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W. P. WOOD

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WATER SAVING DEVICE FOR WATER CLOSETS

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2 Sheets-Sheet 1

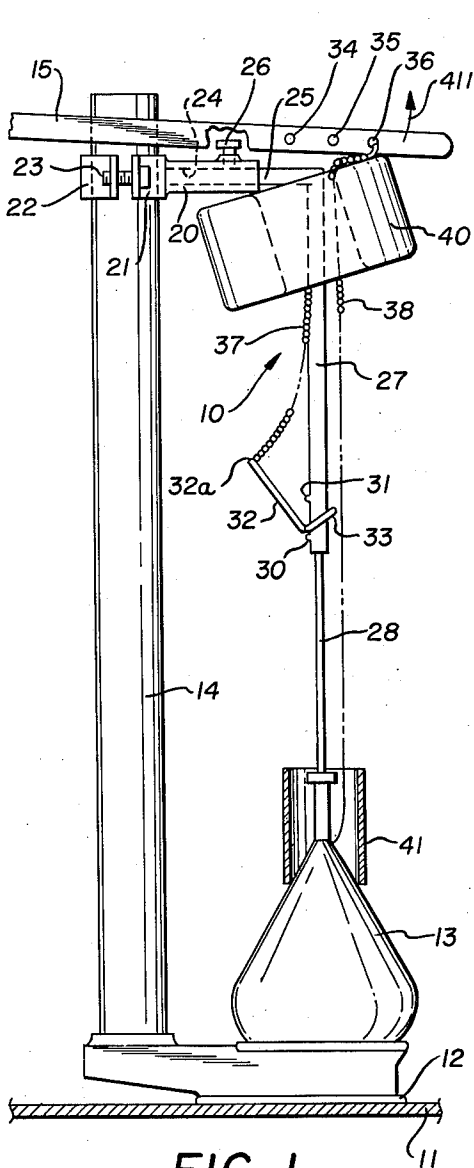


FIG. 1

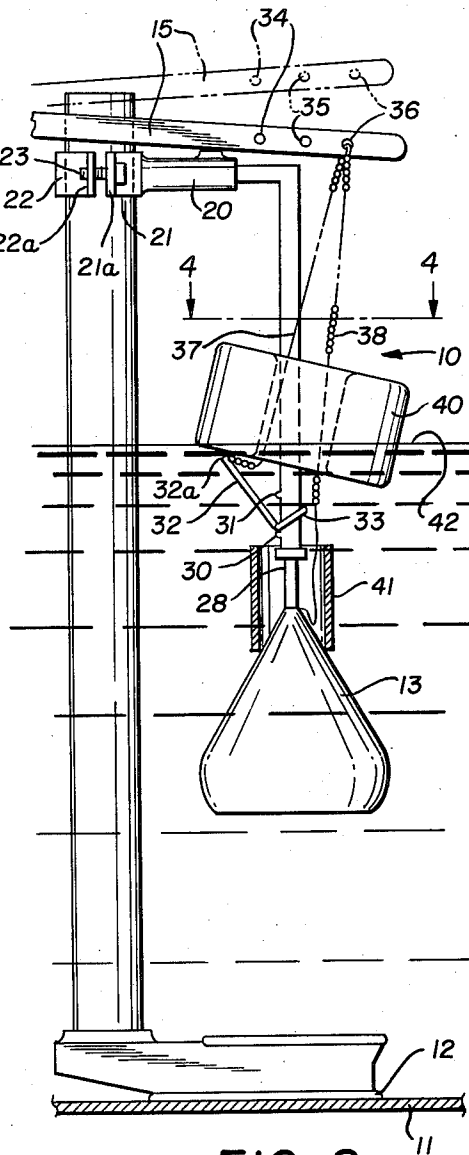


FIG. 2

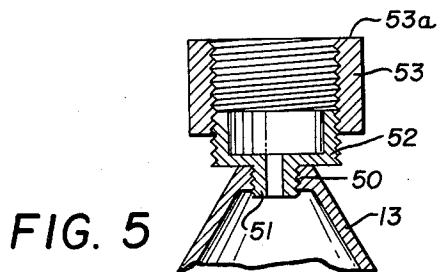


FIG. 5

INVENTOR.
WILLIAM P. WOOD

BY

Frederick Freeman

ATTORNEY

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3,026,536

WATER SAVING DEVICE FOR WATER CLOSETS

William P. Wood, 1164 Thorndale Drive, Akron, Ohio

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6 Claims. (Cl. 4-57)

This invention relates to the art of water closet construction and in particular has reference to water saving improvements designed for use in connection with the flushing of a water closet so as to selectively control the amount of water used during each such flushing operation.

In the known prior art, it has been proposed on several occasions to provide water closets wherein a reduced amount of water can be used for flushing purposes. It has been further contemplated by the prior art to provide means for selectively determining the amount of water to be used during each flushing cycle, with the result that larger or smaller amounts of water can be employed, depending upon the setting of the water saving mechanism.

In applicant's copending application, Serial No. 773,537, now Patent No. 2,939,152, issued June 7, 1960, a water saving mechanism of the general type herein being referred to was disclosed.

In basic essence the disclosure of the above referred to copending application was to provide a pivoted arm in connection with the stem of the buoyant closure valve, with the arm being connected to the handle arm so that upon actuation of the handle arm the lever arm would be disposed in the path of the descending ball float conventionally employed in water closets.

It will be seen, therefore, that the above referred to improvement utilizes the existent ball float for weight purposes to cause premature reseating of the buoyant closure valve so as to operate the same prior to evacuation of all water in the tank.

While the above device has proven satisfactory, it has been found that the same is possessed of certain disadvantages.

First and foremost is the difficulty of adapting the water saving means to the varied types of closet structures presently on the market. This disadvantage oftentimes precludes the sale of the water saving device in kit form for installation by the home owner and, accordingly, limits its application principally to the field of original equipment.

Additionally, it has been found that the above device would be inoperable in instances where no ball float was employed in the water closet.

Specifically in this regard, there now appears on the market a water closet that eliminates the need for the ball float by employing a resilient strap that surrounds the intake pipe and which also carries the buoyant valve member. This type of operation merely requires a chain or other connection between the handle arm and the end of the resilient strap so that actuation of the handle arm causes unseating of the valve, with the resiliency of the strap causing automatic return of the valve to seated condition after evacuation of the tank.

It has been discovered that all of the aforementioned disadvantages can be obviated by providing a buoyant weight member that is guided into contact with the buoyant valve after flushing so as to cause premature reseating of the same. When the water level returns, this buoyant weight will rise out of contact with the valve and will return to its normal position spaced from the buoyant valve until the next flushing cycle occurs.

It has been further found that if the gravity descent or lowering of this buoyant weight is restricted that the normal flushing operation will result in full evacuation of the tank. However, if immediately following the initial actuation of the handle there is made a second movement

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thereof, the buoyant weight will be permitted to drop rapidly into contact with the buoyant valve and thus cause premature reseating of the same to effectuate savings of water.

It accordingly becomes the principal object of this invention to produce a new and novel type of water saving means that features the use of a floating weight that is guided into and out of contact with the closure member of the water closet so as to permit premature seating thereof when desired to thus effectuate water savings.

It is a further object of this invention to provide a device of this type that will be adaptable to use on existing water closets, regardless of the presence or absence of the conventional ball float.

These and other objects of the invention will become more apparent upon a reading of the following brief specification, considered and interpreted in the light of the accompanying drawings.

Of the drawings:

FIGURE 1 is an elevational view of the improved water saving means associated with conventional water closet construction.

FIGURE 2 is a view similar to FIGURE 1 but showing the position of the component parts during normal use where water saving is not desired.

FIGURE 3 is a view similar to FIGURE 2 but showing the water saving means being actuated.

FIGURE 4 is a sectional view taken on the lines 4-4 of FIGURE 2.

FIGURE 5 is a fragmentary section of a modified form of the invention.

FIGURE 6 is a view similar to FIGURES 1 and 2 but showing a modified form of the invention.

Referring now to the drawings and in particular to FIGURES 1 through 4 thereof the improved water saving means, generally designated by the numeral 10, are shown associated with the conventional component parts of a water closet.

In this regard, it is to be understood that a detailed description of all components of the water closet will not be undertaken, with reference being had to applicant's copending application for a complete description as to location and operation of these known parts.

It suffices in this regard to indicate that the tank 11 has a discharge opening 12 that serves to evacuate the tank 11 upon reseating of a buoyant closure valve 13. Overflow is also delivered to the discharge opening 12, beyond the point of seal effectuated by valve 13, through overflow pipe 14, while a handle arm 15 is connected in known fashion to the exterior handle that is present on all water closet constructions, with the arm 15 being moved between full and chain dotted line positions of FIGURE 2 upon actuation of such handle.

The water saving means 10 per se includes a support frame 20 having a base 21 that is hemispherical in cross sectional configuration so as to be received in encircling relationship around the pipe 14 as clearly shown in the drawings. A complementary strap 22 is also provided with the flanges 21a and 22a of these members being interconnected by bolt 23 so as to secure the member 20 at right angles to the pipe 14 as shown in the drawings.

The supporting member 20 is internally bored so as to 24 so as to telescopically receive a shaft 25, with the axial position of the shaft 25 in bore 24 being adjustable by virtue of tapped adjustment screw 26.

The shaft 25 is bent at substantially right angles to define a depending shaft 27 and this leg portion 27 is preferably internally bored so as to telescopically receive the shaft 28 that is secured to the buoyant valve 13 through a conventional fitting. Adjacent its lowermost end, the shaft 27 is provided with axially spaced protuberances 30 and 31 that serve to limit the axial movement

of an arm member 32. This arm member 32 preferably consists of a flat plate having a yoked end 33 that loosely encircles the lowermost portion of shaft 27. In this fashion the arm will normally be positioned as shown in FIGURES 1 and 2 due to the weight of the flat portion thereof around its pivot point on shaft 27 so that the arm 32 will normally be in the position of FIGURES 1 and 2.

In addition to the aforementioned component parts, the arm 15 is preferably provided with a plurality of apertures 34, 35 and 36, with aperture 36 being shown receiving one end of a chain 37, the opposite end of which attaches to the end 32a of the arm 32. A similar chain 38 interconnects opening 36 with closure valve 13.

A resilient torus 40 surrounds the shaft portion 27 and also surrounds the chains 37 and 38 in the position of FIGURES 1 and 2. Preferably, this torus is of resilient material and is capable of floating at water level during periods of non-use.

Additionally, a cylinder 41 encircles the shaft 28 at its point of juncture with valve 13 so as to receive the torus 40 thereon at an early time. This cylinder 41 can, of course, be eliminated or varied in size if desired.

In use or operation of the improved water saving means, it will first be assumed that the component parts have been positioned as shown in the drawings and at such time the normal position during periods of non-use will be similar to that shown in FIGURE 1 of the drawings.

However, when the handle is flushed, the arm 15 will move upwardly in the direction of the arrow 411 in FIGURE 1 and at this time the chain 38 will cause the buoyant valve 13 to unseat and simultaneously the chain 37 will cause the arm 32 to be pivoted around shaft 27 so as to be disposed in substantial parallelism therewith. At this time the discharge opening 12 will be unseated and water can be evacuated.

Immediately after the handle is released, the arm 15 will return to the position of FIGURE 1 and the arm 32 will return to the position of FIGURE 1 by virtue of the weight balance around shaft 27. This condition of component parts is shown best in FIGURE 2, where the buoyant valve 13 is spaced from seat 12 and chain 38 is slack.

At this time it is assumed that the water level has dropped to the position indicated by the line 42 and in the event that it is desired to cause premature reseating of the buoyant valve 13 it is merely necessary that the arm 15 be moved to the chain-dotted line position by actuating the external handle. This will cause the arm 32 to be pivoted into parallelism with the shaft 27 and at this time the torus can pass around the retracted arm and fall directly onto the buoyant valve 13. This condition is shown in FIGURE 3.

The added weight of the torus 40 on valve 13 will cause the same to drop faster than normal and will also cause the inherent buoyancy thereof to be overcome by the added weight of the torus 40. At this time the valve 13 will reseat and simultaneously water will commence to re-enter the tank.

During this re-entry of water, the torus 40 will be free to float upwardly and as the same approaches the arm 32 the buoyancy of the same will cause the arm 32 to repivot to parallelism with shaft 27, thus allowing the torus to return to the normal position of FIGURE 1.

It will be noted that the torus 40 is, in fact, "captured" or controlled by shafts 27, 28 and chain 37 and 38 during ascent and descent.

In the event it is not desired to use the water saving mechanism it is merely necessary that the second actuation of the handle be eliminated and in such instances the torus will become suspended on the arm 32 as shown in FIGURE 2, with no weight being placed on the buoyant valve 13, which will, accordingly, reseat in normal fashion.

In the modification shown in FIGURE 5, means are provided for causing the torus to be effectively suspended on the ball 13 at an earlier time in the flushing opera-

tion. Accordingly, the valve 13 of FIGURE 5 is shown provided with a threaded opening 59 that receives a threaded portion 51 of a cylinder 52. The exterior of the cylinder 52 is also threaded for complementary engagement with an encircling tubular member 53. The end 53a of the cylinder 53 will contact the torus 40 during its descent and by virtue of the fact that this edge 53 projects beyond the normal point of contact between torus 40 and valve 13, it will be noted that weight will be applied to the valve 13 much sooner than would otherwise be the case. This time of contact can be varied by adjustment of the sleeve 53 as by rotation so as to either increase or decrease the extent of projection of end 53a beyond valve 13.

The operation of this modification is exactly the same as previously described.

In the modification of the invention shown in FIGURE 6, the overflow pipe 14 is again encircled by a support standard 60, with the standard being contoured for engagement against the pipe 14 and being held in place by a strap 62 that is interconnected with the standard 60 by bolt 63. Again a depending shaft 64 is disposed vertically in the tank and includes axially spaced ribs 65 and 66 that limit movement of arm 67 thereon. The arm 67 is preferably of configuration similar to that previously described in connection with the arm 32 of FIGURES 1 through 5.

Adjacent the discharge opening 12 a resilient strap 68 is disposed around the pipe 14 and this strap is appropriately contoured so as to carry a buoyant valve 69, with the valve being movable between full and chain-dotted line positions of FIGURE 6 upon operation of arm 15, as will now be described.

Accordingly, the projecting end of the strap 68 has a lug 70 that receives a ring 71, with chains 72 and 73 being connected to the ring 71 shown in FIGURE 6. The chain 73 connects with the end of shaft 64, while the chain 72 connects to the opening 36 of the arm as shown. As before, a chain 37 extends between the end of arm 67 and opening 34.

In use or operation of the device the component parts will be positioned as shown in full lines, with the exception that the buoyant valve 69 will normally be positioned in the chain-dotted line position of FIGURE 6, at which time the chains 72 and 73 will be in a substantially taut condition.

When the arm 15 is raised, the chain 72 will cause the buoyant valve 69 to unseat and at this time the inherent buoyancy of the valve 69 will prevent reseating of the same. Again on a single operation of the handle, the torus 40 will be suspended on the arm 67 and the valve 69 will reseat only after the water level has decreased to the point where the inherent resiliency of the strap 68 overcomes the buoyancy of valve 69.

In the event it is desired to save water it is merely necessary that a second actuation be given to the handle 16 to thus cause the chain 37 to swing the arm 67 into parallel with rod 64. At this time the torus 40 will pass over the arm 67 and the chain 73 will guide the same onto the valve 69 in its unseated position. The added weight will cause premature reseating of valve 69 and after seating and following re-entry of water the torus 40 will float upwardly with the rising water level with its position being guided at all times by the chain 73. As the water level rises the torus 40 will again repivot the arm 67 to pass beyond the same, at which time the arm 67 will return to its normal position as shown in the drawings.

While a full and complete description of the invention has been set forth in accordance with the dictates of the patent statutes it is to be understood that the invention is not intended to be so limited.

Accordingly, where appropriate, modifications of the invention may be resorted to without departing from the spirit hereof or the scope of the appended claims.

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What is claimed is:

1. A toilet mechanism of the character described, comprising; a tank having a water reservoir; inlet valve means controlling the entrance of water into said tank; a discharge opening for said tank; a cover member normally seated on and closing said discharge opening; a handle mechanism movable relatively of said tank and being operable to unseat said cover member; a guide element fixed with respect to said tank; a control element interconnecting said guide element with said cover member and permitting relative movement therebetween; a buoyant weight carried by said guide element in shiftable relationship therewith; an arm pivoted to said guide element and normally being positioned in the path of movement of said weight; means for pivoting said arm out of the path of said weight; and means for guiding said weight between a position on said guide element and a position on said cover member, whereby said weight, when positioned on said cover member, will effectuate premature reseating of the same.

2. The device of claim 1 further characterized by the fact that said means for guiding said weight include a chain interconnecting said cover member and said guide element.

3. The device of claim 2 further characterized by the fact that said weight is a torus surrounding said chain and being movable relatively thereof.

4. The device of claim 1 further characterized by the fact that said means for guiding said weight include a

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shaft fixed to said cover member and being shiftably connected to said guide element.

5. The device of claim 4 further characterized by the fact that said weight is a torus encircling said shaft and being movable relatively thereof.

6. A toilet mechanism of the character described, comprising; a tank having a water reservoir; inlet valve means controlling the entrance of water into said tank; a discharge opening for said tank; a cover member normally seated on and closing said discharge opening; a handle mechanism movable relatively of said tank and being operable to unseat said cover member; a guide element fixed with respect to said tank; a control element interconnecting said guide element with said cover member and permitting relative movement therebetween; a buoyant weight carried by said guide element in shiftable relationship therewith; stop means secured to said guide element and normally being positioned in the path of movement of said weight; means for moving said stop means out of the path of said weight; and means for guiding said weight between a position on said guide element and a position on said cover member, whereby said weight, when positioned on said cover member, will effectuate premature reseating of the same.

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UNITED STATES PATENTS

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