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(54) A closure

(57) The present invention is directed to a packaging (1) comprising a container (2) with a container body (5), and a container opening (6) having an upper edge (7), and a closure (4) for closing said container, the container (2) and the closure (4) being made out of polyethylene terephtalate (PET), polyethylene naphtalate (PEN), or a combination thereof, said container and said closure comprising respectively first (8) and second (9) attachment means, **characterized in that:**
(i) the attachment means (8, 9) are adapted in shape and size to cooperate with each other, and
(ii) at least the second attachment means (8) is made of PET or PEN and adapted in shape and size to deform permanently by punching or rolling to link both attachment means, and create a permanent, preferably fluid-tight, arrangement between said container (2) and said closure (4).

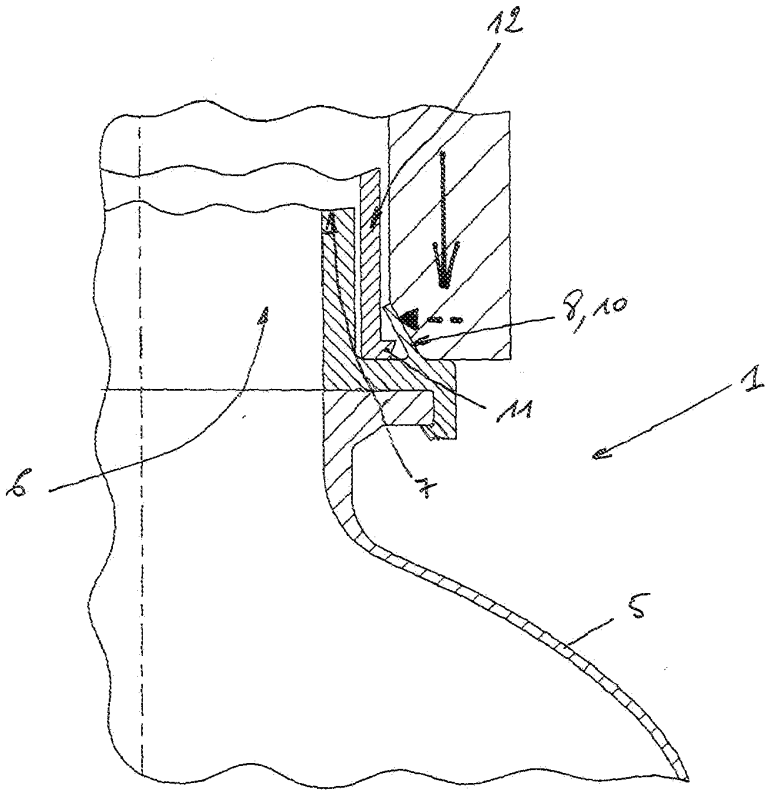

FIG. 3

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Description

Field of the invention

[0001] The present invention concerns a packaging comprising at least two parts which are assembled by deforming one portion of the plastic material - preferably polyethylene terephtalate (PET) or polyethylene naphtalate (PEN) of at least one of these parts.

Background of the invention

[0002] A packaging generally comprises a container with a container opening that is closed by a closure element.

[0003] The assembly process of the closure element (cap) to the container requires to have cooperating screw threads on these two parts of the packaging, or an equivalent means such as clipping cooperating elements.

[0004] There is a need for an alternative system for efficiently and reliably attaching a closure element to a container.

Summary of the invention

[0005] The technical problem mentioned above is met with a packaging comprising a container with a container body, and a container opening having an upper edge, and a closure for closing said container, the container and the closure being made out of polyethylene terephtalate (PET), polyethylene naphtalate (PEN), or a combination thereof, said container and said closure comprising respectively first and second attachment means According to the invention, the packaging is characterized in that:

(i) the first and second attachment means are adapted in shape and size to cooperate with each other, and

(ii) at least the second attachment means are made of PET or PEN and adapted in shape and size to deform permanently by punching or rolling to link both attachment means, and create a permanent, preferably fluid-tight, arrangement between said container and said closure.

[0006] The permanent deformation that is applied to the groove wall was found to be possible under certain constraints, and only with PET or PEN. This deformation is permanent and the deformed part is sufficiently strong to prevent the attached part to detach from the other, even when high mechanical constraints are applied to the assembly. Basically, the type of link that is achieved with such an assembly method, is as strong as heat sealing between the two parts.

[0007] In a preferred embodiment of the invention, the first attachment means is a groove having one of its walls which is deformable by punching or rolling, and the second attachment means is an extending ridge adapted in shape and size to be inserted into the groove, and in that the closure is attached to the container in a water-tight arrangement by inserting the closure ridge into the container groove and permanently deforming at least one wall of the groove so as to unremovably catch the ridge into the groove.

[0008] Preferably the groove wall is less than 2 mm, preferably less than 1 mm thin so as to be more easily deformable by punching or rolling, and so as to avoid possible problems of cracking or whitening of the plastic material when the deformation is applied. The flexibility and permanent deformation of the material is made possible when the piece to be deformed is sufficiently thin so as to bend, up its point of permanent deformation, without stressing too much the plastic material.

[0009] In one first possible embodiment of the invention, the closure can comprise a spout and an overcap attached to the spout, in which case the closure's ridge extends from the lower edge of the spout.

[0010] In a second possible embodiment of the invention, the closure element can comprise a ring-shaped base and an overcap attached to the base, in which case the closure's ridge extends from the lower edge of the ring-shaped base.

[0011] In all cases, the overcap can advantageously be pivotably attached to the spout or, respectively, to the ring-shaped base, by a pivot hinge.

[0012] Preferably in the second possible embodiment of the invention mentioned above, the ring-shaped base is less than 10 mm, preferably less than 3 mm in height.

[0013] The overcap mentioned above is preferably made out of polypropylene (PP), and also preferably, said spout and said overcap are manufactured as one single piece.

[0014] Further, on top of the plastic deformation that is used as an essential way to assemble the packaging according to the present invention, the closure element can also be attached to the container ultrasonic sealing.

[0015] Preferably, the packaging according to the present invention further comprises tamper-evident means, said means preferably comprising a detachable tamper-evident band that is formed together with the closure, so that it catches one part of the container, thus preventing removal of the closure from said container, unless the said tamper-evident band is torn from the rest of the closure.

Brief description of the drawings

[0016] Additional features and advantages of the present invention are described in, and will be apparent from, the description of the presently preferred embodiments which are set out below with reference to the drawings in which:

Figure 1 is a schematic cut profile view showing a packaging assembled according to the present in-

vention, with attachment means not yet deformed ;
Figure 2 is an enlarged schematic profile cut view showing the attachment means with one wall of the attachment groove that is deformed to permanently and leak-tightly catch the ring-shaped base of a closure ;
Figure 3 is an partial profile schematic cut view showing how different parts of the packaging are assembled by rolling in conjunction with ultrasonic sealing ;
Figure 4 is a schematic profile cut view showing the top portion of a packaging according to the invention, before the attachment means of the container are deformed to attach the closure element to said container ;
Figure 5 is a perspective top view showing a closure element;
Figure 6 is a perspective top view similar to figure 4 ;
Figure 7 is a view similar to figure 4, where a hinged overcap is partially open ; this figure illustrates the difficulty to pivot completely the overcap in open position when the walls of the spout and the over cap are tall ;
Figure 8 is profile view showing the top portion of a packaging according to the invention, where the overcap comprises a tamper-evident detachable front tab ;
Figure 9 is a view similar to figure 8, wherein the detachable front tab was removed in order to allow complete lifting of the overcap ;
Figure 10 is a view similar to figure 4 showing high closure walls.

Detailed description of the invention

[0017] As illustrated in **figure 1**, the invention concerns a packaging 1 comprising a bottle 2 made from blow-moulding of a preform 3, the bottle 2 being closed by a closure 4, and both the bottle 2 and the closure 4 being made of polyethyleneterephtalate (PET).

[0018] In the present description, it can be seen from the drawing that **figure 1** represents a not yet blown bottle, so what is represented in **figure 1** is the PET preform 3 that will later be blown into a full size bottle.

[0019] The container 2 comprises a container body 5 and a container opening having an upper edge. Said container 2 and said closure 4 comprising first 8 and second 9 corresponding attachment means.

[0020] According to the invention, the second attachment means 9 are adapted in shape and size to cooperate with the first attachment means 8, and both attachment means 8, 9 are made of PET and integrally part of the rest of the pieces they are linked to - they could however be added to existing parts, by any means of linking, such as heat sealing, ultrasonic welding for instance -. More than that, both attachment means 8, 9 are adapted in shape and size to deform permanently by rolling to create a fluid-tight permanent arrangement between said container 2 and said closure 4.

[0021] As can be seen from **figure 1** and **figure 2,** the first attachment means is a groove 8 having one of its walls 10 which is deformable by rolling, as illustrated in **figure 2.** The second attachment means is an extending ridge 9 that is adapted in shape and size to be inserted into the groove 8, such that the closure can be attached to the container in a water-tight arrangement by inserting the closure ridge into the container groove and permanently deforming the wall 10 of the groove 8 so as to unremovably catch the ridge 9 into said groove 8.

[0022] Of course, the example described herein shall not be taken as a limiting example, and for instance the first attachment means of the closure could be a groove, whereas the second attachment means of the container could be a corresponding ridge (inverted positioning of the attachment means relative to the constitutive parts of the packaging.

[0023] The deformable groove wall 10 is about 1.5 mm thin so as to be more easily deformable during the rolling operation, and so as to avoid possible problems of cracking or whitening of the plastic material when the deformation is applied. The flexibility and permanent deformation of the material is made possible when the piece to be deformed is sufficiently thin so as to bend, up its point of permanent deformation, without stressing too much the plastic material.

[0024] As illustrated in figure 1, the closure element comprises a ring-shaped base and an overcap attached to the base. The closure's ridge extends from the lower edge of the ring-shaped base. The overcap is pivotably attached to the spout or, respectively, to the ring-shaped base, by a pivot hinge. The ring-shaped base is about 3 mm in height.

[0025] As shown in **figure 2,** the ridge 9 of the closure is disposed into the groove 8 of the preform (or bottle) neck, and the latter is permanently deformed after the rolling operation, in a position that locks the ridge 9 into the groove 8, so that the closure 4 is permanently attached to the neck of the bottle 2. This attachment is a fluid tight attachment.

[0026] The groove is a U-shaped groove with a height of at least 2, preferably at least 3 mm, and a width sufficient to accommodate the ridge of the closure.

[0027] The permanent deformation can be performed by punching, rolling, cold forming, hot forming, or a combination thereof. As illustrated in **figure 3,** the permanent deformation technique cited before can also be used in combination with ultrasonic welding, so that when the second attachment means is deformed to catch the first attachment means, in order to create a fluid-tight connection between said container and said closure, an additional ultrasonic welding step is performed to create a permanent seal between the container 2 and the closure 4. At the sealed interface between these two parts of the packaging, the plastic material is melted, and then colds back to its initial solid state, in such a way that the closure and the container form one single integral piece. Such a

ultrasonic welding operation is performed in this case with a sonotrode, which also plays the role of a puncher that deforms the attachment means of the container, before (or at the same time) transmitting ultrasonic waves to seal the closure and the container together.

[0028] The permanent deformation of the PET or PEN is performed at a temperature comprised between 0°C and the glass transition temperature of the plastic material. This temperature of glass transition is well defined for both thermoplastics used in the present invention. For PET, the temperature of glass transition is Tg = 69°C. For PEN, this temperature of glass transition is Tg = 122°C. However, preferably the permanent deformation is applied at a temperature which is comprised in a more restricted range, and a range which is closer to ambient temperature, that is to say a temperature comprised between 18°C and 40°C, more preferably at a temperature comprised between 20°C and 30°C.

[0029] In the example shown in **figure 3**, the attachment means of the bottle 2 is a circular ridge 9, that is deformed inwardly towards the centre of the bottle, and catches the attachment means of the closure, which is a horizontal extension 11 of the closure skirt 12.

[0030] Actually, the attachment means of the container and/or the closure could be not entirely circular (i.e. all around the periphery), but rather on a portion of the circumference of the container and/or closure, or even at very specific points of the said container and/or closure.

[0031] As illustrated in **figures 4, 5 and 6,** the closure 4 can be a hinged closure, comprising a base ring 13 and an overcap 14 that is pivotably attached to the ring 13 by a hinge 15.

[0032] As shown in **figure** 4, the lower part of the ring 13 is disposed into a groove 8 of the bottle neck, before a wall 10 of said groove is deformed to permanently catch the ring 13, as described before. In that case and as shown in **figure 5 and figure 6**, the overcap 14 is moulded as one integral piece with the ring 13, but these two parts are linked via breakable bridges 16, which are broken by tearing when the used first lifts the overcap 14 to open the closure 4. This systems constitutes a tamper-evident means.

[0033] However, as shown in **figure 7**, there can be a problem for lifting the overcap 14 due to the functional dimensions of said overcap: in that case, it can be become impossible to lift the overcap as its front wall 17 will be stopped by the container neck 18.

[0034] In order to avoid the potential problem illustrated in **figure 7**, the closure front wall 17 is preferably equipped with a detachable front wall portion 19 as illustrated in **figure 8**, that can be torn off before lifting the overcap 14 in open position of the closure, as shown in figure 9.

[0035] This detachable portion 19 is moulded as an integral portion of the rest of the closure 4, but linked to the latter by breakable bridges 16 of plastic material. This detachable front wall portion 19 of the closure can be also integral to the ring 13 of the closure (embodiment not shown in the drawing), or alternatively it can be also detachable from the ring 13, as illustrated in **figure 9.**

[0036] As shown in **figure 10,** a detachable front wall portion 19 of the closure 4, makes it possible for a very tall neck 18 of the closure which will still be closed with a hinged closure.

[0037] It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

Claims

1. A packaging (1) comprising a container (2) with a container body (5), and a container opening (6) having an upper edge (7), and a closure (4) for closing said container, the container (2) and the closure (4) being made out of polyethylene terephtalate (PET), polyethylene naphtalate (PEN), or a combination thereof, said container and said closure comprising respectively first (8) and second (9) attachment means, **characterized in that**:

   (i) the attachment means (8, 9) are adapted in shape and size to cooperate with each other, and
   (ii) at least one of the first (8) and/or second (9) attachment means is made of PET or PEN and adapted in shape and size to deform permanently by punching or rolling to link both attachment means, and create a permanent, preferably fluid-tight, arrangement between said container (2) and said closure (4).

2. A container (1) according to claim 1, wherein the first attachment means is a groove (8) having at least one of its walls (10) which is deformable by punching or rolling, and the second attachment means is a extending ridge (9) adapted in shape and size to be inserted into the groove (8), and in that the closure (4) is attached to the container (2) in a water-tight arrangement by inserting the closure ridge (9) into the container groove (8) and permanently deforming at least one wall (10) of the groove (8) so as to unremovably catch the ridge (9) into the groove (8).

3. A container (1) according to claim 1, wherein the deformable groove wall (10) is less than 2 mm, preferably less than 1 mm thin so as to be deformable by punching or rolling.

4. A container (1) according to any of the preceding claims, wherein the closure (4) comprises a spout

and an overcap attached to the spout, and the closure's ridge (9) extends from the lower edge of the spout.

5. A packaging (1) according to claim 1, wherein the closure element (4) comprises a ring-shaped base (13) and an overcap (14) attached to the base (13), and wherein the closure's ridge (9) extends from the lower edge of the ring-shaped base (13).

6. A packaging (1) according to claims 2 or 3, wherein the overcap (14) is pivotably attached to the spout or, respectively, to the ring-shaped base (13), by a pivot hinge (15).

7. A packaging (1) according to claims 4 or 5, wherein the ring-shaped base (13) is less than 10 mm, preferably less than 3 mm in height.

8. A packaging (1) according to any of the preceding claims 2 to 7, wherein said overcap(14) is made out of polypropylene (PP).

9. A packaging (1) according to any of the preceding claims 2 to 8, wherein spout and overcap are manufactured as one single piece.

10. A packaging (1) according to any of the preceding claims, wherein the closure element (4) is also attached to the container (2) by ultrasonic sealing.

11. A packaging (1) according to any of the preceding claims, which comprises tamper-evident means, said means preferably comprising a detachable tamper-evident band that is formed together with the closure (4), so that it catches one part of the container, thus preventing removal of the closure from said container, unless the said tamper-evident band is torn from the rest of the closure.

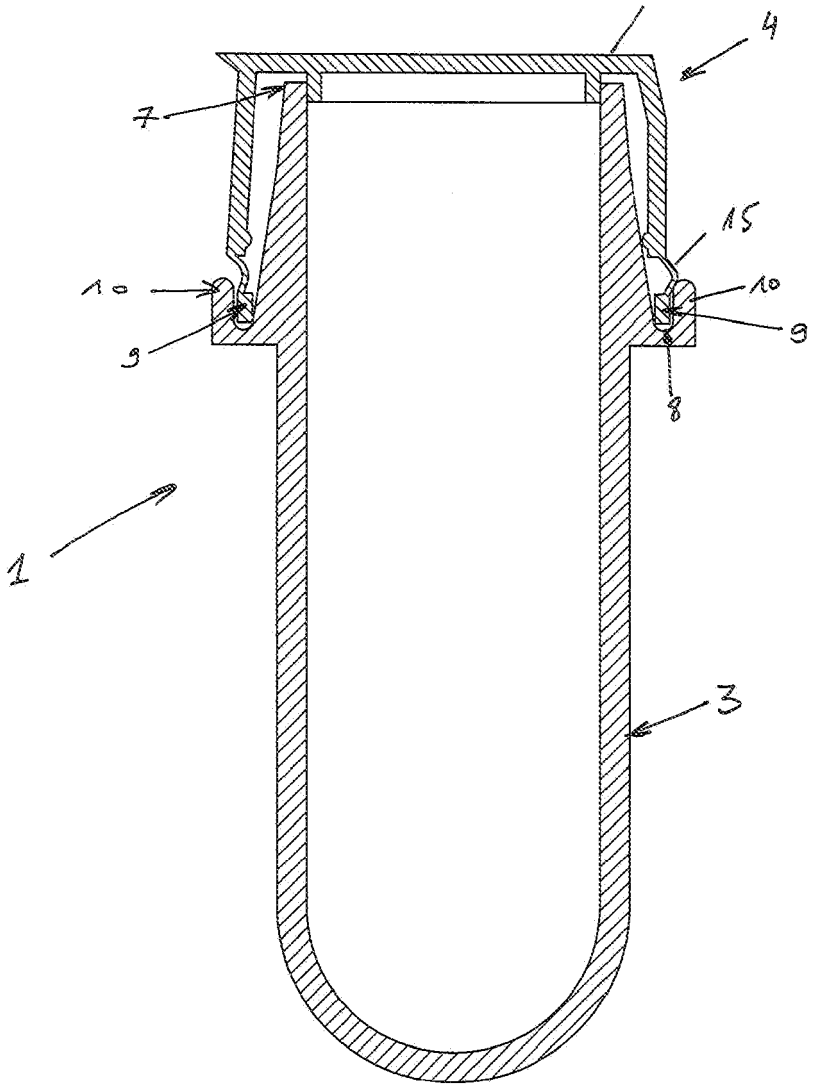

FIG. 1

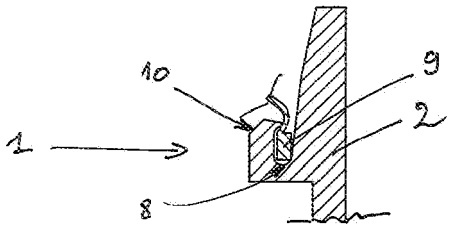

FIG. 2

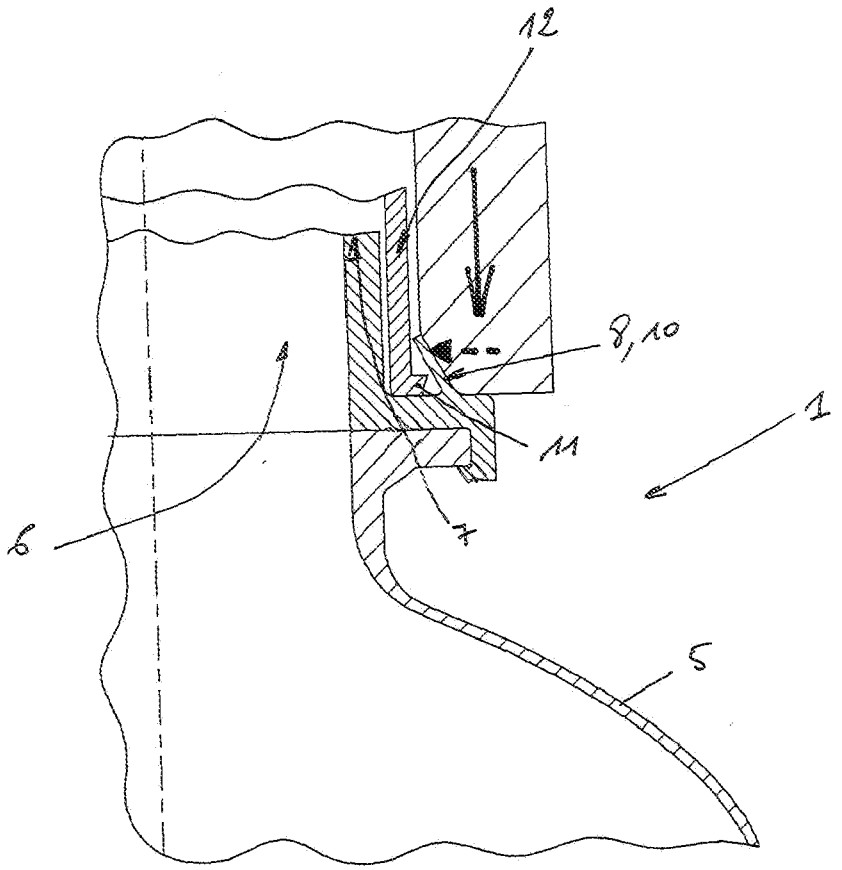

FIG. 3

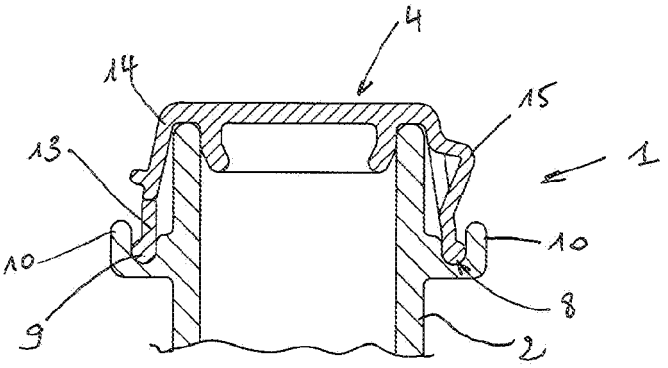

FIG. 4

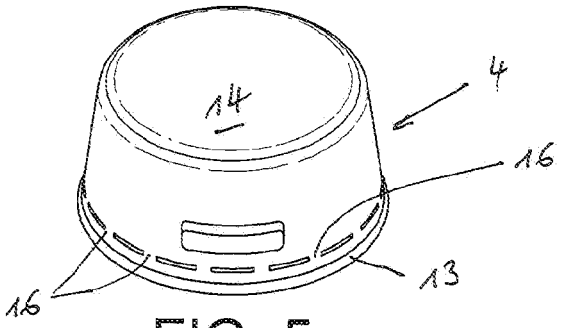

FIG. 5

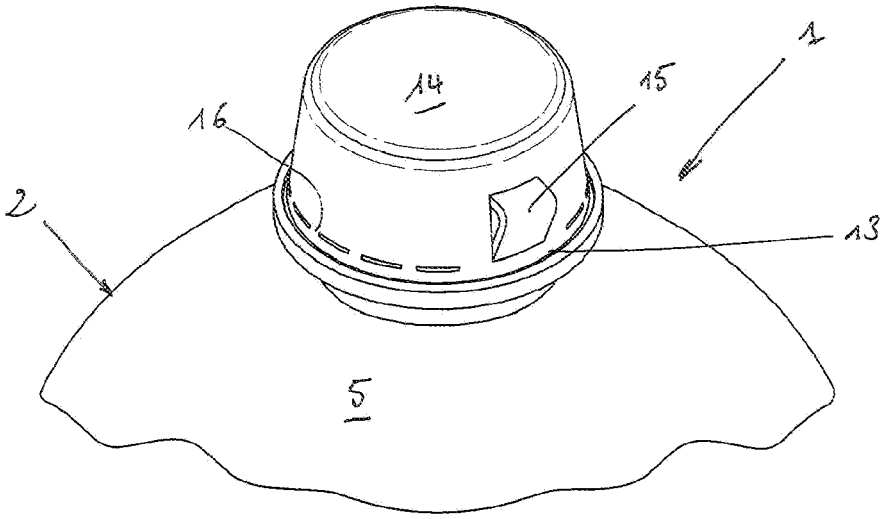

FIG. 6

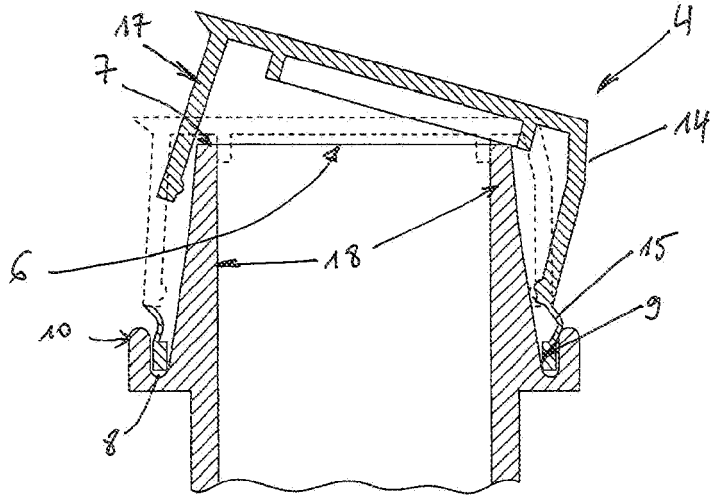

FIG. 7

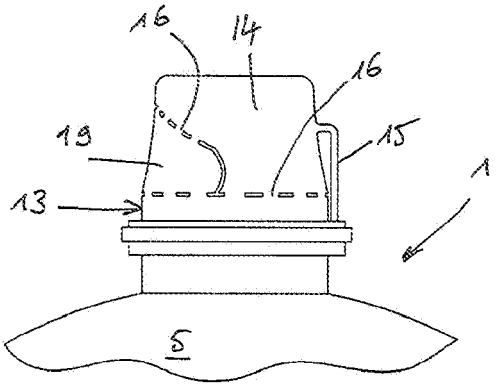

FIG. 8

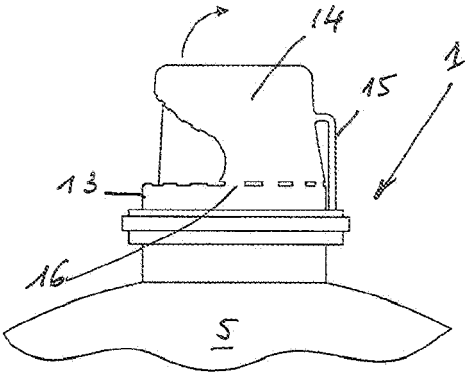

FIG. 9

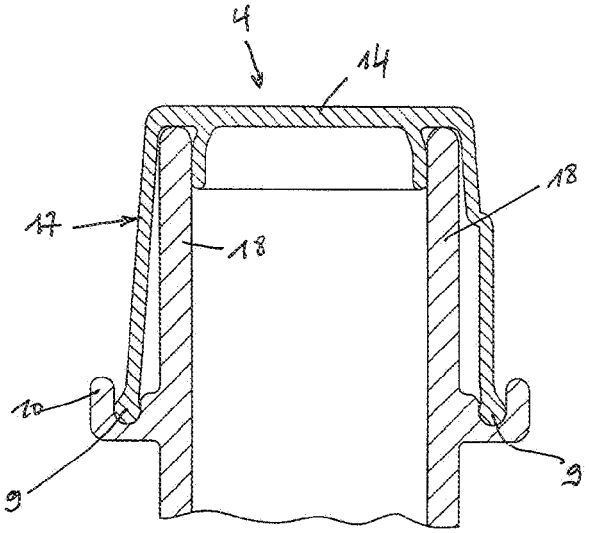

FIG. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 09 17 3868

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 3 927 805 A (STULL MORTON B) 23 December 1975 (1975-12-23) * column 3, line 21 - column 3, line 31; figures *	1-11	INV. B65D47/08
X	GB 1 123 000 A (METAL BOX CO LTD) 7 August 1968 (1968-08-07) * page 2, line 24 - page 2, line 34; figures *	1-2	
X	WO 02/42174 A1 (ALPLA WERKE [AT]; KLOPFER MANFRED [AT]) 30 May 2002 (2002-05-30) * page 6, line 8 - page 6, line 11; figures *	1-2	

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	15 December 2009	Vigilante, Marco

CATEGORY OF CITED DOCUMENTS

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15-12-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3927805 A	23-12-1975	CA 1025397 A1	31-01-1978
		GB 1468458 A	30-03-1977
GB 1123000 A	07-08-1968	NONE	
WO 0242174 A1	30-05-2002	AT 301587 T	15-08-2005
		AU 1602702 A	03-06-2002
		BR 0101765 A	09-07-2002
		CA 2428681 A1	30-05-2002
		CN 1476404 A	18-02-2004
		DE 50107072 D1	15-09-2005
		EP 1337444 A1	27-08-2003
		HU 0303572 A2	29-03-2004
		MX PA03004654 A	04-09-2003
		PL 365988 A1	24-01-2005
		US 2004026465 A1	12-02-2004

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