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(54) **LIQUID REFILL CARTRIDGE, SYSTEM AND METHOD THEREOF**

(57) The present invention relates to a liquid refill cartridge (1) for refilling containers (2) of liquid products, said liquid refill cartridge (1) comprising a hollow body (10) for containing said liquid products, said hollow body (10) being provided with a first end (11) and a second end (12), opposite to said first end (11), said first end (11) having a first opening (110), said second end (12) having a second opening (120) larger in size than or equal in size to said first opening (110), both said first opening (110) and second opening (120) being closed by means of respectively first removable closing means (13; 14; 15; 16) and second removable closing means (13; 14; 15; 16; 17; 18) so that, when in use for refilling said containers, said liquid refill cartridge (1) being filled of said liquid products, said first opening (110) may be open by removing said first removable closing means (13; 14; 15; 16; 17; 18), and said liquid refill cartridge (1) may be used to refill said container, while, when empty, said liquid refill cartridge (1) may be refilled by closing said first opening (110) with said first removable closing means (13; 14; 15; 16; 17; 18) and by removing said second removable closing means (13; 14; 15; 16; 17; 18) from said second opening (120) for allowing the inlet of said liquid products inside said second opening (120). The present invention relates also to a liquid refill system (3) comprising said liquid refill cartridge (1) and a method for refilling liquid products inside a container (2) using said liquid refill cartridge (1).

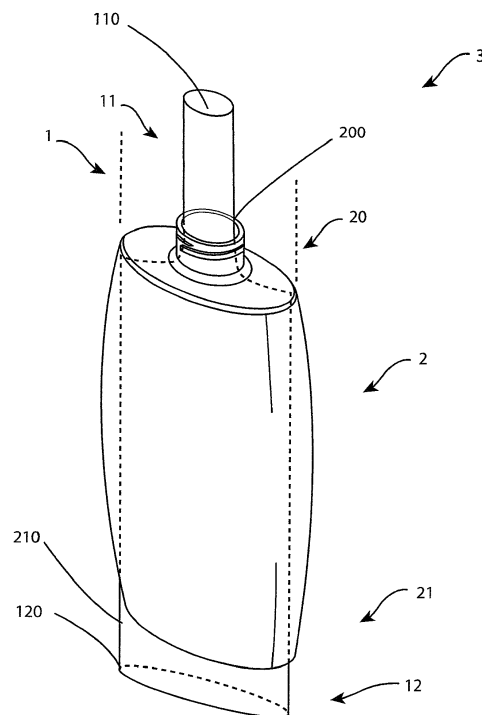


Fig.3

Description

[0001] The present invention relates to a liquid refill cartridge, a liquid refill system and a method for refilling liquids in a container.

[0002] Specifically, the present invention relates to a refill cartridge for refilling a container with liquid products, said liquid refill cartridge containing said liquid products, such as soaps and the like.

[0003] Furthermore, the present invention relates to a system comprising said cartridge and a container.

[0004] Finally, the present invention concerns a method for refilling liquid products inside a container.

[0005] It is well known that liquid containers for liquid products, such as shampoo and conditioner bottles, hand soap dispensers, laundry detergent bottles, cleaning sprays, perfume bottles and the like, have a major impact in the production of household plastic waste.

[0006] Additionally, the cost of the container is part of the final price of such products.

[0007] In the last few years, several solutions have been proposed for refilling liquid containers, in particular containers made of hard plastic, in order to reduce their environmental impact and their relative costs both for the producers and for the consumers.

[0008] Traditional methods for refilling such liquid containers may involve bringing an empty liquid container to be refilled to a refill station, usually provided inside stores, in particular supermarkets or health and beauty retailers, and refill them with the desired liquid product stored in bulk containers.

[0009] However, such methods require consumers to bring their empty liquid containers to the refill stations any time they need to buy new liquid products, which requires to plan the visit to the stores in advance, with further burdening for the consumer.

[0010] Furthermore, such containers need to be washed at home, and usually occupy a large amount of space in the user bag. They can also be made with heavy materials, such as glass or metal, which make their transport even more cumbersome for the consumer.

[0011] In order to solve the problems for the consumer related to bringing the containers back to the store for the refill, some companies have proposed a refilling scheme, wherein the containers are refilled periodically at home by a delivery person bringing the desired refilling material in bulk.

[0012] However, in such case the consumer needs to be at home during the refilling time, with the subsequent problems related to the coordination of a periodical delivery.

[0013] Furthermore, both the aforementioned solutions require the use of bulk containers, which usually need a large amount of space to be stored.

[0014] Alternative solutions involve the purchase of a refill pouch containing the liquid product needed, and refilling the liquid containers at home, by pouring the content of the liquid pouch inside them.

[0015] The refill pouches are usually provided with a nozzle for facilitating the pouring of the liquid product inside the container. Furthermore, the refill pouches are usually made with a minor amount of plastic if compared to the liquid containers to be refilled, and may contain a larger amount of product, allowing multiple refills of one container, and allowing to reduce the total plastic consumption.

[0016] However, such solution is not a zero-waste solution, since after being emptied from their content, the pouches, usually made of single use plastic, will be thrown away.

[0017] Furthermore, there is only a limited number of liquid products sold inside such liquid pouches.

[0018] Also, the user may find difficult to completely empty the pouches from their content, involving a potential waste of liquid products.

[0019] Finally, all the above-mentioned methods may incur in the spilling of liquid products while refilling the containers.

[0020] An alternative solution for solving the latter problem was shown in the US design patent n. US 5 337 921, according to which the refill pouch can be inserted inside a structural skeleton comprising a central hollow cavity for the insertion of said liquid refill cartridge.

[0021] However, even such solution involves the consumption of single-use plastic.

[0022] Therefore, the aim of the present invention is to overcome the above-mentioned disadvantages in refilling containers of liquid products.

[0023] In particular, it is a specific aim of the present invention to provide a refill cartridge, which is easy to use for refilling liquid containers and prevents the spilling of liquid products.

[0024] Furthermore, an aim of the present invention is that such cartridge and system may be used in a zero-waste close-loop economy.

[0025] Another aim of the present invention, is to provide a refill scheme that reduces the amount of space required for the refilling containers.

[0026] In addition, another aim of the present invention is to provide a refill scheme, which can be adapted to the consumer needs and lifestyle.

[0027] Yet, another aim of the present invention is that such cartridge reduces the total costs of liquid products, both for the producer and for the consumer.

[0028] It is therefore an object of the present invention a liquid refill cartridge for refilling containers of liquid products, said liquid refill cartridge comprising a hollow body for containing said liquid products, said hollow body being provided with a first end and a second end, opposite to said first end, said first end having a first opening, said second end having a second opening larger in size than or equal in size to said first opening, both said first opening and second opening being closed by means of respectively first removable closing means and second removable closing means so that, when in use for refilling said containers, said liquid refill cartridge being filled of

said liquid products, said first opening may be open by removing said first removable closing means, and said liquid refill cartridge may be used to refill said container, while, when empty, said liquid refill cartridge may be re-filled by closing said first opening with said first removable closing means and by removing said second removable closing means from said second opening for allowing the inlet of said liquid products inside said second opening.

[0029] According to the invention said first end can be tapered towards said first opening.

[0030] Furthermore, according to the invention, said first removable closing means and/or said second removable closing means may comprise

at least one folding line on said hollow body for folding said first end and/or said second end over said hollow body, and fastening means to fasten said folded first end and/or said folded second end to said hollow body; and/or a sealing clip; and/or a push-lock zipper; and/or a top-slider closure.

[0031] Also, according to the invention, said liquid products can be soaps, shampoos, liquid creams, cleaning agents, powders or bulk solids.

[0032] It is a further object of the present invention a liquid refill system comprising a liquid refill cartridge according to the invention and a container configured to receive said liquid refill cartridge, wherein said container comprises a top portion, having a top opening, and a further opening adapted to receive said liquid refill cartridge, and wherein said first opening of said liquid refill cartridge is adapted to be aligned to said top opening, once said liquid refill cartridge is inserted inside said container through said further opening.

[0033] According to the invention, at least a part of said first end of said liquid refill cartridge can be insertable inside said top opening, with said first opening protruding outside said top opening.

[0034] In addition, according to the invention, said further opening may be a bottom opening arranged on a bottom portion of said container, so that said liquid refill cartridge can be inserted inside said container through said bottom opening in an upright position, with said first opening facing upwards.

[0035] Also, according to the invention, said liquid refill cartridge can have substantially the same shape as said container.

[0036] Furthermore, according to the invention, said container may have a storing space for storing at least one empty liquid refill cartridge.

[0037] It is a further object of the present invention a method for refilling liquid products inside a container by means of a liquid refill cartridge according to the invention, said liquid refill cartridge being filled of liquid products, wherein said container comprises

a top portion having a top opening, and
a further opening adapted to receive said liquid refill cartridge,

said second opening of said liquid refill cartridge being closed by means of said second removable closing means,

said method comprising the following steps:

A. if closed, removing said first removable closing means from said first opening; and

B. inserting said liquid refill cartridge inside said container through said further opening, aligning said first opening of said liquid refill cartridge to said top opening.

[0038] A method according to the invention can also comprise the following step, before or after said steps A and B:

C. if open, closing said first opening by means of said first removable closing means;

D. removing said second removable closing means from said second opening; and

E. filling said liquid refill cartridge of a liquid product by pouring said liquid product through said second opening.

In addition, a method according to the invention may also comprise the following step, after said step E.

F. closing said second opening by means of said second removable closing means.

[0039] Furthermore, according to the invention, said top opening of said container may be adapted to receive at least a part of said first end and said method comprising the following sub-step of said step B:

B1. inserting said at least a part of said first end inside said top opening, said first opening protruding from said top opening.

[0040] Also, according to the invention, during said step B, said liquid refill cartridge can be inserted inside said container, being in an upright position, with said first opening facing upwards.

[0041] Finally, according to the invention, said further opening of said container can be a closable bottom opening arranged on a bottom portion of said container, and in said step B. can comprise the following sub-steps:

B2. inserting said liquid refill cartridge inside said container through said closable bottom opening, and

B3. closing said closable bottom opening .

[0042] Embodiments of the invention will now be described by way of example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a perspective view of a first embodiment of a liquid refill cartridge according to the present invention, such liquid refill cartridge being empty and having two openings on opposite ends;

Fig. 2 is a perspective view of an empty container suitable for receiving the liquid refill cartridge of fig. 1;

Fig. 3 is a perspective view of a first embodiment of a liquid refill system according to the present invention, comprising the liquid refill cartridge of Fig. 1 inserted inside a container;

Fig. 4 is a perspective view of the liquid refill system of Fig. 3, with the container being closed by a cap;

Fig. 5 is a perspective view of a second embodiment of a liquid refill cartridge according to the present invention, such liquid refill cartridge being empty and having two openings on opposite ends;

Fig. 6 is a perspective view of the empty liquid refill cartridge of Fig. 5, wherein a first end of the two openings has been closed by means of removable closing means;

Fig. 7 is a perspective view of the liquid refill cartridge of Fig. 5, filled with a liquid product, wherein the second opening of the two openings has been closed by means of removable closing means and the first opening is open;

Fig. 8 is a perspective view of the filled liquid refill cartridge of Fig. 7 being inserted inside a container;

Fig. 9 is a perspective view of a second embodiment of a liquid refill system according to the present invention, comprising a container filled with the liquid refill cartridge of Fig. 7;

Fig. 10 is a frontal view in section of a third embodiment of a liquid refill system according to the present invention, comprising a container filled with a liquid refill cartridge according to the present invention;

Fig. 11 is a frontal view of the liquid refill system of Fig. 10;

Fig. 12 is a frontal view of the liquid refill cartridge of Fig. 10;

Fig. 13 is an exploded frontal view of the container of Fig. 10.

Fig. 14 is a perspective view of a first variation of removable closing means to be used for at least one opening of a liquid refill cartridge according to the present invention;

Fig. 15 is a perspective view of a second variation of removable closing means to be used for at least one opening of a liquid refill cartridge according to the present invention;

Fig. 16 is a perspective view of a third variation of removable closing means to be used for at least one opening of a liquid refill cartridge according to the present invention; and

Fig. 17 is a perspective view of a fourth variation of removable closing means to be used for at least one opening of a liquid refill cartridge according to the present invention.

[0043] With particular reference to Figs. 1 - 14, the reference number 1 will be assigned to a liquid refill cartridge according to the present invention.

[0044] The liquid refill cartridge 1 comprises a hollow body for containing liquid products. As a way of example, such hollow body 10 may be realized by heat sealing, by

injection molding, die casting or any other suitable process.

[0045] In particular, with "liquid products" is intended any liquid, independently of its viscosity, any powder or any bulk solids, such as soaps, shampoos, liquid cleaning agents, washing powder, sugar, dry beans, cereals and the like.

[0046] The hollow body 10 has a first end 11, with a first opening 110, and a second end 12, opposite to said first end 11, with a second opening 120, greater in size than said first opening 110.

[0047] The different size of the second opening 120 compared to the first opening 110 allows the liquid refill cartridge 10 to be easily used in a zero-waste close-loop economy, as better explained below.

[0048] However, in alternative embodiments the dimension of the first opening 110 and of the second opening 120 may be the same.

[0049] The presence of said first opening 110 and second opening 120 makes the liquid refill cartridge 1 easy to wash, and hence to facilitate its use in a zero-waste close-loop economy, as better explained below. In fact, the liquid refill cartridge 1 can be easily cleaned by pouring water through one of the two opening 110; 120 and by discarding such water by the opposite opening 120; 110.

[0050] Furthermore, in the embodiments shown in Figs. 1 - 12, the hollow body 10 has a first end 11 with a striction, as shown in Fig. 1, 3 or which is tapered, as shown in Fig. 5 - 11 and said first opening 110 is at the tip of said first end 11 with a striction or of said tapered first end 11, which can allow an easier refill of a liquid container, as better described further.

[0051] However, in other embodiments (not shown), the hollow body 10 of the liquid refill cartridge 1 can have different shapes from the one described.

[0052] In particular, the first opening 110 can be substantially central to said first end 11 or at a corner of it, and the first opening may be provided with a nozzle.

[0053] Both the first opening 110 and the second opening 120 can be closed with removable closing means, respectively first and second removable closing means, so as to allow the transportation of a liquid refill cartridge 1 full of liquid products, before its use.

[0054] The liquid refill cartridge 1 may be made of different materials adapted to contain liquid products, preferably plastic soft materials or any other malleable, heat-sealable, washable material, which allows the liquid refill cartridge 1 to be squeezed of its content and to be eventually folded.

[0055] Preferred materials used for making the liquid refill cartridge 1 are Polyethylene (PE) or recyclable Acrylonitrile butadiene styrene (ABS), or any other material, which, after the liquid refill cartridge 1 breaks, can be melted and used for the making of a new liquid refill cartridge 1 requiring a minimum amount of new added material (so called "regeneration" of the liquid refill cartridge 1).

[0056] With particular reference to Figs. 4, 6 and 11, such removable closing means may comprise a folding line 13 on said hollow body 10, for folding said first end 11 and/or said second end 12 with their respective opening 110, 120 over said hollow body 10.

[0057] Furthermore, as shown in the embodiments of Fig. 6 and 11, an elastic band 14, which can be coupled to said first end 11 and/or to said second end 12 for closing it. As a matter of example, said elastic band 14 may be made using a heat sealing process. The use of said elastic band 14 makes the liquid refill cartridge 1 particularly easy to use.

[0058] In an alternative embodiment, as shown in Fig. 14, in place of the elastic band 14, the removable closing means may comprise a closing button 15, preferably a clip button 15. However, other fastening means, other than said elastic band 14 and said closing button 15, may be used for fastening the folded first end 11 and/or the folded second end 12 to said hollow body 10, and therefore for closing their respective openings 110, 120.

[0059] Alternative removable closing means are shown in Figs. 15 - 17, and can comprise:

- a sealing clip 16, as shown in Fig. 15; and/or
- a push-lock zipper 17, as shown in Fig. 16; and/or
- a top-slider closure 18, as shown in Fig. 17.

[0060] However, further embodiments (not shown in the figures) may comprise different removable closing means from the ones described, which can be specifically designed for the container 2 which can be filled by means of said liquid refill cartridge 1.

[0061] In fact, the liquid refill cartridge 1 is used to fill an empty container 2 with a liquid product, wherein said container comprises a top portion 20, a bottom portion 210, opposite to said top portion 20, and a top opening 200 at said top portion 20.

[0062] Examples of containers 2 that can be filled with the liquid refill cartridge 1 are:

- liquid containers having a cap or a lid, e.g. shampoo and conditioner containers, body wash containers, lotion containers, dish washing liquid container;
- dispensers, e.g. hand soap or cream dispensers;
- spray or atomizer containers, e.g. perfume bottles or all-purpose cleaners containers; or
- liquid bottles, e.g. liquid floor cleaner bottles or laundry detergent bottles.

[0063] Therefore, the liquid refill cartridge 1 and the container 2 can be part of a liquid refill system 3. In particular, such liquid refill system 3 may be referenced as a dynamic container 3, given its flexibility of use, as discussed below.

[0064] With particular reference to figs. 3, 4, 8 and 9, once the first removable closing means are removed from said first opening 110, the liquid refill cartridge 1 can be inserted inside the container 2, with said first opening

110 of the liquid refill cartridge 1 and said top opening 200 of the container 2 being aligned. In this way, the liquid product can flow outside said container 2 by acting on the container 2 itself and therefore on the hollow body 10 of the liquid refill cartridge 1 inside it.

[0065] Therefore, the liquid refill cartridge 1 can be advantageously inserted inside any container 2 having similar dimensions to its own for refilling it of a desired liquid products.

[0066] In particular, when the liquid refill cartridge 1 has said folding line 13, the container 2 may be configured in such a way that the folded first opening 11 adheres on its walls, as shown in Fig. 4.

[0067] In alternative embodiments (not shown), the first removable closing means may be removed from the first opening 110 after the insertion of said liquid refill cartridge 1 inside said container 2, said first removable closing means being still accessible after said insertion.

[0068] In this way it is ensured to avoid any spilling of the liquid product while refilling said container 2.

[0069] In further possible embodiments, the liquid refill cartridge 1 can be emptied of its liquid product inside a container 2, by pouring it through said first opening 110. In such case, the liquid refill cartridge 1 can be advantageously used with any refillable container available on the market. However, if compared to the known liquid refill cartridges, the liquid refill cartridge 1 has the advantage of being adapted to be used in a zero-waste circular economy, as better explained below.

[0070] In the embodiment shown in Figs. 2 - 4, 10 - 12, the top opening 200 is greater in size than the first opening 110 of the liquid refill cartridge 1 and of a portion of said first end 11, so that said portion of said first end 11 can be inserted inside said top opening 200, said first opening 110 protruding from it. This configuration ensures the stability of the alignment between said first opening 110 and said top opening 200, and facilitates the insertion of said liquid refill cartridge 1 inside said container 2. Once inserted, the first opening 110 and the top opening 200 may be closed with a lid 202, as shown in Fig. 2, or with a cap 204, as shown in Fig. 4.

[0071] In the particular embodiment of the container 2 shown in Fig. 2, the flip-top lid 202 has a through hole 203, aligned with said top opening 200 and with said first opening 110, when the container is filled with said liquid refill cartridge 1. Hence, the flip-top lid 202 allows the passage of the liquid product through the through hole 203, while hiding the first 11 of the liquid refill cartridge 1. This configuration has the advantage to protect the liquid refill cartridge 1 from breakage and to be esthetically pleasing for the user. In other embodiments (not shown), the lid 202 can be a different lid with different shapes.

[0072] Furthermore, in the particular embodiment shown in Fig 2, the first end 11 protruding from said top opening 110 may be folded inside out in order to adhere to said top opening 200. Specifically, said top opening 200 may be provided with ridges 22 to allow the adhesion

of said first end 11 to said top opening 200. In this way, the coupling between said liquid refill cartridge 1 and said container 2 is more reliable, and the insertion of said lid 202 can be facilitated.

[0073] In the particular embodiment shown in Fig. 4, is shown a container 2 with the same characteristics as in Fig. 2, but with a different cap 204. In particular, the cap 204 may be a screw bottle cap or a flip top bottle cap or any other suitable cap.

[0074] However, in different embodiments the positioning of the liquid refill cartridge 1 inside said container 2 may be achieved also with different configurations than the one described, and the first end 11 may not be inserted inside said top opening 200.

[0075] As a matter of example, in the embodiment shown in Fig. 13, the top opening 200 is arranged on a removable lid, and the first end 11 may or may not be inserted inside said top opening 200, being aligned to it nonetheless.

[0076] In other embodiments (not shown), the first end 11 may be secured to said top opening 200 with securing means, such as elastic bands, rings or the like, after folding the first end 11 inside out or without such folding inside out.

[0077] Furthermore, the container 2 can have a further opening 210, in particular a bottom opening 210 on its bottom portion 21, preferably a closeable bottom opening 210, said bottom opening 210 being greater in size than said top opening 200, so that the liquid refill cartridge 1 can be easily inserted inside said container 2 through said bottom opening 210. An example of possible closeable bottom openings 210 can be an opening 210 with a cap or lid. In this case, the liquid refill cartridge 1 can be inserted inside the container 2 in an upright position, with said first opening 110 facing upwards, advantageously preventing the spill of any liquid during the refill of said container 2.

[0078] In other embodiments the container 2 may not have said bottom opening 210 and the liquid refill cartridge 1 may be inserted inside the container 2 in an upright position nonetheless. For example, said further opening, may be a closeable secondary top opening, which allows the insertion of said liquid refill cartridge 1. In such embodiments, the top opening 200 may be arranged on a cap or lid for closing said closeable secondary top opening, as shown in Fig. 13. Alternatively, the container 2 may be adapted to be separated in two halves for the insertion of said liquid refill cartridge 1 said two halves being able to be rejoined after the insertion.

[0079] In a further alternative embodiment (not shown), the container 2 may consist in a structural skeleton, comprising a hollow cavity as a further opening for the insertion of said liquid refill cartridge 1, said structural skeleton having a top portion 20 with a top opening 200, to hold in position said first end 11 of the liquid refill cartridge 1.

[0080] Advantageously, since the liquid refill cartridge 1 is emptied once inside the container 2, the user may

be able to use all the liquid product inside it, e.g. by diluting the liquid product when the liquid cartridge 1 is almost empty.

[0081] In fact, the liquid refill cartridge 1 can be washed by pouring water inside said first opening 110 and/or said second opening 120.

[0082] Finally, the container 2 and the liquid refill cartridge 1 have preferably substantially the same shape, so that the liquid refill cartridge 1, once inside the container 2, is easy to squeeze by simply acting on the container 2 itself, improving the usability of the liquid refill system 3.

[0083] However, a liquid refill cartridge 1 may also be used for refilling different types of containers 2, allowing greater flexibility of use, if compared to other liquid refill systems. As a matter of example, the liquid refill cartridge 1 may also be used for filling liquid containers 2 already available on the market, after they have been emptied of their original liquid product.

[0084] Once the liquid refill cartridge 1 inside a container 2 is empty, it can be removed from the inside of the container 2, and the open first opening 110 can be closed with said first removable closing means.

[0085] In other embodiments (not shown) the container 2 can have a storing space inside it, so that said container 2 can contain both a full liquid refill cartridge 1, with its product accessible from said top opening 200, and at least one empty liquid refill cartridge 1, which is stored inside said storing space before being refilled, ensuring that the empty liquid refill cartridges 1 are not lost inside the homes of the users before being refilled. Said storing space may even be some extra space in the volume containing said liquid refill cartridge 1 and not an additional storing space divided from it.

[0086] The empty liquid refill cartridge 1 can be brought to a liquid refill station, such as the ones available inside supermarkets or inside health and beauty retailers.

[0087] Bringing the liquid refill cartridge 1 to the liquid refill station is more comfortable for the user than bringing directly the container 2 to be refilled, since a liquid refill cartridge 1 can be made of a soft material, and therefore can be easily folded, and occupies a smaller amount of space, if compared to the container 2 to be refilled.

[0088] The refill of the liquid refill cartridge at the liquid refill station will be done by removing the second removable closing means from the second opening 120, and by pouring the liquid inside the liquid refill cartridge 1 through said second opening 120, said first opening 110 being closed by said first removable closing means.

[0089] Since the second opening 120 is greater in size than said first opening 110, it facilitates the refill of the liquid refill cartridge 1, preventing possible spilling of liquids.

[0090] Once the liquid cartridge 1 has been refilled of a liquid product, said second opening 120 can be closed with said second removable closing means, and the liquid refill cartridge 1, filled of the liquid product, can be brought back at home, to refill the container 2.

[0091] Therefore, a method for refilling liquid products inside a container 2 by means of the liquid refill cartridge 1, can comprise the following steps:

- A. removing first removable closing means from the first opening 110 of the liquid refill cartridge 1; and
- B. inserting said liquid refill cartridge 1 inside said container 2, aligning the top opening 200 of the container 2 to the first opening 110 of the liquid refill cartridge 1; preferably inserting it in an upright position, with said open first opening facing upwards.

[0092] As already described, once the content of the liquid cartridge 1 is empty, or before inserting the liquid cartridge 1 inside said container 2, said method can also comprise the following steps:

- C. if open, closing said first opening 110 by means of said first removable closing means;
- D. removing said second removable closing means from said second opening 120;
- E. filling said liquid refill cartridge of a liquid product by pouring said liquid product through said second opening; and
- F. closing said second opening 120 by means of said second removable closing means.

[0093] The method described above can be carried out by a user, who can bring the liquid refill cartridge 1 to a liquid refill station, as already mentioned, or can be carried out, at least in part, by the liquid product producer. Specifically, the user/consumer may be able to buy a liquid refill cartridge 1 any time he needs to refill a container 2 and may be able to bring back the empty liquid refill cartridges 1 to apposite collection points, where the empty liquid refill cartridges 1 are collected and then brought to an automatic/semiautomatic refill station, to be refilled and resold. Before the refilling, said liquid refill cartridges can also be washed automatically or hand-washed. In particular, they can be washed and sanitized, if the liquid refill cartridges 1 will be used for different products, or just washed if they will be used for the same product and such product does not have particular hygienic requirements.

[0094] The collection points can be physical collection points, such as special bins/baskets inside the stores, or virtual ones, i.e. the consumer may be able to book the withdrawal of at least one empty liquid refill cartridge 1 from home, and the delivery of the filled liquid refill cartridges.

[0095] In this way, the liquid refill system 3 just described can be part of a zero-waste close-loop economy, which facilitates the consumer to carry the liquid refill cartridge 1 to the refilling stations/collection points, given its small dimensions and flexibility.

[0096] Furthermore, the flexibility of use of said liquid refill system 3, allows a delivery scheme based on it to advantageously being adapted to the needs of the con-

sumer/user and to his lifestyle.

[0097] In case the liquid refill cartridge 1 is punctured, damaged or excessively worn after use, so as to compromise its integrity and possibly the integrity of the liquid product contained, the liquid refill cartridge 1 may be mended, regenerated or recycled, therefore without the need of using further amount of plastics. The simplicity of the liquid refill cartridge design can, in fact, facilitate its regeneration, as previously explained.

[0098] Furthermore, the consumer does not need to plan the visit to the stores always in advance, since he can buy new filled liquid refill cartridges 1 directly at the stores, and bring one or more empty liquid refill cartridges 1 at the collection points in a second time.

[0099] Alternatively, given the flexibility of the use of the liquid refill cartridges described, even when the liquid refill cartridges need to be refilled by the user at refill stations, the user is able to buy an empty liquid refill cartridge 1 to be refilled or a filled liquid refill cartridge 1 directly at the store, if he does not have the empty liquid refill cartridge with himself. In a second moment, he can also fill the previously emptied liquid refill cartridge with a different product, preferably with a liquid product configured for a similar use as the previous one, e.g. for refilling a different container 2.

[0100] In the above, the preferred embodiments have been described and variants of the present invention have been suggested. However, it is to be understood that the skilled person would be able to make modifications and changes without going beyond the relative extent of protection, as defined by the enclosed claims.

Claims

1. Liquid refill cartridge (1) for refilling containers (2) of liquid products, said liquid refill cartridge (1) comprising a hollow body (10) for containing said liquid products, said hollow body (10) being provided with a first end (11) and a second end (12), opposite to said first end (11), said first end (11) having a first opening (110), said second end (12) having a second opening (120) larger in size than or equal in size to said first opening (110), both said first opening (110) and second opening (120) being closed by means of respectively first removable closing means (13; 14; 15; 16) and second removable closing means (13; 14; 15; 16; 17; 18) so that, when in use for refilling said containers, said liquid refill cartridge (1) being filled of said liquid products, said first opening (110) may be open by removing said first removable closing means (13; 14; 15; 16; 17; 18), and said liquid refill cartridge (1) may be used to refill said container, while, when empty, said liquid refill cartridge (1) may be refilled by closing said first opening (110) with said first removable closing means (13; 14; 15; 16; 17; 18) and by removing said second removable closing means (13; 14; 15; 16; 17; 18) from said sec-

- ond opening (120) for allowing the inlet of said liquid products inside said second opening (120).
2. Liquid refill cartridge (1) according to claim 1, **characterized in that** said first end (11) is tapered towards said first opening (110). 5
 3. Liquid refill cartridge (1) according to any one of the preceding claims, **characterized in that** said first removable closing means (13; 14; 15; 16; 17; 18) and/or said second removable closing means (13; 14; 15; 16; 17; 18) comprise 10
at least one folding line (13) on said hollow body (10) for folding said first end (11) and/or said second end (12) over said hollow body (10), and fastening means (14; 15) to fasten said folded first end (11) and/or folded second end (12) to said hollow body; and/or 15
a sealing clip (16); and/or
a push-lock zipper (17); and/or
a top-slider closure (18). 20
 4. Liquid refill cartridge (1) according to any of the preceding claims, **characterized in that** said liquid products are soaps, shampoos, liquid creams, cleaning agents, powders or bulk solids. 25
 5. Liquid refill system (3) comprising a liquid refill cartridge (1) according to any one of the preceding claims and a container (2) configured to receive said liquid refill cartridge (1), 30
wherein said container (2) comprises
a top portion (20), having a top opening (200), and
a further opening (210) adapted to receive said liquid refill cartridge (1),
wherein said first opening (110) of said liquid refill cartridge (1) is adapted to be aligned to said top opening (200), once said liquid refill cartridge (1) is inserted inside said container (2) through said further opening (210). 35
 6. Liquid refill system (3) according to claim 5, **characterized in that** at least a part of said first end (11) of said liquid refill cartridge (1) is insertable inside said top opening (200), with said first opening (110) protruding outside said top opening (200). 40
 7. Liquid refill system (3) according to claim 5 or 6, **characterized in that** said further opening (210) is a bottom opening (210) arranged on a bottom portion (21) of said container (2), so that said liquid refill cartridge (1) can be inserted inside said container (2) through said bottom opening (210) in an upright position, with said first opening (110) facing upwards. 50
 8. Liquid refill system (3) according to any one of claims 5 - 7, **characterized in that** said liquid refill cartridge (1) has substantially the same shape as said container (2). 55
 9. Liquid refill system (3) according to any one of claims 5 - 8, **characterized in that** said container (2) has a storing space for storing at least one empty liquid refill cartridge (1).
 10. Method for refilling liquid products inside a container (2) by means of a liquid refill cartridge (1) according to any one of claims 1 - 4, said liquid refill cartridge (1) being filled of liquid products, wherein said container (2) comprises
a top portion (20) having a top opening (200), and
a further opening (210) adapted to receive said liquid refill cartridge (1),
said second opening (120) of said liquid refill cartridge (1) being closed by means of said second removable closing means (13; 14; 15; 16; 17; 18), said method comprising the following steps:
A. if closed, removing said first removable closing means (13; 14; 15; 16; 17; 18) from said first opening (110); and
B. inserting said liquid refill cartridge (1) inside said container (2) through said further opening (210), aligning said first opening (110) of said liquid refill cartridge (1) to said top opening (200).
 11. Method according to claim 10, **characterized in that** it comprises the following step, before or after said steps A and B
C. if open, closing said first opening (110) by means of said first removable closing means (13; 14; 15; 16; 17; 18);
D. removing said second removable closing means (13; 14; 15; 16; 17; 18) from said second opening (120); and
E. filling said liquid refill cartridge (1) of a liquid product by pouring said liquid product through said second opening (120).
 12. Method according to claim 11, **characterized in that** it comprises the following step after said step E.
F. closing said second opening (120) by means of said second removable closing means (13; 14; 15; 16; 17; 18).
 13. Method according to any one of claims 10 - 12, **characterized in that** said top opening (200) of said container (2) is adapted to receive at least a part of said first end (11), said method comprising the following sub-step of said step B:
B1. inserting said at least a part of said first end (11) inside said top opening (200), said first opening (110) protruding from said top opening (200).

14. Method according to any one of claims 10 - 13, **characterized in that**, during said step B, said liquid refill cartridge (1) is inserted inside said container (2) being in an upright position, with said first opening (110) facing upwards. 5

15. Method according to claim 14, **characterized in that** said further opening (210) of said container (2) is a closable bottom opening (210) arranged on a bottom portion (21) of said container (2), and **in that** said step B. comprises the following sub-steps: 10

B2. inserting said liquid refill cartridge (1) inside said container (2) through said closable bottom opening (210), and 15

B3. closing said closable bottom opening (210).

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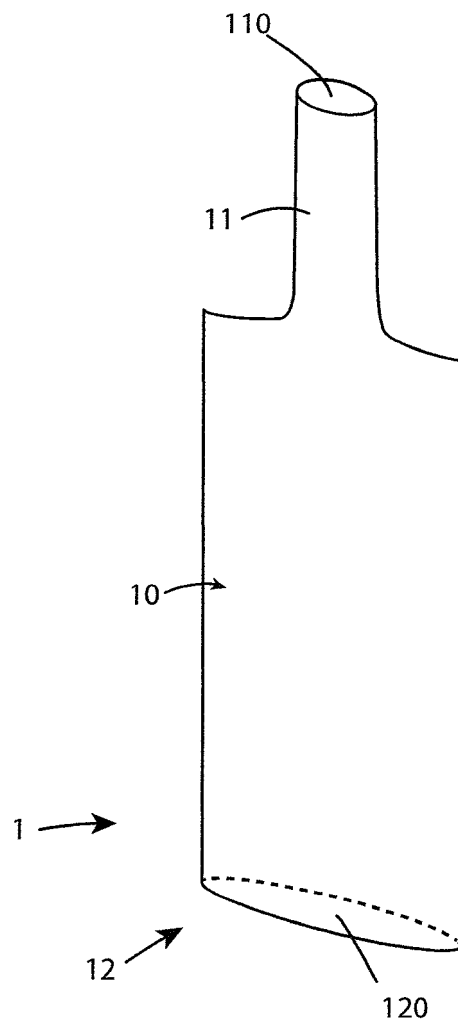


Fig.1

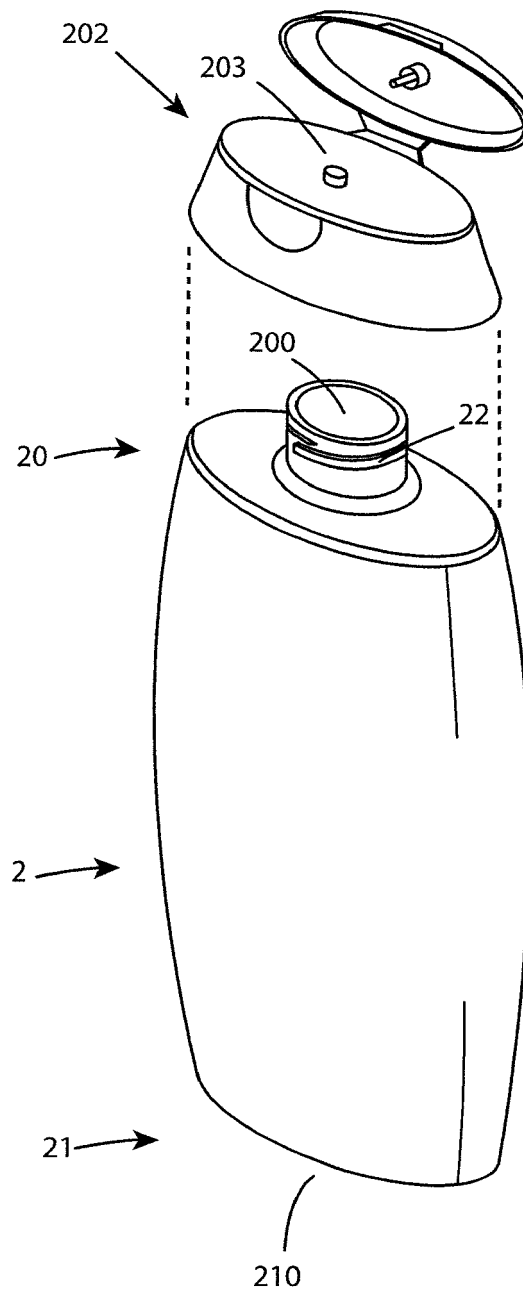


Fig.2

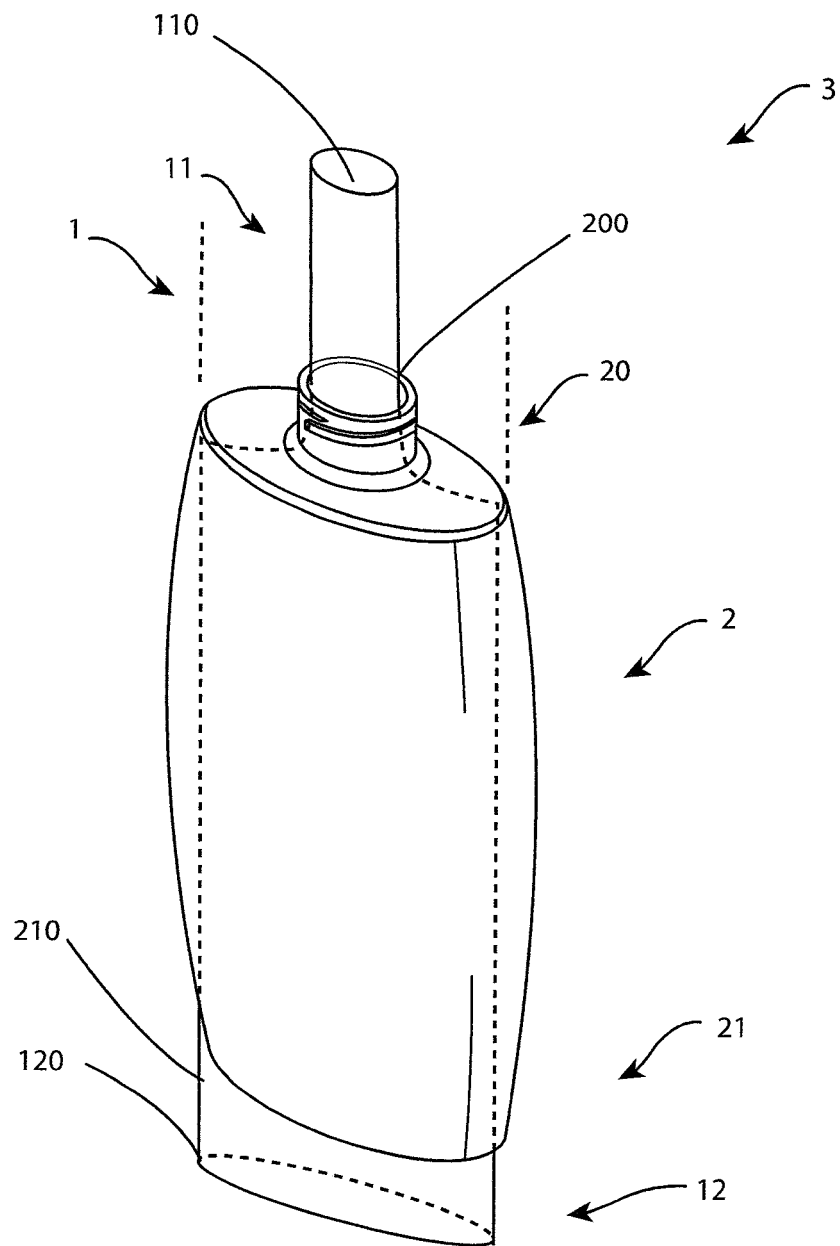


Fig.3

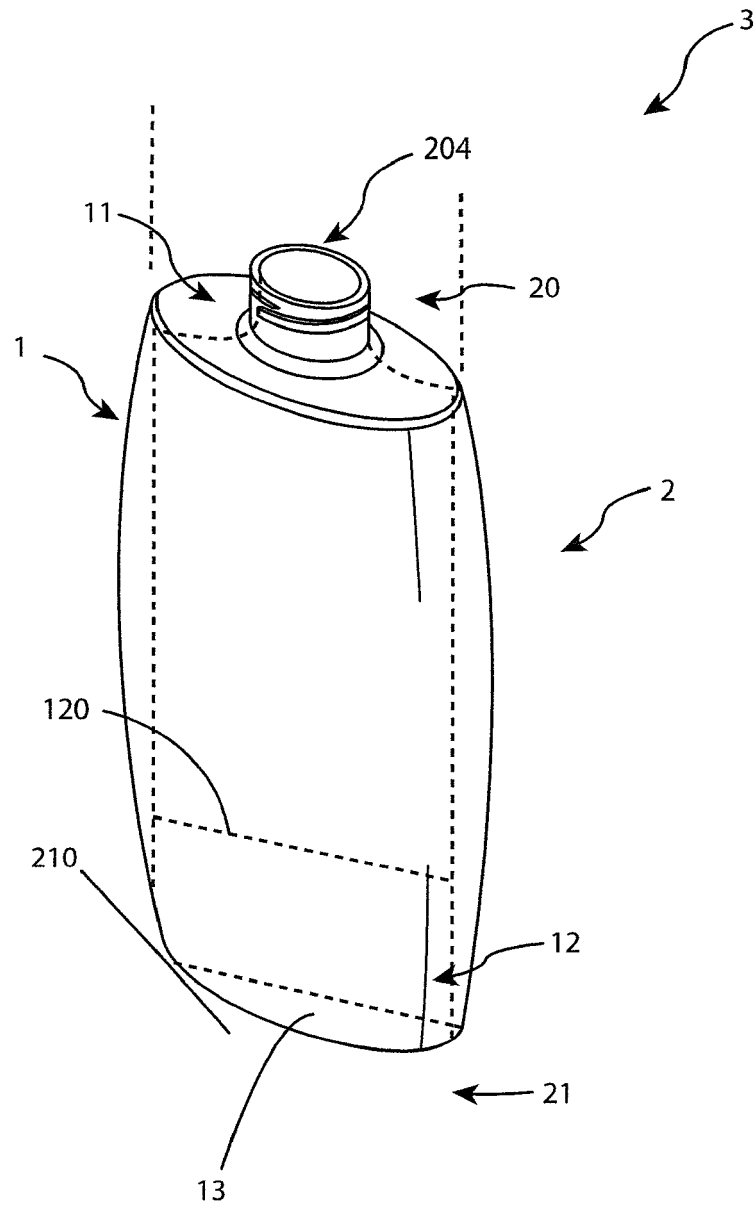


Fig.4

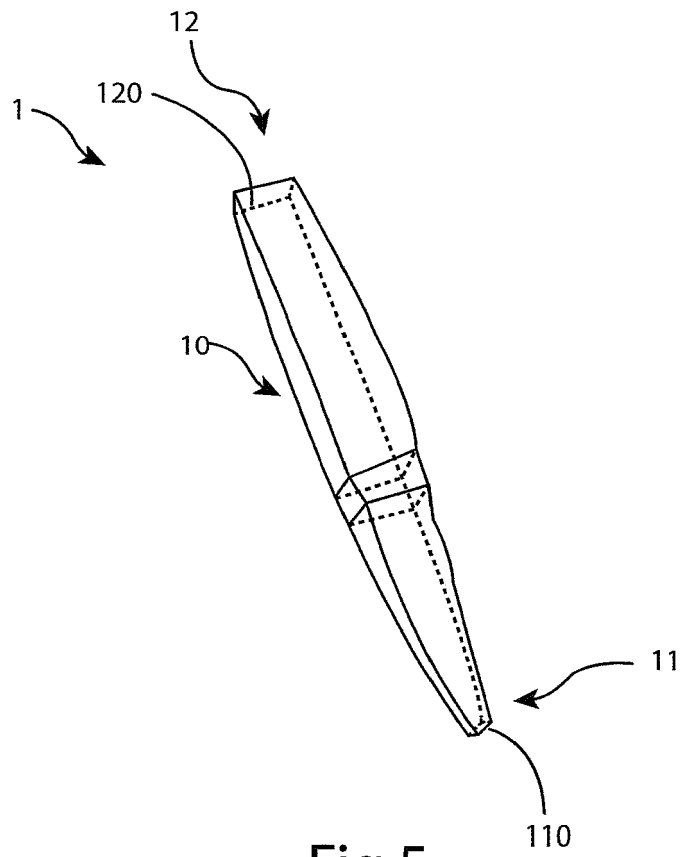


Fig.5

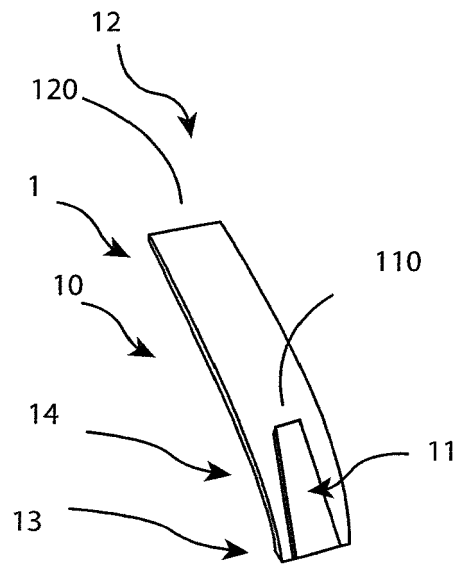


fig.6

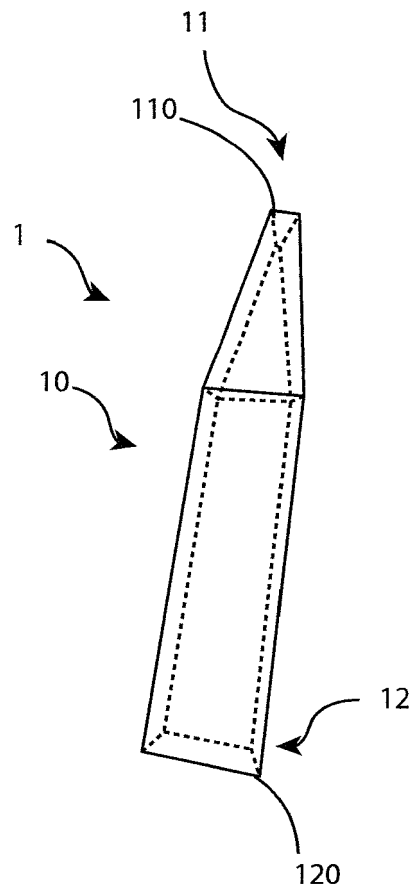


Fig.7

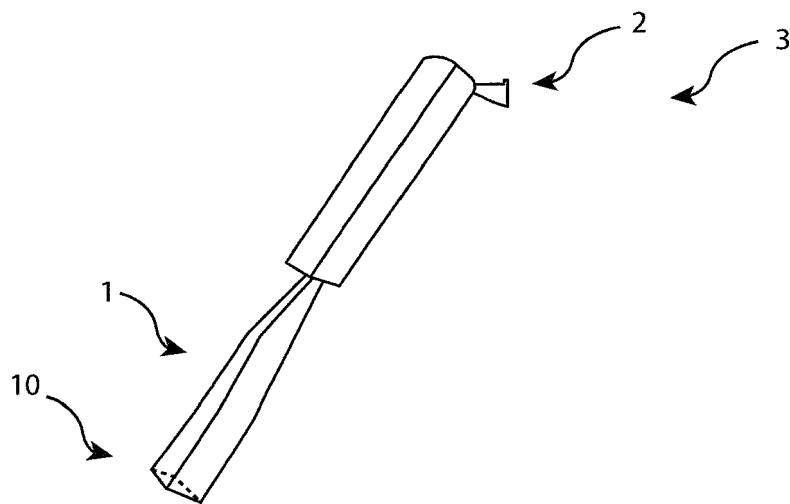


Fig.8

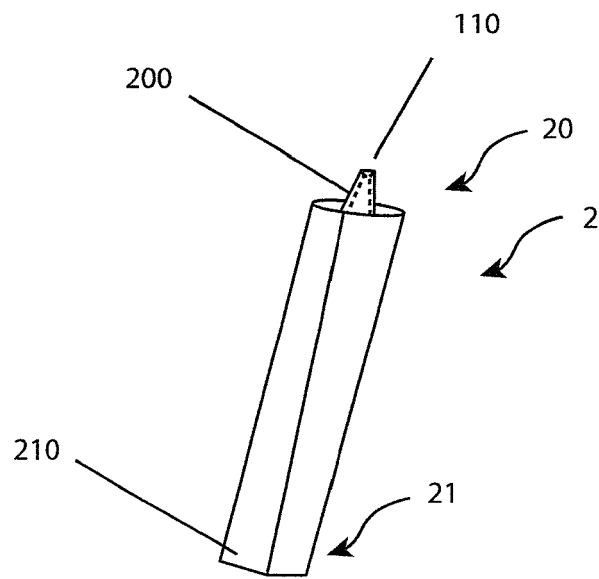


Fig.9

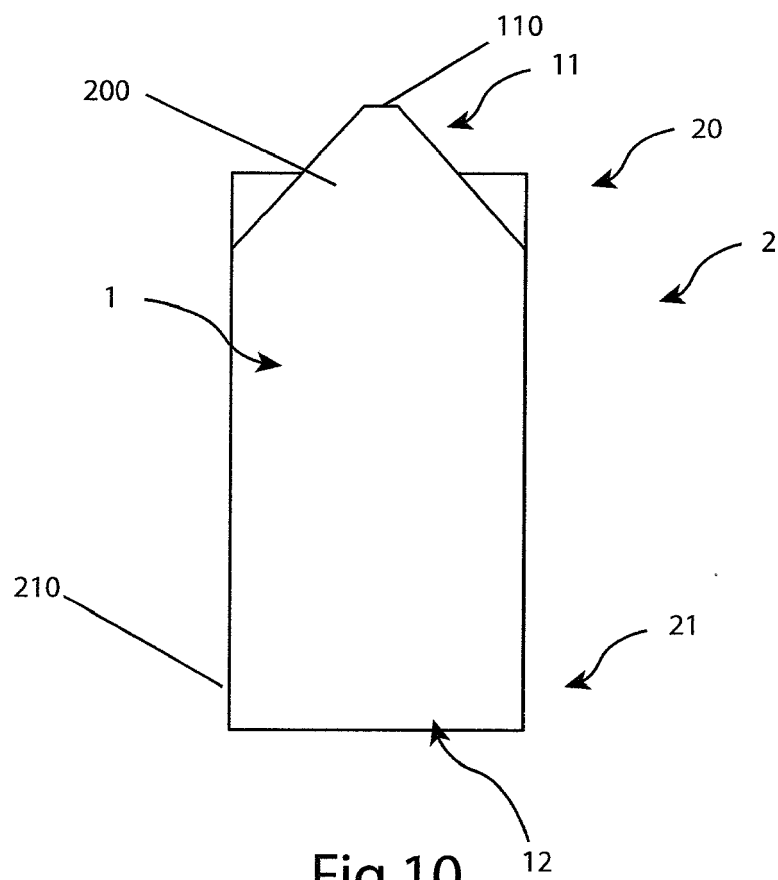


Fig.10

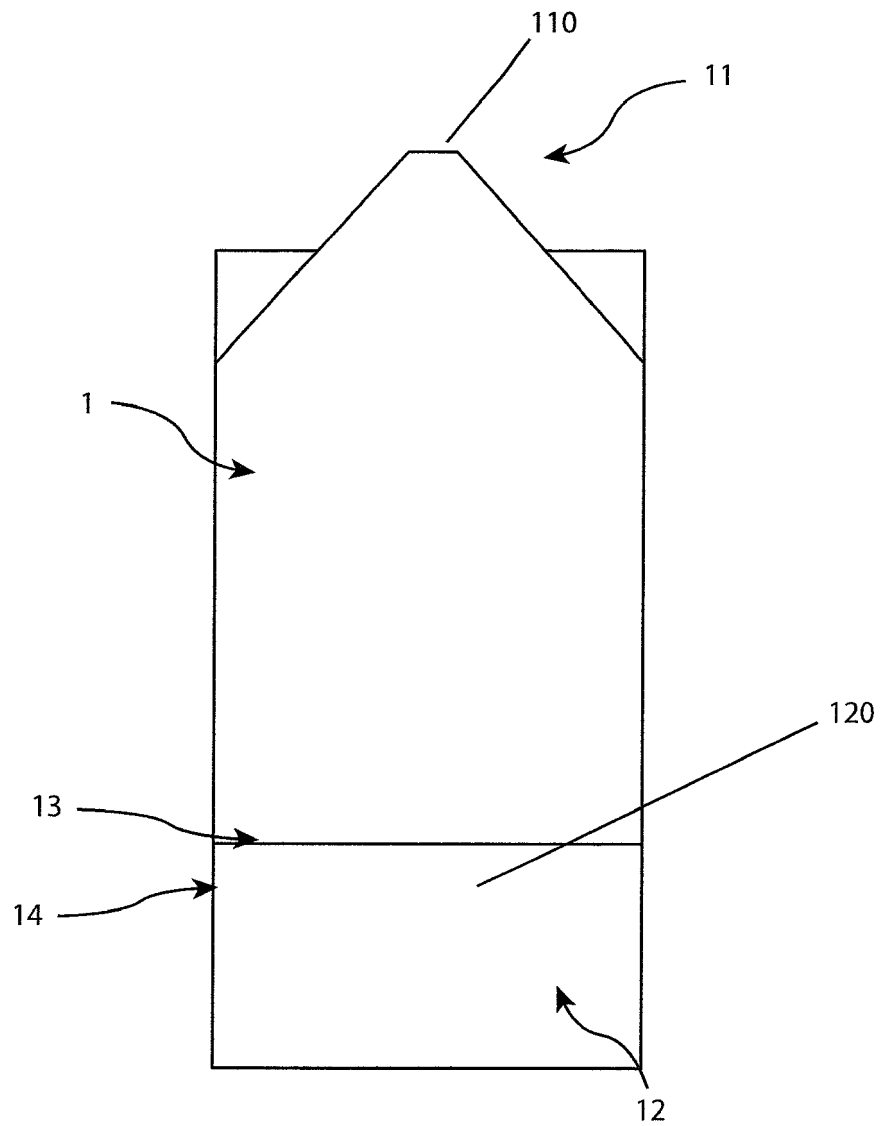


Fig.11

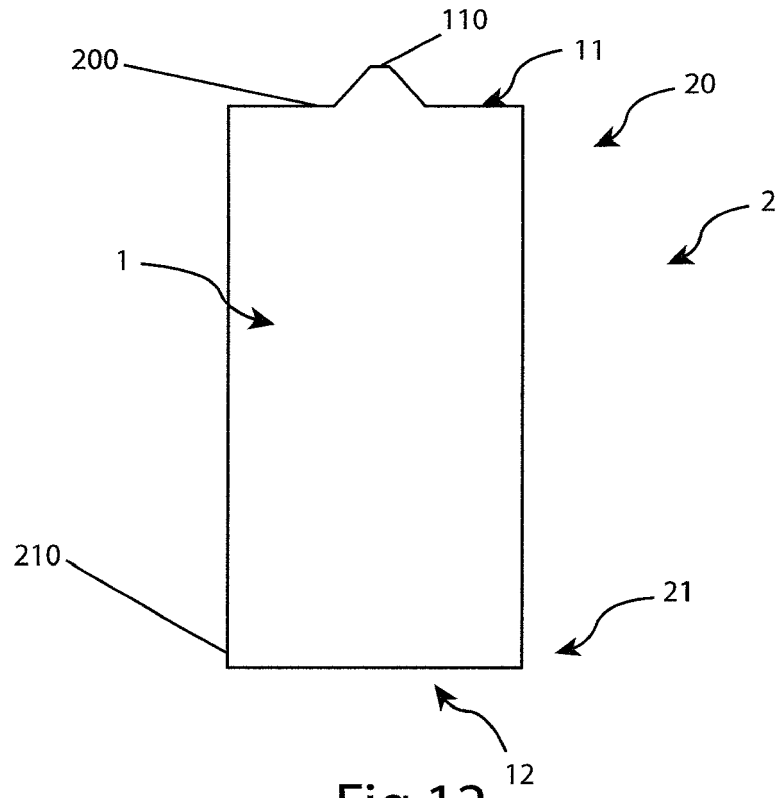


Fig.12¹²

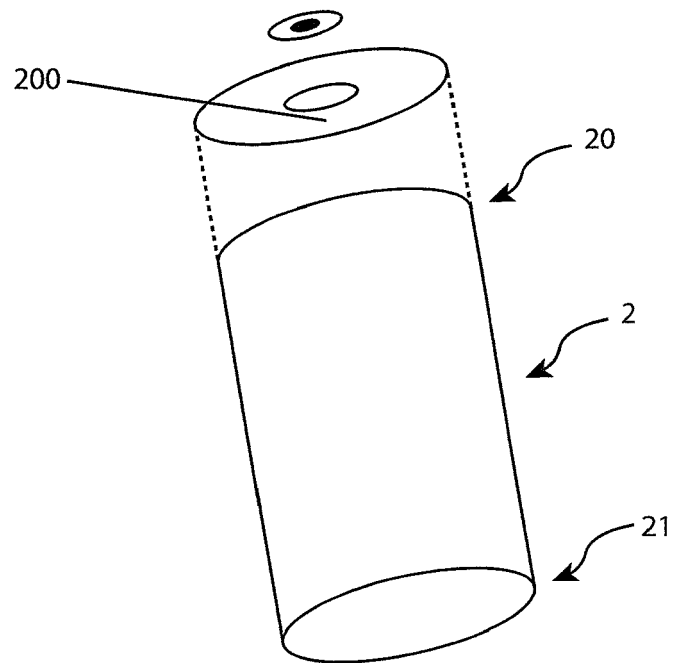


Fig.13

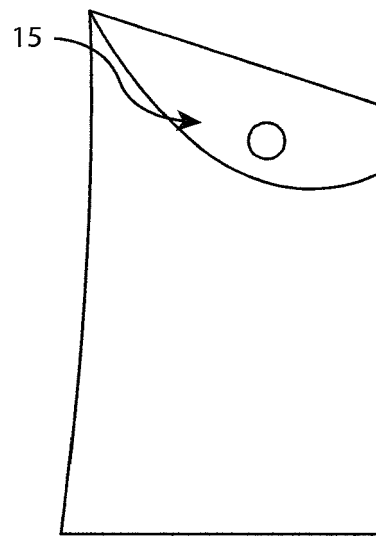


Fig.14

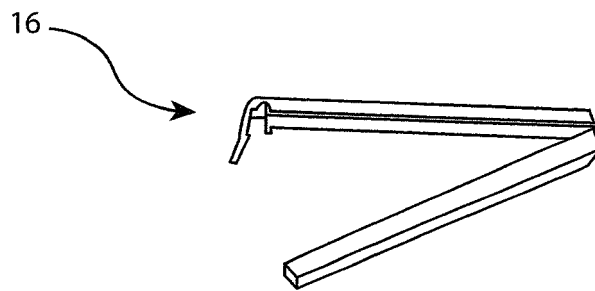


Fig.15

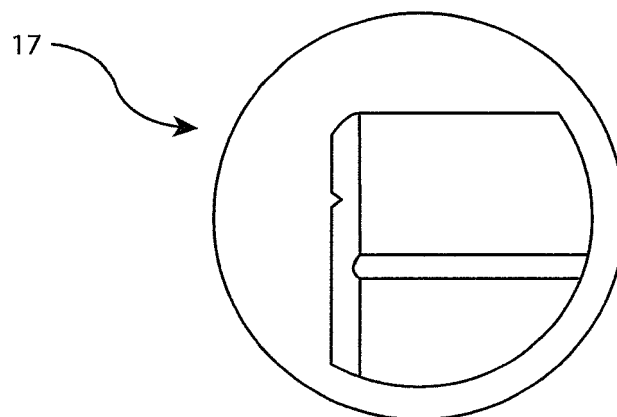


Fig.16

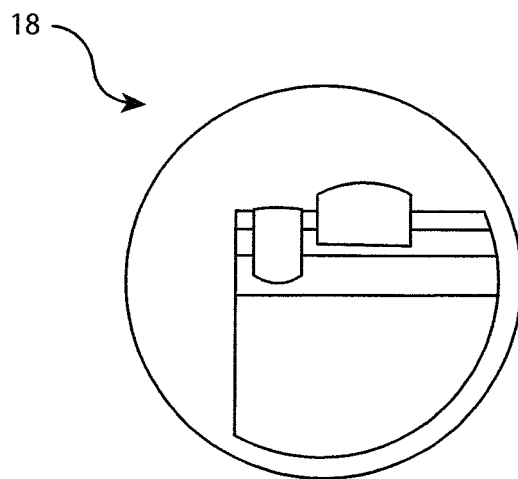


Fig.17



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 Application Number
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A	US 6 179 165 B1 (KNIGHT DAVID [US] ET AL) 30 January 2001 (2001-01-30) * column 2, lines 22-26; figures 1-2 *	3	
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Place of search Munich		Date of completion of the search 11 January 2021	Examiner Leijten, René
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