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

(11) **EP 2 489 602 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.08.2012 Bulletin 2012/34

(51) Int Cl.:
B65D 47/08 *(2006.01)*

(21) Application number: **11154509.1**

(22) Date of filing: **15.02.2011**

(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

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(54) Flip closure for sealing a container

(57) A flip closure (10) for sealing a container comprises:
- a first part (12) with an outer circumferential first sealing element (22), and
- a second part (14) with an outer circumferential second sealing element (24),
- the first part (12) connected to the second part (14) by a hinge (16) which allows rotational movement of one of the two parts (12,14) around an axis (17) into an open or a closed position of the flip closure (10), the first sealing element (22) providing, in the closed position, a form-fit with the second sealing element (24),
- the second sealing element (24) being divided into a hinge region (26) and a non-hinge region (28), and having, in said non-hinge region, a height (30) greater than the height in the hinge region.

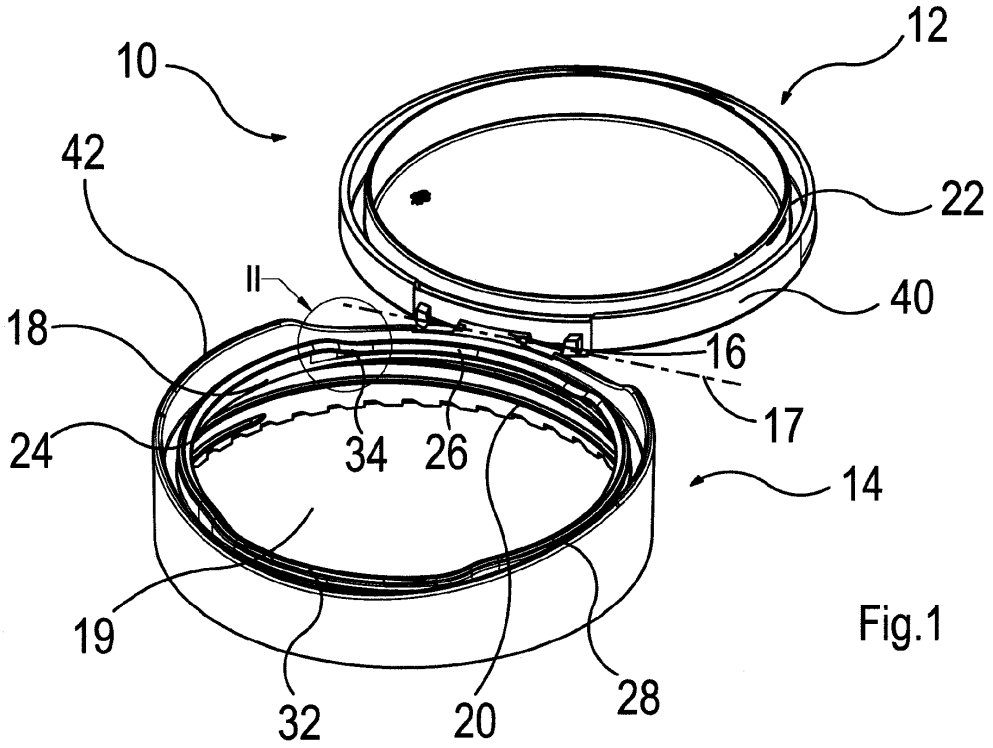

Fig.1

EP 2 489 602 A1

Description

FIELD OF THE INVENTION

[0001] In a first aspect, a flip closure for sealing a container is provided. The flip closure comprises a first part with an outer circumferential first sealing element, and a second part with an outer circumferential second sealing element. The first part is connected to the second part by a hinge which allows rotational movement of one of the two parts around an axis into an open or a closed position of the flip closure. The second sealing element is divided into a hinge region and a non-hinge region, wherein in the hinge region a height of the second sealing element is adapted to the rotational movement of one of the two parts around the axis. Furthermore, the first sealing element which in the closed position engages with the second sealing element provides a form-fit. In a second aspect, a container having a flip closure is provided.

BACKGROUND OF THE INVENTION

[0002] Containers with flip closures have found use in a variety of applications. For example, they can be used for storing and preserving products such as viscous fluids, like hairstyling or hair care products. For instance, styling gels and hair conditioners are usually stored in jars having a product discharge opening or a mouth with a defined diameter in order to enable a user to manually remove the product from the container by e.g. inserting fingers into the opening or mouth to spread the product onto the fingertips.

[0003] Containers and closures for sealing containers have to meet a number of requirements, for instance, the container, i.e. the closure has to be easy to open and close as well as to be easy in terms of handling in general. Moreover, quantitative removal of the product from the container has to be easy which means that the container must have a suitable shape and size and, in particular, the mouth of the closure has to provide an opening with a diameter that is large enough to enable the user to insert his or her fingers into the container. Further, the closure should prevent the product from spilling once the container has been closed.

[0004] In order to prevent leakage and/or spillage of the product during transport and/or storage the container is provided with a closure which can be moved into an open or into a closed, i.e. substantially tightly sealed position, respectively.

[0005] These closures usually comprise a lid part and a base part which is mounted onto an opening of the container.

[0006] Flip closures often further comprise a hinge connecting the lid part with the base part further allowing rotational movement of the lid part around an axis.

[0007] In order to provide a substantially tight sealing of the closure a sealing element, such as a circumferential sealing lip is usually located between the lid part and the base part. The sealing element possesses a defined height which is adapted to the rotational movement of the lid part.

[0008] US 2009/0314792 A1 discloses a closure device for a container, especially for a bottle. This closure device comprises a base element, which can be fastened on an opening of the container, and a hinged cap, which is pivotably fastened to the base element, so that the cap can be moved between a closed and an open setting to allow a free-flowing medium, in particular, to be dispensed from the bottle. Further, the closure device shows a dispensing element which comprises close to a dispensing opening at least one sealing lip. The sealing lip extends inward and downward essentially in a U-shape, so that, when the cap is closed, the sealing lip interacts with associated elements of the hinged cap. The sealing lip is formed with a constant height.

[0009] Commonly known closures are often made of plastic materials, such as polypropylene by an injection molding process. However, these plastic materials may have the disadvantage of potential warping during a cooling period after injection molding and thereby modifying their initial original shape. This warping-problem occurs in particular in cases where injection-molded plastic parts, like the lid part, have bigger dimensions, for example lids with a diameter of at least 40 mm. Further, the lid part of the closure normally shows a slight concavity and is, thus, not totally flat or planar in shape thereby contributing to the lack of fit between the lid and base part. All of this result in a closure with increased leak-potential as the lid part loses its exact fit with the base part over a period of time. An increased leak-potential in turn is likely to complicate handling and logistics of the packaged product.

[0010] Therefore, there is a need for providing an improved closure for sealing a container, in particular a flip-style closure, which is capable of providing a tight sealing. In addition, there is a need for a container provided with such a closure.

SUMMARY OF THE INVENTION

[0011] In a first aspect, the present invention relates to a flip closure for sealing a container, the flip closure comprising:

- a first part with an outer circumferential first sealing element, and
- a second part with an outer circumferential second sealing element,
- the first part connected to the second part by a hinge which allows rotational movement of one of the two parts around an axis into an open or a closed position of the flip closure,
- the second sealing element divided into a hinge region and a non-hinge region, wherein in the hinge region a height of the second sealing element is adapted to the rotational movement,

- the first sealing element which in the closed position engages with the second sealing element provides a form-fit,

wherein the second sealing element in the non-hinge region has a height which is greater than the height in the hinge region.

[0012] In a second aspect, the invention relates to a container having a flip closure according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] According to the invention, a flip closure comprises a first and a second part which are joined together by a hinge, such as a film hinge. With the hinge the first part is connected to the second part allowing the first part to be positioned relative to the second part in an open or closed position by a pivoting, i.e. rotational movement. The axis of this rotational movement spans in a tangential direction with respect to the closure along the central part of the hinge.

[0014] The first part of the closure may be designed as a lid part or base part and the second part of the closure may be designed as the complementary base part or lid part, respectively.

[0015] The flip closure may be attached to a container, such as a jar. The container is typically used for storing fluids, like liquids or viscous fluids, for example jells, such as hair dressings, hairstyling products, hair-care products, like hair conditioners or styling gels.

[0016] To allow the fluid to be manually removed from the container, one of the two parts of the flip closure as well as an upper side of the container comprise a mouth or opening to enable the user to insert his or her fingers through the mouth/opening of the closure and into the container to spread the product e.g. onto the fingertips. The flip closure may be joined with the container by means of a screw coupling, for example.

[0017] In order to improve the tightness of the closure, the first and second part of the closure, each comprises an outer circumferential sealing element. In the closed position of the closure, the first and second sealing element engage and provide a form-fit. The term form-fit as used herein, means that a relative movement of two members is blocked in at least one direction by at least two interlocking walls. In the present context, the two outer circumferential sealing elements interlock preventing the closure to be opened without applying force.

[0018] Further, the second sealing element of the second part is divided into a hinge and a non-hinge region, wherein the hinge region is defined as the region in the vicinity of the hinge. The remainder of the second sealing element accordingly is defined as the non-hinge region.

[0019] In the hinge region the second sealing element possesses a height that is adapted to the rotational movement of one of the two parts around the rotational axis. That means that the height of the sealing element in the hinge region is sufficient small to allow the other part, i.e. the other outer circumferential sealing element to perform the rotational movement around the hinge from the open to the closed position without being blocked by the other sealing element.

[0020] According to the invention, drawbacks of flip closures and, in particular, flip closures made of plastic materials, have been overcome by providing a second sealing element which in the non-hinge region has a height which is greater than the height in the hinge region. The height of the sealing element in the non-hinge region is greater than in sealing elements or sealing lips of the state of the art.

[0021] By providing such a second sealing element, the overlap of the two interacting and engaging sealing elements is enlarged. This allows higher production and product tolerances. Even when a warping-problem occurs the closure provides a substantially fluid-tight sealing of the container. A sealing element is provided which generates a more robust packaging design. In this way greater amount of warping can be tolerated without obtaining insufficient tightness.

[0022] According to an embodiment of the invention, the first part of the closure is a lid part and the second part is a base part. In that case the base part comprises the advantageously shaped second sealing element. This may be beneficial, for instance, if a heat sealing film is placed between the lid part and the base part after inserting the fluid into the container in order to protect the product from contamination before first usage. The risk of damage to the heat sealing film is significantly decreased as the lid part comprises a sealing element with regular height instead of a sealing element with an elongated or extended height which may cut into the heat sealing film and may cause damage.

[0023] In another embodiment of the present invention, the first sealing element is a sealing wall and the second element is a sealing lip. The sealing wall may be formed as a circumferential sealing ring located perpendicular to an upper face of the lid part and projecting downward in the direction of the container. In the closed position, the sealing lip is positioned around the outer circumference of the sealing wall. The sealing lip is so shaped that it forms contact with the sealing wall or, alternatively, that it projects into close proximity of the sealing wall.

[0024] In another embodiment of the flip closure, the second sealing element further comprises a projection extending into the direction of the first sealing element. Preferably the second sealing element is a sealing lip which engages with the sealing wall in the closed position. The projection can be formed as a hook and may contact the outer face of the sealing wall thereby providing a tight sealing.

[0025] In another embodiment, the flip closure has an outer diameter of at least 40 mm, preferably of at least 50 mm and more preferably of at least 60 mm. Containers to be used in conjunction with flip closures having an

outer diameter of at least 40 mm, preferably of at least 50 mm and more preferably of at least 60 mm may comprise an inner volume of about 200 ml to about 300 ml. Closures of these sizes frequently display warping problems so that a second sealing element according to the invention is beneficial.

[0026] In another embodiment of the invention, the hinge-region and the non-hinge region are connected by transition regions on each side of the hinge region. That means that the height of the second sealing element in the hinge region changes to the height in the non-hinge region. The path of the rim of the second sealing element in the transition region can have a number of shapes which can be described by corresponding mathematical functions.

[0027] In another embodiment the second sealing element in the transition region is formed as a linear function, preferably as a continuously ascending ramp. The term "ascending ramp" as used herein means any increasing gradient of the rim of the sealing element from the hinge region to the non-hinge region. The intersection of the sealing element between the hinge-region and the ascending ramp as well as the intersection of the sealing element between the ascending ramp and the non-hinge region may be shaped in a substantially angled manner. A second sealing element with a corresponding shape can be produced in a facile manner.

[0028] In another embodiment the second sealing element in the transition region can also be formed as a step function. The term "step function" as defined herein means any one or a plurality of horizontal platforms which are connected to each other by a substantially vertical segment. Thus, the rim of the second sealing element may describe one or more steps. A second sealing element with a corresponding shape can be produced in a facile manner, as well.

[0029] In another embodiment the second sealing element in the transition region can also be formed as a sigmoid function. As used herein, the term "sigmoid function" means any increasing gradient of the rim of the second sealing element wherein the intersection between the hinge-region and the increasing gradient as well as the intersection between the increasing gradient and the non-hinge region may be shaped in a substantially rounded manner. A second sealing element with a corresponding shape can be produced in a facile manner, as well.

[0030] In another embodiment of the invention, the ratio of the height of the second sealing element in the hinge region and the height of the second sealing element in the non-hinge region is from about 1:1,5 to about 1:3, preferably about 1:2. A ratio within that range provides tight sealing characteristics of the closure. In particular, higher production tolerances of the closure can be tolerated resulting in a robust packaging.

[0031] In another embodiment of the invention, in the closed position of the flip closure the first and the second sealing element overlap in the non-hinge region at least about 2 mm, preferably about 3 mm to about 4 mm. Such an overlap assures tight sealing characteristics.

[0032] In another embodiment, the flip closure is integrally molded. Preferably, the flip closure is molded in one piece by means of an injection blow-molding process. Using an injection blow-molding process a great variety of shapes and forms of the closure can be realized. Further, by integrally molding the flip closure, a simple and cost saving manufacturing process is provided. Moreover, the flip closure may be produced in a two-step-molding process wherein one of the parts is molded in a first injection blow-molding process and afterwards the other corresponding part is molded in a second injection blow-molding process. By applying a two-step-molding process two different materials with different colors or other characteristics, for instance, may be combined. Furthermore, the sealing lip may also be applied by a separate injection blow-molding process. In that case, the sealing lip may consist of another material, for example of a thermoplastic elastomer.

[0033] In a further embodiment, the flip closure is made of a plastic material, preferably of polypropylene. A plastic material typically consists of polymers of high molecular mass, and may contain other substances to improve performance and/or reduce costs. The polymers are made from monomers which may be either natural or synthetic organic compounds. The flip closure is preferably made of thermoplastics. Thermoplastics are plastics that do not undergo chemical change in their composition when heated and can be molded by heat influence; examples are, polystyrene, polypropylene, polyvinylchloride and polytetrafluoroethylene. Plastic materials, such as polypropylene, are advantageous materials as they provide sufficient mechanical strength to withstand mechanical stresses caused, for example, by transportation, handling and storage under varying temperature and moisture conditions. Furthermore, flip closures made of plastic materials, preferably of polypropylene, have a low net weight and, therefore, permit a reduction in transportation costs compared to other materials, like metal.

[0034] In another advantageous embodiment, the flip closure is formed as a snap-lock closure. Preferably, the hinge structure may have a snap-action biasing force which maintains the lid in a selected nearly closed or open position. That means that during the closing procedure the first and second part of the flip closure snap together until a predefined position has been reached. A snap-lock closure permits to close and re-open the lid part of the closure in an easy manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] The invention is described in more detail below with reference to an illustrative embodiment, wherein:

Fig. 1 shows a perspective view of an embodiment of the closure according to the invention in an open position;

Fig. 2 shows the detail II of Fig. 1; and

Fig. 3 shows a cross-sectional view of the closure of Fig. 1 in a closed position.

DETAILED DESCRIPTION OF THE INVENTION AS SHOWN IN THE EMBODIMENTS OF THE DRAWINGS

[0036] Fig. 1 shows a flip closure 10 for sealing a container, e. g. a jar, for storing viscous liquids, like hair care products, such as hair styling gels or hair conditioners. The flip closure 10 comprises a lid part 12 and a base part 14 which are connected via a hinge 16.

[0037] In other words, a hinge 16 joins the base part 14 and the lid part 12 allowing movement of the lid part 12 relative to the base part 14 around a rotational axis 17. The closure 10 can be positioned in an open or closed setting, depending on the position of the lid part 12 relative to the base part 14. The hinge 16 is designed as a film hinge 16 which exercises a snap-action biasing force that orientates the lid part 12 in an open or in a nearly closed position.

[0038] The closure 10 has a rounded circumference and shows an outer diameter of about 85 mm.

[0039] The base part 14 contains a hole 19 with a diameter of about 75 mm. The hole 19 corresponds to an opening on the upper side of the container. Thus, once the lid part 12 has been moved in the open position, it is possible for a user to insert his or her fingers into the container in order to spread the product contained therein onto the fingers.

[0040] An inner surface 18 of the base part 14 has a screw thread 20 corresponding to a screw thread formed on an outer surface of the container allowing the closure 10 to be screwed onto the container.

[0041] In order to provide a tight sealing of the container, both, the lid part 12 as well as the base part 14 comprise outer circumferential sealing elements 22, 24. The sealing element 22 of the lid part 12 is formed as a sealing wall 22 and the sealing element 24 of the base part 14 is formed as a sealing lip 24. In the closed position of the closure 10 the sealing wall 22 of the lid part 12 engages with the sealing lip 24 of the base part 14 and provides a form-fit.

[0042] The sealing lip 24 is divided into a hinge region 26 and a non-hinge region 28. The hinge region 26 is defined as a section of the perimeter of the sealing lip 24 in the vicinity of the hinge 16, whereas the remainder of the perimeter is defined as the non-hinge region 28.

[0043] The height 30 of the sealing lip 24 in the hinge-region 26 is adapted to the design of the hinge 16, namely to the rotational movement of the lid part 12 around the rotational axis 17. The height 30 of the sealing lip 24 in the hinge region 26 is lower than that of the sealing lip 24 in the non-hinge region 28 thereby providing sufficient space for the relative movement of the sealing wall 22 of the lid part 12 in the course of opening and closing operations of the closure 10.

[0044] The closure 10 is made of a plastic material, namely of polypropylene by an injection molding process. In order to avoid tightness problems caused by warping effects frequently observed with molded plastic parts, the height 30 of the sealing lip 24 in the non-hinge region 28 is greater than the height in the hinge region 26. The ratio of the height of the sealing lip 24 in the hinge region and the height of the sealing lip 24 the non-hinge region is from about 1:1,5 to about 1:3, in particular about 1:2. This facilitates a greater overlap between sealing wall 22 and sealing lip 14 once the lid part 12 has been moved into the closed position. The overlap between the sealing wall 22 and the sealing lip 24 in the non-hinge region 28 is at least about 2 mm to about 4 mm. Due to the longer path of contact between the sealing wall 22 and the sealing lip 24 a bigger range of lid part warping can be tolerated without creating a tightness problem. Thus, tightness characteristics of the closure are improved, and, moreover, higher production tolerances of the closure 10 can be accepted. Compared to closures of the state of the art a more robust flip closure 10 is provided.

[0045] Further, the sealing lip 24 has an undercut 32 on the opposite side of the hinge region 26. The undercut 32 comprises a catching mechanism which securely locks the lid part 12 in the closed position.

[0046] Fig. 2 shows an enlarged view of the detail II of the sealing lip 24. As can be seen in Fig. 1 and 2, the hinge region 26 and the non-hinge region 28 are connected by transition regions 34 on each side of the hinge region 26. The sealing lip 24 in the transition region 34 is formed as a sigmoid function. The sigmoid function comprises an increasing gradient 36 wherein the intersection 38 between the hinge-region 26 and the increasing gradient 36 as well as the intersection 38 between the increasing gradient 36 and the non-hinge region 28 is shaped in a substantially rounded manner. However, the sealing lip 24 in the transition region 34 may also be formed as a linear function, like a continuously ascending ramp, as a step function or as a semicircular arch, for example.

[0047] Fig. 3 shows a cross-sectional view of the flip closure 10 of Fig. 1 in the closed position. The lid part 12 further comprises a ring 40 at the outside circumference of the lid part 12. The ring 40 forms a closing-off structure. The base part 14 further comprises a ring 42 at the outside circumference of the lid part 12 which forms a corresponding closing-off structure. The ring 40 projects into the direction of the base part 14, whereas the ring 42 projects into the direction of the lid part 12. Once the lid part 12 has been closed, the ring 40 of the lid part 12 dips into a gap between the inner surface of the ring 42 and the outer surface of the sealing lip 24. The sealing wall 22 rests against the inner surface of the sealing lip 24.

[0048] The sealing lip 24 comprises a projection 44, namely a hook 44, which extends into the direction of the sealing wall 22. The hook 44 engages with the sealing wall 22 by pushing against its outer surface thereby providing a tight sealing.

[0049] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm".

[0050] List of reference signs:

10	flip closure
12	first part, lid part
14	second part, base part
16	hinge, film hinge
17	pivot axis
18	inner surface of the base part
19	hole
20	screw thread
22	sealing element of the lid part, sealing wall
24	sealing element of the base part, sealing lip
26	hinge region
28	non-hinge region
30	height of the sealing lip
32	undercut
34	transition region
36	increasing gradient
38	intersection
40	ring of the lid part
42	ring of the base part
44	projection, hook

Claims

1. A flip closure (10) for sealing a container, the flip closure (10) comprising:

- a first part (12) with an outer circumferential first sealing element (22), and
- a second part (14) with an outer circumferential second sealing element (24),
- the first part (12) connected to the second part (14) by a hinge (16) which allows rotational movement of one of the two parts (12, 14) around an axis into an open or a closed position of the flip closure (10),
- the second sealing element (24) divided into a hinge region (26) and a non-hinge region (28), wherein in the hinge region (26) a height (30) of the second sealing element (24) is adapted to the rotational movement,
- the first sealing element (22) which in the closed position engages with the second sealing element (24) provides a form-fit,

characterized in that

the second sealing element (24) in the non-hinge region (28) has a height (30) which is greater than the height (30) in the hinge region (26).

2. A flip closure (10) according to claim 1, wherein the first part (12) is a lid part (12) and the second part (14) is a base part (14).

3. A flip closure (10) according to claim 1 or 2, wherein the first sealing element (22) is a sealing wall (22) and the second sealing element (24) is a sealing lip (24).

4. A flip closure (10) according to any of the preceding claims, wherein the second sealing element (24) comprises a projection (44) extending into the direction of the first sealing element (22) in the closed position.

5. A flip closure (10) according to any of the preceding claims, wherein said flip closure (10) has a diameter of at least 40 mm, preferably of at least 50 mm, more preferably of at least 60 mm.

6. A flip closure (10) according to any of the preceding claims, wherein the hinge region (26) and the non-hinge region (28) are connected by transition regions (34) on each side of the hinge region (26).

7. A flip closure (10) according to claim 6, wherein the second sealing element (24) in the transition region (34) is formed as a linear function, preferably as a continuously ascending ramp.

8. A flip closure (10) according to claim 6, wherein the second sealing element (24) in the transition region (34) is formed as a step function.

9. A flip closure (10) according to claim 6, wherein the second sealing element (24) in the tran-

sition region (34) is formed as a sigmoid function.

10. A flip closure (10) according to any of the preceding claims,
wherein the ratio of the height (30) of the second sealing element (24) in the hinge region (26) and the height (30) of the second sealing element (24) in the non-hinge region (28) is from about 1:1,5 to about 1:3, preferably about 1:2.

11. A flip closure (10) according to any of the preceding claims,
wherein in the closed position of the flip closure (10) the first and the second sealing element (22, 24) overlap in the non-hinge region (28) at least about 2 mm, preferably about 3 mm to about 4 mm.

12. A flip closure (10) according to any of the preceding claims,
wherein the flip closure (10) is integrally molded.

13. A flip closure (10) according to any of the preceding claims,
wherein the flip closure (10) is made of a plastic material, preferably of polypropylene.

14. A flip closure (10) according to any of the preceding claims,
wherein the flip closure (10) is formed as a snap-lock closure.

15. A container having a flip closure (10) according to any of the preceding claims.

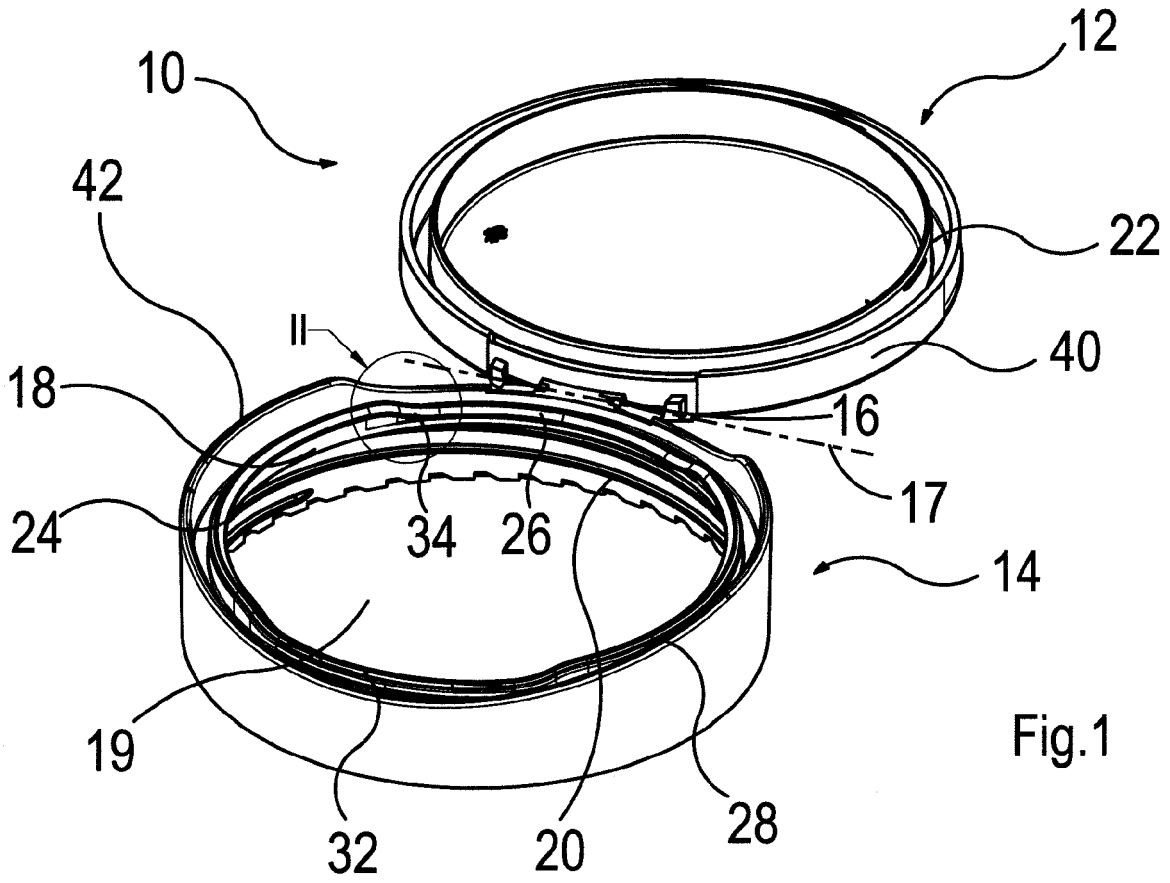

Fig.1

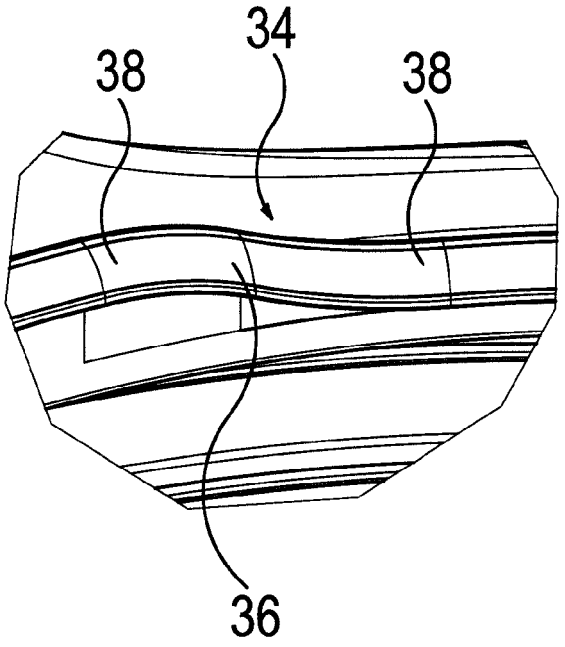

Fig.2

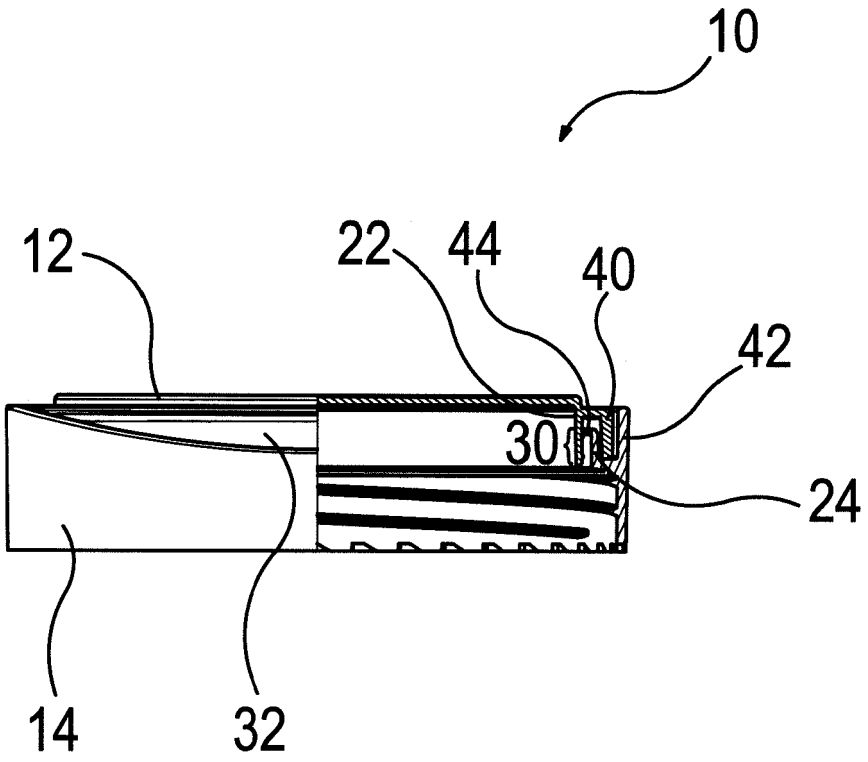

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 4509

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 March 2011	Dederichs, August

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 15 4509

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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Patent documents cited in the description

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