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64 **Squirt dispenser for toilet bowl cleaner with improved coverage under the toilet bowl rim.**

57 The invention relates to a squeezable container (1) for delivering liquid in a delivery direction (50) which is not parallel to the container main axis (55), like for example a toilet bowl cleaner bottle. A toilet bowl cleaner bottle typically has an inclined neck or a neck which is movable to be inclined at its discharge orifice relative to the container main axis. This inclined position allows to squirt liquid from the container under the rim of a toilet bowl while holding the container in an upside down position. The present invention improves the product coverage under a toilet bowl rim when squirting liquid from the container. In particular the present invention relates to such toilet bowl cleaner containers having a discharge orifice (13) which is covered by a self-seal valve (3). A typical self-seal valve (3) comprises a diaphragm having a slit.

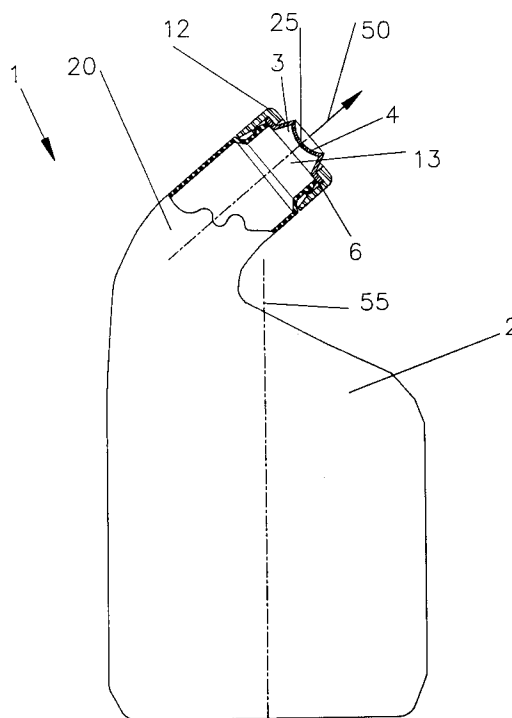


Figure 1

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Field of the invention

The invention relates to a squeezable container for delivering liquid in a delivery direction which is not parallel to the container main axis, like for example a toilet bowl cleaner bottle. A toilet bowl cleaner bottle typically has an inclined neck or a neck which is movable to be inclined at its discharge orifice relative to the container main axis. This inclined position allows to squirt liquid from the container under the rim of a toilet bowl while holding the container in an upside down position. The present invention improves the product coverage under a toilet bowl rim when squirting liquid from the container. In particular the present invention relates to such toilet bowl cleaner containers having a discharge orifice which is covered by a self-seal valve. A typical self-seal valve comprises a diaphragm having a slit.

Background of the Invention

Self sealing valves are known in the art, for example, EP-A-395 380 discloses slit seal valves made of silicone rubber which are said to be useful in the context of pastes, shampoos or conditioners and especially for upside down positioned squeezable containers.

EP-A-160 336 and EP-A-278 125 disclose self seal valves for containers which are designed to be used in an upside down position. The desired benefit is drip-free self sealing of the containers in the upside down position. Liquids mentioned to be stored in these containers are high viscosity liquids like shampoos, conditioners, soaps or detergents.

EP-A-144104, EP-A-217114 or DE-A-3121591 all disclose particular toilet bowl cleaning bottles having an inclined neck positioning. The inclined neck positioning allows dispensing the toilet bowl cleaner under the rim of the toilet bowl while holding the toilet bowl in a comfortable position and not having to reach into the toilet bowl to squirt liquid up against the rim. None of these documents however discloses a self-seal valve at the orifice of the bottle. In particular EP-A-144104 acknowledges the problem of container soiling by dripping from the bottle after use and resolves this problem by incorporating a drip catching area. No reference is made in any of these documents to prevent dripping from occurring.

UK-A-1563881 discloses closures having a directable swivel spout. This represents an alternative version of a directable outlet orifice to the inclined neck bottle used for toilet bowl cleaners. However the disclosed swivel spouts are not equipped with self-seal valves and are not addressing the problems of the present invention.

The containers having self seal valves whether commercially available or disclosed in the prior art appear not to satisfy the desires of the present invention. No disclosure of a combination of self-seal valves and bottles with an inclined neck or otherwise directable orifice are known. In general self seal valves have not been considered as closures for containers in an upright position. The liquids in upright containers, provided they are not dangerous when evaporating, do not require drip out or other confinement means. They are safely stored in the container in its upright position and cannot leak out through the discharge orifice even if it is open.

It has now been found that liquids when being squirted out through a discharge orifice tend to leave a small amount of liquid at the orifice. After several discharges these small amounts create a messy appearance of the vicinity of the discharge orifice. This is particularly undesirable for bottles in an upright position where drops of liquid remaining at the discharge orifice run down the container side walls. Upon the following use the user would necessarily have to clean the bottle or accept to touch the soiled side wall.

It also has been found desirable that a container having a directable discharge orifice, especially those containers designed for delivering liquid counter current to gravity, for example under a toilet bowl rim, has a high ejection velocity in order to reach the desired place. This can be achieved by increasing the necessary pressure when squirting out liquid.

It is therefore an objective of the present invention to provide a container for liquids such as toilet bowl cleaners with reduced or eliminated messiness. It is another objective of the present invention to provide a container that allows more accurate dosing and better directed and higher squirting of the liquid.

A further objective of the present invention is to provide a container which confines the liquid inside the container even when the container is accidentally tipped over and lies on its side. The container also should allow the user to turn it upside down just prior to liquid discharge without liquid starting to drip out of the discharge orifice under the influence of gravity.

An additional objective of the present invention is to provide a container which is better accepted for domestic refilling due to its durability and cleanliness, and thereby to improve the user acceptance of refill packages which are less environmental burdensome.

These and other objectives are satisfied by the present invention as will become apparent from the detailed description of the invention and the accompanying drawings.

Summary of the Invention

The present invention relates to a squeezable, liquid container for delivering a liquid in a delivery direction which is not parallel to the container main axis. The container has a body portion which provides the volume to contain a liquid and which is flexible to reduce the inside volume of the body portion upon squeezing and returns to its relaxed shape when releasing the squeezing. The container further has a neck portion with a discharge orifice through which liquid can be discharged. The neck portion connects the body portion and the discharge orifice and is directed or is directable in order to discharge liquid in the delivery direction. The present invention is characterized in that the discharge orifice comprised in the neck portion of the container is closed by a self seal valve.

In a preferred embodiment of the present invention, that part of the neck portion which comprises the self seal valve over the discharge orifice is replaceably joined in particular by a screwable connection to the neck portion or a transition piece which is part of the neck portion.

The self seal valve has a top portion closing the discharge orifice. The top portion has a slit or slits which open during discharge when squeezing the body portion of the container and increasing the pressure in the container beyond the discharge pressure, which is characteristic of the particular self seal valve. The self sealing is provided by material resiliency of the top portion of the sealing valve by forcing the slit in the top portion to return to its closed position upon releasing the pressure inside the container below the discharge pressure. In order to provide improved self sealing the top portion of the self seal valve can have a concave aperture towards the inside of the container. Preferably the self seal valve of the container system also allows venting of the container when the pressure inside the container is reduced and the container retracts from the deformation caused by the squeezing. Also preferred are retractive self seal valves as described in a parallel patent application entitled "Upright liquid containing container system with self seal valve" by Deflander, Hertogs, Leclercq and Van Rompaey, filed on the same date as the present application in the European Patent Office.

The retractive self seal valve can be made of a variety of elastic materials such as various natural rubbers, elastic polymers, silicone rubber, polyvinyl chloride, polyethylene, ethylene vinyl acetate or styrene butadiene copolymers, but preferably it is made of silicone rubber which is well known in the art. Likewise the container body portion and neck can be made of a variety of materials which provide the body portion with the ability to deform

when being squeezed such as plastic materials in particular polyethylene, polypropylene, polyester, polyethylene terephthalate or mixtures thereof and which materials provide enough stability for the neck portion of the container or for the connecting part of the body portion to an individual separate part of the neck portion.

In a preferred embodiment the present invention has a protective cap which is covering the discharge orifice and provides protection against involuntary discharge during transport of the container. For transport discharge protection the protective cap preferably should be liquid-tight for its contents but allow pressure compensation across the self seal valve in order to maintain the container in its relaxed shape. The protective cap may be screwed on or clipped on to the container to cover the discharge orifice.

Another aspect of the present invention is an embodiment of a container system which comprises the container of the present invention and a liquid which is a thixotropic, non-Newtonian liquid. Thixotropic liquids are characterized by a marked reduction of viscosity under increased shear rate. Relative to prior art containers the present container requires an additional pressure increase during discharge which also leads to an increased discharge velocity. It therefore is in particular advantageous in combination with thixotropic liquids. A typical example of thixotropic liquids are toilet bowl cleaner liquids. Toilet bowl cleaners are squirted under the rim of a toilet bowl. In order to perform the required cleaning action they have to display a high viscosity when sticking to a vertical or overhead surface. On the other hand, a low viscosity is desired from toilet bowl cleaners when squirting them to reach the most distant and hard to reach places. Therefore a preferred embodiment of the container system of the present invention comprises the container of the present invention containing a toilet bowl cleaner.

Brief Description of the Drawings

Figure 1 shows a container according to the present invention with a partial cross-section at the self seal valve.

Figure 2 shows a cross-section of a neck portion which is directable by a flexible corrugated transition piece.

Figure 3 shows a cross-section of an alternative neck portion which fixed delivery direction to Figure 1.

Figure 4 shows a cross-section of an alternative neck portion to those of Figures 1-3 comprising a swivel spout.

Figure 5 a-c shows the neck portion of a container according to the present invention before, during

and after dispensing of a toilet bowl cleaner.

Figure 6 a-c shows the neck portion of a prior art container before, during and after dispensing of a toilet bowl cleaner liquid.

Detailed Description of the Invention

Figure 1 shows a container (1) having a flexible body portion (2) and a neck portion (20). The body portion (2) and the neck portion (20) of figure 1 are formed as a single piece. Alternatively the neck portion (20) and body portion (2) can be connected by any of the connection techniques known in the art. In particular the body portion (2) may have a filling orifice designed to allow filling of the body portion (2) in a direction parallel to the main container axis (55). The neck portion (20) can be joined to the body portion (2) by clip-on, screw-on, welding, glueing or other joining techniques usual in the art.

The neck portion (20) provides a liquid communication between a discharge orifice (13) at one end of the neck portion (20) with the body portion (2) which is containing a liquid. The neck portion may be a single piece or comprise further one or several transition pieces. Also it can partially be made as an integral part of the container but still comprise transition pieces.

The body portion (2) as well as the neck portion (20) can be made of any of the several materials providing the flexibility and squeezability necessary for the present invention. In particular plastic material preferably polyethylene, polypropylene, polyester, polyethylene terephthalate or mixtures thereof have been found to be useful as construction materials for the container of the present invention. The particular material for construction of the container chosen for any given application will in general be determined by factors such as product compatibility, cost, permeability, flexibility and the like. For flexible containers the critical parameter is that the squeezable body portion (2) exhibit a flexibility sufficient to permit a manual deformation of the container to squirt out product through the sealing valve (3) as well as a sufficiently strong resiliency to return to its undeformed condition when external forces are removed. The neck portion (20) may provide a similar flexibility as the body portion (2) but could also be made of a different material or with a different wall thickness in order to provide a more rigid neck portion (20).

Figure 1 shows the discharge orifice (13) at the end of the neck portion (20) of container (1) and the self seal valve (3) covering the discharge orifice (13). The self seal valve (3) comprises a flexible top portion (4), a sealing flange (6) and a slit (25).

The self seal valve (3) is joined to the neck portion (20) of the container (1) by a clip-on collar

(12). In this way the collar (12) together with the sealing flange (6) of the self seal valve (3) form a liquid tight seal around the discharge orifice (13). Other ways to join the self seal valve (3) to the container (1) may be by use of a screw-on collar by welding or glueing along the sealing flange (6) of the self seal valve (3) or by form molding of an orifice portion around a self seal valve which itself can be joined, preferably replacably by clip-on or screw-on techniques to the neck portion (20).

The container (1) of the present invention has a main axis (55). This main axis (55) is defined to be parallel to the gravitational force direction when container (1) is standing in an upright position as shown in figure 1. In order to allow liquid dispensing in a direction different from that into which the main container axis (55) can be directed, in particular when delivering liquids behind corners like for example under the rim of a toilet bowl, the container (1) has a delivery direction (50) which is non parallel to the main container axis (55).

The top portion (4) of the self seal valve (3) typically has a concave curvature towards the inside of container (1). In less preferred embodiments of the present invention the top portion (4) can also have a flat or convex curvature. In a preferred embodiment of the present invention the self seal valve (3) further comprises flexible flange portions suspending the top portion (4) retractably into the neck portion (20) when the self seal valve (3) is in its relaxed position. The benefits derivable from such a retractive self seal valve are disclosed in more detail in parallel European Patent Application "Upright liquid containing container system with self seal valve", supra.

The retractive self seal valve can be made of a variety of materials in particular elastic materials like natural rubber, elastic polymer, silicone rubber, polyvinyl chloride, polyurethane, ethylene vinyl acetate or styrene butadiene copolymers. Preferably the self seal valve is made of silicone rubber. Good examples of self seal valves and their functional principles are disclosed in EP-A-395 380 by Liquid Molding Systems, Inc. and EP-A-160 336 by Procter & Gamble. Self seal valves also of the retractive kind according to the present invention are available from Liquid Molding Systems, Inc., Midland, Michigan, U.S.A.

The self seal valve (3) may be protected during transport of the container by a protective cap which is not shown in the figures. The protective cap is placed over the self seal valve. It can be joined to the container by screwing or clipping it on to the neck portion (20). Preferred protective caps are shown in European Application 92870027.7 which allow venting of the container during transport.

Figure 2 shows a preferred alternative of the neck portion (20). A flexible corrugated transition

pieced (40) which allows to change the delivery direction (50) is connecting the discharge orifice (13) to the lower part of the neck portion (20). The corrugation of the transition piece (40) can be used to redirect the delivery direction (50) for a more desirable discharge of the liquid from the container of the present invention. It also may be used to extend or reduce the length of the transition piece (40) and hence the neck portion (20). The transition piece may be made from the same materials as the container and neck portion of the present invention. It may however also be made of more flexible materials like those indicated above for the self seal valve. Since the transition piece (40) provides a directable delivery direction (50) the neck portion (20) may be parallel to the main container axis (55). Also the transition piece (40) could represent the whole neck portion (20) if transition piece (40) is directly joined to the body portion (2) of the container (1).

Figure 3 shows another alternative of the neck portion (20) comprising a fixed angel transition piece (42). In general the off-set between the main container axis (55) in its gravitational direction and the delivery direction (50) depends on the desired use of the container of the present invention. An off-set of 20° to 160°, preferably 90° to 160° for integral neck portions and 20° to 120° for transition pieces have been determined to be particularly useful in the context of container systems comprising toilet bowl cleaners.

Figure 4 shows an alternative neck portion (20) to Figure 2 also having a directable delivery direction (50) by comprising a swivel spout (30). The swivel spout (30) has a grip tab (34) and comprises discharge orifice (13) which is covered by the self seal valve (3) in a similar fashion as discussed above. In particular the grip tab (34) can be formed as an extension of a clip-on collar (12).

The swivel spout (30) comprises a cylindrical or ball shaped end (31) which fits into a bearing (32) and thereby allows rotational movement of the swivel spout to provide directionability of the delivery direction (50). It also allows to close the swivel spout (30) by rotating the swivel spout (30) in the bearing (32) such that the channel (35) has no further liquid communication with the swivel spout inlet orifice (33). This additional closure option could also serve as a transport protection against accidental discharge through the self seal valve (3).

The whole swivel spout construction can be mounted on a clip-on collar (36) which is connected to the neck portion (20). Other connections could be a screw on collar or even an integrated swivel spout which forms the end part of the neck portion (20).

The swivel spout can be made of any of the materials which are typically used for containers

according to the present invention. The swivel spout inlet orifice (33) may be wider than the diameter of the channel (35) in order to allow more flexibility when setting the delivery direction (50).

The man skilled in the art will find it obvious to combine some of the examples of the container neck portions of the present invention in order to satisfy particular objectives when designing a container according to the present invention. For example the directionable corrugated transition piece (40) of Figure 2 could be combined with the swivel spout construction of figure 4 while the neck portion (20) may already be bent at a certain angel relative to the container main axis (55) as shown in Figure 1 or Figure 3.

Figure 5 a)-c) shows the neck portion of the container of Figure 1 during the different phases of discharging. Figure 5 a) shows the closed self seal valve while the container is already directed such that the liquid in the container communicates to the self seal valve. In Figure 5 b) the discharge action is indicated by a forceful squirt of liquid exiting the container in the delivery direction. In order to overcome the discharge pressure of the self seal valve an increase of the internal pressure beyond that of prior art containers is required. Therefore the liquid squirted from a container according to the present invention travels a further distance than liquid discharged from a prior art container. Figure 5 c) shows again the closed self seal valve preventing liquid from dripping through the discharge orifice.

Figure 6 a)-c) shows a prior art similar in a similar discharge situation as Figure 5a)-c). The difference is that the discharge orifice is not closed by a self seal valve but ends in a thin channel spout which remains permanently opened. As can be seen from Figure 6a) this permanently open container does not prevent gravitational discharge of liquid already prior to the desired discharge. Also when discharging through an open thin channel spout a lower pressure is required and achieved and hence a shorter travel distance of the discharged liquid has to be afforded. Figure 6c) again shows the involuntary liquid loss through the open thin channel spout at the end of liquid discharging.

An additional aspect of the present invention is a container system comprising a container as described above and comprising a thixotropic, non-Newtonian liquid, preferably a toilet bowl cleaner liquid. Open systems as shown in Figure 6a)-c) benefit from the thixotropic behaviour of the liquid inside, however only until the container is turned and the internal shear forces reduce the viscosity of the liquid such that it still may drip out of the discharge orifice under gravitational forces. The container system according to the present invention therefore has particularly beneficial characteris-

tics for thixotropic liquids when the delivery is initiated by applying shear forces to the liquid prior to discharge like for example when turning the container upside down, for example for toilet bowl cleaners, or if shaking the liquid in the container is required. 5

Claims

1. A squeezable, liquid container (1) for delivering liquid in a delivery-direction (50) which is not parallel to the container main axis (55), said container (1) comprising :
 - a body portion (2) for containing said liquid, said body portion (2) being flexible to reduce the inside volume upon squeezing and said body portion (2) retracting to its relaxed shape upon releasing the squeezing; 15
 - a neck portion (20) comprising a discharge orifice (13) and providing a liquid communication from said body portion (2) to said discharge orifice (13), said neck portion (20) being directed or being directable to squirt out liquid in said delivery-direction (50); 20
 and said container being characterized in that it further comprises a self seal valve (3) closing said discharge orifice (13). 25
2. A container (1) according to claim 1 characterized in that said neck portion (20) is directable by comprising a swivel spout (30), said swivel spout (30) comprising said discharge orifice (13). 30
3. A container (1) according to claim 1, characterized in that said neck portion (20) is directable by comprising a flexible corrugated transition piece (40) between said discharge orifice (13) and said body portion (2), preferably the part of said neck portion (20) comprising said discharge orifice (13), being repacably joined, preferably by screwing, to said transition piece (40). 40 45
4. A container (1) according to any of the preceding claims characterized in that the self seal valve (3) has a concave curvature towards the inside of said container (1) and preferably allows venting of said container (1) upon retracting of said body portion (2). 50
5. A container (1) according to any of the preceding claims characterized in that the self seal valve (3) is a retractive self seal valve extending outside said discharge orifice (13) during discharge. 55
6. A container (1) according to any of the preceding claims characterized in that said container further comprises a protective cap being disposed over said discharge orifice (13), preferably screwed or clipped to said neck portion (20), and providing a liquid tight discharge protection of said discharge orifice (13) during transport.
7. A container (1) according to any of the preceding claims characterized in that said self seal valve (13) is made of natural rubber, an elastic polymer, silicone rubber, polyvinyl chlorid, polyurethan, ethylene vinyl acetate or styrene-butadien copolymers, preferably silicone rubber.
8. A container (1) according to any of the preceding claims characterized in that said body portion (20) is made of a plastic material, preferably polyethylene, polypropylene polyester, polyethylene tereftalat or mixtures thereof.
9. A liquid containing container system characterized in that it comprises
 - the container (1) of any of the claims 1 to 8; and
 - a liquid in said container (1) having a thixotropic, non-Newtonian viscosity behaviour of reducing viscosity with increased shear rate.
10. A container system according to claim 9 characterized in that said liquid is a toilet bowl cleaner.

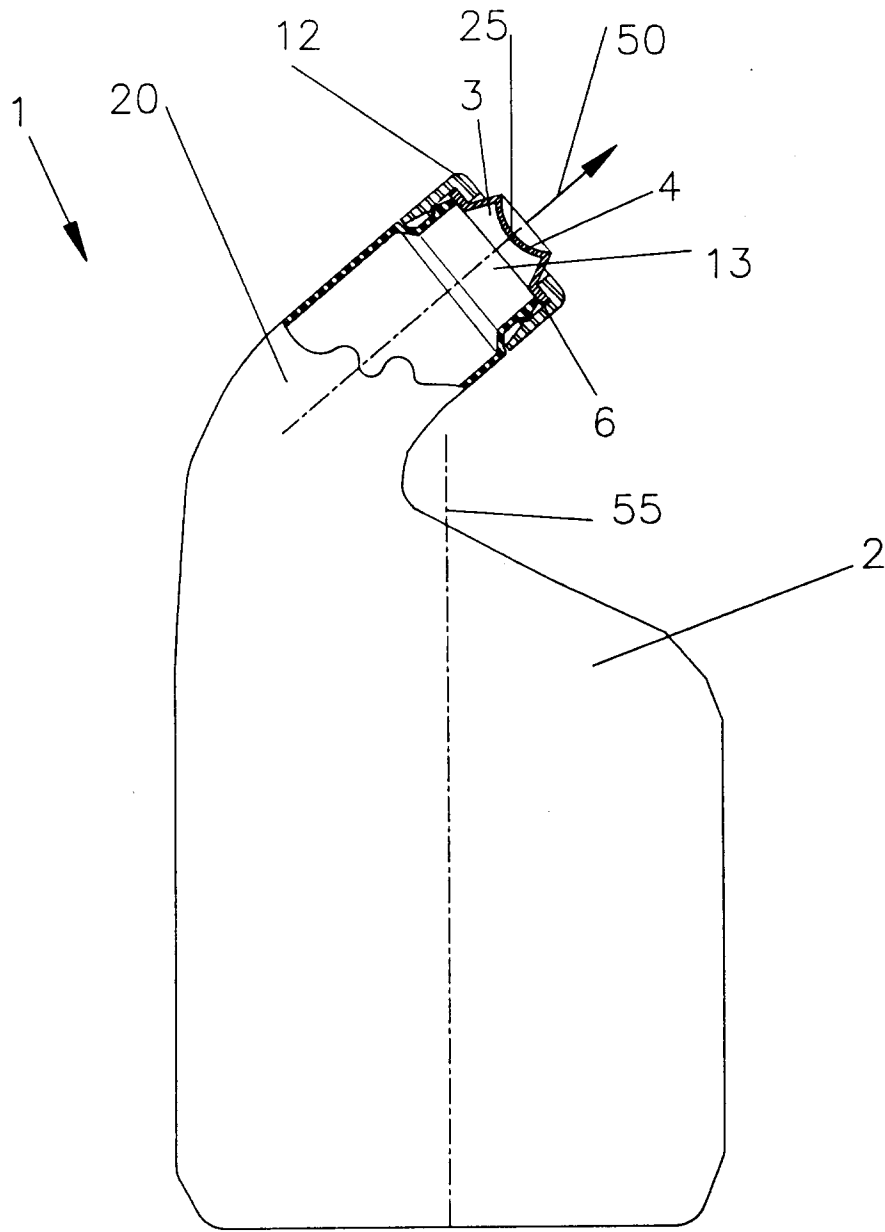


Figure 1

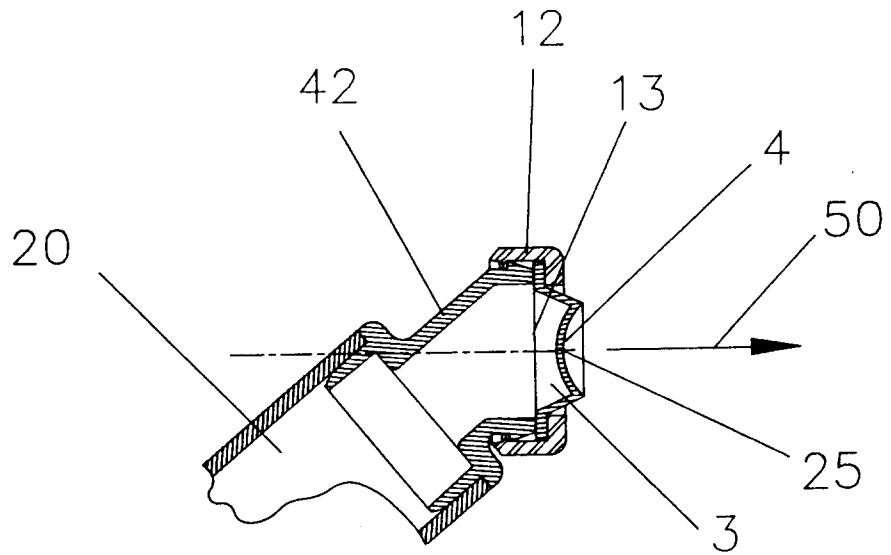


Figure 3

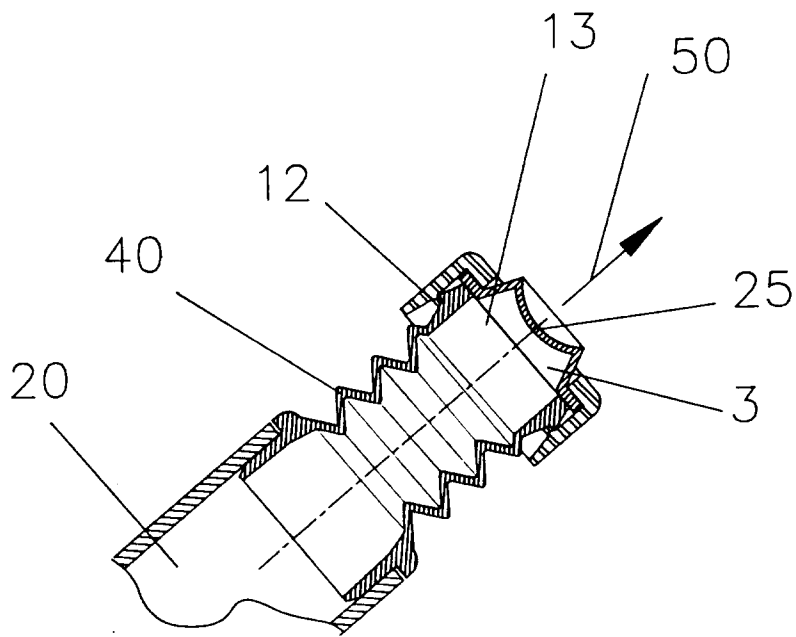


Figure 2

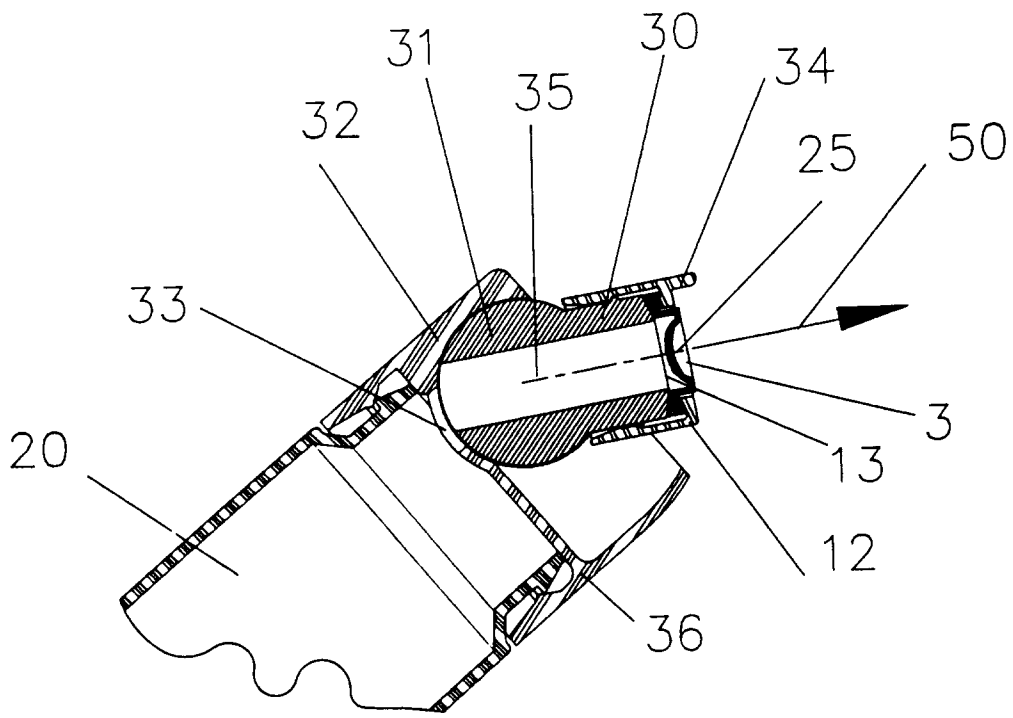


Figure 4

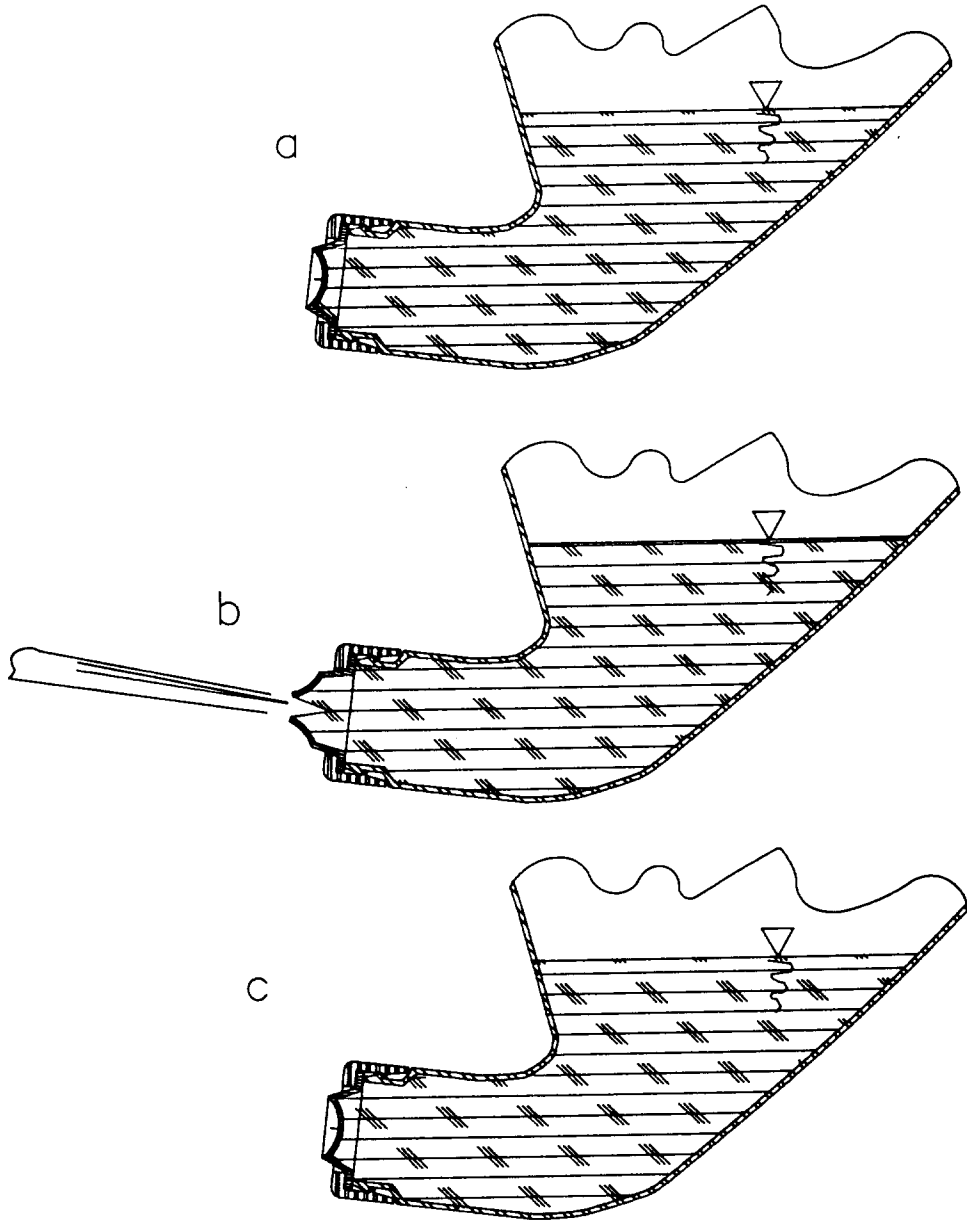


Figure 5 a-c

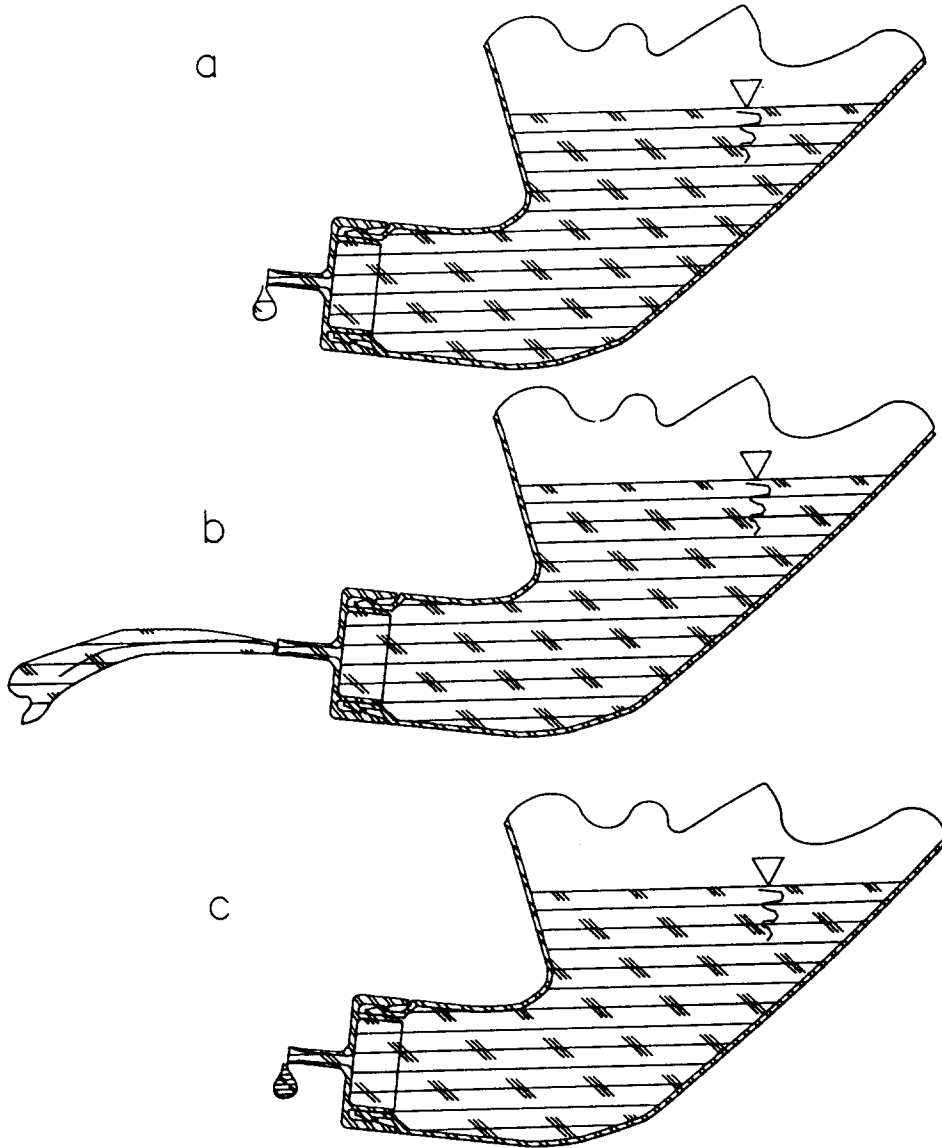


Figure 6 a-c



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 92 87 0145

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	DE-A-3 121 591 (DURING AG) * abstract; figures * ---	1	B65D47/20 B65D47/06 B65D47/26
D,A	EP-A-0 395 380 (LIQUID MOLDING SYSTEMS, INC.) * abstract; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 APRIL 1993	Examiner GINO C.P.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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