United States Patent [19]

Wilhelm

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[45] **Apr. 15, 1975**

[54] **WATER CLOSETS**

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[52] **U.S. Cl.** ..... **4/67 R;** 4/34; 4/67 A

[51] **Int. Cl.** **E03d 1/22;** E03d 1/30

[58] **Field of Search** ..... 4/67 A, 67 R, 37, 34, 52, 4/76, 89

[56] **References Cited**

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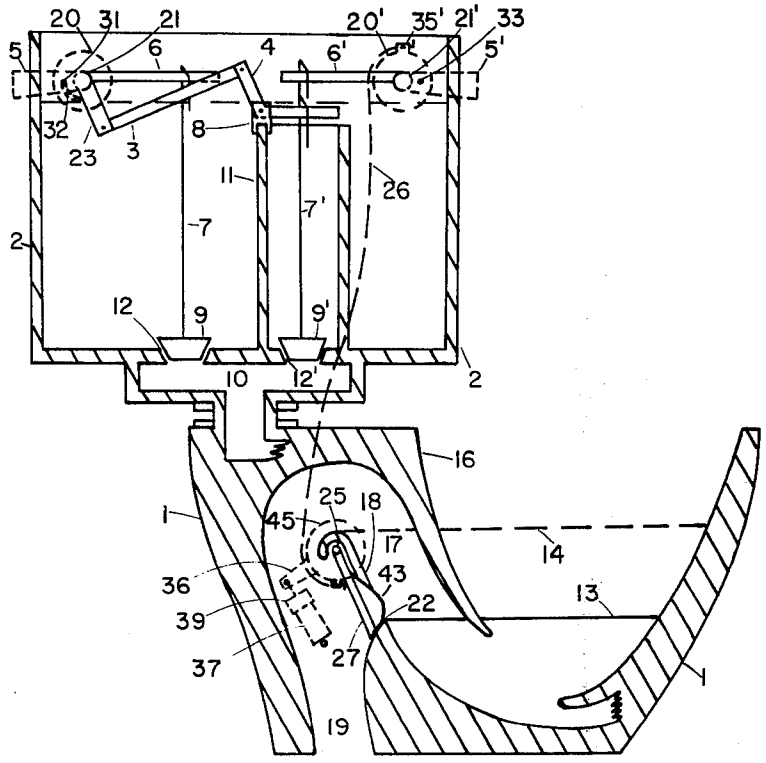
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Primary Examiner—Henry K. Artis

[57] **ABSTRACT**

Means by which a by-pass valve in the weir of the trap of an otherwise conventional water closet which is to be utilized with a dual flushing tank, i.e., selectively full or fractional flush, is completely controlled by one of two flush handles mounted on the front of the tank, the toilet combination otherwise appearing and functioning in a manner identical to conventional techniques, such a toilet to be employed as a very significant water saving device.

2 Claims, 4 Drawing Figures



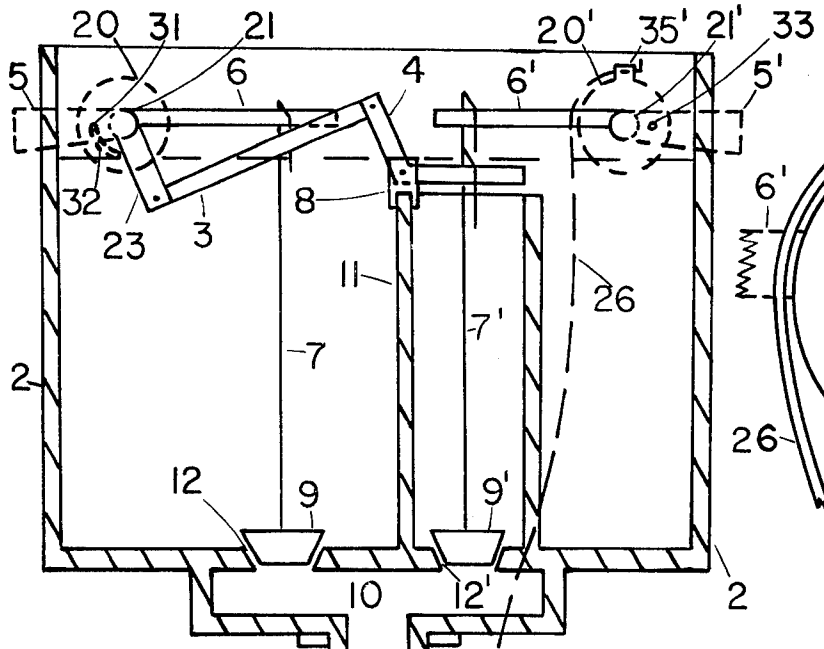


FIG. I

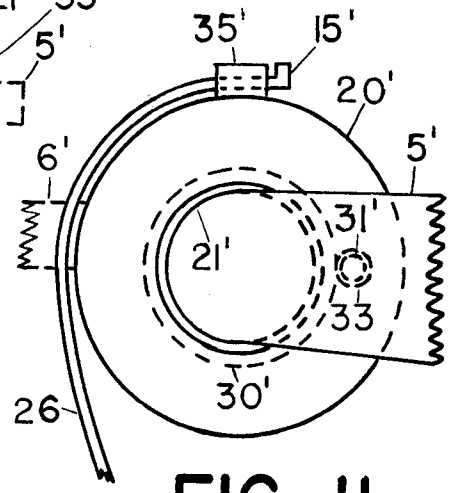
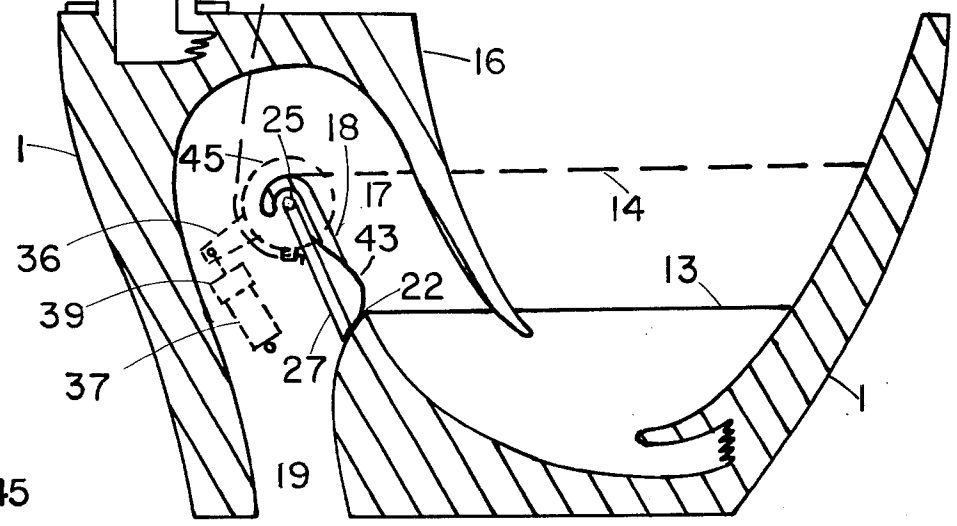


FIG. II



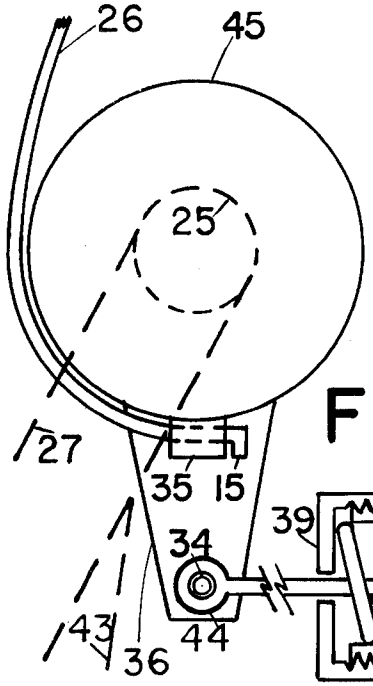


FIG. III

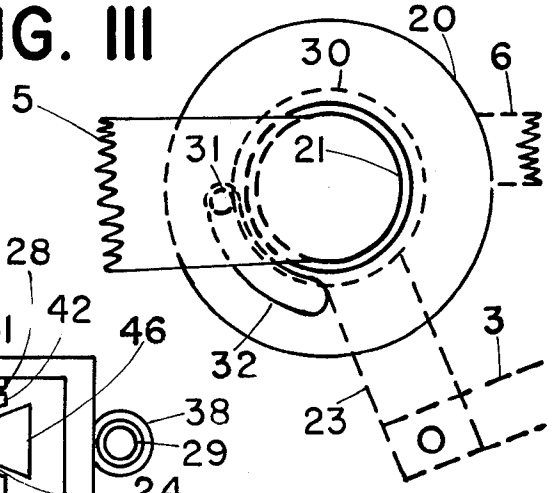
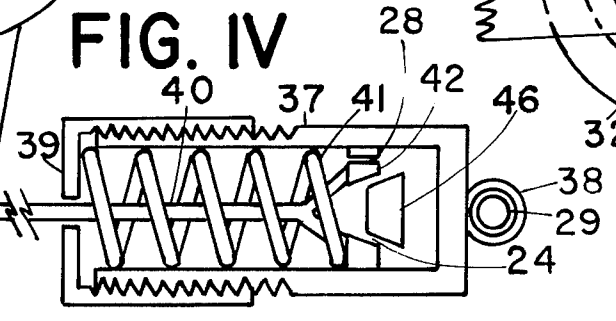


FIG. IV



WATER CLOSETS

There is now registered in the U.S. Patent Office a water saving water closet concept that uses a valved bypass connection in the weir of the trap of an otherwise conventional water closet to permit a choice of two liquid levels in the water closet, the higher and conventional level to be used in the instances of defecation where odor control and bowl cleanliness dictate the need for the higher level. The lower level is intended to provide an amount of liquid just sufficient to assure proper trap functioning for use in urination-only occasions. This water closet is to be used in conjunction with a water tank which provides the capability of either a full or partial flush as described by Mr. Brown in U.S. Pat. No. 1,805,204 dated May 1931 and others. It is my contention that while a full tank flush is recognized by most as necessary to esthetically and sanitarily remove the solid wastes and clean the bowl of a traditional water closet after a defecation, though often unrecognized, an identical amount is required to fully dispose of liquid-only wastes. Unless there is a siphoning action in the traditional models, dilution rather than complete removal results. In other words the need is dictated by the volume of soiled water in the bowl and not just by its consistency. A tank with dual flush capability alone, therefore, is of marginal value. However, with the volume of liquid in the trap of the water closet to be disposed of greatly reduced and the point over which it must be raised to pass into the sewer at a minimum height, the fractional flushing tanks disclosed by Mr. Brown and others will then do an effective job and can accomplish a completely satisfactory disposal of urine with pints rather than gallons of liquid. It is the basic concept of this invention that the valve in the weir of the trap is normally held closed by the force of an externally mounted spring which maintains the trap volume above the top of the dip of the trap in tact. In this way lower than full trap quantities of liquid in the trap do not get drawn over the weir or thru the valve in the weir and lost into the sewer by momentary fluctuations within the soil stack.

It is the object of this invention to set forth a mechanical configuration which completely operates the positioning of the internal valve of the water closet by the use of a cable connection from just one of the two flushing handles on the front of the tank.

In FIG. I, I show a general view giving the relationship of the tank and the water closet with the tank rotated 90° for the sake of clarity. The upper portion of the figure shows a cross-section of the interior of the tank to explain the relationships of the two flushing handles and how the left hand handle flushes the partial tank in certain instances. The lower part of the drawing depicts the water closet in elevation giving emphasis to the valve rotating mechanisms which are mounted on the exterior of the water closet. In this figure I use dotted lines to represent all devices which are mounted on the exterior surfaces of the tank and water closet. In the remaining figures I use dashed lines to indicate elements which are within the confines of the tank or water closet.

FIG. II shows the detail of the right hand, or urine flush handle. It relates the method of actuating the pull cable control of the valve in the water closet with the actuation of the reduced quantity flush.

FIG. III shows the left hand, or defecation flush handle and the means for introducing additional water into the bowl of the water closet prior to a defecation by a clockwise rotation of the defecation flush handle.

FIG. IV clarifies the means by which the valve in the water closet is retracted by the flushing action of the urine flush handle and how its subsequent closure is accomplished over a finite period of time by the use of a pneumatically damped, externally mounted, spring.

Turning attention to FIG. I I show a water closet **1** attached plumbingwise in a conventional manner to the tank **2** which employs the accepted methods of filling and overflow control not shown. It has a flush handle **5** which thru flusher shaft **21,** flush rod **6,** and flush attachment **7** raises ball cock **9** and drains the liquid contents of tank **2** into the manifold **10** thru opening **12** and thense to water closet **1.** Contained within tank **2** I show a standpipe **11** cast during manufacture having a separate flushing mechanism. It is filled from the main tank since its height is less than the normal water line of the main tank. Water is drained from this standpipe by depressing flush handle **5'** which, thru flusher shaft **21',** flush rod **6',** and flush attachment **7'** raises ball cock **9'** and allows the contained liquid to pass into the manifold **10** thru opening **12'** and thense to the water closet **1.** This figure also shows the means by which a clockwise rotation of flush handle **5** acting thru actuating lug **31,** actuation wheel **20,** radial link **23,** flushing link **3,** and flush crank **4** also empties standpipe **11.**

The lower portion of FIG. I identifies the bowl **16** of the water closet. It also shows the trap volume **17,** the sewer access volume **19,** and the weir **18** which separates them as well as the trap opening **22** in the weir **18.** Trap opening **22** is selectively closed by the movement of pad **43** being rotated into and out of contact with trap opening **22** by the action of pad support **27** and valve shaft **25.** Valve shaft **25** penetrates the side of sewer access volume **19** where externally it receives its rotational impetus. Water level **13** is the conventional level of water in the trap, established when trap opening **22** is open. Water level **14** shows the height of water tha can be attained in bowl **16** when trap opening **22** is closed and subsequent water is introduced into the bowl.

FIG. II details how actuation wheel **20'** moves with flush handle **5'.** The actuation wheel **20',** with its penetration collar **30',** is mounted on, and co-axially with, the flusher shaft **21'** which together penetrate the wall of the tank **2.** Flush handle **5'** is mounted on the outer end of flusher shaft **21'** and has on its tank side an actuating lug **31'** which interacts with a circular hole **33** in actuation wheel **20'.** Rotation of flush handle **5'** causes identical rotation of actuation wheel **20'.** Mounted on the circumference of actuation wheel **20'** I show pull cable stop **35'** which loosely encloses pull cable **26.** Pull cable **26** slides freely thru pull cable stop **35'** until such time that it engages the enlarged cable end **15'** which causes pull cable **26** to move with actuation wheel **20'.** FIG. III shows a similar configuration to that of FIG. II except that actuating lug **31** in this instance moves in a segment of a circular slot **32** in actuation wheel **20.** In this manner certain limited rotational movements of flush handle **5** have no interaction upon actuation wheel **20** while others do and cause rotational interaction. In addition the penetration collar **30** has attached to it on the inner side of the tank a radial link **23** parallel to the inner tank wall which transmits the rotation of the penetration collar **30** to connecting

flushing link 3 and flush crank 4 in order to flush the standpipe 11. Flush crank 4 rotates on flush crank pivot 8. Turning attention to FIG. IV each upward movement of pull cable 26, thru the interaction of the enlarged cable end 15 with the pull cable stop 35, causes the circular cam 45 and valve shaft 25 to rotate clockwise. This rotates pad 43 away from the trap opening 22 in the weir 18 within the water closet. Working thru the circular cam crank 36, which is a part of circular cam 45, valve closure spring 41 is compressed. This is accomplished thru the actions of the circular cam crank pivot 34, the piston rod eye 44, the piston rod 40, the piston 42 on one end and the cylinder cap 39, the cylinder 37, the cylinder eye 38, and anchor point 29 suitably attached to the water closet on the other. In order to retard the subsequent release of the energy of the valve closure spring 41, I use a pneumatic check valve 46 and an orifice 28 in the piston 42. During the energy storage portion of the cycle air can pass freely thru the pneumatic check valve seat 24. During the energy release portion of the cycle, however, the pneumatic check valve 46 closes into the pneumatic check valve seat 24 and the trapped air must vent thru orifice 28. It is the intent of this mechanism to act as a timing device to hold the valve in the weir of the trap open until the urine flush cycle is completed but once closed, hold it firmly closed.

The coordination of all of these elements is best understood by reviewing an operational cycle. The valve opening 22 is customarily closed by pad 43 under the force of the externally mounted valve closure spring 41. The water level in the bowl 16 is at the lower position 13 having been established by the previous urine disposal flush. Male or female urination is performed normally but now contaminates much less water. Flushing with a clockwise rotation of the right handle 5' does two things. It empties the standpipe 11 and also, thru the action of the pull cable 26, rotates pad 43 away from the trap opening 22 allowing the flushing action to take place thru trap opening 22. The valve re-closes slowly under the force of the valve closure spring 41 being damped pneumatically by the operation of the air cylinder 37 in which the spring is contained. The spring is compressed by the same rotation of valve shaft 25 that moves the pad 43 away from the valve opening 22. A check valve 46 in the piston 42 within the cylinder allows air to pass un-restrained from one side to the other during the compression of the spring. Re-extension of the spring is severely retarded, however, since the check valve closes and the air must vent thru the orifice 28. At the conclusion of the cycle clean water at the lower level exists but with the opening 22 in the weir of the trap firmly closed.

The toilet is prepared for defecation by performing one unique function prior to use. This is simply accomplished by operating the left hand lever 5 in an upward or clockwise motion. This empties the standpipe 11 providing the additional water that the bowl will require and is capable of containing since the valve is closed. Defecation takes place and is flushed with a normal siphoning action initiated with a downward or counter-clockwise motion of the left handle 5. This empties the full tank. The water level this time returns to the higher level 14 which is desirable to insure full cleansing of the bowl. The next urination flush restores the water level to the lower level as the flushing action by the inner tank water takes place.

While I have described my invention in certain of its preferred embodiments, I realize that modifications may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

I claim:

1. In a water closet of the variable-quantity type having a first tank of standard volume and a second tank of relatively smaller volume with respective flushing devices for emptying such tanks into a common bowl and a water trap formed by a bowl rear wall and a trap wall spaced rearwardly therefrom, a liquid-level control apparatus, comprising

a valve opening in said trap wall intermediate the length thereof and interconnecting such water trap and a sewer access opening,

a valve member adapted to cooperate with said valve opening and mounted for movement into and out of contact with said valve opening,

means urging said valve member to a normally closed position in contact with said valve opening, and

means interconnecting said valve member and the flushing device of such second tank for moving said valve member to an open position upon operation of such flushing device,

whereby the liquid level in such bowl is selectively controlled by the operation of the flushing device of such second tank.

2. A liquid-level control apparatus in accordance with claim 1 including means for retarding the motion of said valve member towards said valve opening.

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