

Dec. 8, 1970

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3,545,014

SANITIZERS

Filed Feb. 5, 1968

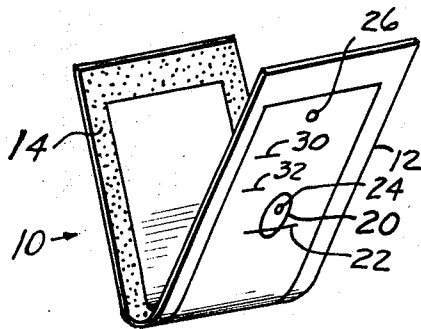


FIG. 1

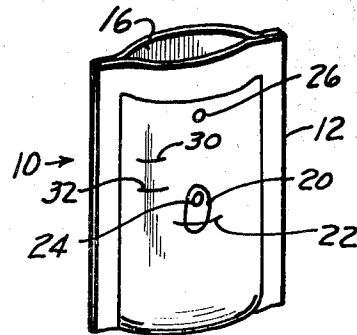


FIG. 2

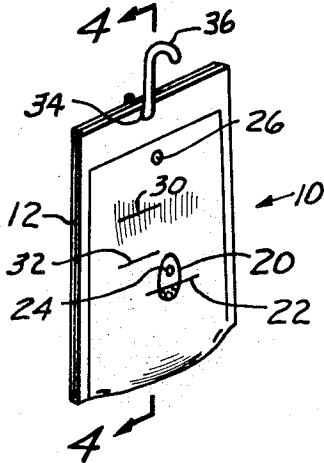


FIG. 3

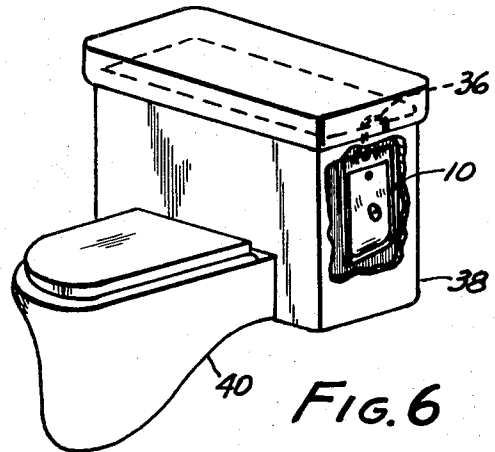


FIG. 6

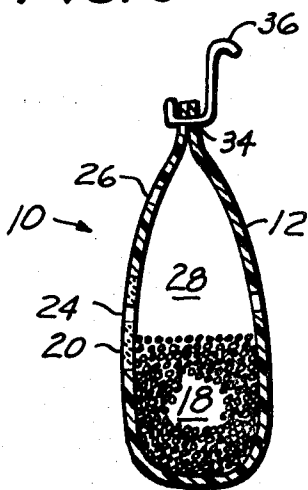


FIG. 4

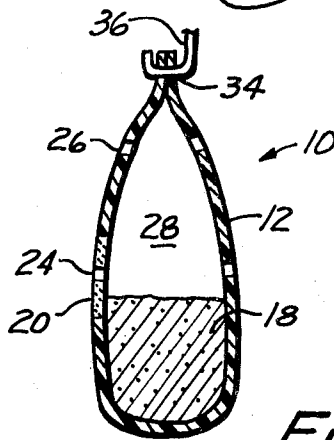


FIG. 5

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Filed Feb. 5, 1968, Ser. No. 702,908  
Int. Cl. E03d 9/02  
U.S. Cl. 4-228 10 Claims

## ABSTRACT OF THE DISCLOSURE

This disclosure relates to sanitizers, and particularly to sanitizers for sanitizing toilet bowls.

A sanitizer according to the present disclosure comprises a sanitizer material contained in a flexible package. The package is adapted to be provided with first and second apertures through a wall of the package.

When placed in use, the package is shaken or otherwise agitated so that the powder gathers within the bottom of the package, thereby expanding the walls of the package. The first and second apertures are formed, and the sanitizer is partially immersed in flush tank water. The water hydrates the powder to form a cake which is slowly soluble in water and which, given sufficient time, saturates the water within the package with dissolved sanitizer material. Upon each flushing of the flush tank, some of this solution drains from the package into the flush tank water as the water flows into the toilet.

This invention relates to sanitizers, particularly to sanitizers for sanitizing toilet bowls.

Heretofore, sanitizers for sanitizing toilet bowls included a solid cake of sanitizing material within a rigid container. Due to their size, shape and rigidity, prior sanitizers are difficult to display, store and package and fit into the available space in the flush tank. Furthermore, they are subject to premature soilage, spillage and leakage during storage and shipment due to water or moisture entering the container through the apertures provided therein.

It is an object of the present invention to provide a sanitizer having a dispenser package which is lightweight, easily displayed, easily fitted in the limited space in the flush tank and which provides more effective sanitizing.

Another object of the present invention is to provide a sanitizer containing an anhydrous sanitizing material, whereby upon contact with water in a flush tank, the sanitizing material takes up a sufficient amount of water to solidify.

Another object of the present invention is to provide a sanitizer having a flexible package containing an anhydrous sanitizer powder. The powder may be shaken to the bottom of the sanitizer package, thereby expanding the walls of the package to increase the volume of space above the powder, thereby increasing the volume of water capable of being treated within the sanitizer.

A sanitizer according to the present invention comprises a flexible dispenser package. The walls of said package form a cavity in which a measured quantity of sanitizer material is disposed so that a portion of the cavity is substantially free of sanitizer material when the sanitizer material is gathered at the bottom of the cavity. The package is adapted to be provided with first and second apertures through a wall of the package. Upon gathering the sanitizer material at the bottom of the package, the walls of the package are separated, thereby expanding the cavity. Upon providing the first and second apertures through the wall of the package and partially immersing the package in a tank of water so that the water level in the tank is between the first and second apertures, water in the tank is admitted into the expanded cavity and a portion of

the sanitizer material dissolves in the water in said expanded cavity to form a chemical solution.

According to an optional and desirable feature of the present invention, the sanitizer material is an anhydrous granular or powdered material so that the water in the flush tank hydrates the sanitizer material to solidify the material within the package.

Another optional and desirable feature of the present invention is the provision of flexible mounting means for mounting the package to the wall of a flush tank.

The above and other features of this invention will be more fully understood from the following detailed description and the accompanying drawings, in which:

FIG. 1 is a perspective view of a package for the sanitizer according to the present invention in an unsealed condition;

FIG. 2 is a perspective view of the package illustrated in FIG. 1 in a partially sealed condition;

FIG. 3 is a perspective view of a sanitizer in accordance with the present invention;

FIG. 4 is a side elevation in cutaway cross-section of the sanitizer illustrated in FIG. 3, taken at line 4-4 in FIG. 3;

FIG. 5 is a side view elevation in cutaway cross-section as in FIG. 4 of the sanitizer illustrated in FIGS. 3 and 4 having a hydrated sanitizing material disposed therein; and

FIG. 6 is a partly cutaway perspective view of a toilet having a sanitizer according to the present invention mounted in the flush tank thereof.

Referring to the drawings, and particularly to FIGS. 1-5, there is illustrated a sanitizer 10 according to the present invention. Sanitizer 10 comprises a package 12 formed of a suitable flexible plastic material. By way of example, package 12 may be formed from a single sheet of polyethylene plastic folded over at its approximate middle, and heat-sealed on its edge surfaces. Preferably, a polyester film of "Mylar" is applied over the polyethylene plastic on the outside of the package to prevent chemical or water erosion of the plastic package. A suitable adhesive material 14 such as polyester resin, may be applied to the adjacent matching edge surface to seal the entire periphery of the package.

Before sealing the upper portion 16 of package 12, a predetermined quantity of sanitizing material 18 is placed within the package through the opening provided by the unsealed upper portion of the package. Sanitizer material 18 preferably includes a mixture of cleaning material, foaming material, odorant, and a water soluble dye. By way of example, one suitable formulation for sanitizer material 18 is set forth in Table I.

TABLE I

Material	Percent by weight
Androus Sodium Sulfate	39.0
Anhydrous Sodium Tripolyphosphate	39.0
Detergent powder	17.0
Aniline dye	4.2
Methyl Salicylate	0.8

Anhydrous sodium sulfate ("soda cake") solidifies upon contact with water and forms ( $\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$ ). Therefore, the sanitizing material containing anhydrous sodium sulfate will substantially solidify upon contact with water to form a cake within package 12 (see FIG. 5). Anhydrous sodium tripolyphosphate forms  $\text{Na}_3\text{P}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$  upon contact with water. The tripolyphosphate is chosen due to its relatively low solubility, its synergistic improvement in detergency, and its ability to sequester calcium and magnesium and other "hard water" materials. The sodium tripolyphosphate eliminates ring formation within the

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toilet bowl and disperses soil ingredients to prevent their depositing upon the toilet bowl.

It has been found that by increasing the percentage of anhydrous sodium sulfate in the sanitizing material the hydrated cake becomes increasingly harder. Conversely, by increasing the percentage of anhydrous sodium tripolyphosphate in the powder, the hydrated cake will be softer, and form a sludge in the package. It is preferred that the percentages of anhydrous sodium sulfate and anhydrous sodium tripolyphosphate be chosen such that the hydrated cake is sufficiently soft so that sharp edges will not form to puncture the package, and still be sufficiently hard so as to prevent discharge of undissolved sanitizing material from the package. The formulations set forth in Table I result in a hydrated deformable sludge within these criteria.

A suitable detergent powder is one commercially available under the trade name "Nacconal" which contain 40% alkyl aryl sulfonate detergent beads. A suitable aniline dye is alphazurine FGND concentrate, having an Acid Blue No. 9 Color Index Number 4209. This dye is a condensation product of orthoformyl benzene sulfonic acid with alpha-normal ethylanilino meta toluene sulfonic acid, oxidized and converted to an ammonium salt.

Methyl salicylate synthetic oil of wintergreen is an odorizer which gives off a fragrant aroma and is highly useful as an odorizer for the purposes of the present invention.

The water soluble dye is preferably a blue dye so that the sanitizer material is distributed into the flush tank of the toilet and thence to the toilet bowl. The blue tint added to the water in the toilet bowl serves two purposes: First, the blue tint provides an aesthetically pleasant tint to the water in the toilet bowl; secondly, the blue tint serves as an indicator that there exists a sufficient quantity of sanitizer to continue sanitizing the toilet bowl. Should the water appear to be clear upon inspection, the custodian of the toilet will know that the sanitizer needs replacement.

On at least one face of package 12 there is provided a transparent window 20 having a mark line 22 disposed thereon. Line 22 in transparent window 20 indicates the maximum height the anhydrous powder sanitizer material within the package may extend when the package is first placed in the flush tank. The quantity of material within the package is such that when the bulk of the sanitizing material is disposed in the bottom of the package, the material will not stand above line 22. Marker 24 is disposed above line 22 and preferably within window 20 to indicate the location of a first aperture to be punched through the package and into cavity 28 prior to the positioning of the package within a flush tank of a toilet. Second marker 26 is disposed at the upper portion of the package and indicates the position of a second aperture to be punched through the package and into cavity 28. The aperture at marker 26 provides an air hole through which air may enter cavity 28.

Line 30 is disposed on the face of package 12 to indicate the maximum depth at which the package is immersed in the flush tank water. When the surface level of the water in the flush tank is at line 30, normal cleaning and tinting of the toilet bowl water is provided. A lower line 32 is provided to provide indication as to the location of the minimum depth of the package in the flush tank water. When the surface level of the water in the flush tank is at line 32, lighter cleaning and tinting of the toilet bowl is provided.

As indicated in FIGS. 3-5, the level of the sanitizing material should not exceed the height of the aperture provided at marker 24.

To mount the package in a flush tank, aperture 34 is provided through the sealed upper portion 16 of the package and one end of a flexible hook 36 preferably constructed of reinforced plastic, is passed through aperture 34. Hook 36 is adapted to extend over an upper edge of

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the side wall of a flush tank at the opposite end of the package.

FIG. 6 illustrates a sanitizer 10 in position within a flush tank 38 of toilet 40. As indicated in FIG. 6, the upper portion of hook 36 extends over the upper edge of one wall of flush tank 38 and is hidden from view by the flush tank lid.

To use a sanitizer according to the present invention the package is shaken or otherwise agitated so that the sanitizer material gathers at the bottom of the package and forms a bulge therein (see FIGS. 3-5). The walls of the package are thus expanded and separated to increase the volume of space above the powder. Apertures are formed at each of markers 24 and 26 and the sanitizer is mounted in a flush tank of a toilet as illustrated in FIG. 6.

Liquid from the flush tank enters cavity 48 formed by the expanded walls of package 12 through the aperture provided at marker 24. This water hydrates the material to form a soluble deformable sludge at the bottom of package 12 as illustrated in FIG. 5. The water within the package above the sanitizer material becomes saturated with sanitizer material due to the solubility of the material, and upon flushing of the toilet and dropping of the level of water in the flush tank below the bottom orifice, the solution in the package flows into the flush tank. Upon refilling of the flush tank 38 with water, the residual solution is diluted with fresh water in the flush tank and the sanitizer material is dispersed throughout the flush tank water. Upon a subsequent flushing of toilet 40, the treated flush tank water is discharged into the toilet bowl. The sanitizing material dispersed within the water provides cleaning, tinting, and deodorizing of the toilet bowl water and tends to clean the flush tank and toilet bowl.

The air hole provided by the aperture 26 permits equalization of air pressure above the water in the package with the atmosphere so that the water level in the package will be equal with the water level in the flush tank and above the aperture at marker 24, if desired.

Each time the toilet is flushed, the used or old sanitizing material within the toilet bowl is discharged to waste with toilet bowl water, and fresh sanitizer material is introduced into the toilet bowl from the flush tank.

The cycle continues until all the soluble material within the package 12 has been used up. When this occurs, there is no more sanitizing material to tint the water blue, so that the custodian of the toilet may readily determine that the sanitizer requires replacing. However, if the water is tinted blue, the custodian can be assured that the sanitizer is working properly.

The sanitizer according to the present invention may be easily stored and shipped in a concentrated powdered form disposed in a sealed package. The powder is shaken to form a bulk at the bottom of the package, thereby expanding the walls of the package to increase the volume of space above the material, and thus, the volume of water to be discharged from the sanitizer to the flush tank. The dispenser may be formed by simply piercing the package above the powder level to permit water to enter the package, and at the top for an air breather hole. The package may be put to use by partially immersing it below the water line in the flush tank. Water in the flush tank then flows into the package and hydrates the powder to form a soft cake or sludge. Water inside the package and above the cake slowly dissolves the chemicals and dye to produce a saturated solution. Flushing the tank lowers the water level outside the package resulting in a discharge of concentrated solution through the lower pierced hole. As the flush tank refills, the package takes on a measured amount of fresh water and the cycle is repeated.

One important feature of the present invention is that the package is sealed until put to use. Thus, the sanitizer material within the package cannot be prematurely spoiled, spilled, or soiled during storage or shipment. The package lies flat and is lighter than prior sanitizers. For

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example, a package for sanitizing a toilet will normally contain approximately 5 ounces of anhydrous sanitizer material which, upon hydration, will form approximately 8 ounces of hydrated sanitizer material.

Another important feature of the present invention is that the package may be stored and shipped in a relatively flat condition. However, when the sanitizer is placed in use, the sides of the package are expanded by gathering the bulk of the material at the bottom of the package, thereby increasing the volume of space above the material. The volume of water to be treated during each cycle may thereby be accurately metered by the expanded volume above the material and by the depth to which the package is immersed in the flush tank water.

This invention is not to be limited by the embodiment as shown in the drawings or described in the description, which is given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

What is claimed:

1. A sanitizer for dispensing a chemical solution to water in the flush tank of a toilet, said sanitizer comprising: a flexible package adapted to be partially immersed in the water in the tank, said package having walls sealed closed around the entire periphery of said package, said walls forming a cavity within said package; water-soluble sanitizer material within said cavity, said sanitizer material consisting of an anhydrous powder of such measured quantity that at least a portion of said cavity is substantially free of sanitizer material when said sanitizer material is gathered at the lowermost portion of said cavity, said anhydrous powder being of the type which forms a deformable sludge upon contact with water; said package being adapted to be provided with a first aperture through a package wall into said cavity above the sanitizer material when the sanitizer material is substantially gathered at the bottom of said cavity and a second aperture through a package wall into said cavity above the first aperture and near the uppermost portion of said cavity, whereby upon gathering said sanitizer material in the bottom of said package, the walls of said package separate to expand said cavity, and upon providing said first and second apertures through the package wall, and upon placing the package in said tank so that the surface level of water in said tank is above said first aperture, water is admitted through said first aperture into said expanded cavity to dissolve a portion of the sanitizer material in the water in said expanded cavity to provide a chemical solution in said cavity and to form a deformable sludge of the remainder of the sanitizer material; and support means attached to said package for supporting said package in said tank.

2. A sanitizer according to claim 1 wherein said sanitizer material includes: anhydrous sodium sulfate; sodium tripolyphosphate; methyl salicylate; a detergent; and a water soluble dye.

3. A sanitizer according to claim 1 further including

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first mark means on a wall of said package indicating the position for said first aperture.

4. A sanitizer according to claim 3 further including a transparent portion on a wall of said package to enable viewing into said cavity, said first mark means being disposed on the wall of said package above the lowermost portion of said transparent portion.

5. A sanitizer according to claim 4 further including second mark means on a wall of said package above said first mark means indicating the position for said second aperture.

6. A sanitizer according to claim 5 further including third mark means on a wall of said package between said first and second mark means for indicating the position of the surface level of water in said tank relative to said package when said package is partially immersed in water in said tank.

7. A sanitizer according to claim 3 wherein said third mark means comprises a first line on said package and a second line marked on said package above said first line.

8. A sanitizer according to claim 3 further including fourth mark means on said package indicating the highest permissible surface level of the bulked sanitizer material in said package when said package is immersed in water.

9. Apparatus according to claim 8 wherein said fourth mark means is disposed across said transparent portion.

10. Apparatus according to claim 9 wherein said third mark means comprises a first line marked on said package and a second line marked on said package above said first line.

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