the line 6–6 of FIG. 2;

FIG. 7 is a view similar to FIG. 1 but showing an alternate embodiment of the present invention;

FIG. 8 is a sectional view, enlarged, taken approximately on the line 8–8 of FIG. 7; and

FIG. 9 is a sectional view, taken approximately on the line 9–9 of FIG. 8.

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.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more particularly to the drawings and specifically FIGS. 1 to 6 thereof, a toilet flush tank 10 of conventional type is shown having a front wall 11, a rear wall 12, sidewalls 14 and 15 and a bottom wall 16 and with a cover 13 for the top of the tank.

A fitting 17 of well-known type is provided having a threaded section 18 extending through bottom wall 16 and held in place by a nut 19 engaging a washer 20 for sealing and having a delivery pipe 21 communicating with the toilet bowl or hopper (not shown) of the toilet below the valve seat 22 portion of the fitting 17.

The fitting 17 has an upright overflow pipe 25 of well-known type carried thereby and connected below the valve seat 22 for discharge of excess water.

The tank 10 has a water source pipe 29 connected thereto and to a water supply valve (not shown) with a water delivery pipe (not shown) carried thereby and controlled by a float 30 on arm 31 of the water supply valve in a well-known manner, and with a hush tube (not shown) extending down into the overflow pipe 25.

The fitting 17 as shown in FIG. 1, has a hollow valve ball 35, therein of rubber or the like, with a flexible carrying and seating plate 36 engageable with the valve seat 22 and hingedly carried on a mounting ring 37 on the pipe 25. The ball 35 has an opening 38 in the bottom thereof to permit the entry of water to the interior, depending on its venting, and the discharge of water from the interior.

The valve ball 35 has a chain 40 attached thereto for raising the seating plate 36 from the valve seat 22 to permit water to flow down the delivery pipe 20 into the toilet bowl or hopper (not shown) for flushing.

The chain 40 is connected to an arm 41 which extends to a handle assembly 43 with handle 44 for vertical movement of the arm 41.

The valve ball 35 has a flexible vent tube 50 connected to a tube 51 communicating with the interior of the ball 35. The tube 50 extends to shutoff assembly 52 which has a horizontal plate 53 with tabs 54 extending therefrom around the tube 50 retaining the tube 50 from movement. The tube 50 has an adjustable valve assembly 56 extending into its end which includes a hollow internally threaded valve body 57 with orifice 58 therethrough, and having a rim 59 thereon. A valve plug 60 is in threaded engagement in the valve body 57 and is of solid construction with a stem 61 and a rim 62 on the stem 61 for manual adjustment thereof.

The plate 53 of the shutoff assembly 52 has a plate 55 connected thereto which extends up, over, and down the sidewall 15 of tank 10 between the wall 15 and the tank cover 13, restrained from movement by its engagement with wall 15 and the weight of the cover 13.

The plate 55 has a spring clip arm 65 rotatably secured thereto by a shaft 66 which clip arm 65 has a stop portion 67 thereon and normally rests upon the vent tube 50.

An arm 68 of a crank 69 is engaged with the clip 65 and can urge it down against the tube 50 as desired. The crank 69 extends up and between the wall 15 and the cover 13 where it is rotatably secured by a ring 70. The crank 69 is provided with an arm 71 for manual turning.

Referring now to FIGS. 7 to 9, an alternate embodiment is there illustrated which includes a toilet tank 10 similar to that

of FIG. 1 having front and rear walls 11 and 12, sidewalls 14 and 15, a bottom wall 16 and a top cover 13, a fitting 17 extends through the bottom wall 16 with its threaded section 18 held therein by nut 19 and sealed from leakage by washer 20. A pipe 21 is engaged with the fitting 17 and extends into a toilet bowl or hopper (not shown) for delivery of water below the valve seat 22 of fitting 17.

The fitting 17 also has an overflow pipe 25 connected below the valve seat 22 and with a hush tube (not shown) in the pipe 25.

Water under pressure is delivered to the tank 10 through a supply pipe 29 into a delivery pipe (not shown) controlled by a water supply valve (not shown) with attached float 30. A hollow valve ball 35 of rubber or the like extends down into the fitting 17 with a flexible carrying and seating plate 36 engaged with the valve seat 22 and hingedly carried on the pipe 25 by a ring 27.

The valve ball 35 has an opening 38 in the bottom to permit water to enter the interior depending on its venting. A chain 42 is attached to valve ball 35 and to an arm 41 of a handle assembly 43 with handle 44 to permit raising valve ball 35 from seat 22 to discharge water down pipe 21.

A flexible vent tube 100 is connected to tube 51 of valve ball 35 communicating with the interior of valve ball 35 for venting of the interior.

The vent tube 100 extends to a mounting plate 101 which is fastened to the wall 15 of tank 10 and has a projection 102 over the wall 15 and below the top cover 13. The tube 100 is held to the plate 101 by a ring 104 and extends downwardly inside tank 10 along a vertical rod 103 which is attached to plate 101, the tube 100 being held to the rod 103 by a series of rings 105.

The mode of operation and use will now be pointed out.

Referring to the embodiment shown in FIGS. 1 to 6, and assuming the tank 10 is filled with water, the handle 44 is moved and through arm 41, and chain 40, the valve ball 35 is raised so that plate 36 rises off seat 22 and water flows down pipe 21 into the toilet bowl or hopper (not shown) and flushes out the waste material therein.

The water supply valve (not shown) is opened by the float 30, and arm 31 moving downward and water flows into the tank 10 through pipe 29 out the hush tube (not shown) and into the tank.

If full flushing is desired then arm 67 of crank 68 is moved to engage clip 65 and tube 50 is compressed against plate 53 so that no air can flow through tube 50 and no water will flow into the interior of valve ball 35 through opening 38 so that valve ball 35 retains complete buoyancy. If only partial flushing is desired, then the crank 68 is positioned so that the tube 50 is open and unobstructed and the valve assembly 56 is adjusted so that orifice 58 is open or partially open, air can then be displaced and water flow into valve ball 35 through opening 38 to the extent desired so that the buoyancy is decreased and valve ball 35 seats before tank 10 is empty. The water will flow into the tank 10 through pipe 29 until tank 10 if filled and the cycle can be repeated as desired.

Referring now to FIGS. 7 to 9 and assuming tank 10 is filled with water, the handle 44 is moved, valve ball 35 is raised and water flows down through fitting 17 to the pipe 21 and into the toilet bowl or hopper (not shown). If full flushing is desired then the tube 100 is immersed in the water to its full extent so that valve ball 35 retains maximum buoyancy and floats until all the water has run from the tank 10. If partial flushing is desired then the end of tube 100 is raised the desired distance so that air will be displaced from the tube 100 and interior of valve ball 35 and water will flow thereinto through opening 38 causing the ball 35 to move downwardly before the tank 10 is empty and seat on valve seat 22.

The tank 10 fills as before described and the flushing cycle may continue as desired.

I claim:

1. Toilet tank flush control apparatus for use with a toilet tank with an upper rim and having a water supply valve assembly, a source of water under pressure, a discharge valve fitting having a seat, a valve member for engagement with said seat to permit retention or discharge of water from said tank, said valve member having a hollow interior portion with an opening in the bottom providing access to the interior, and manually operable members for moving said valve member from said seat for discharge of water from the tank, in combination with

means for selectively controlling the buoyancy of said valve member,

said means including

a flexible tube having one end connected to and in communication with the interior of said valve member and having a free end,

a body member having a portion in hooked engagement with the upper rim supporting said tube intermediate its ends on said tank,

said free end having an adjustable air inlet valve carried thereby for controlling access of air to said tube and therethrough to said hollow interior portion, and

a shutoff valve for said tube carried by said body member and having an operating portion exteriorly accessible at the upper rim of said tank.

2. Toilet tank flush control apparatus as defined in claim 1 in which

said shutoff valve includes a resilient member engaging said tube, and

a movable member to which said operating portion is connected for urging said resilient member into collapsing engagement with said flexible tube.