

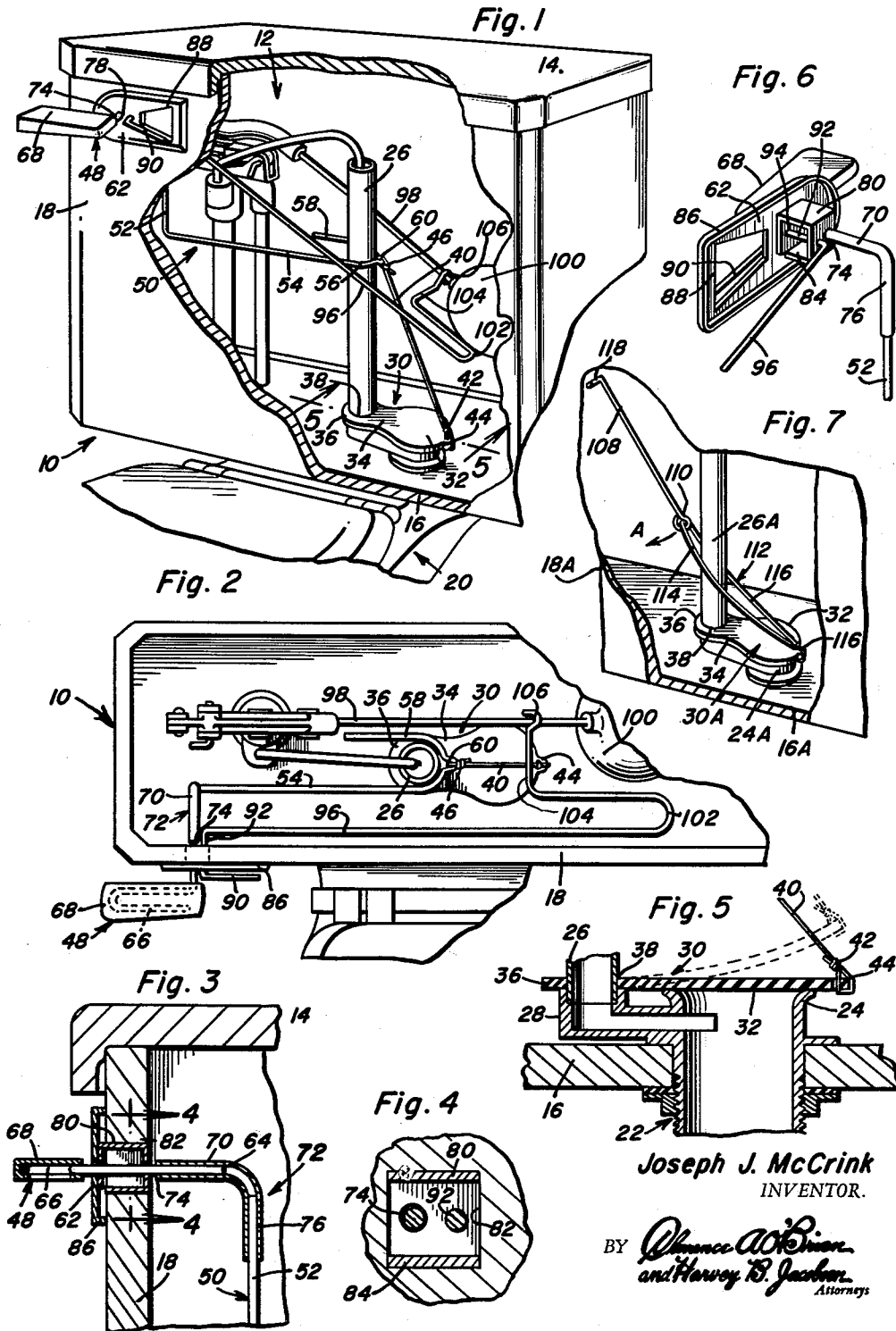
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RESILIENT FLUSH TANK VALVE AND WATER LEVEL INDICATOR

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RESILIENT FLUSH TANK VALVE AND WATER LEVEL INDICATOR

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This invention relates, generally speaking, to a flush tank and toilet bowl assembly but, more particularly, to an improved valve to take the place of the customary rubber tank ball or valve, and novel manually trippable means for unseating the valve in a well known manner to flush the toilet bowl.

It follows that one aspect of the instant concept is to replace the usual hollow tank-ball with a highly simple, practical and economical valve; for example, a rubber or an equivalent flap valve. One end of the latter is anchored on the lower end portion of the standard-type overflow pipe and the flap proper, which is preferably disk-like and is seated over the water intake of the tank-emptying bowl flushing elbow between the tank's bottom and proximal portion of the toilet bowl.

The invention features, in addition to the above, simple and novel means for opening and closing the flap valve, wherein said means, broadly construed, has to do with a lever which is mounted in the water containing tank, a flexible connection between the valve and valve actuating end of the lever, and a manually actuatable trigger or trip lever and operating crank connection between the trigger and lever.

More explicitly, the lever means may vary in construction in that one form or embodiment thereof embodies an L-shaped lever portion with one limb thereof connected to a rockably mounted trigger-equipped portion.

An alternative adaptation is characterized by a generally straight lever one end of which is actuated by a trigger and the other end connectible to a flexible cord or equivalent loop which, in turn, is connected to the flap valve.

Also, and as will be hereinafter more specifically revealed, the invention embodies, in addition to the flap valve and operating means therefor, water level indicating means, the latter operating in conjunction with the already described means and being connected for satisfactory usage with the float-carrying arm which rises and falls according to the water level in the tank.

With respect in particular to the water level indicator it is to be pointed out here that it is an innovation in that it constitutes a feasible and an apparently acceptable water saver. This is to say, the user of the flap-valve-equipped flush tank may control the opening and closing movements of the valve. Consequently when the indicator indicates to the user that sufficient water has discharged from the flush tank into the bowl to produce an adequate flush, the valve can be allowed to close with the result that instead of emptying some five gallons more or less of water from the tank into the bowl, the amount dispensed for a given use can be a couple of gallons, more or less, thus to achieve the water saving result.

Further novelty is predicated on a simple, practical and efficient escutcheon plate which lends itself to mounting on the front or upper lefthand corner portion of the front wall of the tank and can, as a matter of fact, be substituted for the bushing structure now commonly employed by reason of the fact that the plate is provided with adapter means which fits into the customary front wall opening, said plate being further unique in that it serves to accommodate the index finger of the aforementioned water level indicator means.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter

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described and claimed, reference being had to the accompanying drawing forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a view in perspective showing a fragmentary portion of the usual toilet bowl, the associated flush tank with portions of the walls thereof broken away to disclose the present invention and the manner in which the component parts thereof are constructed and installed for use;

FIGURE 2 is a top plane view with the cover removed and with the righthand end portion of the flush tank omitted;

FIGURE 3 is a fragmentary sectional view detailing the escutcheon plate and the adaptable attaching or mounting means therefor wherein the latter is provided with desirable bearing means;

FIGURE 4 is a detail section on the vertical section line 4—4 of FIGURE 3 looking in the direction of the indicating arrows;

FIGURE 5 is a fragmentary view on the plane of the section line 5—5 of FIGURE 1;

FIGURE 6 is a fragmentary view in perspective showing, with greater particularity, the construction of the multipurpose escutcheon or equivalent exteriorly arranged plate; and

FIGURE 7 is a fragmentary view in perspective showing a modified flap valve operating arrangement.

Referring now to the views of the drawing and more particularly with reference to FIGS. 1 to 3 and 5. The usual flush tank is denoted at 10. This tank embodies the customary receptacle portion 12, removable lid or cover 14, a bottom wall 16 and front wall 18. For purposes of the instant invention the other walls need not be mentioned. The toilet bowl or hopper is denoted generally by the numeral 20 and as shown in FIG. 5 the flush water delivering or drainage elbow between the tank bottom 16 and bowl 20 comprises the usual elbow 22 having an interior or upper end portion which is of bell-mouth form and provides a regularly used valve seat 24. The customary vertical upstanding overflow pipe 26 is communicatively connected as at 28 to the elbow.

As has already been suggested the customary ball tank valve is to be replaced by the simple rubber or equivalent one-piece flap valve 30, the latter comprising a disk-like body portion 32 which constitutes the valve proper and is normally engaged with the seat 24 as shown. This body portion is joined by an intervening neck portion 34 to a ring-like end portion 36 which constitutes an attaching and retaining collar. The apertured portion 38 of this collar embraces the lower end portion of the overflow pipe and the yielding neck provides a novel hinge providing a hinge action which allows the normally closed flap to be lifted up as indicated in phantom lines in FIG. 5 to thus open and close the mouth or seat 24. Manifestly the degree of opening of this flap valve is regulatable depending on the stress or pull exerted on a flexible operating element. This element comprises a strong cord or an equivalent tethering element 40. The lower loop end thereof at 42 is tied or otherwise connected to a tab 44 on the margin of the flap valve. The upper end of this element, denoted generally at 46, is connectible with the operating connection, that is the connection between the flexible element 40 and the exteriorly arranged and manually manipulatable trigger or trip lever 48.

The operating connection is characterized chiefly by a balanced lever which in turn is in the form of a substantially L-shaped rod denoted generally at 50 and embodying a vertical limb 52 (FIGS. 1 and 3) and a horizontal limb 54 (FIGS. 1 and 2) said horizontal limb having its righthand end portion of special construction so that the part thereof denoted at 56 embraces one side

of the upstanding overflow pipe. It is connected to a return bend or bent portion 58 which is on a diametrically opposite side of the overflow pipe, the intervening portion having a substantially V-shaped crotch 60 with which the end 46 of the flexible element is connected as brought out in FIGS. 1 and 2. The flexible element will have to be of prerequisite length so that when the L-shaped lever 50 is at rest in its normal position the flap valve is closed and the cord or flexible element 40 is substantially taut and is ready to lift the valve up to an open position as soon as the trigger or trip lever 48 is pushed down by the user's finger in the customary fashion. Before dwelling with particularity on the aforementioned exterior escutcheon or equivalent plate 62 attention is first invited to FIG. 3 wherein it will be noted that the trigger embodies a horizontal rod 64 which constitutes an axle or shaft and whose outer end is of U-shaped form as at 66 and is provided with a suitably ornamental jacket or cover 68. The righthand end portion in FIG. 3 extends into a socket provided by one branch 70 of a substantially angle-shaped connecting or coupling member 72. The part 64 is fitted securely in 70 and a rigid connection is thus provided. The end of 70 provides a stop shoulder as at 74. The other branch 76 provides a socket for the upper end of the limb or arm 52. The plate is provided with a bearing hole as at 78 and is also provided in line therewith with a so-called adapter 80 which fits into the usual square opening 82 (FIG. 3) in the wall 18 of the flush tank. The adapter is welded or otherwise fixed to the attachable side of the plate and has one end which is yieldably free as at 84. This is yieldingly fitted in the opening 82. Other portions of the adapter have bearing openings which are aligned with the bearing opening 78 to thus provide a satisfactory supporting and journaling arrangement for the trigger rotated shaft 64. The escutcheon plate is also provided with a reinforcing marginal edge flange 86 which bears directly against the surface of the wall 18. This plate is also provided with a suitable sight opening 88 which functions as a simple dial, as it were, to designate the movement of the index finger 90 which constitutes a part of the trippable water level indicating means. This means, more particularly, embodies a rod portion 92 which is rotatable in the bearings 94 provided therefor as shown in FIG. 6. This shaft connects with a reach arm 96 which is spaced from and approximately parallel to the arm 98 which carries the water level float 100. There is a U-shaped end portion at the right as at 102 having a lateral terminal bend 104 which terminates in a hook 106 which is engaged with the arm 98 adjacent to its point of connection with the float 100. It follows that when the trigger 48 is pushed down in the customary manner to open the tank valve and flush the toilet bowl and when the float arm 98 descends in connection with the float 100, the reach and connecting arm and its linking means 102 and 106 serves to operate the shaft member 92 and consequently the index or indicator finger 90. The travel of this finger which is measurable in relation to the opening 88, enables the user to actually follow the rise and fall action of the arm 98 and float 100. It also enables the user to determine when approximately one-half the water in the tank has flushed into the bowl whereupon the valve 30 can be allowed to close and trap the bulk of the water in the flush tank. It follows as before suggested that by incorporating the water level indicating means with the trigger means or trip lever 48, the two, 48 and 90 operate in unison. Consequently the user of the toilet can operate the trigger 48 for a full flush or where as desired or preferred for a half-flush.

The same general principle of operation is applicable to the modification as seen in FIG. 7. In this figure the water level indicator means would be the same. The only difference is in the simplified operating connection between the trigger means 48 and the valve. For con-

venience the bottom wall of the tank is denoted at 16A and the front vertical wall at 18A. The overflow pipe is denoted at 26A, the valve seat at 24A and the flap valve at 30A. Here again the flap valve is of the construction described in that it embodies the aforementioned disk-like main flap 32, neck 34, collar 36 and attaching or anchoring hole 38. In this modification the lever comprises the single substantially straight rod 108 having an eye 110 at the lower end which swings in the direction of the arrow A, that is from right to left. The eye is connectible to the upper end of a cord or an equivalent flexible element or loop 112 having component portions 114 and 116 on diametrically opposite sides of the overflow pipe and with the lower end portions 116 connected to the flap valve so that it is lifted up to open position or dropped and allowed to close in keeping with the inherent resilient properties embodied in the valve. Thus the valve is normally closed and is gradually openable by exerting a pull on the flexible operating element 40 or 112 as the case may be. The lever means serves to accomplish this result and in FIG. 7 the upper end 118 (not detailed) is connected with appropriate trigger means so that it is rocked or oscillated in the desired angular manner.

It is believed that a careful consideration of the specification in conjunction with the views of the drawing will enable the reader to obtain a clear and comprehensive understanding of the construction and arrangement and cooperation of the component parts, the manner of operation, and the features and advantages thereof. Consequently, a more extended description is regarded as unnecessary.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A water fillable and drainable flush tank construction comprising: a walled tank having a bottom wall provided with outlet means embodying a gravity flow elbow, said outlet means being adapted to be operatively communicatively connected at a discharge end with a complementary toilet bowl, said outlet means having a portion within the interior of said tank provided with a valve seat, an upstanding tank water overflow pipe in said tank joined at its lower end to said elbow, a flap valve normally atop said seat and closing the outlet means, said flap valve being flexible and also resilient, a shaft rockable in a bearing provided therefor on a front wall of said tank, a hand operated trip member mounted on said shaft and located exteriorly of said front wall, an elongated lever in said tank, the major portion of said lever being disposed in an operating plane below the plane of the upper end of said overflow pipe and having one end operatively connected with said shaft, the other end being free, terminating adjacent to said overflow pipe and provided with terminal guide means guidingly embracing and movably operable relative to said upstanding overflow pipe, a normally taut flexible element between and connected at a lower end with a liftable and lowerable end portion of said flap valve and oriented with said overflow pipe and connected at its upper end to and adapted to be lifted and tautly suspended by said terminal guide means, a conventional-type float arm mounted for operation in said tank, a float carried by said arm and responsive to the rise and fall of the water in said flush tank, and readily viewable rise and fall indicating means embodying a rocker shaft operatively mounted on said front wall, said rocker shaft being provided on an outer visible end with an indicating finger, a dial fixed on said front wall, said finger being cooperable with said dial, and a reach arm in said tank having one

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end operatively connected with said rocker shaft in a manner to actuate said indicating finger and its opposite end operatively connected with a median portion of said float arm.

2. In combination, a walled tank having water outlet means at its bottom including a conventional enclosed gravity flow elbow and adapted for communicative connection with a complementary toilet bowl, said means provided on the interior of the tank with a horizontal valve seat, an upstanding tank water overflow pipe communicatively joined at its lower end to said elbow, a flexibly resilient flap valve anchored at one end on said overflow pipe and normally covering the water outlet means and residing atop said seat, a hand operated trip lever mounted for access and ready operation on the exterior of the front wall of said tank, means operatively connecting said trip lever and flap valve for lifting and opening said valve and then permitting the valve to automatically descend and close, said means including a lever operatively joined at one end to the trip lever, a flexible valve lifting element oriented with and located between the other end of the lever and connected therewith and also with the openable and closable end to said flap valve, a float arm operable in the space of said tank, a float mounted on said arm, a water rise and fall indicating finger arranged on the exterior of the tank, a plate fixed on said exterior, said finger being contiguous to and cooperable with a surface of said plate, means operatively connecting said finger and said float arm for operation in unison, said last-named means including a reach rod paralleling the float arm and having one end thereof provided with a hook releasably engageable with a cooperating portion of said arm, the other end thereof having a shaft rockably mounted in a bearing provided therefor in said plate and carrying the indicating finger.

3. The structure defined in claim 2, and wherein said plate is provided with an adapter, said adapter being plugged and fitted telescopingly and removably into an opening provided therefor in the front wall of said tank, said adapter embodying yieldable self-retained retaining means engageable with the marginal edges of said opening, said adapter and also said plate having aligned coaxing bearing means, and said rocker shaft being mounted for angular rotation in said bearing means.

4. In combination, a flush tank, a float arm mounted for operation on the interior of said tank, a float mounted

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for operation on a free end portion of said arm, an escutcheon plate mounted on an exterior surface of the front wall of said tank, said plate having an attachable surface facing said front wall and being provided with adapter means, said adapter means projecting into a retaining opening provided therefor in said front wall, said adapter means and also said plate being provided with bearing means, a rocker shaft mounted for angular rotation in said bearing means, said rocker shaft having an outer end extending beyond said front wall and provided with a laterally projecting indicating finger, said plate having a sight opening constituting and providing an index and said indicating finger being parallel to said plate and proximal to and cooperating movably with said index, a reach rod in said tank and connected at one end with said rocker shaft and having its opposite end portion free and provided with a return bend defining a U-shaped portion, said U-shaped portion having a lateral terminal including a hook releasably engageable with a median portion of said float arm, the bottom of the tank being provided with outlet means having a valve seat and an associated overflow pipe, a flap valve mounted on said overflow pipe and having a liftable and lowerable portion resting normally atop said seat, a normally taut flexible element connected at one end with said valve for lifting and opening said valve and then permitting unhampered lowering and closing of the valve against said seat, lever means arranged in said tank and having a free end terminating adjacent said overflow pipe, slidably embracing said overflow pipe and operatively connected with said flexible means, a second shaft mounted for angular rotation in additional bearing means provided therefor on said adapter and plate, said second shaft being provided on its outer end with an accessible fingergrip, and means on the inner end of said second shaft operatively connected by way of the lever means with said flexible element.

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