

[54] **WATER CLOSET SAFETY CONTROL**

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[58] Field of Search.....4/58, 41, 57 R, 57 P, 4/45, 52, 53, 56, 81, 249, DIG. 1; 137/432, 423

[56] **References Cited**

UNITED STATES PATENTS

3,115,893 12/1963 Doyle 137/432 X
3,321,972 5/1967 Goldtrap 137/432 X

3,428,966 2/1969 Schoepe et al. 137/432 X
3,543,309 12/1970 Boone 4/41
3,554,219 1/1971 Hudson 137/432 X
3,574,867 4/1971 Biniore 4/41
3,626,520 12/1971 Biniore 4/41

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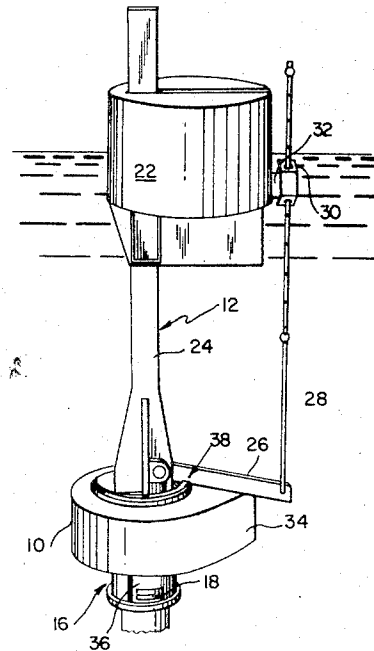
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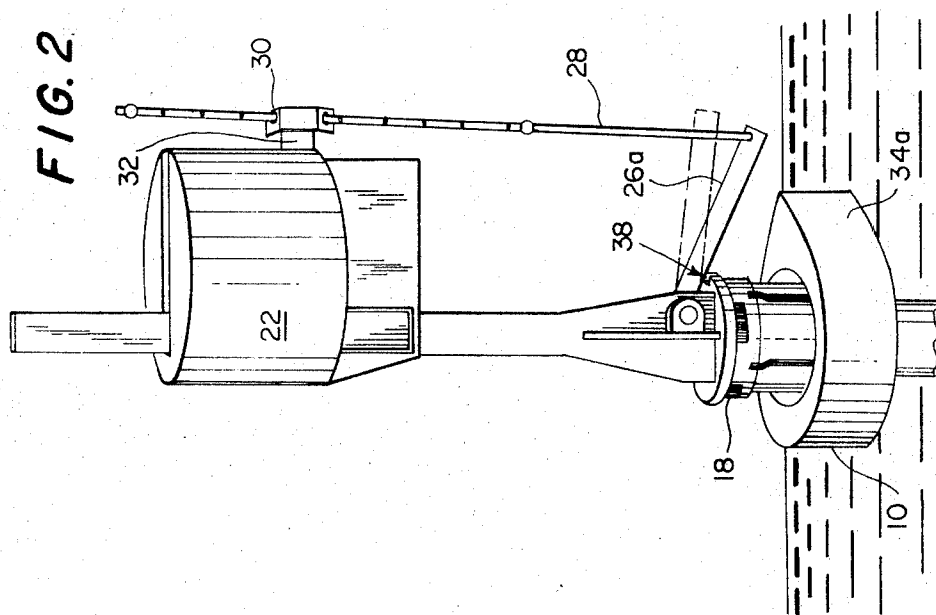
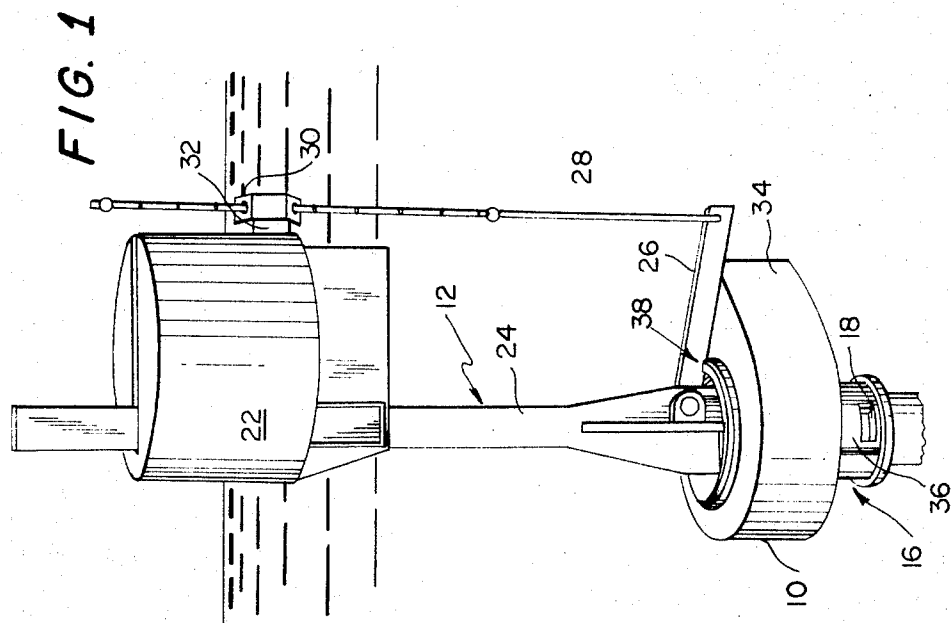
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ABSTRACT

A water closet safety control, more specifically, in a water closet supply tank of the type embodying a ball cock or fill valve float regulating the water supply, according as the level of water rises in the tank, a supplemental safety control operable to insure cutting off the water supply in the event of tank breakage, or other apparatus failure resulting in continued water flow.

6 Claims, 2 Drawing Figures





WATER CLOSET SAFETY CONTROL

BACKGROUND OF THE INVENTION

1. Field of the Invention

Substantial attention has been directed to providing an inexpensive method and means of preventing continued running or wasting of water when a failure or breakage occurs in the water closet, such as the tank itself, the flush valve, flush valve seats, standpipe or overflow pipe, the control handle and flush valve controls. Continuous running of water in the event of operating impairment wastes a very substantial amount of water and tank breakage, with continued flow, can result in extensive damage to a building where installed. The present invention is directed to a simple and inexpensive means of eliminating such problems.

2. Description of the Prior Art

Attempts have heretofore been made to solve the problem by developing float controls which are attached to the discharge valve in the water tank. Braswell (U.S. Pat. No. 2,740,129) and Petrie (U.S. Pat. No. 2,908,018) are typical in this respect. Such devices utilize a complicated mechanical linkage to attempt closing of the discharge valve upon malfunction, but do not necessarily insure that the water supply being fed to the tank will cut off. My prior U.S. Pat. Nos. 3,574,867 and 3,626,520 teach inclusion of a control tank within the water closet to sense the water level at the bottom of the tank after a normal flushing operation. Should the water level in such devices not remain at a predetermined height, such as 1 to 2 inches, as normal, a cylinder or tank which encloses the fill valve or ball cock is closed off from the toilet tank, accomplished by a valve attached to a sensor float, and would proceed to fill with water thereby effecting cut-off by way of raising the normal fill valve float to the off position. The present invention, on the other hand, is directed to closing of the water supply valve, independently of the operation of the water tank discharge valve. As a result, the water filling valve is closed immediately as the safety control of the invention senses a malfunction due to tank breakage or other apparatus failure.

SUMMARY OF THE INVENTION

According to the present invention, a sensor float is installed around the bottom of a normal fill valve shaft which serves to stop the floating of the sensor float a distance above the bottom of the tank. A modification has been made in the fill valve which will allow linkage arm mechanism to drop a slight distance further than it does in an unaltered valve. At this lower position the fill valve will revert from cut-on to cut-off. Mechanism of the general type is disclosed in A. Schoepe et al., U.S. Pat. No. 3,428,966, to which the present invention is adaptable and shown for illustrative purposes of the concept of the present invention. Under normal operating conditions the sensor float will not permit the fill valve linkage arm to drop to a position to move the needle valve from the cut-on to the cut-off position. If the toilet tank is broken the sensor float will drop a distance sufficient to allow the fill valve linkage arm to drop to a lower position effecting cut-off of the water, even though the fill valve float is down instead of up.

Additional advantages and objects of the present invention will be more readily apparent from the following detailed description of an embodiment thereof when taken together with the accompanying drawings in which:

FIG. 1 is a perspective view of a toilet flush tank having a ball cock assembly incorporating a fill valve float, and with the present safety control incorporated therein; and

FIG. 2 is a view similar to FIG. 1 under conditions of tank breakage or other malfunctioning of the control apparatus.

Referring now in greater detail to the drawings, the figures of the drawing disclose a toilet flush tank 20 having installed therein a ball cock apparatus 12, substantially as disclosed in aforesaid U.S. Pat. No. 3,428,966. A lower threaded stem or end 14, is adapted for connection with a water inlet pipe, not shown, in a usual manner. The apparatus includes a valve body, generally indicated at 16, which includes a needle valve in the interior thereof, not shown, and openings 18 in a usual manner. Flow of water into the flush tank and through refill hose 20 into a usual refill tube, not shown, is controlled primarily by a ball cock float or fill valve float 22, slidably mounted on a mast or pylon 24, in conjunction with valve operating lever or linkage arm 26 operatively associated with the inner needle valve. Linkage arm 26 is interconnected with float 22 through connecting lever 28 adjustably secured by a spring clip 30 through boss 32 formed integrally on the float 22.

Under normal conditions the float 22, which can be formed of any desired material in a known manner, controls cut-off of the fill valve when raised to the position shown in FIG. 1. As the tank is flushed and water flows from the flush connection, not shown, the float 22 lowers and thereby permits refill water to flow into the tank by opening of the inlet valve.

A buoyant sensor float 34 consisting of a material such as polypropylene, polyethylene, or the like, for example, is installed around the bottom of the fill valve shaft 36 which, by its design, will stop floating of the sensor float at approximately two inches above the bottom of the tank, if the toilet tank is not broken. The fill valve body has a notch or recess 38 therein which allows linkage arm 26 to drop approximately one-eighth inch further than it does in an unaltered valve body to position 26A (FIG. 2). At this lower position the fill valve will revert from cut-on to cut-off just as it does if fill valve float 22 is raised. If the toilet tank is operating properly the sensor float 34 will float at approximately 2 inches, and will not allow the fill valve linkage arm 26 to drop the additional one-eighth inch which would move the needle valve from the cut-on to the cut-off position. Should the toilet tank be broken, the sensor float 34 will drop approximately one inch to a position 34A (FIG. 2) which allows the fill valve linkage arm 26 to drop to the lower 26A position, thereby effecting cut-off of the water even though the fill valve float 22 is down instead of up.

The structure accordingly provides a safety control factor over and above normal operation of the control shown in U.S. Pat. No. 3,428,966 through sensing the water level at the bottom of the toilet tank after a normal flushing operation. The present invention is an im-

provement over the structures shown in my prior aforementioned patents. It reduces the size of the overall unit and will fit into a larger number of present toilet tanks. It eliminates the cylinder and valve assembly as shown in my prior patent, reduces the cost of manufacture by, for example, 90 percent and reduces shipping weight. Dependability is substantially increased due to fewer parts, and the apparatus can be adapted to operate with many specifically different valve structures.

Manifestly, minor changes in details of construction can be affected without departing from the spirit and scope of the invention as defined in, and limited solely by, the appended claims.

I claim:

1. In a water closet having a refill control valve and a refill float controlling normal water refill flow cut-on and cut-off valve positions;

A. a valve linkage control arm movable in conjunction with said refill float between normal upper and lower positions and moving said valve respectively to cut-off and cut-on positions; and

B. a water level sensor float engageable with said arm and having an upper restricted position with the valve during normal tank operating conditions being in open tank refill position controlled by said arm and refill float, and with a lower than normal water tank level permitting movement of said arm to a further lower position for a valve cut-off condition.

2. In a water closet having a refill control valve and a refill float controlling normal water refill float cut-on and cut-off valve positions:

A. a valve body;

B. a pivotal valve linkage control arm mounted on said body and operatively connected to said refill float and movable between upper and lower positions for moving said valve respectively to cut-off and cut-on positions;

C. said valve body having a recess therein to permit downward pivoting of said control arm to a lowermost position for actuating said valve to cut-off position independent of normal positions of said refill float; and

D. a water refill sensor float operatively floatingly

mounted on said valve body and engageable with said control arm to prevent pivoting thereof to said lowermost position to maintain said valve open during normal refill operating conditions said water level sensor float at a lower than normal water tank level permitting movement of said arm to a further lower position for a valve cut-off condition.

3. In a water closet of the type embodying a convention flush water tank with a water supply conduit having a filling valve, a ball cock float positioned in said tank and connected to said filling valve, and a discharge drain, a refill water safety control comprising:

A. a fill valve body and an upstanding shaft thereon movably mounting said float;

B. a water level sensor float mounted loosely around said fill valve body with the uppermost floating position being restricted thereby;

C. a pivotally mounted valve control linkage arm operatively interconnected with the filling valve and ball cock float;

D. said fill valve body having a recess therein adapted for receiving said linkage arm in a downward pivoted position;

E. said sensor float during normal tank operation floatingly engaging the underside of said linkage arm and preventing entry thereof into said recess and with the fill valve in open water flow position, but upon an abnormal lowering of the water level in the tank permitting pivoting downward an added increment in which position the fill valve is moved to water flow cut-off position.

4. In apparatus as claimed in claim 2, said valve body having a ring engageable by said sensor float to limit floating thereof to a restricted upper position wherein normal valve refilling condition is undisturbed, and preventing pivoting of said arm to said lowermost position.

5. In apparatus as claimed in claim 4, said sensor float consisting of a buoyant plastic material.

6. In apparatus as claimed in claim 5, said sensor float having a bore therethrough loosely engageable over said valve body to permit free floating to positions as determined by water level in said closet.

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