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DISPENSER FOR TOILET-TANK COMBINATION

Filed Nov. 5, 1957

Fig. 1

Fig. 4

Fig. 2

Fig. 5

Fig. 3

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The present invention relates to dispensers for the type of toilets in which a separate tank is connected to provide a quantity of flush water that is automatically collected after each flushing and is held ready for the next. This application is in part a continuation of prior application Serial No. 450,290 filed August 17, 1954, since abandoned.

Many different types of dispensers have been suggested heretofore for the purpose of adding disinfectants or the like to flush water, but they have not been too successful. Instances of such prior suggestions will be found in U.S. Patents 2,243,454 and 2,647,266.

Among the objects of the present invention is the provision of an automatic dispenser that is simple to manufacture, not likely to misoperate and enables dispensing with a maximum of efficiency.

The above as well as additional objects of the present invention will be more clearly understood from the following description of several of its exemplifications, reference being made to the accompanying drawings wherein:

FIG. 1 is a broken-away pictorial view of a portion of the above type of toilet tank, with the dispenser of this invention fitted in position;

FIG. 2 is a vertical sectional view of the dispenser itself with the mounting structure not shown, and with the section line broken to better illustrate the construction;

FIG. 3 is a plan view of the dispenser of FIGS. 1 and 2, with the mounting structure in place;

FIGS. 4 and 5 are plan views of the mating surfaces of the dispenser portions when the dispenser is disassembled along the line 4-4 of FIG. 2.

FIG. 6 is a broken-away vertical sectional view of a modified form of dispenser; and

FIG. 7 is a sectional view of the construction of FIG. 6 taken along the line 7-7.

According to the present invention an efficient dispenser of the above type has an open-top container, mounting elements for holding the container in a flush tank above the liquid fill line, a valve assembly secured to the bottom wall of the container, a pair of passageways, each leading from the lower portion of the container through the valve assembly to a different location on the exterior of the dispenser, and dispensing control structure including a float underneath the valve assembly and connected to cause discharge of liquid from the container through the passageways when the float is lowered by the water in the flush tank and to prevent such discharge when the float is raised, and separate adjustment screws separately connected in the respective passageways to adjust the relative flow through them.

It is particularly desirable to have the valve assembly made of polyethylene plastic inasmuch as this can be secured to the container in a gastless manner, and dispensing conduits can also be held in such an assembly in a gastless manner.

For highly effective control and simplified handling in the assembling process, the valve assembly has a block with an upstanding boss mating with a corresponding recess in the underside of the container, the laterally extending grooves have portions directed downwardly along the side of the boss, and the adjustment screws fit into these downwardly directed portions and extend up into the container.

In FIG. 1 of the drawings, there is shown a broken-away portion of a flush tank 10 which is connected to an accompanying toilet bowl, not illustrated, and which collects and stores a quantity of water with which the bowl is flushed, the water-level line being indicated at 12. The principal connection to the bowl is from the bottom of the flush tank, but an overflow pipe 14 also connects with the bowl, one of the purposes of this overflow pipe being to provide an outlet for the water in the tank should its shut-off mechanism (also not illustrated) fail to operate. The top of the overflow pipe 14 is accordingly fixed at a level above the liquid level 12 and below the top of the tank 10.

The overflow pipe 14 is also used in all modern toilet constructions for separately supplying to the bowl a quantity of water separate and apart from that used for flushing. To this end, an auxiliary water-supply line 16 is connected to the tank-filling mechanism or supplying a relatively small amount of water to the overflow pipe each time the tank is filled. This auxiliary amount of water follows the completion of the flushing operation and assures that a proper quantity of water is in the bowl between flushings.

The dispenser of the present invention is generally indicated at 20 and includes an open-top generally rectangular container 22 mounted adjacent to the upper edge of a tank wall as by straps 23, 24 that are shaped to hook over the wall edge, as indicated at 25, 26, and to have a U-shaped portion 27, 28 in which the container is received.

As shown more clearly in FIG. 2 the container 22 has a bottom wall 30 to the underside of which is secured a valve assembly 32 that includes a valve block 34, a float mechanism generally indicated at 36, and a valve ball 38. The upper face of the valve block 34 is shown in more detail in FIG. 5 and has a central float guide bore 40 with the upper portion of this bore somewhat enlarged to form a shoulder 41. The upper surface of block 34 has an upstanding boss 42 that encircles a hollow valve chamber 44 from which a pair of grooves 45, 46 extend laterally to the edge of the boss. Downwardly along this edge are additional groove portions 47, 48 that extend from the grooves 45, 46 to terminal grooves 49, 50 which run laterally to the edge of the valve block 34. The top of the block around the boss 42 is of somewhat lower level, and has a set of screw apertures 52 that penetrate completely through the block and can have their lower portions countersunk, as indicated at 54.

The underside of container wall 30 is shown in FIG. 4 and is thickened as indicated at 60, to provide a lower surface that mates with the upper surface of block 34. A central recess 62 receives the boss 42 and is further hollowed at 64 to form the upper part of the valve chamber 44. The hollow 64 opens through an outlet opening 66 into the bottom of container 22. Grooves 75, 76, 77, 78, 79 and 80 are shaped to match and overlie the corresponding grooves 45, 46, 47, 48, 49, 50 in the valve block so that when the block is assembled to the container underside, the assembly provides a pair of laterally extending passageways between the valve chamber 64 and open.
ings 81, 82 on the outside of the valve assembly at the terminals of the grooves. Aligned with the screw-receiving holes 52, the thickened container underside 60 has anchoring sockets 83, the lower ends of which are open and the upper ends of which are not. In addition, internally threaded posts 88, 89 formed on the upper surface of the container floor 30 open into the passageway portions formed by grooves 77, 79 and their mating grooves 47, 48. Within these threaded posts are fitted adjusting screws 90, 91. The valve block and container are preferably molded or cast, and lightening cavities 84, 85, 86 can be formed in the respective member to reduce their bulk. Polyethylene is a preferred material from which these members are molded, and the lightening cavities help to make this material somewhat more resilient so that the valve block can be secured to the underside of the container in a gasketless manner. By way of example, as shown in FIG. 2, a set of four screws 93 can be fitted through the openings 52 and threaded engaged in the sockets 83 to securely hold the block directly against the undersurface 60 when both are made of polyethylene, and no gasket is needed. The screws 93 are preferably of the self-tapping kind, in which case the sockets 83 need not be prethreaded. If the baking faces are slightly out of true, there may be slight leakage with such a gasketless joint, when the container holds a dispensing liquid having the viscosity of water. However, liquids of somewhat higher viscosity will not leak even with the ordinary unevenness that can be expected from plastic molding. A viscosity at 20°C of about 100 centipoises is sufficient for most purposes insomuch as the water in the tank 10 will generally not be above room temperature. A dispensing liquid having a sufficiently high viscosity is made by dissolving in a quart of water up to about ½% by weight of sodium poly-acrylate, sodium carboxymethyl cellulose or methyl cellulose. Cleaning action is readily provided by also including in the solution a strong detergent such as trisodium phosphate. Any perfume that is not affected by the other ingredients can also be used. When it is desired to make sure that no leakage takes place, particularly when the tubing pieces 94, 95 are twisted around in the grooves in which they are fitted, the outer face of the joint 98 between the block 34 and surface 60, can be coated with a layer of water repellent material such as paraffin wax deposited with a brush, as indicated at 99 in FIG. 2.

In the illustrated construction, the float mechanism includes a float bell 101, in a thickened upper portion of which is threaded a rod 102. The upper end of the rod in turn has an enlarged head 103 formed, for example, by shrinking a band around it. Bore 40 is made large enough to freely pass the shank of the rod 102 but to keep the head 103 from falling through. The dispenser of FIGS. 1 through 5 fits neatly into a corner of the flush tank 10 and is entirely automatic in operation. The rod 102 is made long enough to keep the float bell between six and eight inches below the top of the tank so that it will be below the usual water level. Accordingly, when the tank is filled to that level, the float presses the valve ball 38 against the overflow outlet 66, and thereby prevents discharge of liquid from container 22. A flushing operation causes the tank 10 to empty so that the float bell is permitted to drop of its own weight until the water level rises again. Dropping of the float permits the valve ball 38 to also drop, thereby opening the discharge outlet and causing liquid to flow through the tubes 94, 95. The quantity of liquid dispensed from the container during the flushing interval is observed by watching the liquid discharges and adjusting the screws 90, 91, which are conveniently in the form of thumb screws, so they can be readily rotated by hand. In order to make sure that the liquid will properly fall into the overflow pipe, the container 22 should have a depth no greater than about two inches. It will be noted from FIG. 2 that the threading of these screws further into the downwardly directed portion of the discharge passageways will cause the lower ends of the screws to obstruct more and more of these passageways.

In accordance with the present invention, a single assembly will provide two differently controllable dispensing discharges, one into the body of water in the tank 10 and the other into the overflow pipe 14. The cleaning action of the two streams of dispersed liquid is entirely different. The liquid in the tank does not need a high concentration of cleaning agent, since this body of liquid only tends to accumulate a little bit of scum and a film of corrosion products. However, the volume of this liquid is pretty large, generally three gallons or more. On the other hand, the quantity of water stored in the toilet bowl is generally less than half a gallon, but here a more concentrated cleaner is desirable. The separate adjustability feature of the present invention enables the proper concentration to be obtained in both bodies of water from a single supply of cleaning liquid.

Another important feature of the present invention is that dispensing does not take place along the shank of the float rod 102, particularly when the valve block is made of polyethylene. A cleaning solution dispensed along this shank would have a tendency to dry out during a period of non-use, and deposit solid chemicals between the shank and the bore 40, and thus cause the float rod to stick.

The construction of FIGS. 1 to 5 inclusive is also readily disassembled for cleaning purposes, for example where dirt or other foreign materials are permitted to fall into the container 22 and finds its way in blocking position in outlet 66, or in the passageway grooves.

The adjustability features of the present invention also enable the use of the dispenser with any kind of toilet-tank combination, even those in which the tank-filling time varies from a few seconds to as long as five minutes or more. In different locations the pressure of the water used to fill the tank is subject to wide variation, and the control valve which controls the filling can also be set for different filling speeds. Were it not for the adjustment, it would be necessary to use a dispensing apparatus with a measuring arrangement, as in above-identified Patent No. 2,423,454, and such measuring arrangements require as least two different spaced seals so that they are more difficult to manufacture and keep free of leaks.

FIGS. 6 and 7 show a valving arrangement for a dispenser according to a modified form of the present invention. In this construction the floor 30 on the dispenser tank has a valve which is shown generally by the reference character 132. This valve includes a valve body 134 projecting on both sides of floor 30 and having an annular flange 136 which overlies and rests on the upper surface of the floor. A separate locking ring 138 is secured to the valve body 134 and is prevented against the bottom of the floor 30 to hold the valve body in place. Extending through the valve body 134 in diametrically
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5 opposed relation, as is best illustrated in FIG. 7, are fluid passages 140 and 142. The fluid passage 140 opens through the bottom of the valve body 134 and communicates with the interior of the flush tank for dispensing the treating material into the water carried by the flush tank.

The fluid passage 142 terminates short of the bottom of the valve body 134 and has communicated therewith a horizontal fluid passage 146 which in turn has communicated therewith a pipe 148. The pipe 158 extends from the valve body 134 into the upper end of the overflow pipe, as in FIG. 1.

It is to be noted that the valve body 134 is provided with a central chamber 150. The chamber 150 has disposed therein a valve member 152 carried by a valve stem 154. The valve stem 154 extends vertically down through the valve body 134 and is provided at its lower end with a float 156. The float 156 is intended to be in contact with the flush water 144 and actuated thereby. The valve stem 154 also includes a reduced upper portion 158 which extends vertically through the valve body 134 and is provided with a counterbalance spring 160 which normally urges the valve member 152 upwardly and counterbalances the weight thereof. The upper end of the valve body 134 is provided with a removable cap 159.

In addition to the valve member 152, which may be considered a first valve means, there is provided second valve means in the form of needle valves 164. Each of the needle valves 164 is carried by a projection boss 166 of the valve body 134 and is associated with an inlet passage 168. The individual inlet passages do not communicate with one of the fluid passages 140 and 142. It is to be noted that the valve member 152 is so positioned whereby when it is in its shut-off position it closes the inlet passages 168.

From the foregoing, it will be readily apparent that the valve member 152 controls the entire flow of the dispensing liquid through the fluid passages 140 and 142 and that the needle valves 164 control the volume of liquid which flows into the individual fluid passages 140 and 142.

The construction of FIGS. 6 and 7 operates in the same manner as that of FIGS. 1 through 5.

The dispenser of the present invention can be used not only to clean but to odorize or perfume and sterilize bodies of water into which the dispensing takes place. Even though the container 22 has an open top, not too much perfume or other material can be contained as the container is kept relatively cool and standard tank covers generally make a fairly efficient lid that prevents undue evaporation.

While polyethylene makes a highly effective material for construction of the valve assembly, the valve ball 36 is preferably made of metal such as stainless steel. Adjustment screws 90, 91 are also conveniently made of similar metal, although here plastic materials such as Bakelite, are just as effective. While the float shank 102 is described above as made of metal (stainless steel is here also desirable) it can be made of plastic and can be molded integrally with the float body 101, if desired. A metal rod has the advantage of adding more weight to the float so that it will drop more positively at each flushing. An extremely light float, such as one molded entirely of plastic will have a greater tendency to hang up as a result of friction against guide bore 40, particularly if foreign material works its way into the bore. Float assembly weight of at least one ounce is used.

Its thickened portion 60 has the shape in the above figures, is readily molded in one piece, as is the valve ball 34.

The dispenser of the present invention need not be mounted on the particular tank wall as shown in FIG. 1, but can be mounted on any of its four walls. Conduit tubing 96 is accordingly arranged to provide sufficient length to reach the overflow pipe from different container mounting locations.

Where the container installation does not unduly obstruct visual access to the discharge openings 81, 82, the tube section 94 can be omitted and the discharge adjusted by watching the dispenser outflow from the corresponding outlet 82. To help assure that such discharge will not run down the outer surface of the valve and over the float shank, the valve block can be modified by having a shallow groove formed in the vertical side below openings 82, and at the bottom of this vertical groove a downward projection can be formed to act as a flow guide.

Instead of having a single outlet 66 from the dispensing container of the construction of FIGS. 1 through 5, there can be a plurality of outlet openings arranged in a group so that each will be controlled by a single float control. For example, such a plurality of container openings can be arranged to all open into the hemispherical roof of the valve chamber where they will all be obstructed by the valve ball 38 when it is lifted by the float mechanism. Alternatively the valve ball can be replaced by a body of suitably shaped non-porous sealing material such as ordinary rubber or sponge rubber of plastic foam. Because of its resiliency such sealing material can be used with a cooperating surface that is not hemispherical and can have any suitable shape such as shown, for example, in Patents 2,722,394 or 2,620,097.

The use of a plurality of outlets from the container is helpful to reduce the possibility of misoperation by reason of clogging with foreign matter.

Obviously many modifications and variations of the present invention are possible in the 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 is:

1. A flush tank dispenser for dispensing predetermined quantities of liquid into a toilet-tank combination every time the toilet is flushed, said dispenser having a container not over about two inches in depth, mounting elements for holding the container in a flush tank above the liquid fill line, a valve assembly secured to the bottom wall of the container, a pair of passageways in the valve assembly each communicating with the lower portion of the container, each passageway also extending to a different discharge location on the exterior of the dispenser, and control structure for actuating the shut-off valve in the valve assembly, a perpendicular bore in the lower portion of the valve assembly, a float underneath the valve assembly and connected through the bore to the shut-off valve to cause discharge of liquid from the container through the passageways when the float is lowered by the water in the flush tank and to prevent such discharge when the float is raised, and separate adjustment screws separately connected in the respective passageways to adjust the relative flow through them, said discharge locations being each spaced from the lower end of the bore sufficiently to keep discharged liquid from reaching the float connection, the underside of the container has a polyethylene surface, the valve assembly is formed of a polyethylene block secured to said surface in a gasketless arrangement, both the block and the underside have laterally extending mating grooves that together define the respective passageways and conduit elements are held in gasketless arrangement in said mating grooves.

2. A flush tank dispenser for dispensing predetermined quantities of liquid into a toilet-tank combination every time the toilet is flushed, said dispenser having a container not over about two inches in depth, mounting elements for holding the container in a flush tank above the liquid fill line, a hollow valve block secured to the underside of the container, a single dispenser outlet in
the bottom wall of the container, said outlet leading into the hollow block, the container underside and the block having mating laterally extending grooves in their contacting faces defining lateral passageway means leading from the hollow in the block to the exterior of the dispenser, a vertically-extending float guide bore leading from the hollow to the bottom of the block, float control mechanism extending through said bore and having a shut-off element cooperating with the container underside to cause passage of liquid from the container through the outlet when the float control mechanism is lowered by the water in the flush tank and to prevent such passage when the float control mechanism is raised, the valve block having on its upper surface an upstanding boss, a corresponding recess in the underside of the container mating with said boss, the laterally-extending grooves having portions directed downwardly along the side edge of the boss, and adjustment screws in said downwardly directed portions and extending up into the container.

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