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(54) **COVER FOR METAL CONTAINER**

(57) A lid (5) for a metal container (1), which lid (5) comprises a metal middle part (6) and a plastic circumferential part (7) attached to it and surrounding it, the circumferential part forming the outer circumference of the lid (5). The circumferential part (7) has an outer circumferential section (8) and an inner circumferential section (9) as well as a bridge section (10) connecting them, which together define a groove (11) opening downwards. The inner circumferential section (9) of the circumferential part (7) comprises at least one seal element (14) directed downwards and towards the outer circumferential section (8).

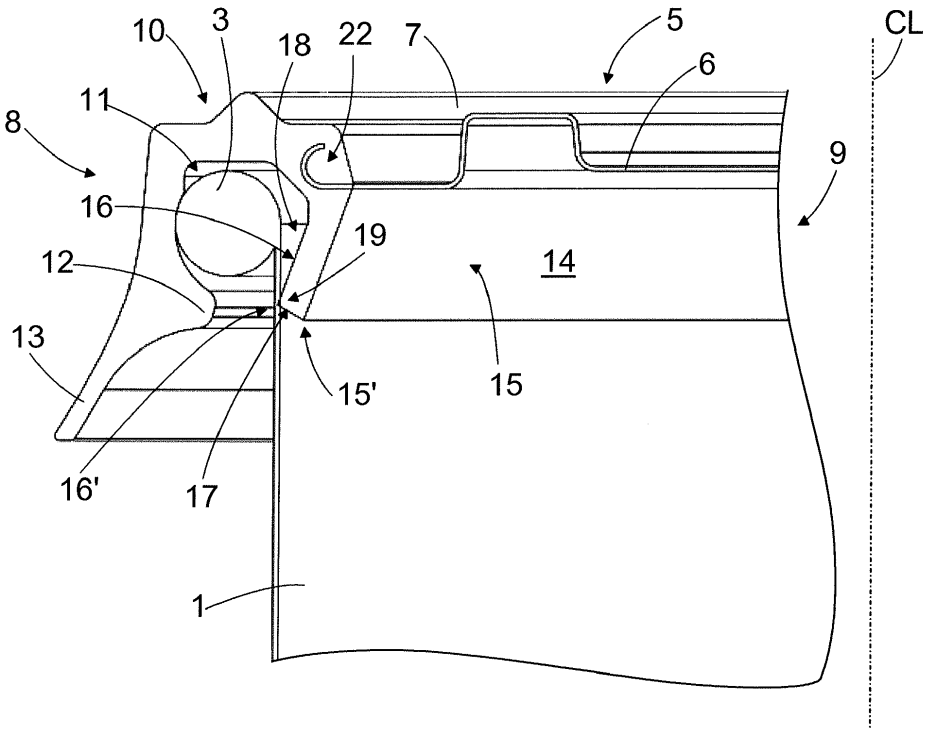

FIG. 2

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Description

Background of the invention

[0001] The invention relates to a lid for a metal container, which lid comprises a metal middle part and a plastic circumferential part attached to it and surrounding it, the circumferential part forming the outer circumference of the lid and having an outer circumferential section and an inner circumferential section as well as a bridge section connecting them, which together define a groove opening downwards.

[0002] Various storage containers, which may hereinafter be referred to as just containers, are commonly used for keeping, storing and transporting various products. A significant part of storage containers is formed by metal containers, which are packages with a rigid structure, commonly used for packing for instance foodstuffs as well as paints, varnishes, sizes, glues, inks, oil products or other technochemical products.

[0003] In order to prevent a product packed in a container from changing as regards its properties or even going bad due to the effect of the environment, the container is closed with a lid in an airtight manner. One lid type very commonly used for closing metal containers is a lug lid. In a lug lid, the outer circumference of the lid is provided with fastening lugs, i.e. lugs which, when the container is being closed, is bent below a rolled edge forming the outer circumference of the mouth of the container to fasten the lid to the container. The lugs bent below the edge of the container mouth generate a force which presses the container lid against the outer circumference of the container, whereby the lid and a seal in the lid, remaining between the lid and the edge of the container mouth, close the container. A disadvantage of a lug lid is that it is difficult to reclose in an airtight manner after the lid has been opened for the first time.

[0004] DE publication 8814972 U1 discloses a metal container closed with a lid comprising a metal middle part and a plastic circumferential part which is attached to the metal middle part and surrounds it, forming the outer circumference of the lid. The circumferential part has a flange-like outer circumferential section and a flange-like inner circumferential section as well as a bridge section connecting them, which together define a groove opening downwards. When the container is closed with the lid, the edge of the container mouth becomes positioned at the bottom of said groove, the inner circumferential section of the circumferential part becoming positioned in a wedge-like manner adjacent to the inner circumference of the container. Owing to the metal middle part, the lid can be easily perforated for instance to tint the contents of the container without a need for detaching the lid from the container. Owing to the plastic circumferential part, the container can also be reclosed more tightly than a lug lid. In a lid according to the above, it is, however, difficult to make the wedge-like joint between the inner circumference of the container and the inner circumference section of the plastic circumferential part of the lid tight.

Summary of the invention

[0005] An object of the invention is to provide a novel lid for a metal container.

[0006] The lid according to the invention is characterized in that the inner circumferential section of the circumferential part comprises at least one seal element directed downwards and towards the outer circumferential section.

[0007] The invention is based on the idea that the plastic circumferential part forming the outer circumference of the lid has, in the inner circumferential section of the circumferential part, a seal element which is directed downwards and towards the outer circumferential section of the circumferential part and which forms a lip seal that becomes positioned against the inner circumference of the metal container when the container is closed with the lid fastened to the container mouth. Said lip seal also presses against the inner circumference of the container due to the effect of the internal pressure of the container, generating not only mechanical sealing but also a kind of pressure sealing between the container and the lid.

[0008] Owing to the metal middle part, the lid is sufficiently rigid so that the middle part of the lid can be easily perforated for instance to tint the contents of the container without a need for detaching the lid from the container. Such perforating of the lid cannot be properly done when lids made completely of plastic material are used. Owing to the plastic circumferential part of the lid and the seal element in it, the lid can be easily opened and closed, and it can be reclosed more tightly than a lug lid made completely of metal, for instance.

[0009] Some embodiments of the invention are presented in the dependent claims.

List of figures

[0010] The invention is now described in closer detail in connection with preferred embodiments and with reference to the accompanying drawings, in which

- Figure 1 is a schematic view of a metal container and its lid;
- Figure 2 is a schematic view of a part of a container according to Figure 1 and of a lid fastened to it in cross-section;
- Figure 3 is a schematic view of a part of a second lid in cross-section;
- Figure 4 is a schematic view of part of a container according to Figure 1 and of a third lid fastened to it in cross-section; and
- Figure 5 is a schematic view of a part of the lid shown in Figure 4 in cross-section.

[0011] For the sake of clarity, the figures show some

embodiments of the invention in a simplified manner. Similar parts are marked with the same reference numbers in the figures.

Detailed description of the invention

[0012] Figure 1 shows schematically a metal container 1 and its lid 5, the lid 5 being detached from the metal container 1. Hereinafter, the metal container 1 may also be referred to as just a container 1. Figure 2 is a schematic view of a container 1 according to Figure 1 and a lid 5 fastened to it in cross-section.

[0013] The container 1 has a mouth 2 defined by a rolled edge 3, i.e. an edge bent downwards substantially to a circular shape in cross-section. Further, on the outer side of the container 1, a fastener 4 for a handle to be used for carrying the container 1 is shown. The handle itself, which may not be present in all containers, is not shown in Figure 1. The container 1 may be used for packing for instance foodstuffs or paints, varnishes, sizes, glues, inks, oil products or other technochemical products. The nominal diameters of said containers 1 are typically 170 mm when the container has a capacity of 2 to 4 litres, and 285 mm when the container has a capacity of 10 to 20 litres. The lid 5 described here is not, however, limited to be used with containers 1 of said sizes, in other words the lid 5 described here may also be used with containers of other sizes.

[0014] The lid 5 comprises a metal middle part 6 which is typically a metal sheet pressed to a desired shape. Further, the lid 5 comprises a plastic circumferential part 7 which is attached to the metal middle part 6 and surrounds it, forming the outer circumference of the lid 5. The circumferential part 7 comprises an outer circumferential section 8 which becomes at least partly positioned outside the edge 3 of the container 1 when the lid 5 is fastened to the container 1. The circumferential part 7 further comprises an inner circumferential section 9 which becomes at least partly positioned inside the edge 3 of the container 1 when the lid 5 is fastened to the container 1. Furthermore, the circumferential part 7 comprises a bridge section 10 connecting the outer circumferential section 8 and the inner circumferential section 9. The outer circumferential section 8, the inner circumferential section 9 and the bridge section 10 together define a groove 11 opening downwards, in which groove the edge 3 of the mouth 2 of the container 1 becomes positioned when the container 1 is closed with the lid 5. The outer circumferential section 8 has a protrusion section 12 which is directed towards the outer circumference of the container 1 and which becomes positioned below the edge 3 of the container 1 and locks the lid 5 to the container 1 when the container 1 is closed with the lid 5. Further, the outer circumferential section 8 has a skirt section 13 which extends below said protrusion section 12 and moves or shrinks towards the outer circumference of the container 1 when the lid 5 is locked to the container 1, but the skirt section 13 can be bent away from the container 1 such that the protrusion section 12 moves away from below the edge 3 of the container 1 to detach the lid 5 from the container 1.

[0015] The inner circumferential section 9 of the circumferential part 7 of the lid 5 further comprises a seal element 14 which seals the joint between the lid 5 and the container 1 in such a section of the inner circumference of the container 1 which becomes positioned adjacent to or below the edge 3 on the inner circumference of the container 1. The seal element 14 is a protrusion which is directed downwards and towards the outer circumferential section 8 from the direction of the inner circumferential section 9 and which is arranged to go round the whole circumference formed by the circumferential part 7 in the inner circumferential section 9 of the circumferential part 7.

[0016] The seal element 14 comprises a first slanting surface 15 which is towards an imaginary central axis CL of the lid 5 and runs slantwise from up downwards, from the direction of the inner circumferential section 9 of the circumferential part 7 towards the outer circumferential section 8. In other words, the first slanting surface 15 runs slantwise from up downwards, away from the central axis CL towards the outer circumferential section 8. Further, the seal element 14 comprises a second slanting surface 16 which is directed away from the central axis CL of the lid 5 and runs slantwise from up downwards, from the direction of the inner circumferential section 9 of the circumferential part 7 towards the outer circumferential section 8. In other words, the second slanting surface 16 runs slantwise from up downwards, away from the central axis CL towards the outer circumferential section 8. In the lower part of the seal element 14, there is an end surface 17 of the seal element 14 which connects lower edges 15', 16' of said slanting surfaces 15, 16 and forms the lower surface 17 of the seal element 14.

[0017] In the lid 5 according to the above, the seal element 14 forms a lip seal that becomes positioned or presses against the inner circumference of the metal container 1 when the container 1 is closed with the lid 5. The first slanting surface 15 of the seal element 14, which is directed slantwise towards the central axis CL of the lid 5, forms, in the seal element 14, a surface arranged to receive force generated by the pressure inside the container 1. The second slanting surface 16 of the seal element 14, which is directed away from the central axis CL of the lid 5, leaves, in turn, a free space 18 between the inner circumference of the container 1 and the seal element 14, as a result of which the seal element 14 can press towards the inner circumference of the container 1 due to the effect of the force generated by the internal pressure of the container 1, which affects the first slanting surface 15. Thus, the lip seal formed by the seal element 14 presses, due to the effect of both its own structure and that of the internal pressure of the container 1, against the inner circumference of the container 1. In addition to the mechanical sealing formed by the seal element 14 itself, pressure sealing is generated between

the container 1 and the lid 5 as a result of the pressure inside the container 1.

[0018] In the lid 5 according to the figures, in its vertical direction, the lower edge 15' of the first slanting surface 15 of the seal element 14 is arranged to extend lower than the lower edge 16' of the second slanting surface 16. Thus, the lower surface 17 of the seal element 14 runs slantwise from up downwards towards the central axis CL of the lid 5, from the lower edge 16' of the second slanting surface 16 to the lower edge 15' of the first slanting surface 15. Thus, an angle 19 directed towards the outer circumferential section 8 is generated between the second slanting surface 16 and the lower surface 17 of the seal element 14, the angle being pressed against the inner circumference of the container 1. Owing to the angle 19 and the internal pressure of the container 1, which affects the seal element 14, a tighter joint or sealing is formed between the seal element 14 of the lid 5 and the inner circumference of the container 1 at the location of said angle 19, compared with a solution where there would be a second surface substantially parallel to the surface of the inner circumference of the container 1 being pressed against the inner circumference of the container 1. The value of the angle 19 between the second slanting surface 16 of the seal element 14 and the lower surface 17 of the seal element 14 may vary for instance between 80 to 100 degrees, being preferably about 90 degrees. In this case, the angle is still so acute relative to the edge 3 of the mouth 2 of the container 1 that the lower surface 17 of the seal element 14 easily guides the seal element 14 into the inside of the container 1 when the lower surface 17 of the seal element 14 contacts the edge 3 of the mouth 2 of the container 1 when the container 1 is being closed with the lid 5.

[0019] The metal middle part 6 of the lid 5 may be for example a sheet made of thin steel or other metal, which may be, in addition, pressed to a desired shape to make stacking of containers 1 easier or to further stiffen the structure of the middle part 6, for example. The plastic circumferential part 7 of the lid 5 may be of, for instance, polypropylene (PP), polyethylene (PE) or polyurethane (PUR). The seal element 14 may be of the same plastic material as the other parts or sections of the circumferential part 7 of the lid 5 and form a single casting integral to the other parts or sections of the circumferential part 7 of the lid 5. The seal element 14 may also be of a different plastic material than the other parts or sections of the circumferential part 7 of the lid 5, in which case the seal element 14 may be for instance of a softer plastic material than the other parts or sections of the circumferential part 7. The seal element 14 of the above type may also be manufactured as one casting integral to the other parts or sections of the circumferential part 7 of the lid 5 by using a mould for two materials, in which the metal middle part 6 may also be positioned as an insert. The seal element 14 may also be separately fastened to the circumferential part 7 of the lid 5 by gluing, for example.

[0020] The lid 5 according to the above may be manufactured by placing the metal middle part 6 in a casting mould and by casting the plastic circumferential part 7 around the metal middle part 6 in such a way that the outer circumference 6' of the metal middle part 6 remains inside the plastic casting forming the plastic circumferential part 7. The fastening of the metal middle part 6 to the plastic circumferential part 7 may be reinforced by forming one or several bent sections on the outer circumference 6' of the middle part 6. Alternatively, the metal middle part 6 could be fastened to the plastic circumferential part 7 by gluing, for instance, or in another fastening manner.

[0021] Figure 3 is a schematic view of a part of a second lid 5 in cross-section. The lid 5 shown in Figure 3 has, on the lower surface 17 of the seal element 14, a first auxiliary seal 20 which extends around the whole circumference of the seal element 14, increasing the tightness of the joint formed between the seal element 14 and the inner circumference of the container 1. Thus, both the seal element 14 and the auxiliary seal 20 press against the inner circumference of the container 1.

[0022] Further, on the lower surface of the lid 5 shown in Figure 3, at the joint or interface between the metal middle part 6 and the plastic circumferential part 7, there is a second auxiliary seal 21 which extends around the whole circumference of said joint or interface, increasing the tightness of the joint or interface between the metal middle part 6 and the plastic circumferential part 7.

[0023] The first auxiliary seal 20 and the second auxiliary seal 21 may be of, for example, closed-cell cellular plastic, such as polyurethane (PUR). Said auxiliary seals 20, 21 or only one of them may be used in, for example, lids 5 used for closing containers containing material with a very low viscosity. Said auxiliary sealing is also applicable to preventing possible weakening of the tightness of joints between metal and plastic parts of the container 1 and the lid 5, which might occur when the temperature varies and be the result of possible different thermal expansion coefficients of the metal and plastic parts of the container and the lid.

[0024] Figure 4 is a schematic view of a part of the container 1 according to Figure 1 and of a third lid 5 fastened to it in cross-section, and Figure 5 is a schematic view of a part of the lid 5 shown in Figure 4 in cross-section.

[0025] In a manner similar to that shown in Figures 2 and 3, the lid 5 in Figures 4 and 5 comprises a metal middle part 6 and a plastic circumferential part 7 fastened to and surrounding it. The circumferential part 7 comprises an outer circumferential section 8, an inner circumferential section 9 and a bridge section 10 connecting the outer circumferential section 8 and the inner circumferential section 9. The outer circumferential section 8, the inner circumferential section 9 and the bridge section 10 together define a groove 11 opening downwards, in which groove the edge 3 of the mouth 2 of the container 1 becomes positioned when the container 1 is closed

with the lid 5. The outer circumferential section 8 further has a protrusion section 12 directed towards the outer circumference of the container 1, and a skirt section 13 extending below said protrusion section 12. The inner circumferential section 9 of the circumferential part 7 of the lid 5 further comprises a seal element 14 which is a protrusion directed downwards and towards the outer circumferential section 8 from the direction of the inner circumferential section 9 and arranged to go round the whole circumference formed by the circumferential part 7 in the inner circumferential section 9 of the circumferential part 7.

[0026] In the lid 5 of Figures 4 and 5, the seal element 14 comprises a first slanting surface 15 which is towards the imaginary central axis CL of the lid 5 and runs slantwise from up downwards, from the direction of the inner circumferential section 9 of the circumferential part 7 towards the outer circumferential section 8. In other words, the first slanting surface 15 runs slantwise from up downwards, away from the central axis CL towards the outer circumferential section 8. Further, the seal element 14 comprises a second slanting surface 16 which is directed away from the central axis CL of the lid 5 and runs slantwise from up downwards, from the direction of the inner circumferential section 9 of the circumferential part 7 towards the outer circumferential section 8. In other words, the second slanting surface 16 runs slantwise from up downwards, away from the central axis CL towards the outer circumferential section 8. In the lower part of the seal element 14, there is further an end surface 17 of the seal element 14 which forms the lower surface 17 of the seal element 14.

[0027] At the joint between the second slanting surface 16 and the lower surface 17 of the seal element 14, a groove section 23 is provided which opens towards the outer circumferential section 8 of the circumferential part 7 of the lid 5 and is arranged to go round the whole circumference formed by the circumferential part 7 in the inner circumferential section 9 of the circumferential part 7. Thus, a protrusion section 24 directed towards the outer circumferential section 8 is formed at the joint between the second slanting surface 16 and the groove section 23 in the lower part of the second slanting surface 16, the protrusion section being arranged to press against the inner circumference of the container 1. Further, at the joint between the lower surface 17 and the groove section 23, the above-described angle 19 directed towards the outer circumferential section 8 is generated between the second slanting surface 16 and the lower surface 17, the angle being also pressed against the inner circumference of the container 1. Said protrusion section 24 and said angle 19 are thus at a distance from each other in the vertical direction, said angle 19 being thus positioned below said protrusion section. Said protrusion section 24 and said angle 19 both form, in the inner circumferential section of the circumferential part 7 of the lid 5, lip seal sections pressed against the inner circumference of the container 1, whereby the tightness of the joint formed between the inner circumference of the container 1 and the lid 5 can be further improved compared with the embodiment of Figure 2 by, for instance, a double lip seal solution provided by said protrusion section 23 and said angle 19.

[0028] Figure 4 further shows a third auxiliary seal 25 which is positioned in the groove section 23 and extends around the whole circumference of the seal element 14, being thus directed towards the outer circumferential section 8 and becoming positioned between the seal element 14 and the inner circumference of the container 1 to increase the tightness of the joint formed between the seal element 14 and the inner circumference of the container 1. Further, the first auxiliary seal 20 and the second auxiliary seal 21 mentioned earlier may be used in the lid 5 of Figures 4 and 5. The third auxiliary seal 25 may have the same properties as the first auxiliary seal 20 or the second auxiliary seal 21.

[0029] A person skilled in the art will find it obvious that, as technology advances, the basic idea of the invention may be implemented in various ways. The invention and its embodiments are thus not restricted to the above examples but may vary within the scope of the claims.

Claims

1. A lid (5) for a metal container (1), which lid (5) comprises a metal middle part (6) and a plastic circumferential part (7) attached to it and surrounding it, the circumferential part (7) forming the outer circumference of the lid (5) and having an outer circumferential section (8) and an inner circumferential section (9) as well as a bridge section (10) connecting them, which together define a groove (11) opening downwards,
   characterized in that
   the inner circumferential section (9) of the circumferential part (7) comprises at least one seal element (14) directed downwards and towards the outer circumferential section (8).

2. A lid for a metal container as claimed in claim 1, **characterized in that** the seal element (14) comprises a first slanting surface (15) which is towards a central axis (CL) of the lid (5) and runs slantwise from up downwards towards the outer circumferential section (8) of the circumferential part (7), and a second slanting surface (16) which is directed away from the central axis (CL) of the lid (5) and runs slantwise from up downwards towards the outer circumferential section (8) of the circumferential part (7), and, in the lower part of the seal element (14), an end surface (17) which connects lower edges (15', 16') of said slanting surfaces (15, 16) and forms the lower surface (17) of the seal element (14).

3. A lid for a metal container as claimed in claim 2,

characterized in that in the vertical direction of the lid (5), the lower edge (15') of the first slanting surface (15) is arranged to extend lower than the lower edge (16') of the second slanting surface (16), whereby the lower surface (17) of the seal element (14) runs slantwise from up downwards towards the middle axis (CL) of the lid (5) from the lower edge (16') of the second slanting surface (16) to the lower edge (15') of the first slanting surface (15), generating an angle (19) directed towards the outer circumferential section (8).

4. A lid for a metal container as claimed in claim 3, **characterized in that** at the joint between the second slanting surface (16) and the lower surface (17) of the seal element (14), a groove section (23) is provided which opens towards the outer circumferential section (8), whereby at the joint between the second slanting surface (16) and the groove section (23), there is a protrusion section (24) directed towards the outer circumferential section (8), and at the joint between the lower surface (17) and the groove section (23), there is an angle (19) directed towards the outer circumferential section (8).

5. A lid for a metal container as claimed in claim 3 or 4, **characterized in that** the angle between the second slanting surface (16) and the lower surface (17) of the seal element (14) is 80 to 100 degrees, preferably about 90 degrees.

6. A lid for a metal container as claimed in any one of the preceding claims, **characterized in that** on the lower surface (17) of the seal element (14), there is a first auxiliary seal (20) extending around the whole circumference of the seal element (14).

7. A lid for a metal container as claimed in any one of the preceding claims, **characterized in that** on the lower surface of the lid (5), at the joint between the middle part (6) and the circumferential part (7) of the lid (5), there is a second auxiliary seal (21) extending around the whole circumference of said joint.

8. A lid for a metal container as claimed in claim 4, **characterized in that** in the groove section (23) of the seal element (14), there is a third auxiliary seal (25) extending around the whole circumference of the seal element (14).

9. A lid for a metal container as claimed in claim 6 or 7, **characterized in that** the first auxiliary seal (20) and the second auxiliary seal (21) and the third auxiliary seal (25) are of closed-cell cellular plastic.

10. A lid for a metal container as claimed in any one of the preceding claims,**characterized in that** the seal element (14) is of the same material as the plastic circumferential part (7) and forms an integral part of it.

11. A lid as claimed in any one of the preceding claims, **characterized in that** the outer circumference (6') of the metal middle part (6) is cast inside the plastic circumferential part (7).

12. Use of a lid (5) as claimed in any one of claims 1 to 11 for closing a metal container (1) provided with a rolled mouth (3), wherein a rolled edge (3) of the mouth (2) of the metal container (1) becomes positioned in a groove (11) which is defined by an outer circumferential section (8), inner circumferential section (9) and bridge section (10) of a circumferential part (7) of the lid (5) and which opens downwards, and a seal element (14) becomes positioned against the inner circumference of the container (1).

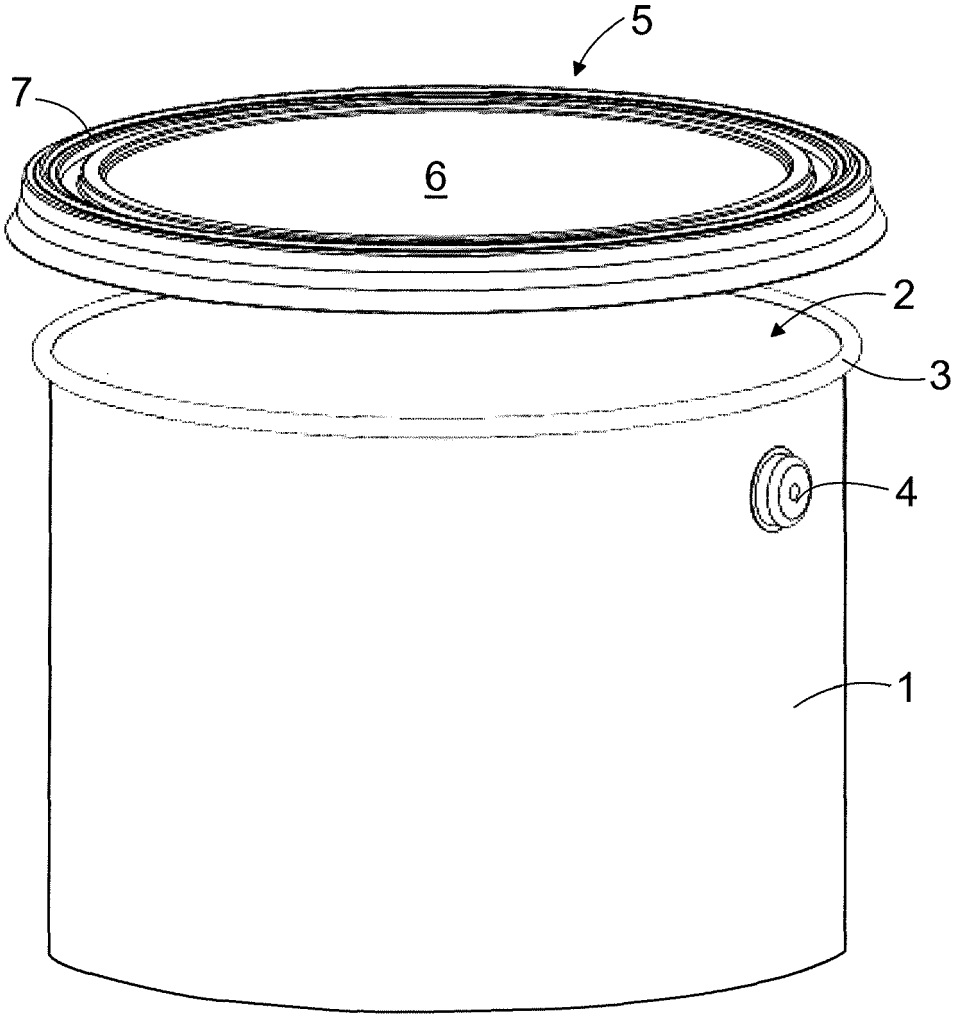

FIG. 1

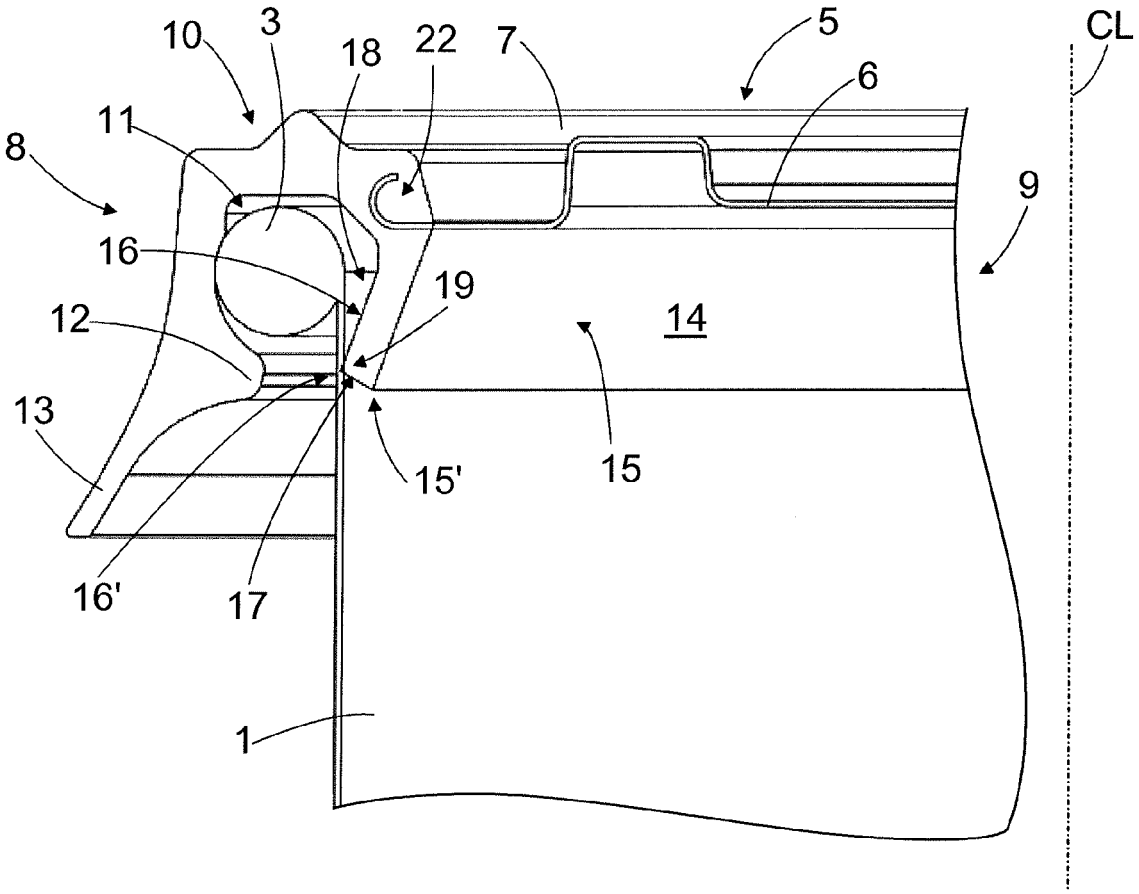
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FIG. 2

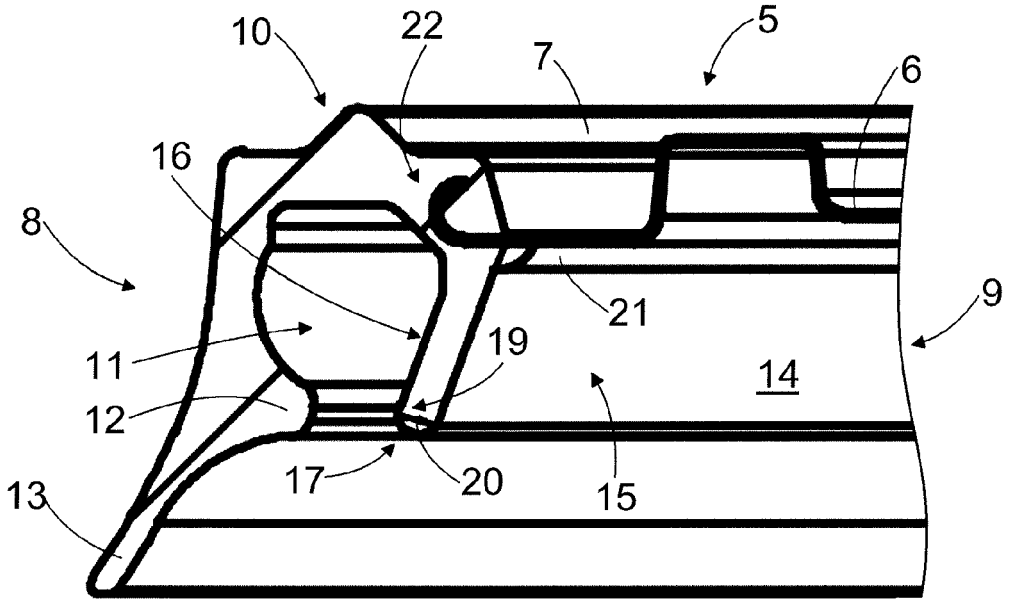
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FIG. 3

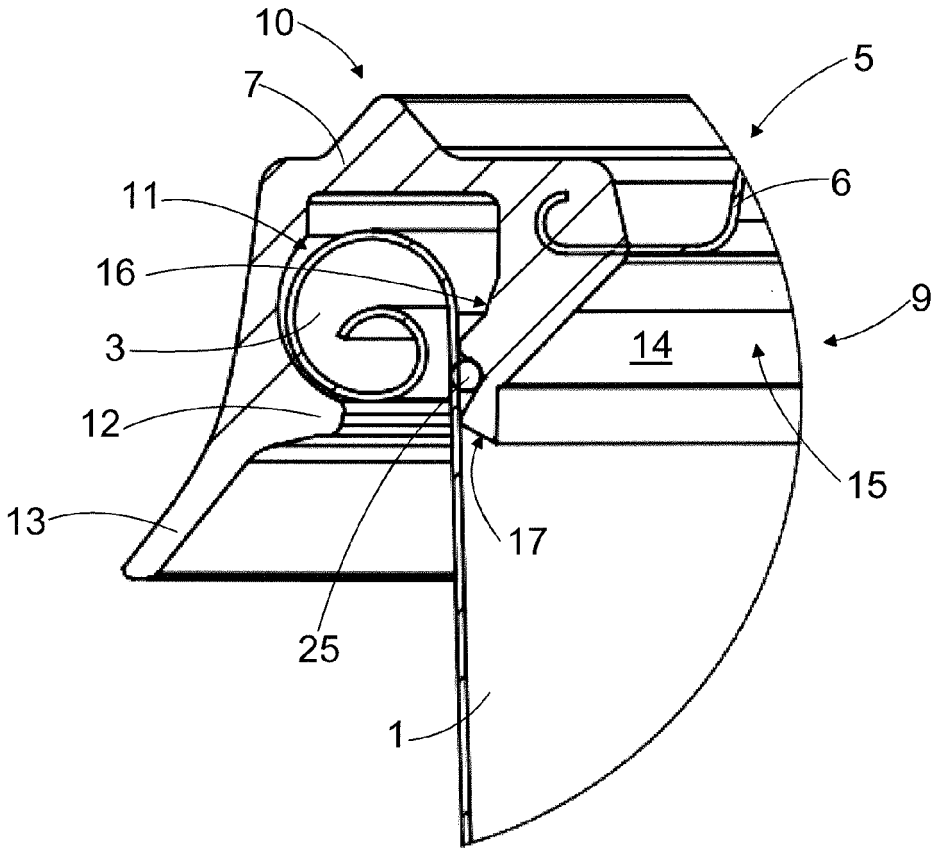
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FIG. 4

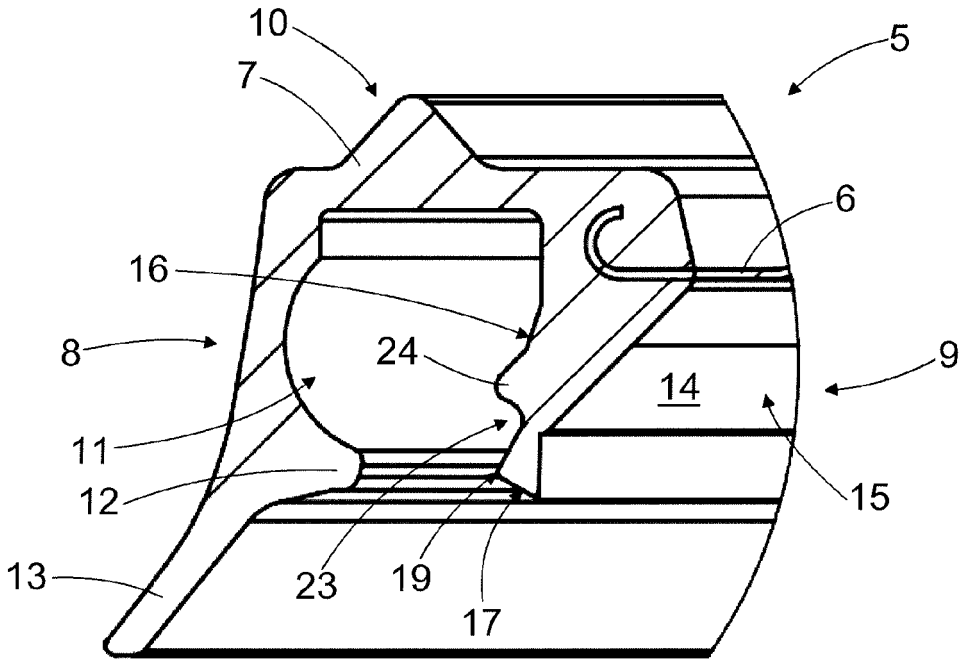
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FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 8536

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	US 3 782 575 A (BRAUN T) 1 January 1974 (1974-01-01) * column 3, line 5 - column 4, line 46; figures 6-7 *	1-5,7-12	INV. B65D43/02
X	DE 843 379 C (MUNDT PETER; GEIGER ALBERT) 7 July 1952 (1952-07-07) * claim 1; figures 5, 6, 12, 18 *	1,2,6,7, 9-12	
A	EP 0 835 819 A1 (DART IND INC [US]) 15 April 1998 (1998-04-15) * figures *	1	
A	CA 2 163 306 A1 (PORANUNT CO LTD [TH]) 21 May 1997 (1997-05-21) * figures *	1	
A	US 2 674 390 A (MEYER CORNELIS A) 6 April 1954 (1954-04-06) * figures *	8	
A	US 4 718 571 A (BORDNER PAUL G [US]) 12 January 1988 (1988-01-12) * figures *	8	TECHNICAL FIELDS SEARCHED (IPC) B65D
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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	10 November 2016	Fournier, Jacques

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 16 16 8536

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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10-11-2016

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