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(54) Light and flexible lid retaining ring

(57) A lid retaining ring made of plastic comprises an outer ring (2) for engaging the outside of a container (14) and an inner ring (3) for engaging a groove (15) in a lid (16) for closing the container. A bridge (4) connects the outer to the inner ring, such that a U-shaped channel is formed. The inner ring (3) comprises a first portion (3a), a second portion (3b) and a third portion (3c), wherein the first portion (3a) connects the inner ring (3) to the bridge (4), the second portion (3b) connects the first portion (3a) to the third portion (3c) such that the first portion (3a) and the third portion (3b) are radially and axially offset parallel to each other, the third portion (3c) configured to form an open end of the inner ring (3) when inserted into the groove (15) of the lid (16).

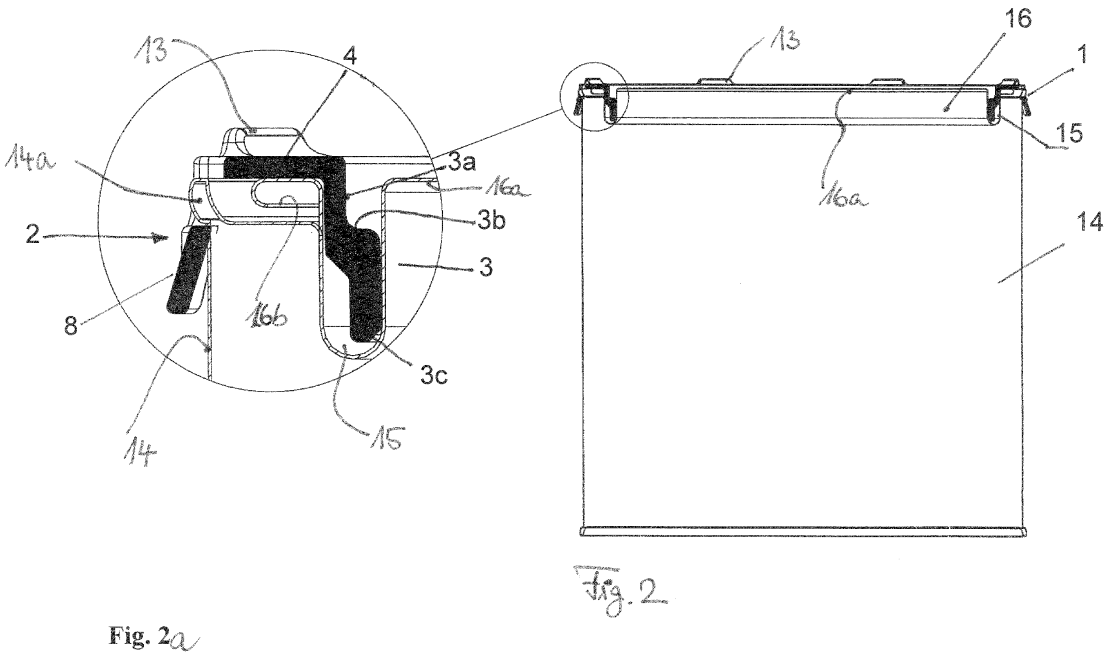

Fig. 2

Fig. 2a

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Description

[0001] The invention relates to a lid retaining ring which is preferably made of plastics. The lid retaining ring comprises an outer ring for engaging the outside of a container. The lid retaining ring also comprises an inner ring for engaging a groove in a lid of the container. A bridge connects to the outer ring to an inner ring, preferably close to an upper edge of both rings which face away from the lid in an applied condition.

[0002] **It is an object** of the invention to provide a lid retaining ring which reliably secures a lid to a container, in particular a container filled with chemical-technical fluid, such as paint.

[0003] This object is solved by the subject-matter of claim 1 or 16. The lid retaining ring is light and flexible for use.

[0004] Embodiments of the claimed invention are called for in the dependent claims. Said developments can be combined with each other in any technologically feasible way. The description, in particular in conjunction with the figures, additionally develops and specifies details of the claimed invention.

[0005] The invention relates to a lid retaining ring, preferably made of plastic, comprising: an outer ring for engaging the outside of a container; an inner ring for engaging a groove in a lid of the container; and a bridge which connects the outer ring and the inner ring, wherein the outer ring preferably surrounds the inner ring at a constant distance. The inner ring comprises a first section, a second section and a third section, wherein the first section connects the inner ring to the bridge, the second section connects the first section to the third section such that the first section and the third section are offset essentially parallel to each other. The third section forms an open end of the inner ring. When inserted into the lid claiming portions in the groove (sections are to be read as portions).

[0006] The second section of the inner ring can extend obliquely with respect to the first section and the third section. The second section can in particular be connected to the first section at a first angle of more than 90° and to the third section at a second angle of less than 270°. The first angle is preferably greater than 110°, and the second angle is preferably smaller than 250°. The values of the first angle and the second angle total 360°±20°, preferably 360°±10°.

[0007] The first section of the inner ring can form a substantially closed ring, while the second section and the third section comprise a plurality of annular portions (segments) which are distributed, preferably equally spaced, around the inner circumference of the lid retaining ring. Each two adjacent annular portions can be separated by a gap. All such gaps preferably extend axially through the whole of the third section and the second section of the inner ring and can also extend partially into the first section of the inner ring. The closed end of each of these gaps is preferably rounded.

[0008] The second section can bias the third section towards the centre of the lid retaining ring, in order to press the third section against the radially inner wall of the groove in the lid of the container and thus secure the inner ring within the groove. Alternatively, both the first section and the second section are formed so as to bias the third section towards the centre of the retaining ring.

[0009] The annular portions can each comprise a reinforcing rib on their radially inward-facing sides. Each reinforcing rib is preferably equidistant between the two gaps which separate one annular portion from the two annular portions adjacent to it. The reinforcing rib can protrude from the surface of the annular portion, such that when the inner ring engages the groove in the lid of the container, only the reinforcing ribs contact the radially inner wall of the groove.

[0010] Each reinforcing rib preferably extends axially over all of the third section and the second section of the inner ring and can also extend partially over the first section of the inner ring, for example as far as or almost as far as the middle of the first section. The reinforcing rib can be bevelled at its lower end adjacent to the open end of the third section, in order to facilitate inserting the inner ring into the groove in the lid of the container.

[0011] Preferably, the reinforcing ribs project from the surface of the annular portions, such that the inner ring contacts the radially inner wall of the groove only along the lines described by the reinforcing ribs, which facilitates removing the lid retaining ring by hand. At the same time, a contact pressing force which secures the lid retaining ring against being accidentally removed from the groove is greater than it would be if the entire facing area of the third section contacted the radially inner wall of the groove, provided the elastic force produced by each of the annular portions is identical.

[0012] The outer ring may comprise a plurality of first sub-rings and a plurality of second sub-rings. A sub-ring is understood to mean an annular portion of the outer ring or a partial outer ring. Adjacent sub-rings are separated by orifices (claim 6).

[0013] The first sub-rings form an upper part of the outer ring and can be connected to the bridge or can be formed integrally with the bridge. In other words, the first sub-rings form a first axial and/or radial part of the outer ring.

[0014] The second sub-rings are respectively connected to the first sub-rings. The second sub-rings may each comprise an engagement element (claim 8), preferably an upper edge, for engaging the outside of a container, for example the upper edge of the rim of a container (body). The second sub-rings form a second axial and/or radial part of the outer ring. The first sub-rings and the second sub-rings together form the outer ring as a whole.

[0015] The first sub-rings are respectively connected to the second sub-rings by fillets. The fillets connect the edge of a first sub-ring facing away from the bridge to the edge of a second sub-ring facing towards the bridge. The fillets can connect the edges of the first and second

sub-rings in a straight line and preferably connect the edges diagonally.

[0016] The second sub-rings can transition into the fillets in a common circumferential plane.

[0017] The second sub-rings are preferably connected to the fillets at an angle, wherein the upper edges of the second sub-rings facing the bridge may be slanted or tilted (claim 15) towards an imaginary centre of rotation of the lid retaining ring, and the lower edges of the second sub-rings lie in essentially the same circumferential plane as the outside of the first sub-rings.

[0018] Thus, the fillets can be formed so as to bias the second sub-rings towards an outer surface of the container, i.e. towards the inner ring. In order to engage the rim of the container, the engagement elements of the second sub-rings can be forced outwards in order to pass the rim, whereupon they elastically return to their original position and so engage said rim from below.

[0019] In order to improve the flexibility of the lid retaining ring and/or reduce its overall weight and cost in terms of material, the lid retaining ring can comprise orifices which can be formed between the bridge and each of the second sub-rings. The orifices can in particular be formed by the gaps between the first sub-rings. The orifices allow air to escape as the lid retaining ring is placed onto the container and prevent the lid retaining ring from being held on the container by a vacuum or lower then ambient pressure when the lid retaining ring is to be removed, such that the lid retaining ring can be removed by hand without any need to use a tool.

[0020] The first sub-rings are preferably arranged diametrically opposite to the gaps in the inner ring portions which each separate two adjacent annular portions (claim 3).

[0021] The upper face side of the bridge can comprise surface elevations (claim 13) in order to stiffen the bridge of the lid retaining ring and/or to form a grip in order to facilitate fastening the lid retaining ring by hand or machine (top hat lidder). Controlled guidance of axial forces into the lid retaining ring are available, upon attaching the retaining ring. Thus next to both circumferential ends of a respective second sub-ring a surface elevation is provided, for controlling the attaching force of this sub-ring. This

[0022] The surface elevations as webs may serve as a stacking aid, radially centering an lower seam end of a three piece container body.

[0023] The lid retaining ring can be produced integrally, for example by injection moulding or deep-drawing (claim 14).

[0024] Another aspect of the invention relates to a combined container and lid retaining ring, wherein the container comprises a lid with a circumferential groove, and wherein the lid retaining ring is a lid retaining ring engaging in the groove of the lid.

[0025] An embodiment will now be described with the aid of the attached figures. Technical features which are relevant to the invention but only disclosed in the figures nonetheless form part of the invention and can - either individually or in any illustrated combination - advantageously improve the invention.

Figure 1 shows a perspective view of the lid retaining ring in accordance with an embodiment of the invention. Figure 1a is a close up of a portion. Figure 4 is a larger representation to show the tilted portions 8 (of the outer ring 2 in the second sub-ring portions 8).

Figure 2 shows a side view of a combined container 14 and lid retaining ring 1. Fig. 2a is an enlarged cross-sectional view of the rim portion with lid retaining ring 1 in solid black. The lid retaining ring in Figure 2a preferably is suitable for a single tight reverse lever (one axially extending sealing surface at the radially inner surface or curl of the lid ring that is seamed to the body rim with a curved outer portion, as shown). But may be applied to triple tight lid rings and corresponding containers.

Figure 3 shows a top view onto the lid retaining ring with bridge 4 and elevations 13 for stacking (and mounting). The ring is attached to the lid and container as seen in Figure 2, thus the upper edges 9 of the portions 8 grasp below the outer body rim of the container (not specifically seen in this view).

Figure 4 is a larger perspective representation of the lid ring 1 of Figure 1.

[0026] Figure 1 shows a perspective view of an illustrative embodiment of a lid retaining ring 1 in accordance with the invention. The lid retaining ring 1 comprises an outer ring 2, an inner ring 3 and a bridge 4 which connects the inner ring 3 and the outer ring 2.

[0027] The outer ring 2 comprises an upper part and a lower part which are visually distinguishable from each other. The upper part of the outer ring 2 is formed by a plurality of first sub-rings 7, and the lower part of the outer ring 2 is formed by a plurality of second sub-rings 8. Each two mutually sub-rings 7 are separated by a curved orifice 11, and each two adjacent sub-rings 8 are likewise separated by an orifice, i.e. the upper and lower parts of the outer ring 2 comprise a plurality of sub-rings 7 and 8 respectively, separated by a plurality of orifices.

[0028] The illustrated embodiment comprises an upper part of the outer ring 2 comprising eight sub-rings 7 and seven orifices, and a lower part of the outer ring 2 comprising eight sub-rings 8 and seven orifices.

[0029] The first sub-rings 7 are connected to the bridge 4 along almost their entire physical circumferential length. The bridge 4 is essentially shaped as a flat ring. The bridge 4 comprises sections which exhibit a first

width W_1 and sections which exhibit a second width W_2, wherein the second width W_2 is greater than the first width W_1 (see Figure 3). The first sub-rings 7 are connected to the bridge 4 at the sections which exhibit the second, greater width W_2.

[0030] The second sub-rings 8 form an open end of the outer ring 2. They are connected to the first sub-rings 7 via fillets 10. The fillets 10 respectively connect a corner of an axially lower end of a first sub-ring 7 to a corner of an axially upper end of an adjacent second sub-ring 8. The fillets 10 are formed so as to bias the second sub-rings 8 towards the rotational centre M (see Figure 3) of the lid retaining ring 1.

[0031] The upper side 4a of the bridge 4 comprises a surface elevation 13 at each of the sections which exhibit the second width W_2. These surface elevations 13 project from an upper surface of the bridge 4 and serve to stiffen the lid retaining ring 1 and/or form a kind of grip which facilitates fastening the lid retaining ring 1 onto a container. To this end, the surface elevations 13 are formed so as to allow pressure to be applied to the lid retaining ring 1 by hand, preferably via a user's thumb, or automated machinery, in order to fix the lid retaining ring 1 to a container.

[0032] Also if the lid retaining ring 1 is thus put onto the lid and container, e.g. automatically by a top hat lidder or an inclined roller system, the elevations 13 ensure the pressure is applied in the correct locations (e. g. points) so that the upper edges 9 of the portions 8 (the second sub-rings 8) click below the outer body rim of the container 14.

[0033] In this embodiment always two neighboured elevations 13 (left and right from a second sub-ring 8, when viewed in a circumferential direction) are symmetrical locations where the axial forces are applied to fix the circumferentially extended upper edge 9 of this sub ring 8 in between the neighboured elevations 13 below the outer body rim of the container 14.

[0034] Since the second sub-rings 8 are respectively positioned at an axial distance below the sections of the bridge 4 which exhibit the first width W_1, an orifice 11 is formed axially above each of the second sub-rings 8. These orifices 11 advantageously prevent air from being trapped beneath the lid retaining ring 1 when it is affixed to a container. The orifices 11 simultaneously serve to increase the flexibility of the lid retaining ring 1 and to reduce both its weight and cost in terms of material.

[0035] The inner ring 3 comprises three distinct axial sections 3a, 3b and 3c, wherein the first section 3a connects the inner ring 3 to the bridge 4, the second section 3b connects the first section 3a to the third section 3c, and the third section 3c forms an open end of the inner ring 3. The second section 3b extends obliquely with respect to both the first section 3a and the third section 3c, such that the first section 3a and the third section 3c are offset substantially parallel to each other. Alternatively or additionally, the second section 3b can bias the third section 3c towards the inner ring 3, i.e. towards the centre C of the lid retaining ring 1.

[0036] In the illustrative embodiment shown, the first section 3a of the inner ring 3 is connected to the bridge 4 along the entire circumference of the lid retaining ring 1. The first section 3a thus forms a closed ring at least in its area adjacent to the bridge 4. The second section 3b and the third section 3c form a plurality of annular portions 5 which are distributed equally around the circumference of the inner ring 3. The annular portions 5 are separated by gaps 12 which extend through the whole of the third section 3c and the second section 3b and terminate in a closed end in the first section 3a. Each of the gaps 12 in the inner ring 3 is arranged diametrically opposite to one of the first sub-rings 7 of the outer ring 2.

[0037] The annular portions 5 each comprise a reinforcing rib 6 which is formed centrally on the circumferential extent of the respective annular portion 5 and protrudes from a radially inwardly-facing surface of the inner ring 3 of the lid retaining ring 1 towards the rotational centre C of the lid retaining ring 1. Thus, the reinforcing ribs 6 each form an engagement along the line of their axial extent by pressing against a radially inner wall of a groove 15 in a lid 16 of a container 14 when the lid retaining ring 1 is placed onto the container 14, as illustrated in Figure 2.

[0038] **Figure 2** shows the lid retaining ring 1 in combination with a container 14. The enlarged detail on the left as Figure 2a shows a second sub-ring 8 of the outer ring 2 engaging the outside of the container 14 (below the rim portion 14a of the body 14).

[0039] The container 14 comprises a lid 16 with a circumferential groove 15, a lid panel 16a and a lid rim 16b. The lid retaining ring 1 spans the distance between the groove 15 and the outside of the container 14, wherein the inner ring 3 of the lid retaining ring 1 engages into the groove 15, and the outer ring 2 of the lid retaining ring 1 engages the outside of the container 14 below 14a.

[0040] As can best be seen in Figure 2a, the bridge 4 of the lid retaining ring 1 rests on the top of the lid 16 (the lid rim 16b), wherein the second sub-rings 8 of the outer ring 2 (only one of which is shown in the enlarged detail in Figure 2) engage the outside of the container 14 below a rim 14a formed by the upper end of the container 14. The inner ring 3 engages the groove 15, wherein the first section 3a of the inner ring 3 presses against a radially outer wall of the groove 15, and the third section 3c presses against the opposite wall of said groove 15 and thus locks the inner ring 3 in place inside the circumferentially extending groove 15.

[0041] **Figure 3** shows a top view onto the lid retaining ring 1 of Figure 1 when attached to the lid 16 closing the container body 14.

[0042] The circumferential bridge 4 comprises sections which exhibit a first width W_1 and sections which exhibit a second width W_2 and is circumferentially connected to the inner ring 3. The outer ring 2 is connected to the bridge 4 via the first sub-rings 7, and orifices 11 are formed in the lid retaining ring 1 where there are no

first sub-rings 7 connected to the bridge 4.

[0043] Surface elevations 13 are formed in the upper face portions of the bridge 4 which exhibit the second width W_2, and reinforcing ribs 6 are formed in the middle of the circumferential extent of each of the annular portions 5 of the inner ring 3, wherein the annular portions 5 of the inner ring 3 are separated by gaps 12.

[0044] In the foregoing description, a preferred embodiment of the invention has been presented for the purpose of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Obvious modifications or variations are possible in light of the above teachings.

[0045] The embodiment was chosen and described to provide the best illustration of the principles of the invention and its practical application, and to enable a person of ordinary skill in the art to utilise the invention in various embodiments and with various modifications such as may be suited to any particular use contemplated. All such modifications and variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth which they are fairly, legally, and equitably entitled to.

Claims

1. **Lid retaining ring,** comprising a set of rings or ring portions,

   a) an outer ring (2), configured to engage an outside of a container (14);
   b) an inner ring (3), configured to engage a groove (15) in a lid (16) for the container (14); and
   c) a bridge (4) connecting the outer ring (2) and the inner ring (3), wherein the outer ring (2) surrounds the inner ring (3) at a constant distance,
   characterised in that
   d) the inner ring (3) comprises a first portion (3a), a second portion (3b) and a third portion (3c), wherein the first portion (3a) connects the inner ring (3) to the bridge (4), the second portion (3b) connects the first portion (3a) to the third portion (3c) such that the first portion (3a) and the third portion (3b) are offset parallel to each other, the third portion (3c) configured to form an open end of the inner ring (3) when inserted into the groove (15) of the lid (16).

   1a. The lid ring of claim 1, being made of plastics material.

2. The lid retaining ring of claim 1, wherein the second section (3b) extends obliquely with respect to the first section (3a) and the third section (3c).

3. The lid retaining ring of claim 1 or 2, wherein the first section (3a) forms a substantially closed ring, and the second section (3b) and the third section (3c) form a plurality of annular portions (5) equally distributed around the circumference of the inner ring (3).

4. The lid retaining ring of any of the preceding claims, wherein the second section (3b) biases the third section (3c) towards a centre of the lid retaining ring.

5. The lid retaining ring of any of the preceding claims, wherein the annular portions (5) each comprise a reinforcing rib (6).

6. The lid retaining ring of any of the preceding claims, wherein the outer ring (2) comprises a plurality of first sub-rings (7) and a plurality of second sub-rings (8).

7. The lid retaining of claim 6, wherein the first sub-rings (7) connect the bridge (4) to the second sub-rings of the outer ring (2).

8. The lid retaining ring of any of claims 6 or 7, wherein the second sub-rings (8) are respectively connected to the first sub-rings (7) and each second sub-ring (8) comprises an engagement element (9) to engage to an outside of the container, preferably below an outer body rim of the container (14).

9. The lid retaining ring of claim 8, wherein fillets (10) respectively connect the second sub-rings (8) to the first sub-rings (7).

10. The lid retaining ring of claim 9, wherein the fillets (10) bias the second sub-rings (8) towards the inner ring (3).

11. The lid retaining ring of claims 6 to 10, wherein an orifice (11) is formed between the bridge (4) and each of the second sub-rings (8) and laterally delineated by the fillets (10).

12. The lid retaining ring of any of claims 6 to 11, wherein the first sub-rings (7) are arranged diametrically opposite to gaps (12) in the inner ring (3) each gap (12) separating two adjacent annular portions (5) of the second and third portions (3b,3c).

13. The lid retaining ring of any of the preceding claims, wherein an upper face (4a) of the bridge (4) comprises surface elevations (13) in order to one of

    - stiffen the bridge of the lid retaining ring (1) and
    - form a handle to facilitate attaching the lid retaining ring (1)
    - controlled guide axial force into the lid retaining ring (1) upon attaching this, wherein next to both

circumferential ends of a respective second sub-ring (8) a surface elevation (13) is provided.

14. The lid retaining ring of any of the preceding claims, wherein the lid retaining ring (1) is produced integrally, for example by injection moulding.

15. Lid retaining ring of claim 8, wherein at least a few of the sub-rings (8) as curved portions are slanted.

16. **Combination** of a container and a lid retaining ring, wherein the container (14) comprises a lid (16) with a circumferential groove (15), and wherein the lid retaining ring is the lid retaining ring (1) of any one of claims 1 to 14.

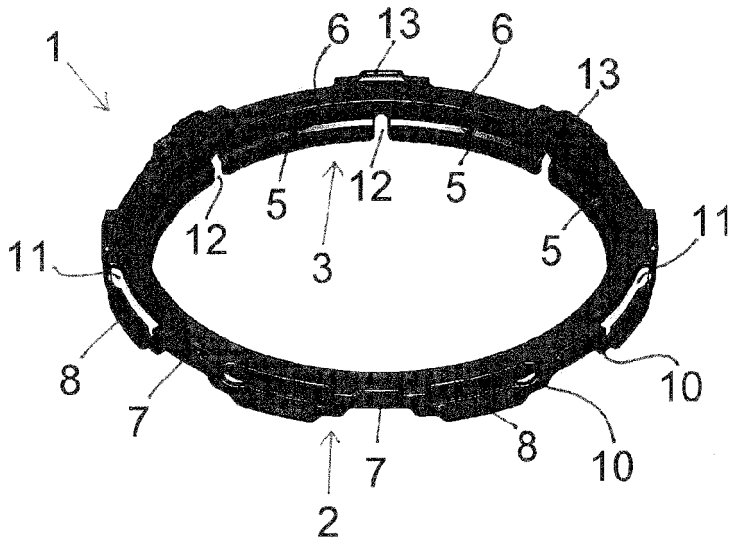


Fig. 1

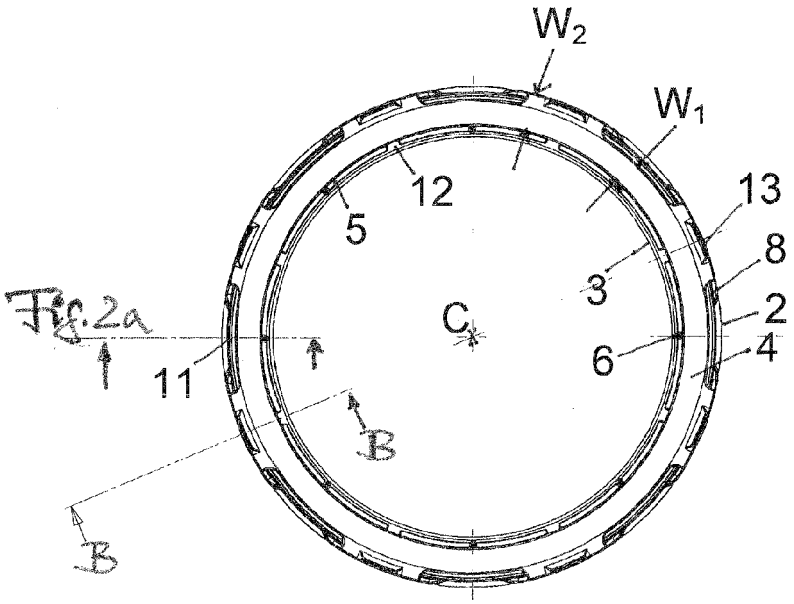
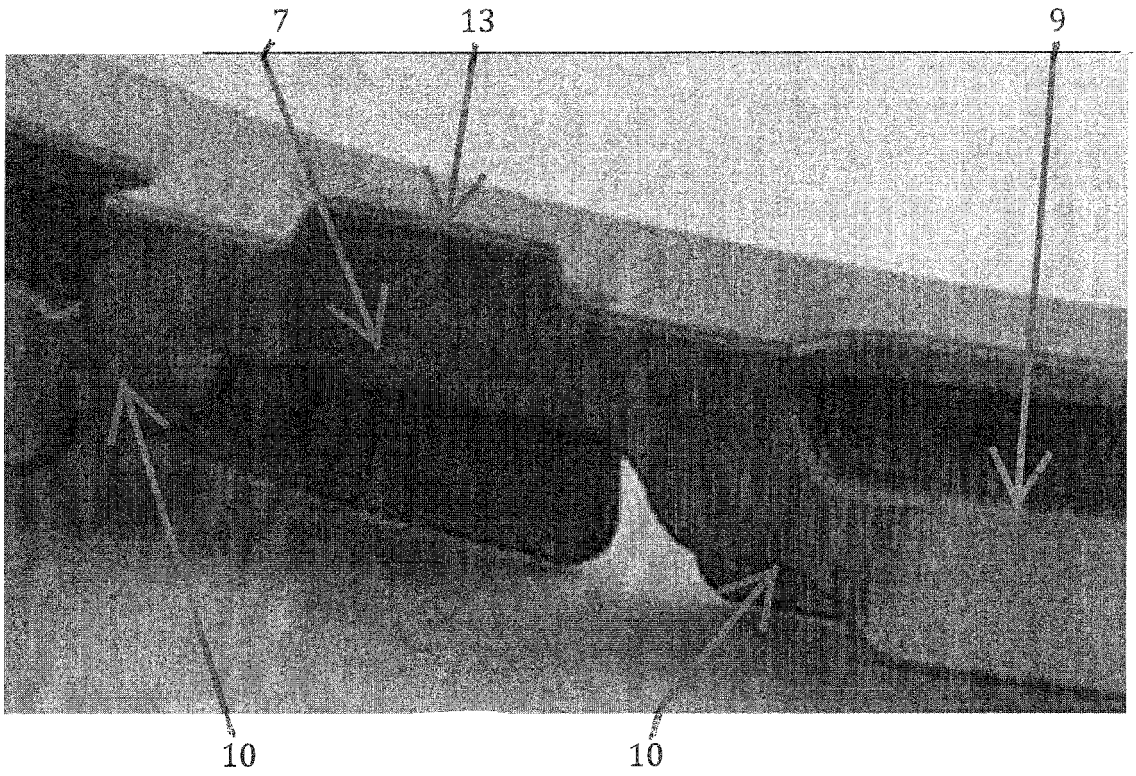


Fig. 3

Fig. 1a



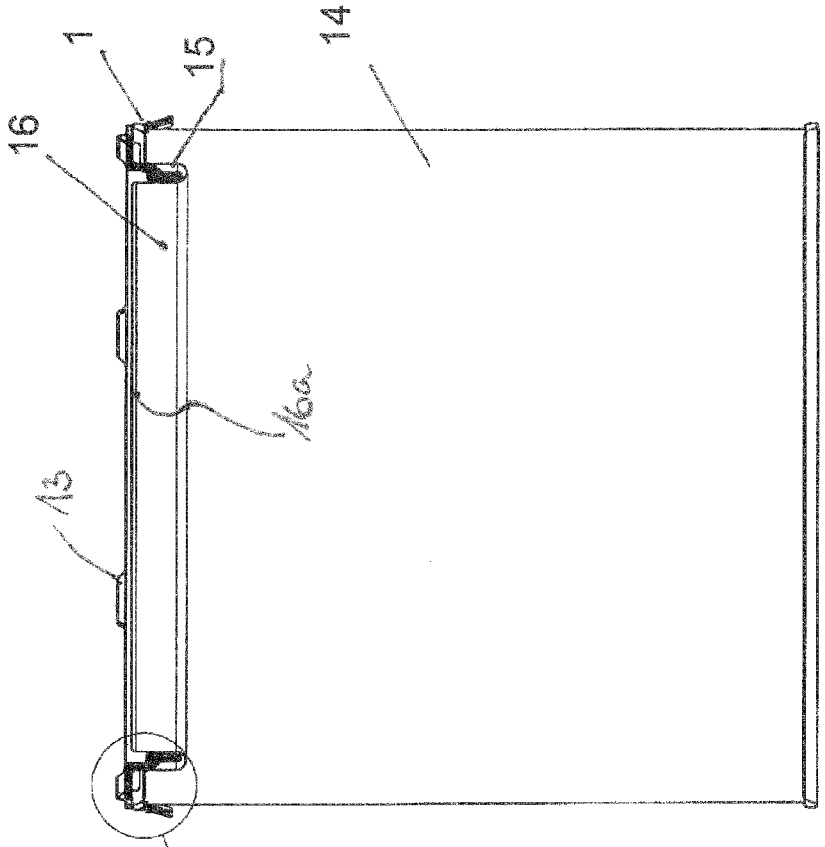


Fig. 2

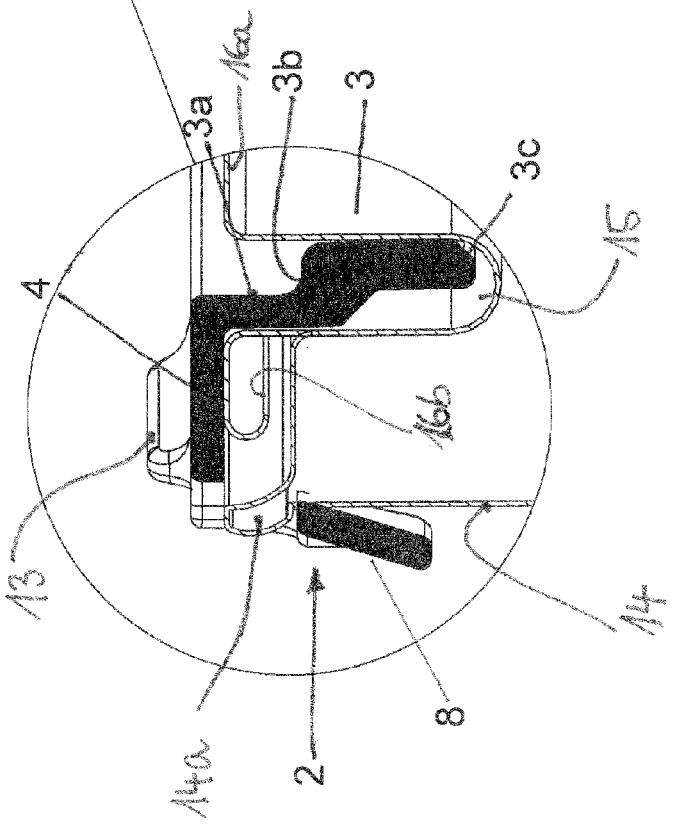


Fig. 2a

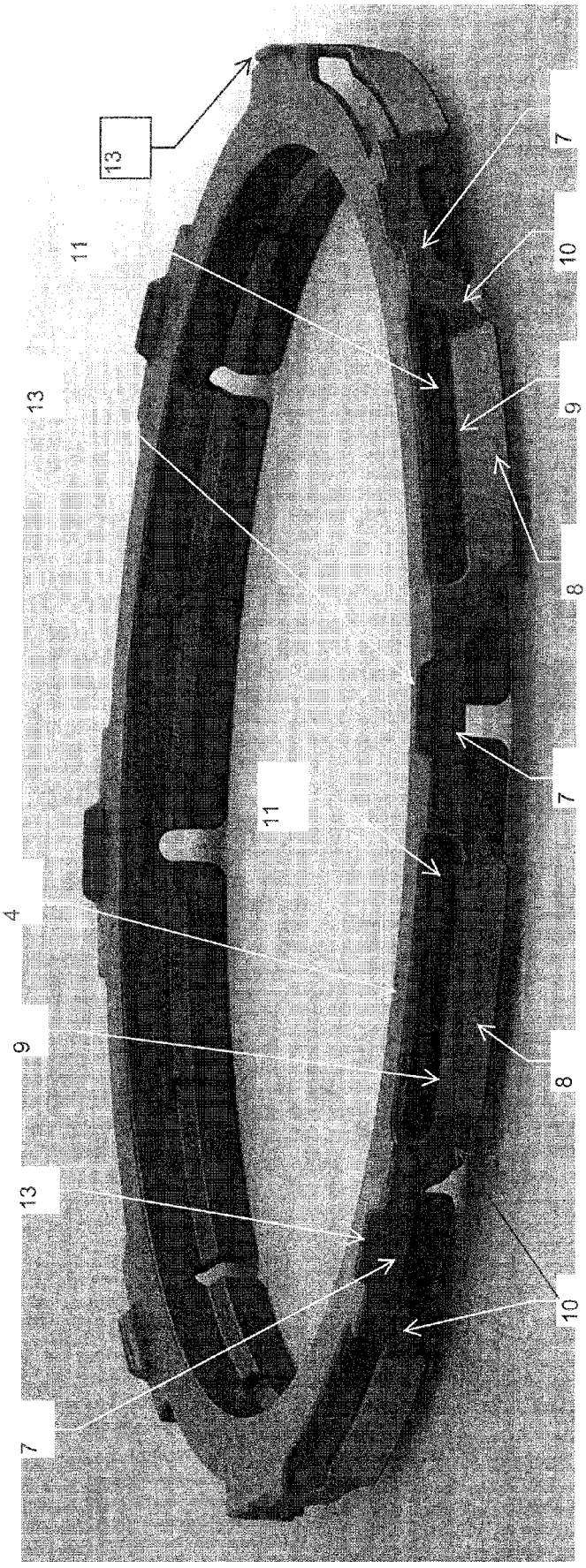


Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 14 16 2491

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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Y A	WO 2011/041826 A1 (VIP STEEL PACKAGING PTY LTD [AU]; MCFADYEN ROBERT CECIL [AU]; NULTY TR) 14 April 2011 (2011-04-14) * page 8, lines 9-15; figures * -----	14 1-13, 15-17	
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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
The Hague	29 August 2014	Dederichs, August

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 16 2491

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