

- (21) Application No **8108447**
- (22) Date of filing **18 Mar 1981**
- (43) Application published **22 Sep 1982**
- (51) INT CL<sup>3</sup>  
**E03D 9/03**
- (52) Domestic classification  
**E1C 22B2**
- (56) Documents cited  
**GB 1476458**  
**GB 1462201**  
**GB 1243039**  
**GB 0860016**  
**GB 0710796**  
**GB 0705904**
- (58) Field of search  
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(54) **A liquid dispenser for use in a flushing cistern**

(57) A dispenser for use in flushing cisterns comprises a container (3) with a suspension hook 23 and attached e.g. by screw threads 13, 24 to a cylindrical container 1 having a communicating hole 12 at the top and

apertures 4 in the sides; an extension of the container 1 may form a reservoir 3. The dispenser which is suspended in the cistern contains disinfectant or like liquid; as the cistern fills with water air is trapped in the container 1, compressed and forced through the hole 12 into the container (3); on flushing the water level falls and the air pressure above the disinfectant forces it through the hole 12 either directly into the flushing water or preferably into the reservoir 3 (when provided) and so into the flushing water.

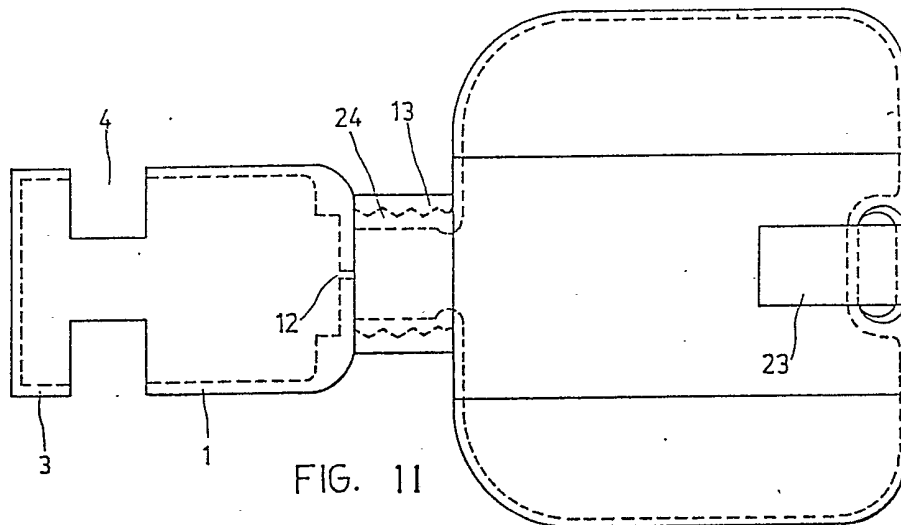


FIG. 11

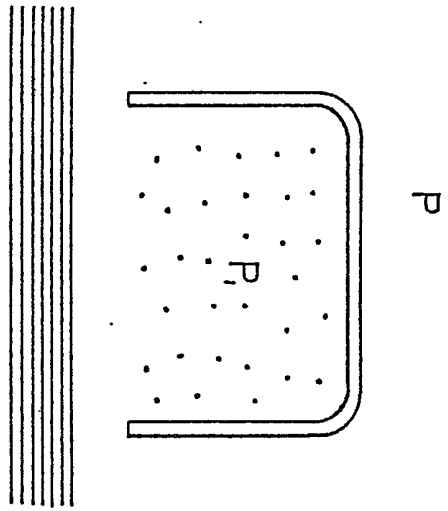


FIG. 1

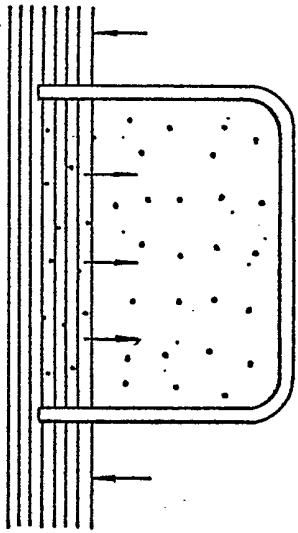


FIG. 2

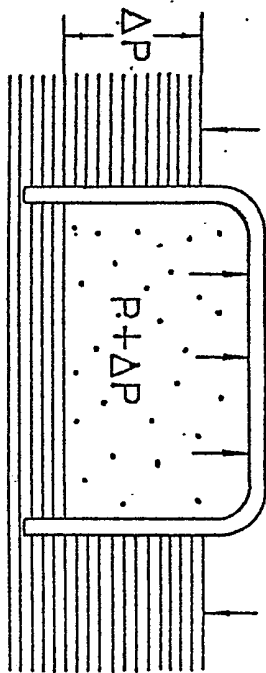


FIG. 3

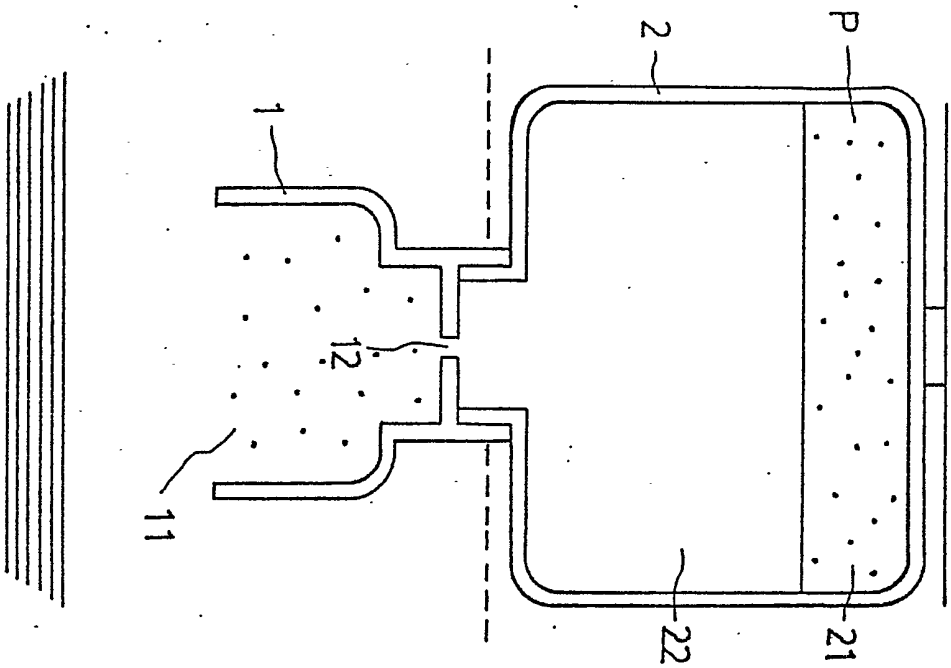


FIG. 4

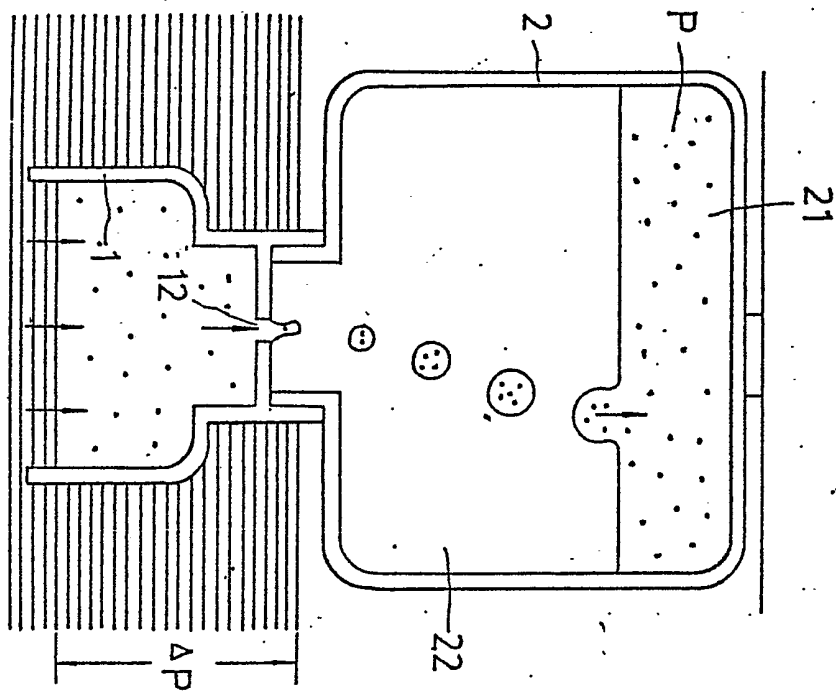


FIG. 5

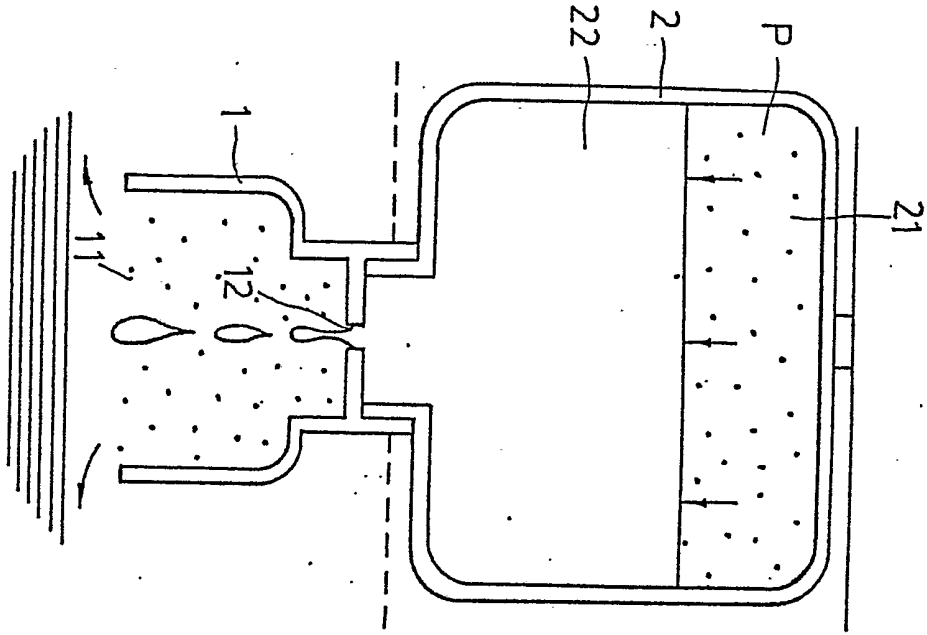


FIG. 6

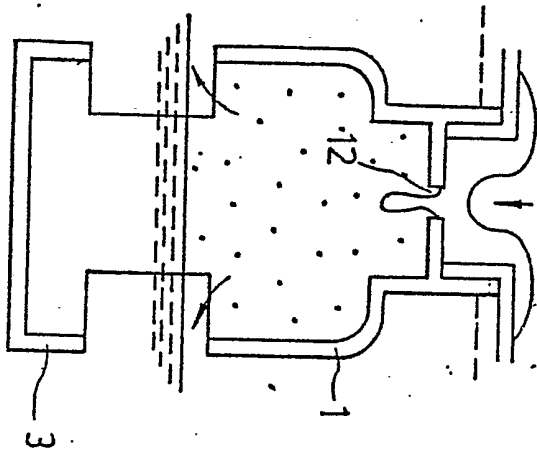
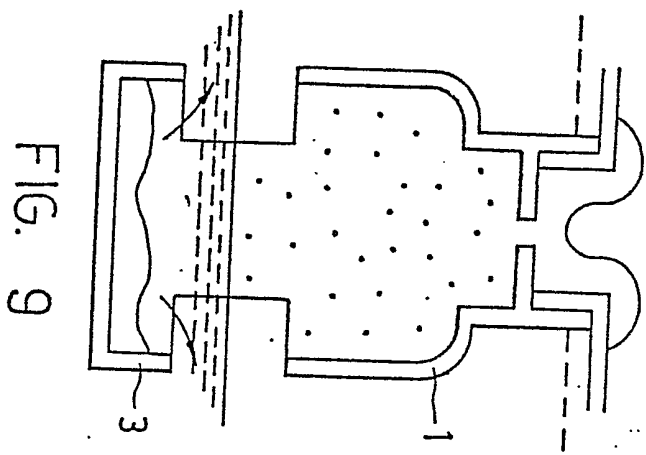
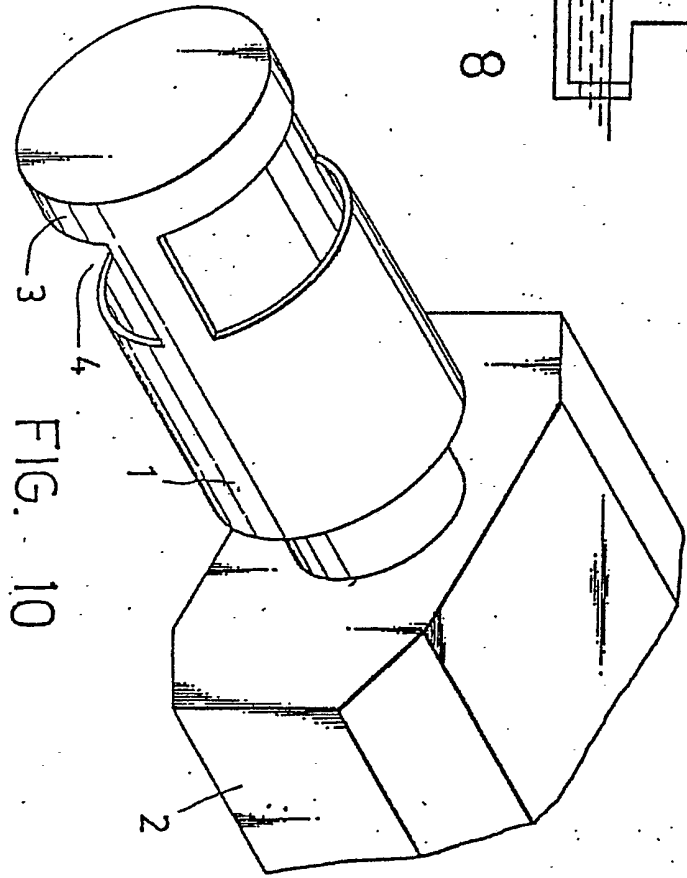
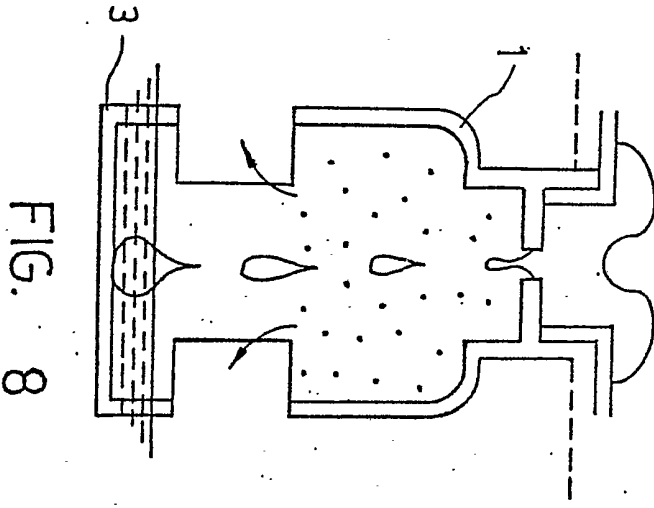


FIG. 7



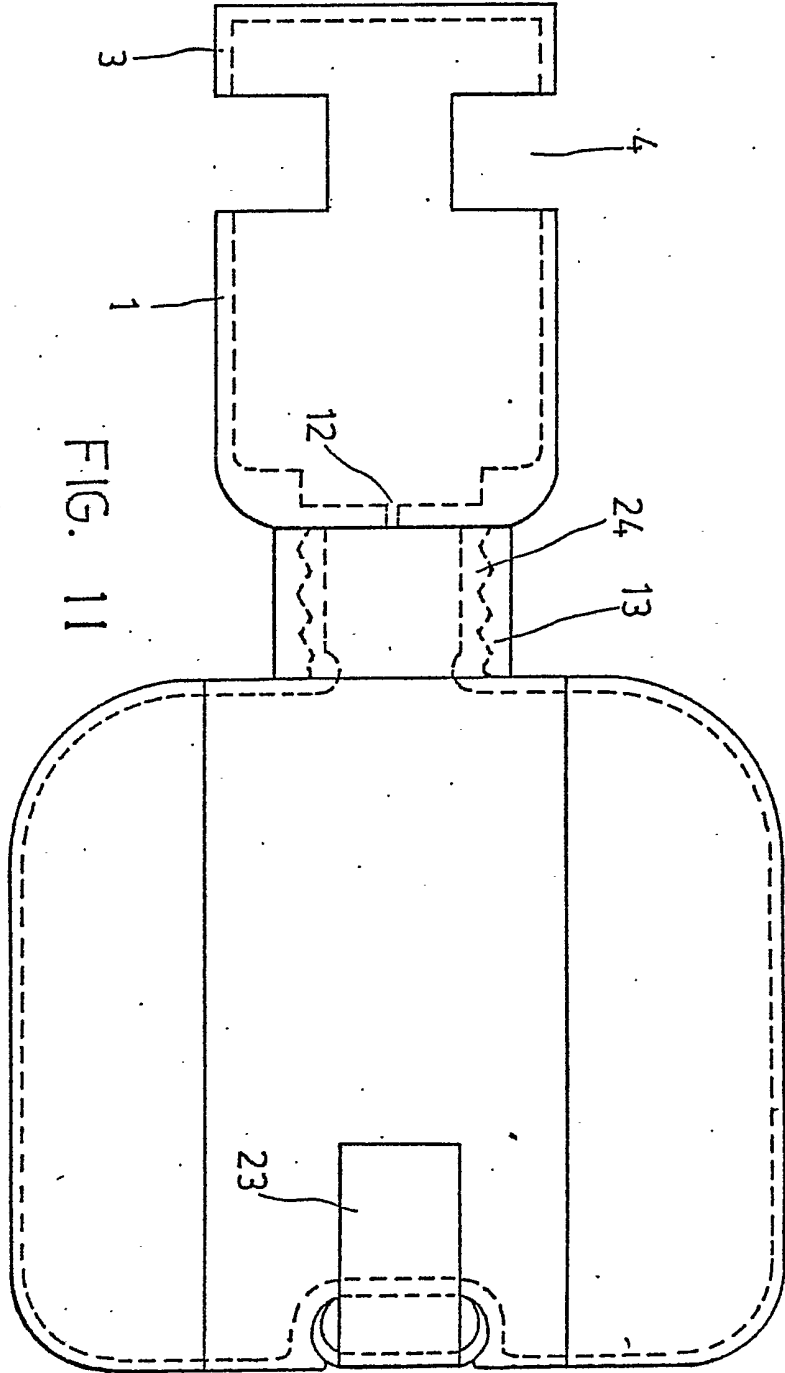


FIG. 11

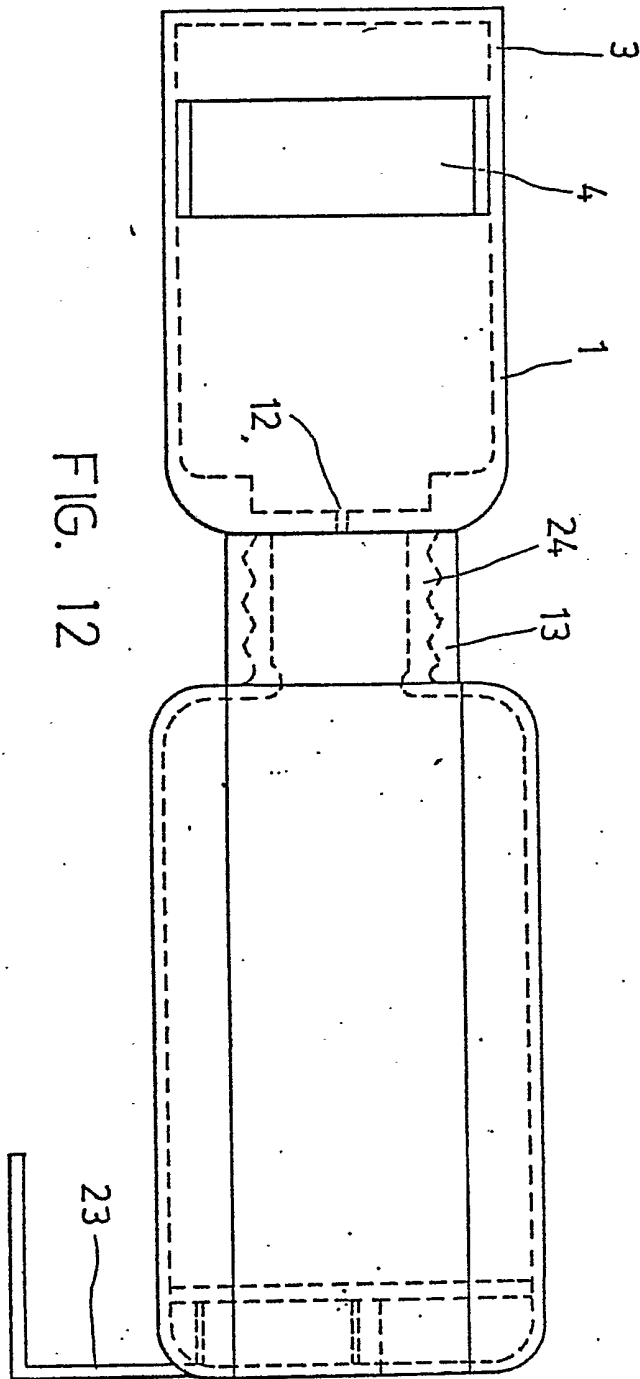


FIG. 12

## SPECIFICATION

**An automatic dosing dispenser used in toilet bowl**

## Background of the Invention

5 This invention relates to an automatic dosing dispenser, particularly to a cleaning apparatus used in toilet bowl.

10 The automatic bowl cleaner registered with the trade mark VANISH, which is not commercially available, is provided with a float at the mouth of the cleaner. By means of the float, the opening and closing of the cleaner is dominated by the alternate fall and rise of the water level. Though convenient, the cleaner has the following

15 disadvantages:

1) To be discharged between the alternate rise and fall of the water level, the defecating solution dispersed in the water is not uniform.

20 Furthermore, because the defecating solution stops dripping only when the water rises up to the highest level, the defecating solution will waste a lot.

25 2) Required to be light enough is the float to shut off the communicating passage of the defecating solution upon the rise of the water level, while required to be weighty enough is still none other than the float to fall and open the passage upon the fall of the water level. And, the weight of the float is also determined by the

30 density and viscosity of the defecating solution. Thus, it occurs frequently that the float fails to fall back to its original position.

35 3) Should the toilet bowl break down, the defecating solution will continue to drip until it is consumed away.

## Summary of the Invention

In accordance with this invention, an automatic dosing dispenser used in toilet bowl comprises a cleaner body, a hanging device to suspend said

40 cleaner body upside down, an inverted container attached to said cleaner body, which as an aperture at the rear end to communicate with the inside of said cleaner body and a wide mouth pointing downward and, a reservoir fixed onto said

45 inverted container with a suitable distance therebetween, characterized in that said automatic dosing dispenser, regulated by the alternate rise and fall of the water in the tank of the toilet bowl, may dose a definite quantity of

50 defecating solution.

One object of the invention is to provide an automatic dosing dispenser used in toilet bowl to eliminate the disadvantages as set forth.

55 Another object of the invention is to provide an automatic dosing dispenser used in toilet bowl wherein the opening and closing of the defecating solution is dominated by the tide of the water, while the quantity of the dosed defecating solution is defined by how deep the inverted container is

60 submerged into the water.

Still another object of the invention is to provide an automatic dosing dispenser used in toilet bowl, which, though provided with no float,

will not subject the opening and closing of outlet

65 of the defecating solution to breakdown.

Still another object of the invention is to provide an automatic dosing dispenser used in toilet bowl wherein the dispersion of the defecating solution into the water is uniform.

70 The present invention will be further described with reference to the accompanying drawings, the description being given by way of example only, not by way of limitation.

## Brief Description of the Invention

75 Figs. 1 to 3 diagrammatically illustrate the basic concept of an inverted container of the present invention,

Figs. 4 to 6 are vertical sectional views of an embodiment according to the present invention,

80 Figs. 7 to 9 are vertical sectional views of another embodiment according to the present invention,

Fig. 10 is a perspective view of the embodiment as shown in Figs. 7 to 9,

85 Fig. 11 is a front elevation of Fig. 10, and Fig. 12 is a side elevation of Fig. 10.

## Detailed Description of the Present Invention

As shown in Fig. 1, a container is suspended upside down over the water. The inverted

90 container is filled with the air which pressure  $P_1$  equals to the atmospheric pressure  $P$  outside the inverted container.

Fig. 2 shows that, when the inverted container of Fig. 1 is, with the opening ahead, dipped

95 gradually into the water, the air within the inverted container, compressed by the water flowing into the inverted container thereafter, will decrease in volume and increase in pressure.

As shown in Fig. 3, when the inverted container

100 of Fig. 2 is dipped further to a specific depth, the pressure of the air within the inverted container will amount to  $P_1 + \Delta P$ , that is, the total atmospheric pressure  $P$  and hydraulic pressure of the water in specific depth.

105 The basic concept as disclosed from Fig. 1 to Fig. 3 is applied to the inverted container of the present invention to facilitate the supply of a definite quantity of defecating solution.

Fig. 4 shows that an inverted container 1 is

110 fixed onto or engaged with the narrow mouth of a cleaner body 2. The narrow mouth of the cleaner body 2 points downward as does the wide mouth of an inverted container 1. At the rear end of the inverted container 1 is provided an aperture 12 to communicate with the inside of the cleaner body 2. As shown in Fig. 4, either because the gaseous pressure of a gaseous space 21 within the cleaner body 2 in a reverse position equals to the atmospheric pressure  $P$ , or because the frictional resistance of the aperture 12 and the surface tension of the defecating solution are resistable to the hydraulic pressure of the hydraulic space 22, the defecating solution will not flow out of the

115 aperture 12.

125 As shown in Fig. 5, when the inverted container 1 is below the water level in the tank, the



phenomenon of which repeats that of Fig. 1 to Fig. 3, the air within the inverted container 2 will be compressed to bubble through the hydraulic space 22 into the gaseous space 21 until the gaseous pressure of the gaseous space 21 is equivalent to that of the inverted container 1. At the moment, the pressure of the gaseous space 21 is greater than the atmospheric pressure by  $\Delta P$ .

As shown in Fig. 6, when water of the tank is flushed, the pressure upon the air within the inverted container 1 will be released until the wide mouth of the inverted container 1 is in a position in communication with the atmosphere. At the moment, the gaseous pressure within the gaseous space 21 of the cleaner body 2, which is greater than the gaseous pressure within the inverted container 1, will force the defecating solution to flow down through the aperture 12.

As disclosed from Fig. 4 to Fig. 6, when the water level rises to a definite height to render the wide mouth of the inverted container 1 below the water level by a definite depth, the gaseous space of the inverted container 1 will be compressed to increase in pressure and decrease in volume; a definite quantity of air forced into the gaseous space 21 by the increasing pressure mentioned above will promote the pressure of the gaseous space 21. However, when the water level drops down to a position where the opening of the inverted container 1 is exposed to the atmosphere, the added air within the gaseous space of the cleaner body 2 will compress a definite quantity of defecating solution to flow out of the aperture 12, thus rendering the gaseous space 21 of the cleaner body 2 to return to a volume defined by the normal atmosphere. A cleaner body provided with the inverted container 1 of the present invention, which begins to release a definite quantity of defecating solution when the level of water in flush is slightly lower than that in full capacity, is more economic than Vanish's Toilet Bowl Cleaner. In this regard, the inverted container 1, whether fixed onto or attached to the cleaner, has a specific value.

According to the embodiment of the present invention as mentioned above, the defecating solution of the cleaner body falls down when the water level begins to lower. There is no defecating solution dosed in the antecedent streams of flushing water and the concentration of the defecating solution in the flushing water will be greater when time for flushing goes by. To eliminate the disadvantages as set forth, another embodiment is presented, that is, a reservoir 3 is fixed under the inverted container 1. As shown in Fig. 7, there is a suitable distance between the wide mouth of the inverted container 1 and that of the reservoir 3. The inverted container 1 and the reservoir 3 of the embodiment according to Fig. 7 may be molded into one body by taking some portions of the cylindrical sides away.

As shown in Fig. 7, when the water level drops down to expose the wide mouth of the inverted container 1 to the atmosphere, the defecating solution will flow out of the aperture 12. And,

when the water level further drops down under the wide mouth of the reservoir 3, the defecating solution begins to drip into the reservoir 3. As shown in Fig. 8, the mixture of the defecating solution and the water left in the reservoir 3 begins to overflow when the defecating solution of the cleaner body 2 drips into the reservoir 3. As shown in Fig. 9, as soon as the water level once again rises to submerge the reservoir 3, the defecating solution left therein will uniformly disperse into the water stored in the tank.

As disclosed above, when the water level rises over the wide mouth of the reservoir 3, some defecating solution stored within the reservoir 3 is dispersed into the water; still there is dispersed some defecating solution when the water is flushed. In comparison with Vanish's Toilet Bowl Cleaner, a cleaner provided with the inverted container 1 and reservoir 3 of the present invention performs a more uniform dispersion of the defecating solution. The most preferred embodiment as shown from Fig. 10 to 12 comprises a cleaner body 2 the narrow mouth of which is provided with a female screw 24, a hanging means 23 attached onto the rear of the cleaner body 2, and a bottle shaped container 1 the narrow end of which is provided with a male screw 13 to engage with a female screw 24 of said cleaner body 2. As shown, the bottle shaped container 1 is further provided with an aperture 12 at the rear end. The bottle shaped container 1 is provided with at least an opening 4 at the cylindrical side so that the bottle shaped container 1 appears as two portions. The upper portion is the inverted container 1 as disclosed above, while the lower portion is the reservoir 3. As set forth, the present invention which is suspended in the tank of the toilet bowl may automatically discharge a definite quantity of defecating solution into the tank.

It is to be understood that the foregoing disclosure is given by way of illustrative example only, rather than by way of limitation, and that without departing from the principle and scope of the invention, the details may be varied within the scope of the appended claims.

#### CLAIMS

1. An automatic dosing dispenser used in toilet bowl comprising a cleaner body positioned upside down, and, an inverted container attached onto said cleaner body, said inverted container being provided with an aperture at the rear to communicate with the inside of said cleaner body and having an opening pointing downward.

2. An automatic dosing dispenser used in toilet bowl as claimed in Claim 1 wherein said cleaner body and said inverted container are molded into one body with at least an opening therebetween.

3. An automatic dosing dispenser used in toilet bowl as claimed in Claim 1 or 2 further comprising a reservoir fixed onto said inverted container with a distance therebetween, said reservoir having an opening pointing upward.

4. An automatic dosing dispenser used in toilet bowl as claimed in Claim 3 wherein said inverted container and said reservoir are molded into one body.

5 5. An automatic dosing dispenser used in toilet bowl substantially as hereinbefore described with reference to and as illustrated by the attached drawings.