Oct. 10, 1967 M. J. RAFFERTY 3,345,648

FLUSH-TANK OUTLET VALVE

Filed June 15, 1965

FIG. 1

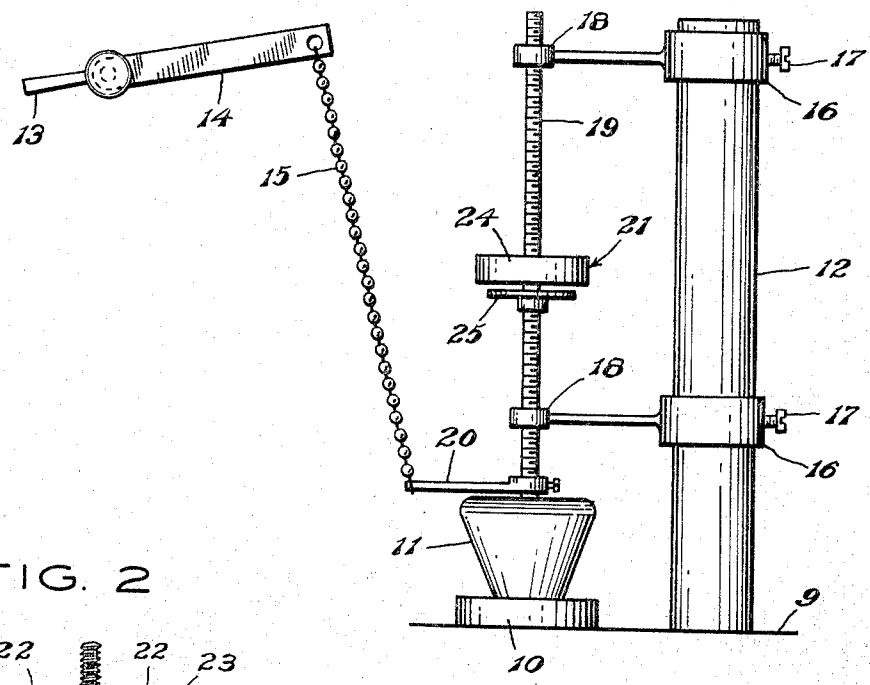


FIG. 2

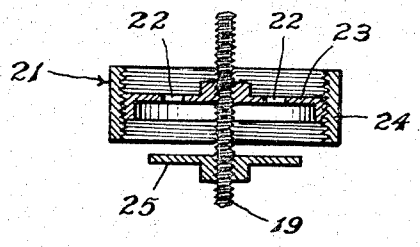


FIG. 3

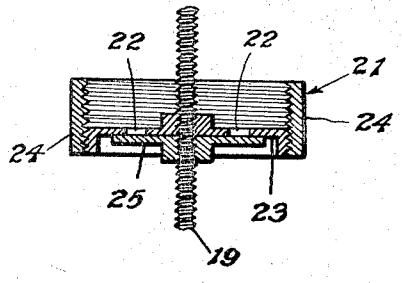
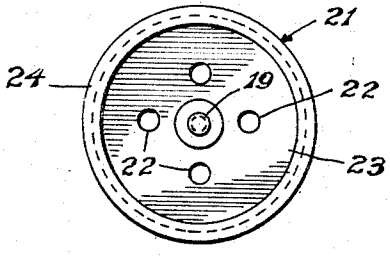


FIG. 4



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FLUSH-TANK OUTLET VALVE

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ABSTRACT OF THE DISCLOSURE

A cup arrangement applied to a flush-tank outlet valve temporarily weighted by water from the tank providing for regulation of bleeding escape of the weighting water as well as adjustment to regulate depth of water discharged from the flush tank before the valve closes.

A primary object of the invention is provision of an improved flush-tank outlet valve by which a saving of amount of water used may be effected.

So far as found practical, the present invention utilizes present-day outlet valve construction with a minimum of alteration therein to promote the water-saving and other features of this concept.

Basically, the invention proposes an improved adjunct to present-day flush-tank outlet valves adding to the utility thereof.

More in detail, the invention proposes a selectively adjustable structure whereby less than a full tank of water is utilized automatically when the valve is tripped, but when desired a full tank may be used for flushing purposes.

The invention also provides a structure whereby after a partial tank of water has been passed, the remaining water in the tank may also be automatically completely flushed.

A further proposal of the invention is to enable its use, when desired, to require constant manual retention of the flush-valve raised from its seat; automatic operation being suspended in adjusting for this use.

Objectively the invention is of a construction and nature permitting reversion of the flush-tank outlet valve to its original status of accomplishment of a full tank flush automatically when water saving is no longer essential.

A structural feature of the invention is to reduce the unseated freedom of the present-day outlet closure element during the flushing operation and obtain a more prompt automatic closing thereof before the tank is empty.

Other objects, advantages, beneficial results and novel structural features will appear to persons skilled in the art to which the invention appertains, as the description proceeds, both by direct recitation thereof and by implication from the context.

The novel features that are considered characteristic of the invention are set forth in the appended claims. The inventive concept, however, as to its construction and method of operation, together with additional objects and advantages, will be better understood from the following description of an arbitrarily selected embodiment when read in conjunction with the accompanying drawing, in which:

FIGURE 1 is an elevation of a flushing tank outlet valve construction utilizing the invention;

FIGURE 2 is a diametric sectional view of the weight-applying entity utilized as an essential part of the invention, showing one possible adjustment of parts;

FIGURE 3 is a sectional view similar to FIG. 2 but showing a different adjustment of parts; and

FIGURE 4 is a plan of the showing of FIGS. 2 and 3.

It will be understood that inlet valves which automatically shut off water in-flow to a flush-tank when the tank is full, are well known and commonly used, wherefore the drawing has not been complicated either by inclusion thereof or by full showing of a flush tank for which line **9** in FIG. 1, representing the bottom of such a tank is deemed adequate for present purposes.

Further usual equipment utilized in ordinary flush-tank constructions, is a hollow outlet valve seat **10** adapted to receive a hollow valve closure **11** to prevent, when seated, escape of the water from the tank, and permitting flow when lifted for flushing purposes. Associated with said outlet, there is the usual upright over-flow pipe **12** which is standard equipment and needs no further description. As a further item of standard equipment, it may also be pointed out that a trip-handle **13** is usually provided at the front of the tank, having operative connection with a lever **14** inside the tank, said lever having appropriate connection, here shown as a chain **15**, for lifting valve closure **11**. Ordinarily in prior practice, the closure is tripped and the handle is let go, the closure floating above the valve seat thereby allowing an automatic flush of the full tank.

Two brackets **16** are mounted on said over-flow pipe **12** suitably retained, as by set screws **17** in adjusted positions so as to have desired longitudinal spacing from each other and from the valve seat. Said brackets project laterally from the said pipe **12**, and at their outwardly situated ends are constituted as vertical guides **18** positioned on a common axis parallel to said pipe and aligned with the axis of the valve seat **10**. Said guides **18** slidably receive a vertical rod **19** the lower end of which is attached, by screw threads or otherwise, coaxially to valve-closure element **11**. The lower one of the brackets has a location sufficiently high to permit the closure element to be lifted adequately from its valve seat **10** to permit out-flow of the water and floating of said element. According to the present showing, a radial arm **20** is shown fixed on rod **19** at the top of the closure element **11** to which chain **15** is attached.

According to the arbitrarily selected showing herein of the invention, said rod **19** extends upwardly from the seated valve closure element **11** to approximately the height of the overflow pipe **12** and the upper one of said brackets **16** is conveniently located near the top of both the pipe and rod so as to guide the rod thereat, and leaves a considerable length of said rod between the two brackets. On this intervening length of the rod, there is adjustably mounted a control device designated generally by numeral **21** and which is an essential feature of the invention.

It is preferable to use a light material for said device **21** with a specific gravity equal to or very close to that of water, so that it will not of itself add depressing weight to the valve closure element. Said device is made in the nature of a cup, adapted to fill with water, and therefore, when not submerged, but when containing water, will function as a weight and will depress the valve closure **11**. Therefore the device, attached to the rod at an elevation of water in the tank where shut-off is desired for the flushing operation, protrudes above the water level when the water has receded therebelow, and thereupon applies the weight of its contained water to depress the valve closure **11**.

Normally, with weight applied to the valve closure, the remaining balance of water in the tank cannot be automatically flushed, because the weight will seat the closure as soon as the user releases the handle, and so, under these conditions, full flush can be obtained only by retaining hold of the handle that holds the valve closure open. According to the present invention, let it first be said that the weight of the device **21** in comparison to the floating lift developed by the valve closure is insufficient to de-

press the said closure without the additional weight supplied by water retained in said cup device. It is therefore a feature of the present invention to discharge the water from the cup device after it has served its purpose and thereby condition the valve closure to again function automatically if lifted a second time and thereby discharge the balance of the water in the tank without having to continuously hold the handle. According to the specific disclosure of the drawings, the cup is provided with drain holes **22** through which the water may bleed out, said holes arbitrarily being shown in the bottom wall **23** of said cup. The holes are made small enough to be sure to retain the water in the cup long enough to assure the water in the cup serving as the weight depressing the valve closure. There are two factors involved in this bleeding of the water from the cup, namely, (1) the volume or quantity to be bled, and (2) the rate of bleeding. The invention features control of these factors.

In the specific embodiment of the invention as here disclosed, said cup device **21** may comprise a peripheral wall **24** in the form of a ring with internal screw threads meshing with corresponding threads on the periphery of the bottom wall **23** so that by screwing the bottom wall up or down in the peripheral wall, the capacity of the cup can be adjusted to desired or proper amount. Also, rate of flow from the bleed holes **22** may be controlled by a regulator **25** adjustable to more or less interfere with escape of the water from the cup. In this disclosure, the regulator is in the form of a disc disposed beneath the drain holes **22** and adjustable toward and from the same. In FIGURES 1 and 2, the regulator is shown far enough below the drain holes as to permit free flow from the holes, and thus the number and size of the holes will determine the rapidity of discharge, whereas in FIG. 3 no discharge can take place. At intermediae positions of said regulator, the flow will be more or less retarded depending upon the closeness of the regulator to the holes. Finally, as a constructional feature, it will be observed that both the bottom wall **23** of the cup device **21** has a threaded mounting on rod **19** which is shown threaded for its entire length. Likewise, the regular **25** has threaded mounting on said rod. Thus both the cup and the regulator may be adjusted to the desired positions. The higher the cup is positioned on the rod, the less will be the amount of water permitted automatically to be discharged for flushing purposes. Bleeding of the water from the cup must be retarded sufficiently for the cup to act as a weight to close the flushing valve closure, but prompt enough so that a second lifting of that closure will permit the closure to again float and automatically close only when the final full-tank flushing has been accomplished. Should the user wish the tank to flush only so long as the valve closure is manually held, the regulator may be adjusted to the bleed-hole closing position shown in FIG. 3, and the cup and regulator adjusted to a position below but close to the full-tank water level so the cup will always be filled and act as a weight as soon as raised by the manual lifting of the control valve closure **11** by trip handle **13** and function to close that valve immediately upon release of the handle by the user. Complete removal of the cup device **21** will return the flush mechanism to its original state of giving a full-tank automatic flush by a single lifting of the control valve when

saving of water is not important. But full automatic flush can be more easily obtained by adjusting bottom wall **23** to the top of side wall **24** so the device then holds no water and no weight is added.

I claim:

1. An adjunct to flush-tank outlet valves for regulating the depth of water discharged from a flush tank before the valve closes comprising a cup-shaped control device immersible in the water of a flush-tank, said device being upwardly open for being filled with water upon immersion, said device having drain holes at its bottom adapted to discharge the water from said device, and a regulator controlling rate of discharge of water from said device.

2. An adjunct to flush-tank outlet valves in accordance with claim **1**, wherein an upright threaded rod provides screw-thread engagement with and support for said device at adjusted position on said rod.

3. An adjunct to flush-tank outlet valves in accordance with claim **1**, wherein an upright threaded rod passes through said device and provides screw-thread engagement with said regulator enabling the regulator to be varied in its proximity to said device by rotating said regulator on the screw-threads of said rod.

4. An adjunct to flush-tank outlet valves in accordance with claim **1**, wherein an upright threaded rod passes through and has threaded engagement with both said device and said regulator, enabling the device and the regulator to be individually varied in location on said rod and the regulator adjusted to desired proximity to said device.

5. An adjunct to flush-tank outlet valves in accordance with claim **4**, wherein said device provides a peripheral wall threaded on its entire interior, and a bottom wall threaded at its periphery and in threaded engagement with said peripheral wall, thereby adapted to be located at any desired elevation within said peripheral wall, the said regulator having a diameter less than the interior diameter of said peripheral wall and less than the diameter of said bottom wall and thereby adapted to enter within said peripheral wall in proximity to said bottom wall when at a location within the peripheral wall.

6. In combination with a flush-tank valve closure a means for regulating the depth of water discharged from a flush tank before the valve closes, comprising a rod projecting upwardly from said valve closure, a device adjustably mounted on said rod, said device being immersible in and emergent from the water in the flush tank, said device when emerged from the water applying weight to said valve closure, and said device having means automatically gradually reducing with a controlled delay after emergence of the device the weight of water applied while immersed.

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