May 25, 1971 A. M. DYER 3,579,649

TOILET TANK AND GUIDE FOR FLUSH CONTROL VALVE

Filed Nov. 13, 1968

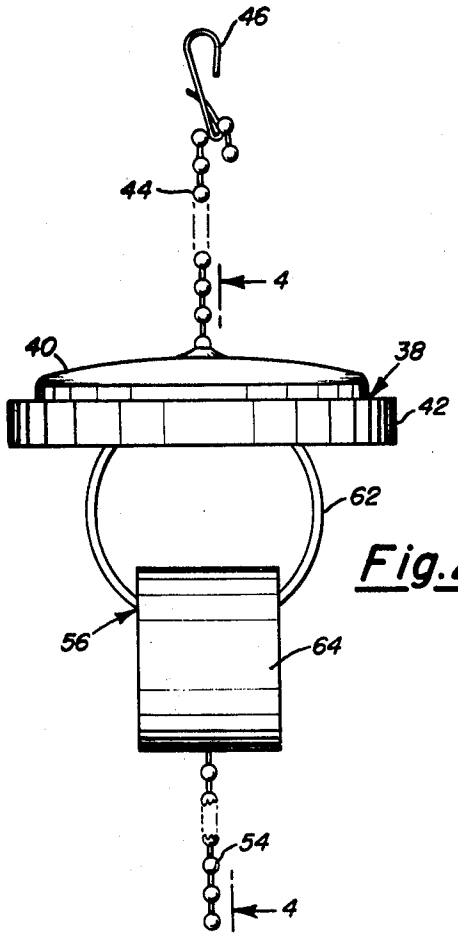


Fig.2

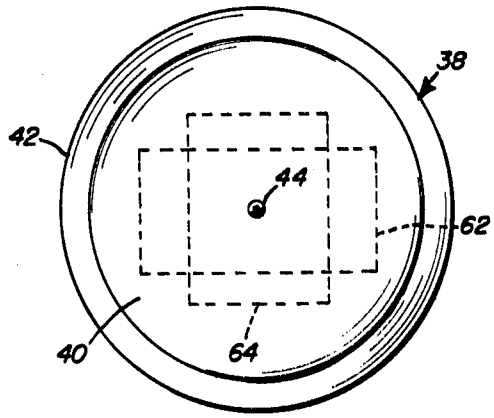


Fig.3

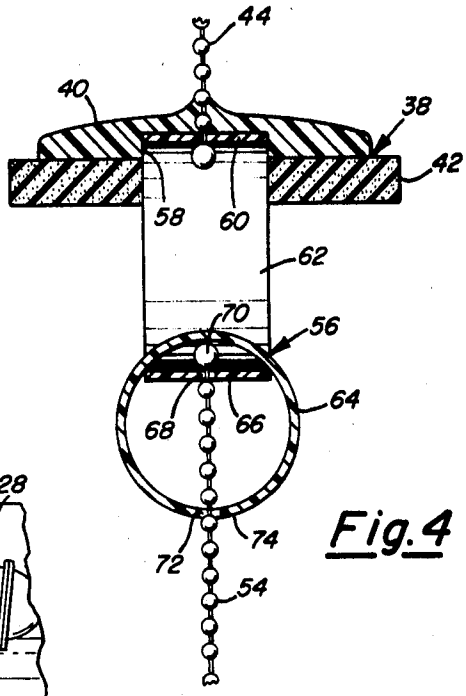


Fig.4

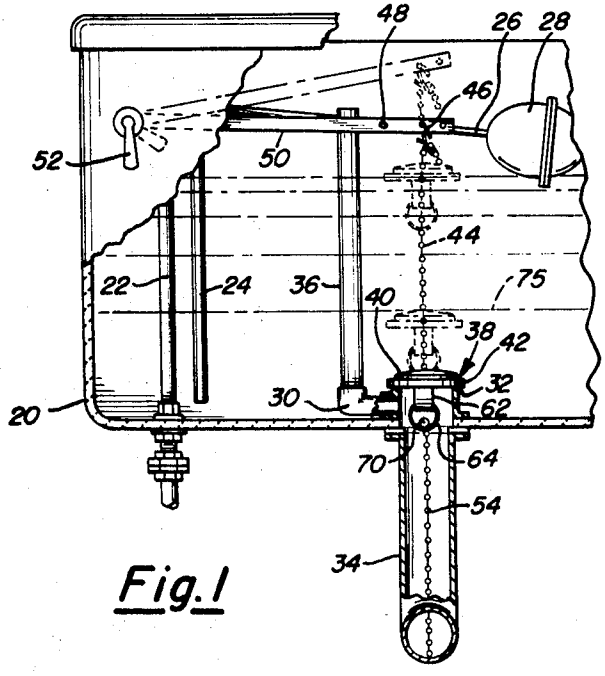


Fig.1

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TOILET TANK AND GUIDE FOR FLUSH CONTROL VALVE

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ABSTRACT OF THE DISCLOSURE

A combination of a toilet tank and a movable baffle below the flush control valve which, in conjunction with a chain extending into the drain pipe and under the influence of water being flushed, guides a float type valve toward the valve seat leading from the tank.

CROSS-REFERENCE TO RELATED APPLICATIONS

The present invention is an improvement on my co-pending application, Ser. No. 578,630, filed Sept. 12, 1966.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention is directed to toilet tanks and valves for controlling the flow of water from the tank, and particularly to the type of valve which floats freely when removed from the valve seat, e.g. a valve that is not guided by a post or the like.

(2) Description of the prior art

As far as applicant is aware, the closest prior art is that cited in my aforementioned application, to wit:

Pat. No. 2,599,940 issued to Rickena;
Pat. No. 2,693,600 issued to Kass; and
Pat. No. 2,230,613 issued to Deady.
Attention is also directed to the Haas Pat. No. 1,605,938.

A float type valve, when employed in a toilet tank is subjected not only to the downward influence of water, which is being flushed through the drain outlet, but is also subjected simultaneously to a flow of water entering the tank, which latter flow is transverse to the outgoing flow of water. It has been found in actual practice that the mere use of a chain depending from the float and extending into the drain pipe is not adequate for counteracting the transverse flow with the consequence of improper and ineffective seating of the float valve on the outlet valve seat.

Ball-type valves, such as that illustrated by Rickena, are subject to the aforesaid transverse current and unless weighted heavily from below as by a heavy chain or auxiliary weight, upon being subjected to said current, and are often improperly and ineffectively rested on the valve seat, resulting in continuous leakage, waste of water, and inability to flush the tank because the necessary head of water is absent.

The same is true with respect to the illustration in FIGS. 3, 3*a* and 5 of the Kaas patent. To counteract the transverse flow of water, Kass employed fixed guides to the bottom of the float as illustrated in FIGS. 1, 2, 4 and 6. Deady employed the same type of guide using a cage of wires **54**. Hass in Pat. No. 1,605,938 employed a depending valve stem **39** for assisting the elongated rod **42** for guiding the float.

SUMMARY OF THE INVENTION

The present invention encompasses a free-floating valve, e.g. one not guided by a vertical post, but which is lifted from its seat by a chain. A second chain is connected with the bottom of the float valve and extends into the drain pipe. Baffle means, including a freely movable baffle, is carried by the underside of the float valve, which baffle is predominately influenced by the out-rushing water for directing the valve onto its seat.

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

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary, front view, partly in section, showing a standard type of water tank and drain;

FIG. 2 is a front view of the unit including the float, the valve, the two chains and the baffle mechanism;

FIG. 3 is a top plan view of the unit; and

FIG. 4 is a sectional view taken along the line **4—4** of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more in detail to the drawing, the tank is shown at **20** having inlet pipes **22** and **24**, which are connected with one another at the upper portions thereof, there being a valve disposed in the upper portions of the connection between these two pipes. This valve is of the standard type (not shown) and is actuated by a float arm **26** carrying a float **28**. The bottom of the tank carries an outlet coupling **30**, the top of which forms a valve seat **32**. This outlet coupling is connected in the usual manner with a drain pipe **34**. An overflow pipe **36** is connected with the coupling **30** for draining the water from the top of the tank should the inlet valve mechanism become inoperative, to shut off the flow of water to the tank.

The unit, heretofore mentioned, comprises a float **38** including a central section **40**, preferably formed of a plastic such as rubber or synthetic resin and the disc **42** formed of a vinyl sponge material. The bottom of this disc **42** functions as a valve for closing upon the valve seat **32**. A flexible member which may be in the form of a cord, cable or as herein shown, as a chain **44**, extends from the top of the unit and the upper end thereof is provided with a hook **46** which is hooked into one of the openings **48** and an actuating arm **50**. This arm is disposed within the tank and is actuated by a lever **52** which extends to the front exterior of the tank, all of this being of standard practice. The bottom of the unit **38** carries an element which may be in the form of a cable, cord or as herein shown, a chain **54**. This chain **54** extends into the drain pipe **34**.

Baffle mechanism **56** is suitably attached to the underside of the central section **40**. The underside of the section **40** is recessed as at **58** for receiving the upper portion **60** of an endless band **62**. This band is immovably fixed, as by an epoxy, to the underside of the central section **40**, whereby the band depends therefrom. The lower end of chain **44** is fastened to the upper portion **60** of the band **62**. The baffle mechanism **56** includes a second endless band **64** which is linked with band **62**, the axes of the bands being transverse to one another. These bands are formed of thermosetting plastic which will not float on water.

The lower portion **66** of upper band **62** is provided with a hole **68** through which the upper part of chain **54** extends. The top most bead **70** of chain **54** has a larger diameter than the hole **68** whereby the chain **54** is supported by and depends from the lower portion **66** of band **62**. Chain **54** extends through an enlarged opening **72** in the bottom portion **74** of band **64**.

The buoyancy of the float is such that it will buoy the unit in water from the position shown in solid lines in FIG. 1 to the topmost position shown in FIG. 1 in dotted lines,

when the float is not under the influence of the water being flushed from the tank. Therefore, when the float is lifted above the influence of the water being flushed from the tank, it will float to the surface of the water, carrying with it the chains **44** and **54**, and the bands **62** and **64**. The lever **52** is moved in a counterclockwise direction causing the float to be lifted from the full line position to the lower dotted line position, in which dotted line position the influence of the flushing water is not sufficient to pull the float downwardly whereby the float will rise to the surface of the water. As the water in the tank recedes, the floating valve will recede also. The chain **54** is of such length that when the valve is in its highest position, at least the lower end of that chain will be in the drain pipe **34**, i.e., below the valve seat **32**. Upon lowering of the valve, the chain will recede in the drain pipe and will be under the influence of the water being flushed through the pipe.

The downward application of the force of the water will be applied to the bands **62** and **64**, resulting in exerting a force to urge the valve toward vertical movement, substantially completely counteracting the transverse current of water caused by the entrance of water into the tank. In the event that the axis of the band **64** is transverse to the horizontal current in the extreme bottom of the tank, the water flowing horizontally will impinge on the outer and inner surfaces of the band and such impingement will have the effect of turning the band toward axial alignment with that flow of current. This turning movement can be readily effected since the band **64** is loosely looped through band **62**, and furthermore, the entire valve can turn, if necessary, since water offers little resistance to the turning thereof. Therefore, the transverse current will have insufficient force to move the valve horizontally to such extent that it will not seat properly on valve seat **32**. The entire valve is moving downwardly during the aforesaid turning movement and after the band **64** enters the top of the drain pipe, the downward force of the outflowing water, acting on both bands, is more than sufficient to increase the downward speed of the valve, whereby the valve is closed completely when the water drops to adjacent the level indicated by the line **75**. But should there be a slight misalignment, the band **64**, upon entering the drain pipe **34**, will cam the valve toward a central position, and then the downward force of the flushing water on the bands will have a further centralizing effect on the valve, thus assuring seating of the valve on the seat.

From the foregoing it is apparent that less water is used, but without reducing the hydrostatic head pressure which influences the flushing. In this manner, a large percentage of the water is conserved compared with the conventional system. Cleaning action of the toilet bowl 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 materials and siphoning is more complete. Although the noise level is unaffected, noise duration is reduced since the time expended for the outflow of water is materally reduced.

The flushing action of the water on the chain and bands **62** and **64** pulls the valve downwardly and substantially maintains the float in vertical alignment with the valve seat **32** as the float is being lowered in response to receding of the water level in the tank. Therefore, there is no need for a fixed guiding element for the float.

Inasmuch as the float is free floating and is not guided by a fixed guide, the cost is materially reduced since the fixed guide is no longer necessary.

Having described my invention, I claim:

1. In a water closet, the combination of:

(A) a flush tank for the storage of water, said tank having one opening and a valve seat in the bottom thereof and a flushing drain pipe leading from said seat;

(B) a unit comprising:

(1) a float forming a valve cooperating with said seat for opening and for closing the flushing drain opening,

(2) a flexible member connected with the top of the float,

(3) an element extending from the bottom of the float into the drain pipe, said element having a length at least equal to the length of movement of the float from its drain closing position to its extreme upper position,

(4) baffle means disposed below the valve and movable relative to the valve, said means being subjected ot the flow of water toward the drain opening and cooperating with said element for guiding the valve toward the valve seat,

(5) means for connecting the baffle means for movement relative to the valve,

said float having a buoyancy value equal to that necessary to buoy the unit in water when said float is lifted to above the influence of the flushing water adjacent the flushing drain opening but insufficient for buoying the unit when lowered into the influence of flushing water adjacent said opening;

(C) and means connected with the flexible member for lifting the unit above the area of water which is being flushed from the tank through said drain opening.

2. A combination as defined in claim **1**, characterized in that the element (3) of the unit (B) is a flexible chain.

3. A combination as defined in claim **1**, characterized in that the flexible member (2) of unit (B) is a flexible chain.

4. A combination as defined in claim **1**, characterized in that the element (3) of the unit (B) is a flexible chain and the flexible member (2) of unit (B) is a flexible chain.

5. A combination as defined in claim **1**, characterized in that the baffle means is in the form of a band.

6. A combination as defined in claim **1**, characterized in that the means for connecting the baffle means to the float is in the form of a band secured to the underside of the float.

7. A combination as defined in claim **6**, characterized in that the baffle means is in the form of a band loosely linked with the first mentioned band.

References Cited

UNITED STATES PATENTS

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