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(54) **RESERVOIR CAP**

(57) The invention relates to a reservoir cap (1) configured to be coupled to a neck (4A) of a container (4) at an opening (5) thereof and comprising a body (3) equipped with a cup-shaped portion (9) sealed at the bottom thereof by a breakable wall (31), the body (3) comprising at least one element (32) for fastening to the said neck (4A), the cap also comprising a cutter (2) equipped with a head (20) from which a hollow essentially cylindrical surface (21) extends which, when coupled to the cup-shaped portion (9), forms - together with at least a part of the cup-shaped portion (9) - a reservoir (S) for the said product (10), the cutter sliding inside the cup-shaped portion (9) in a sealed manner and comprising a cutting surface (24) of the breakout wall (31) at a free end (22) of the cylindrical surface (21), the cup-shaped portion (9) being configured so that, when the cap is placed on the container (4) and the product is in the reservoir (S), the cutter (2) - when pressed forcefully against the breakable wall (31) thereof, detaches the said wall at least partially from the cup-shaped portion (9) resulting in the product falling and entering the container (4); the external cylindrical surface (21) of the cutter (2) consists of at least a first piece (2A), made of a moisture-absorbing material and positioned near the said breakable wall 31, and a second piece (2B), made of plastic and fastened to the first piece, the first and the second piece forming the cutter (2). Class: B65D

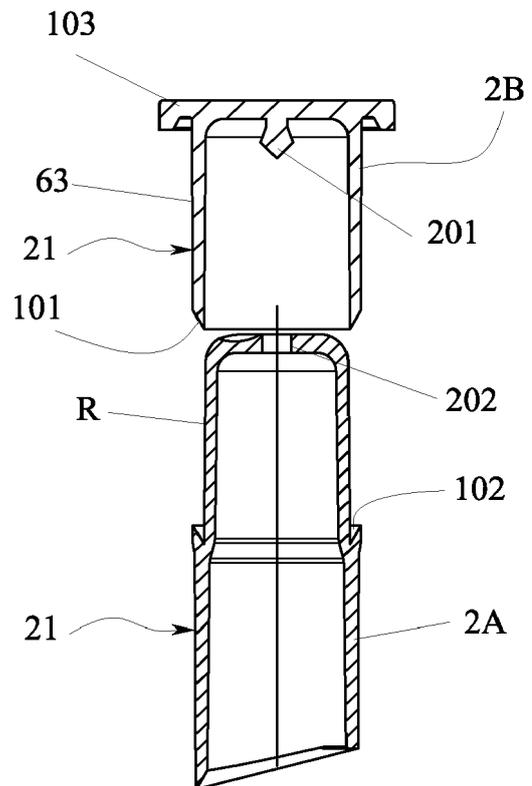


FIG. 4

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a reservoir cap.

BACKGROUND ART

[0002] A commonly known reservoir cap is described in patent n. EP2704962-A1.

[0003] This reservoir cap features a cutter inside which a hollow sleeve or cup-shaped element made of a moisture-absorbing material is inserted.

[0004] It has been found that the configuration of the cap described in the said patent document does not provide the product contained inside the reservoir with effective protection against moisture.

[0005] Furthermore, emptying out the product contained in the reservoir proves difficult.

[0006] Last but not least, the presence of an absorbent material as described decreases the volumetric capacity of the said reservoir.

SUMMARY OF THE INVENTION

[0007] The object of the present invention is to provide a reservoir cap which is improved compared to those described in the prior art.

[0008] This and other objects are achieved by means of a reservoir cap made in accordance with the appended claims.

[0009] Advantageously, a reservoir cap according to the invention improves protection of the product present in the reservoir from moisture.

[0010] Furthermore, advantageously, a reservoir cap according to the present invention improves product emptying as compared to the caps described in EP2704962-A1 and EP3351486-A1.

[0011] Still more advantageously, a reservoir cap according to the present invention allows increased volumetric capacity of the reservoir as compared with commonly known reservoirs.

BRIEF DESCRIPTION OF THE FIGURES

[0012] Further features and advantages of the innovation will become clearer in the description of a preferred but not exclusive embodiment of the device, illustrated - by way of a non-limiting example - in the drawings annexed hereto, in which:

Figure 1 is an axial sectional view of a reservoir cap according to the present invention, in a first operative configuration and housed on top of a container and with a cutter, the latter shown in a simplified manner;

Figure 2 is an axial section view of the reservoir cap in Figure 1, in a second operating configuration;

Figure 3 is a detailed side view of the cutter in Figure 1;

Figure 4 is an exploded axial section view of the cutter in Figure 3; and

Figure 5 is an (assembled) axial section view of the cutter in Figure 3.

10 DETAILED DESCRIPTION OF THE INVENTION

[0013] With reference to the figures stated, reference number 1 is used to denote, as a whole, a reservoir cap.

[0014] The reservoir cap 1 is configured to be coupled to a neck 4A of a container 4 at an opening 5 thereof.

[0015] More specifically, the cap 1 comprises a body 3, which defines a cup-shaped portion 9 which is sealed at the bottom thereof by a breakable wall 31. The body 3 comprises at least one element 32 for sealing onto the said neck 4A, which can be made from an external surface of the cup-shaped portion 9, whose diameter is sized so as to couple with the internal part of the neck of the container 4 with a slight interference fit and in a sealed manner.

[0016] The body 3 can also feature an abutment 61 intended to come into contact with a front surface of the opening 4A, so as to stop insertion of the body 3 in the opening 4A at a given position.

[0017] The cap 1 comprises a cutter (or shear) 2. The cutter 2 is shown schematically in Figures 1 and 2, but is visible in greater detail in Figures 3 to 5.

[0018] As can be seen, the said cutter can have a mushroom conformation. It can be equipped with a head 20 from which an essentially cylindrical surface 21 extends, which is hollow and - when coupled to the cup-shaped portion 9 - forms (together with at least a part of said cup-shaped portion 9) a reservoir S which can house a product 10.

[0019] By way of example, the product 10 can be a powder containing one or more of the following: lactic acid cultures, bacteria, vitamins, food supplements for both medical treatment and dietary use etc.

[0020] The cutter 2 slides inside the cup-shaped portion 9 in a sealed manner.

[0021] For this purpose, on the external surface of the cutter (better visible in Fig. 3), an area with a larger diameter 63 can be envisaged (for example near the head 20), which is intended to couple with the internal surface of the cup-shaped body with a slight interference fit and in a sealed manner.

[0022] The interference between the cutter and the cup-shaped portion is, in any case, sufficient to allow the cutter to slide axially with respect to the cup-shaped portion when a predetermined pressure is applied to the former.

[0023] The cutter, and more specifically a free end of the cylindrical surface 21 thereof, defines a cutting surface 24 of the breakable wall 31. Advantageously, the

free end 22 of the cutter 2 lies on a plane which is angled with respect to the longitudinal axis A of the cutter, so as to form a blade that facilitates the breakage of the bottom by concentrating the pressure at an individual portion of the free end.

[0024] The cup-shaped portion 9 is configured so that when the cap 1 is positioned on the container 4 and the product is in the reservoir S, the cutter 2 - when pushed forcefully against the breakable wall 31 thereof - detaches the said breakable wall at least partially from the cup-shaped portion 9 resulting in the product falling and therefore entering the container 4 (see Figure 2).

[0025] Advantageously, a screw-on lid 40 can be envisaged. The lid can advantageously be screwed onto a thread envisaged on the container 4, near the mouth 4A thereof.

[0026] Once any seal on the lid 40 has been removed, the said lid can be screwed on tightly.

[0027] Advantageously, the seal is removed automatically; when the cap is screwed on fully, the seal lowers and breaks on a cone, envisaged on the bottle, which stretches the seal. Once broken, the seal remains on the bottle or attached to the lid 40.

[0028] In this way, the lid 40 can press down on the cutter, thereby breaking the bottom 31 of the cup-shaped body.

[0029] When the lid 40 is present, the body 3 can be totally enclosed within the container 4 and the lid.

[0030] Advantageously, sealing means can be envisaged which prevent air leakage between the body 3 and the cover 40. In a non-limiting example, the said sealing means can comprise a lip 70 protruding from the body 3, which rests on the internal surface of the lid 40, above a threaded portion thereof.

[0031] Advantageously, the lip 70, if present, can allow coupling (by interference fit) of the cup-shaped portion 9 with the lid 40 when the lid 40 is screwed on fully. In this way, when pulling on the lid 40, the cup-shaped element (together with the cutter 2 and the lid 40) can be uncoupled from the neck of the bottle 4, to allow direct access to the mouth of the bottle 4.

[0032] According to the present invention, the external cylindrical surface 21 of the cutter 2 consists or is formed of at least a first piece 2A, made of a moisture-absorbing material and positioned near the said breakable wall 31, and a second piece 2B, made of plastic and fastened to the first piece, the first and the second piece forming the cutter 2.

[0033] Therefore, the cutter 2 is formed by a first 2A and a second piece 2B, which are mutually coupled or fastened. Both can have a cup configuration, and the second piece 2B can be fitted onto the first piece 2A.

[0034] The first piece 2A can have an external cylindrical surface endowed with a lowered area R, so that when the second piece 2B is fitted on the first piece 2A in the said lowered area, the cylindrical surface 21 is essentially devoid of steps.

[0035] In the present text, the term 'essentially devoid

of steps' means that the cylindrical surface 21 may have different external diameters in different areas (see the aforesaid area 63), but the connection between the areas with different diameters, in this case, has a taper I which facilitates insertion of the cutter 2 into the cup-shaped body.

[0036] The external surface of the first piece 2A onto which the second piece is fitted may have a smaller diameter than the free surface of the first piece 2A (for example at the lowered area R).

[0037] Furthermore, the area of the internal surface of the first piece 2A where the second piece 2B is fitted can have a smaller diameter than the free internal surface of the first piece 2A.

[0038] At least one seal can be made between the cutter 2 and the cup-shaped portion 9 (for example the part denoted 63) at the coupling between the cup-shaped portion 9 and the second piece 2B.

[0039] As can be seen in Figure 4, a free edge 22 of the first piece 2A can feature a cutting edge configured to facilitate breakage of the breakable wall 31.

[0040] The second piece 2B can feature a protruding flange 103, preferably positioned at the head of the cutter.

[0041] Furthermore, a free edge 101 of the second piece 2B can be tapered and can engage with a groove 102 in the first piece 2A. The external part of the first piece 2A can form the said taper I at the groove 102.

[0042] The first and second pieces can be mutually fastened in many ways, for example by snap-coupling, as shown in Figure 4. For example, a mushroom-shaped element 201 can protrude from the top of the second piece 2B and be snap-fitted into a hole 202 made in the top of the first piece 2A.

[0043] Obviously, other systems for mutually fastening the first and the second piece are possible, including simply interference-fit systems.

[0044] In this way, the moisture-absorbing material of which the first piece 2A is formed lines the interior of the reservoir (almost) completely. Similarly, no part of the moisture-absorbing material is facing the outside air (remembering that there is a seal in the area 63).

[0045] On the other hand, the first piece 2B (made of plastic or a material that forms a moisture barrier) also protects the moisture-absorbing material from the moisture present between the cap 40 and the cup-shaped portion 9.

[0046] In this way, the moisture-absorbing material can be completely dedicated to absorbing the moisture found in the reservoir S, thereby protecting the product 10 housed therewithin.

[0047] In practice, the conformation of the cutter 2, and more specifically of the second piece 2B, protects the piece 2A from the moisture present in the chamber 80 which forms between the lid 40 and the body 3 (or more generally inside the container 4), improving product conservation.

[0048] Furthermore, the free end 22 of the cutter is made of a thermoplastic material which absorbs mois-

ture. Indeed, it has been found that, in the configuration with an intact breakable bottom 31 and with the cutter 21 in the position in Figure 1, this is the first area of the cutter that comes into contact with the moisture that transpires from the breakable bottom

[0049] Furthermore, since the moisture-absorbing material is essentially stiff, and in any case stiffer than the thermoplastic material of which the cutter is usually made, use thereof in this position improves the 'cutting' of the breakable bottom.

[0050] As the cutter 2 shown here is made of two pieces, it is cheaper than the same kind of cutter made by co-moulding.

[0051] It must be reiterated that the second piece 2B is made of a standard plastic material, which does not absorb moisture but rather acts as a barrier thereto.

[0052] Obviously, only some embodiments of the innovation have been disclosed herein, but further embodiments may also be conceived using the same innovative concept. Therefore, for example, there are no limits as to shape (which could also be hexagonal) or capacity (for example, solutions with a capacity of 100 ml or more are also possible).

[0053] Preferably in this text, the 'conventional plastic material' of which the cutter is made can be one or more of those in the following group: PE-PA-PP.

[0054] Furthermore, the body 3 can be made of one or more of the following plastic materials: PE-PP-SEBS.

[0055] The cap 40, on the other hand, which can be equipped with a seal, can be made of one or more of the following plastic materials: PE-PP-SEBS, compounds.

[0056] Last but not least, for thermoplastic moisture-absorbing material, an absorbent polymer can be used, preferably a water-absorbent or hygroscopic polymer that can be moulded using conventional techniques. The hydro-absorbent or hygroscopic polymer, at room temperature, is in a solid state and has physical characteristics which are comparable or similar to the conventional plastic materials of which the other parts of the cutter are made.

[0057] For example the said polymer can have comparable (or even greater) hardness than PE-PA-PP etc. in the same environmental conditions. The moisture-absorbing polymer may be a plastic compound polymer. This compound polymer is preferably identical to polypropylene and therefore can be recycled therewith.

Claims

1. Reservoir cap (1) configured to be coupled to a neck (4A) of a container (4) in correspondence with one of its opening (5), comprising a body (3) equipped with a cup-shaped portion (9) closed at one of its bottom by a breakable wall (31), the first body (3) comprising at least one sealing element (32) with said neck (4A), the cap also comprising a shear (2) equipped with a head (20) from which an internally

hollow substantially cylindrical surface (21) extends which, when coupled to the cup-shaped portion, forms together with at least a part of the cup-shaped portion (9) a reservoir (S) for said product (10), the shear being slidable inside the cup-shaped portion (9) and comprising a cutting surface (24) of the breakable wall (31) obtained at a free end (22) of the cylindrical surface (21), the cup-shaped portion (9) being configured so that, when the cap is placed on the container (4) and the product is in the reservoir (S), the shear (2), pushed with force against its breakable wall (31) detaches it at least partially from the cup-shaped portion (9) with consequent introduction of said product inside the container (4), **characterized in that** the external cylindrical surface (21) of the shear (2) is defined by at least one first piece (2A) made of a material that absorbs humidity and positioned in proximity of said breakable wall (31) and a second piece (2B) made of a plastic material and fixed to the first piece, the first and the second piece forming the shear (2), the second piece (2B) being fitted onto the first piece (2A).

2. Cap according to one or more of the preceding claims in which the first piece (2A) has an external cylindrical surface provided with a lowered area (R), so that when the second piece (2B) is fitted on the first piece (2A) in said lowered area the cylindrical surface (21) is substantially free of steps.

3. Cap according to one or more of the preceding claims in which the external surface of the first piece (2A) on which the second piece is fitted has a smaller diameter than the free surface of the first piece (2A) and/or in which the internal surface of the first piece (2A) corresponding to the part where the second piece (2B) is fitted has a smaller diameter than the free internal surface of the first piece (2A).

4. Cap according to the previous claim in which at least one seal between the shear (2) and the cup-shaped portion (9) is made in correspondence with the coupling between the cup-shaped portion (9) and the second piece (2B).

5. Cap according to one or more of the preceding claims, in which a free edge (22) of the first piece (2A) has a cutting edge configured to facilitate the breaking through of the breakable wall (31).

6. Cap according to one or more of the preceding claims in which the first piece (2A) and/or the second piece (2B) have a cup-shaped configuration.

7. Cap according to one or more of the preceding claims, wherein the second piece (2B) has a protruding flange (103), preferably arranged at the head of the shear.

8. Cap according to one or more of the preceding claims, in which a free edge (101) of the second piece (2B) is tapered and engages in a groove (102) of the first piece (2A).

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9. Cap according to one or more of the preceding claims in which the first and second pieces are mutually snap-fastened.

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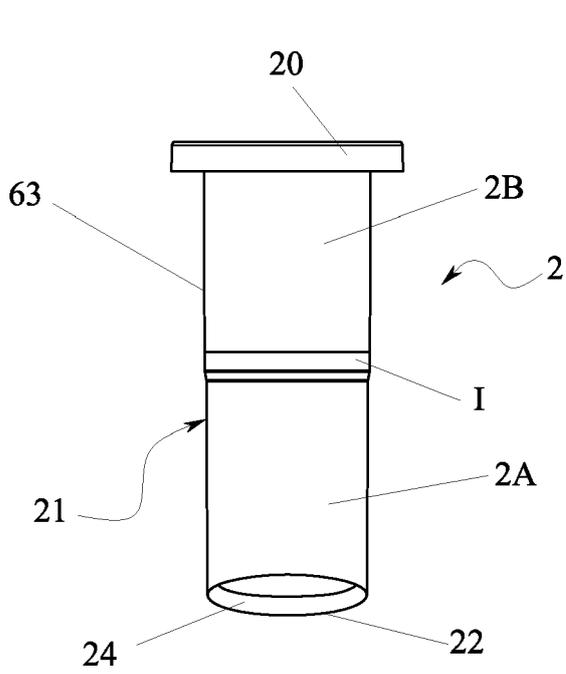


FIG.3

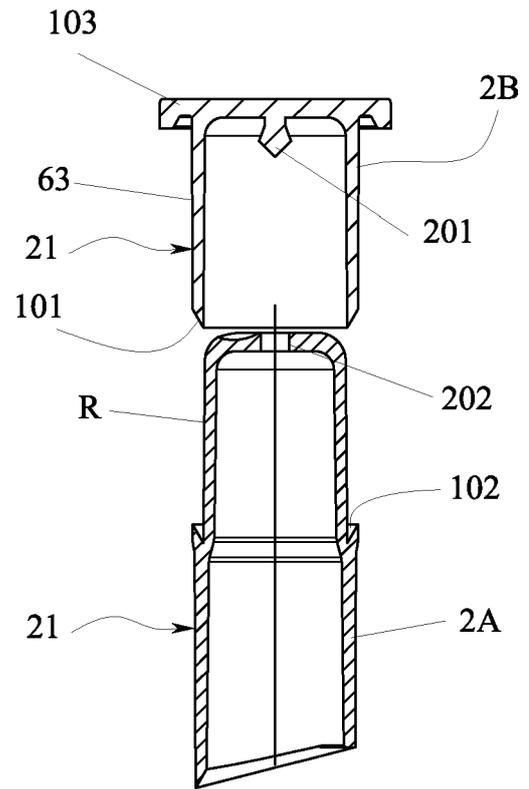


FIG.4

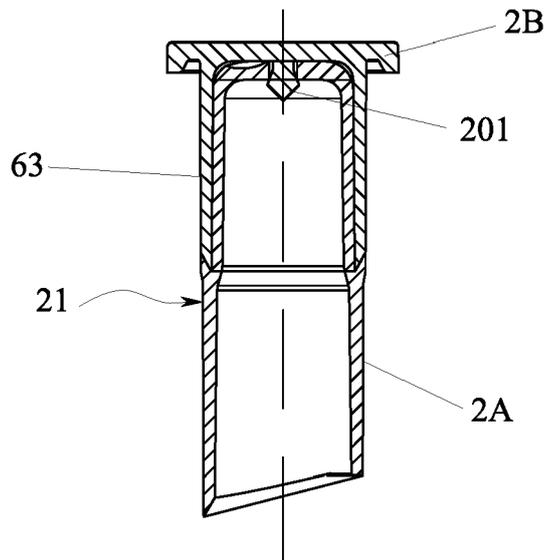


FIG.5



EUROPEAN SEARCH REPORT

Application Number

EP 21 21 0104

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| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|---|--|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
| A | <p>EP 3 351 486 A1 (CAPSOL S P A [IT]) 25 July 2018 (2018-07-25) * paragraph [0031] * * paragraph [0051] - paragraph [0053] * * figures 1, 2, 8A *</p> <p>-----</p> | 1, 5, 7 | <p>INV. B65D51/28 B65D81/26</p> |
| A | <p>WO 95/24640 A1 (FANG TA YUN [US]) 14 September 1995 (1995-09-14) * figure 3 *</p> <p>-----</p> | 1, 3, 6 | |
| | | | <p>TECHNICAL FIELDS SEARCHED (IPC)</p> <p>B65D</p> |
| <p>The present search report has been drawn up for all claims</p> | | | |
| <p>Place of search</p> <p>The Hague</p> | | <p>Date of completion of the search</p> <p>2 May 2022</p> | <p>Examiner</p> <p>Bridault, Alain</p> |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> | | <p>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</p> <p>..... & : member of the same patent family, corresponding document</p> | |

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 21 0104

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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02-05-2022

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|-------------------|-------------------------|-------------------|
| EP 3351486 A1 | 25-07-2018 | EP 3351486 A1 | 25-07-2018 |
| | | US 2018208371 A1 | 26-07-2018 |
| ----- | | | |
| WO 9524640 A1 | 14-09-1995 | EP 0749576 A1 | 27-12-1996 |
| | | US 5543097 A | 06-08-1996 |
| | | WO 9524640 A1 | 14-09-1995 |
| ----- | | | |

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2704962 A1 [0002] [0010]
- EP 3351486 A1 [0010]