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CLOSURE CAP FOR LIQUID-CONTAINING CONTAINERS
- (57)

Closure cap for liquid-containing containers, attachable to the neck (1) of a container, wherein the cap comprises:
 - a lower seal (7),
 - a folding upper lid (8),
 - a joint (9) that articulately connects the lid (8) with the seal (7); and
 - frangible bridges (14), which extend between the upper edge of the seal (7) and the lower edge of the peripheral
- skirt (11).

An upper edge of the seal (7) comprises a stepped area (15) diametrically opposite to the joint (9), which comprises a first end (16), a second end (17) and an upper ridge (18) that extends between the first end (16) and the second end (17); and the lower edge of the peripheral skirt (11) of the lid (8) comprises an indentation (19) having complementary geometry to the stepped area (8).
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- FIG. 1
- EP 4 446 245 A1
- Processed by Luminess, 75001 PARIS (FR)

Description

OBJECT OF THE INVENTION

[0001] The present invention falls within the technical field of caps for pouring openings, as well as accessories for container closures, and particularly refers to a closure cap for liquid-containing containers. More specifically, it is a hinged cap that complies with the EN 17665:2022 Standard for reducing the impact in nature of single-use plastics.

BACKGROUND OF THE INVENTION

[0002] In the technical field of caps for containers, those formed by the articulation of two parts are known, a lower part known as a seal or inviolability band, provided with means for its coupling on a neck of the bottle, and an upper part, known as a cap or lid, which occupies a closed or open position, allowing a user to take the liquid contained in the container without having to remove the cap.

[0003] These caps are usually equipped with anti-tamper indicator elements, designed to make it visible to the consumer that said caps and their contents have or have not been tampered with. For example, frangible bridges are small links made of the same plastic material as the rest of the cap and which include an upper end attached to the lid and a lower end attached to the seal. When the lid is opened for the first time, the bridges are pulled and broken, showing that the first opening has occurred.

[0004] Frangible bridges are the most commonly used first opening indicator elements due to the advantages they have. Among them, it is worth highlighting the fact that they are simple elements, which do not negatively interfere with either the structural resistance or the usefulness of the cap. With regard to their construction, these frangible bridges can be molded within the same mold of the cap, or they can be produced at a later stage with a blade.

[0005] A classic cap consists of at least a threaded cylindrical lid, an internal sealing skirt, frangible bridges and a tamper-proof seal that has hooks to attach to the neck of a bottle and remain attached thereto. For its part, the neck on which said cap is attached comprises at least one threaded surface defined in proximity to the pouring opening, a retaining ring and a carrying collar.

[0006] The current operation in a first opening is as follows: after the bridges break, the seal separates from the lid, falls and is lodged and retained between the retaining ring and the carrying collar of the neck. The total height of the seal is much lower than the housing defined between the bottom of the retaining ring and the top of the carrying collar of the container neck. Therefore, the cap seal will have side clearance, and consequently will lose tension in the hinge area of the lid upon opening, so that it moves inside the housing.

[0007] On the other hand, when unscrewing the lid to open it for the first time, the action of the internal threads in relation to the corresponding threads on the neck of the bottle causes the cap to rise with respect to the neck.

5 The hooks make an upward movement and rest under the attachment ring of the neck. At the same time, the internal sealing skirt also rises inside the neck.

[0008] This contact between the hooks of the cap and the neck ring pulls on the bridges when the cap is opened.

10 The anti-tampering objective is to break the bridges before the sealing skirt moves inside the neck and the sealing is lost. To ensure such anti-tampering, the sealing skirt must be long enough to absorb the functional movement between the cap hooks and the neck retaining ring.

15 The problem in having a sealing skirt that is too long is that capping defects occur in the automatic assembly of the cap in a bottling line, specifically when screwing.

[0009] Another solution is to reduce the cross section of the bridges so that they break quickly, but this means that these bridges can break in the bottling line, making them useless for their anti-tampering function. In addition, it must be taken into account that a minimum plastic passage section is required so that the cap can be manufactured correctly during the injection process.

25 [0010] There is also the possibility of reducing the clearance between the hooks and the bottom of the neck ring, to limit the rise of the skirt inside the neck, but this can cause fit rejections when capping on the bottling line.

[0011] In the current state of the art, documents are known that disclose a closure cap for liquid-containing containers that comprises a threaded cylindrical lid, an internal sealing skirt, frangible bridges, a tamper-proof tamper-evident seal or band, which has hooks for its attachment to the neck of a bottle and remain attached thereto (WO2021068058A1, US2021094733A1, DE1955047A1, FR1581775A), and a hinge that joins the lower edge of the vertical wall of the lid and the upper edge of the ring (WO2021068058A1, US2021094733A1).

40 [0012] Document WO2021068058A1 describes a closure device for a container that defines a neck and an annular flange. The closure device comprises a lid body, a tamper-evident band positioned below the annular flange, a tab extending from the lid body towards the tamper-evident band, and first and second straps positioned on either side of the tab. The first and second straps connect the lid body to the tamper-evident band and allow the lid body to be removed from the neck of the container while remaining attached to the tamper-evident band. When the lid body is actuated to a fully open position, the first and second straps act as a torsion spring to cause the tab to exert a force against the neck of the container to retain the lid body in the fully open position.

55 [0013] Document WO2021068058A1 does not disclose that the seal incorporates a stepped area with two ends at different heights, and that the lower edge of the vertical wall of the lid has an indentation complementary

to the stepped area. The technical effect it produces is to prevent the breakage of the frangible bridges during the screwing of the cap into the container's neck.

[0014] There is therefore a need to have a cap that allows the aforementioned objections to be overcome without negatively affecting the stability and functionality of the cap.

DESCRIPTION OF THE INVENTION

[0015] The object of the invention consists of a closure cap for liquid-containing containers attachable on a neck of said container, which neck comprises at least one threaded surface defined in proximity to the pouring opening, a retaining ring and a carrying collar.

[0016] The cap of the invention comprises a threaded cylindrical lid, with an internal sealing skirt, a tamper-proof tamper-evident seal or band, equipped with hooks to be attached to the neck of a bottle and remain attached thereto, frangible bridges that extend between the lid and the seal, and a hinge, which articulately joins the lid to the seal.

[0017] An upper edge of the seal incorporates a stepped area, which defines in said seal two sectors of different heights until reaching the area where the hinge is located. For its part, the lower edge of the vertical wall of the lid has an indentation that complements the stepped area, so that a proper closure occurs.

[0018] The solution proposed in this cap model therefore consists of incorporating into the seal a stepped area configured to limit the movement of said seal with the neck. This stepped area prevents the seal from engaging between a housing defined between the retaining ring and the carrying collar of the neck, as mentioned above.

[0019] To guarantee proper functioning of the seal and the hinge, the stepped area has a width between 1 mm and 10 mm. The height of the seal must always be higher than the remaining height between the bottom of the band and the top of the carrying collar. The height required for the seal to fall once the cap is opened, and thus make it visible that the cap has already been opened, is a minimum of 0.5 mm.

[0020] Regarding the height of the stepped area with respect to the rest of the seal, it shall have a minimum height to contact the peripheral skirt during capping and a maximum height in order not to interfere with the thread on the internal part of said peripheral skirt.

[0021] The stepped area has two ends with different slopes, both on the opposite side where the hinge is located.

[0022] By means of this solution it is possible to reduce the cross section of frangible bridges. During the bottling process, more specifically in the capping stage, the lid rises up the side of the stepped zone when it rotates clockwise to transmit the capping forces. Without modifying the stepped area, it is the bridges that support the forces during the capping process and the aforementioned breaks occur.

[0023] Furthermore, when the lid is opened and rests on the face of the stepped area of the seal, by virtue of the inclination of this face, it will exert a reverse thrust, that is, the seal will be pushed downwards while the lid will move upwards, contributes to the breakage of the bridges and makes the first opening easier for the user without negatively affecting anti-tampering.

[0024] Therefore, the incorporation of the stepped area into the seal provides numerous technical advantages by preventing the breakage of the frangible bridges when screwing the cap onto the container, facilitating its breakage when opening said cap and improving anti-tampering. Likewise, it prevents the seal from becoming lodged between the two rings on the neck of the container, reducing the clearance in the band and thus improving the correct functioning of the hinge.

DESCRIPTION OF THE DRAWINGS

[0025] To complement the description that is being made and in order to help a better understanding of the features of the invention, in accordance with a preferred example of practical embodiment thereof, a set of drawings is attached as an integral part of said description wherein, for illustrative and non-limiting purposes, the following has been represented:

Figure 1.- Shows a top perspective view of the front part of the closure cap before its insertion into a neck.

Fig. 2.- Shows a top perspective view of the rear part of the closure cap.

Fig.3.- Shows a front view of the front part of the cap.

Fig.4.- Shows a right-side view of the cap.

Fig.5.- Shows a left-side view of the cap.

Fig.6.- Shows a front view of a cut made to the closure cap attached to the neck and before the first opening occurs.

PREFERRED EMBODIMENT OF THE INVENTION

[0026] Below, with the help of the aforementioned figures, there is provided a detailed explanation of an example of a preferred embodiment of the object of the present invention.

[0027] In this description, when reference is made to the X axis, it should be understood that this corresponds to an axis of the cap intended to be positioned orthogonally to the plane of the hole to be plugged when it is in the closing position and plugs said hole. The X axis thus corresponds to the axis of rotation of the cap when it is screwed into the neck of the container. By convention, the "radial" orientation is directed orthogonally to the X axis. The terms "external" are used to define the relative

position of one element with respect to another one, by reference to the X axis, an element close to the X axis is thus classified as internal as opposed to an external element located radially on the periphery. The terms "upper" and "lower" are used to define the relative position of one element with respect to another one by reference to a position in which the neck hole is oriented upward and the cap is in a closed position on the neck of the container, wherein an element intended to be placed lower is called lower and an element intended to be placed higher is called upper.

[0028] The closure cap for liquid-containing containers being described is intended to be attached to the neck (1) of a container, which comprises a threaded surface (2) defined in proximity to the pouring opening (3), a retaining ring (4) and a carrying collar (5). A lower housing (6) is defined between the retaining ring (4) and the carrying collar (5).

[0029] The cap, shown in figures 1 and 2, comprises a lower seal (7), intended to be retained in the housing (6) of the neck (1), a folding upper lid (8), intended to cover the opening (3) of the neck (1) to seal it, and a joint (9), which connects in an articulated manner the lid (8) with the seal (7).

[0030] The lid (8) comprises a flat and horizontal upper wall (10) intended to be arranged substantially orthogonal to the X axis in front of the opening (3) when said lid (8) is in the closed position. The lid (8) further comprises a peripheral skirt (11), intended to surround the neck (1) when said lid (8) is in the closed position. The peripheral skirt (11) extends downward, perpendicular to the upper wall (10), from the external periphery of said upper wall (10).

[0031] The peripheral skirt (11) has, on its internal face, a screw surface, formed by a series of helical ribs, intended to cooperate with the threaded surface (2) of the neck (1). In this way, the lid (8) is configured to screw on the neck (1) in order to close the container, and to unscrew from the neck (1) in order to open the container.

[0032] The lid (8) is therefore movable between a closed position and an open position. In the open position, the lid (8) is no longer attached to the neck of the container. It is thus suitable for folding towards the open folded position, in which the lid (8) is removed from the opening (3) of the neck (1), so that it does not hinder the pouring of the contents of the container.

[0033] The peripheral skirt (11) has, on its external face, a series of grooves (12) distributed around the X axis and extending parallel to the X axis. The grooves (12) thus provide a rough surface that facilitates the gripping of the lid (8) both by the user and by the assembly device of the bottling chain.

[0034] The lid (8) also comprises a sealing skirt (13) that extends perpendicularly downwards from an internal face of the upper wall (10), and which is configured to be inserted inside the opening (3) of the neck (1). The lid (8) further comprises an annular lip that extends, from an internal face of the upper wall (10), radially between the

sealing skirt (13) and the external peripheral skirt (11).

[0035] The sealing skirt (13) and the annular lip are sized so that, when the lid (8) is in the closed position on the neck (1) of the container, the sealing skirt (13) is in contact against the internal face of the neck (1), while the annular lip is in contact against the external face of the neck (1). In this way, the sealing skirt (13) and the annular lip ensure the tightness of the closure.

[0036] The seal (7) is, before the first opening of the cap, connected to the lid (8) by frangible bridges (14) intended to break during the first opening of the lid (8). These frangible bridges (14) thus constitute the main element to guarantee the anti-tampering of the cap and connect the upper edge of the seal (7) and the lower edge of the peripheral skirt (11) of the lid (8).

[0037] The joint (9) is configured to allow the lid (8) to oscillate between the closed position and the folded open position.

[0038] The upper edge of the seal (7) comprises a stepped area (15), located in a sector of the seal (7) diametrically opposite to that where the joint (9) is located and which extends beyond said upper edge of the seal (7), as shown in Figures 3 to 5. This stepped area (15) has a first end (16), a second end (17) and an upper ridge (18) that is essentially straight and extends between the first (16) and the second end (17). As can be seen in the attached figures, especially in Figure 3, the first end (16) has a different geometry and height with respect to the seal (7) than the second end (17).

[0039] In the preferred embodiment illustrated herein, the first end (16) of the stepped area (15) consists of a step with a right angle between the upper edge of the seal (7) and the upper ridge (18), while the second end (17) consists of a step in the form of a descending ramp from the upper ridge (18) towards the upper edge of the seal (7).

[0040] The lower edge of the peripheral skirt (11) of the lid (8) has an indentation (19) having complementary geometry to that of the stepped area (15), thus ensuring a correct fit between lid (8) and seal (7) when the cap is in the closed position.

[0041] As indicated in Figure 3, the stepped area (15) of the seal (7) has a total length (A) comprised in a range between 1 mm and 10 mm. The maximum height (B) of the stepped area (15) must be greater than the height (D) of the housing (6). Figure 6 shows these dimensions in an arrangement of the cap prior to its first opening.

[0042] Reference (E) shows the height required for the seal (7) to fall once the lid (8) is opened and the frangible bridges (14) are broken. Said height (E) must have a minimum value of 0.5 mm to make that first opening visible and evident. As seen in Figure 6, this height (E) corresponds to the difference in height between the upper edge of the carrying collar (5) of the neck (1) and the lower edge of the seal (7) before the first opening occurs and makes it possible to see a stripe that shows that the cap has already been opened.

[0043] Finally, reference (C) refers to the minimum

height that the stepped area (15) must have with respect to the upper edge of the seal (7). Said height (C) must be between a minimum value such that it allows contact with the peripheral skirt (11) during capping and a maximum value such that it avoids interference with the screw surface of said peripheral skirt (11).

Claims

1. Closure cap for liquid-containing containers, attachable to the neck (1) of a container, the neck (1) comprising a threaded surface (2), a pouring opening (3), a retaining ring (4), a carrying collar (5) and a housing (6) delimited between the retaining ring (4) and the carrying collar (5), and wherein the housing (6) has a height (D);

wherein the cap comprises:

- a lower seal (7), intended to be retained in the housing (6);
- a folding upper lid (8), intended to cover the opening (3), which in turn comprises:
 - a horizontal upper wall (10) for temporary sealing of the opening (3);
 - a peripheral skirt (11), intended to surround the neck (1) when the lid (8) is in the closed position, which has a lower edge and a screw surface intended to cooperate with the threaded surface (2); and
 - a sealing skirt (13) that extends from an internal face of the upper wall (10), attachable inside the opening (3) of the neck (1);
- a joint (9) that articulately connects the lid (8) with the seal (7); and
- frangible bridges (14), which extend between the upper edge of the seal (7) and the lower edge of the peripheral skirt (11);

the closure cap being **characterized in that:**

- the upper edge of the seal (7) comprises a stepped area (15), located in a sector of the seal (7) diametrically opposite to that where the joint (9) is located, stepped area (15) that comprises a first end (16), a second end (17) and an upper ridge (18) that extends between the first end (16) and the second end (17); and
- the lower edge of the peripheral skirt (11) of the lid (8) comprises an indentation (19) having complementary geometry to the stepped area (8).

2. Closure cap according to claim 2 wherein the first end (16) has a different geometry and height with respect to the seal (7) than those of the second end (17).

3. Closure cap according to claim 2 wherein:

- the first end (16) of the stepped area (15) is a step with a right angle between the upper edge of the seal (7) and the upper ridge (18) of the stepped area (15); and
- the second end (17) is a step in the form of a descending ramp from the upper ridge (18) towards the upper edge of the seal (7).

4. Closure cap according to any of the preceding claims wherein the stepped area (15) has a total length (A) comprised in a range between 1 mm and 10 mm.

5. Closure cap according to any of the preceding claims wherein the stepped area (15) has a maximum height (B) greater than the height (D) of the housing (6).

6. Closure cap according to any of the preceding claims wherein the stepped area (15) has a minimum height (C) with respect to the upper edge of the seal (7) comprised between a minimum value such that it allows contact with the peripheral skirt (11) during capping and a maximum value such that it avoids interference with the screw surface of said peripheral skirt (11).

7. Closure cap according to any of the preceding claims wherein a height (E), corresponding to the difference in height between the upper edge of the carrying collar (5) of the neck (1) and the lower edge of the seal (7) prior to the breakage of the frangible bridges (14), is at least 0.5 mm.

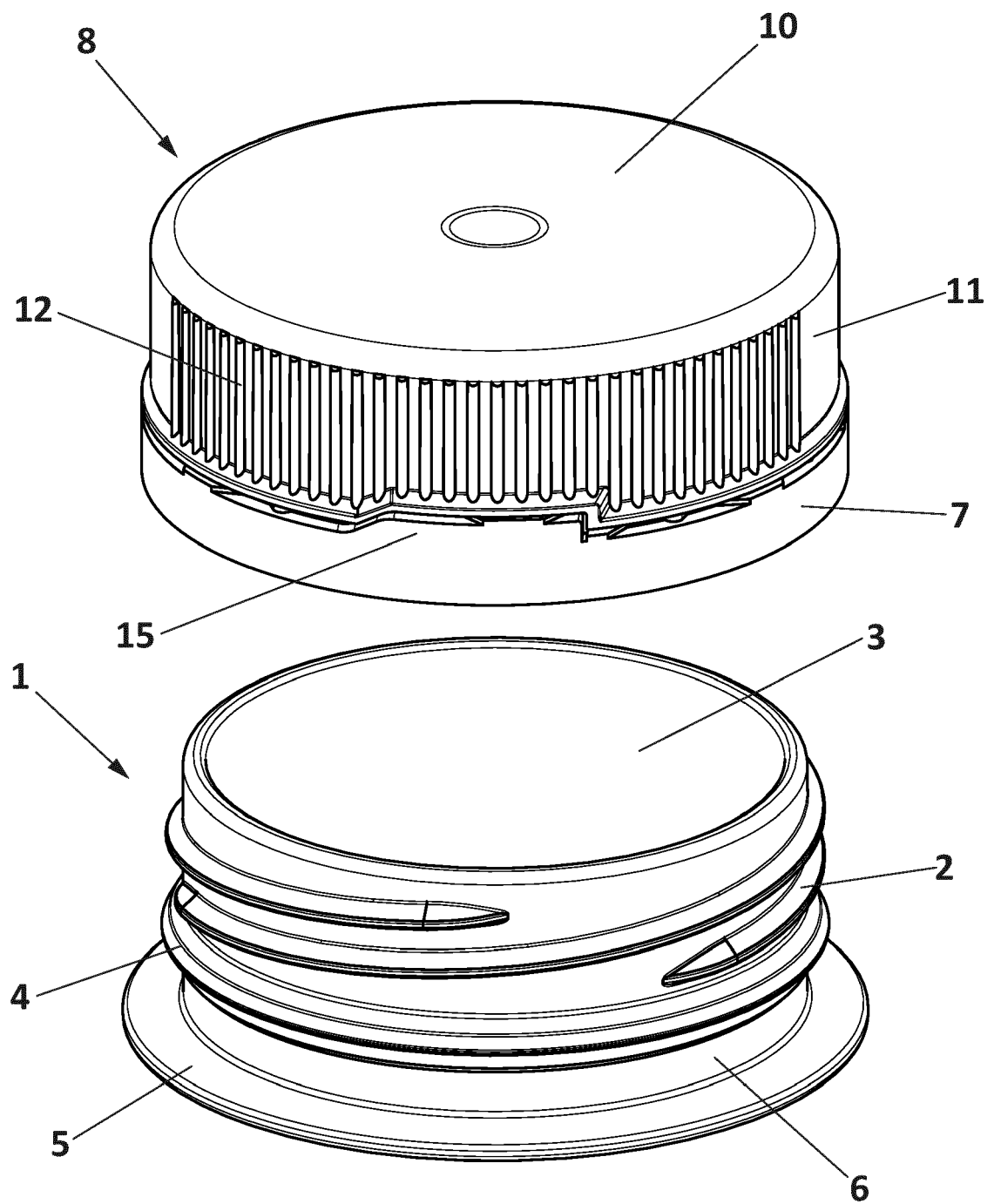


FIG. 1

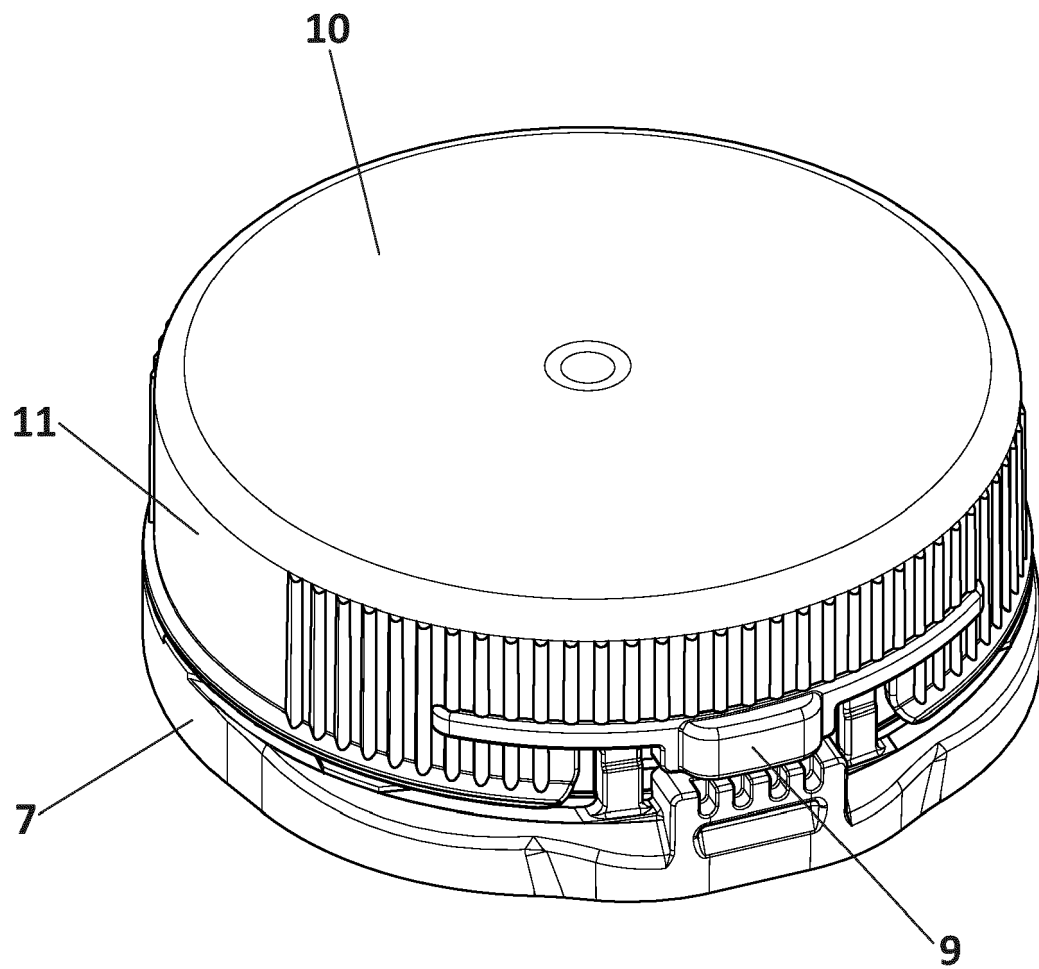


FIG. 2

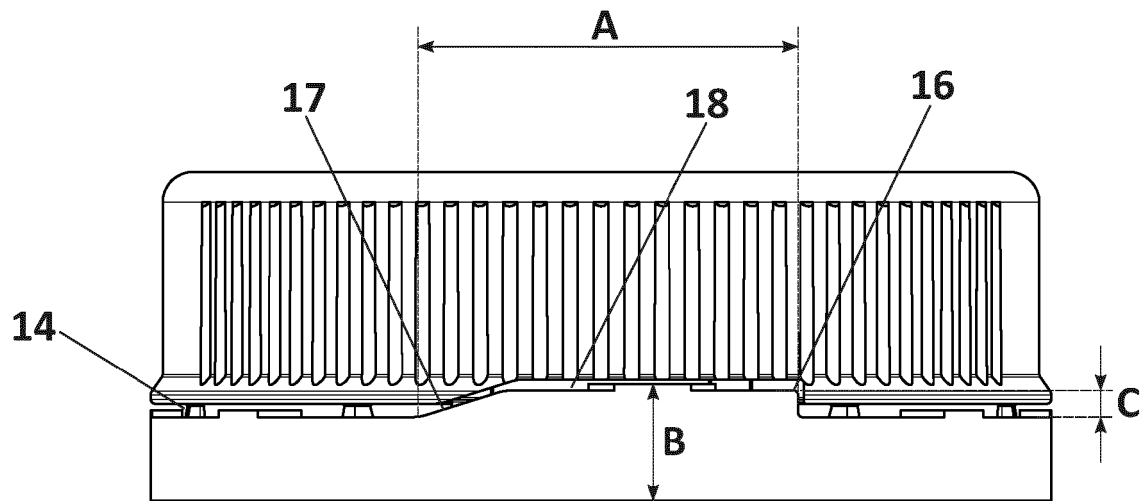


FIG. 3

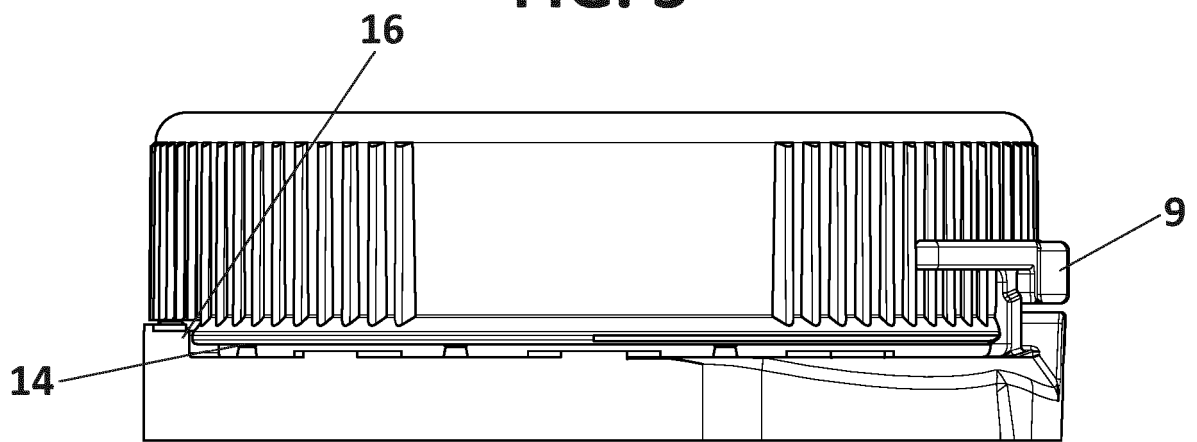


FIG. 4

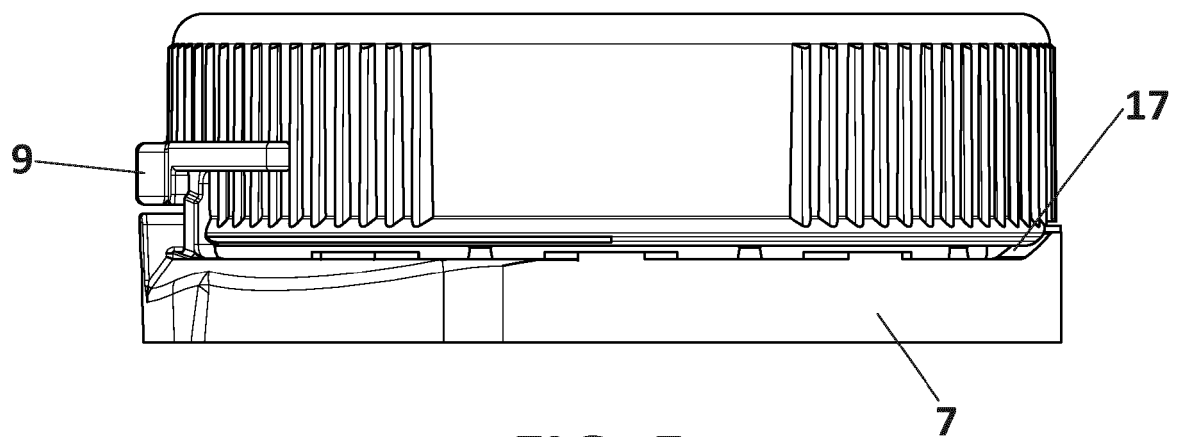


FIG. 5

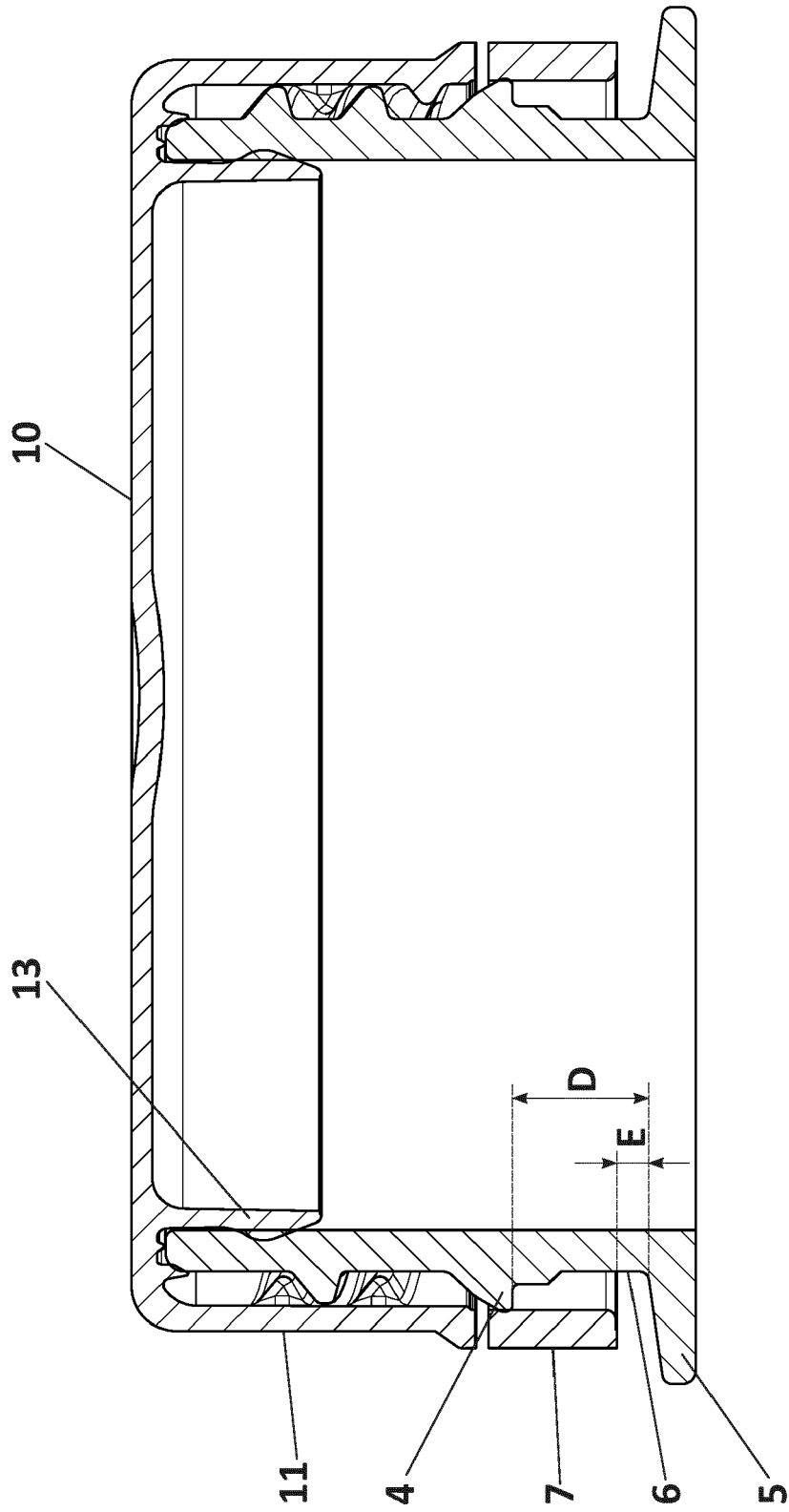


FIG. 6



EUROPEAN SEARCH REPORT

Application Number

EP 24 38 2363

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 August 2024	Examiner Le Bihan, Nicolas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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