May 11, 1943. A. H. TOW 2,318,978

FLUSH TANK

Filed May 11, 1942 4 Sheets-Sheet 1

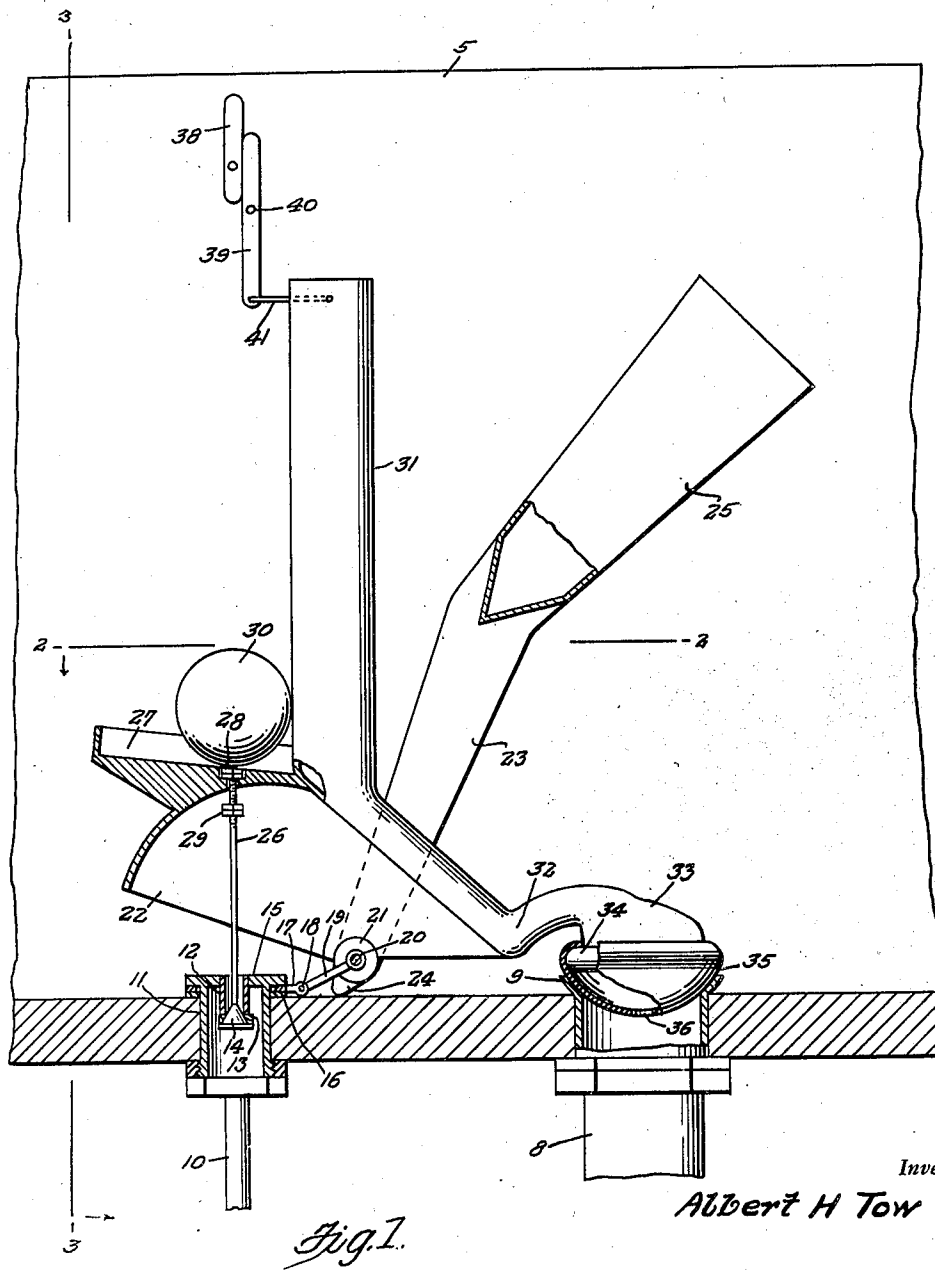


Fig. 1.

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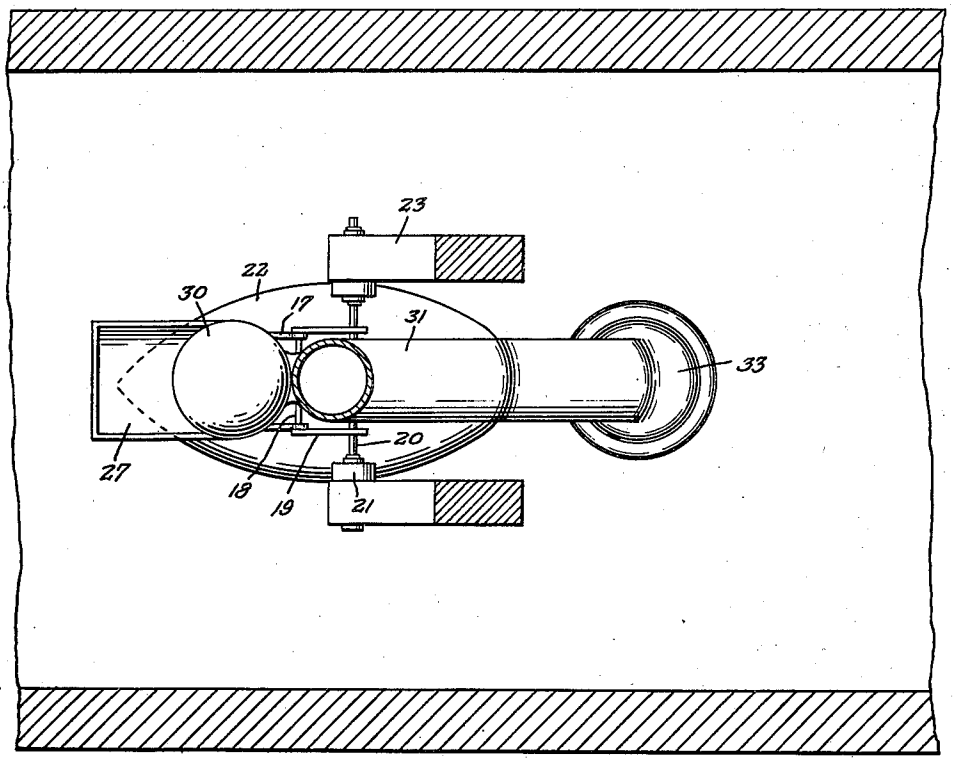


Fig. 2.

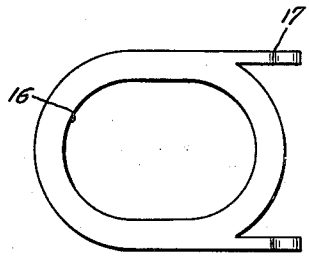


Fig. 4.

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FLUSH TANK

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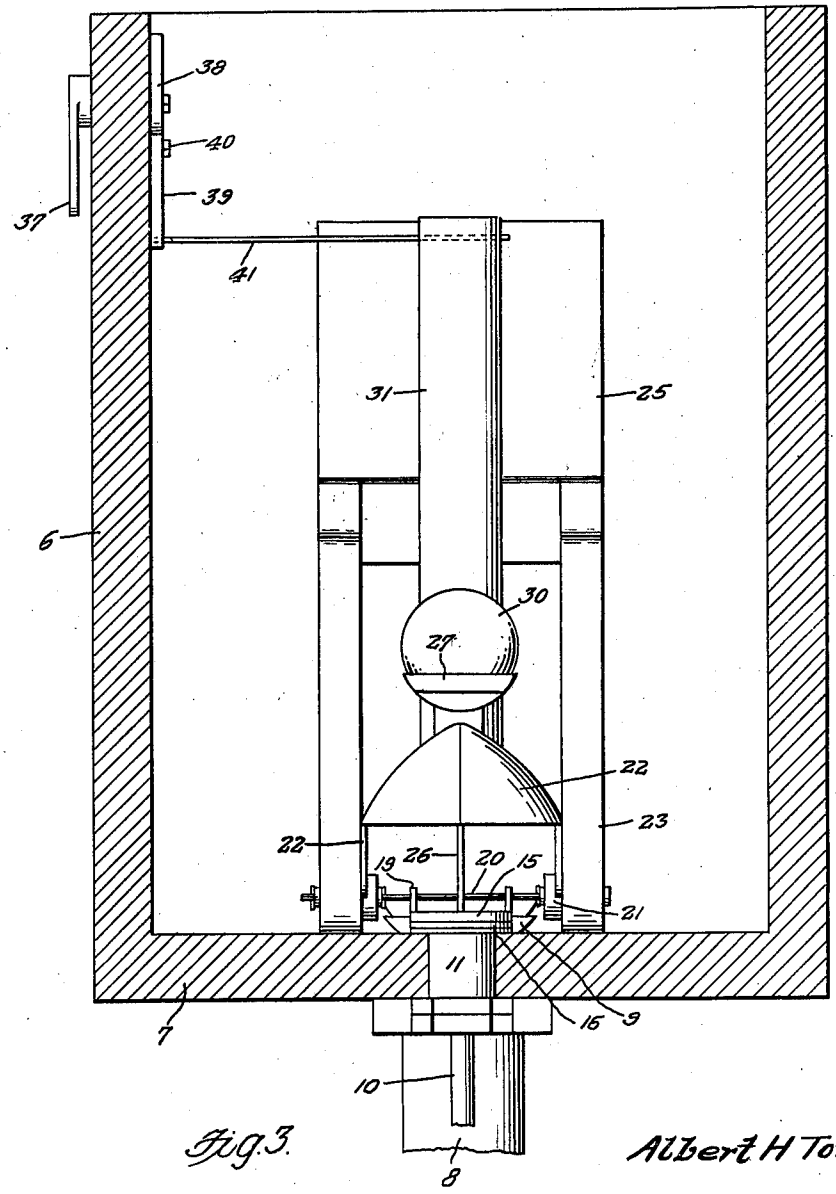


Fig. 3.

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FLUSH TANK

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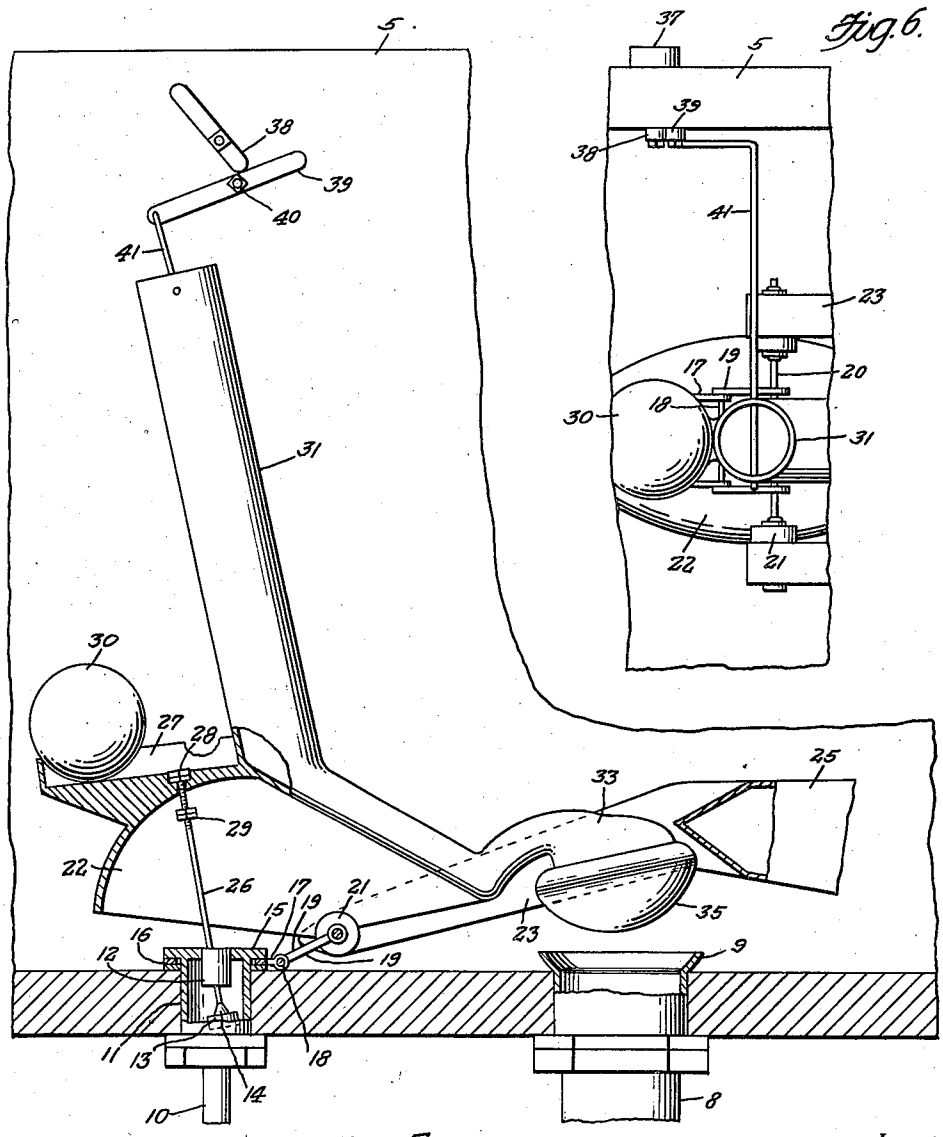


Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE

2,318,978

FLUSH TANK

Albert H. Tow, Atlanta, Ga., assignor of one-half to Frank B. Slupesky, Indianapolis, Ind.

Application May 11, 1942, Serial No. 442,520

18 Claims. (Cl. 4—41)

The present invention relates to new and useful improvements in flush tanks for toilets and has for its primary object to provide a rockably mounted valve unit constructed practically entirely of ceramic or other suitable molded plastic or non-metallic material, and including integrally cast or molded valve means carried thereby for the feed and drain pipes of the tank and an overflow pipe communicating with the drain valve.

Another object is to provide a float unit likewise constructed of similar material and operatively connected to the valve unit for rockably actuating the latter into its valve closing position.

A further object is to provide a counter-balancing weight carried by the valve unit and adapted when in one position to retain the said unit in valve opening position, while the tank is being drained, and also to retain the valves in closed position upon an opposite movement of the weight, and while the tank is being filled.

A further object is to provide a device of this character of simple and practical construction, which is efficient and reliable in performance, relatively inexpensive to manufacture and maintain in operation and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout and in which—

Figure 1 is a fragmentary vertical sectional view of a flush tank showing the flushing unit in position therein.

Figure 2 is a sectional view taken substantially on a line 2—2 of Figure 1.

Figure 3 is a vertical sectional view taken substantially on a line 3—3 of Figure 1.

Figure 4 is a plan view of the anchoring member for securing the lower portion of the valve unit in position in the tank.

Figure 5 is a view similar to Figure 1 and showing the device in flushing position, and

Figure 6 is a fragmentary top plan view.

Referring now to the drawings in detail, wherein for the purpose of illustration I have disclosed a preferred embodiment of the invention, the numeral 5 designates the flush tank having the side walls 6 and bottom 7, the bottom having the drain pipe 8 connected thereto terminating at its upper end in a valve seat 9 and the bottom is also provided with the water supply pipe 10 communicating with a valve fitting 11 secured in the bottom of the tank, the fitting including a tubular member 12 communicating through the top of the fitting and with which the conical portion 14 of a valve 13 engages for controlling the feeding of water from the pipe 10 into the tank.

The fitting 11 also includes a flanged top 15 spaced above the bottom of the tank and positioned beneath the flange is an oval-shaped member 16 loosely surrounding the fitting and having spaced parallel eyes 17 projecting from one end of the member 16, through which a pin 18 extends to provide pivotal mountings for a pair of links 19 which have their opposite ends pivotally connected to a horizontal rod 20 journaled in bosses 21 formed on the inner side of an inverted shield 22 concaved on its underside, and which overlies the intake end of the fitting 11 to check upward force of water entering the tank.

The rod 20 also extends through the lower ends of a pair of legs 23 which have substantially rounded cam-shaped lower ends 24 bearing against the bottom of the tank.

The legs 23 extend upwardly in the tank and are connected at their upper ends by a hollow cross-member 25 which forms a float.

The valve 14 is provided with an upwardly extending stem 26 which extends through the top of the shield 22 and also through a trough 27 formed on top of the shield, the upper end of the stem being loosely inserted through the shield and the trough and is threaded to receive upper and lower nuts 28 and 29 positioned above and below the shield to adjust the movement of the valve relative thereto. A solid or weighted ball 30 is positioned for movement in the trough 27 from end to end thereof, one end of the trough being closed by a pipe 31 cast or molded integrally with the shield 22 and extending vertically above the shield and trough. The lower end of the pipe extends in a direction toward the discharge pipe 8 and is formed with a downwardly offset portion 32 forming a trap for water entering the pipe, the extremity of the pipe being formed into an annular head 33 provided with a bead 34 to which a rubber cup-shaped valve 35 is secured for seating on the valve seat 9. The trough 27 is inclined in a direction to cause the ball 30 to gravitate into a position at the inner end of the trough adjacent the pipe 31, as shown in Figure 1, when both valves 14 and 35 are closed.

Overflow of water in the tank is adapted to enter the top of the pipe 31 and pass downwardly through the trap 32, head 33 and valve 35, and

the bottom of the valve 35 is formed with a drain opening 36 for emptying the overflow into the discharge pipe 8.

A quantity of the overflow water will be retained in the trap 32 and accordingly will eliminate any possibility of odors entering the tank from the discharge pipe 8.

Projecting through the side wall 6 of the tank, adjacent its upper edge, is a manual operating lever 37 having a double-ended head 38 at its inner end engaging a lever 39 pivoted intermediate its ends on a pin 40 within the tank, the upper end of the lever being engaged by the head 38 for pivotal movement of the lever upon a movement of the lever 37 in either direction. The lower end of the lever 39 is connected to the upper end of the pipe 31, by means of a rod 41, to swing the pipe in accordance with the movement of the lever 39 and thereby cause a rocking movement of the flushing unit on the cam ends 24 of the float to raise the valve 35 from the discharge pipe 8 and thus permit discharge of water from the tank through the pipe. At the same time the trough 27 is tilted downwardly in an opposite direction from the position shown in Figure 1 of the drawings, whereby the ball 30 will be moved toward the outer end of the trough and the valve 14 moved downwardly to open the intake pipe 10 to admit water into the tank. The pipe 10 is of a capacity considerably less than the capacity of the discharge pipe 8 and accordingly will not prevent draining of the water from the tank while the valve 14 is in open position.

When the water is drained from the tank, the float 25 will be lowered and when approaching its lowermost position the inner edge of the float will engage the head 33 of the valve 35 and thereby move the valve 35 downwardly for engagement with the valve seat 9 whereby to cut off further discharge of water from the tank and accordingly the admission of water into the tank from the pipe 10 will gradually fill the tank. As the tank becomes filled, the float 25 will be moved upwardly and the camming action of the extremity 24 of the legs 23 to which the float is attached will cause a raising movement of the shield 22 and pipe 31, thereby causing the valve stem 26 to close the valve 14.

During the initial movement of the valves 14 and 35, when the ball 30 is moved toward the outer end of the trough 27, the weight of the ball will serve to maintain the valves in open position while the float is being lowered.

In order to eliminate the use of critical war material as much as possible, the shield 22, trough 27, pipe 31, and head 33 are cast as a unit from vitrified clay commercially known as "ceramic". The ball 30 is likewise made of similar material and the legs 23 and float 25 are also cast as a unit from similar material.

The oval-shaped member 16 is the only element employed for anchoring the device in the bottom of the tank and may be adjusted on the fitting 11 to cause proper seating of the valves 14 and 35.

With the flush tank full, parts are positioned as shown in Figure 1. Upon actuation of the conventional lever handle 37 exterior of the flush tank, the overflow tube 31 is tilted from Figure 1 position toward Figure 5 position. Immediately upon sufficient tilting occurring, the solid ball 30 rolls from the position shown in Figure 1 to the position shown in Figure 5, holding the overflow in counter-clockwise tilted relation which elevates the valve 35 from the seat 9. This permits flush discharge of tank contents. As water level recedes, float 25 follows down with dropping level until the angular edge of the float engages the valve end of the overflow structure and tilts it in the further receding movement of the float valve into the closed valve position, to-wit, moving the float valve from position shown in Figure 5, toward the position shown in Figure 1. In this movement, at the proper portion thereof, the ceramic ball 30 rolls from position of Figure 5 to position shown in Figure 1, thus holding the overflow in the position shown in Figure 1.

During all this time, due to the fact that the float valve is still down, there being little or no water in the flush tank, the inlet valve will remain open and supply water to the tank until such time as the water has risen in the tank carrying with it the float 25 and at the appropriate level the float is positioned as shown in Figure 1 and at the same time the inlet valve is closed, cutting off further water supply. In the event this cut-off fails to work, the water will continue to rise, overflow into the overflow 31 at the top and escape downward through the waste vent 36 in the flush valve.

All odors, as explained before, are prevented from escaping from the bowl proper by way of pipe 8 and the overflow 31 due to the water seal 32 which always is trapped and cannot escape regardless of the position of the overflow in either of its two extreme positions.

It is believed the details of construction and manner of use of the device will be readily understood from the foregoing without further detailed explanation.

Having thus described the invention what I claim is:

1. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, and a trap in said overflow pipe retaining a water seal therein at all times.

2. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, a manually operable lever connected to the overflow pipe for opening the valve, a float, an inlet valve for the feed pipe, means connecting the float to said inlet valve and to the drain valve for closing the latter in float descent and closing the inlet valve in float ascent incident to flushing and tank filling respectively, the overflow pipe being pivoted on the float and movable thereby for tank filling and movable independently thereof for tank discharge.

3. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, a manually operable lever connected to the overflow pipe for opening the valve, and a float engaging the valve in its downward movement for closing the valve.

4. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, a manually operable lever connected to the overflow pipe for opening the valve, a float, and means connecting the float to the overflow pipe to provide a fulcrum for the pipe during the opening and closing movement of

the valve, said float engaging the valve during downward movement of the float to close the valve.

5. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, a manually operable lever connected to the overflow pipe for opening the valve, a float, a rigid member pivotally connecting the float to a lower portion of the overflow pipe, a cam on the lower end of the member working on the bottom of the tank to raise and lower the overflow pipe in accordance with a corresponding movement of the float, said float engaging the valve to close the same upon a predetermined lowering movement of the float, and a valve for the feed pipe and operatively connected to the overflow pipe and closed upon an upward movement of the overflow pipe.

6. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, a manually operable lever connected to the overflow pipe for opening the valve, a float, a rigid member pivotally connecting the float to a lower portion of the overflow pipe, a cam on the lower end of the member working on the bottom of the tank to raise and lower the overflow pipe in accordance with a corresponding movement of the float, said float engaging the valve to close the same upon a predetermined lowering movement of the float, and a valve for the feed pipe and operatively connected to the overflow pipe and closed upon an upward movement of the overflow pipe, and a captive counterbalancing weight carried by the overflow pipe for opening the last-named valve upon a lowering movement of the overflow pipe.

7. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, an overflow pipe in the tank, a valve on the lower end of the overflow pipe controlling the drain pipe, a manually operable lever connected to the overflow pipe for opening the valve, a trough projecting laterally from the overflow pipe and having a weighted ball loosely positioned therein, a shield beneath the trough disposed over the feed pipe, a valve for the feed pipe connected to the trough for actuation of the valve upon a predetermined tilting action of the trough, a float, and a support pivotally connecting the float to the shield and including a cam element on its lower end engaging the bottom of the tank to raise and lower the shield for actuating last-named valve, said cam element also constituting a fulcrum for the overflow pipe to effect opening and closing of the first-named valve upon tilting movement of the overflow pipe.

8. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, a valve unit including an overflow pipe having a valve at its lower end adapted to close the drain pipe, a valve operatively connected to the valve unit for closing the feed pipe, manually operated means connected to the valve unit for actuating both valves into their open positions, a float pivotally connected to the valve unit and adapted upon a descending movement to close the first-named valve, and adapted upon an ascending movement to close the second-named valve.

9. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, a valve unit including an overflow pipe having a valve at its lower end adapted to close the drain pipe, a valve operatively connected to the valve unit for closing the feed pipe, manually operated means connected to the valve unit for actuating both valves into their open positions, a float pivotally connected to the valve unit and embodying means tiltably supporting the valve unit, and a counter-balance carried by the valve unit adapted to retain the valves in open position during initial descending movement of the float, said first-named valve being disposed in the path of descending movement of the float for closing the first-named valve and to return the counter-balance to its original position for retaining the first-named valve closed, said float operating through its tiltable supporting means to close the second-named valve upon an ascending movement of the float.

10. A flush tank mechanism comprising a tank having a water feed pipe and a drain pipe connected to the tank, a valve unit including an overflow pipe having a valve at its lower end adapted to close the drain pipe, a shield concaved on its under side overlying the feed pipe, and a trough projecting laterally from the overflow pipe, said overflow pipe, said valve, said shield and said trough being integrally formed, a counter-balance ball mounted for movement from end to end of the trough, a float unit including a hollow member and a leg pivotally connecting the float unit to the valve unit, said hollow member and leg being integrally formed, a cam on the lower end of the leg bearing against the bottom of the tank and operable to raise and lower the valve unit upon a corresponding movement of the float unit, said trough being inclined in one direction when the float is raised to move the ball into a position for closing the drain valve, a valve for the feed pipe connected to the valve unit, both of said valves being movable into open position by a tilting movement of the valve unit on the cam as a fulcrum, and manually operated means for tiltably actuating the valve unit to open the valves, said drain valve being disposed in the path of descending movement of the float to close the drain valve, and said valve for the feed pipe being closed upon a raising movement of the float.

11. In a flush tank having a valve-controlled water inlet and a flush discharge, the combination with a manually operated movably mounted overflow element having a flush valve at its lower end and movable into open valve position incident to manual actuation of the element, of a float and a counter-balance, said float being responsive to flush tank liquid level and operatively associated with the overflow element for closing the flush valve upon tank discharge and effective upon the inlet valve to close the latter and in opposition to action of the counter-balance for insuring closing of the flush valve by the latter during tank filling.

12. In a flush tank having a valve-controlled water inlet and a flush discharge, the combination with a manually operated movably mounted overflow element having a flush valve at its lower end and movable into open valve position incident to manual actuation of the element, of a float and a counter-balance, said float being responsive to flush tank liquid level and operatively associated with the overflow element for closing the flush valve upon tank discharge and effective upon the inlet valve to close the latter and in

opposition to action of the counter-balance for insuring closing of the flush valve by the latter during tank filling, said counter-balance including a weighted mass carried by the overflow element and movable relative thereto in opposite directions in accordance with the movement of the latter.

13. In a flush tank having a valve-controlled water inlet and a flush discharge, the combination with a manually operated movably mounted overflow element having a flush valve at its lower end and movable into open valve position incident to manual actuation of the element, of a float and a counter-balance, said float being responsive to flush tank liquid level and operatively associated with the overflow element for closing the flush valve upon tank discharge and effective upon the inlet valve to close the latter and in opposition to action of the counter-balance for insuring closing of the flush valve by the latter during tank filling, said counter-balance including a weighted ball freely carried by the overflow element and movable relative thereto in opposite directions in accordance with the movement of the latter.

14. In a flush tank having a valve controlled water inlet and a flush discharge, the combination of an angular overflow element controlling said inlet and discharge and having a counter-balance, and a pivoted float, the latter having operative engagement with the overflow element for moving the same into position for closing the inlet and discharge.

15. In a flush tank having a valve controlled water inlet and a flush discharge, the combination of an angular overflow element controlling said inlet and discharge and having a counter-balance, and a pivoted float, the latter having operative engagement with the overflow element for moving the same into position for closing the inlet and discharge, and a liquid baffle in said overflow element.

16. A valve unit for the inlet and discharge ports of a flush tank and comprising an overflow tube of plastic material having a valve head integrally formed on its lower end adapted to control the discharge port and providing drainage communication for the tube with the discharge port at all times, and a valve for the inlet port connected to and movable with and by the tube.

17. A valve unit for the inlet and discharge ports of a flush tank and comprising an overflow tube of plastic material having a valve head integrally formed on its lower end adapted to control the discharge port and providing drainage communication for the tube with the discharge port at all times, a valve for the inlet port connected to and movable with and by the tube, and means adjustably mounting the unit in a flush tank for registry of the valves with their respective ports.

18. In a flush tank having a water inlet and discharge, the combination of a valve unit comprising an overflow tube of plastic material having a valve integrally formed at its lower end for controlling the discharge and a second valve also carried by the unit for controlling the inlet, and a float unit also constructed of plastic material and pivotally connected to the valve unit and adapted to actuate said valves for closing movement thereof.

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