Jan. 7, 1969 F. W. KERTELL 3,419,912

TOILET TANK FLUSH VALVE

Filed Feb. 14, 1966 Sheet 1 of 3

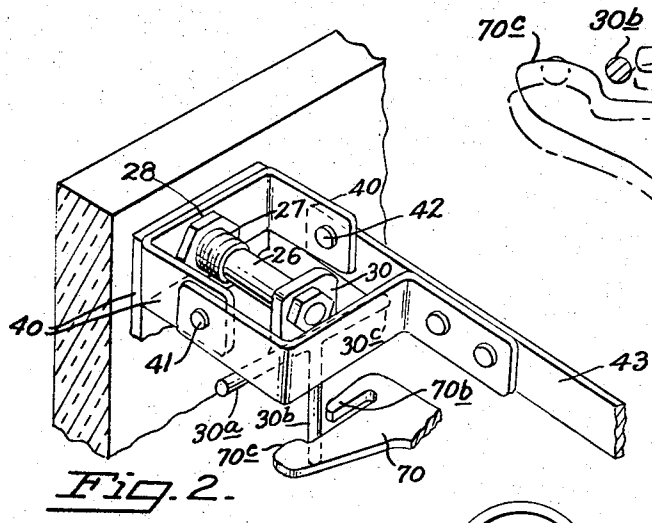


Fig. 2.

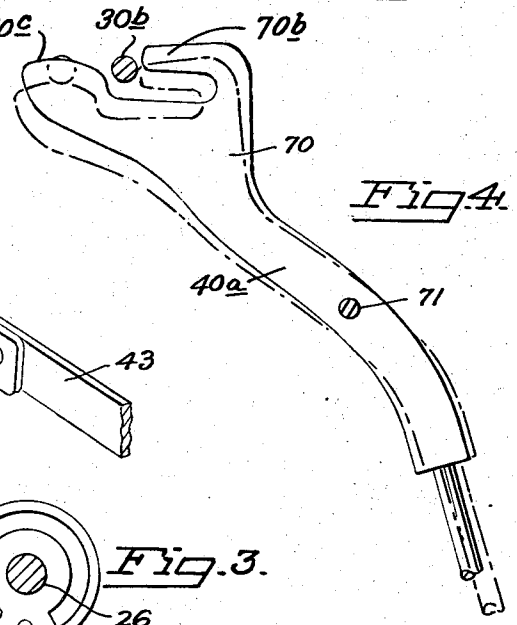


Fig. 4.

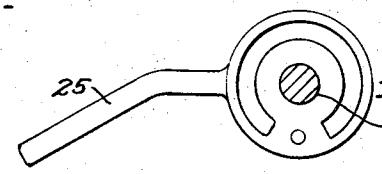


Fig. 3.

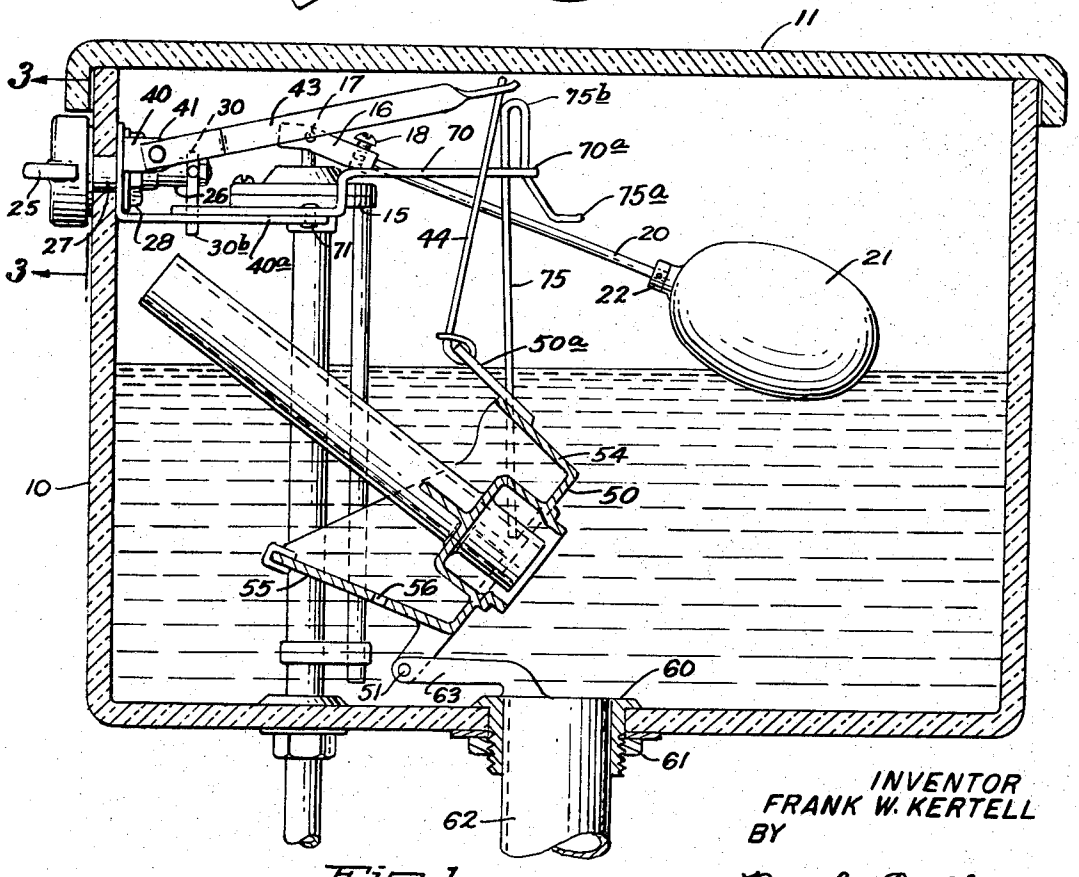


Fig. 1.

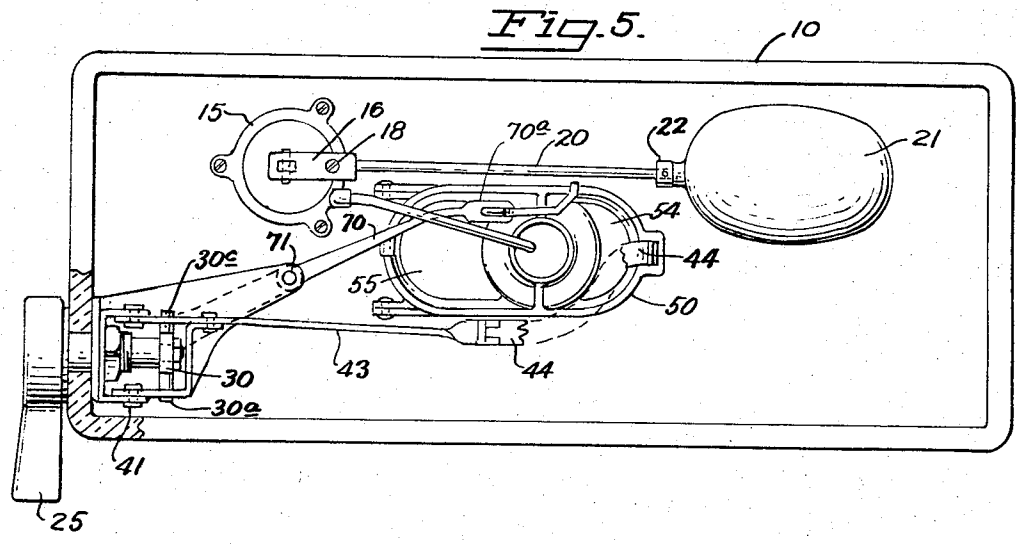
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TOILET TANK FLUSH VALVE

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Fig. 5.



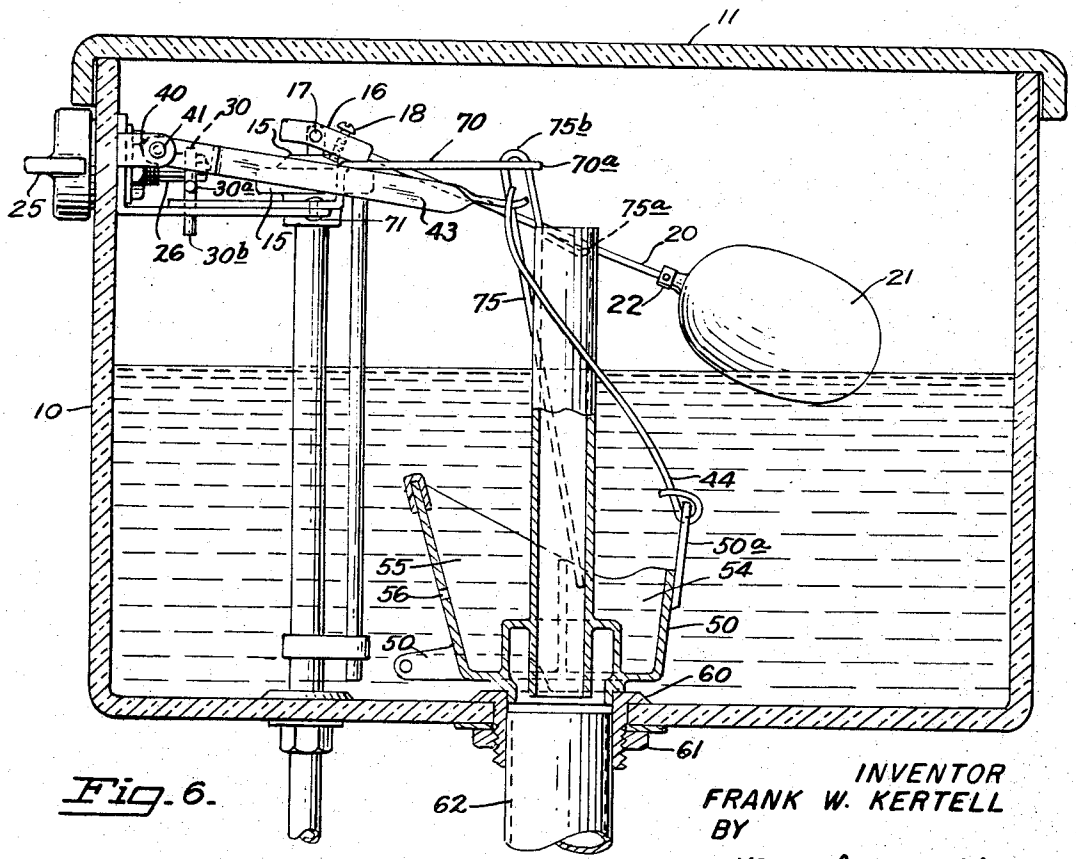


Fig. 6.

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Fig. 7.

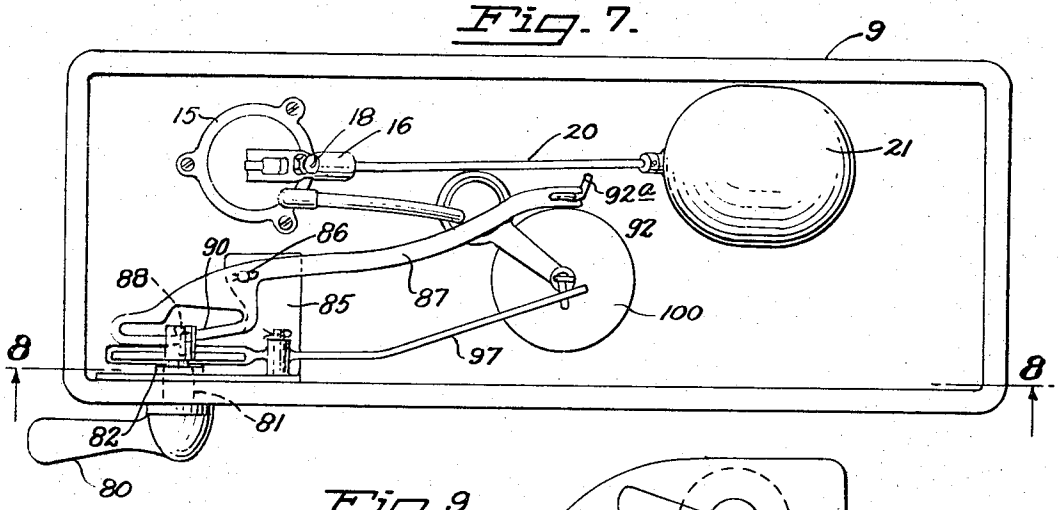
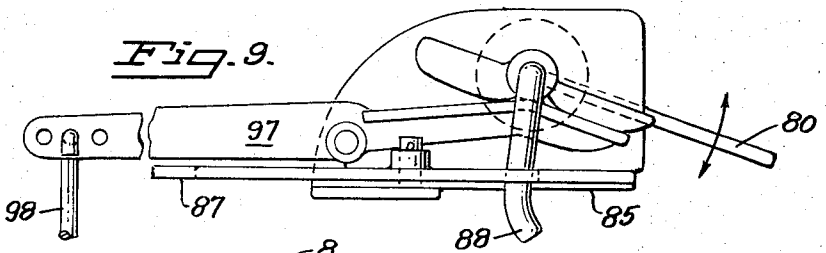


Fig. 9.



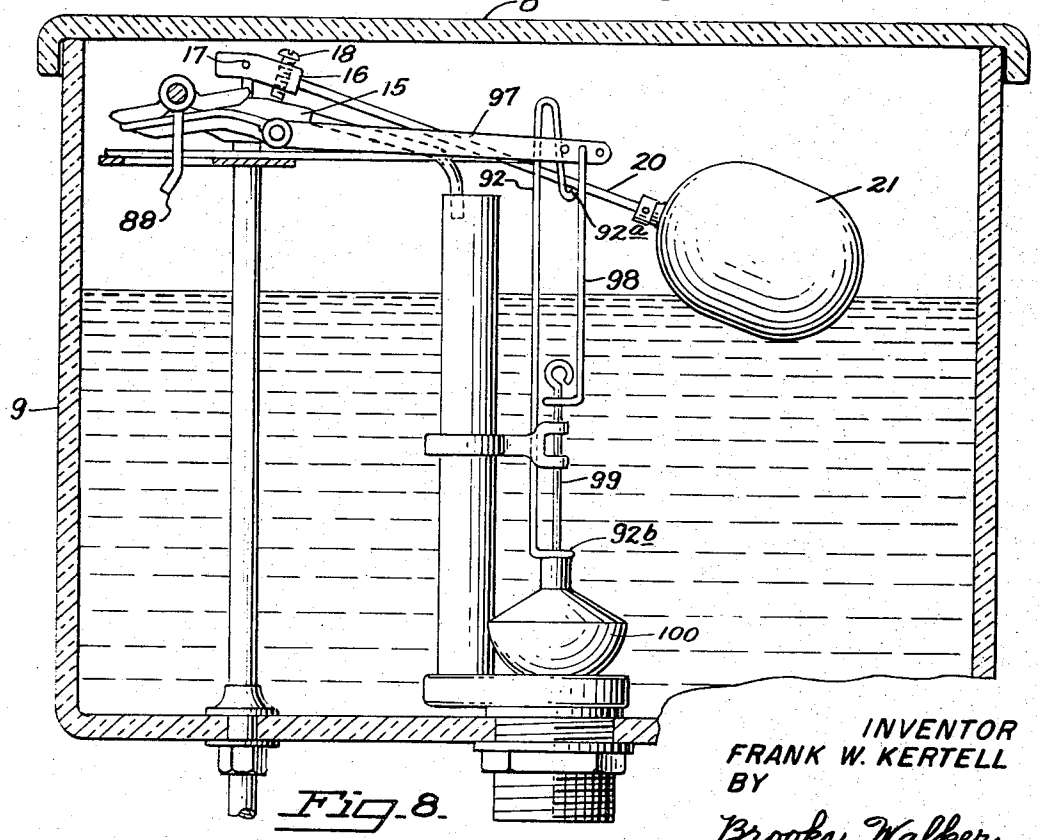


Fig. 8.

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United States Patent Office 3,419,912
Patented Jan. 7, 1969

3,419,912

TOILET TANK FLUSH VALVE

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Filed Feb. 14, 1966, Ser. No. 527,313
U.S. Cl. 4—58 3 Claims
Int. Cl. E03d 1/14

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 application 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 toilet.

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 lifed 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. Kertell, 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 our 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 shift 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 tip 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 tip 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 **15** 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 **50***a* 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 sloping wall to the left with a bleed hole **56** to allow cup **55** to drain slowly after the 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—**30***a*, **30***b* and **30***c*. Arm **43**, as stated, is pivoted at pins **41** and **42** to bracket **40**. Arm **43** rests on ends **30***a* and **30***c* 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** is secured to tank **10** by nut **61**. 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 **40***a*. End **70***a* supports trip rod **75**, the lower end of which rests in cup **54** and the looped end **75***b* passes through a hole and slot in the end **70***a* of shift lever **70**. End **75***a* 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 **50** will be tilted back and cam end **30***b* moves shift lever counterclockwise, as viewed in FIGS. 2 and 5, to cause end **75***a* 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 **20** with end **75***a* of rod **75** as controlled by shift lever **70** as controlled by cam end **30***b* 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 **75***a*, being out of the path of motion of float rod **20** when lever **25** is moved down so cam end **30***b* moves against shift lever portion **70***b*. Friction again holds shift lever **70** in this full flush position until cam end **30***b* moves to the right, as viewed in FIG. 4, when cam end **30***b* and end **70***c* 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 **30***c* to tilt valve **50** to the dump position. Shift lever will stay in the neutral position, as shown in FIG. 4, with end **75***a* 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 part 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 and 8 and shift lever **87** will stay in full flush position so that arm **20** will not intercept end **92***a* 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 counterclockwise slightly so that rod end **92***a* is moved under the float rod **20**. In this position float **21** and rod **20** will cause rod **92** to move down and through looped end **92***b* 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 is near the top of float valve **100** when the suction of water running out will cause it to sink and shut off the flow from the tank. Handle **80** does not need to be held in either position to accomplish a full or part flush due to the friction in the support of shift lever **87**. 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 scope of this invention.

To those skilled in the art to which this invention relates many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and description herein are purely illustrative and are not intended to be in any sense limiting.

I 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, 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.

3. A device as defined in claim **2** wherein the means for shifting the rod and extension comprises a lever, means pivotally mounting the lever in the tank, cam means for pivoting the lever, and a handle connected to the cam means and outlet valve for opening said valve and for moving said cam means in one direction to shift the said lateral extension into the plane of oscillation and for moving the cam means in the opposite direction to shift said lateral extension away from said plane of oscillation.

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