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COMBINED SUPPLY VALVE AND REFILL TUBE

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Fig. 1

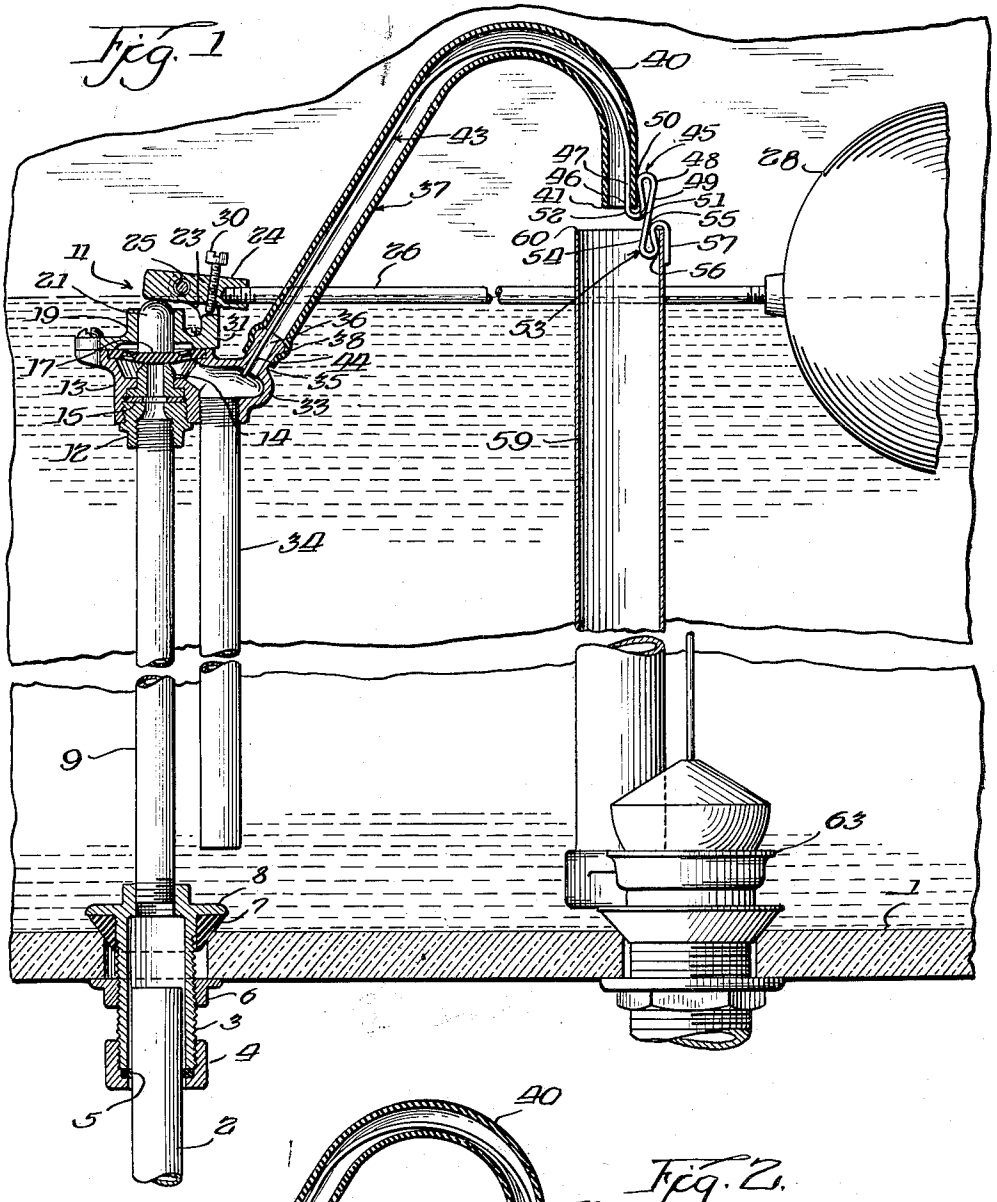
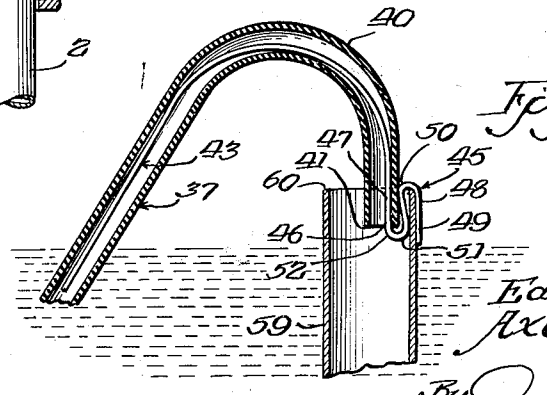


Fig. 2.



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COMBINED SUPPLY VALVE AND REFILL TUBE

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3 Claims. (Cl. 4—57)

This invention relates generally to inlet supply means for flush tanks for water closets and the like, and, more particularly, applies to the supply valve and the refill tube associated therewith.

Copper tubing has commonly been employed heretofore for the refill tube of a ballcock or float valve, the tubing frequently being bent so as to extend too far into the overflow tube during installation or later, frequently extending into the latter to a point below normal water tank level. This condition has permitted siphonage to occur through the usual hush tube and refill tube into the overflow tube as hereinafter apparent. This siphonage continuously draws off water and prevents full closing of the float valve, resulting not only in the objectionable sound of running water and continuous waste of the same, but ultimately in wire drawing and erosion of the valve seat, and making a fluid tight closing of the valve impossible.

Also, proper adjustment is often not made or the valve mechanism gets out of adjustment raising the water level normally necessary for closing of the valve which may then be even with or above the outer end of the refill tube so as to start the siphoning action.

Flexible rubber tubing with a stiffening wire therewithin has heretofore been used for refill purposes, but the wire is subject to being bent so that the tube extends too far into the overflow tube as mentioned in the case of the copper tubing. The rubber tubing is also subject to being deflected out of the overflow tube or of the proper position for discharge into the tube where the end is above the same by a reaction similar to that which occurs when a stream of water discharges from a hose.

It is therefore one of the objects of the invention to provide a device of a relative simple nature and inexpensive which will support the discharge end of a rubber or flexible refill tube with relation to the top of the overflow tube so as to prevent displacement of the discharge end from the overflow tube preventing proper discharge of fluid into the latter for refill purposes.

Another object is to provide a device for positioning of the discharge end of a refill tube with respect to the top of an overflow tube and tank water level so as to prevent siphonage of tank water through the refill tube and into the overflow tube.

Other objects and advantages will become more readily apparent upon proceeding with the description read in light of the accompanying drawings, in which

Fig. 1 is a fragmentary sectional view of a water closet flush tank showing the float valve and overflow tube arrangement embodying our invention.

Fig. 2 is a view similar to Fig. 1, but showing a fragmentary portion of the refill and overflow tubes and a modified form of the novel clip or positioning means.

Similar reference numerals refer to similar parts throughout the views.

Fig. 1 shows a preferred form of the invention in which 1 is the flush tank for a closet bowl, and 2 is the water supply line for filling and operation of the same. The

supply line is connected to the usual shank 3, passing through the bottom of the tank by means of the union ring 4 maintained in fluid tight relation by a union ring or slip joint gasket 5. The shank 3 is secured to the floor of the tank by a locknut 6 at the bottom and the usual tank rubber or sealing member 7 at the top, the latter being held so as to be fluid tight by means of a base flange or shoulder portion 8 of the shank. A standpipe 9 is threaded into the shank 3 and supports a ballcock or float valve 11 of conventional design at the top.

The valve comprises a seat bushing 12 for connection to the standpipe and a body portion 13, seat member 14 and a gasket 15 interposed between the bushing and seat member. The body is provided with a diaphragm 17 of rubber or the like for cooperation with the top of the seat member for effecting closure of the valve. A bonnet 19 is attached to the body by suitable means as by screws as shown and is provided with a plunger 21 for deflection of the diaphragm for said valve closure. A pair of arms 23 (only one shown) support a float rod arm 24 by means of the usual pivot connection at 25. A float rod 26 with a float member 28 at the outer end thereof is secured to the rod arm 24 for pivotal movement of the latter and axial movement of the plunger 21 as the water level in the tank rises or lowers in accordance with the customary operation of such valves. An adjusting screw 30 is provided for cooperation with a stop 31 for limiting the downward movement of the float rod and float. The body portion 13 of the valve extends to one side at 33 for connection of the usual hush tube 34 and terminating in a refill nib 35 having a central passage or port 36.

Departing from standard practice and according to the present invention, a flexible tubing 37 of rubber or the like is provided for refill purposes, being connected to the body portion of the valve for transmission of fluid under pressure when the valve is open by resilient engagement around the refill nib 35 at the lower end 38. The tubing extends upwardly at an angle as in the case of the conventional copper tubing and then down at 40 so that the lower end 41 thereof is in position to discharge into the overflow tube 55 during refill of the plumbing fixture (not shown). To stiffen the refill tube and to provide proper curvature so as to prevent crimping of the same and possible stoppage of fluid flow, a special refill tube support generally designated 43 is provided. This support may be made of wire or rod stock preferably of non-corrosive metal such as copper and extends along the inside wall of the flexible tubing 37. The lower end of the device slips into the fluid port 36 of the refill nib 35 of the valve for anchorage and to prevent puncture of the rubber tubing.

Of particular importance is the formation of the opposite end of the tube support 43 which extends beyond the refill tube. In order to position the flexible refill tube 37 so as to discharge into the overflow tube 59 extending from the flush valve 63 of the conventional Douglas type a double clip arrangement of generally double S-configuration is provided. The upper clip 45 comprises reverse loops or bends 46 and 48 which are upwardly and downwardly directed, respectively, and which are tightly formed or doubled back so as to make contact with the exterior arms 47 and 49 at 50 and 51, respectively. The inner loop 46 is adapted to receive the outer end 41 of the refill tube, the latter being supported near the bottom of the loop at 52. The resiliency of the metal and closeness of contact at 50 enables the rubber side wall of the refill tube to be firmly gripped to prevent the tube from being dislodged from the wire or rod member 43 and discharging into the overflow tube 59 as intended. If desired, the wire may be roughened as by spaced notches along the inside of the loop for better gripping contact

with both the inside and outside annular surfaces of the refill tube.

The lower clip 53 is of substantially the same shape as the upper clip except that it is not necessary that the inner loop 54 make contact at 55, but it should be suitably tight or positioned relatively close at 56 so as to grip the side wall of the overflow tube adjacent the top. The upper clip, it may here be added, need not necessarily be formed to allow for contact between bent portions at 51, except that the double clip formation should be sufficiently tight or compact so as to properly position the outlet end 41 of the refill tube for discharge into the overflow tube 59. The inside of the outer loop 57 of the lower clip may be filed or roughened for better gripping of the overflow tube as indicated in connection with the inner loop of the upper clip.

It should be noted that the valve 11 is shown in closed position in the drawing and that the tank 1 is full, the water level being approximately along the center line of the float 28 which is fully raised. Although the top 60 of the overflow tube is well above the water level when the valve is in good working order and properly adjusted, it is often the case, particularly in an older valve, that the water will rise well above the level shown before the valve will shut off. Should the refill tube extend within the overflow tube as is the present practice with copper or brass refill tubes, and if the end of the refill tube be lower than the water level, a siphonage or drawing out of water will occur from the tank 1, through the hush tube 34, the hollow interior of the valve body 13, the refill tube and into the overflow tube 59. This process continuously draws off water, lowering the level thereof below that which is necessary for full closure of the valve which results in continuous inflowing of water through the valve. In addition to waste of water and objectionable noise, erosion and wire drawing of the valve seat takes place making closure impossible and ultimately requiring valve replacement.

The present invention in the preferred form shown in Fig. 1 renders the above objectionable result impossible by spacing the end of the refill tube 41 above the top 60 of the overflow tube. The water may thus rise without danger of siphonage until the valve is fully closed or, in the case of a clogged valve or extreme wear or maladjustment, the water overflows directly into the overflow tube.

The double clip member 43 therefore serves the dual purpose of supporting the end of the refill tube in proper position over the open end of the overflow tube for discharge therein without disturbing the tube location by the reaction of the discharging stream and of preventing the refill tube from entering the overflow tube for possible siphoning action. The outlet end of the refill tube is thus positively positioned with respect to the open end of the overflow tube, being secured attaching to the same by the novel clip means.

It should also be noted that the lower end 44 of the wire clip member of this invention is free to seek its own position within the fluid opening or port 36 of the discharge spout 35, the only connection of a rigid sort being at the opposite or clip end. This structural arrangement provides a certain flexibility of mounting which is desirable.

If desired, the lower clip 53 may be omitted as shown in Fig. 2, in which case, the outer loop 43 is formed to receive and grip the upper edge 60 of the overflow tube in lieu of a separate lower clip. It should be noted that the discharge end of the refill tube is held securely with respect to the open end of the overflow tube as before, except that the refill tube is in this form slightly within the overflow tube. The amount of such insertion, of course, depends on the shape and size of the clip 45. As long as the water level in the tank is appreciably below the bottom of the refill tube as shown, no siphonage will occur and it is impossible for the refill tube to be pushed too far into the overflow tube as in the case of the conventional unsupported copper or brass tubing. The Fig. 1 form is, of course, preferable in the event of poor adjustment or failure of the valve disc to seat properly because of foreign matter or otherwise or wearing of parts.

Although the clip or positioning device has been illustrated as applied to a rubber tubing, it may of course be used with a flexible or deformable cooper or brass refill tube to secure and maintain the discharge end in the proper position and to prevent the same from being positioned too deeply into the overflow tube.

It is therefore seen that a simple, yet effective, device has been produced which not only stiffens and supports the rubber refill tube preventing collapse of the latter and stoppage of fluid flow therethrough, but by virtue of the novel clip arrangement at the outer end the refill tube is prevented from being displaced or in the preferred form it assures proper positioning over the overflow tube regardless of the reaction created by the fluid discharging from the end thereof. Further, the outlet end of the refill tube is fixed with respect to the overflow tube to prevent its insertion thereinto to a point opposite or near maximum water level in the tank which would result in the objectionable siphoning action.

The invention is capable of embodying other modifications within its spirit as measured by the appended claims.

We claim:

1. In a flush tank, the combination comprising an upstanding overflow tube and a float actuated inlet supply valve, both mounted in the flush tank, a refill tube of flexible material such as rubber attached to said supply valve and extending towards the overflow tube, clip-on means positioning the outlet end of the said refill tube on said overflow tube for fluid discharge thereinto, said latter positioning means comprising a one-piece resilient member of substantially double S formation and disposed so that the first part of the first S-portion and second part of the second S-portion receive the lower edge portion of the refill tube and upper edge portion of the overflow tube respectively within the openings of the said double S-formation, the bottom edge of the refill tube and top edge of the overflow tube being abuttable with the insides of the said first part of the first S-portion and second part of the second S-portion respectively, the resilient member of double S-formation being formed so that the inside abuttable surface of the first part of the first S is on a higher level than the inside abuttable surface of the second part of the second S whereby to limit the bottom edge of the refill tube to a predetermined spacing above the overflow tube, the first part of the first S and second part of the second S being adapted to frictionally engage a portion of the wall of the refill tube above the said bottom edge thereof and the wall of the overflow tube below the top edge thereof respectively for retention of the refill tube in mounted relation on said overflow tube.

2. The subject matter of claim 1, the said first part of the first S-portion being extended and continuing along a substantial portion of the inside of said refill tube for support of same.

3. The subject matter of claim 1, the said first part of the first S-portion being extended and continuing along the inside of said refill tube for support of the refill tube along its entire extent, said extended portion of the resilient member being loosely received within the opening of the supply valve through which the refill fluid flows for filling of the refill tube.

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