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TWO-WAY FLUSH TANK CONTROL

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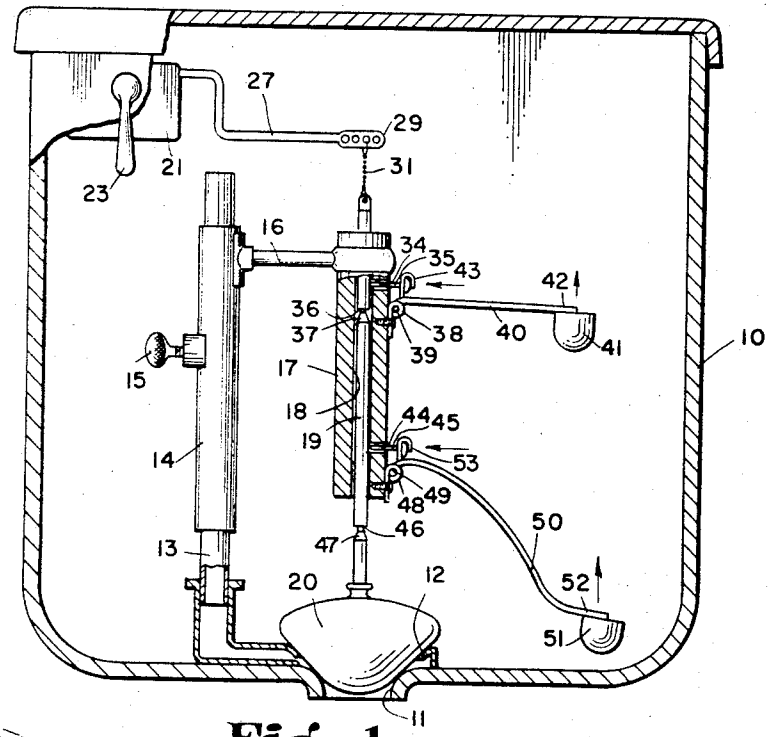

Fig. 1

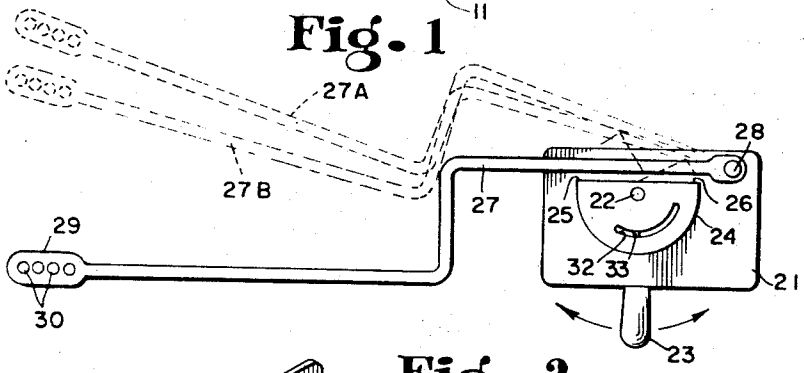

Fig. 2

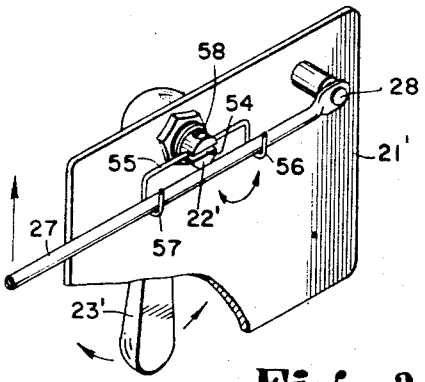

Fig. 3

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TWO-WAY FLUSH TANK CONTROL

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ABSTRACT OF THE DISCLOSURE

A flush tank control including a flush valve carried on a stem guided for vertical reciprocation within the tank, an oscillable handle outside the tank and operatively connected to the stem to raise the valve off its seat to a predetermined height when said handle is turned in one direction and to a greater height when said handle is turned in the opposite direction, float controlled catch means at one level in said tank and cooperative with said stem when the latter is lifted to said predetermined height, and other float controlled means at another level in said tank and cooperative with said stem when the latter is lifted to said greater height. In a preferred form, the guide for said stem and both of said catch means are supported from a bracket which is mounted within said tank for vertical adjustment, preferably upon the conventional overflow pipe.

The present invention relates to a two-way flush tank control for toilets and is primarily concerned with means for conserving water in a flush tank type of toilet.

In such a toilet installation, there is conventionally provided a water reservoir whose capacity is such as to provide for a vigorous flushing of the toilet bowl upon each actuation of the flushing handle. However, upon occasions when the bowl contains only liquid, a much less vigorous flush, involving the use of only about one-half of the capacity of the reservoir, will effectively clear the bowl. Thus, there are many occasions, during the ordinary, daily use of such a toilet, when unnecessarily large volumes of water are delivered to, and wasted through, the toilet bowl.

The primary object of the present invention, then, is to provide a flushing control so constructed and arranged that, when the bowl contains only liquid, a relatively small amount of water will be delivered from the reservoir; but on other occasions, when a more vigorous flush is required, the full capacity of the reservoir will be so delivered.

A further object of the invention is to provide, in such a mechanism, an arrangement such that the smaller amount of liquid will be delivered when the manually manipulable handle is moved in one direction from its neutral position, while the full capacity of the reservoir will be automatically delivered when the handle is moved in the opposite direction.

Still another object of the invention is to provide an adapter assembly so constructed and arranged that it can be substituted, in a conventional flush tank, for the conventional flush valve control.

Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

FIG. 1 is a section through a conventional flush tank or reservoir in which our two way-control has been installed;

FIG. 2 is a fragmentary view, drawn to an enlarged scale, and illustrating our lifter lever, flush handle and associated parts as viewed from the rear of FIG. 1; and

FIG. 3 is a fragmentary perspective showing a modified form of actuator for said lever.

Referring more particularly to FIGS. 1 and 2, it will be seen that we have illustrated a tank or reservoir **10** provided with a conventional discharge port **11** guarded by a seat **12**, said reservoir being provided, as usual, with an upstanding overflow pipe **13** communicating with the port **11** below the seat **12**.

Telescopically mounted upon the overflow pipe **13** is a sleeve **14** which may be secured in any desired position of vertical adjustment upon said overflow pipe **13** by means, for instance, of a set screw **15**. Said sleeve fixedly carries an arm **16** which supports a vertically extending guide means **17** formed with a longitudinal bore **18** which is arranged in vertical alignment with the seat **12**. Freely, slidably guided in the bore **18** is a stem **19** which, at its lower end, carries a non-buoyant valve head **20** constructed and arranged to seat sealingly upon the seat **12**. Obviously, when the head **20** is so seated, water flow through the port **11** (except through the overflow pipe **13**) is prevented.

A plate **21** is fixedly secured within the reservoir **10** at a suitable point near the top of the front wall of the reservoir. Journalled in said plate is a rocker **22** which penetrates the reservoir wall and exteriorly carries a manually manipulable handle **23**. Inside the reservoir, an actuator cam **24** is fixed to the rocker **22**, the opposite ends **25** and **26** of said cam extending oppositely from the vertical plane which contains the axis of the rocker **22**.

A lever **27** is pivotally mounted on the plate **21** upon an axis **28** which is parallel with the axis **22**, said lever overlying the cam ends **25** and **26** and extending past the above-mentioned vertical plane to intersect the axis of the guide bore **18**. The distal end **29** of the lever is formed with one or more holes **30** with which may selectively be engaged one end of a chain or other flexible element, the other end of which is attached to the upper end of the stem **19**.

The cam **24** is formed with a concentric slot **32** in which is engaged a stop pin **33** fixed with respect to the plate **21**.

It will be apparent that, when the handle **23** is rocked in a clockwise direction as viewed in FIG. 2, the cam end **25** will engage the lever **27** to lift the same to the position **27A** indicated in broken lines in FIG. 2, before the right hand end of the slot **32** comes into engagement with the pin **33**. However, when the handle **23** is moved in a counter-clockwise direction as viewed in FIG. 2, the cam end **26** will engage the lever **27** to lift the same only to the position indicated at **27B** in broken lines in FIG. 2 before the left hand end of the slot **32** engages the stop pin **33**.

A lateral bore **34** is formed in the guide element **17** and opens from the outside thereof to the bore **18**, a catch pin **35** being reciprocably mounted in said bore **34**. Near its upper end, the stem **19** is formed with a peripheral notch **36**, the lower wall **37** of which is formed as an upwardly tapering cone. The parts are so proportioned and designed that, when the head **20** rests on the seat **12**, the notch **36** is disposed somewhat below the bore **34** and pin **35**.

A bracket **38** is secured to the guide member **17** below the bore **34** and provides a journal mounting for an axle **39** upon which is oscillably supported a laterally projecting float arm **40**, a float **41** being carried at the distal end **42** of said arm **40**. The proximal end **43** of said arm is

turned upwardly and is operatively engaged with the catch pin **35** so that, when said arm **40** is in its illustrated lowermost position, the pin **35** will be withdrawn from the guide bore **18**. However, whenever the float **41** is submerged in water in the reservoir **10**, it will exert a force upon the arm **40** tending to turn the same in a counterclockwise direction to urge the pin **35** yieldably inwardly.

Near its lower end, the guide member **17** is formed with a second lateral bore **44** in which is reciprocably received a second catch pin **45**. A second peripheral notch **46**, the lower wall **47** of which is upwardly tapered, is formed in the stem **19** at a point which, when the head **20** is on the seat **12**, is spaced below the bore **44** to an extent greater than the spacing of the notch **36** below the bore **34**. A bracket **48** secured to the guide member **17** provides a journal mounting for an axle **49** upon which is oscillably mounted a second float arm **50** which, at its distal end **52**, carries a second float **51**. The proximal end **53** of the lever **50** is turned upwardly and operatively engaged with the catch pin **45** in a manner in all respects similar to the operative engagement of the lever end **43** with the catch pin **35**. Thus, when the lever **50** is in its lowermost position as shown, the pin **45** will be withdrawn from the bore **18**; but whenever the float **51** is submerged, it will exert a force yieldably tending to move the pin **45** into the guide bore **18**.

Obviously, the reservoir **10** will be provided with the usual inlet controlled by a float actuated valve (not shown) whereby, whenever the port **11** is closed, the reservoir will be automatically filled to a level immediately below the upper open end of the overflow pipe **13**.

If, now, the handle **23** is moved in a clockwise direction as viewed in FIG. 2 until the right hand end of the slot **32** is brought into engagement with the stop pin **33**, the lever **27** will be lifted to its position indicated at **27A** in FIG. 2 and the stem **19** will be lifted sufficiently to bring the notch **46** into registry with the pin **45**. Of course, as the stem moves upwardly, the notch **36** will pass the pin **35** which, under the influence of the submerged float **41**, will be urged inwardly; but the conical wall **37** of the notch **36** will cam the pin **35** outwardly as the notch passes that pin.

When the notch **46** comes into registry with the pin **44**, said pin will move into that notch under the influence of the submerged float **51**; and when the handle **23** is released, the pin **45** will retain the stem **19** in its elevated position. When the head **20** is thus lifted off the seat **12**, water will flow rapidly from the reservoir **10** toward the toilet bowl (not shown) whereby the level in the reservoir will fall. As the level of liquid in the reservoir drops below the float **41**, the tendency of that float to move the pin **35** inwardly will be eliminated; but the stem **19** will be held in its elevated position until the liquid level drops below the elevated position of the float **51**. When that time comes, the arm **50** will move in a clockwise direction to withdraw the pin **45** from the notch **46**, thus releasing the stem **19** and permitting the non-buoyant head **20** to drop into closing position on the seat **12**. Thus, the entire capacity of the reservoir **10** will be delivered to the toilet bowl whenever such a vigorous flush is required.

If, however, the handle **23** is moved in a counterclockwise direction as viewed in FIG. 2, the left hand end of the slot **32** will engage the pin **33** when the lever has been lifted to its position indicated at **27B** in that figure; thereby, the stem **19** will be lifted only high enough to permit the pin **35** to drop into the notch **36**; and when the lever **23** is released, the head **20** will be retained in its elevated position only by the pin **35**. As water flows from the reservoir through the port **11**, the level in the reservoir will fall until it passes the elevated position of the float **41**. As soon as the liquid level passes that position, the float **41** will drop, thus withdrawing the pin **35** from the notch **36** and permitting the head **20** to fall upon the seat **12** to cut off water flow. Of course, the position of the float **41** will be so adjusted as to accomplish the delivery of sufficient water from the reservoir to effect the gentle flush which is needed when the bowl contains only liquid.

A modified form of actuator is illustrated in FIG. 3 wherein a plate **21'** similar to the plate **21** provides a journal mounting for a rocker **22'** to which is fixed a handle **23'**. and also provides the pivot **28** for the lever **27**. In this form of assembly, the rocker **22'** is formed with an open, diametrical slot **54** in which is received an actuator bracket **55** provided at its opposite ends with upwardly-opening hooks **56** and **57** disposed beneath, and operatively engaged with, the lever **27**. In this case, no movement-limiting means for the handle **23'** is provided; but it will be obvious that movement of the handle in a counter-clockwise direction as viewed in FIG. 3 will lift the lever **27** to a higher elevation than will movement of said handle in the opposite direction to the same degree. In this form of the invention, the lifting ratio can be varied by shifting the bracket **55**, relative to the rocker **22'**, toward or away from the pivotal axis **28** of the lever **27**. Said bracket **55** may be secured in any such position of adjustment by means of a set screw **58**, or the like.

We claim as our invention:

1. In combination, a liquid reservoir having an upwardly-opening discharge port, a non-buoyant valve having a head seatable on said port to close the same and having a stem, vertical guide means supported in said reservoir, said stem being reciprocably received in said guide means to support said head in operative registry with said port, manually-manipulable means movably disposed outside said reservoir, means providing an operative connection between said manually-manipulable means and said stem to lift said stem to one elevation upon movement of said manually-manipulable means in one direction and to lift said stem to a higher elevation upon movement of said manually-manipulable means in another direction, a first catch means engageable with said stem to support the same at said first-named elevation, a second catch means engageable with said stem to support the same at said higher elevation, and separate float means for said respective catch means, the float means for said first catch means acting to disengage said stem when the liquid level in said reservoir drops below a predetermined value and the float means for said second catch means acting to disengage said stem when the liquid level in said reservoir drops below a lower value.

2. The combination of claim **1** in which said guide means is tubular and coaxial with said port, said stem being freely slidable in said guide means, said guide means being formed with a first lateral bore opening from its interior to its exterior, said first catch means comprising a first pin reciprocably penetrating said first bore and said stem being formed with a first notch disposed, when said head is seated on said port, a predetermined distance below said first bore to receive the inner end of said first pin when said stem is lifted to said one elevation, the float means for said first catch means comprising an arm pivotally mounted on said guide means at a first level, having a first float at its distal end and operatively connected to said first pin to move the same outwardly when said float drops, said guide means being formed with a second lateral bore opening from its interior to its exterior at a point below the lowermost position of said first notch, said second catch means comprising a second pin reciprocably penetrating said second bore and said stem being formed with a second notch disposed when said head is seated on said port, a greater distance below said second bore to receive the inner end of said second pin when said stem is lifted to said higher elevation, the float means for said second catch means comprising a second arm pivotally mounted on said guide means, having a float at its distal end and operatively connected to said second pin to move the same outwardly when said second float drops, said second float being positioned below said first float.

3. The combination of claim 1 including stationary upright means in said reservoir, said catch means and said float means being carried by said guide means, sleeve means vertically adjustably supported from said upright means, and means for securing said sleeve means in selected positions relative to said upright means, said guide means being supported from said sleeve means.

4. The combination of claim 1 in which said manually-manipulatable means comprises a rocker penetrating a wall of said reservoir for oscillation about a horizontal axis, and said means providing an operative connection comprises a lever pivoted within said reservoir upon an axis parallel with said rocker axis but more remote from said guide means, an actuator fixed to said rocker and extending toward and away from said lever axis in registry with said lever whereby turning movement of said rocker in one direction engages said actuator with said lever at a point between said rocker axis and said guide axis to lift the distal end of said lever and turning movement of said rocker in the opposite direction engages said actuator with said lever at a point between said rocker axis and said lever axis to lift the distal end of said lever, and flexible means connecting the distal end of said lever with said stem.

5. The combination of claim 4 in which said actuator is a cam having an arcuate slot therein receiving a stop pin fixed relative to said reservoir wall, said slot extending oppositely but unequally from said stop pin when said rocker is in a neutral position and limiting movement of said rocker in said opposite direction to an angular extent less than permissible movement thereof in said one direction.

6. The combination of claim 4 in which said actuator is a bracket having hooks at its opposite ends engageable beneath said lever, and means for securing said bracket to said rocker in any one of a plurality of positions of adjustment toward and away from said lever axis.

7. The combination of claim 2 in which the lower boundary wall of each notch is inclined downwardly and outwardly to act as a cam against its associated catch pin during upward movement of said stem.

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