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WATER VOLUME CONTROL FOR WATER CLOSET

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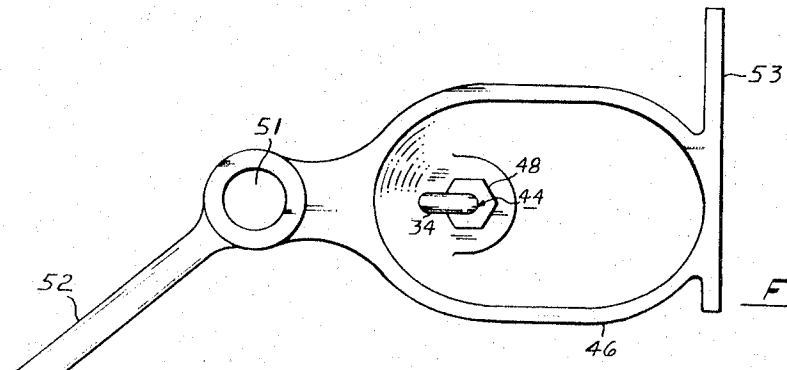

FIG. 3

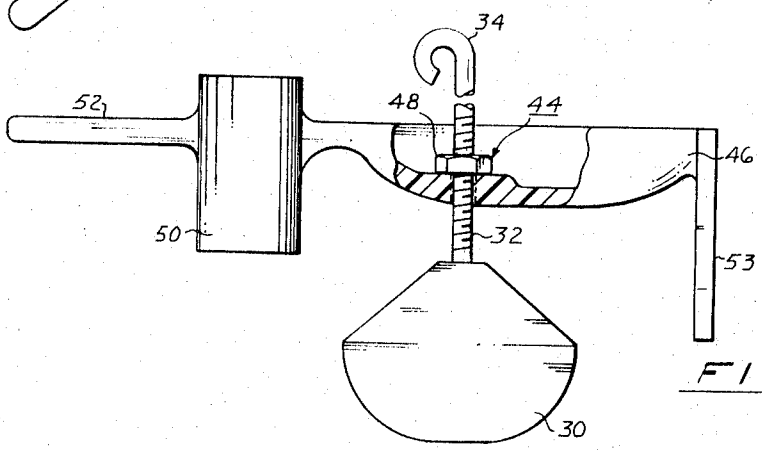

FIG. 2

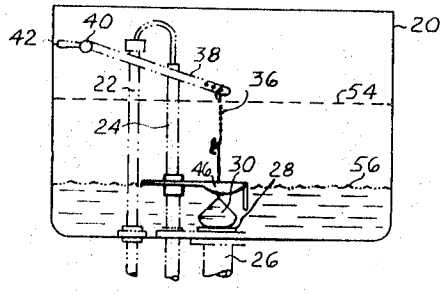

FIG. 1

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WATER VOLUME CONTROL FOR WATER CLOSET

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ABSTRACT OF THE DISCLOSURE

Water volume control for a water closet tank employing an element including an open top vessel disposed above the outlet valve and having a sleeve surrounding a standard pipe in the tank, which sleeve, together with an integral arm, provide the sole means for vertical guiding of the valve mechanism, the element having a specific gravity slightly above unit.

The present invention relates to a water closet tank and the mechanism for controlling the flow of water from the tank.

Water closet tanks are provided with a drain opening having a valve seat about the opening. A float valve, normally held in place by water pressure thereabove, prevents the escape of water through the drain. However, when the float valve is lifted off the seat a sufficient distance, far enough to prevent the outgoing water from drawing the valve downwardly, it will rise to the surface of the water and after rising to the surface, it falls with the surface as the water recedes in the tank. And then when the level of the water recedes to adjacent the bottom of the tank, the valve is resisted and the weight of the water thereabove holds the valve on its seat.

In practicing the present invention an element is disposed above and connected with the valve. This element has a specific gravity slightly above that of the water which will be referred to at times as having a gravity "slightly above unity." The value of buoyancy of the float valve is substantially equal to that which is necessary to buoy itself and the element in the water. When the bottom of the float valve approaches the valve seat, the force of the outgoing water draws the valve upon its seat. At this time, the weight of the water above the valve and that of the element is sufficient to maintain the valve on its seat.

Preferably the aforesaid element is in the form of an open top vessel.

Suitable means is provided for guiding the valve toward its seat as the water recedes in the tank. In the embodiment illustrated, the element which is disposed above the float valve is guided by a stationary guide in the tank, as for example one of the vertical pipes in the tank.

Other features and the advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of the invention is illustrated.

In the drawing:

FIG. 1 is a vertical cross sectional view of one of the standard water closet tanks, showing the improved invention therein; however, the water inlet valve and the float control have not been shown since such elements are standard and play no part in the present invention;

FIG. 2 is a side view of the improved valve mechanism shown in FIG. 1, but on a larger scale, and part of the vessel is shown in section; and

FIG. 3 is a top plan view of the mechanism shown in FIG. 2.

Referring more in detail to the drawings, the water closet tank is shown at **20** having two upright pipes extending therein and shown at **22** and **24**. One of these pipes is an inlet pipe for water and the other is an overflow pipe for water. The valve for controlling the inlet of water and the float for controlling the inlet valve have been omitted since such are standard parts and form no part of the present invention. The bottom of the tank is provided with a drain pipe **26** which opens into the bottom of the tank and this opening is surrounded by a valve, generally indicated at **28**. A float type valve **30** secured to the bottom of a rod **32**, controls the flow of water from the tank through the drain pipe **26**. The top of this rod **32** is provided with a hook **34**, which in turn is connected by a chain **36**. The upper end of this chain **36** is connected to a lever **38** which is pivotally mounted on a pivot **40** and is actuated by a lever **42**. By pushing downwardly upon the lever **42**, the valve **30** will be lifted from its seat **28**.

Valve **30** is a part of a valve mechanism **44**, which mechanism also includes an element, in the form of an open top vessel **46**. This vessel is threaded onto the rod **32** and held in adjusted position by a nut **48**. The element **46** also includes a sleeve **50**, having a vertically extending passage therethrough, indicated at **51** in FIG. 3. This passage receives the pipe **24** whereby the pipe **24** provides a vertical guide for the valve mechanism **44**. The element **46** also includes an arm **52** which is utilized for limiting swinging movement of the valve mechanism **44**, since it is adapted to engage the inside front wall of the tank if the valve mechanism **44** moves in a counterclockwise direction and is adapted to engage the pipe **22** in the event that the valve mechanism **44** tends to swing in a clockwise direction.

Valve **30** is of the standard type, usually formed of a flexible and resilient rubber. The element **46** is formed of a suitable plastic having a specific gravity slightly above unity, i.e., that in itself when the entire element **46** is emerged in water, it is not buoyant. However, the buoyancy of the rubber ball type valve **30** is of a value substantially equal to that necessary to buoy itself, the rod **32** and the element **46** in water and thereby normally urges the valve mechanism upwardly whereby the upper extreme portion of the vessel **46** is slightly above the water level.

The normal water level is indicated at **54** in FIG. 1. At this time the valve assembly is in the position shown in FIG. 1 whereby the ball valve **30** is on its seat **28**. When the lever **38** is moved in a counterclockwise direction by the handle **42**, the ball valve **30** is lifted high enough so that it is not influenced by the force of the water flowing thereabout and into the drain pipe **26**, and consequently, since its buoyancy is sufficient to raise the entire valve mechanism upwardly, the valve mechanism will be buoyed upwardly to a position in which the extreme upper part of the vessel **46** extends slightly above the water level. As the water recedes, the valve mechanism recedes therewith until the ball valve **30** is brought into the influence of the force of the water flowing out of the drain pipe at which time, the bottom of the ball valve **30** will close the seat **28** and arrest the flow of water through the drain pipe **26**. At this time, the combined weight of the water above the ball valve and that of the rod **32** and the vessel or element **46** is sufficient to retain the valve upon its seat. The height of the water in the tank, at the time that the valve **30** closes upon the seat **28** is controlled by the relative position of the vessel **46** with respect to the valve seating surface of the ball valve **30**. And this height can be adjusted by the threaded relationship between the rod **32** and the vessel **46**. Thus, it is apparent that the flow of water from the tank is cut off as the water level recedes to the height of the mass, that is, to the height of the vessel **46**, at which point the displacement buoyancy of the mass is lost and a downward force equal to the weight of the mass in air is exerted on the tank bulb. The tank bulb seals quickly

and positively under pressure. The flow is cut off at what would otherwise have been its approximate midpoint in time for emptying the tank although somewhat more than 50% of the water will have drained from the tank. Refilling of the tank is normal except that a shorter time is required since less water has been used.

Several advantages accrue from the use of the present invention. As previously stated, less water is used, in that less water is drained from the tank and, through the shortened drain time, less refill water is added to the flow during draining. Approximately 40% to 50% of the water is conserved compared tot he conventional system.

Cleaning action is more complete since the flow is cut off before the energy level is reached at the bottom of the tank, that is, there is less tendency to develop whirl pooling and consequent failure to ingest buoyant material, and siphoning is more complete.

There is less likelihood of a failure of the tank bulb to seat and seal since the sealing is done under higher pressure. No jiggling of the flush lever **38** is necessary to start the refilling portion of this cycle. Although the noise level is unaffected, noise duration is reduced since the time expended for outflow water is materially reduced.

The tank bulb does not require precise alignment with the drain seat since the outflowing water positions the ball.

A selected level is illustrated and shown at **56** indicating the level of water which remains in the tank at the time that the bulb or ball valve **30** is seated.

Flange **53** of FIGS. 2 and 3 is for the purpose of preventing outrushing water from shifting the bulb **30**, that is, it maintains the bulb directly over the drain pipe while the water is rushing out.

While the form of embodiment herein shown and described, constitutes a preferred form, it is to be understood that other forms may be adopted falling within the scope of the claims that follow.

I claim:

1. In a water closet, the combination of:

(A) a tank for the storage of water, said tank having a drain opening,

(1) a valve seat about the drain opening;

(B) a vertically extending pipe within the tank;

(C) a mechanism floatable in water, including:

(1) an element including a sleeve surrounding the pipe, said sleeve providing for unrestricted horizontal swinging movement of the said mechanism about the pipe, said element also including an arm extending horizontally from the sleeve and engageable with parts of the interior of the tank for limiting horizontal swinging movement of the element about the pipe, said sleeve providing the sole means for vertical guiding of the said mechanism,

(2) means forming a buoyant valve for closing upon said seat, said means being disposed below and connected with the element, the buoyancy of the means having a value substantially equal to that necessary to buoy itself and said element in water;

(D) and means for lifting the valve from the seat including a chain connected with said mechanism.

2. A combination as defined in claim **1**, characterized in that said element has a specific gravity slightly above unity.

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