United States Patent [19]

Overbey

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[54] **VARIABLE FLUSHING CONTROL UNIT ATTACHMENT FOR A TOILET**

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[21] Appl. No.: **442,081**

[52] **U.S. Cl.** ..... **4/67 A;** 4/57 P; 4/37; 4/55; 4/67 R

[51] **Int. Cl.**..... **E03d 1/34;** E03d 5/02; E03d 5/10

[58] **Field of Search** ..... 4/67 A, 67 R, 57 R, 57 P, 4/53, 55, 41, 52, 61, 62, 63

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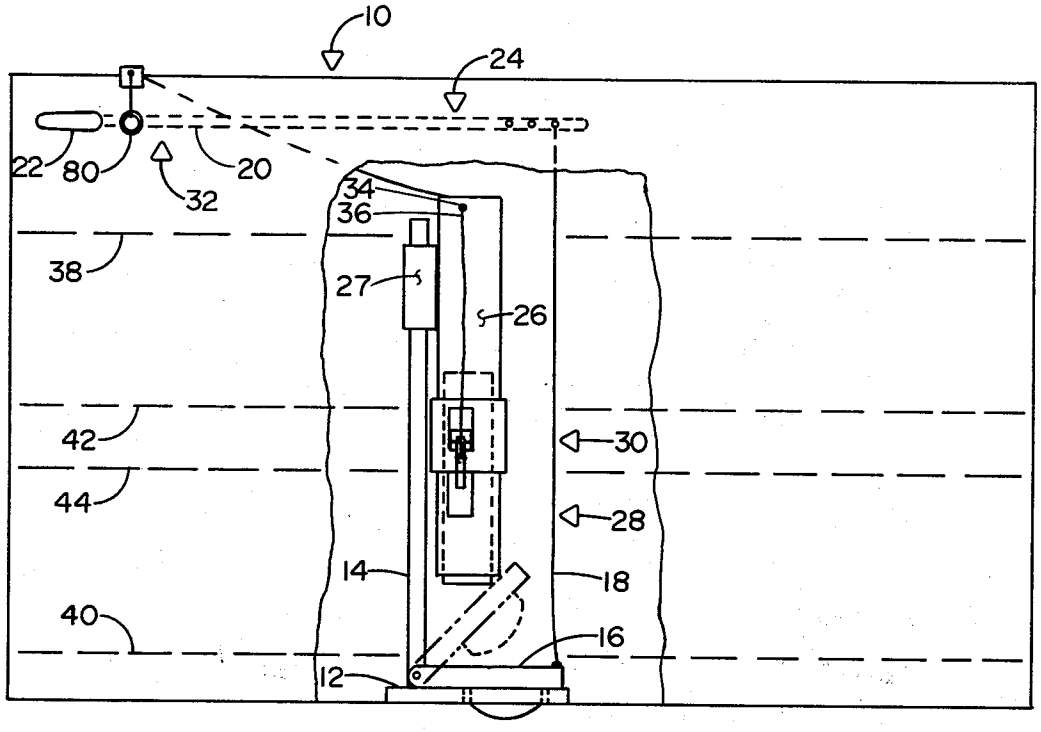
Primary Examiner—Henry K. Artis

[57] **ABSTRACT**

A low cost variable flushing control unit attachment for existing toilets which effects optimum flushing or clearing of the toilet bowl with a minimum amount of water. The attachment kit retains full discharge capability for the toilet tank, yet provides a means for the homeowner to pre-set for his particular toilet the best and most satisfactory quantity of water that will be discharged to the bowl for those flushes that do not require total discharge. After use of the toilet, the user selects the most cost-effective flush mode that will completely clear the bowl. Once triggered by the user, the attachment kit reliably controls closing of the tank outlet valve and automatically resets itself.

3 Claims, 12 Drawing Figures



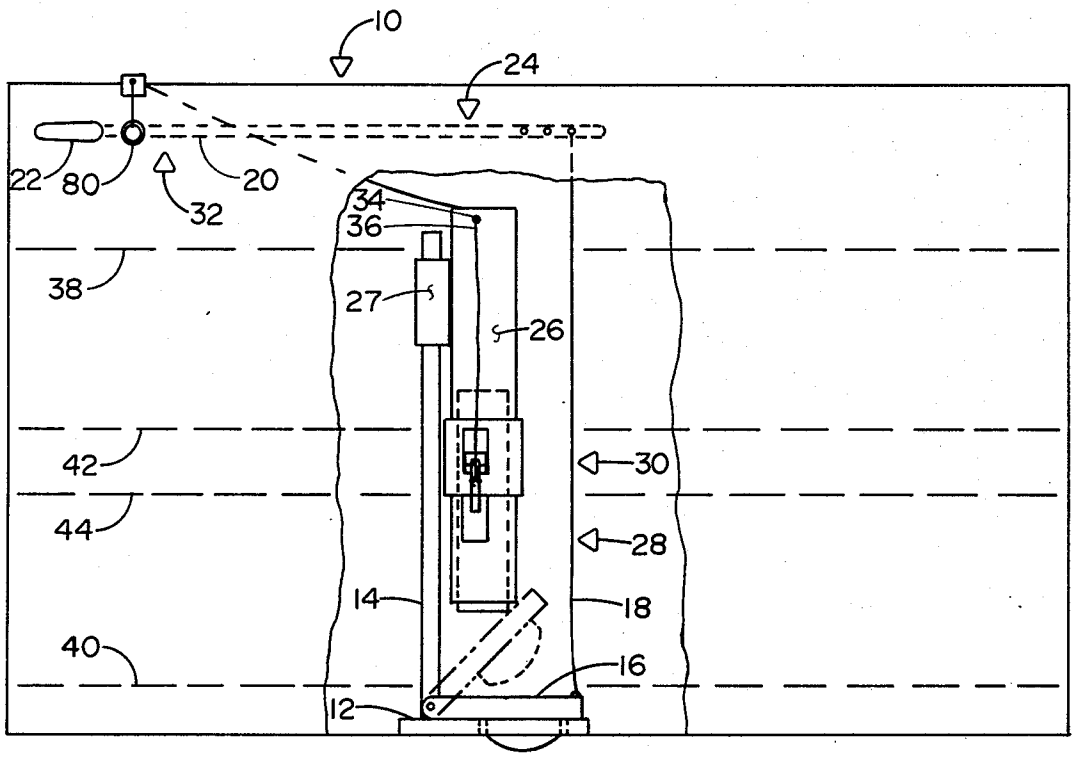


FIG. 1

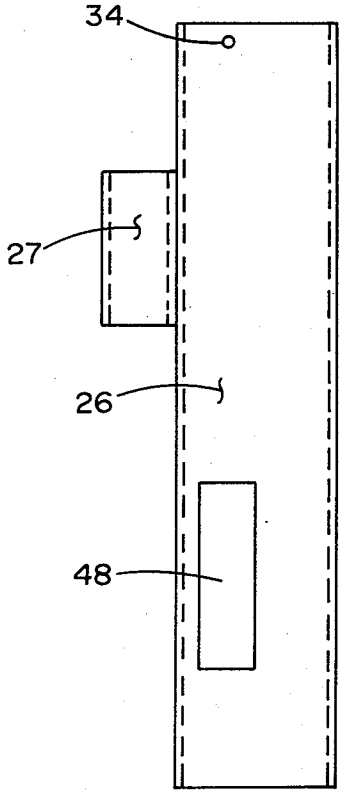


FIG. 3

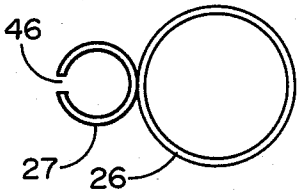


FIG. 2

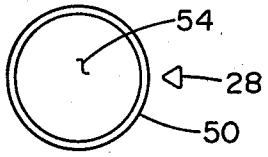


FIG. 4

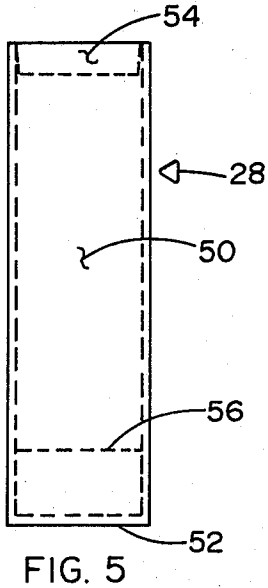


FIG. 5

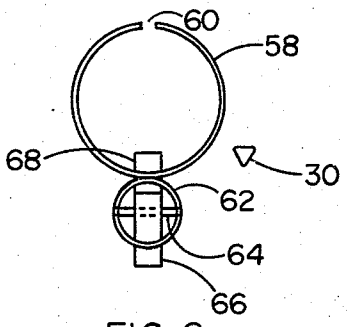


FIG. 6

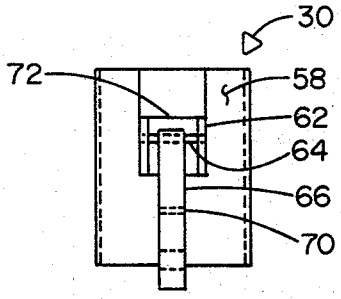


FIG. 7

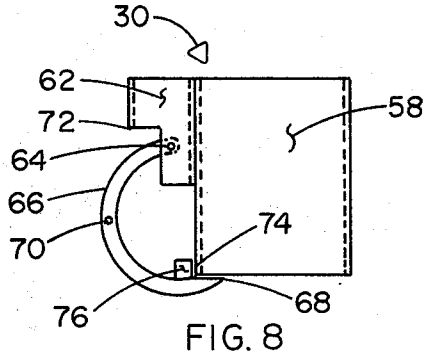


FIG. 8

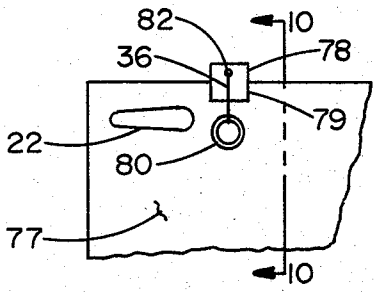


FIG. 9

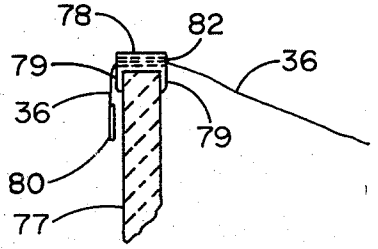


FIG. 10

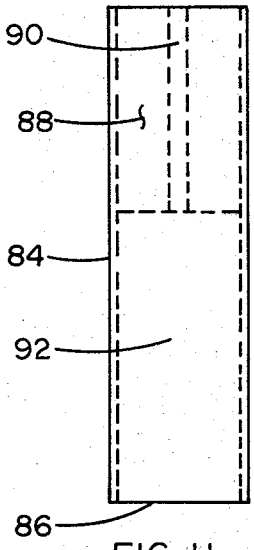


FIG. 11

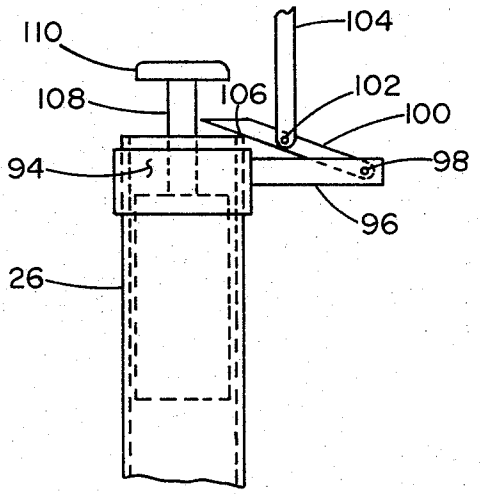


FIG. 12

VARIABLE FLUSHING CONTROL UNIT ATTACHMENT FOR A TOILET

The present invention relates to a variable control unit attachment for optimum clearing or flushing of toilet bowls.

More particularly, the invention permits an election to be made by the user of the toilet as to whether a complete emptying of the toilet tank is necessary to satisfactorily and completely clear the toilet bowl. The variable control unit attachment provides a means for the user of the toilet to select and effect a toilet bowl flushing mode that will completely clear the bowl in the most cost-effective manner.

Present toilets impose a requirement that the user discharge the entire toilet tank into the bowl, even though in most instances such total discharge is not required to accomplish the task of completely clearing the bowl. This causes an inordinate amount of water to be wasted nationwide each day and increases water procurement and treatment costs to municipalities, increases direct utility costs to homeowners and others, and requires larger and more costly sewage treatment and handling facilities. With the present invention, such losses are eliminated or are negligible.

For those instances where a full discharge of the toilet tank is not necessary for complete clearing of the bowl, the invention provides a means for a homeowner to pre-determine the quantity of water necessary to most efficiently clear the bowl of his particular toilet and to then set an adjustable feature of the variable control unit attachment to control discharge of that quantity. The variable control unit attachment will then reliably repeat the performance each succeeding time any toilet user calls on it to do so.

In operation, a person makes an election after using the toilet as to whether or not a full discharge of the toilet tank is necessary to completely clear the bowl. Assuming the need is for a partial tank, he simply operates the conventional flush handle and by use of a means which is a part of the attachment kit he triggers the variable control unit attachment. The attachment then automatically reproduces a flush similar to the type determined by the homeowner as being the most efficient and costeffective flush that will accomplish complete clearing of the bowl. The attachment incorporates a means for resetting itself without further attention on the part of the user so it is ready for the next use.

Other methods and customary apparatus for conserving water when a toilet is flushed are:

By adding one or more discharge valves within the tank, by adding discharge valves on standpipes or branches at different levels in the tank, by adjustment of the total quantity of water in the tank through the placement of one or more bricks in the tank, or by adjusting the level at which the float closes the ballcock that admits water to the tank.

These methods have the following distinct disadvantages: the addition of discharge valves in the tank, proper, or the addition of standpipes having discharge valves decreases the total overall reliability of the discharge system. As the number of valves increase, there is a corresponding increase in nuisance leakages. Some designs require specially manufactured tanks to accommodate added valves or their operating means. Placement of a brick or bricks in the tank conserves water in those instances where a full tank is not needed; however, this significantly reduces the efficiency of clearing the bowl when there is a need for a full tank discharge. Such ineffective clearing of the bowl also may occur if the water level in the tank is adjusted below the level recommended and marked in the tank by the toilet manufacturer. There are other variations of the above methods and apparatus, but they all offer substantially the same disadvantages. It is worthy to note that none of these present systems has proved to be so effective as to gain universal acceptance and broad use.

An object of the present invention is to overcome these disadvantages and provide a low cost variable control unit attachment that will clear the bowl, conserve water and save utility costs for homeowners and those having toilet facilities serving the public, such as service stations and restuarants.

Another object is to save potable water processing and procurement costs and sewage treatment costs for municipalities.

Another object is to provide a means for election by the user as to whether there will be a complete or partial emptying of the tank when the bowl is completely cleared.

Still another object is to provide a system with no additional valves, and which will reliably repeat its performance after being triggered by the user, and without a need for any further attention by the user.

A further object is to provide an attachment having a means to automatically reset itself.

A still further object is to reduce duration of the sounds attendant to refill of the toilet tank.

Another object is to provide a variable control unit attachment in kit form that may be easily installed in conventional toilets in wide use without making extensive changes.

Another object is to provide a means within the attachment whereby a homeowner may pre-adjust the depth to which his particular toilet tank will empty so that he may realize optimum savings for his particular toilet.

Another object is to provide a means for triggering operation of the attachment by sole use of the existing conventional toilet flush handle and/or by a separate triggering means.

In addition to the foregoing, the invention is simple and reliable. It is long lasting, requires no extensive plumbing changes, is low in initial cost, is easy to use and requires no attention on the part of the user.

These and other advantages will become more apparent from the following specification and the accompanying illustrative but not restrictive drawings.

FIG. **1** is a cutaway front elevational view showing the variable control unit attachment installed in a conventional toilet tank.

FIG. **2** is a plan view of the energy cell race and its support structure.

FIG. **3** is an elevational view of the energy cell race and its support structure.

FIG. **4** is a plan view of the energy cell.

FIG. **5** is an elevational view of the energy cell.

FIG. **6** is a plan view of the adjustable retaining device shown in FIGS. **7** and **8.**

FIG. **7** is a front elevational view of the adjustable retaining device shown in FIGS. **6** and **8.**

FIG. **8** is a side elevational view of the adjustable retaining device shown in FIGS. **6** and **7.**

FIG. 9 is a front partial elevational view showing a portion of the energy cell release mechanism.

FIG. 10 is a partial elevational cross-sectional view taken along the line 10—10 in FIG. 9.

FIG. 11 is an elevational view showing an alternate type of energy cell.

FIG. 12 is an elevational view showing an alternate top-mounted adjustable retaining device.

With reference to FIG. 1, a conventional toilet tank assembly designated generally by reference numeral 10 is illustrated with the present invention incorporated as a part of the overall system. The tank lid, the conventional ballcock and float, and the pull chain to flapper/ball 16 when it is in the open or "up" position are omitted for clarity. The reference numeral 12 designates a conventional outlet valve seat assembly at the bottom of the tank. The reference numeral 14 designates a conventional tank water overflow standpipe which is conventionally supported by and attached to the outlet valve seat assembly 12. The reference numeral 16 designates one type of conventional valve flapper/ball which is shown in its closed or seated position and in its open position. The conventional valve opening mechanism includes a pull chain 18, a lever 20 and a handle 22. The variable control unit attachment is designated generally by reference numeral 24 and is shown mounted on standpipe 14.

Referring again to FIG. 1, the variable control unit attachment 24 includes the following: A means for guiding an energy cell is provided by the energy cell race designated by reference numeral 26. Although a cylinder is shown herein any suitable means for guidance may be used. A means for application of kinetic and static forces to close the tank outlet valve is provided by a buoyant energy cell designated generally by reference numeral 28. A means for retaining the energy cell so it may not travel unless released to do so is provided by an adjustable retaining device designated generally by reference numeral 30. This retaining device 30 functions primarily as a stop for limiting downward travel of the buoyant energy cell 28. A means for automatic reset is also provided by adjustable retaining device 30, described in more detail hereinafter. A means for triggering operation of the variable control unit attachment 24 is provided by a triggering mechanism designated generally by reference numeral 32.

A hole 34 near the top of energy cell race 26 has a lanyard 36, which is a part of the triggering mechanism 32, passing through it. The horizontal broken lines designated by reference numerals 38, 40, 42 and 44 are imaginary lines indicating tank water levels. Tank water level with a full tank is designated by reference numeral 38. Tank water level with an "empty" tank is designated by reference numeral 40. Approximate tank water level when the energy cell 28 is just starting to close flapper/ball 16 is designated by reference numeral 42. Approximate tank water level after the energy cell 28 has imposed controlling forces on flapper/ball 16 so that it has closed is designated by reference numeral 44.

Referring to FIGS. 2 and 3, the energy cell race 26 has a support structure 27 to facilitate its mounting in the toilet tank on standpipe 14 as illustrated in FIG. 1. The support structure 27 may be of plastic or metal with a split 46 running its length as shown in FIG. 2. Split 46 enables support structure 27 to be conveniently slipped over the existing standpipe 14, and be adjustable both vertically and rotationally. Although this method of mounting is described, it can also be accomplished by many other simple mechanical means. The energy cell race 26 has an aperture 48 in its side to permit proper operation of the adjustable retaining device 30, shown generally in FIG. 1, in a manner to be more fully described hereinafter. Energy cell race 26 has a small hole 34 near its top to serve as a guide for a lanyard. FIG. 1 illustrates a lanyard 36 passing through this hole 34.

As shown in FIGS. 4 and 5, the energy cell 28 is a tubular shaped container 50 with the bottom end 52 closed. The top end is adapted to receive a removable closure 54. An imaginary line representing the top surface of water placed inside of tube 50 is designated by reference numeral 56. By varying the quantity of water inside of tube 50, the homeowner may vary the forces induced by the energy cell and accordingly, vary the closing of the toilet tank outlet valve. Although use of water is described, small weights may be used in the energy cell to produce the desired variation of water level at which the tank outlet valve closes.

FIGS. 6, 7 and 8 illustrate an adjustable retaining device 30 wherein the sleeve 58 has a split 60 to permit longitudinal and rotational adjustment of the adjustable retaining device 30 on energy cell race 26. In further reference to FIGS. 6, 7 and 8, attached to sleeve 58 is a combination stop and pivot support structure 62. Hinge pin 64 serves as a pivot point for a releasable latch or stop 66 which is of such dimension as to permit its end 68 to penetrate through the aperture 48 of energy cell race 26 illustrated in FIG. 3. It may be clearly seen in FIGS. 6 and 8 that this penetration of end 68 is adequate to restrain downward travel of energy cell 28 provided its bottom end 52 is above end 68 of releasable latch 66. In operation, the top end of energy cell 28 never gets below end 68 of releasable latch 66. During descent and ascent of energy cell 28 in energy cell race 26, the end 68 or releasable latch 66 rides on the outer surface of energy cell 28. As shown in FIGS. 7 and 8 releasable latch 66 incorporates a hole 70 to facilitate attachment of an actuating means, such as a lanyard or mechanical linkage. Referring to FIGS. 7 and 8 the reference numeral 72 designates a stop which limits travel of releasable latch 66 when it is operated. Referring to FIG. 8 another stop is the general area 74 of sleeve 58, wherein post 76 of releasable latch 66 abuts against it.

FIGS. 9 and 10 show one form of a means for triggering operation of the attachment. In FIGS. 9 and 10 a conventional toilet tank front wall 77 has mounted on it a small clip 78 near existing handle 22. The handle 22 is omitted from FIG. 10 for clarity. Also, the tank lid is omitted from both FIGS. 9 and 10 for clarity. Clip 78 shims up the tank lid slightly near one corner, but this is not noticeable to the eye. Clip 78 has legs 79 which are sprung inward at manufacture. When installing clip 78 the legs 79 are deformed outwardly so clip 78 is held in place on tank wall 77 by friction and pressure from legs 79. Lightweight trigger ring 80 is connected to lanyard 36 which runs through hole 82 in clip 78. As shown generally in FIG. 1, the other end of lanyard 36 connects with the adjustable retaining device 30. Specifically, the other end of lanyard 36 is connected at hole 70 of releasable latch 66 shown in detail in FIGS. 7 and 8. Although a combination of a trigger ring and lanyard system are shown herein as a means

of operating the releasable latch, there are many release means available which are suitable and which offer convenience, such as use of a small lever, a sliding button, or a push button connected mechanically to the releasable latch. Further, if desired, the existing handle **22** and existing lever **20** shown in FIG. **1** may be used as a triggering means by providing mechanical communication between existing lever **20** and the releasable latch **66** and adding a small spring in existing pull chain **18** so that existing lever **20** is enabled to travel further after the flapper/ball **16** makes contact with energy cell race **26.**

FIG. **11** illustrates one alternate type of energy cell. This energy cell comprises a shaped tube **84** open at bottom end **86.** Near its top it contains a buoyant material **88,** such as foamed plastic, with one or more vent holes **90** such that air will not be trapped in cavity **92.** To vary the kinetic and static forces that will be exerted by this type of energy cell the homeowner varies the quantity of buoyant material **88,** which is furnished with the kit in a close fitting wafer form. Although energy cells in cylindrical form are shown, any shape may be used.

FIG. **12** illustrates an alternate type of adjustable retaining device configured for mounting near the top of energy cell race **26** and comprising a longitudinally and rotationally adjustable split sleeve **94,** a support arm **96,** a pivot **98,** a releasable latch **100,** another pivot **102** and an actuating means **104.** In the retaining mode releasable latch **100** rests on the top edge of energy cell race **26** at point **106** and restrains downward travel of the energy cell which has its top modified by addition of a necked down portion **108** and a flanged top portion **110.** In the operating mode actuating means **104** rotates releasable latch **100** about pivot **98** thus removing a constraint to the passage of flange **110.** After downward passage of flange **110,** releasable latch **100** is returned by gravitational forces so as to rest on point **106.** Then, as the toilet tank refills, and the energy cell travels upward, its flange **110** lifts releasable latch **100** until flange **110** passes, after which releasable latch **100** again returns to rest at point **106** where it once again will restrain passage of flange **110.**

In operation it is apparent that when the user elects to clear the toilet bowl by discharge of the tank to the preset approximate water level **44** he simply operates handle **22** and then trigger ring **80.** This causes lever **20** to lift chain **18** thereby lifting flapper/ball **16** and then lanyard **36** to operate adjustable retaining device **30,** thus permitting energy cell **28** to descend and apply kinetic and static forces to flapper/ball **16** so that it closes when water in the tank is at approximate level **44.** The attachment automatically resets itself as the tank refills. On the other hand, if it is desired to substantially empty the tank to approximate water level **40** it is only necessary that handle **22** be operated to lift lever **22** and chain **18** thereby moving flapper/ball **16** to the open position. Energy cell **28** will be retained by adjustable retaining device **30** and the tank will accordingly discharge to approximate water level **40.**

Although use of the invention in conjunction with a conventional toilet system has been described, it is apparent that it may be used with other liquid systems. It is also apparent that a plurality of energy cells and their guidance means may be so dimensioned that they may be spaced adjacent to a single valve. When each energy cell is individually preset to exert a different level of force on the valve, and separate triggering means are provided, the user can then selectively command that the valve be automatically closed at any of the multiple predetermined levels.

Although preferred embodiments of the invention have been described in detail, it is contemplated that modifications of the apparatus and method may be made and some features may be employed without others, all within the spirit and scope of the invention.

I claim:

1. A water-saving attachment unit for a toilet having a water tank, an outlet valve to discharge water from said tank and a mechanism for operating said outlet valve to substantially empty the water from said tank, comprising:

A. a tubular element adapted to be located in said tank adjacent said outlet valve;

B. a buoyant energy cell slidably mounted in said tubular element and adapted to close said outlet valve;

C. a retaining device mounted adjacent said tubular element to normally prevent said buoyant energy cell from sliding within said tubular element when said mechanism is operated to substantially empty the water from said tank; and

D. a control mechanism connected to said retaining device for selectively releasing said retaining device to permit said buoyant energy cell to slide within said tubular element and thereby prematurely close said outlet valve to effectuate only a partial emptying of the water from said tank.

2. A water-saving attachment unit as defined in claim **1** wherein said retaining device includes:

A. an opening in said tubular element;

B. a stop having one end pivotally mounted on said tubular element and the other end adapted to extend through said opening to normally retain said buoyant energy cell in a nonengaged position with said outlet valve; and

C. said stop being arranged to automatically pivot to its retaining position after said buoyant energy cell has floated past said other end of said stop.

3. A water-saving attachment unit as defined in claim **1** wherein said control mechanism includes:

A. a lanyard having one end thereof attached to said retaining device and the other end thereof extending to a point external of said tank and adjacent said mechanism; and

B. a ring attached to said other end of said lanyard.

* * * * *