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DETERGENT DISPENSER FOR FLUSH VALVE FIXTURES

Filed June 9, 1959

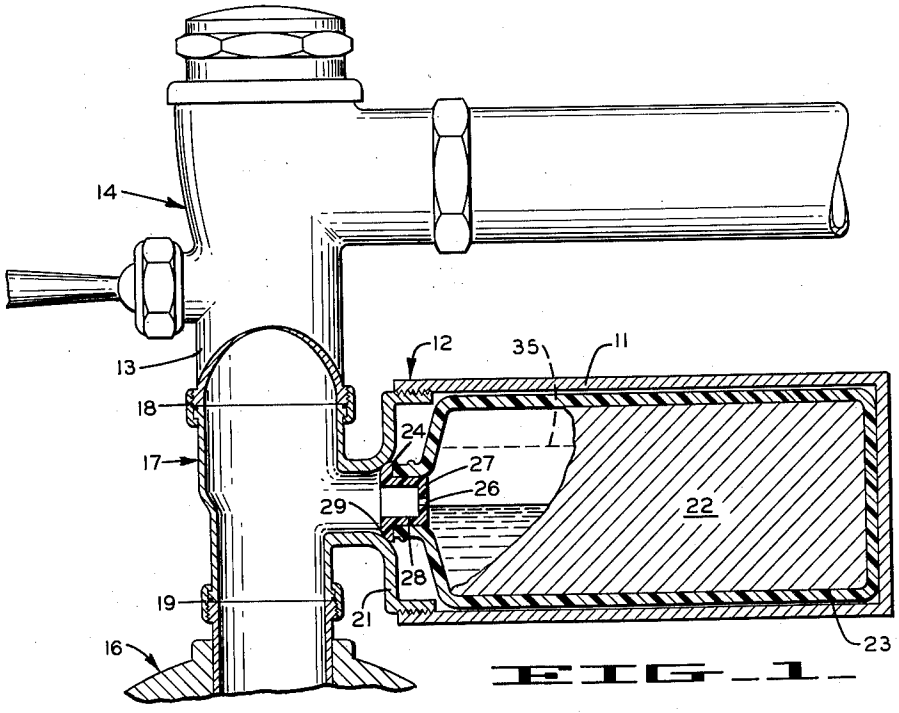



FIG. 1

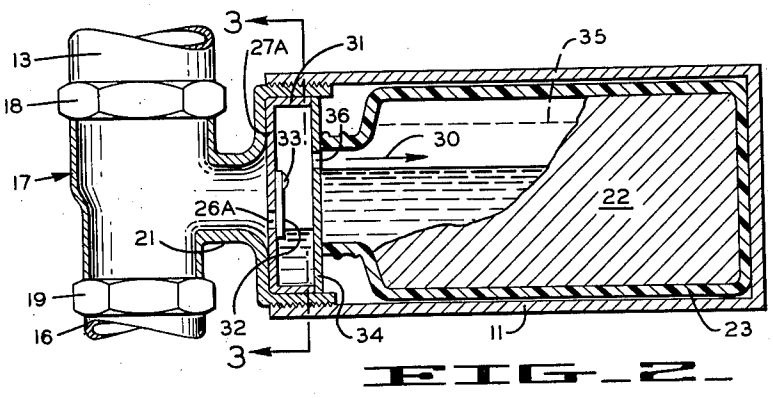



FIG. 2

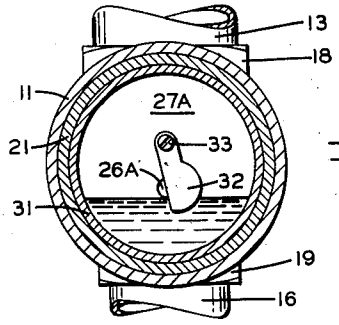



FIG. 3

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# DETERGENT DISPENSER FOR FLUSH VALVE FIXTURES

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3 Claims. (Cl. 4—225)

This invention relates to improvements in a Detergent Dispenser for Flush Valve Fixtures, and more particularly to dispensers of the type designed to inject a liquid having cleaning, sanitizing and deodorizing components into the flush water before it reaches the bowl of the fixture.

A dispenser for introducing such materials to the flush water of the tank or reservoir type fixture is disclosed in my co-pending application, Serial Number 791,088, filed February 4, 1959, and entitled Detergent Dispenser for Toilets.

As pointed out in that application, certain advantages may be obtained by providing a solid mass of soluble detergent material mounted in such a manner that a portion of the flush water will dissolve a portion of the material and mix it into the flush water prior to its entry into the bowl. This is contrasted with previous methods of placing a cake in the bowl or injecting a liquid into either the bowl or the flush water.

The dispenser of the present invention is intended for use in fixtures which have a flush valve, that is, a valve which meters through a desired number of gallons of flush water and then turns itself off. Such valves eliminate the need for flush tanks or reservoirs.

One of the main difficulties encountered in connection with flush valve fixtures lies in providing enough of the detergent material to last a significant period of time without having an excessively bulky reservoir. Frequent refilling is inconvenient, time-wasting and requires storage of large amounts of the detergent material.

The present invention contemplates the use of a solid mass of concentrated detergent material in a small and inconspicuous assembly which blends in with, and looks like a part of, the usual plumbing. Because of the concentrated amounts of detergent, olfactory agent, sanitizing agent and coloring agent possible in a solidified mass, a single filling will last for several weeks, depending, of course, upon how often the fixture is flushed.

It is, therefore, a principal object of the present invention to provide a device for automatically dispensing a measured quantity of detergent material into the flush water of a flush valve toilet fixture.

Another object of the present invention is to provide a detergent dispenser for flush valve toilets employing a replaceable cartridge of solid detergent material which is constructed to dissolve a desired amount of the material and inject it into the flush water during each flushing so that the water remaining in the toilet bowl will contain an effective amount of the material at all times.

A further object of the present invention is the provision, in a detergent dispenser of the character described of a detergent cartridge incorporating a solid mass of soluble material in a novel manner insuring that only the required quantity of detergent will be injected at each flushing, this feature further providing a long cartridge life effective over hundreds of flushings.

A still further object of my invention is to provide a detergent dispenser of the character described which employs the dynamic forces of the surging stream of flush water to inject a portion of the water into the dispenser, and thereafter to eject a concentrated solution of the material into the final portion of the flush water.

Yet another object of the invention is to provide a



dispenser of the type set forth in which a forcible stream of water is employed to eat away the solid mass of material in an even manner, and to achieve thorough mixing of the newly entering flush water with the concentrated solution remaining in the dispenser from the previous flushing.

The preferred forms of my invention are illustrated in the accompanying drawings, forming part of this application, in which:

FIGURE 1 is a longitudinal cross-sectional view of a detergent dispenser constructed in accordance with the present invention, and mounted in operating position between a flush valve and a toilet fixture;

FIGURE 2, a longitudinal cross-sectional view of a modified form of detergent dispenser; and

FIGURE 3, a cross-sectional view taken substantially on the plane of line 3—3 of FIGURE 2.

While I have shown only the preferred forms of my invention, it should be understood that various changes or modifications may be made within the scope of the claims hereto attached, without departing from the spirit of the invention.

Referring to the drawings in detail, it will be seen that the detergent dispenser for flush valve fixtures of the present invention consists essentially of a container **11** partially filled with a soluble detergent material and means **12** connecting the container to the conduit **13**, between the flush valve **14** and the toilet fixture **16**, the means **12** being responsive to variations in fluid flow through the conduit for alternately injecting a portion of the flush water into the container and then draining such water, and the detergent dissolved therein from the container and into the flush water passing through the conduit.

The means **12** is here shown as including a fitting **17** which is mounted between the flush valve **14** and fixture **16** in place of the usual adapter, the fitting being held in place by the conventional slip-nuts **18** and **19**. The fitting **17** is of T-shaped type with a leg **21** extending horizontally and terminating in an enlarged, externally threaded section upon which the container **11** may be attached.

In accordance with the present invention, the soluble detergent material **22** is provided in the container in the form of a solid mass. The slow melting and eating away of the mass affords a long life between refills.

A suitable material for use in the present dispenser is disclosed in my previously mentioned co-pending application, Serial Number 791,088, as recited herein. The correct characteristics may be obtained by combining the desired detergents and/or sanitizing, deodorizing and coloring agents with a soluble base material of polyethylene glycol polymers, heating the material to fuse it, and pouring the molten material into the container **11** so as to achieve intimate contact with the container walls and expose only a limited area of the material to the flush water at one time.

The soluble material **22** may be solidified within the container **11** and good results will be achieved. As the flush valve **14** is operated, the flush water under full line presssure, shoots through the fitting **17**. Due to back pressure, a portion of this water is forced through the leg **21** and into container **11**, compressing the air trapped therein.

As the flush valve starts to close, the flow through, and consequently the pressure in, fitting **17** drops. The energy stored in the compressed air in the container **11** will then force a portion of the water, now containing dissolved detergent, back out of the container and into the last of the flush tank water as it proceeds through fitting **17** toward the future **16**.

It will be noted that a considerable amount of water will remain in the container **11** between flushings. This

water will continue to dissolve the material until it reaches a saturation point. Then, when the fixture is again flushed, the inrushing water will quickly mix with the saturated solution to form a concentrated solution which is ejected into the flush water.

Improved results may be obtained by constructing the dispenser in the manner shown in FIGURE 1 wherein the detergent material **22** is contained within a cartridge **23** replaceably carried within the container **11**.

This construction provides several advantages. The detergent material is more easily replaceable since the empty cartridge may be removed and a full one substituted. The mouth **24** of the cartridge is designed to seal against leg **21** and prevents flush water from entering the space between the cartridge and the container wall. Thus, when the container is unscrewed, the retained flush water will not spill out.

As an important feature of the present invention, means is provided for controlling the amount of water taken into and ejected from the cartridge **23** so as to control the concentration of the detergent material in the flush water. This means consists basically of an orifice **26** formed in a diaphragm **27** across the opening to the cartridge, the size of the orifice being effective to determine the quantity of water which will enter the cartridge during the initial portion of the flushing cycle.

Conveniently, the cartridge **23** may be in the form of a conventional flexible plastic bottle, known generally as "squeeze bottles," and the diaphragm **27** may be provided by a soft plastic cork **28** pressed into the botttle opening. Preferably, the cork **28** has a flange **29** encircling the lip of the bottle and designed to seat against the fitting leg **21** to provide a hermetic seal.

The bottle **23** and container **11** are proportioned to press the flange **29** tightly against the fitting when the container is screwed onto leg **21**.

A modified form of dispenser used in the present invention is illustrated in FIGURES 2 and 3 of the drawings. This modification provides selective adjustment of how much flush water is injected during each flushing, and means is provided for insuring effective utilization of all of the solid mass of detergent material.

The selective adjustment of the amount of water admitted is effected by varying the size of the orifice **26A**. This is here accomplished by providing the diaphragm **27A** in the form of a cup-shaped metal member **31** which fits within the fitting leg **21**, and by mounting a gate **32** on a screw **33**, so as to adjustably block off part of the orifice area. Thus, the effective opening of the orifice **26A** may be obtained by simply loosening the screw and moving the gate to the desired position.

It will be understood that while I have shown only the preferred forms of my invention, various changes or modifications may be made within the scope of the claims hereto added, without departing from the spirit of the invention. Thus, for instance other, equivalent methods for varying the orifice may be employed.

The form of FIGURES 2 and 3 also functions to cause the inflowing stream of water to impinge upon and eat away the upper portion of the detergent material **22**. This is desirable because this upper portion is out of the retained water between flushings and naturally would tend to be dissolved away more slowly than the lower portion which is always immersed.

The equalized dissolving action is accomplished by positioning the orifice above the centerline of the unit as far as possible. The water enters so forcibly, upon flushing, that it is squirted in a stream, indicated by arrow **30**, which actually tends to eat away the upper portion first.

As shown in FIGURE 2, a second diaphragm **34** may be mounted in the leg **21**, in parallel and spaced relation



to diaphragm **27A**, and a second orifice **36** may be formed therein as high as possible. The diaphragm **34** may rest against the rim of the cup-shaped member **31**, with the assembly being held in place by the cartridge **23** which is pressed into sealing engagement with diaphragm **34**.

In operation, the cartridge **23** is placed in the container **11** which is screwed onto fitting leg **21** until the cartridge seat on either the leg **21** (FIGURE 1) or diaphragm **34** (FIGURE 2) to form a hermetic seal therewith. Upon flushing of the fixture, a sharp pressure rise occurs in the fitting **17** forcing water through the orifices and into the cartridge.

The air in the cartridge is compressed, and the water rises to the position indicated by line **35** of FIGURE 2. As the flush valve shuts off, the pressure in fitting **17** drops and air pressure forces the quantity of water injected back out and into the last portions of the flush water for passage therewith to the toilet fixture. This action insures that the detergent enters with the portion of the flush water normally retained in the fixture bowl, and hence reduces waste and permits the use of less detergent for each flushing.

It should be noted that, while the present dispenser is particularly suited for injecting detergent materials into flush valve toilet fixtures, it may be used for similarly injecting any soluble chemical into a fluid passing through a conduit where there are sufficient variations in fluid flow to cause a surging action.

I claim:

1. In combination with a toilet flushing apparatus comprising a flush valve, a toilet fixture and a vertical conduit connecting the same and operative to deliver successive streams of water to the fixture in a substantially free flow, a T-shaped fitting forming part of the conduit between the flush valve and the toilet fixture and having a horizontally extending tubular leg, a cylindrical container detachably mounted on said horizontal leg of said fitting and extending horizontally therefrom with the diameter of the container greatly in excess of the diameter of the leg and the axis of the container in alinement with the axis of the tubular leg, a solid body of water-soluble chemical material accommodated in the container and having substantially the same cross-sectional area as the container and providing a close fit therein, the T-shaped fitting being reduced in diameter below the tubular leg whereby a stream of water rushing downward through the vertical conduit is partly by-passed into the container to contact the exposed face of the material for dissolving part of the chemical and is withdrawn at the end of the water feeding period when the pressure changes into suction, the enlarged diameter of the container as compared with that of the leg structure causing a portion of the water to remain in the container to absorb chemical in preparation for the next operation.

2. A combination as defined in claim 1, in which the solid body of water-soluble material is enclosed in a removable and replaceable cartridge having a close fit in the cylindrical container and having an aperture communicating with the tubular leg of the fitting.

3. A combination as defined in claim 2, in which the aperture has means for controlling the effective size thereof.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 690,337 | Willits | Dec. 31, 1901 |
| 1,220,730 | Costner | Mar. 27, 1917 |
| 2,067,328 | Lux | Jan. 12, 1937 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 523,526 | France | Apr. 23, 1921 |