

[54] **WATER SAVER TOILET BOWL FLUSH SYSTEM**

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[58] **Field of Search** 4/67 A, 67 R, 57 P,
4/57 R, 58, 60, 61, 34, 37

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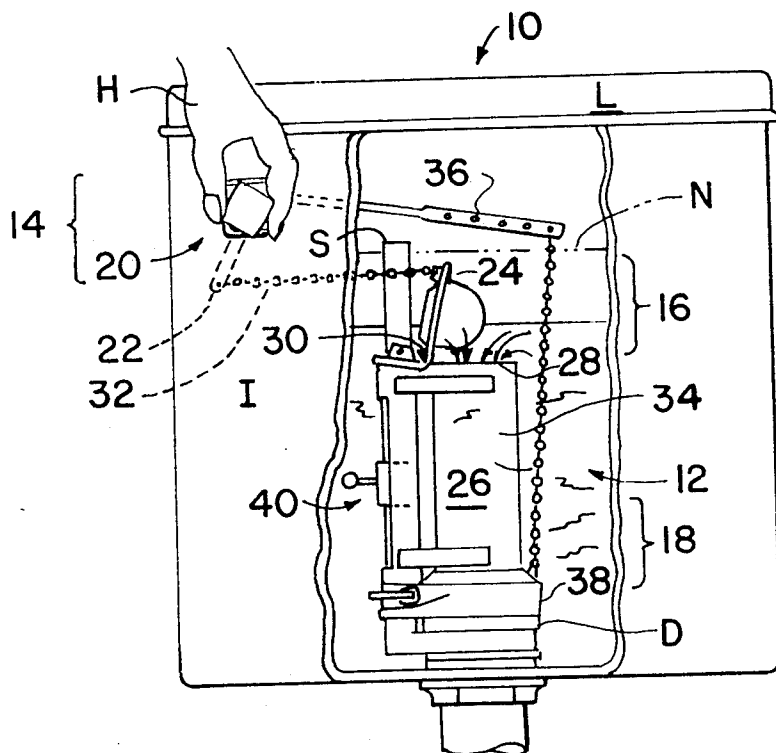
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[57] **ABSTRACT**

A two-level selective volume valve assembly for providing optional light and heavy flushes in toilets having storage tanks; twisting the control actuates a quick-opening flapper type upper valve which releases water from a higher level only; pushing the control actuates a lower straight-lift valve closure which carries with it the upper valve and a tube spacing the two, releasing the full capacity of the tank; single clamp installation and adjustment of the valve assembly, single-screw installation of the double acting control, and use of commonly available toilet valve parts and control parts modified to the special design of the invention are other features of the invention.

11 Claims, 7 Drawing Figures



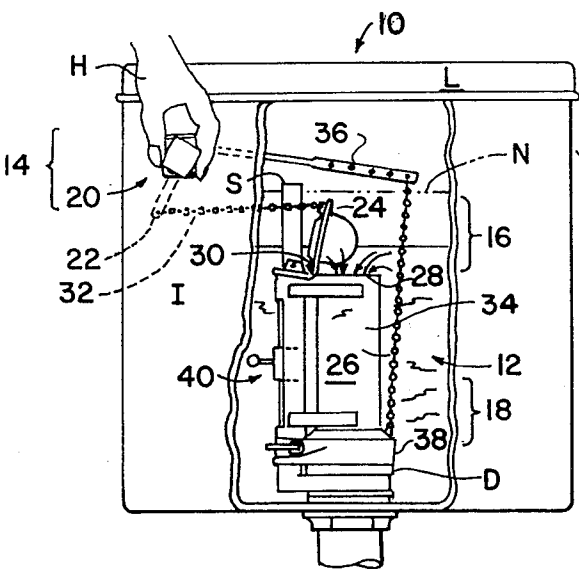


FIG. 1

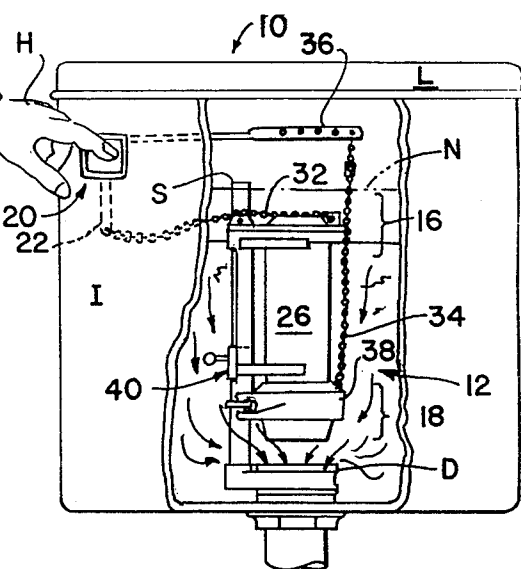


FIG. 2

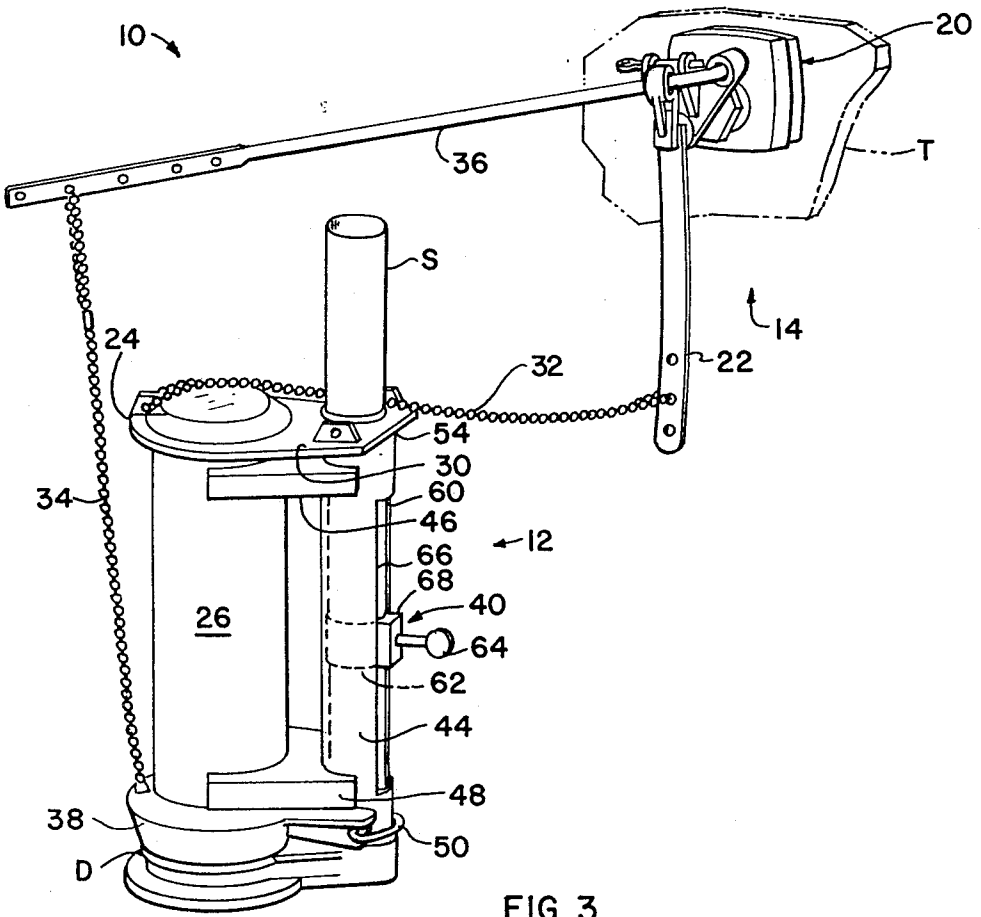


FIG. 3

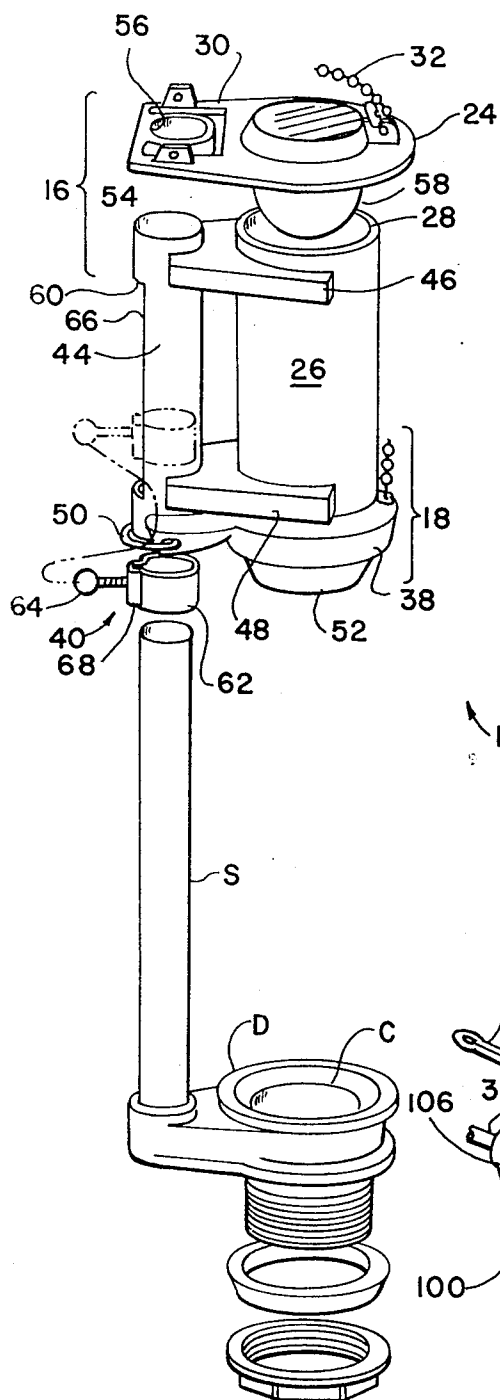


FIG. 4

FIG. 5

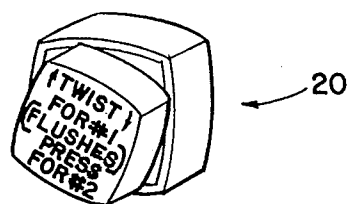
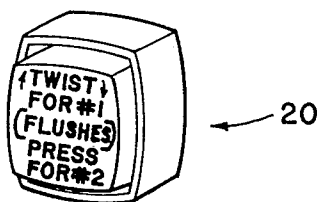


FIG. 6



12

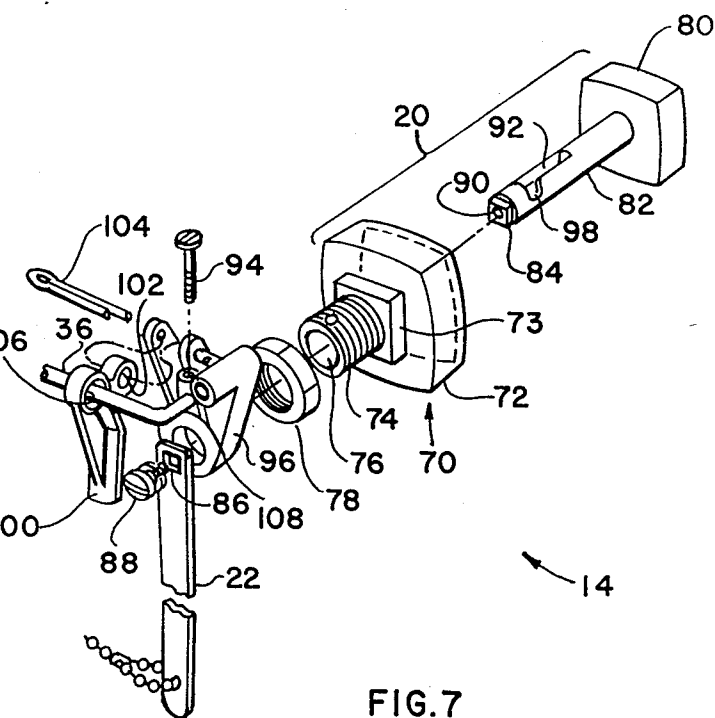


FIG. 7

WATER SAVER TOILET BOWL FLUSH SYSTEM

This invention relates generally to fluid handling systems and specifically to sanitary plumbing devices of the flush-toilet type.

Although the flush toilet has been in use for many years, and although the need for saving water becomes recognized as increasingly important with each year, a selective flush water saving toilet has not found widespread acceptance.

The ordinary flush toilet was designed without any consideration of flush selection for economy in the use of water or for alleviation of sewage problems. With the ordinary tank which holds about four gallons and is flushed about six times per person per day, water consumption is about 24 gallons per person per day. With the present invention, assuming one complete flush and five one-third tank flushes per person per day, savings can be expected to amount to about twelve gallons per person per day. As the average domestic use per person is about sixty gallons per day, domestic use savings with the present invention can be expected to be about 20 percent. It is calculated that the invention will pay for itself in less than a year of operation.

In the prior art the concept of plural level flush tanks and selective controls for same has been disclosed in patents, including U.S. Pat. Nos. 3,186,007, 3,151,337 and 3,080,567 as examples.

In spite of these and other attempts at providing for the needs of water conservation, the complexities of installation and operation and high costs have apparently prevented old-art designs from the universal adoption which must eventually take place if water supplies of the nation are to be properly conserved.

Both in the country, where individual water-supply and septic systems are the rule, and in towns and cities, where centralized systems are available, overdemand on water supply and overproduction of fluid wastes can be attributed in substantial part to water waste in sanitary systems.

Principal objects, therefore, of the present invention are to provide a simple, direct, low-cost device for drastically reducing unnecessary consumption of water in toilet flushing.

Another object of the invention is to provide a plural-level adapter for tank-type water closets which allows the user to select between predetermined quantities of flush water according to need, thereby preventing excessive expenditure of flush water where not needed.

A further object of the invention is to provide a unique selector for tank control which simplifies a choice of predetermined quantities of water to be used and which prevent mistakes which would otherwise waste water.

And further objects of the invention are to provide a toilet-flush system and control as described which is adaptable and simple enough for the average homeowner to install in his own flush tank, regardless of age, make, model or capacity, and which produces minimum reduction in overall tank capacity.

Still further objects are to provide a system as described which will become a standard article of commerce for the purposes set forth because of adjustability, simplicity, reliability, durability, speed and thoroughness of operation.

And final objects of the invention are to provide a device as described which makes maximum use of conventional, readily available components, thereby af-

fording economy and efficiency of manufacture, and which is compact and self-contained, so that it does not require room taken by other components in the tank and can be installed without any interference before, during, or after completion of installation.

The above and other advantages and objects of this invention will become more readily apparent on examination of the following description, including the drawings, in which:

FIG. 1 is a front elevation, partly in section, illustrating a mode of operation of the invention;

FIG. 2 is a front elevation, partly in section, illustrating another mode of operation of the invention;

FIG. 3 is a rear elevation detailing mechanisms shown in FIGS. 1 and 2;

FIG. 4 is an exploded assembly-detail of a portion of the invention in front elevation;

FIG. 5 is a front elevation detail of one mode of the selector mechanism of the invention;

FIG. 6 is a front elevation of another mode of the selector mechanism of the invention; and

FIG. 7 is an exploded assembly-detail of a portion of the invention.

In the drawings, like parts are indicated by like numerals.

Turning to the drawings in detail, FIGS. 1 and 2 show a typical toilet flush tank or water closet storage tank T. The tank has a standard drain pipe D and overflow standpipe S integrally interconnected with and supported by the drainpipe. The drainpipe connects in the usual manner with a toilet bowl, not shown, and the tank T has a lid L at the top. The normal water level in the tank is maintained at N approximately by an ordinary float-controlled supply, not shown.

The invention 10 includes a valve assembly 12 and a selective control assembly 14. The valve assembly includes upper valve 16 subassembly lower valve subassembly 18.

FIGS. 1 and 2 respectively indicate two modes of use or operation of the invention.

FIG. 1 shows a light flush, or "No. 1 flush."

When the user (indicated by hand H) desires a light flush as when only liquid waste is to be displaced from the commode, the user simply twists the selector 20 clockwise. Twisting the selector clockwise swings bell crank 22 clockwise lifting upper valve closure 24 free of valve spacer tube 26 allowing the volume of water stored above the top 28 of the valve spacer tube to fall through the tube into drainpipe D. Since the upper valve closure 24 pivots on a flexible-arm connection 30 which extends almost parallel with the horizontal direction of upper valve actuator chain 32 the lift is more tangential than direct. Because of the tangential linkage a relatively small movement of the chain produces a relatively large, sudden opening of the upper valve closure, frees the water trapped above valve spacer tube 26, and lets it fall freely downward for high speed redirected passage through the toilet bowl below (not shown) efficiently clearing waste fluid from the bowl.

FIG. 2 shows a heavy flush, or "No. 2 flush."

When the user (indicated by hand H) desires a heavy flush, as when solid matter is to be swept from the commode by a sustained downpouring of water, the user presses the selector 20 inward. Pressing the selector inward lifts chain 34 and bell crank 36 upward. Lifting bellcrank 36 slides the entire valve assembly 12, including lower valve closure 38, straight upward on stand-

pipe S and well clear of drainpipe D, allowing all the stored water above the level of the drainpipe to swirl down through the drain with minimum resistance. The prolonged free-swirling action produced efficiently scours the bowl in the normal manner expected from the best designed conventional flush arrangements. Flushing aperture and thus violence of the flushing action are adjustable by screwclamp 40, which sets the height to which the valve mechanism 12 can be raised, in the normal manner, allowing tank depletion to the predetermined level.

FIG. 3 is a rear view of the mechanism described in reference to FIGS. 1 and 2. The wall of tank T, the drainpipe D, and the standpipe S completely and simply support the mechanisms of the invention 10.

Valve assembly 12 is unitary and slides on standpipe S. Selector 20 fits the standard flush-handle opening in all tanks, and is retained by a nut which engages a portion of the body of the selector. Chains 32 and 34 adjustably connect the selector with the upper and lower valve closures 24 and 38.

FIG. 4, an exploded view, shows the various parts of valve assembly 12, and the simple assembly relations.

The main body of the valve assembly consists of integrally molded, or cemented together, or otherwise affixed valve spacer tube 26, slider tube 44, and connective arms 46, 48 which join them. The parts are preferably of rigid plastic such as polystyrene, and solid, except for the arms, which are preferably hollow to provide slight positive buoyancy to the entire valve assembly 12, permitting float-operation when raised. Valve spacer tube 26 is preferably of about the same diameter as a standard drainpipe D, and force fits into annular rubber lower-valve closure 38 which also may have attachment 50 to slider tube 44 for additional security. Lower valve closure 38 terminates in a conical flexible flange 52 which fits the standard conical recess C in drainpipes such as drainpipe D.

The lower valve closure is easily made from a heavy-duty type flapper-valve, which is available at most plumbing supply stores, by cutting the circular hole necessary for receiving the larger tube.

Upper valve closure 24 is also rubber and has an extension 54 with a hole 56 which force-fits to slider tube 44. The opposite end of the upper valve closure has a conical protrusion 58 which fits the upper end of the larger tube 26. The intermediate portion of the upper valve closure serves as a flexible hinge. The whole forms a flapper-type device of the type which is also commonly available at plumbing supply stores.

The upper valve closure has a molded or other connection for engagement with the horizontally arranged chain 32. The lower valve closure 38 has a similar connection with the vertically arranged chain 34.

Slider tube 44 has an elongated vertical slot 60 in the side away from the valve spacer tube. Slot 60 receives screwclamp 40, which comprises a circular band 62 for fitting to the smaller tube with a screw 64 for clamping it in position.

The sides 66 of the slot are parallel, and are spaced to receive and guide on a parallel-sided protrusion 68 on the screwclamp, on which they guide as the valve assembly 12 rises and falls.

The screwclamp 40 thus is easily adjusted so that one setting establishes the upper limit to which the valve assembly 12 rises and the side-to-side centering of the

lower valve closure 38 over the conical recess C in the drainpipe D.

Adjustment of the upper valve seat is equally easy, being made by manual sliding and rotation of the perforated extension 54 on slider tube 44 on which it rides.

As indicated by the phantom lines, the screwclamp is readily assembled inside the smaller tube by threading it screw-first up through the bottom or down through the top of the smaller tube.

To install the device a homeowner has simply to remove any existing valve equipment attached to the standpipe and drainpipe, remove the existing handle, attach the new valve assembly 12 to the standpipe using the one screwclamp 40, and attach the selector assembly 20 in the tank wall in place of the handle. After connection of the two chains, the job is complete.

FIGS. 5 and 6 detail the two positions of operation which produce the two flushes described, No. 1 for a light flush and No. 2 for a heavy flush, depending on whether the button is twisted or pushed.

Twisting and pushing are completely different actions, and even a small child can learn the difference, so that when told to do one or the other in flushing the toilet he can easily obey. Likewise, adult users can easily form the habit of selecting the correct flush.

A cardinal feature of the invention is that twisting results in an action of the mechanism which in no way interferes with the pushing action, and vice versa, and the two actions are exclusive, with no possibility of mixing.

FIG. 7 shows in exploded relation the mechanism which allows the unique selection and operation.

Frame 70 of the selector 20 consists of a hollow square 72 having a central threaded protrusion 74 with a hole 76 passing through. Square shoulder 73 prevents rotation of the frame by fitting the square hole which is standard in toilet tanks. Nut 78 secures the frame to any standard tank, with the hollow square outside.

Actuator-button 80, which is square, fits within hollow square 72 when pushed, and otherwise is held just free of it, in position to be twisted, by slotted shank 82. Slotted shank 82 extends integrally from the square actuator-button 80 through hole 76 in frame 70 of the selector. The end 84 of the slotted shank is square, and has a tapped hole.

The square end 84 fits with square hole 86 in the horizontal chain actuating bell crank 22, and is retained by round head screw 88 in tapped hole 90 in the end of square end 84.

When the square actuator-button 80 is twisted clockwise, it thus rotates bell crank 22, pulling horizontal chain 32 and opening upper valve closure 24 as shown in FIG. 1.

The square actuator-button 80 cannot be turned counterclockwise because slot 92 engages the protrusive end of key-screw 94, which fixes yoke 96 to the end of central threaded protrusion 74 and then passes through hole 76 engaging the slot, and because the slot has a circumferential enlargement 98 enabling actuator button rotation in only the one direction.

When turned, the square actuator-button will not fit into frame 70 since it is almost size-to-size with hollow square 72, but when not turned, it can be freely pushed into hollow square 72.

Pushing the square actuator-button 80 axially advances the head of screw 88 against pivotal link 100. Pivotal link 100 is pivoted at hole 102 to the perforated arms of yoke 96 by cotter-key 104 or other suitable

means, and has an oversize hole 106 which loosely receives vertical chain bell crank 36. Vertical chain bell crank 36 has a right-angle bend portion which pivots it in hole 108 in yoke 96.

When the head of screw 88 is axially advanced against pivotal link 100 by a push on square actuator button 80, vertical chain bell-crank is rotated upward by pivotal link 100, raising valve assembly 12 by the vertical chain 34.

The weight of the mechanism returns the square button to the beginning position when the chosen flush is completed.

It will be noted that the twist and push actions of the invention are not only separated but that they also cannot interfere and that they cannot be operated in an incorrect direction.

As in the case of the valve assembly, all the critical parts of the selector can be common, commercially available flush toilet parts, modified to the special design of this invention.

Those parts which are not commonly found in flush toilets, such as the uniform diameter, uniform wall, free-flowing valve spacer tube 26, are economically obtainable from stock.

The unit consisting of the slider tube 44, valve spacer tube 26 and the connective arms 46, 48 is preferably to be molded in one piece of plastic.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed and desired to be secured by U.S. Letters Patent is:

1. In a toilet bowl flush assembly having a tank with one wall perforated for a flush lever and a removable cover, and inside the tank a drain having a circular aperture and a vertical standpipe connected to the side of the drain, the improvement comprising: means for slidably engaging the standpipe; means, integral with the slidably engaging means, for sealing the circular opening of the drain, thereby defining a first flush level; said means for sealing at the circular aperture of the drain being vertically elongate and having a vertical passage therethrough into the drainpipe; means, integral with the slidably engaging means, for sealing the upper end of said vertical passage, thereby defining a second flush level and means for selectively opening the means for sealing the circular aperture and the means for sealing the upper end of the vertical passage.

2. In a toilet bowl flush assembly as recited in claim 1, the vertically elongate means for sealing at the circular aperture of the drain comprising a substantially uniform tube and an annulus of resilient material integral with the lower end thereof for thereby sealing the circular aperture of the drain on contact therewith.

3. In a toilet flush bowl as recited in claim 2, the means for sealing the upper end of said vertical passage comprising a tapered closure of resilient material adapted for removable engagement with the upper end of said tube.

4. In a toilet flush as recited in claim 3, the means for slidably engaging the standpipe comprising a tubular member having a vertical slot with parallel sides and a limit at the bottom, and means uniting the tubular member with said tube.

5. In a toilet flush as recited in claim 4, a clamp adapted to slide over said standpipe with the slotted tubular member, the clamp having an extended portion adapted to guide the parallel sides of said vertical slot and to strike said limit at the bottom of the vertical slot at one extreme of motion, and means for adjustably and simultaneously fixing the clamp in rotative and vertical position on the standpipe, whereby fixing the clamp on the standpipe in adjustment both laterally centers said annulus of resilient material over the drain, and limits the degree of opening therebetween on actuation of said means for selectively opening.

6. In a toilet flush as recited in claim 1, the means for selectively opening the means for sealing at the circular aperture of the drain including a vertically deployed tensile member adapted for raising said means for slidably engaging the standpipe, the means for sealing the upper end of the vertical passage having a pivotal extension, and the means for selectively opening the means for sealing the upper end of the vertical passage including a horizontally deployed tensile member tangentially arranged with respect thereto for actuating said pivot.

7. In a toilet flush as recited in claim 6, the means for selectively opening including a control passing through said tank wall perforation and being rotatable therein, a first arm rotatable by rotation of said control, and a connection between said first arm and horizontally deployed tensile member for thereby pivotally opening the means for sealing the upper end of the vertical passage, permitting flushing to said first level on rotation of said rotatable control.

8. In a toilet flush as recited in claim 7, said control being axially movable on axial push of a portion thereof exterior the tank, a second arm adapted for vertical movement by axial movement of the control, and a connection between said second arm and vertically deployed tensile member for thereby raising said means for slidably engaging the standpipe, thereby opening the means for sealing the circular aperture at the drain and permitting flushing to said second level on a said push of the control.

9. In a toilet flush as recited in claim 8, said means for selectively opening including a frame portion engaging the tank wall and adapted for slidable engagement with the control when the control is axially pushed, thereby providing said selective opening by preventing simultaneous push and rotation of the control.

10. In a toilet flush as recited in claim 7, the adaption for vertical movement of the second arm including a frame member passing through the tank wall and slidably receiving the control, a link having a hole there-through, the link being pivoted to the frame member and extending into the path of axial travel of the control, and a yoke, said second arm being pivotally attached to the yoke and passing through the hole in the link, whereby axial travel of the control when pushed pivots the link, rotating said second arm upward, and whereby the weight of said link and arm acts to reposition said control axially when the control is not being pushed.

11. In a toilet flush as recited in claim 3, the means for slidably engaging the standpipe being buoyant.

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