

[54] **LIQUID DISPENSING DEVICE**

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[51] Int. Cl. **E03d 9/02**

[58] Field of Search **4/227, 228, 222; 222/57, 56, 519, 541, 543**

[56] **References Cited**

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Primary Examiner—Robert B. Reeves

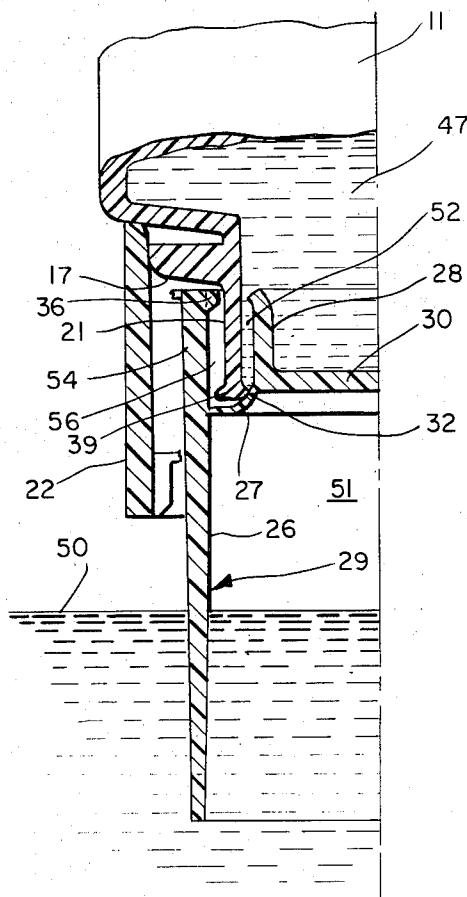
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[57] **ABSTRACT**

A dispensing device is provided, connected to a container which holds a liquid to be dispensed, such connection being tight, for purposes of shipping, but being releasable, for movement between two end-closing positions for dispensing liquid from the container. The device is particularly adapted for toilet tank use, with a dispensing device including a buoyant member which functions with the increase and decrease of water level in the toilet tank, in order to dispense a liquid germicide, perfume or the like into the tank. The dispensing device is molded as a one-piece unit, and it is separable into two distinct components.

2 Claims, 8 Drawing Figures



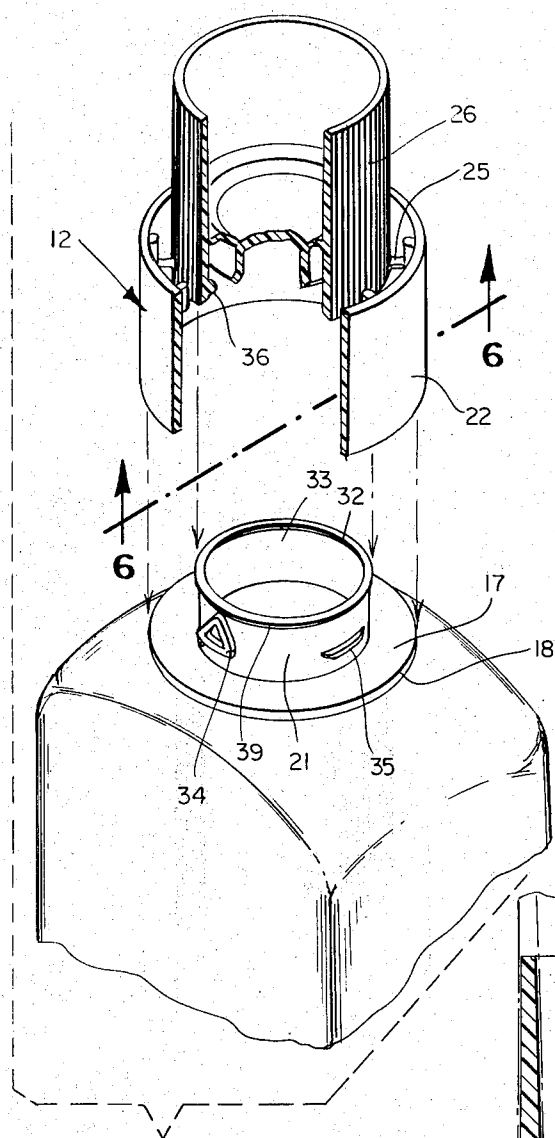


Fig. 2

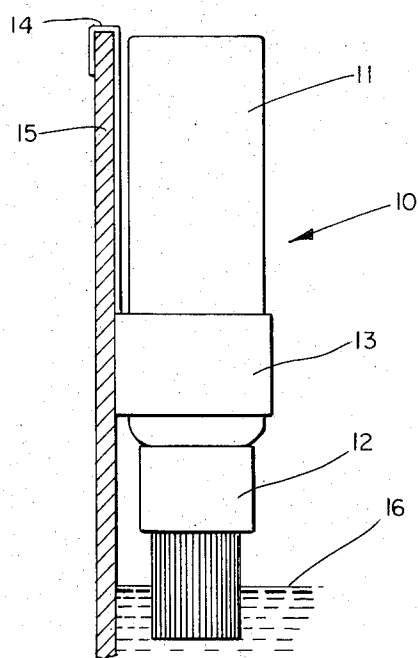


Fig. 1

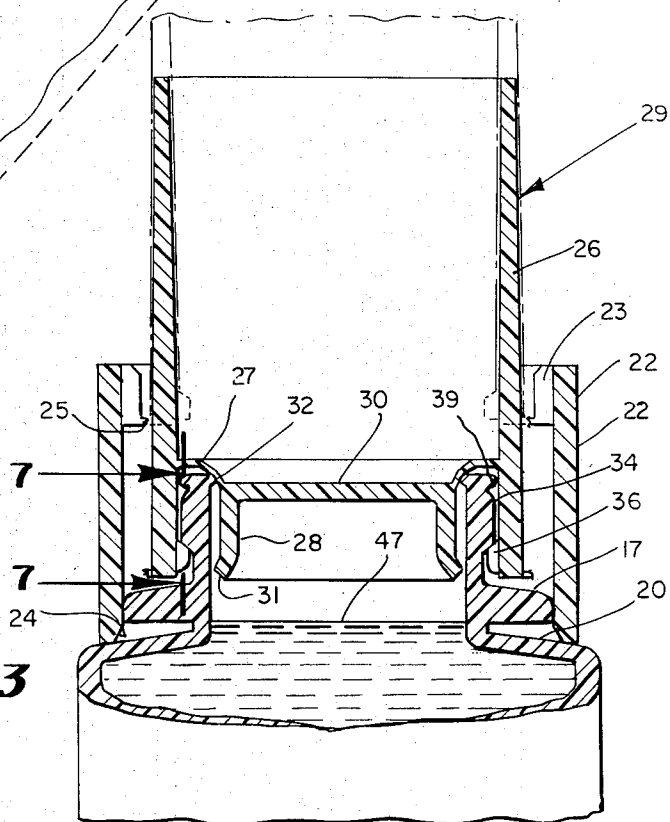


Fig. 3

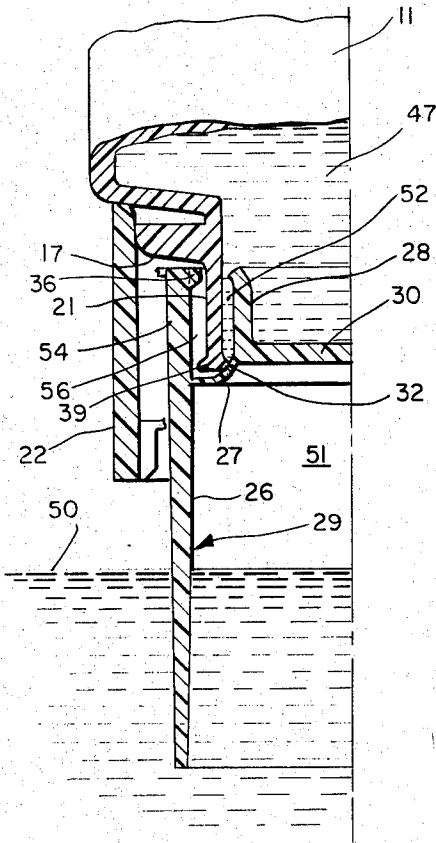


Fig. 4

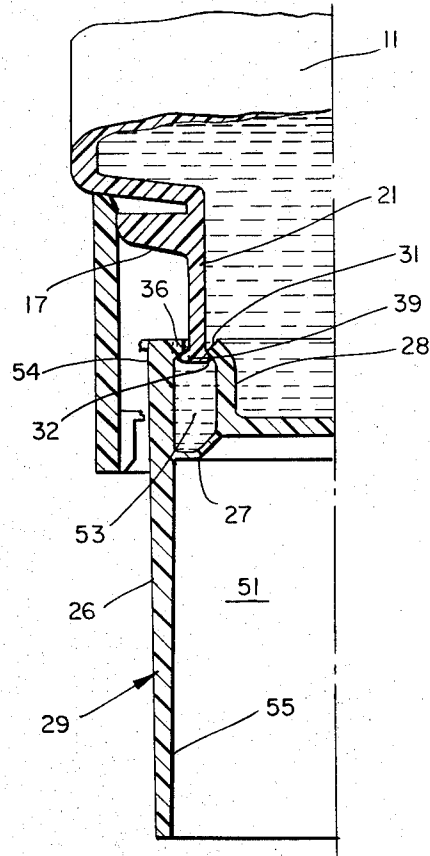


Fig. 5

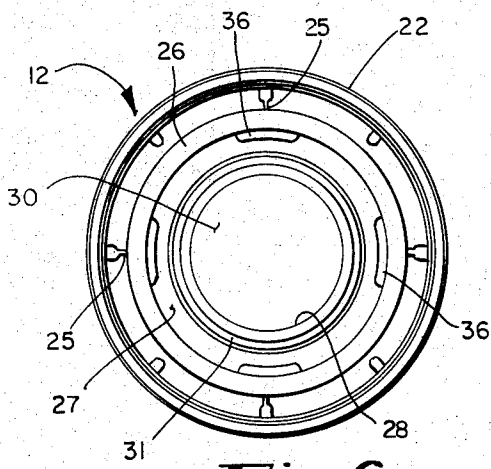


Fig. 6

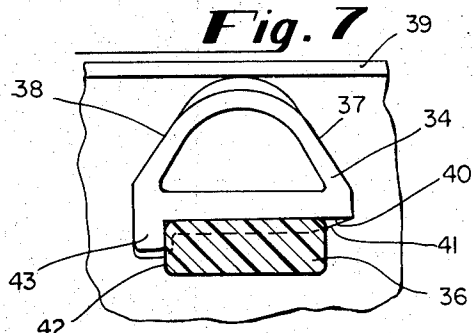


Fig. 7

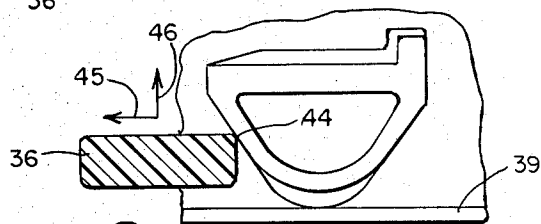


Fig. 8

LIQUID DISPENSING DEVICE

BACKGROUND OF THE INVENTION

Various types of dispensing devices have been developed to date, many being specifically adapted for toilet tank use or the like. However, many such dispensing devices are complicated in nature, lending themselves to difficulty in manufacture, and ultimately to prohibitive expense, such that these items become unfeasible, unless they are designed for multiple usage. In this latter instance, multiple-usage dispensing devices require additional caps for the containers during shipping, storage and the like, and also require manipulation and changing of the dispensing device.

Accordingly, it becomes desirable to have dispensing devices that are adapted to be of the throw-away type. However, the provision of a dispensing device of the throw-away type, which performs an effective sealing, dispensing, and, preferably a metering function, for fluid being dispensed, and which is still sufficiently economical in manufacture that the same can actually be of the throw-away type, as well as functioning as the container closure during shipping, storage and the like, represents a need in the art. It is this need to which the present invention is addressed, and to the provision of components of the dispensing device, that are made together, as portions of a one-piece structure.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed toward providing a novel dispensing device that will be generally inexpensive in manufacture, and which can be used to provide a closure for the container during shipment, storage and the like, and which may also be used to dispense metered amounts of liquid from the container, as for example when the container is inverted in a toilet tank or the like with the device functioning by means of a buoyant portion of the dispensing device being responsive to differences in water level within the tank. The dispensing device is made as a one-piece molded member, with frangible connections between different portions of the member facilitating predetermined breakage of such frangible connections to separate the members into two discrete members that assist the dispensing function of the apparatus.

Accordingly, it is a primary object of this invention to provide a novel dispensing device.

It is a further object of this invention to provide the combination of a liquid container, and a dispensing device therefor.

It is another object of this invention to provide a novel apparatus for dispensing germicidal and/or perfume agents into toilet tanks.

It is a further object of this invention to provide a novel dispensing method for use with a container of liquid, wherein the dispensing member is of one-piece molded construction.

Other objects and advantages of the present invention will be readily apparent to those skilled in the art from a reading of the following brief descriptions of the drawing figures, detailed description of the preferred embodiment, and the appended claims.

IN THE DRAWINGS

FIG. 1 is a side elevational view of a container embodying the dispensing device of this invention, with the container being mounted on a wall of a toilet tank,

and with the lower end of the dispensing device being disposed within the water level in the tank, for illustration of a typical environment with which the invention of this application is utilized.

FIG. 2 is an enlarged fragmentary exploded perspective view of a container and dispensing device of this invention, prior to assembly of the two together.

FIG. 3 is an enlarged view, principally in vertical section, of a container opening and dispensing device therefor, with two positions of a moveable component of the dispensing device being illustrated, one in full lines, and one in phantom, with the phantom position being representative of the moveable component of the dispensing device, just prior to breakage of frangible connections between such moveable components, and a fixedly positioned component.

FIG. 4 is a fragmentary view, principally in section, of an inverted container and the dispensing device therefor, in one functional position of the moveable component of the dispensing device.

FIG. 5 is a view generally similar to that of FIG. 4, but wherein the moveable component of the dispensing device of this invention is illustrated in yet another position; adapted for dispensing of liquid therefrom, upon upward movement of the moveable component of the dispensing device, from the position illustrated in FIG. 5.

FIG. 6 is a lower end view of the dispensing member illustrated in FIG. 2, taken generally along the lines 6-6 of FIG. 2.

FIG. 7 is an enlarged detailed view of a device carried by the container neck, for facilitating the locking of the dispensing apparatus thereon, taken generally along the lines 7-7 of FIG. 3.

FIG. 8 is a view similar to that of FIG. 7, but illustrated in inverted position, for particularly illustrating the manner in which a protrusion carried by the container neck is adapted to guide a protrusion carried by the moveable dispensing member, during vertical movement of the dispensing member relative to the container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, reference is first made to FIG. 1, wherein an apparatus generally designated by the numeral 10, in accordance with the invention is illustrated, specifically there being shown an inverted container 11, with a dispensing apparatus 12 at the lower most end thereof, and with a circular band or the like 13, in engagement with the container 11, about its body, with a bracket, clamp or the like 14, secured to the band 13, and having a hooked upper end, as illustrated, or hanging the same over a side wall of a toilet tank 15, or the like. A level 16 of tank water is illustrated, for the sake of clarity.

With reference to FIG. 2, the container 11 is illustrated as having an annular shoulder 17 integral therewith, the shoulder being radially outwardly directed as illustrated most clearly in FIGS. 2 and 3, and terminating in an annular peripheral surface 18, with a lower end of the shoulder 12 as illustrated in FIG. 3 being spaced longitudinally from an end wall 20 of the container 11, also as illustrated in FIG. 3.

The shoulder 12 is carried by a longitudinally extensive neck 21 of the container 11, with the neck 21 also

being integral with the container 11, and generally of annular, cylindrical construction.

The dispensing component 12, like the container 11, is generally of thermoplastic material construction, but is molded as a one-piece unit, of a rigid plastic, like polyethylene

The unit 12 includes a cylindrical sleeve member 22 having inner lugs 23, near an upper end thereof, as illustrated in FIG. 2, with the lugs 23 functioning, in cooperation with the sleeve 22, as a guide means, in a manner which will later be described herein. The lower most end of the sleeve member 22 is chamfered at 24, to facilitate placement of the same over the surface 18 of the shoulder 17 of the container 11, in interference-tight relation therewith. Extending radially inwardly of the guide lugs 23, are frangible connection portions 25, which, in the state of the unit 12 illustrated in FIG. 2 are integrally connected with the lower most end of the second annular sleeve portion 26, that is spaced generally concentrically within the sleeve member 22, at the upper end thereof, as illustrated in FIGS. 2 and 3. The sleeve portion 26 is longitudinally knurled, if desired, as illustrated in FIGS. 1 and 2, in order to facilitate rotation of the portion 26, in a manner which will later be described hereinafter against resistance thereto.

An annular web portion 27 connects a lower end of the sleeve portion 26, to another annular sleeve portion 28 generally concentrically disposed within the sleeve portion 26, with the sleeve portion or annular wall portion 28 having a closure wall portion 30 connected thereto, at the same end of the sleeve portion 28, to which the annular web 27 is connected, as illustrated in FIG. 3, and with the sleeve portion 28 terminating at its lower most end, as illustrated in FIG. 3, in a first annular seal 31, which is, in effect, a radially outwardly protruding annular lip, having a greater outside diameter than the outside diameter of the remainder of the outer surface of the sleeve portion 28, and also having a greater outside diameter than the inner diameter of a radially inwardly projecting annular lip 32, at the neck opening 33 for the container 11, with the annular lip 32 functioning as a sealing means, also in a manner which will later be described hereinafter. An outer annular bead 39 on the neck finish of the container is provided as a secondary retaining device, which, in cooperation with protrusions 36, prevents accidental removal of the movable component 29 by the user. In instances in which the lip 32 must be smaller in size than the size most desirable for engaging the seal 31, as for example when the container is made of a rigid material such as polystyrene, and because of the hardness of the material, the bead 39 can cooperate with the protrusions 36 to comprise a primary retention feature. It will be apparent that the wall portion 30 is coextensive, across one end of the sleeve portion 28. It will also be apparent that the annular web 27 also function as a seal, designated "second seal" in the claims hereinafter, when in engagement with a lip such as that 32 of the neck opening 33.

On the neck 21 of the container 11, there are provided a pair of triangular protrusions 34, disposed opposite each other, and a pair of generally linear protrusions 35, also disposed opposite each other, with the protrusions 34 and 35 each being adapted to cooperatively and matingly engage radially inwardly directed protrusions 36 carried by the sleeve 26, at the lower most end thereof, as illustrated in FIGS. 2 and 3.

A protrusion 34 has angularly shaped surfaces 37 and 38, as illustrated, and a generally horizontal surface 40, as illustrated in FIG. 7, with a camming slope or ramp 41, adapted upon relative rotation between members 11 and 29, to engage a leading edge of the protrusion 36 of the sleeve 26, and facilitate relative movement between the sleeve 26 and the container neck 21, until the protrusions 34 and 36 thereof are in the relative positions illustrated in FIG. 7, with the left-most end 42 of the protrusion 36, as illustrated in FIG. 7, being an abutment against a stop 43 of the protrusion 34, as illustrated. Thus, the protrusions 36 and 34, taken together, provide a locking means, for locking the moveable components of the dispensing means, generally designated by the numeral 29, to the container neck 21.

The protrusion 35 functions in the same manner as the protrusion 34, discussed above, except that no stop such as that 43 is provided therefor. However, the protrusions 34, because of their said surface portions 37 and 38, also provide a means of camming an edge 44 of a protrusion 36 thereagainst, for guiding the member 29 to which the protrusion 36 is integrally connected, in an appropriate direction, such as the direction of the arrow 45 illustrated in FIG. 8, for alignment of such protrusion 36, and guiding such protrusion 36, along the neck 21, a sufficient distance that mere rotation of the member 29, relative to the neck 21, will facilitate engagement beneath one of the protrusions 34 and 35, rather than being in abutment against an upper surface of a member such as that 35, were constructed in the same manner as that 35, having horizontal upper edges, rather than the angular surfaces 37 and 38 illustrated. Accordingly, during longitudinal movement of the protrusions 36, in the direction of the arrow 46 illustrated in FIG. 8, there will be some guiding in the direction of the arrow 45, and also a likely relative rotation between the members 29 and 21.

With reference to FIG. 3, it will be apparent, that after the member 12 is placed over the neck 21 of the container 11, such that the sleeve portion 22 is in engagement over the shoulder 12, as illustrated in FIG. 3, generally after the container 11 has been filled with a liquid 47, disposed therein as illustrated in FIG. 3, it will be desirable to cap the container 11, securely, for delivery, shipment, storage or the like.

In this regard, the sleeve portion 26 will be grasped by a packer (workman or the like), or by an appropriate machine, with sufficient pressure to force the same longitudinally downwardly relative to and toward a neck shoulder 12, until protrusions or lugs 36 are in a position to engage beneath protrusions or lugs 34 or 35, such downward movement of the member 29 relative to its connected sleeve portion 22 being under sufficient force to break the frangible connection portions 25, permitting such complete relative longitudinal movement.

When the member 29 has been moved toward the shoulder 12, a maximum permissible distance, a slight clockwise rotation of the member 29 relative to the neck 21, will permit locking engagement of protrusions 34 and 35, with protrusions 36, such as that illustrated in FIG. 3, whereby sealing means 32 of the neck opening 33 will be in sealing engagements with the annular seal or web 27, such sealing being sufficiently tight to deform the web 27 somewhat, within its elastic limit. The apparatus illustrated in FIG. 3 also comprises a

complete dispensing apparatus, wherein dispensing components are functioning as closure members, for shipment, storage or the like.

When it is desired to utilize the treatment liquid, germicide, perfume or the like 47 contained within the container 11, it is only necessary to rotate the member 29, in a counter-clockwise direction, for approximately 45°, relative to the container neck 21, and to invert the same, and hang the dispensing apparatus with the container from a bracket 13 somewhat in the manner illustrated in FIG. 1 for example.

With reference to FIGS. 4 and 5, and particularly to FIG. 4, water 50, in a toilet tank, thus enters the lower end of the sleeve 26, and becomes trapped within the blind bore formed by the annular skirt at the lower end of the sleeve (beneath the web 27), the web 27, and the closure wall 30. The blind bore or air trap 51 thus formed maintains the position of the moveable dispensing member 29, as illustrated in FIG. 4, with the container neck sealing means 32 in engagement with the second seal or web 27, with partial deformation of the web 27 as illustrated, under the sealing pressures provided by the buoyancy of the member 29, due to the trapped air within the blind bore 51.

In the position illustrated in FIG. 4, the liquid 47 is thus free to enter an annular chamber 52, formed between the neck 21 and the sleeve 28.

Upon flushing the toilet, and discharge of water 50 from the tank, beneath the lower end of the moveable member 29 illustrated in FIG. 4, air trapped within the blind bore 51 is released in pressure, thereby permitting vertically downward, or longitudinal movement of the member 29, to a position generally as illustrated in FIG. 5, relative to the container 11, whereby the lip or sealing means 32 is in sealing engagement with the outwardly directed annular seal (second annular seal) 41. During such vertically downward movement of the member 29, the liquid within the previously mentioned temporarily formed void or channel 52, along with other liquid from the interior of the container 11, fills the annular channel or zone 53, between the sleeves 26 and 28, or more precisely, between the annular wall 28 and the longitudinally inwardly directed annular skirt 54 of the sleeve 26. It will be noted that that portion of the annular sleeve 26 that extends in a longitudinally outward direction, beneath the web 27, comprises a skirt designated by the numeral 55.

Thus, with reference again to FIG. 5, liquid from the container 11, will fill the channel 53. Upon refilling of the toilet tank once again, with water 50, and rising of the moveable member 29, in the manner discussed above with respect to FIG. 4 due to the presence of trapped air within the blind bore 51, the entry of the neck 21, into the annular channel 53, will serve to push liquid from the channel 53, overflowing the upper outer edge of the skirt 54, and flowing downwardly about the sleeve 26, to enter the water 50, once again having filled the tank to the level illustrated in the FIG. 4. Such upward movement of the member 29, will once again approach the relative positions of elements illustrated in FIG. 4, such that additional liquid will enter the channel 52, as illustrated in FIG. 4, but that, at this position, and in successive positions of the members, after additional flushings, liquid will be present also be-

tween the neck 21 and the skirt 54, when the components are in the relative positions illustrated in FIG. 4. In the event of additional flushing of the tank, above the level illustrated for the water 50 in FIG. 4, to encompass the lower end of the guide sleeve 22, an additional air trap will be formed between the inner wall of the guide sleeve 22, and the shoulder 17, and the outer surface of the skirt 54, to prevent entry of water over the upper annular edge of the skirt 54, and into the channel 56 formed between the skirt 54 and the neck 21.

It will further be apparent that during successive operations of the dispensing device of this invention, as discussed above, the moveable member 29 will function between the positions illustrated in FIGS. 4 and 5, and between positions of the member 29, in which the seal 31 is in engagement with the sealing means or lip 32, and in which the seal or web 27 is in engagement with sealing means or lip 32. Accordingly, the moveable component of the dispensing device functions between two sealing positions, such that liquid is not free to leak from the container 11, and in fact, is not free to flow therefrom, except during an upward or downward movement of the moveable member 29, relative to the container 11, and not in any fixed position of the member 29.

In view of all the above, it is apparent that a container having a dispensing apparatus is provided, in fulfillment of the desired ends of this invention. It will further be apparent that many details in construction and operation may be offered, all within the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. A one-piece dispensing member of thermoplastic construction adapted for container mounting at a neck end thereof, comprising a first cylindrical sleeve portion, a second cylindrical sleeve portion generally concentrically spaced inwardly thereof, with a plurality of radial frangible connection portions integral with each of said sleeve portions, a third cylindrical sleeve portion generally concentrically spaced inwardly of said second portion and integrally connected therewith by an annular web portion of reduced material thickness relative to any of said sleeve portions, said third sleeve portion being axially coextensive generally between said web portion and an adjacent end of said second sleeve portion, and said third sleeve portion having a free end thereof remote from said web portion terminating in a radially outwardly directed annular lip of greater outer diameter than that of said third sleeve portion.

2. The combination of the one-piece dispensing member of claim 1 and a container therefor, said container being sized for receipt of said first sleeve portion over a neck thereof, with said container neck being sized to receive said second sleeve portion thereabout and said third sleeve portion therein upon breach of said frangible connection portions, and with said container neck having an opening sized for sealing engagement with said web portion, and with said container neck and said second sleeve portion each having cooperating components of locking means thereon.

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