

[54] **DUAL FLUSH TOILET MECHANISM**

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[51] Int. Cl. **E03d 1/22, E03d 1/30**

[58] Field of Search. **4/67 R, 67 A, 34, 249,
4/57 R, 57 P**

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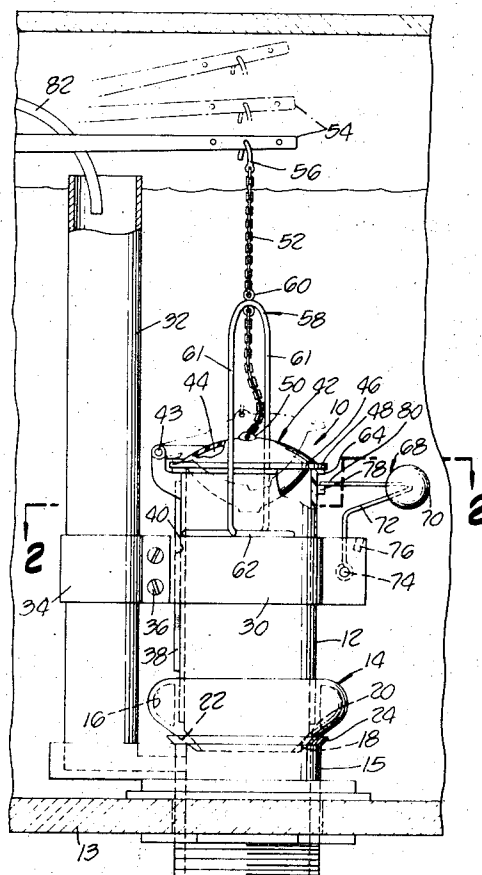
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[57] **ABSTRACT**

A mechanism adapted to be installed in a toilet of the water tank type which is operable to flush half the water from the cistern, or alternatively, all the water therefrom, which is comprised of a donut type tank ball mounted about the lower end of an upstanding drain tube and adapted to seat in the toilet drain. A drain tube cover rests on the upper open end of the upstanding drain tube and is secured to the flush chain so that it is lifted from the drain tube upon slight rotation of the toilet handle. A catch mechanism is carried by the flush chain and adapted to abut a stop member mounted on the upper portion of the drain tube upon further rotation of the toilet handle and raising of the chain, whereby the tube and tank ball will be lifted from the toilet drain.

3 Claims, 7 Drawing Figures



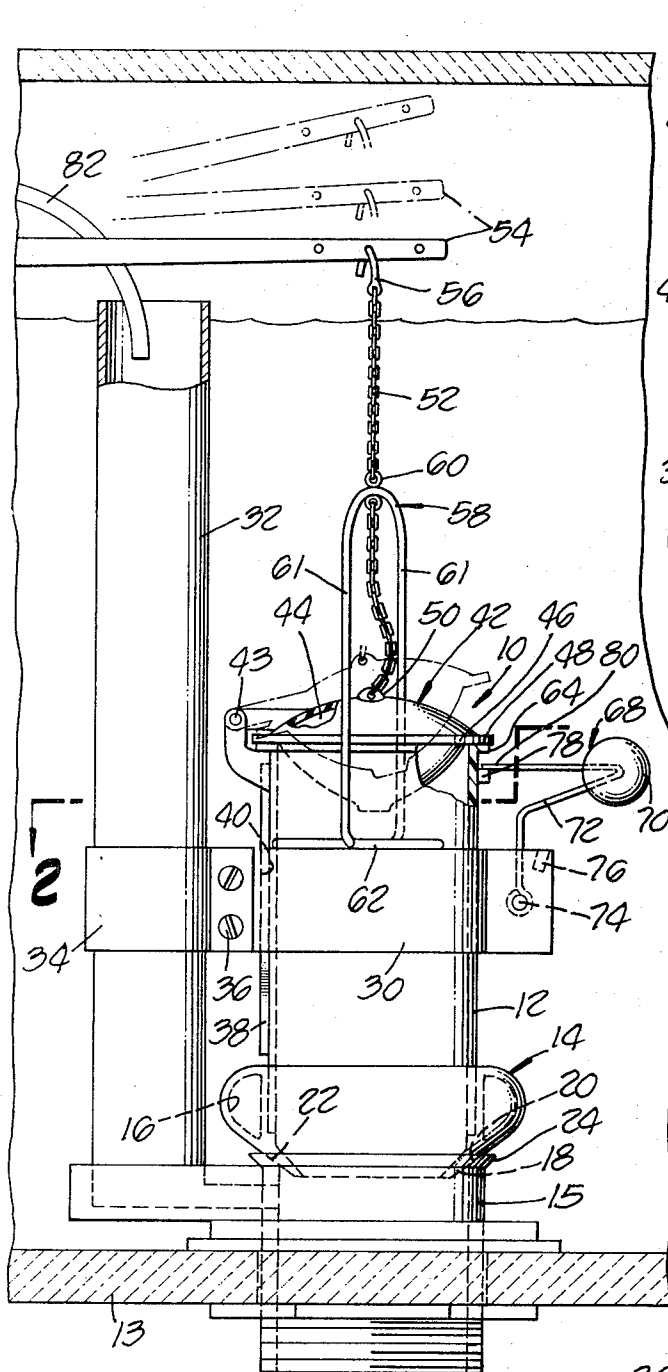
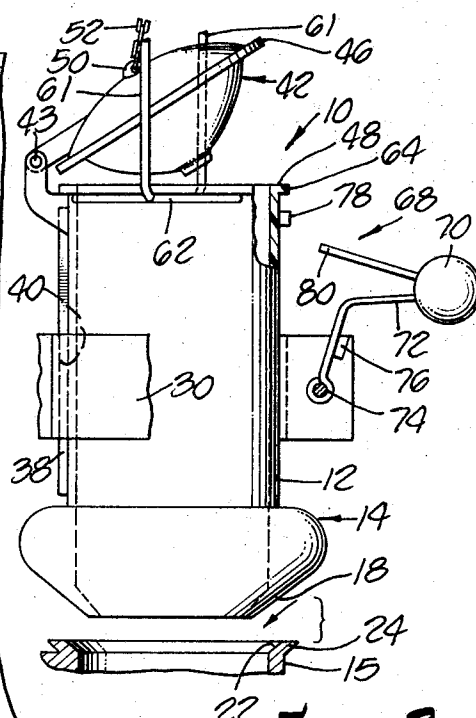


FIG. 3.

FIG. 1.

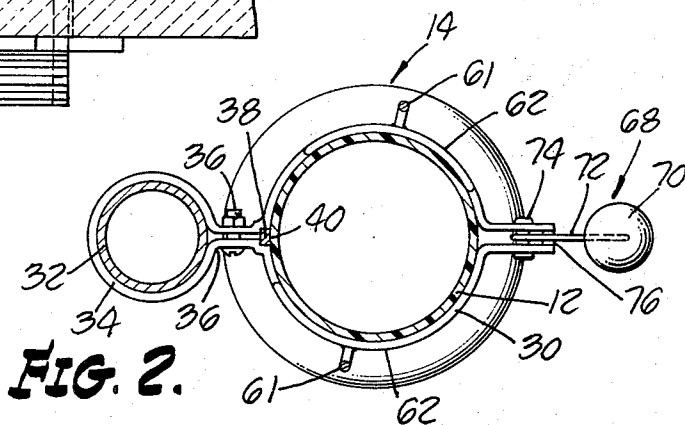


FIG. 2.

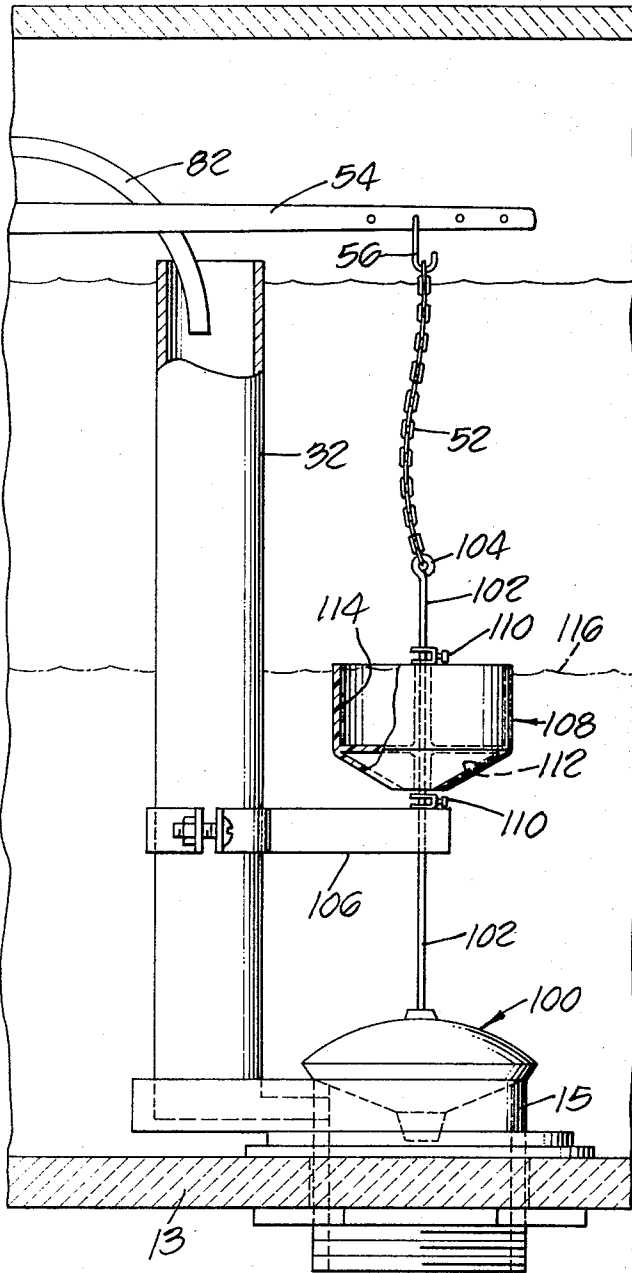
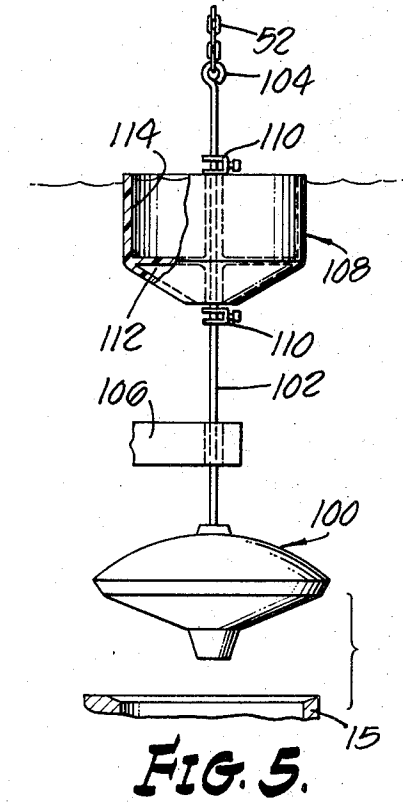
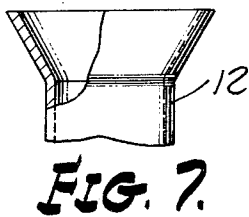
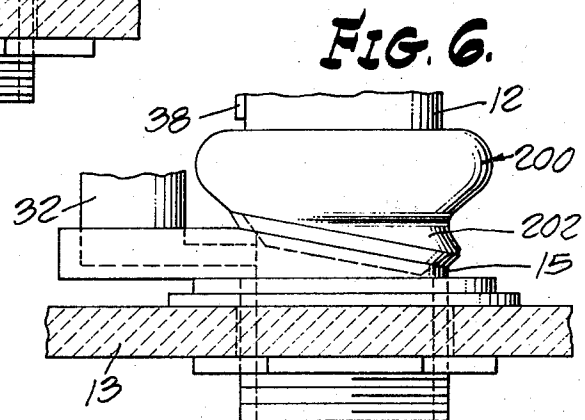


FIG. 4.



DUAL FLUSH TOILET MECHANISM

BACKGROUND OF THE INVENTION

The water tank type toilet or water closet commonly installed in homes and apartments has a simple flush mechanism whereby all of the water held in the cistern or water tank portion of the toilet is flushed down a drain into a sewer or septic tank. While a full flush of the water held in the cistern is often necessary to adequately flush a bowel movement from the bowl of the toilet, such a large amount of water is quite excessive in handling a urination flush or discharge of other materials such as cigarette butts and ashes resulting from the emptying of ash trays into the toilet bowls. Such functions could be effectively accomplished with the use of only half of water in the cistern. Such a water savings, when multiplied by the great number of such toilets currently in use, would have a substantial effect on a locality's water resources, which is particularly important in times of drought. In addition, the use of less water would help to reduce the overload on sewage and septic tank systems, and, of course, reduce the amount of water bills paid by renters and homeowners.

It is therefore the principal object of this invention to provide a dual flush toilet mechanism which is operable to flush either all or a portion of the water held in the cistern.

It is another object of this invention to provide a dual flush toilet mechanism which is adapted for use in standard water tank type toilets.

It is a further object of this invention to provide a dual flush toilet mechanism which is of simple construction and economical to manufacture.

These and other objects and advantages of the present invention will become apparent upon the following detailed description taken in conjunction with the accompanying drawings.

SUMMARY OF THE INVENTION

Briefly, the invention consists of a lightweight drain tube extending about half way up the cistern and having a donut type float about the lower end thereof, which float fits into and seals the toilet drain. A cover is provided at the upper end of the drain tube and is affixed to the flush chain so that upon turning the toilet handle, the cover is lifted from the drain tube and half the water held in the cistern pours down the drain tube, out the drain and into the bowl. The cover also carries a catch mechanism, which, upon further turning of the handle and lifting of the cover catches a stop member positioned in the drain tube and lifts the tube and donut float from the drain, thereby allowing a full flush of all the water held in the cistern.

IN THE DRAWINGS

FIG. 1 is a side elevation of the dual flush mechanism installed in a tank type toilet.

FIG. 2 is a sectional view taken along line 2—2 in FIG. 1.

FIG. 3 is a side elevation of the mechanism showing the guide tube and tank ball in the full flush position.

FIG. 4 is a side elevation of a second embodiment of the invention.

FIG. 5 is a side elevation of the second embodiment with the activating float and plug in the elevated position.

FIG. 6 is a side elevation of a tank ball for use in the first embodiment with slanted drains.

FIG. 7 is a partial view of a flared drain tube for alternate use in the first embodiment.

Referring now in detail to the drawings, the dual flush toilet mechanism 10 is easily installable in a standard tank type toilet [only a portion thereof being shown] and is seen to comprise a drain tube 12 which is constructed of a lightweight material such as polypropylene plastic and extends upwardly in the cistern 13 of the toilet from a point directly over the cistern drain 15 to approximately the mid-way point in the water depth level within the cistern. The drain tube 12 has a donut type tank ball 14 positioned about the lower end thereof, as shown in FIGS. 1 and 2. The tank ball has a sealed chamber 16 in the body portion thereof and an annular projecting portion 18 at the lower end thereof extending inwardly of the ball and the lower end of the drain tube 12, defining a valve seal 20. The valve seal is adaptable to rest in a valve seat 22 formed by the flared end portion 24 of the cistern drain 13, which communicates with the bowl of the toilet. [not shown]. The air chamber 16 in the tank ball is of sufficient size to render the ball essentially weightless when beneath the water level in the cistern 13, so that the buoyancy of the ball will keep the cistern drain open during a full flush [later to be more fully explained]. The drain tube 12 is held in proper alignment over the cistern drain 15 by a guide collar 30 which is secured to the overflow tube 32 by a support bracket 34 and tightening means 36, shown clearly in FIG. 2. The guide collar 30 is of sufficient diameter to allow vertical movement of the drain tube 12 therethrough. To prevent rotation of the drain tube and tank ball, a ridge 38 is provided on the external surface of the drain tube which is adapted to ride within a groove 40 in the collar guide 30.

A cover float 42 is positioned over the open upper end of the drain tube 12 to prevent the water in the cistern 13 which is above the elevation of the upper end of the tube from flowing therethrough, out the cistern drain 15 and into the toilet bowl. The cover float 42 is shown in FIG. 1 to be pivotally secured at 43 to the cistern drain. In alternate embodiments, the cover could merely rest on the drain tube. The cover 42 has an interior air chamber 44 to offset the weight of the cover so that the cover is sufficiently buoyant to float in water, for reasons to be explained. An annular flange 46 is provided about the outer edge of the float which is adapted to abut the upper surface 48 of the drain tube 12 and is held there against by the pressure of the water thereon which overcomes the buoyant force of the air chamber 44 in the cover float and thereby effectively seals the upper end of the drain tube when the cistern is filled with water. An eyelet 50 is provided on upper side of the cover float 42 and has a flush chain 52 connected thereto, which in turn is fastened to lever 54 by hook 56. The lever 54 is controlled by the toilet handle [not shown]. When the handle is depressed or rotated and the lever caused to pivot upwardly, the chain lifts the float cover 42 from the drain tube 12. The water in the cistern 13 above the lever of the tube then flows downwardly therethrough and into the toilet bowl. Once the seal is broken between the cover and the tube and the water begins to flow down the drain tube, re-

lieving the pressure against the float cover, the buoyancy of the cover float prevents the float from settling back down on the tube, thereby keeping the upper end of the drain tube open until all the water above the tube has flowed therethrough.

A lifting mechanism 58 is secured to the flush chain 52 at 60. The lifting mechanism has a pair of vertical leg members 61 which support lower arcuate catch members 62 which are adapted to fit loosely about the drain tube 12. An annular flange 64 is disposed about the upper portion of the drain tube. It can be seen that upon sufficient lifting of the lever 54 and pivoting of the cover float 42, the catch members 62 about the underside of annular flange 64. As lifting continues, the drain tube 12 and donut tank ball 14 are raised from the cistern drain 15, whereupon all the water held in the cistern 13 flows into the toilet bowl through the cistern drain. As was the case with the cover float, once the seal is broken between the valve seal 20 on the tank ball and valve seat 22 on the cistern drain 15, the pressure is reduced and the buoyant force of the air chamber 16 within the tank ball prevents the fall and drain from settling back down atop the drain.

A holding mechanism 68 can be included in the dual flush mechanism 10 to prevent the drain tube 12 and tank ball 14 from inadvertently rising off the cistern drain during the half flush operation. The holding mechanism consists of a float ball 70 carried by a bent rod 72 which is pivotally secured to the guide collar 30 at 74. A stop 76 is provided on the guide collar to abut the rod and limit the clockwise rotation of the mechanism, as shown in FIG. 3. A stud 78 is positioned on the exterior surface of the drain tube, near the upper end thereof. When the drain tube 12 and tank ball 14 are in place over the cistern drain 15, the float ball is buoyed upwardly causing the projecting end 80 of the bent rod 72 to press against the upper edge of stud 78, thereby tending to hold the drain tube 12 and tank ball in place. When the handle is rotated to the extent causing a full flush of the water in the cistern and the drain tube and ball are accordingly raised, the catch assembly 68 merely falls away from the tube and the stud due to the drop in water level, as shown in FIG. 3. It might also be noted that the holding mechanism 68 helps to prevent accidental activation of the full flush when only a half flush is required by pressing downwardly on stud 78 and thereby supplying additional pressure which must be overcome to effectuate the full flush of the toilet.

In use, if a half flush is desired, it is only necessary to slightly rotate and then release the toilet handle, which causes the lever 54 to raise, taking up any slack in the flush chain 52 and momentarily pivoting the cover float 42 upwardly from the drain tube 12. At this point the water above the tube begins to flow therethrough, filling the tube with rushing water and thereby releasing the pressure on the cover float. When the water level reaches the top of the drain tube 12, the cover float 42 will again come to rest atop the drain tube and the cistern is refilled through the conventional float valve [not shown] and the toilet bowl is refilled through flow tube 82. If, on the other hand, a full flush were desired, the handle is merely rotated until the arcuate catch members 62 about the underside of annular flange 64 on the drain tube whereupon any further rotation lifts the drain tube 12 and tank ball 14 from the cistern drain 15, and all of the water in the cistern flows down the

drain into the toilet bowl. It should be noted in conjunction with this first embodiment that the upper end of the drain tube 12 could be flared, as shown in FIG. 7, to enlarge the upper area thereof and thereby speed the flow of water through the drain tube into the toilet bowl. If the flared drain tube were utilized, the float cover and annular flange would be enlarged accordingly to provide the proper seal at the upper end of the drain tube.

A second embodiment of the invention is shown in FIGS. 4 and 5. In this embodiment a float plug 100 is positioned atop the cistern drain. The plug is hollow to provide an air chamber [not shown] therein creating sufficient buoyant force to prevent premature closing of the drain, as discussed with respect to the tank ball 14 and cover float 42 of the prior embodiment. The float plug is fastened to an elongated rod 102 which terminates in an eyelet 104 at the upper end thereof for fastening to the toilet chain 52. A guide means 106 is secured to the overflow tube 32 to maintain the float plug in proper alignment with the cistern drain. Positioned about the rod above the guide means is an activating float 108. The activating float has a central channel therethrough for passage of the elongated rod 102 and is affixed thereto by fastening members 110. The activating plug has an annular lower seal air chamber 112 to render the plug weightless in water and an annular upper channel 114. When the toilet handle [not shown] is turned, lifting the level 54, the plug is pulled from the cistern drain. This releases the pressure on the plug as the water begins to flow thereby and the buoyancy thereof causes the plug to float above the drain, as seen in FIG. 5. In addition, while the water is draining from the cistern 13, the activating plug is also in a buoyed state because of the lower sealed air chamber 112. However, when the water level reaches a point, illustrated at 116 in FIG. 4, the buoyant force of the activating plug is decreased because of the reduced water displacement. Additionally, water is retained in the open upper chamber 114. The combination of the decreased buoyant force and the weight of the water held within the open chamber forces the plug 100 down onto the drain, whereby the flow therethrough is cut off and a half flush is attained. If a full flush were desired the handle could be held open, preventing the lowering of the plug 100. It should be noted that this embodiment utilizes the water at the bottom of the cistern for the half flush, which is under a greater pressure than the water at higher elevations and therefore enters the toilet bowl with a greater force.

While the above embodiments of the invention are described with reference to standard type toilets, it should be noted that variations of some of the components of such toilets do occur. In some cases, the cistern drain may be angled as shown in FIG. 6. When an angled drain is employed, a tank ball 200 can be utilized which has a lower extending portion 202 to conform to the angle of the drain with no change in efficiency. Another variation in toilets of this type is the distance between the overflow tube 32 and the cistern drain 15. In some cases, this distance is quite small making the use of the donut type tank ball in first embodiment quite difficult. In such situations, a horseshoe configuration functions quite efficiently. Such a float could employ a horseshoe shaped air chamber, or alternatively, be partially or wholly constructed of a buoyant material such as styrofoam. Various other changes and modifications

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may be made in carrying out the present invention without departing from the scope and spirit thereof. Insofar as these changes and modifications are within the purview of the appended claims they are to be considered as part of the invention.

I claim:

1. A mechanism adapted to be installed in a tank type toilet which is operable at one stage to flush a portion the water held in the cistern down the cistern drain and into the toilet bowl, and at a second stage, to flush substantially all the water held in the cistern into the toilet bowl, which mechanism comprises a drain tube extending upwardly in the cistern and having an annular flange near the upper end thereof, a toroidal float disposed about the lower end of said drain tube, said float having an air chamber therein and defining an annular sealing member about the lower portion of the float, said sealing member being adapted to abut the cistern drain, whereby the water pressure against the float forms a seal between the float and cistern drain, a buoyant cover pivotally secured on the upper end of said drain tube thereby preventing water flow therethrough, a fastening member carried by said buoyant cover and adapted to be secured to a toilet lifting chain, a bifurcated lifting assembly adapted to be secured to said chain, said assembly having a pair of leg portions and carrying an arcuate catch member at the lower end of each leg portion, said arcuate catch members being adapted to fit about said drain tube and slide therealong so that upon raising the toilet chain to a first stage, the buoyant cover is pivoted upwardly on the drain tube and upon continued raising of the chain to a second stage, said catch members abut said annular flange on said drain tube and lift said drain tube and toroidal float from the cistern drain.

2. A mechanism adapted to be installed in a tank type

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toilet which is operable at one stage to flush a portion of the water held in the cistern down the cistern drain and into the toilet bowl, and at a second stage, to flush substantially all the water held in the cistern into the toilet bowl, which mechanism comprises a drain tube extending upwardly in the cistern and having an annular flange near the upper end thereof, a toroidal float disposed about said drain tube and having an air chamber therein, means for providing a seal between said drain tube and said cistern drain, a buoyant cover disposed on the upper end of said drain tube thereby preventing water flow therethrough, a fastening member carried by said buoyant cover and adapted to be secured to a toilet lifting chain, a bifurcated lifting assembly adapted to be secured to said chain, said assembly having a pair of leg portions and carrying an arcuate catch member at the lower end of each leg portion, said arcuate catch members being adapted to fit about said drain tube and slide therealong so that upon raising the toilet chain to a first stage, the buoyant cover is raised from said drain tube and upon continued raising of the chain to a second stage, said catch members abut said annular flange on said drain tube and lift said drain tube and toroidal float from the cistern drain.

3. The combination of claim 2 including guide means for maintaining said sealing means and drain tube in axial alignment with said cistern drain, a stop member carried by said drain tube, a float pivotally mounted on said guide means and a catch member carried by said float and being adapted to be disposed atop said stop member when the water level in the cistern is above said float whereby the pressure of said catch member on said stop member acts to hold said drain tube over said cistern drain.

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