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(54) Title: A CONTAINER COMPRISING A FREE-FLOATING LEVEL INDICATOR BODY

(57) Abstract: The present invention provides a container (1) containing liquid, such as soap, shampoo, conditioner, body lotion, disinfectant or the like. The container (1) has a longitudinal direction and a transverse direction, an outer wall (2) having a dedicated rear part (4) and a dedicated front part (5), a bottom portion (6) and an upper portion (7).A dispensing means (10) is arranged at or connectable to one of said upper or bottom portions (6, 7) for dispensing liquid from the container (1). At least one free-floating level indicator body (8) is arranged inside the container (1) for indicating the liquid level (9) in the container, particularly when the liquid level (9) in the container is low.

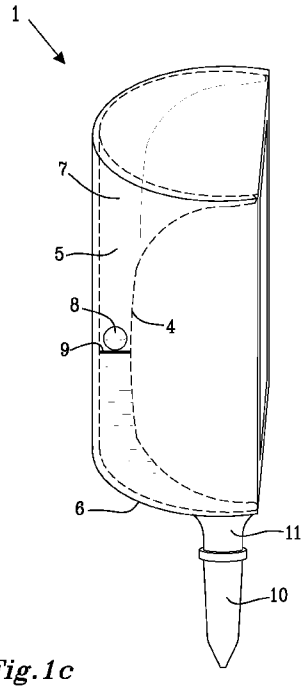


Fig.1c

WO 2014/088482 A1

A CONTAINER COMPRISING A FREE-FLOATING LEVEL INDICATOR BODY

TECHNICAL FIELD

The present invention relates to a container containing liquid, such as soap, shampoo, conditioner, body lotion, disinfectant or the like, the container having an outer wall, a bottom portion, an upper portion and a dispensing means arranged at or connectable to one of said upper or bottom portions for dispensing liquid from the container.

BACKGROUND OF THE INVENTION

Dispensers for dispensing liquids such as soap, shampoo, conditioner, body lotion, disinfectant or the like are well known in the art. Such dispensers comprise a container for holding the liquid, and a dispensing means, e.g. a pump and/or a valve mechanism. Also, the dispenser may comprise a housing for holding the container, and electronic means connected to the dispensing means, wherein the electronic means is activated by a user for activation of the dispensing means (a touch-free dispenser).

Containers are known in a large variety of forms. One particular type of containers is collapsible containers, which are intended to gradually collapse, decreasing their inner volume, as fluid is dispensed therefrom. Collapsible containers are particularly advantageous in view of hygienic considerations, as the integrity of the container is maintained throughout the emptying process, which ensures that no contaminants are introduced thereto, and that any tampering with the content of the container is impossible without visibly damaging the container. One type of collapsible containers is simple bags, generally formed from some soft plastic material.

Another type of collapsible containers is known from e.g. EP 0 072 783 and DE 9012878 U1. This type of collapsible containers has at least one relatively rigid wall, towards which the collapse of the other, less rigid walls of the container will be directed. Hence, hereinafter, this type of container is referred to as a semi-rigid collapsible container. This type of collapsible containers is advantageous in that information may be printed on the rigid wall, such that the information remains clearly visible and undistorted regardless of the state of collapse of the container. Moreover, for some contents, containers having at least one relatively rigid wall may be preferable over bags. However, collapsible containers having at least one relatively rigid wall may require a greater suction force generated from the pump in order to overcome the negative pressure created in the container during emptying thereof, compared to the bags.

Another type of containers is rigid bottles with the dispensing means positioned at the upper part of the container.

The container may advantageously be formed from a polypropylene-based material, or a HDPE-material, and may advantageously be blow-moulded.

The containers generally used for dispensing liquids mentioned above are semi-transparent or opaque, which makes it difficult to determine the level of the liquid in the container. The estimation of the amount of liquid remaining in the container may be even more difficult if the container is positioned inside a housing.

Several attempts have been made to implement level indicators for monitoring the amount of liquid in a container.

US 2003/0071058 discloses a liquid soap container comprising a fill-level indicator. The indicator is positioned inside an intermediate container and comprises a guide strip on which a float having a short top-side flag slides vertically. The flag can be seen from the outside. The dispensing system of US 2003/0071058 is rather complicated since it requires an intermediate container.

According to US 4,570,823, a soap solution dispenser comprises a reservoir having a float body or float which is pivotably mounted and provided with at least one indicator flag. Conjointly with the drop of the liquid level in the soap solution reservoir the float body also descends, which causes a displacement of the indicator flag. During the lowering of the surface of the soap solution the indicator flag moves along a viewing window formed in a cover or covering hood. There is thus signalled or indicated that the content of the soap solution in the reservoir is quite small or nearly consumed, so that the container now should be exchanged. The indicator flag moves externally of the soap solution, which means that the construction if the dispensing system of US 4,570,823 requires a reservoir.

EP 1 010 971 describes a device having a transparent measuring tube which communicates with a container, and a float which is arranged to interrupt light beams of light barrier arrangements formed from a number of optoelectronic devices and spaced in the measuring tube one on top of the other. The height of the float is one and a half times the spacing between the light barrier arrangements.

Although the above-mentioned documents disclose level indicators for determining the amount of liquid in a container, the solutions presented in the prior art are quite complicated and expensive.

Therefore, there is still a need for an inexpensive and simple level indicator for determining the amount of liquid in a container of the kind mentioned above, and particularly for indicating when the liquid level in the container is low.

SUMMARY OF THE INVENTION

The present invention described below eliminates disadvantages of the prior art, and provides a container comprising a level indicator that is simple and inexpensive.

A container according to the present invention has a longitudinal direction, a transverse direction and an outer wall. The outer wall of the container defines an inner volume of the container. The three-dimensional shape of the container defined by its outer wall may vary in a large number of ways. Thus, the container may be cylindrical, pyramidal or truncated pyramidal, conical or truncated conical, parallelepipedal or any other shape known in the art. The outer wall of the container may have a dedicated rear part facing away from the user, and a dedicated front part facing the user. Further, the container comprises a bottom portion and an upper portion positioned at a distance from the bottom portion, wherein the distance extends in the said longitudinal direction. A dispensing means is arranged at or connectable to one of said upper or bottom portions for dispensing liquid from the container. An essential feature of the present invention is that at least one free-floating level indicator body is arranged inside said container.

By the term “free-floating” is meant that the level indicator body is positioned on the surface of the liquid when the container is filled with liquid, can move along the entire surface area, is not by any means connected to the container, and can move freely inside the entire inner volume of the container.

By the term “disposable container” is meant that the container upon emptying is replaced with a new filled container.

By the term “semi-rigid collapsible container” is meant a container having at least one relatively rigid portion of the outer wall, towards which the collapsible motion of the remaining flexible portion of the outer wall will be directed when the container is being emptied.

As mentioned above, a widely used type of liquid containers is semi-transparent plastic containers. When the liquid inside the container is colourless or off-white, it may be difficult to determine the level of the liquid remaining in the container, especially when the container is positioned inside a housing, which may result in the container becoming completely empty and staying empty for a period of time before it is replaced. This may cause hygienic as well as emotional inconvenience for the users. By arranging a free-floating level indicator body inside the container, the level of the liquid is easily monitored, thus facilitating timely exchange avoiding situations when the container runs completely empty.

Free-floating level indicator body in the context of the present invention is an object being able to freely float on the surface of the liquid. The free-floating level indicator body is described in closer details below.

The liquid contained in the container of the present invention may be liquid soap, foam soap, shampoo, conditioner, body lotion, disinfectant or the like.

In order to enable the level indicator body to float, the density of the level indicator body must be lower than or equal to the density of the liquid. At the same time, when the container is filled with a lathering liquid, such as soap or shampoo, the density of the level indicator body should not be too low in order to avoid the level indicator body floating on the foam that may be present on the surface of the lathering liquid, since such a positioning of the level indicator body would show a misleading liquid level. Preferably, the density of the free-floating level indicator body is 50-99% of the density of the liquid. The density of the free-floating level indicator body may be between 0.7-0.95 g/cm^3, particularly for water-based liquids, i.e. liquids in which the main component is water.

In order to be able to dispense the liquid a dispensing means is arranged at or connectable to one of the bottom or upper portions. Such a dispensing means may comprise pump and valve mechanism of any kind known in the art, and is not a part of this invention. Thus, the dispensing means may be a disposable sealingly connected mechanical pump constituting a part of the container, such as one disclosed in WO 2009/104992 or a permanent mechanical pump constituting a part of the housing. The dispensing means of the kind mentioned above are conventionally used for containers in a hanging arrangement. Also, the dispensing means may be an exchangeable mechanical pump conventionally used for standing containers, or an automatic pump connected to a control means, e.g. a user detector.

In case when the container is collapsible and fully filled with liquid, the free-floating level indicator body will float on the liquid surface at the upper portion of the container. The free-floating level indicator body may move along the entire liquid surface. Thus, when the container is completely full, the free-floating level indicator body may at a given moment be positioned in the central part of the liquid surface, remotely from the outer wall of the container, and thus be substantially invisible. As the amount of the liquid gradually decreases, the dedicated rear part will move towards the dedicated front part. When the dedicated front and rear parts are at the minimum possible distance from each other, the liquid level will start to descend, and the free-floating level indicator body will follow this descending motion, clearly indicating the liquid level.

In case when the container is collapsible, the free-floating level indicator body should have a suitable shape and size such that the free-floating level indicator body does not become trapped between the dedicated front and rear parts when the container is fully collapsed and the dedicated front and rear parts are at the minimum possible distance from each other. A possible embodiment of the free-floating level indicator body is spherical pellets having a diameter of 2-20 mm, preferably 4-10 mm.

The collapsible container may comprise a groove positioned in the dedicated front part of the outer wall and extending in the longitudinal direction. If such a groove is provided, the free-floating level indicator body will upon collapsing be guided into the groove in the dedicated front part of the outer wall, which will provide desired positioning of the free-floating level indicator body, and make it readily visible. Of course, the groove and the free-floating level indicator body should have dimensions such that the free-floating level indicator body can be positioned inside the groove and move freely along the groove.

It is also conceivable to provide a container wherein the container comprises a narrow portion, such as a bottle-neck arranged at the bottom portion of the container, and a dispensing means positioned at the bottom portion of the container. The bottle-neck is arranged between the bottom portion of the container and the dispensing means, and may have a predetermined volume. In such an embodiment, a free-floating level indicator body may be invisible as long as the container holds any liquid, but become visible when the liquid level reaches the bottle-neck, thus indicating for the user that the container is almost empty, and the remaining liquid volume in the container is equal to the predetermined volume of the bottle-neck.

When the container is rigid, i.e. not collapsible, the situation may arise when the free-floating level indicator body is positioned at the central part of the liquid surface, remotely from the outer wall of the container, and thus be substantially invisible. Since the rigid container maintains its three-dimensional shape while being emptied, there will be no force pushing the free-floating level indicator body towards the outer wall. In this case, it may be advantageous to provide several, i.e. two or more relatively small free-floating level indicator bodies, e.g. spherical pellets described above. By providing several small free-floating level indicator bodies the probability of having at least one free-floating level indicator body in proximity of the outer wall increases. Having several small free-floating level indicator bodies is also conceivable when a collapsible container is used in order to ensure that at least one of the free-floating level indicator bodies will be at a desired position in proximity of the outer wall and thus readily visible through the outer wall.

In order to achieve a desired positioning of the free-floating level indicator body, the container may be slightly tilted backwards bringing the free-floating level indicator body towards the dedicated front part.

Another embodiment of the free-floating level indicator body suitable for use in rigid containers is a closed curve having the same shape but slightly smaller dimensions compared to the outer wall of the container. Such a curve may by a circle, an ellipse, a rectangle or any other shape matching the shape of the outer wall of the container in the transverse direction of the container. The free-floating level indicator body according to such an embodiment will always be positioned in proximity of the outer wall, and thus readily visible.

As will be obvious for a person skilled in the art, free-floating level indicator bodies of other shapes and sizes are conceivable.

In order for the free-floating level indicator body to be easily detected by vision, the free-floating level indicator body may be imparted with a strong colour, such as red or orange.

The free-floating level indicator body is suitably manufactured from a plastic material, such as polyethylene or polypropylene. This material is inexpensive, readily available and has an appropriate density in terms of floating requirement.

It is possible to provide a free-floating level indicator body made of magnetic plastic material. In such an embodiment, a mechanical positioning means and level indication means may be provided. The positioning means may be a magnetic material positioned

outside the outer wall of the container in proximity of the dedicated front part of the outer wall. Magnetic attraction force will arise between the free-floating level indicator body and the magnetic material, thus positioning the free-floating level indicator body in proximity of the dedicated front part of the outer wall making it readily detectable by vision.

In order to ensure correct indication of the liquid level, a mechanical level indication means, e.g. in the form of a magnetic switch may be arranged at the predetermined liquid level in proximity of the container in cases when the free-floating level indicator body is made of magnetic plastic material. When the magnetic free-floating level indicator body passes the mechanical level indication means, a signal is given to the user that the liquid level has descended to the threshold level. The signal may be a light flash, a sound, or a text message.

In cases when the free-floating level indicator body is coloured, an optical level indication means may be arranged at the predetermined liquid level in proximity of the container. When the coloured free- free-floating level indicator body passes the optical level indication means, a signal is given to the user that the liquid level has descended to the threshold level. The signal may be a light flash, a sound, or a text message.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1a-1c show a semi-rigid collapsible container comprising a free-floating level indicator body;

Fig. 2a-2b show a rigid container comprising a free-floating level indicator body;

Figs. 3a-3c show a semi-rigid collapsible container comprising a groove and a free-floating level indicator body.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1a illustrates a container 1 of semi-rigid collapsible type usually adapted to be placed in a dispenser housing (not shown). The container 1 comprises an outer wall 2 defining an inner volume 3 of the container 1. The outer wall 2 of the container 1 has a relatively flexible dedicated rear part 4 facing away from the user, and a relatively rigid dedicated front part 5 facing the user. Further, the container 1 comprises a bottom portion 6 comprising a bottle-neck 11 and an upper portion 7. A dispensing means 10 of an optional suitable kind mentioned above is attached to the bottle-neck 11 at the bottom portion 6 of the container 1. A free-floating level indicator body 8 is arranged inside the container 1. In

Fig. 1a the container 1 is filled with a maximum possible amount of liquid, and the liquid level 9 as well as the free-floating level indicator body 8 are positioned at the upper portion 7.

Upon decreasing of the liquid volume due to dispensing of the liquid through the dispensing means 10, the relatively flexible dedicated rear part 4 will move towards the relatively rigid dedicated front part 5, as shown in Fig. 1b. The free-floating level indicator body 8 will follow the motion of the dedicated rear part 4 and move towards the dedicated front part 5, thus becoming more visible. As long as the inner volume 3 of the container 1 may decrease due to the collapsible motion of the dedicated rear part 4, the liquid level 9 will be at a constant position at the upper portion 7 of the container 1.

As soon as the dedicated rear part 4 has completed its collapsible motion and is positioned at the minimum possible distance from the dedicated front part 5, the liquid level 9 will start descending with continued decreasing of the liquid volume due to dispensing of the liquid through the dispensing means 10 (Fig. 1c). The free-floating level indicator body 8, now positioned in proximity of the dedicated front part 5 and thus readily visible, will follow the descending motion of the liquid level 9, enabling the user to easily monitor the amount of liquid remaining in the container 1, and facilitating timely replacement of the container 1.

As mentioned above, two or more free-floating level indicator bodies 8 may be positioned inside the container 1 in order to ensure that at least one of the free-floating level indicator bodies 8 will be at a desired position in proximity of the outer wall 2 and thus readily visible through the outer wall 2.

Fig. 2a illustrates a rigid container 101. The container 101 comprises an outer wall 102 defining an inner volume 103 of the container 101. The outer wall 102 of the container 101 has a dedicated rear part 104 facing away from the user, and a dedicated front part 105 facing the user. Further, the container 101 comprises a bottom portion 106 and an upper portion 107 comprising a bottle-neck 111. A dispensing means 110 is arranged at the bottle-neck 111 at the upper portion 107 of the container 101. A free-floating level indicator body 108 is arranged inside the container 101. In the embodiment shown in Fig. 2a, the free-floating level indicator body 108 is in the form of a ring having substantially same shape but slightly smaller dimension than the outer wall 102 in the transverse direction of the container 101. In Fig. 2a the container 101 is filled with a maximum

possible amount of liquid, and the liquid level 109 as well as the free-floating level indicator body 108 are positioned at the upper portion 107.

Upon decreasing of the liquid volume due to dispensing of the liquid through the dispensing means 110, the liquid level 109 will start descending, as shown in Fig. 2b. The free-floating level indicator body 108, at all times positioned in proximity of the outer wall 102 and thus readily visible, will follow the descending motion of the liquid level 109, enabling the user to easily monitor the amount of liquid remaining in the container 101, and facilitating timely replacement of the container 101.

A single free-floating level indicator body of the kind shown in Figs. 1a-c may be used with the container 101 shown in Figs. 2a-2b. However, in this case the free-floating level indicator body 8 may become positioned in the central portion of the liquid surface inside the container 101, remote from the outer wall 102 and thus be more difficult to monitor. This problem may be solved by having a plurality of free-floating level indicator bodies 8 in the rigid container 101, thus ensuring that at least one of the free-floating level indicator bodies 8 will be at a desired position in proximity of the outer wall 102 and thus readily visible through the outer wall 102.

Fig. 3a illustrates a container 201 of collapsible type. The container 201 comprises an outer wall 202 defining an inner volume 203 of the container 201. The outer wall 202 of the container 201 has a relatively flexible dedicated rear part 204 facing away from the user, and a relatively rigid dedicated front part 205 facing the user. Further, the container 201 comprises a bottom portion 206 comprising a bottle-neck 211, an upper portion 207, and a groove 212 positioned in the dedicated front part 205 of the outer wall 202 and extending in the longitudinal direction of the container 201. A dispensing means 210 is arranged at the bottle-neck 211 at the bottom portion 206 of the container 201. A free-floating level indicator body 208 is arranged inside the container 201. The dimensions of the groove 212 and the free-floating level indicator body 208 are chosen such that the free-floating level indicator body 208 fits inside the groove 212 and can move freely along the groove 212. In Fig. 3a the container 201 is filled with a maximum possible amount of liquid, and the liquid level 209 as well as the free-floating level indicator body 208 are positioned at the upper portion 207.

Upon decreasing of the liquid volume due to dispensing of the liquid through the dispensing means 210, the flexible dedicated rear part 204 will move towards the rigid dedicated front part 205, as shown in Fig. 3b. As long as the inner volume 203 of the

container 201 may decrease due to the collapsible motion of the dedicated rear part 204, the liquid level 209 will be at a constant position at the upper portion 207 of the container 201, with the free-floating level indicator body 208 positioned at the liquid surface.

As soon as the dedicated rear part 204 has completed its collapsible motion and is positioned at the minimum possible distance from the dedicated front part 205, the liquid level 209 will start descending with continued decreasing of the liquid volume due to dispensing of the liquid through the dispensing means 210 (Fig. 3c). The free-floating level indicator body 208, now forced to be positioned in the groove 212 in proximity of the dedicated front part 205 and thus readily visible, will follow the descending motion of the liquid level 209 along the groove 211, enabling the user to easily monitor the amount of liquid remaining in the container 201, and facilitating timely replacement of the container 201.

In order to ensure that the free-floating level indicator body 8, 108, 208 is at a desired position in proximity of the outer wall 2, 102, 202 and thus readily visible through the outer wall 2, 102, 202, the container 1, 101, 201 may be slightly tilted in the dispenser housing. In this way the free-floating level indicator body will automatically be in a position with the lowest liquid level, i.e. in proximity of the outer wall 2, 102, 202.

As mentioned above, the detection of the free-floating level indicator body 8, 208 may take place in the bottle-neck 11, 211 of the container 1, 21. The bottle-neck may be so dimensioned that it accommodates a predetermined liquid volume, e.g. allowing 15-30 activations of the dispensing means.

Although the present invention has been described with reference to various embodiments, those skilled in the art will recognise that changes may be made without departing from the scope of the invention. It is intended that the detailed description be regarded as illustrative and that the appended claims including all the equivalents are intended to define the scope of the invention.

CLAIMS

1. A container (1) containing liquid, such as soap, shampoo, conditioner, body lotion, disinfectant or the like, said container having a longitudinal direction and a transverse direction, an outer wall (2) having a dedicated rear part (4) and a dedicated front part (5), a bottom portion (6) and an upper portion (7) positioned at a distance from said bottom portion (6), said distance extending in said longitudinal direction, a dispensing means (10) arranged at or connectable to one of said upper or bottom portions (6, 7) for dispensing liquid from the container (1), *characterized in* that at least one free-floating level indicator body (8) is arranged inside said container (1).

2. The container according to claim 2, wherein the density of said free-floating level indicator body is between 50-99% of the density of said liquid.

3. The container according to any one of the preceding claims, wherein said free-floating level indicator body is spherical.

4. The container according to claim 3, wherein the diameter of said free-floating level indicator body is between 2-20 mm, preferably 4-10 mm.

5. The container according to any one of the preceding claims, wherein said free-floating level indicator body is coloured.

6. The container according to any one of the preceding claims, wherein said free-floating level indicator body is made of plastic material.

7. The container according to any one of the preceding claims, wherein said free-floating level indicator body is magnetic.

8. The container according to any one of the preceding claims, wherein said container is of a collapsible semi-rigid type.

9. The container according to claim 8, wherein said dedicated front part is relatively rigid, and said dedicated rear part is relatively flexible, such that said dedicated rear part is movable towards said dedicated front part upon emptying of the container.

10. The container according to any one of the preceding claims, wherein said container comprises a groove positioned in said dedicated front part of said outer wall and extending in said longitudinal direction, said groove and said free-floating level indicator body having dimensions such that said free-floating level indicator body can be positioned inside said groove and move freely along said groove.

11. The container according to claims 1-7, wherein said container is rigid.

12. The container according to claim 11, wherein said free-floating level indicator body is in the form of a closed curve having the same shape but slightly smaller dimensions compared to said outer wall of said container.

13. .The container according to claims 1-11, wherein said container comprises a plurality of free-floating level indicator bodies.

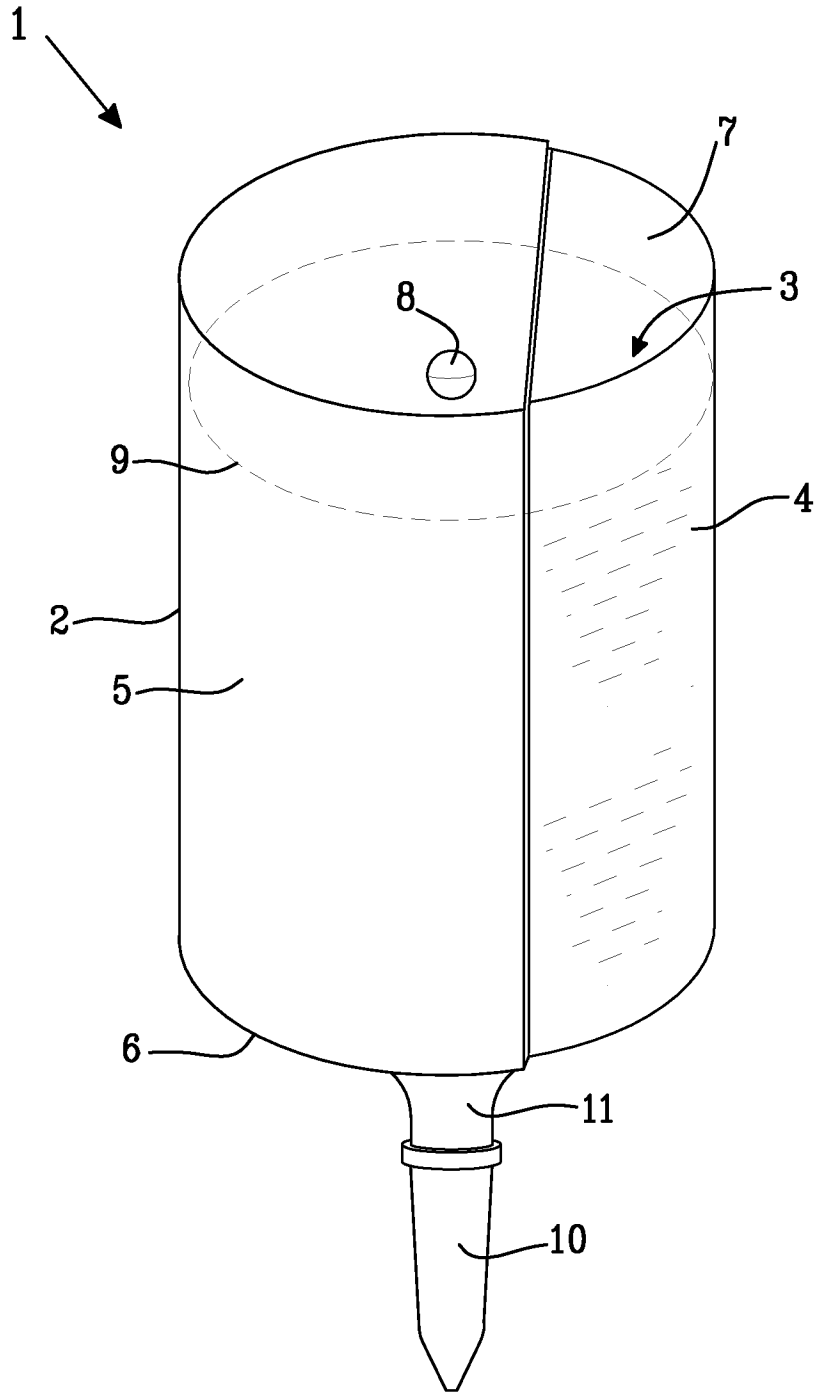


Fig. 1a

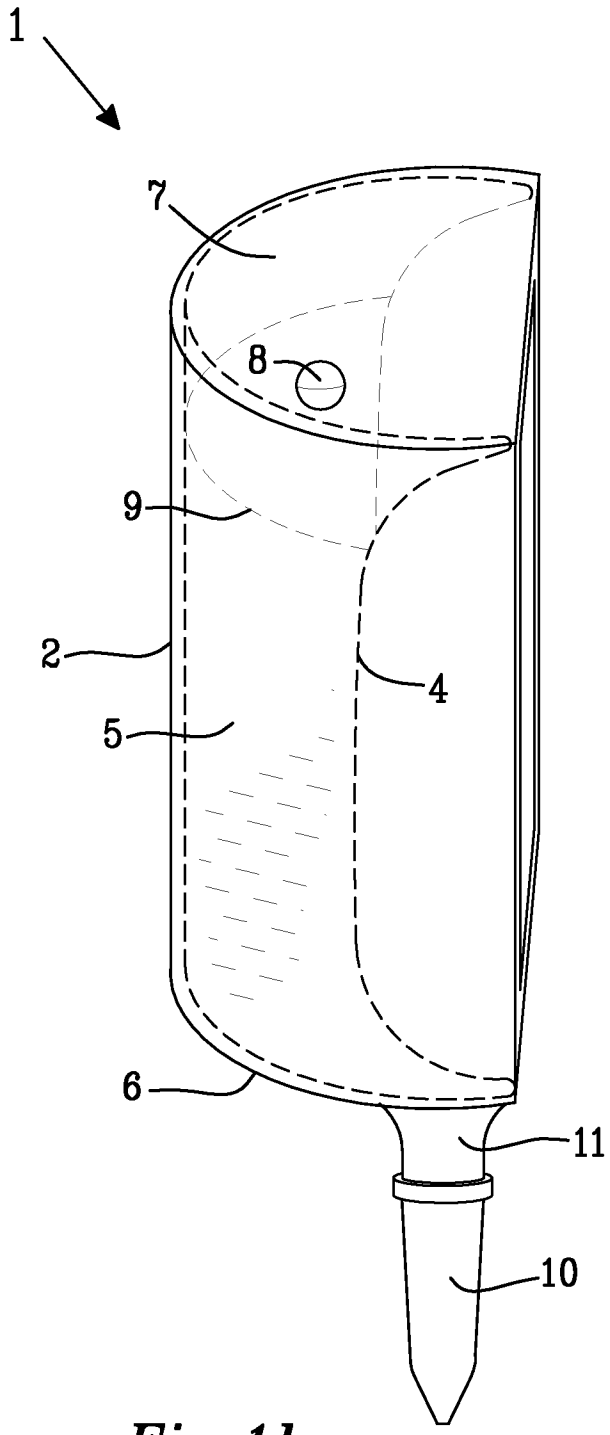


Fig.1b

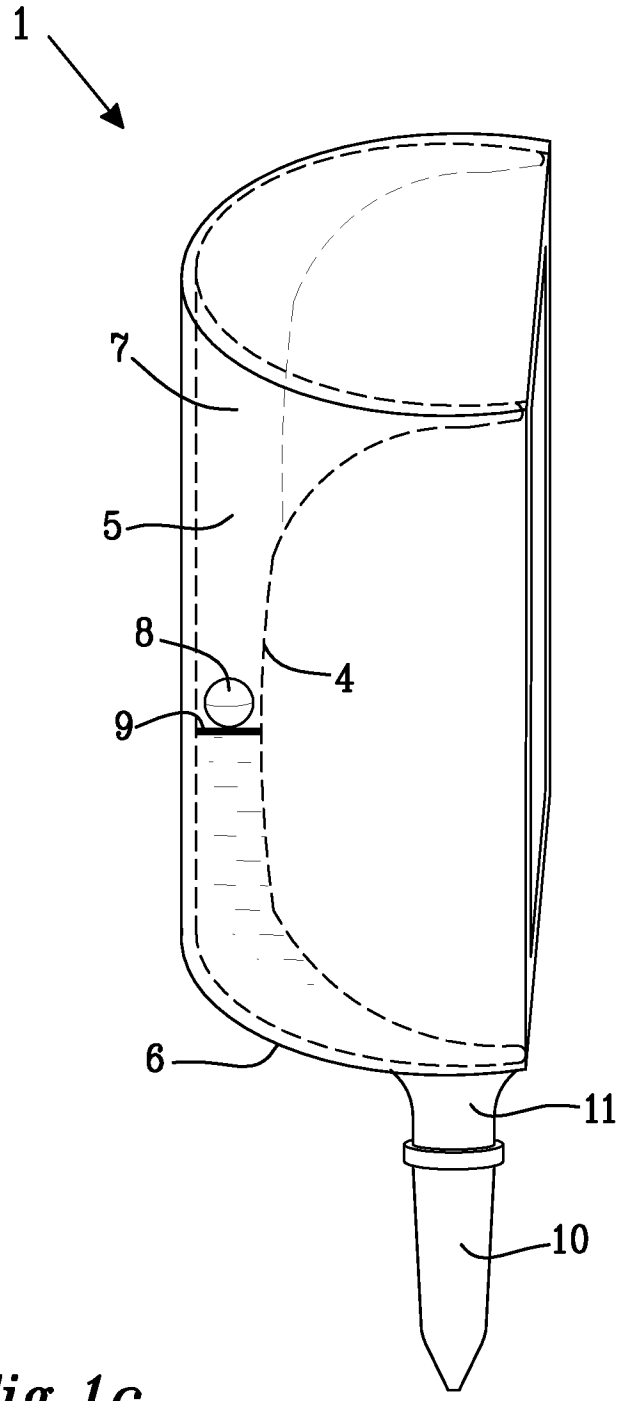
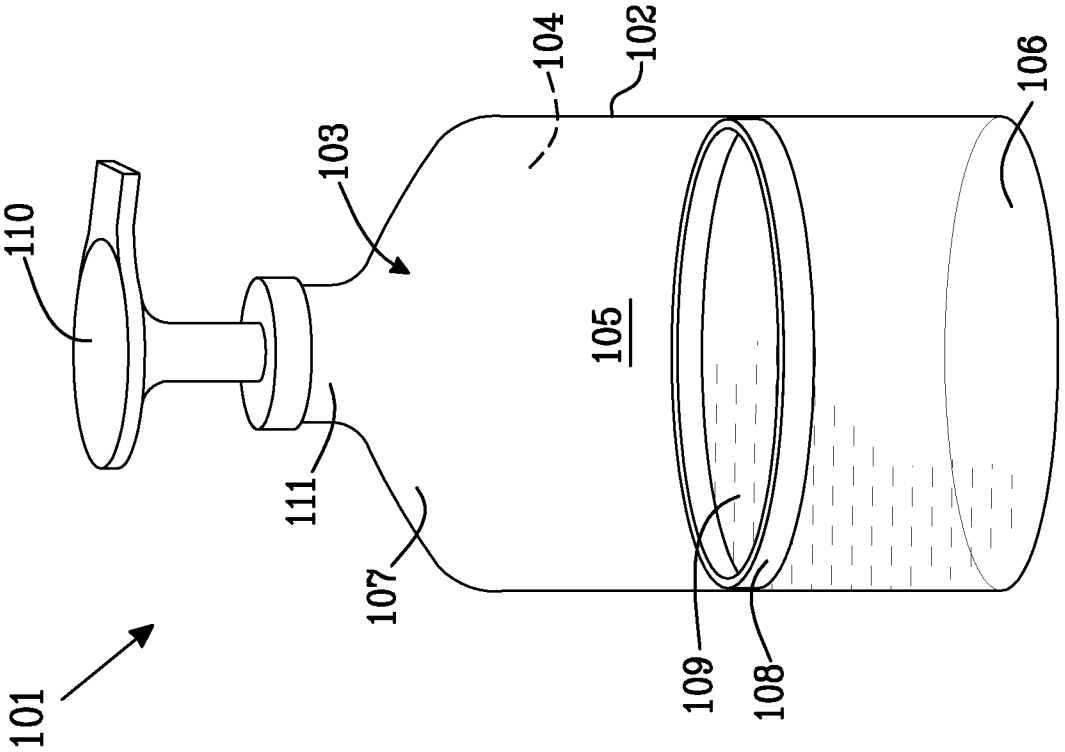


Fig. 1c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108

Fig.2b

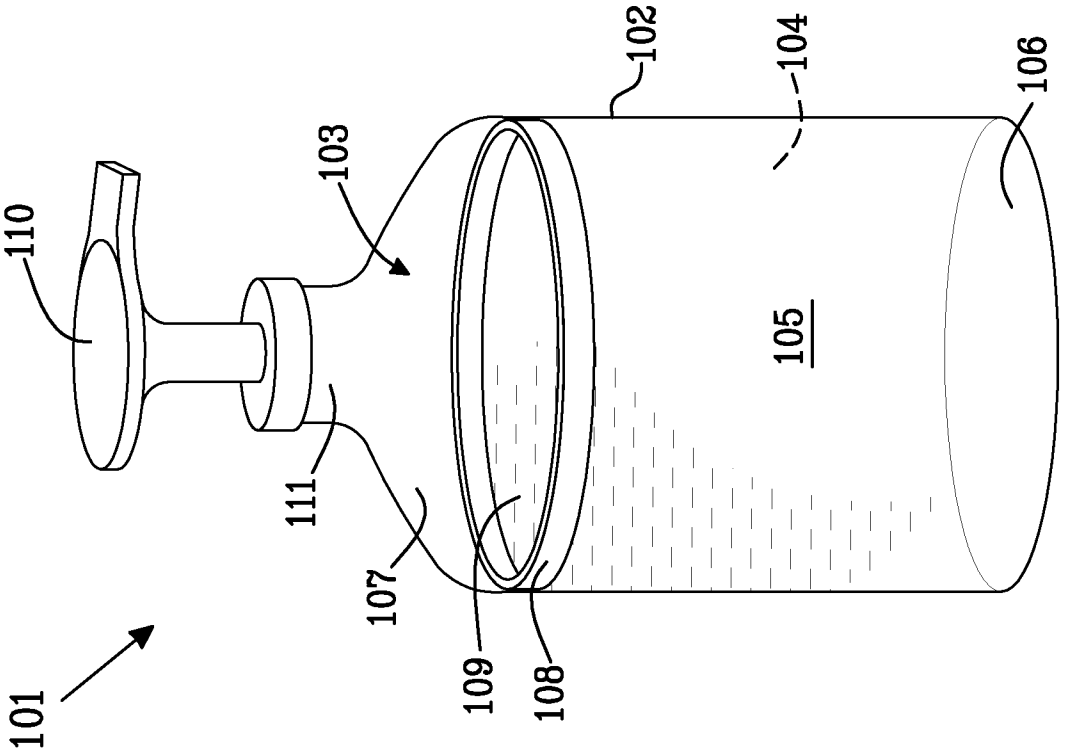
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Fig.2a

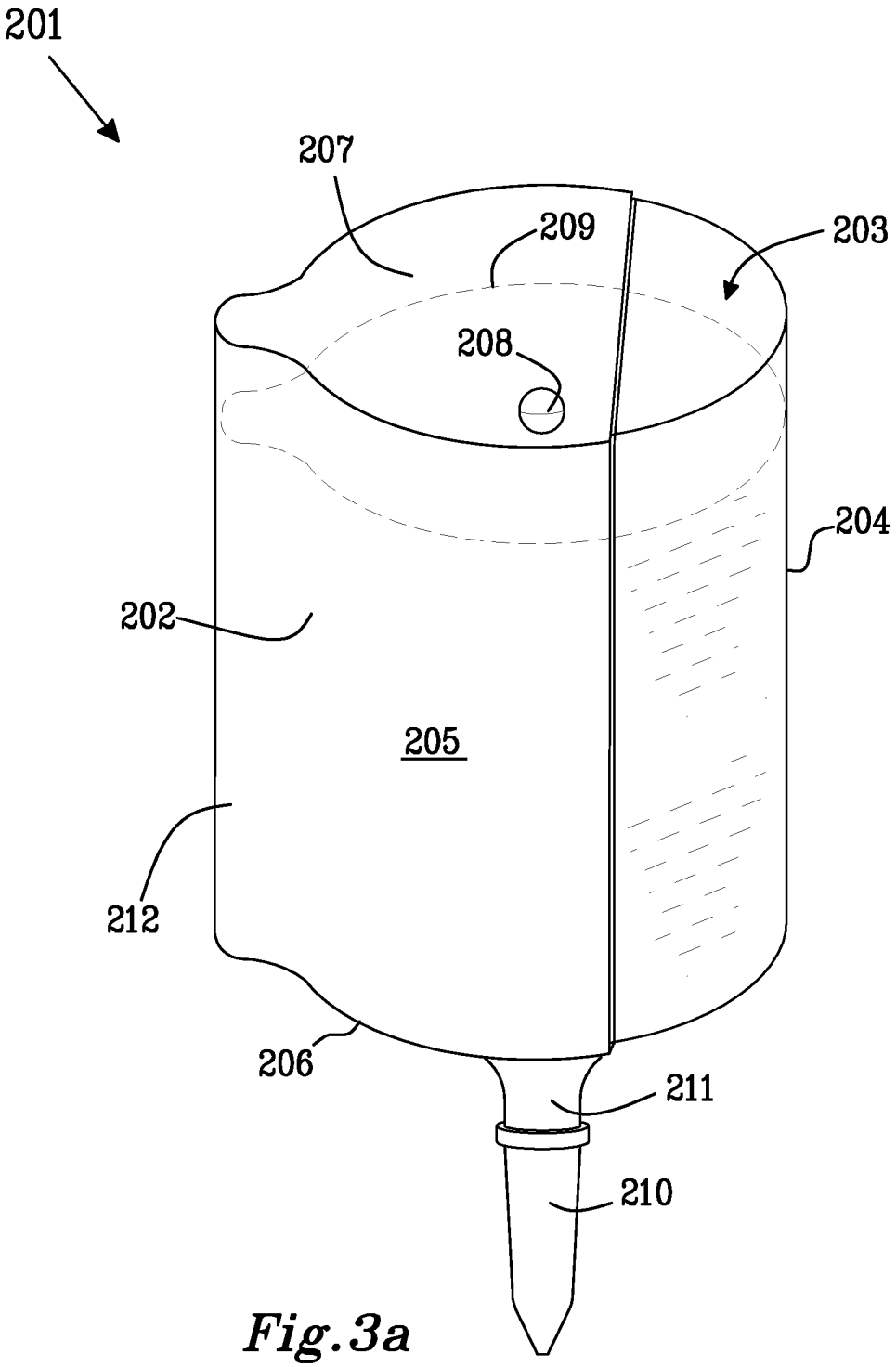

Fig.3a

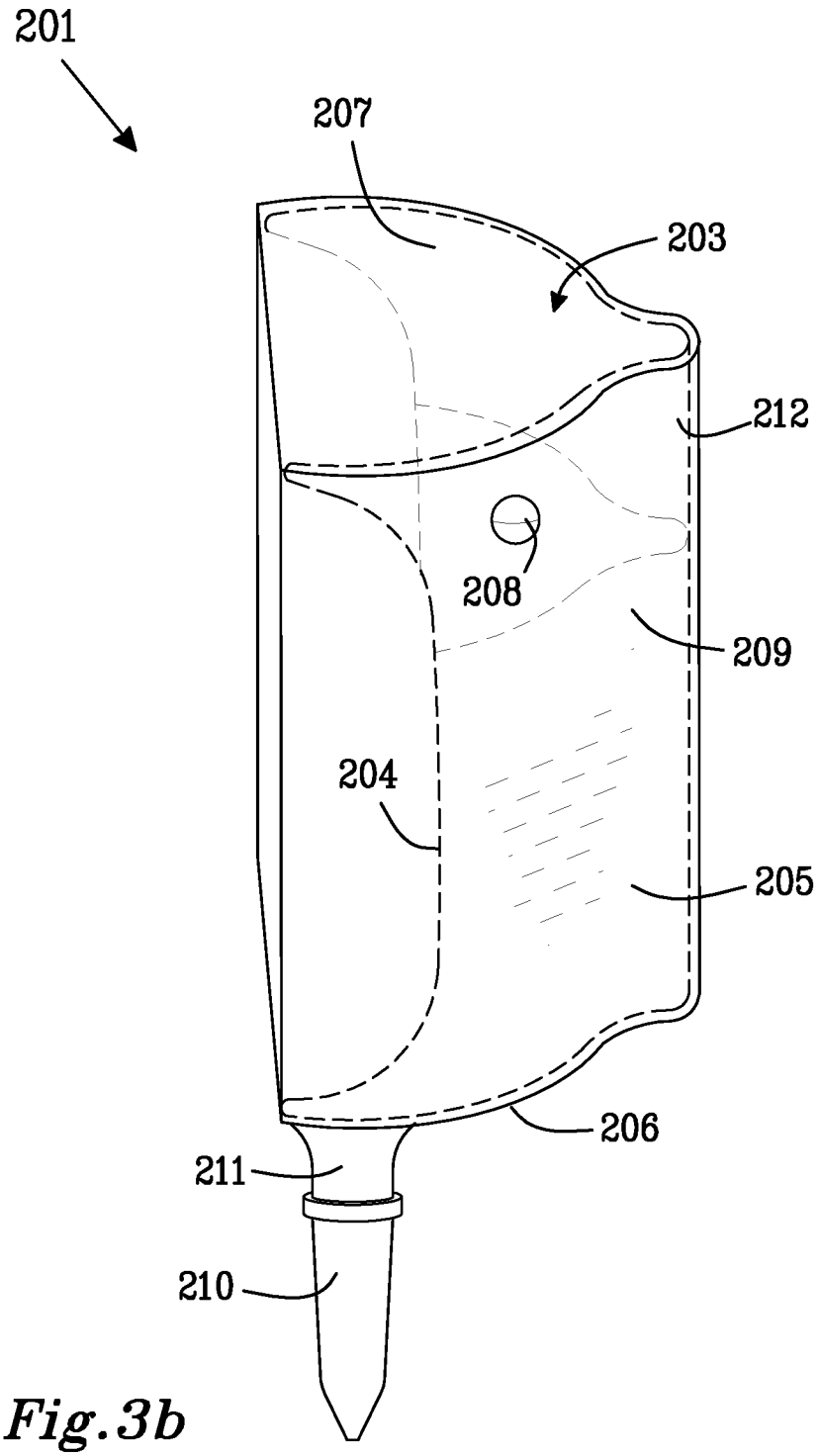

Fig.3b

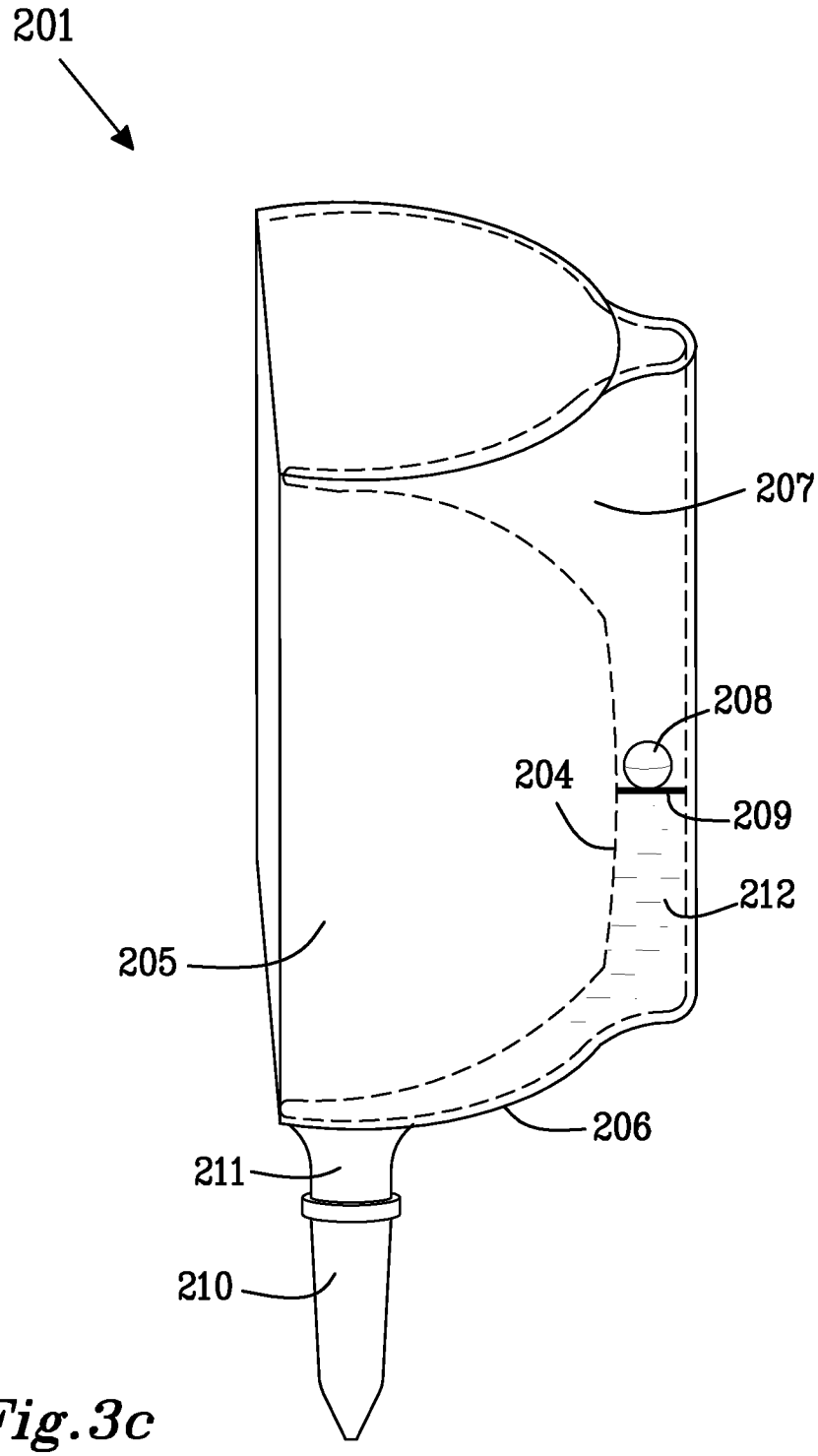

Fig.3c

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2012/051354

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47K, B65D, G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0114026 A1 (CWS AG), 25 July 1984 (1984-07-25); abstract; page 1, line 25 - page 3, line 11; page 5, line 2 - line 14; figures 1-2,4	1-2, 4-6, 8-11, 13
Y	--	3, 7, 12
Y	FR 2972252 A1 (PEUGEOT CITROEN AUTOMOBILES SA), 7 September 2012 (2012-09-07); abstract; page 3, line 2 - page 4, line 3; figures; claims 1-2	3
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Y	GB 2134654 A (DUDLEY IND LTD), 15 August 1984 (1984-08-15); abstract; page 1, line 43 - line 83; figure 1	7
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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07-05-2013	08-05-2013
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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	US 20040103893 A1 (PAYNE SIMON ROBERT), 3 June 2004 (2004-06-03); abstract; figure 1 --	12
A	US 1719386 A (BENCE LOUIS J), 2 July 1929 (1929-07-02); page 1, line 73 - line 85; figures 4,6 -- --------	1-13

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Continuation of: second sheet

International Patent Classification (IPC)

A47K 5/12 (2006.01)
G01F 23/64 (2006.01)

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