(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 670 377 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.06.2020 Bulletin 2020/26

(21) Application number: **19383122.9**

(22) Date of filing: **17.12.2019**

(51) Int Cl.:
B65D 41/32 *(2006.01)* ***B65D 41/34*** *(2006.01)*
B65D 55/16 *(2006.01)* ***B65D 47/08*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **19.12.2018 ES 201831241**

(71) Applicant: **Betapack, S.A.U.**
20305 Irun (Guipúzcoa) (ES)

(72) Inventor: **DELCAMBRE, Pierre**
20305 IRUN (Guipúzcoa) (ES)

(74) Representative: **Herrero & Asociados, S.L.**
Cedaceros, 1
28014 Madrid (ES)

(54) **CAPPING DEVICE THAT IS AFFIXED TO THE NECK OF A CONTAINER**

(57) The invention relates to a capping device (1) intended to be affixed to a neck (2) of a container to seal an opening of said neck (2) and which comprises:
- a lower ring (4) intended to be mounted affixed axially to the neck (2) and rotating on the neck (2) around an X-axis;
- a cap (3) that has a spiral thread (12) intended to cooperate with a spiral thread (9) formed on the neck (2) of the container; and
- a connection device (5) which connects the cap (3) to the lower ring (4) and is positioned to allow the cap (3) to move away from the lower ring (4) during the unscrewing of the cap (3) and thus permit the opening of the cap (3).

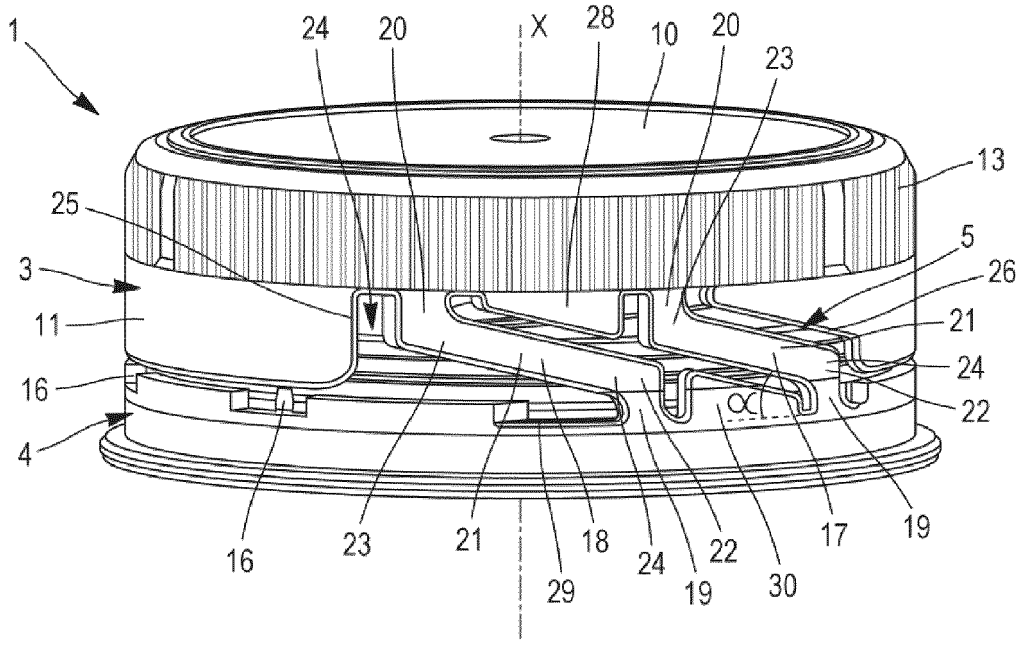

FIG. 1

EP 3 670 377 A1

Description

Technical field

[0001] The invention relates to a capping device of a container and a container equipped with said capping device.

[0002] More specifically, the invention relates to a capping device that maintains a cap connected to the neck of a container, which prevents the cap from being lost in nature.

Prior art in the sector

[0003] Moulded capping devices that comprise a lower ring intended to be affixed axially to the neck of a container, a cap to close the opening of the neck and which has an internal thread intended to cooperate with an external thread of the neck and a connection device that connects the cap to the lower ring, are known in the state of the art. This way, the connection device makes it possible to captively affix the cap to the neck of the container.

[0004] Such capping devices are described, for example, in the documents EP1124734 and EP2308772. However, the capping devices of the state of the art are not completely satisfactory. In particular, the connection devices that provide the connection between the cap and the lower ring have complex shapes that are particularly difficult to mould. In addition, these capping devices are equipped with locking devices to lock the cap in the angled open position, which further increases the complexity of the moulding of said capping devices and it is likely that they will bother the consumer.

[0005] In addition, document JP4906441 discloses a capping device comprising a lower ring affixed axially to the neck of a container, an adapted cap for screwing onto the neck of the container and a connection device that captively connects the cap to the lower ring. The connection device comprises two parallel arms that extend parallel to the X-axis of the threading of the cap when the capping device is moulded in an open configuration of the cap. When the cap is screwed onto the neck of the container and the cap is placed near the lower ring, the two parallel arms are subject to twisting and angle themselves with respect to the vertical. Such a capping device is also not satisfactory. In fact, the capping device is necessarily moulded in the open position, such that the manufacture of the capping device requires an additional manufacturing step for the formation of the frangible bridges that connect the cap and the lower ring before the first opening of the cap. In addition, the connection arms are permanently restricted when the cap is closed, which could damage the connection device over time.

Summary

[0006] One idea that underlies the invention is to provide a capping device that makes it possible to maintain a cap affixed to the neck of a container that is reliable and easy to manufacture.

[0007] According to one embodiment, the invention discloses a capping device intended to be affixed to the neck of a container to close an opening of said neck and which comprises:

- a lower ring intended to be mounted affixed axially to the neck and rotating on the neck around an X-axis;
- a cap which comprises an upper wall intended to be oriented facing the opening of the neck and an exterior peripheral skirt intended to surround said neck, with the exterior peripheral skirt having a spiral thread intended to cooperate with a spiral thread formed on the neck of the container, such that the cap on the neck can be screwed or unscrewed around the X-axis; and
- a connection device that connects the cap to the lower ring and is positioned to allow the cap to move away from the lower ring during the unscrewing of the cap and thus permit the opening of the cap; with the connection device comprising parallel first and second connection arms that each connect the exterior peripheral skirt to the lower ring and with each one comprising a central portion, said central portion having, in an unrestricted state corresponding to a closed position of the cap, a circular spiral shape that is developed around the X-axis in a direction opposite that of the spiral thread of the exterior peripheral skirt, such that the first and second connection arms straighten to allow the cap to move away from the lower ring when the cap is unscrewed from the neck.

[0008] A connection device of this type has shapes that are easier to mould than the capping devices of the state of the art. In addition, the unrestricted state of the connection device corresponds to a closed position of the cap, such that the capping device can be moulded in a single piece in the closed configuration of the cap, which further facilitates its manufacture.

[0009] According to other advantageous embodiments, said capping device may have one or more of the following features:

According to one embodiment, the capping device is moulded in a single piece.

[0010] According to one embodiment, the moulding device can be moulded in the closed configuration of the cap.

[0011] According to one embodiment, the first and second connection arms are separated by a distance L2 of between 6 and 12 mm. This makes it possible to limit the tensions exerted on the connection arms when the cap is opened.

[0012] According to one embodiment, the first and second connection arms extend respectively around the X-axis in a first and a second angular sector, with the first and second angular sectors partially overlapping.

[0013] According to one embodiment, the first and second connection arms each comprise a first end portion that extends from the lower ring and is connected to the central portion of said connection arm through a first folded portion and a second end portion that extends from the exterior peripheral skirt of the cap and is connected to the central portion of said connection arm by a second folded portion. These geometries of the connection arms make it possible, specifically, to avoid the generation of areas of stress concentration that could cause the connection arms to break.

[0014] According to one embodiment, the first and second end portions of the first and second connection arms have an area that is thinner than that of the central portion. These areas make it possible to form preferential folding areas into which the connection arms are folded when the cap is rotated to its angled open position.

[0015] According to one embodiment, the first and second end portions extend parallel to the X-axis.

[0016] According to one embodiment, the first end portions are coupled to the lower ring by means of an angle. According to one embodiment, the second end portions are coupled to the exterior peripheral skirt by means of an angle. These angles have the effect of further limiting the stress concentrations.

[0017] According to one embodiment, the exterior peripheral skirt has a serrated portion, with the second end portion and the central portion of the first and second connection arms housed in said serrated portion.

[0018] According to one embodiment, the serrated portion of the exterior peripheral skirt comprises, between the first and second connection arms, a protruding portion that protrudes towards the lower ring. The purpose of said protruding portion is to limit the dimensions of the free space between the connection arms that could allow dust to enter.

[0019] According to one embodiment, the notch has a lateral edge that follows the contour of the first connection arm.

[0020] According to one embodiment, the protruding portion that protrudes from the serrated portion of the exterior peripheral skirt has a trapezoidal shape defined by vertical lateral edges that are opposite, respectively, the second end portion of the first and second connection arms and by a lower edge that is parallel to the central portion of the second connection arm.

[0021] According to one embodiment, the lower ring has a serrated portion and the first end portion of the first and second connection arms is housed in said serrated portion.

[0022] According to one embodiment, the serrated portion of the lower ring comprises, between the first and second connection arms, a protruding portion that protrudes towards the cap. The purpose of said protruding portion is to limit the dimensions of the free space between the connection arms that could allow dust to enter.

[0023] According to one embodiment, the protruding portion that protrudes from the serrated portion of the lower ring has a trapezoidal shape defined by vertical lateral edges that are opposite, respectively, the first end portion of the first and second connection arms and by an upper edge that is parallel to the central portion of the first connection arm.

[0024] According to one embodiment, the first and second connection arms are long enough to permit the thread of the cap to disconnect from the thread of the neck.

[0025] According to one embodiment, the first and second connection arms each have a length greater than G/(1-sin y), where:

G: an axial dimension between one interior face of the upper wall of the cap and a lower end of the thread of the cap; and

y: the angle formed between a first straight line BD and a second straight line AB, with the first straight line AB connecting the centre B of the horizontal segment formed in the connection between the first end portion of the first connection arm and the lower ring and the centre D of the horizontal segment formed in the connection between the second end portion of the first connection arm and the exterior peripheral skirt and with the second straight line AB connecting the centre A of the horizontal segment formed in the connection between the first end portion of the second connection arm and the lower ring and the centre B.

[0026] According to one embodiment, the lower ring is connected to the exterior peripheral skirt by means of frangible bridges. The purpose of these frangible bridges is to act as indicators of the tamper-proof security of the seal.

[0027] According to one embodiment, the cap has an interior skirt that extends perpendicularly downwards from the upper wall of the cap and is intended to be inserted in the opening of the neck.

[0028] According to one embodiment, the cap further comprises an annular lip that extends radially from the upper wall between the interior skirt and the exterior peripheral skirt and that is intended to come in contact with an external face of the neck.

[0029] According to one embodiment, the invention also provides a container equipped with a neck that comprises an opening and a thread, said container further comprising a capping device mentioned previously, with the lower ring of the capping device affixed axially to the neck and able to rotate around said neck, and with the thread of the exterior peripheral skirt of the cap cooperating with the thread on the neck.

Brief description of the drawings

[0030] The invention will be better understood, and other objectives, details, features and advantages of the invention will appear more clearly in the following descrip-

tion of several particular embodiments of the invention, which are provided solely for the purposes of illustration and not limitation with reference to the attached drawings.

- **Figure 1** is a perspective view of a capping device according to a first embodiment in the closed position.
- **Figure 2** is a front view of the neck of a container intended to be equipped with the capping device of Figure 1.
- **Figure 3** is a perspective view of the capping device of Figure 1 when the cap is opened.
- **Figure 4** is a perspective view of the capping device of Figures 1 and 3 when the cap is in the angled open position.
- **Figure 5** is a cross-section view of a capping device according to an embodiment, mounted on the neck of a container.
- **Figure 6** is a front view of a capping device according to an alternative embodiment.
- **Figure 7** is a front view of the capping device of Figure 6 in which geometric indications have been added.

Detailed description of the embodiments

[0031] In the description and figures, the X-axis corresponds to the axis of rotation of the cap of the capping device when it is screwed onto the neck of a container. In addition, in the description and claims, the terms "external" and "internal" will be used according to the definitions given in the description of the elements of the capping device. By convention, the "radial" orientation is directed orthogonally to the X-axis. The terms "external" and "internal" are used to define the relative position of one element with respect to another, with reference to the X-axis, such that an element close to the X-axis is called internal in comparison with 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 with reference to a position in which the opening of the neck is aimed upward and the cap is in the closed position on the neck of the container, with an element intended to be positioned lower being designated as lower and an element intended to be positioned higher being designated as upper.

[0032] Figures 1 to 5 describe a capping device 1 according to a first embodiment. The capping device 1 is intended to be mounted on the neck 2 or mouth of a container, as shown in Figure 2. The container is, for example, a bottle.

[0033] The capping device 1 comprises a lower ring 4 that is intended to be retained on the neck 2 of the container, a cap 3 intended to cover the opening of the container to close it and a connection device 5 that connects the cap 3 to the lower ring 4, at the same time permitting said cap 3 to move away from the lower ring 4 to allow the opening of the cap 3.

[0034] As shown in Figure 2, the neck 2 of the container has a collar 6 with a truncated cone shape that narrows in the upward direction, that is, in the direction of the opening of the container. The collar 6 defines, downwards, that is, in a direction opposite the opening, a ridge 7. The lower ring 4 comprises anchoring elements, as shown in Figure 5, which permit the retention of the lower ring 4 on the neck 2. The anchoring elements here are tabs 8 that are positioned radially on the interior surface of the lower ring 4 and that protrude radially inwards. During the mounting of the capping device 1 on the neck 2 of the container, the tabs 8 slide against the truncated cone shaped surface of the collar 6, extending beyond the lower end of the collar 6 and then locking, by means of elastic return, behind the ridge 7. The lower ring 4 is thus immobilised axially on the neck 2 while at the same time it can rotate with respect to the X-axis.

[0035] The neck 2 also comprises a thread 9 formed by a series of spiral ribs, shown in Figures 2 and 5. As shown in Figure 5, the cap 3 comprises an upper wall 10 intended to be positioned substantially orthogonally to the X-axis opposite the opening of the neck 2 and an exterior peripheral skirt 11 intended to surround the neck 2 of the container. The exterior peripheral skirt 11 extends, downwards, perpendicular to the upper wall 10, from the exterior periphery of said upper wall 10. The exterior peripheral skirt 11 has, on its interior face, a thread 12 formed by a series of spiral ribs intended to cooperate with the series of spiral ribs formed on the exterior surface of the neck 2. Therefore, the cap 3 is adapted to screw onto the neck 2 in order to close the container and to unscrew from the neck 2 in order to open the container.

[0036] As shown in Figures 1, 3 and 4, the exterior peripheral skirt 11 has, on its exterior face, a top portion 13 that is equipped with a series of grooves distributed around the X-axis and that extend parallel to said X-axis. The grooves thus provide a rough surface that facilitates the gripping of the cap 3 by the user or by the mounting device on the bottling line, which is intended to ensure the mounting of the cap 3 on the neck 2 of the container.

[0037] In addition, the cap 3 also comprises an interior skirt 14, specifically shown in Figure 5, which extends perpendicularly downwards from the upper wall 10 of the cap 3 and has an adequate size to fit inside the interior wall of the opening of the neck 2. The cap 3 also has an annular lip 15, which is also shown in Figure 5 that extends from the upper wall 10 radially between the interior skirt 14 and the exterior peripheral skirt 11. As shown in Figure 5, the interior skirt 14 and the annular lip 15 are dimensioned such that, when the cap 3 is in the closed position on the neck 2 of the container, the interior skirt 14 is in contact with the interior face of the neck 2 while the annular lip 15 is in contact with the exterior face of the neck 2. In this way, the interior skirt 14 and the annular lip 15 permit the sealing of the closure.

[0038] The lower ring 4 is connected to the cap 3 before the first opening of the container, by means of frangible bridges 16, two of which are shown in Figure 1, intended to be broken when the cap 3 is opened. These frangible bridges 16 thus act as indicators of the tamper-proof security of the seal. More specifically, the frangible bridges 16 are distributed around the X-axis and connect the top edge of the lower ring 4 and the bottom edge of the exterior peripheral skirt 11. According to another embodiment not shown, the lower ring 4 and the cap 3 are connected to each other by a tearable strip inserted axially between the cap 3 and the lower ring 4 and that, on one hand, is connected to the lower ring 4 by means of frangible bridges 16 and on the other, connected to the cap 3 by means of frangible bridges 16.

[0039] In addition, the connection device 5 that provides a connection between the cap 3 and the lower ring 4 is positioned to permit said cap 3 to move away from the lower ring 4 to allow the opening of the cap 3. The connection device 5 comprises first and second connection arms 17, 18 that are identical and parallel, each one of which is connected, on one hand, to the lower ring 4 and, on the other, to the exterior peripheral skirt 11 of the cap 3.

[0040] As shown, for example, in Figure 1, each one of the two connection arms 17, 18 comprises a first end portion 19 that is anchored to the lower ring 4, a second end portion 20 that is anchored to the exterior peripheral skirt 11 of the cap 3 and a central portion 21 that is connected respectively to the first and second end portions 19, 20 by means of the first and second folded portions 23, 24. Advantageously, the connection arms 17, 18 follow the exterior curve of the lower ring 4 and the exterior peripheral skirt 11. In addition, advantageously, the first end portion 19 and the second end portion 20 are connected to the lower ring 4 and to the exterior peripheral skirt 11 by means of angles, which makes it possible to limit the stress concentrations.

[0041] When the cap 3 is in the closed position, as shown in Figure 1, the first and second end portion 19, 20 of each of the connection arms 17, 18 are displaced angularly with regard to each other and the central portions 21 are angled with respect to the vertical to connect the first and second end portion 19, 20 of each of the connection arms 17, 18. The closed position, illustrated in Figure 1, corresponds to the state in which the capping device 1 is moulded. Therefore, in this closed position, the connection arms 17, 18 are in an unrestricted resting state.

[0042] The central portions 21 of the connection arms 17, 18 are parallel to each other and each one follows a guide line that has a circular spiral shape. The angle α of the circular spiral shape is constant and the X-axis forms the spiral axis. The direction of the circular spiral shape of the central portions 21 is inverted with respect to that of the thread 12 intended to secure the affixing of the cap 3 on the neck 2.

[0043] In the connection area in which the connection device 5 is positioned, the exterior peripheral skirt 11 has a serrated portion 24 in which the second end portion 20 and the central portion 10 of the connection arms 17, 18 are housed. In this way, the second end portion 20 and the central portion 21 of the connection arms 17, 18 extend above the lower edge of the exterior peripheral skirt 11 outside the connection area. One of the lateral edges 25 of the serrated portion 24 extends vertically, while the other lateral edge 26 substantially follows the contour of the first connection arm 17, comprising, from bottom to top, a first vertical portion, a second portion parallel to the central portion 21 of the first connection arm 17 and a third vertical portion. In addition, the serrated portion 24 comprises, between the two connection arms 17, 18, a protruding portion 28 that protrudes downward. The protruding portion 28 has a trapezoidal shape defined by two vertical lateral edges that are opposite, respectively, the second end portion 20 of either one of the two connection arms 17, 18 and by a lower edge that is parallel to the central portion 21 of the second connection arm 18.

[0044] The lower ring 4 also has a serrated portion 29 in which the first end portions 19 of the connection arms 17, 18 are housed. Therefore, the first end portions 19 extend substantially below the upper limit of the lower ring 4 outside the connection area. In addition, the serrated portion 29 comprises, between the two connection arms 17, 18, a protruding portion 30 that protrudes upward. The protruding portion 30 has a trapezoidal shape defined by two vertical lateral edges that are opposite, respectively, the first end portion 19 of either one of the two connection arms 17, 18 and by an upper edge that is parallel to the central portion of the first connection arm 17.

[0045] This arrangement makes it possible to provide connection arms 17, 18 whose length is sufficient to allow the cap 3 to disconnect from the neck 2 while at that same time it limits the dimensions of the spaces formed between the cap 3 and the lower ring 4 that could allow dust to enter.

[0046] In order to further protect the neck 2 of the container against dust, in the second embodiment shown in Figure 7, the serrated portion 29 of the lower ring 4 has a second protruding portion 31 that protrudes upward and is positioned opposite the second connection arm 18. The protruding portion 31 has a trapezoidal shape defined by two vertical lateral edges and an upper edge that is parallel to the central portion 21 of the second connection arm 18.

[0047] With regard to Figure 7, the geometric and dimensional features of the connection device 5 are described below.

[0048] The first and second connection arms 17, 18 have, respectively, a length L1 and a length L1' that are equal. As shown in Figure 7, the length L1 of the first connection arm 17 is measured, on one hand, between the centre B of the horizontal segment formed in the connection between the first end portion 19 of the first connection arm 17 and the lower ring 4 and, on the other,

the centre D of the horizontal segment formed in the connection between the second end portion 20 of the first connection arm 17 and the exterior peripheral skirt 11. Similarly, the length L1' of the second connection arm 18 is measured, on one hand, between the centre A of the horizontal segment formed in the connection between the first end portion 19 of the second connection arm 18 and the lower ring 4 and, on the other, the centre C of the horizontal segment formed in the connection between the second end portion 20 of the second connection arm 18 and the exterior peripheral skirt 11. In addition, the two connection arms 17, 18 are identical and are separated by a constant distance, with the designated length L2 between points A and B being equal to the designated length L2' measured between points C and D.

[0049] To allow the cap 3 to disconnect from the neck 2 of the container, the lengths L1 and L1' of the connection arms must be greater than G/(1-sin y), where:

G: is the axial dimension between the interior face of the upper wall 10 of the cap 3 and the lower end F of the series of spiral ribs formed in the cap 3; and
y: is the angle formed between the straight line BD and the straight line AB.

[0050] In addition, the connection arms 17, 18 can be associated to a certain degree with a deformable quadrilateral articulation, with the points A, B, C and D constituting the four axes of rotation of the deformable quadrilateral articulation. However, the connection arms 17, 18 have a spiral shape and, therefore, do not extend in a single plane like a deformable quadrilateral articulation, with the connection arms unable to remain substantially parallel to each other during the unscrewing of the cap 3 and with the stresses, including the torsion stresses, exerted on the connection arms 17, 18 during the unscrewing of the cap 3. However, the smaller the distance between two connection arms 17, 18, the smaller the stress that will be experienced between the connection arms when the cap 3 is unscrewed. In addition, lengths L2 and L2' measured, respectively, between points A and B and between points C and D are critical to ensure that the levels of stress that may be exerted on the two connection arms 17, 18 during the unscrewing of the cap 3 do not damage the connection device 5.

[0051] In addition, advantageously, as shown in Figure 7, the first and second connection arms 18 extend, respectively, on a particular angular section s1 and s2, with the angular sections s1 and s2 partially overlapping. This makes it possible to limit the separation between the two connection arms 17, 18 and, therefore, limits the stresses exerted on the connection arms 17, 18 during the unscrewing of the cap 3.

[0052] In addition, the distance L2 between the two connection arms 17, 18 satisfies the following formula:

$$L2 = 2^{\sqrt{2wr - w^2}};$$

R: diameter of the cap 3; and
w: between 0.6 and 1 mm, more specifically between 0.7 and 0.9 mm and preferably on the order of 0.8 mm.

[0053] For example, the radius of the cap 3 is between 10 and 25 mm and, specifically, it may adopt one of the following values: 12.5 mm, 13 mm, 14 mm, 14.5 mm or 19 mm.

[0054] Therefore, advantageously, the length L2 is between 6 mm and 12 mm.

[0055] The following section describes the operations for the mounting of the capping device 1 on the container, on one hand, and the operations for opening and closing the cap 3, on the other.

[0056] To mount the capping device 1 on the container, the capping device 1 is placed on the neck 2 by simply screwing the cap 3 on the neck 2, until the tabs 8 formed on the lower ring 4 move beyond the ridge 7 defined by the collar 6 of the neck 2. The lower ring 4 is affixed to the neck 2 and is movable to rotate around the X-axis of the neck 2.

[0057] During the first unscrewing, the cap 3 leaves its closed position, illustrated in Figure 1, and moves away from the lower ring 4 to a distant position, illustrated in Figure 3, in which the thread 12 of the cap 3 and the thread of the neck 2 are uncoupled. The frangible bridges 16 are broken during this movement. In addition, during this unscrewing movement of the cap 3, the lower ring 4 rotates around the X-axis and the two connection arms 17, 18 straighten as the cap 3 moves away from the lower ring 4. In other words, the angle formed between the central portions 21 of the connection arms 17, 18 and a horizontal axis increases as the cap 3 moves away from the lower ring 4.

[0058] Later, when the spiral ribs of the cap 3 are disconnected from the spiral ribs of the neck 2, the cap 3 can be rotated backwards towards an angled open position, as shown in Figure 4, in which the cap 3 is released from the opening of the neck 2 such that it does not interfere with the discharging of the contents of the container. In this angled open position, the exterior peripheral skirt extends upward from the upper wall 10.

[0059] In one advantageous embodiment, the first and second end portions 19, 20 of the connection arms 17, 18 have an area that is thinner than that of the central portion 21. This makes it possible to form at the level of the first and second end portions 19, 20 of the connection arms 17, 18 the preferred folding areas in which the connection arms 17, 18 are folded when the cap 3 rotates towards its open position. This arrangement makes it possible to optimise the distance between the cap 3 and the opening of the neck 2 to prevent, as much as possible, the interference between the cap 3 and the liquid poured

from the container.

[0060] It is important to take into account that, in order to facilitate the representation, the first and second end portions are shown in Figures 3 and 4 in a torn state, when, actually, they are restricted in terms of twisting and bending to allow the movement of the cap 3 to its angled open position.

[0061] In addition, in the embodiment shown, the capping device 1 is not equipped with a locking device to lock the cap 3 in the angled open position. Therefore, it is the user who maintains the cap 3 in the open position when the liquid contained in the container flows out. This makes is possible, on one hand, to avoid bothering the consumer with an unusual locking device and, on the other, simplifies the structure of the capping device 1. Specifically, the locking devices of the cap 3 in the state of the art, which are generally positioned between the two connection arms 17, 18 of the connection device 5, lead to an additional separation between the connection arms 17, 18 and, consequently, the increase resulting from the stresses exerted on the connection arms 17, 18 when the cap 3 is opened.

[0062] The entire capping device 1 comes from a single piece moulded out of a synthetic material, such as polyethylene, and preferably high-density polyethylene, for example. Advantageously, the capping device 1 is moulded in the configuration shown in Figure 1, that is, in a closed position, in which it can be mounted directly on the neck 2 of the container.

[0063] Although the invention has been described in relation to several particular embodiments, it is obvious that it is not limited to those embodiments and that it comprises all of the technical equivalents of the described means and their combinations, provided that they fall within the scope of the invention as defined in the claims.

[0064] The use of the verbs "cover", "comprise" or "include" and their conjugated forms does not exclude the presence of other elements or steps different from the ones established in a claim.

[0065] In the claims, the reference signs between parentheses should not be interpreted as a limitation of the claim.

Claims

1. A capping device (1) intended to be affixed on a neck (2) of a container to seal an opening of said neck (2) and which comprises:

   - a lower ring (4) intended to be mounted axially on the neck (2) and rotating on the neck (2) around an X-axis;
   - a cap (3) comprising a upper wall (10) intended to be oriented in the direction towards the opening of the neck (2) and an exterior peripheral skirt (11) intended to surround said neck (2), with the exterior peripheral skirt (11) having a spiral thread (12) intended to cooperate with a spiral thread (9) formed on the neck (2) of the container to permit the screwing or unscrewing the cap (3) on the neck (2) around the X-axis; and
   - a connection device (5) that connects the cap (3) to the lower ring (4) and is positioned to allow the cap (3) to move away from the lower ring (4) during the unscrewing of the cap (3) and thus permit the opening of the cap (3); with the connection device (5) comprising first and second parallel connection arms (17, 18), each one of which connects the exterior peripheral skirt (11) to the lower ring (4) and with each one comprising a central portion (21), with said central portion (21) having, in an unrestricted state corresponding to a closed position of the cap (3), a circular spiral shape that is developed around the X-axis in a direction opposite that of the spiral thread (12) of the exterior peripheral skirt (11) such that the first and second connection arms (17, 18) straighten to permit the cap (3) to move away from the lower ring (4) when the cap (3) is unscrewed from the neck (2).

2. The capping device (1) according to claim 1, wherein said capping device (1) is moulded in a single piece.

3. The capping device (1) according to claims 1 or 2, wherein the first and second connection arms (17, 18) are separated by a distance L2 of between 6 and 12 mm.

4. The capping device (1) according to any of claims 1 to 3, wherein the first and second connection arms (17, 18) extend respectively around the X-axis in a first and a second angular sector s (s1, s2), with the first and second angular sectors (s1, s2) partially overlapping.

5. The capping device (1) according to any one of claims 1 to 4, wherein the first and second connection arms (17, 18) each comprise a first end portion (19) that extends from the lower ring (4) and is connected to the central portion (21) of said connection arm (17, 18) through a first folded portion (23) and a second end portion (20) that extends from the exterior peripheral skirt (11) of the cap (3) and is connected to the central portion (21) of said connection arm (17, 18) by a second folded portion (24).

6. The capping device (1) according to claim 5, wherein the first and second end portions (19, 20) of the first and second connection arms (17, 18) have an area that is thinner than that of the central portion (21).

7. The capping device (1) according to claims 5 or 6, wherein the exterior peripheral skirt (11) has a ser-

rated portion (24) and wherein the second end portion (20) and the central portion (21) of the first and second connection arms (17, 18) are housed in said serrated portion (24).

8. The capping device (1) according to claim 7, wherein the serrated portion of the exterior peripheral skirt (11) comprises, between the first and second connection arms (17, 18), a protruding portion (28) that protrudes towards the lower ring (4).

9. The capping device (1) according to any one of claims 5 to 8, wherein the lower ring (4) has a serrated portion (29) and wherein the first end portion (19) of the first and second connection arms (17, 18) is housed in said serrated portion (29).

10. The capping device (1) according to claim 9, wherein the serrated portion (29) of the lower ring (4) comprises, between the first and second connection arms (17, 18), a protruding portion (30, 31) that protrudes towards the cap (3).

11. The capping device (1) according to any one of claims 5 to 10, wherein the first and second connection arms (17, 18) each have a length greater than G/(1-sin y) where:

- G: is an axial dimension between one interior face of the upper wall (10) of the cap (3) and a lower end of the thread of the cap (3); and
- y: is the angle formed between a first straight line BD and a second straight line AB, with the first straight line AB connecting the centre B of the horizontal segment formed in the connection between the first end portion (19) of the first connection arm (17) and the lower ring (4) and the centre D of the horizontal segment formed in the connection between the second end portion (20) of the first connection arm (17) and the exterior peripheral skirt (11) and with the second straight line AB connecting the centre A of the horizontal segment formed in the connection between the first end portion (19) of the second connection arm (18) and the lower ring (4) and the centre B.

12. The capping device (1) according to any of claims 1 to 11, wherein the lower ring (4) is connected to the exterior peripheral skirt (11) by means of frangible bridges (16).

13. The capping device (1) according to any one of claims 1 to 12, wherein the cap (3) comprises an interior skirt (14) that extends perpendicularly downwards from the upper wall (10) of the cap (3) and is intended to fit inside the opening of the neck (2).

14. A container equipped with a neck (2) that has an opening and a thread (9), with said container further comprising a capping device (1) according to any one of claims 1 to 13, with the lower ring (4) of the capping device (1) affixed axially to the neck (2) and able to rotate around said neck (2), and with the thread of the exterior peripheral skirt (11) of the cap (3) cooperating with the thread on the neck (2).

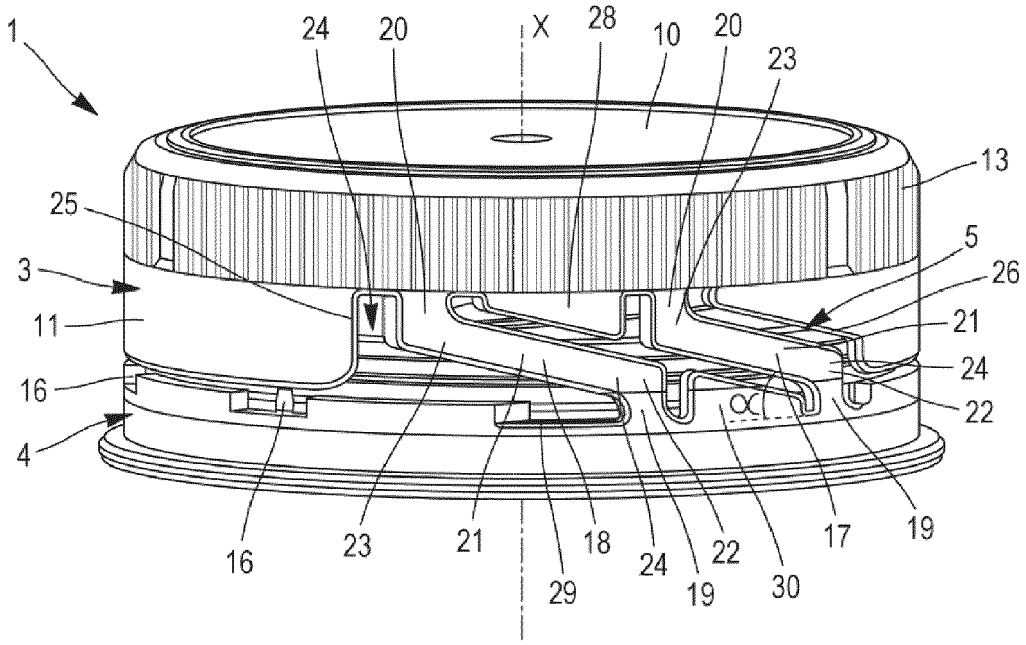
1
24
20
X
28
10
20
23
13
25
5
3
26
11
21
24
16
22
4
16
23
21
18
24
22
17
19
29
19
30

FIG. 1

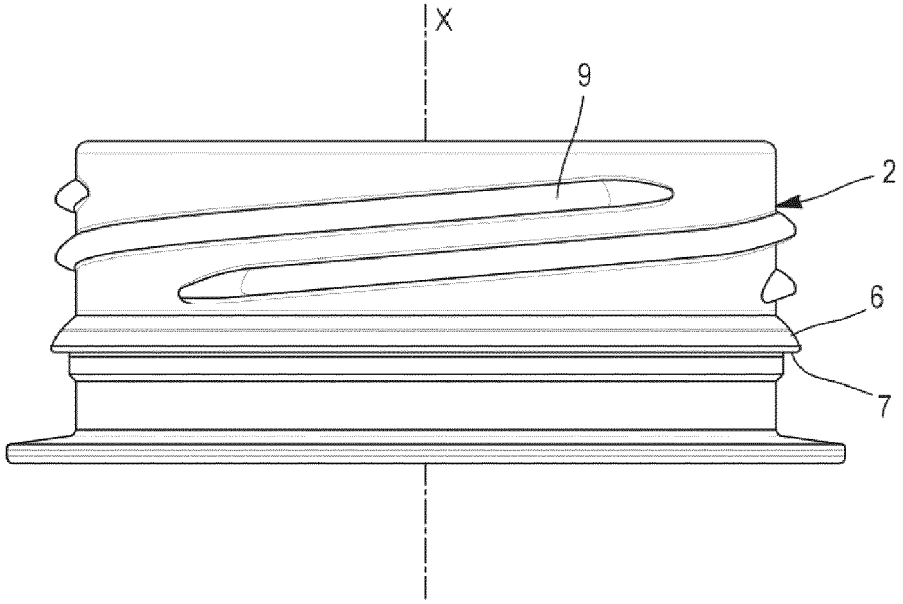
X
9
2
6
7

FIG. 2

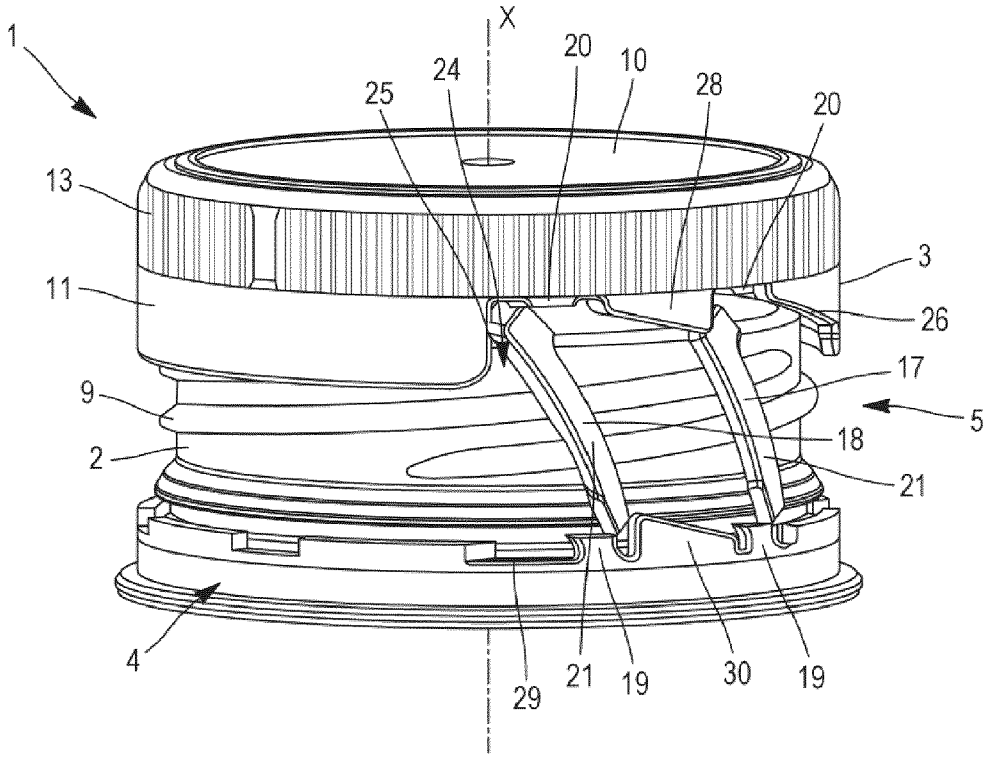
X
1
25
24
20
10
28
20
13
3
11
26
17
9
5
18
2
21
4
29
21
19
30
19

FIG. 3

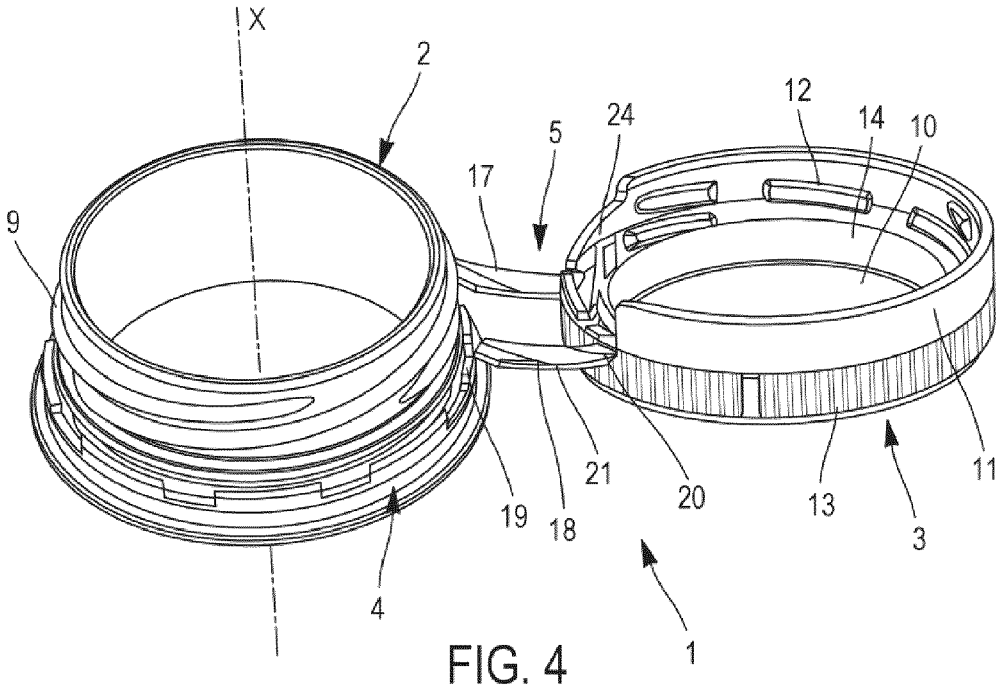
X
2
12
14
10
24
5
17
9
21
20
11
19
18
13
3
4
1

FIG. 4

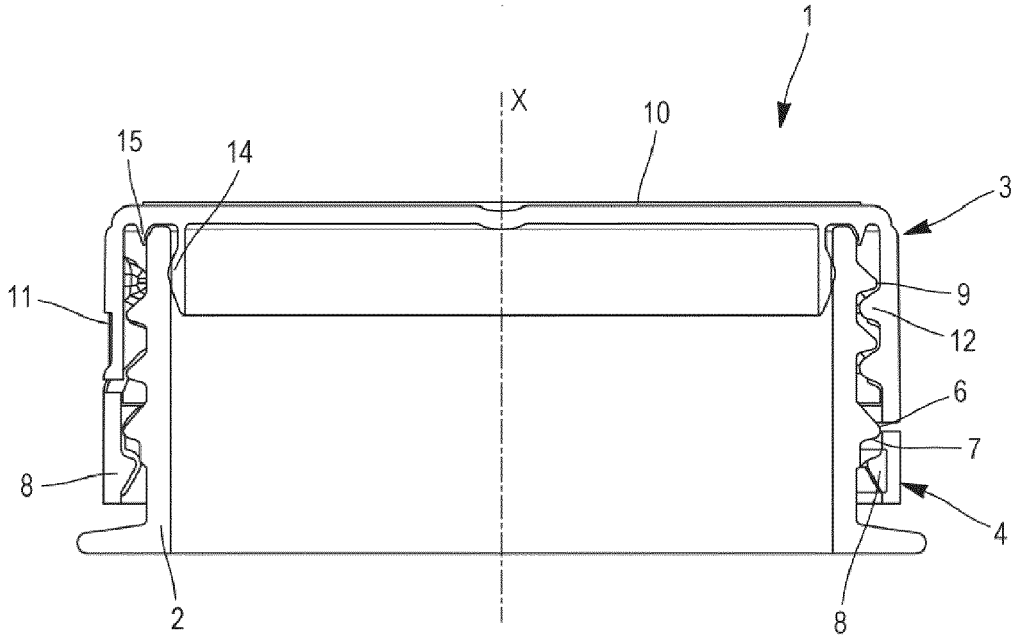
1
X
10
15
14
3
11
9
12
6
7
8
4
2
8

FIG. 5

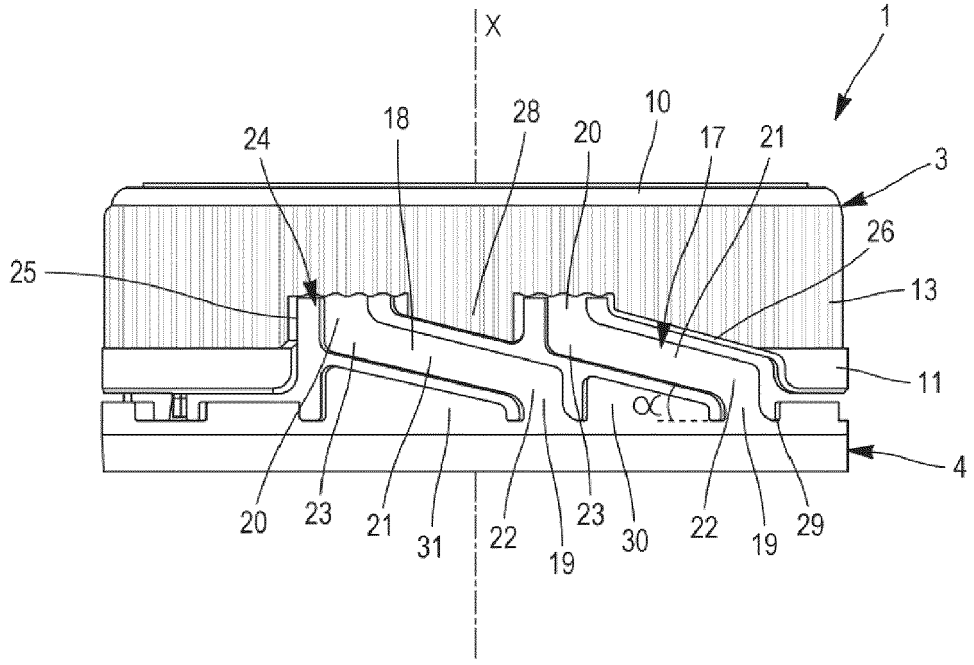
X
1
18
28
10
24
20
17
21
3
26
25
13
11
4
20
23
21
31
22
19
23
30
22
19
29

FIG. 6

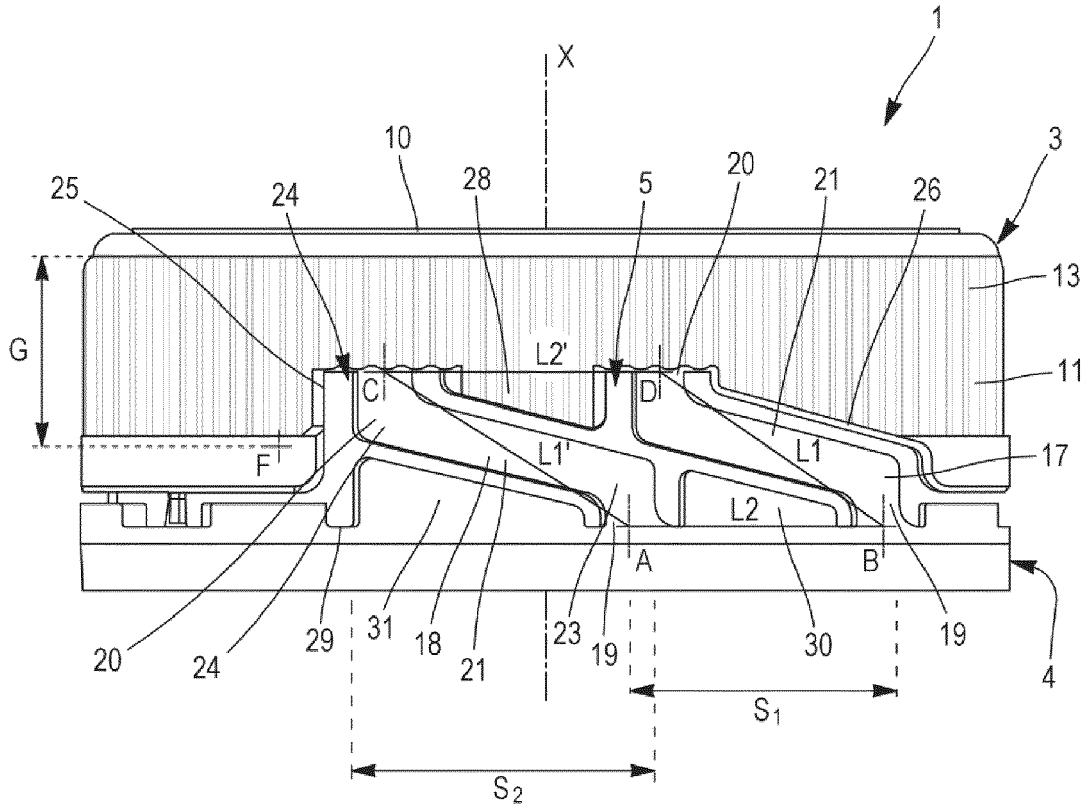
1
X
10
3
25
24
28
5
20
21
26
13
G
L2'
Ci
Di
11
F
L1'
L1
17
L2
A
B
20
24
29
31
18
21
23
19
30
19
4
S1
S2

FIG. 7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 38 3122

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 4 906441 B2 (CROWN CORK JAPAN) 28 March 2012 (2012-03-28) * figures 1a,1b,2a,2b,3 * -----	1,3,5,7, 8,11-14	INV. B65D41/32 B65D41/34 B65D55/16
X	JP 2010 083488 A (CROWN CORK JAPAN) 15 April 2010 (2010-04-15) * figures 1,9,10 * * paragraphs [0011], [0016] * -----	1-3, 12-14	B65D47/08
A	JP 2012 076771 A (CROWN CORK JAPAN) 19 April 2012 (2012-04-19) * figures 1,3 * -----	1-14	
A	JP 2011 201559 A (CROWN CORK JAPAN) 13 October 2011 (2011-10-13) * figures 1-3 * -----	1-14	
A	JP 2011 111192 A (CROWN CORK JAPAN) 9 June 2011 (2011-06-09) * figures 1,2,5,6 * -----	1-14	
A	US 2009/139955 A1 (FRASER ANTHONY HENRY JOSEPH [GB] ET AL) 4 June 2009 (2009-06-04) * abstract; figures 5-8 * -----	1-14	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 April 2020	Tempels, Marco

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 38 3122

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-04-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 4906441 B2	28-03-2012	JP 4906441 B2	28-03-2012
		JP 2008056246 A	13-03-2008
JP 2010083488 A	15-04-2010	JP 5215798 B2	19-06-2013
		JP 2010083488 A	15-04-2010
JP 2012076771 A	19-04-2012	JP 5520768 B2	11-06-2014
		JP 2012076771 A	19-04-2012
JP 2011201559 A	13-10-2011	JP 5552346 B2	16-07-2014
		JP 2011201559 A	13-10-2011
JP 2011111192 A	09-06-2011	JP 5600418 B2	01-10-2014
		JP 2011111192 A	09-06-2011
US 2009139955 A1	04-06-2009	AT 491646 T	15-01-2011
		AU 2006314287 A1	24-05-2007
		BR PI0618720 A2	06-09-2011
		CA 2630170 A1	24-05-2007
		CN 101309837 A	19-11-2008
		EP 1951590 A1	06-08-2008
		GB 2432357 A	23-05-2007
		JP 2009515788 A	16-04-2009
		KR 20080080312 A	03-09-2008
		US 2009139955 A1	04-06-2009
		WO 2007057659 A1	24-05-2007

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1124734 A **[0004]**
- EP 2308772 A **[0004]**
- JP 4906441 B **[0005]**