Sept. 8, 1959 W. McGOVERN 2,902,697

FLUSHING DEVICE

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Fig. 3.

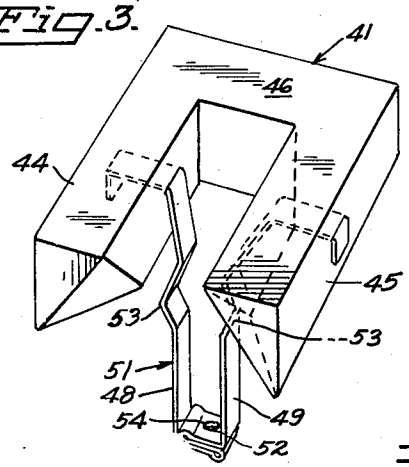


Fig. 4.

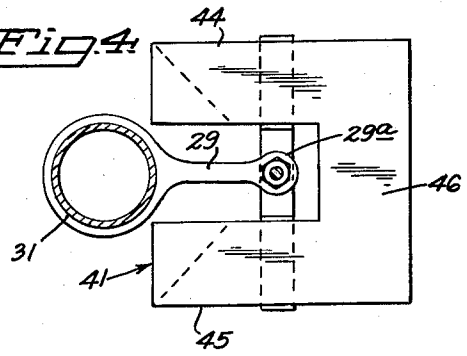


Fig. 5.

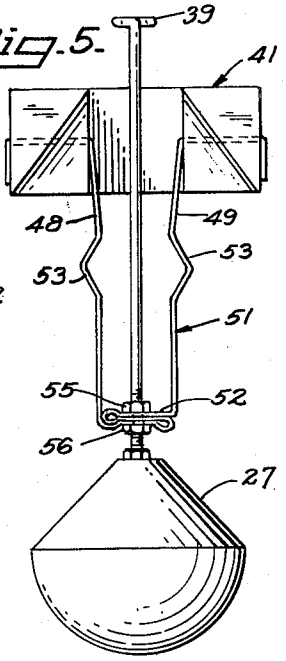
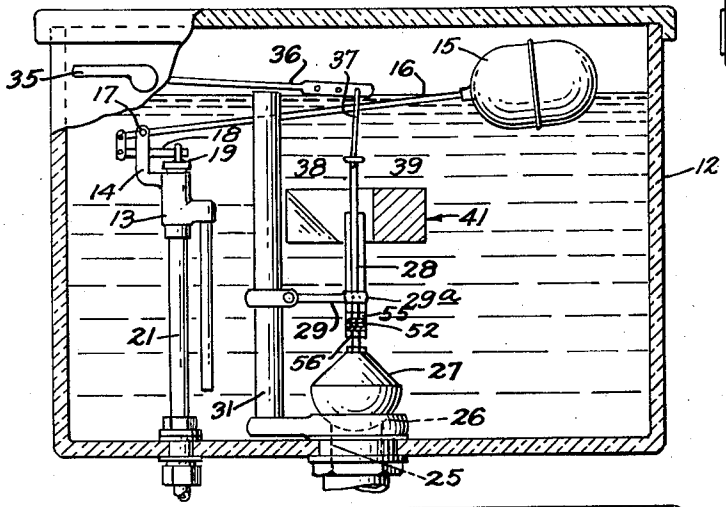


Fig. 1.



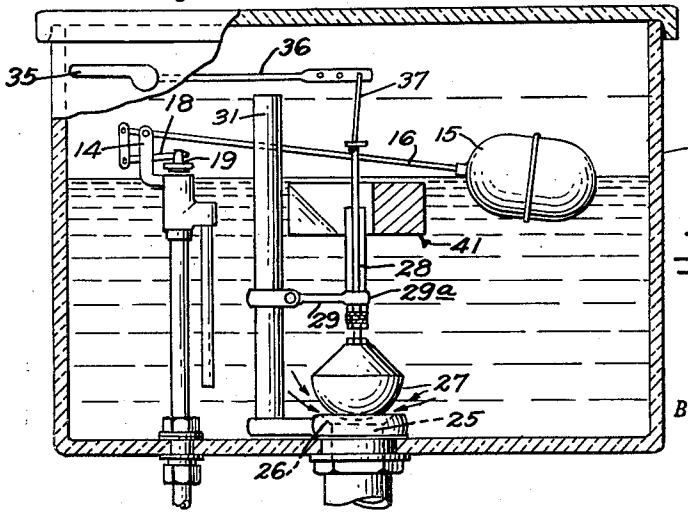


Fig. 2.

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Fig. 6.

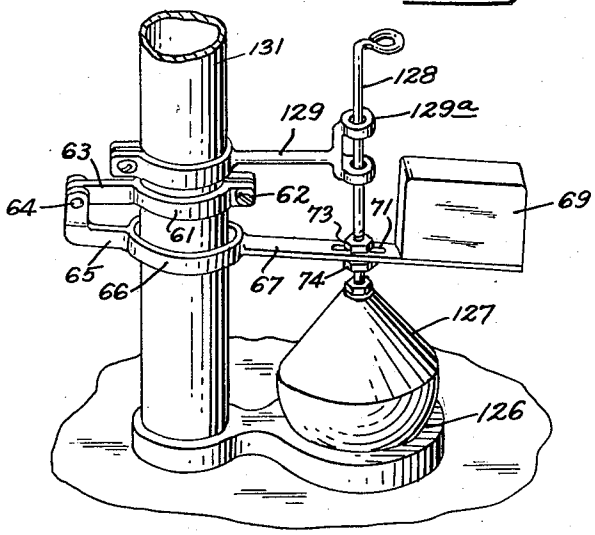
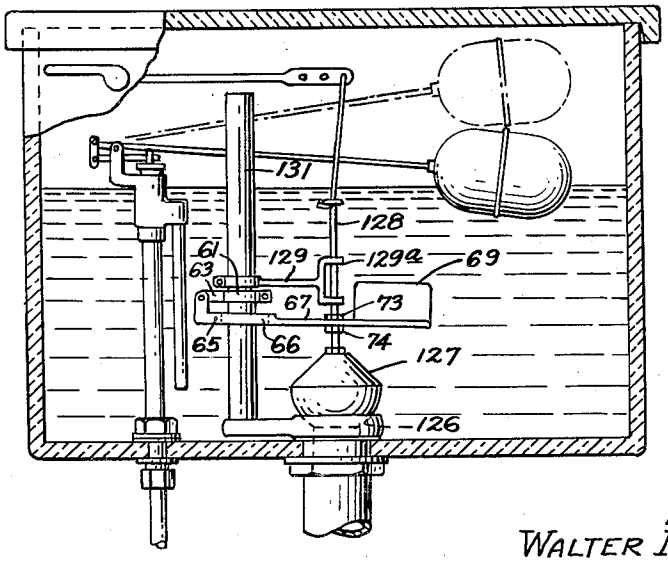


Fig. 7.



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FLUSHING DEVICE

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Application December 19, 1955, Serial No. 553,941
1 Claim. (Cl. 4—57)

This invention relates to a water regulating device for water closets to enable a water closet to flush employing only a predetermined quantity of the total water tank capacity.

Generally, water closets available as a common article of commerce employ a tank disposed above the bowl, which is filled with a supply of water. During flushing operation a valve is opened which allows the full quantity of water in the tank to be forced, by gravity, into the bowl. It has been found that the greater flushing action takes place during the first one-third phase of operations, and that the remaining two-thirds flushing phase accomplishes little in the way of functional flush action. This is due to the rapid decrease in rate of water flow as the water level in the tank is lowered. However, it is necessary to provide a relatively high water level in the tank to provide a sufficient pressure head for satisfactory flushing during the initial phases, and this, perhaps, accounts for the reason why conventional water closet mechanisms utilize a greater volume of water than is necessary to obtain an adequate flushing action in the bowl.

In this invention a stop is employed to limit the distance the lower float ball valve of a conventional water closet tank flushing mechanism can rise so that there is pressure asserted by water passing out through the outlet of the tank sucking the ball back into seating engagement with the outlet valve seat. A second float is employed over the float ball so that the combined buoyancy of the float ball and the second float normally is sufficient to overcome the sucking force, against the float ball. However, when the water level drops below a point, where the second float is not completely submerged, there is insufficient buoyancy to overcome said sucking force, thus causing the float ball to be sucked down into the outlet valve seat to save the remaining water in the tank.

A principal object of this invention is to provide a device of the above described type which may be used in connection with a water closet of conventional design and which operates to stop further flow of water from the tank after the water level in the tank drops below a certain predetermiend limit.

A further object of this invention is to provide a simple, easy to install float which when added to the ball float valve of the conventional water closet will allow a flushing operation using only a portion of the water normally used. In addition to conserving water, the device has the advantage of rendering the water closet available for reflushing with a high water level in a shorter time, due to the lesser amount of water used. Where septic tanks are employed, the reduction of sewage water to the septic tank is a definite asset with respect to the utility and capacity of the tank.

Still another object of this invention is to provide a device which when used in combination with the conventional water closet will cause the lower float ball valve to be forcefully sucked into positive valve seating position by pressure from water passing to the bowl from the tank where before the ball valve depended solely upon gravitational force for placement in seating position.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

Figure 1 is an elevational view of a conventional water closet tank with portions cut away to show the flushing mechanism thereof and with the device embodying this invention incorporated therein.

Figure 2 is a similar view to Fig. 1 shown with the mechanism of the water closet in a different phase of operation.

Figure 3 is an enlarged perspective view of the structure of the invention.

Figure 4 is a plan view of the device of Fig. 3 shown with an accompanying guide mechanism of the water closet.

Figure 5 is a vertical elevational view of the structure of Figs. 3 and 4 showing the device connected to a rod and lower float ball of a conventional water closet.

Figure 6 is a perspective view of a modification of the invention shown attached to a conventional water closet flushing mechanism shown fragmentarily.

Figure 7 is a view of a conventional water closet with portions cut away to show the inner structure thereof and having attached therein the modification of Fig. 6.

A conventional water closet as typified in Figs. 1 and 2 is shown as including a tank generally indicated at **12**. Inside tank **12** there is a supporting member **13** having an arm **14** to pivotally support an intake or upper valve float ball **15** mounted by an arm **16** which in turn is pivoted from arm **14** by a pivot pin **17**. Arm **16** is arranged to engage and depress a valve actuating lever **18** so as to open intake valve **19** and allow water to flow through pipe **21** into tank **12** when arm **16** swings downwardly upon lowering of the water level below float **15**.

An outlet port **25** is provided in the bottom portion of the bowl and is formed with a seat **26** adapted to receive a lower float ball valve **27**. Normally, the ball valve **27** is held in seated engagement by virtue of water pressure in tank **12**. A guide rod **28** extends upwardly from the top portion of ball **27** slidably through a guide **29** attached to the overflow pipe or standard **31**. Pipe **31** extends upwardly slightly above the desired pre-determined upper water level limit and communicates to port **25**. On the outer portion of the tank there is provided a handle **35** which by appropriate leverage is enabled to lift the lower float ball lifting arm **36**. Arm **36** has a pivotally mounted depending rod **37** formed with an eye **38** engaged with a similar eye **39** located on the upper portion of the free end of rod **28**. Thus when lever **35** is depressed rods **37** and **28** are pulled upwardly therein causing ball **27** the be pulled out of engagement with seat **26**.

In the more conventional tank flushing mechanism, upon the depression of lever **35** ball **27** is dislodged and floats upwardly to a point where there is no appreciable force drawing the ball back into seat **26**. The ball thereafter is reset in seat **26** by gravitational force only after sufficient water has passed out of tank **12** so that the ball is unable to float. This type action often results in an imperfect seating, thus causing water leakage from the tank.

In the present invention a stop **29a** is provided to allow ball **27** to rise only a fraction of the distance heretofore permitted in more conventional assemblages. More specifically, the ball **27** is permitted to rise above seat **26** only far enough to provide full and unrestricted water flow from tank **12** through port **25** into the bowl. Consequently, the ball is maintained within the outwardly discharging current of water flow, which said flow continually asserts a suction force on the ball tending to force the ball into engagement with seat **26**. However, a second float **41** is attached to ball float valve **27**, and the combined buoyancy of float **27**, and float **41** is sufficient to overcome the suction forces tending to force ball **27**

back into seating engagement with seat 26. When the water level drops below float 41 thereby reducing the buoyant force of float 41, the aforementioned suction forces will act to force ball 27 into positive seated engagement with seat 26 to close off further water flow from the tank through port 25. Stop 29a utilized to limit upward movement of ball float 27 may comprise the conventional guide 29 which can be positioned and fixed on pipe 31 at any desired predetermined location. Generally, it is desirable that ball 27 not be allowed to pass over an inch to one and a half inches above its seated position in seat 26.

Referring now specifically to Figs. 3, 4 and 5, float 41 is shown as comprising a generally U-shaped member having two legs 44 and 45 and a web 46. Float 41 is shown as being of a water buoyant material such as stryofoam or cork.

Float 41 is connected to ball float 27 in fixed predetermined spaced relation above said ball float 27 by a U-shaped supporting member 51 comprising two parallel legs 48 and 49 having their upper ends embedded within or otherwise anchored to portions 44 and 45 of float 41. The legs 48 and 49 depend from float 41, and the lower extremities of said legs are joined by a web 52, defined by plural overlying folds of the supporting member material. The web 52 is formed with an aperture 54 through which connecting rod 28 projects. The web portion 52 of the supporting member may be rigidly affixed to said rod by lock nuts 55 and 56 threadedly carried by said rod.

Float 41 may be adjustably spaced at desired location above ball float 27 by virtue of adjustment bends 53 formed in legs 48 and 49 of member 51. In this regard, it is seen that by varying the angle of the bends, the effective length of the supporting member 51 may be also varied to space float 41 relatively closer or further away from ball float 27. Thus, for example, referring to Fig. 5, it is seen that if the bends 53 were flattened, the length of each leg 48 and 49 of supporting member 51 would be increased and this in turn would result in correspondingly increasing the spacing of float 41 further above ball float 27. Conversely, if bends 53 were pinched to form tighter folds, the length of legs 48 and 49 would be decreased to cause float 41 to be spaced relatively closer to ball float 27. Preferably the supporting member 51 is formed of a relatively ductile metal, such as relatively thin gauge copper or aluminum alloy sheet material, whereby the angles of the bends 53 can be varied by manual pressure and whereby the material will hold its shape once the angle of the bends is determined and fixed by manual pressure.

As previously indicated, during operation when handle 35 is depressed ball 27 is raised from seat 26 a relatively short distance adequate to permit restricted water flow from the tank through port 25 but still within the suctional influence of said discharging water flow. During initial flushing action the combined buoyancy of float 41 and ball 27 is sufficient to overcome the suctional force tending to reseat ball 27. As the water reaches the level of float 41 (which is determined through adjustment of bends 53) said float 41 will cease to exert buoyant support and ball 27 will thereupon be forcefully sucked back into positive seated engagement with seat 26 to close off further water flow out of the tank. As soon as ball float 27 re-seats, the partially emptied tank will commence to refill through action of conventional inlet valve and float assembly 15—19.

Referring now to Figs. 6 and 7, there is provided a modification of the device in which there is shown a float valve 127 and seat 126 identical to valve 27 and seat 26 of Figs. 1 and 2. An actuation rod 128, a standard 131 and a guide 129 functionally identical to components 28, 31 and 29 respectively of Figs. 1 and 2 are also provided.

In Figs. 6 and 7 a bracket 61 is fixed to standard 131 by screw 62, and an arm 63 extending rearwardly from bracket 61 is provided with a pivot pin 64 from which a float mounting arm 65 is mounted. Arm 65 extends around standard 131 by members 66 which pass on either side of the standard and are joined to an extension 67 extending outwardly past rod 128 to a float 69. An elongated slot 71 is formed in extension 67 through which rod 128 is received and the extension is held against vertical movement on the rod by nuts 73 and 74. The remaining mechanism of the tank as shown in Fig. 7 is identical to the mechanism of tank 12 of Figs. 1 and 2 and bearing identical identification numerals except as herein specified to the contrary.

During flushing operation, handle 35 is manipulated to pull rod 128 upwardly, causing also limited upward movement of float 127 from its seat 126 by guide 129 against bolt 73, defining the upper stop members for limiting upward movement of float valve 127.

As in the previously described embodiment of the invention, the float valve 127 is raised far enough to permit unrestricted water flow from the tank through the discharge port but yet is maintained within the suctional flow of the discharging water. Thus, until the water level in the tank empties to float 69, the combined buoyancy of said float 69 and the ball float 127 will operate to overcome the suctional force exerted on float 127 tending to re-seat the latter. When, of course, the water recedes below float 69, the suctional force exerted against ball float 127 will cause the latter to forcefully re-seat and close off further water flow through the discharge port, whereupon the tank will again refill to its normal top level.

Slot 71 allows arm 65 to slide on extension 67 while being moved vertically so rod 128 can be maintained in vertical alignment. In this arrangement, because arm 65 is pivotally mounted from standard 131, there is another guide influence on rod 128 to assist in proper seating of float 127 in seat 126.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claim.

What is claimed is:

A method of regulating the amount of water expelled from the tank of a water closet flushing mechanism of the type having a water discharge port on the bottom of the tank, a float valve normally seated on the discharge port under influence of suction and a buoyant member connected to and mounted above said float valve and submerged below the flushing valve of the tank, the steps comprising: filling the tank with water to flushing level; flushing the tank by lifting said float valve from seated position on said discharge port and causing water to discharge in a vortex through said port; maintaining said float valve sufficiently in the vortex area at all times during flushing to subject the float valve to sufficient suctional forces from the water flow discharged through said discharge port to completely overcome the buoyant forces of the float valve tending to raise the float valve above the port; overcoming the suctional forces acting to reseat said float valve by the buoyant force of said buoyant member; and overcoming the buoyant forces of said float valve and buoyant member by the suctional forces of the water flow discharging through said discharge port when the water level in said tank drops to a point below a portion of said buoyant member.

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