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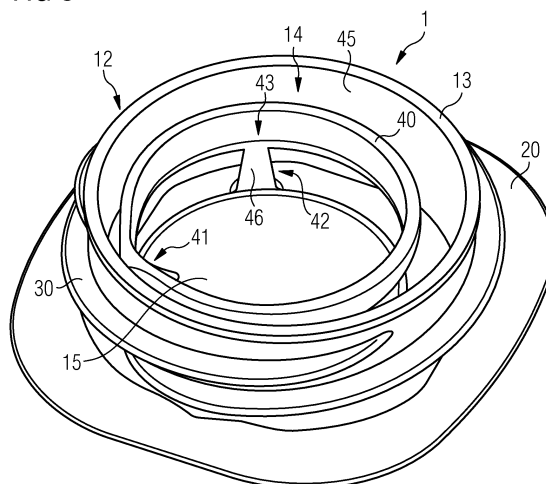
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(54) **An opening device for a container and a method for producing an opening device**

(57) An opening device (1) for a container (100) comprises a pouring spout (12) defining a pouring opening (14) by which to pour in use the content of said container (100), a closing element (15) closing said pouring opening (14) and connected to said pouring spout (12), a pull element (40) connected to said closing element (15) and intended to be pulled by a user to detach said closing element (15) from said pouring spout (12), said opening device (1) further comprising a connecting element (42) interposed between said pull element (40) and said closing element (15) and connected to said pull element (40) and to said closing element (15); a method for producing

an opening device for a container, comprises the steps of forming a pouring spout (12) defining a pouring opening (14) by which to pour in use the content of said container (100), forming a closing element (15) closing said pouring opening (14), forming a pull element (40) connected with said closing element (15) and arranged to be pulled by a user to detach said closing element (15) from said pouring spout (12) and forming a connecting element (42) interposed between said pull element (40) and said closing element (15) and connected to said pull element (40) and to said closing element (15).

FIG 3



Description

[0001] The present invention relates to an opening device for a container, in particular for a sealed container for packaging pourable food products, and to a method for producing an opening device.

[0002] More specifically, the present invention relates to an opening device designed to be directly molded onto a sheet packaging material, in turn adapted to be folded, filled with a pourable food product and sealed to form a finished container; the present invention is also directed to a method for producing an opening device to be applied onto a multilayer sheet packaging material.

[0003] As known, many pourable food products, such as fruit juice, UHT (ultra-high-temperature treated) milk, wine, tomato sauce, etc., are sold in containers made of sterilized sheet packaging material.

[0004] A typical example of this type of container is the parallelepiped-shaped container for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by folding and sealing laminated sheet packaging material.

[0005] The packaging material has a multilayer structure substantially comprising a base layer for stiffness and strength, which may comprise a layer of fibrous material, e.g. paper, or mineral-filled polypropylene material, and a number of lamination layers of heat-sealable plastic material, e.g. polyethylene films, covering both sides of the base layer.

[0006] In the case of aseptic containers for long-storage products, such as UHT milk, the packaging material also comprises a layer of gas-barrier material, e.g. aluminium foil or ethyl vinyl alcohol (EVOH) film, which is superimposed on a layer of heat-sealable plastic material, and is in turn covered with another layer of heat-sealable plastic material forming the inner face of the container eventually contacting the food product.

[0007] Containers of this sort are normally produced on fully automatic packaging machines, on which a continuous tube is formed from the web-fed packaging material. The web of packaging material is sterilized in the packaging machine. The web of packaging material so sterilized is then maintained in a closed, sterile environment, and is folded and sealed longitudinally to form a vertical tube.

[0008] The tube is filled with the sterilized or sterile-processed food product, and is sealed and subsequently cut along equally spaced cross sections to form pillow packs, which are then folded mechanically to form respective finished, e.g. substantially parallelepiped-shaped, containers.

[0009] Alternatively, the packaging material may be cut into blanks, which are formed into containers on forming spindles, and the containers are filled with the food product and sealed. One example of this type of container is the so-called "gable-top" container known by the trade name Tetra Rex (registered trademark).

[0010] To open the containers described above, vari-

ous solutions have been proposed, including reclosable opening devices made of plastic material and substantially comprising a pouring spout, defining a through pouring opening and fitted to a wall of the container.

[0011] When producing the opening device, the opening of the pouring spout is sealed by a closing element connected integrally to the pouring spout and detachable from it along a smaller-section annular tearable membrane; the closing element extends at the same level as the packaging material so as to seal the hole in the wall of the container.

[0012] A removable, e.g. screw or hinged, lid can be fitted to the pouring spout to outwardly closing the latter and allowing closure of the container after the first opening by removing the closing element.

[0013] According to a known embodiment, the pouring spout and the closing element are injection molded in one piece directly on a through hole formed in the packaging material so as to seal it.

[0014] In particular, the portion of the packaging material provided with the hole on which the pouring spout and the closing element are to be formed is placed between two molds in an open configuration. The molds are then displaced towards the packaging material to reach a closed configuration, in which they cooperate with opposite faces of the packaging material and define a closed mold cavity housing the above-mentioned hole. The injection molding operation is performed by injecting the molten plastic material in the mold cavity defined by the molds in the closed configuration. More specifically, the molten plastic material is forced to fill completely the mold cavity so as to form the pouring spout and the closing element.

[0015] Subsequently, a lid is fitted to the pouring spout.

[0016] According to another known embodiment the pouring spout and the closing element are injection molded in one piece directly on a so-called "prelaminated" hole of the packaging material, i.e. a hole formed in the base layer only and covered by the other lamination layers, including the layer of gas-barrier material. The plastic material is injection molded on a first side of the "prelaminated" hole. The plastic material forms the closing portion on one side of the "prelaminated" hole and pierces the "prelaminated" hole along a circumferential region thereof, so forming a circumferential passage. The plastic material, therefore, flows through the circumferential passage and forms the pouring spout on a second side - opposite to the above-mentioned first side - of the "prelaminated" hole. After the molding operation, the lamination layers, in particular the layer of gas-barrier material, are integrated into the closing element and enhances the barrier properties, in particular the gas (oxygen) barrier properties, of the closing element.

[0017] The above-disclosed opening devices are usually provided with a pull ring received into the pouring spout and firmly connected to the closing element. The pull ring is molded as a single piece with the closing element and has an annular-shaped body intended to re-

ceive a finger of the user. When the user wants to open the package, he puts his finger into the annular-shaped body and pulls the pull ring so as to remove the pull ring, and the closing element attached thereto, from the pouring spout.

[0018] A drawback of the above-disclosed opening device is that the pull-ring may protrude outside of the pouring spout. This is due to the shrinkage of the plastic material after molding.

[0019] The portion of the pull-ring that extends from the pouring spout may interact with parts of the packaging machine when the packaging material - onto which the opening device has been molded - is advanced through the packaging machine. Such an interaction may cause damages to the portion of the pull-ring that extends from the pouring spout and/or to the parts of the packaging machine, which may be worn due to the friction.

[0020] An object of the present invention is to improve the known opening devices.

[0021] Another object of the present invention is to provide an opening device that does not cause damages to parts of a packaging machine, when the opening device is attached to a packaging material and is advanced through the packaging machine together with the packaging material.

[0022] Another object of the present invention is to provide an opening device that is not damaged by the interaction with parts of a packaging machine, when the opening device is attached to a packaging material and is advanced through the packaging machine together with the packaging material.

[0023] According to a first aspect of the present invention, there is provided an opening device as claimed in claim 1.

[0024] According to a second aspect of the present invention, there is provided a method for producing an opening device for a container, as claimed in claim 9.

[0025] Some preferred, non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a package having an opening device according to the invention;

Figure 2, is a cross section of a sheet of packaging material intended to form the package of Figure 1, showing the packaging material before the opening device is applied thereto;

Figure 3 is a perspective view of the opening device of Figure 1;

Figure 4 is a section taken along plane IV-IV in Figure 1;

Figure 5 is a section taken along plane V-V in Figure 1;

Figure 6 is a perspective view of a package having an opening device according to another embodiment of the invention;

Figure 7 is a perspective view of the opening device of Figure 6;

Figure 8 is a section taken along plane VIII-VIII in Figure 6;

Figure 9 is a section taken along plane IX-IX in Figure 6.

[0026] Number 1 in Figures 1, 3, 4 and 5 indicates as a whole an opening device 1 for a container 100, in particular a sealed container for packaging pourable food products.

[0027] The opening device 1 is applied to a receiving portion 2 of a multilayer sheet packaging material 3, in turn folded, filled with a pourable food product and sealed in a known manner to form the container 100.

[0028] With particular reference to Figure 2, the packaging material 3 comprises a base layer 4 for stiffness and strength, which may be made of fibrous material, e.g. paper, or mineral-filled polypropylene material, and a first covering layer 5a and a second covering layer 5b, made of heat-sealable plastic material, e.g. polyethylene films, and covering both sides of the base layer 4.

[0029] In the case of an aseptic container for long-storage products, such as UHT milk, the packaging material 3 also comprises a barrier layer 6 made of gas-barrier material, e.g. aluminium foil or ethyl vinyl alcohol (EVOH) film, which is superimposed on the second covering layer 5b and is in turn covered with a third covering layer 5c, made of heat-sealable plastic material, e.g. a polyethylene film, forming the inner face of the container eventually contacting the food product.

[0030] In other words, the first covering layer 5a, the second covering layer 5b, the barrier layer 6 and the third covering layer 5c define lamination layers applied to the base layer 4 when producing the packaging material 3 in the form of a continuous sheet.

[0031] In the example shown, the receiving portion 2 is defined by a so-called pre-laminated hole, i.e. a hole 9 formed through the base layer 4 and covered by the above-mentioned lamination layers so that the hole 9 is sealed by a sheet cover portion 10.

[0032] In a possible alternative embodiment not shown, the cover portion 10 may be defined by only one or some of the above-mentioned lamination layers. For example, the cover portion 10 may be made solely of gas-barrier material.

[0033] In another possible alternative embodiment not shown, the cover portion 10 may be defined by a patch fixed to the packaging material 3 to seal a hole formed, in this case, through the full thickness of the packaging material 3.

[0034] In a further alternative embodiment not shown, the receiving portion 2 may be simply defined by a hole formed through the full thickness of the packaging material 3 and which is destined to be sealed by the opening device 1.

[0035] With reference to Figures 1, 3, 4 and 5, the opening device 1 comprises a pouring spout 12 fixed to the packaging material 3 at the hole 9. The pouring spout 12 defines a pouring opening 14, by which to pour in use

the content of the container. The pouring spout 12 has a cylindrical tubular neck 13.

[0036] The opening device 1 further comprises a closing element 15 closing or sealing the pouring opening 14 and integrally connected to the pouring spout 12 by a smaller-section, annular membrane 16.

[0037] The opening device 1 further comprises a lid - not shown - fitted to the pouring spout 12 in a removable manner to close or seal pouring opening 14.

[0038] In one embodiment, the lid is of a screw type and comprises an inner thread that engages a corresponding outer thread 30 on the neck 13.

[0039] The annular membrane 16 defines a weakening line or tear line along which to detach, in use, the closing element 15 from the pouring spout 12.

[0040] According to a preferred embodiment of the present invention, the pouring spout 12 and the closing element 15 are formed in one piece on the receiving portion 2 of the packaging material 3, whilst the lid is formed separately from the pouring spout 12 and the closing element 15 and then fitted to the pouring spout 12.

[0041] As shown in Figures 1, 3, 4 and 5, the pouring spout 12 further comprises an annular flange 20 fixed to the packaging material 3 at the edge of the hole 9. The neck 13 projects axially and integrally from an annular region of flange 20 radially interposed between an outer edge 21 of the flange 20 and the annular membrane 16.

[0042] In practice, the closing element 15 defines a prolongation of the flange 20 inside the pouring spout 12 and closes or seals one axial end 22 of the pouring spout 12.

[0043] The opening device 1 further comprises a pull element 40 connected to the closing element 15 and arranged to be pulled by a user to detach the closing element 15 from the pouring spout 12.

[0044] The pull element 40 is arranged inside the pouring spout 12, in particular the pull element 40 is received within the neck 13.

[0045] The pull element 40 comprises a grasping body 50 and an appendix 41 extending from the grasping body 50 towards the closing element 15 and firmly fixed to the closing element 15.

[0046] The opening device 1 further comprises a connecting element 42 interposed between the pull element 40 and the closing element 15 and fixed to both the pull element 40 and the closing element 15.

[0047] The connecting element 42 is a breakable connecting element that is broken when a user opens the opening device 1 for the first time.

[0048] The connecting element 42 prevents the pull element 40 from extending outside of the pouring spout 12 before the user opens the opening device 1 for the first time.

[0049] In the embodiment shown, the connecting element 42 is shaped as a column 43 extending between the pull element 40 and the closing element 15.

[0050] The pull element 40 is attached to the closing element 15 at a different location with respect to the ap-

pendix 41. In other words, the connecting element 42 is firmly fixed to the closing element 15 at a distance from the appendix 41.

[0051] In the embodiment shown, the grasping body 50 has the shape of a circular ring, the connecting element 42 and the appendix 41 being arranged at points of said circular ring that are spaced an angular distance - for example 90 degrees - from each other.

[0052] In the embodiment disclosed in Figures 1, 3, 4 and 5, the pouring spout 12, the closing element 15, the pull element 40 and the connecting element 42 are obtained as a single piece by molding molten plastic material, in particular by an injection molding operation carried out on the packaging material 3 before it is folded, filled and sealed so as to form the container 100.

[0053] More specifically, the plastic material destined to form the pouring spout 12, the closing element 15, the pull element 40 and the connecting element 42 is injected in a molten state onto a first side 10a - i.e. the side eventually facing inwards of the final container - of the cover portion 10 placed in a known manner within a molding apparatus (known per se and not shown). In particular, the molten plastic material covers the first side 10a so as to form, in this way, the closing element 15 directly attached to the cover portion 10. The molten plastic material is also forced to pierce the cover portion 10 along an annular peripheral region so as to form the pouring spout 12 projecting from a second side 10b, opposite to the first side 10a, of the cover portion 10 and attached to the closing element 15 through the annular membrane 16. Similarly, the molten plastic material is forced to pierce the cover portion 10 at two additional regions - closer to a longitudinal axis A of the opening device with respect to the above-mentioned annular peripheral region - so as to form the pull element 40 and the connecting element 42 projecting from the second side 10b and attached to the closing element 15.

[0054] In this way, the above-mentioned lamination layers forming the pre-laminated hole are first pierced through and then sealed by the plastic material forming the pouring spout 12, the pull element 40 and the connecting element 42.

[0055] In practice, the neck 13 of pouring spout 12 extends through the cover portion 10 so as to be arranged on both the first side 10a and the second side 10b.

[0056] The closing element 15 and the cover portion 10 together define a sealing portion sealing the pouring opening 14. The closing element 15 substantially has a confetti shape.

[0057] According to a possible alternative not shown, the plastic material destined to form the pouring spout 12 the closing element 15, the pull element 40 and the connecting element 42 may be also directly injected in a molten state through a hole of the packaging material 3 so that such hole is then completely sealed by the closing element 12 only.

[0058] Subsequently, the packaging material 3 - and the opening device 1 attached thereto - is sterilized and

then folded, filled with a pourable food product and sealed in a known manner to obtain container 100.

[0059] The lid is produced separately from the pouring spout 12 then fitted thereto.

[0060] In order to open the package 100, the user removes the lid and puts his finger into the pull element 40 and starts pulling.

[0061] The connecting element 42 brakes due to the pulling action and the pull element 40 is then connected to the closing element 15 only by the appendix 41.

[0062] Subsequently, as the user keeps pulling, the annular membrane 16 is broken and the closing element 15 is removed from the pouring spout 12.

[0063] In the embodiment shown in Figures 1, 3, 4 and 5 the connecting element is delimited by a first wall 44 - facing the inner wall 45 of the neck 13 - and by a second wall 46, opposite to the first wall 44. The second wall 46 is substantially flat and aligned with an inner surface 47 of the pull element 40. The first wall 44 substantially has a truncated cone shape. In the embodiment of Figures 1, 3, 4 and 5 the connecting element is made by filling with molten plastic material a cavity of an annular molding tool arranged for forming the appendix 41 of the pull element 40.

[0064] The embodiment of the opening device 1 shown in Figures 6 to 9 is similar to the embodiment of the opening device 1 shown in Figures 1, 3, 4 and 5. The same numeral references have been used for the same parts and components. In the embodiment of Figures 6 to 9, the connecting element is delimited by a first wall 44a - facing the inner wall 45 of the neck 13 - and by a second wall 46a, opposite to the first wall 44a. The first wall 44a is substantially flat and the second wall 46a substantially has a truncated cone shape. In the embodiment of Figures 6 to 9 the connecting element is made by filling with molten plastic material a cavity of a central molding tool arranged for forming the grasping body 50 of the pull element 40.

[0065] The advantages of the opening device 1 and the method for producing the opening device 1 according to the present invention will be clear from the foregoing description.

[0066] In particular, thank to the connecting element 42 the pull element is fully received and maintained into the pouring spout 12 and does not project from the neck 13.

[0067] In this way, there is no risk that a portion of the pull element 42 interacts with parts of the filling machines.

[0068] In addition, the connecting element 42 has a tamper-evidence function. In fact, if the connecting element 42 has already been detached from the pull element 40 or from the closing element 15, this is a clear indication of an attempt to tamper the container 100, which can be easily recognized by the user.

[0069] Clearly, changes may be made to the opening device 1 and the method for producing it as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

[0070] In particular, the opening device 1 may be compression molded - instead of injection molded - on the packaging material 3. In this case, the connecting element 42 is compression molded in one piece with the pouring spout 12, the closing element 15 and the pull element 40 onto the packaging material 3.

Claims

1. An opening device for a container (100), comprising a pouring spout (12) defining a pouring opening (14) by which to pour in use the content of said container (100), a closing element (15) closing said pouring opening (14) and connected to said pouring spout (12), a pull element (40) connected to said closing element (15) and intended to be pulled by a user to detach said closing element (15) from said pouring spout (12), **characterized in that** said opening device (1) further comprises a connecting element (42) interposed between said pull element (40) and said closing element (15) and connected to said pull element (40) and to said closing element (15), so that this pull element (40) does not extend outside of said pouring spout (12).
2. An opening device according to claim 1, wherein said connecting element (42) is shaped as a column (43) bridging said pull element (40) and said closing element (15).
3. An opening device according to claim 1, or 2, wherein said pull element (40) has an appendix (41) extending towards said closing element (15) and firmly fixed to said closing element (15), said connecting element (42) being arranged at a distance from said appendix (41).
4. An opening device according to claim 3, wherein said pull element (40) comprises a grasping body (50) having the shape of a circular ring, said connecting element (42) and said appendix (41) being arranged at points of said circular ring that are separated by an angular distance from each other.
5. An opening device according to any one of the preceding claims, wherein said connecting element (42) is molded in one piece with said pouring spout (12), said closing element (15) and said pull element (40).
6. An opening device according to claim 5, wherein said connecting element (42), said pouring spout (12), said closing element (15) and said pull element (40) are molded onto a sheet of packaging material intended to form said package (100).
7. An opening device according to claim 6, wherein said packaging material (2) comprises at least a first layer

- (4) and a second layer (5a, 5b, 5c, 6), and has a hole (9) formed through said first layer (4) and sealed by a cover portion (10) of said second layer (5a, 5b, 5c, 6), said connecting element (42), said pouring spout (12), and said pull element (40) being made of plastic material molded through said cover portion (10) and said closing element (15) being made of plastic material covering said cover portion (10) and being firmly attached to said cover portion (10).
8. An opening device according to any one of the preceding claims, wherein said connecting element (42) is so shaped as to break, in use, before said closing element (15) is removed from said pouring spout (12), so that said connecting element (42) acts as a tamper-evidence device.
9. A method for producing an opening device for a container (100), said method comprising the step of forming a pouring spout (12) defining a pouring opening (14) by which to pour in use the content of said container (100), the step of forming a closing element (15) closing said pouring opening (14) and the step of forming a pull element (40) connected with said closing element (15) and arranged to be pulled by a user to detach said closing element (15) from said pouring spout (12), **characterized in that** the method further comprises the step of forming a connecting element (42) interposed between said pull element (40) and said closing element (15) and connected to said pull element (40) and to said closing element (15).
10. A method according to claim 8, wherein said step of forming a connecting element (42) comprises the step of shaping said connecting element (42) as a column (43) bridging said pull element (40) and said closing element (15).
11. A method according to claim 8, or 9, wherein said step of forming a pull element (40) comprises the step of providing said pull element (40) with an appendix (41) extending towards said closing element (15) and firmly fixed to said closing element (15) and said step of forming a connecting element (42) comprises the step of arranging said connecting element (42) at a distance from said appendix (41).
12. A method according to claim 10, wherein said step of forming a pull element (40) comprises the step of providing said pull element (40) with a grasping body (50) shaped as a circular ring, said connecting element (42) and said appendix (41) being arranged at points of said circular ring that are separated by an angular distance from each other.
13. A method according to any one of claims 8 to 11, wherein said pouring spout (12), said closing element (15), said pull element (40) and said connecting element (42) are directly molded onto a sheet of multilayer packaging material (3) intended to form said package (100).
14. A method according to claim 13, wherein said packaging material (2) comprises at least a first layer (4) and a second layer (5a, 5b, 5c, 6), and has a hole (9) formed through said first layer (4) and sealed by a cover portion (10) of said second layer (5a, 5b, 5c, 6), said connecting element (42), said pouring spout (12), and said pull element (40) being made of plastic material molded through said cover portion (10) and said closing element (15) being made of plastic material covering said cover portion (10) and being firmly attached to said cover portion (10).
15. A method according to claim 13, wherein said packaging material (2) comprises at least a first layer (4) and a second layer (5a, 5b, 5c, 6), and has a hole (9) formed through said first layer (4) and sealed by a cover portion (10) of said second layer (5a, 5b, 5c, 6), said method further comprising the steps of molding molten plastic material onto a first side (10a) of said cover portion (10), feeding said molten plastic material along said cover portion (10) to cover said cover portion (10) on said first side (10a) to form said closing element (15), which is firmly fixed to said cover portion (10), and feeding said molten plastic material through a portion of said cover portion (10) to form said spout (12), said pull element (40) and said connecting element (42) projecting from a second side (10b), opposite said first side (10a), of said cover portion (10).

FIG 1

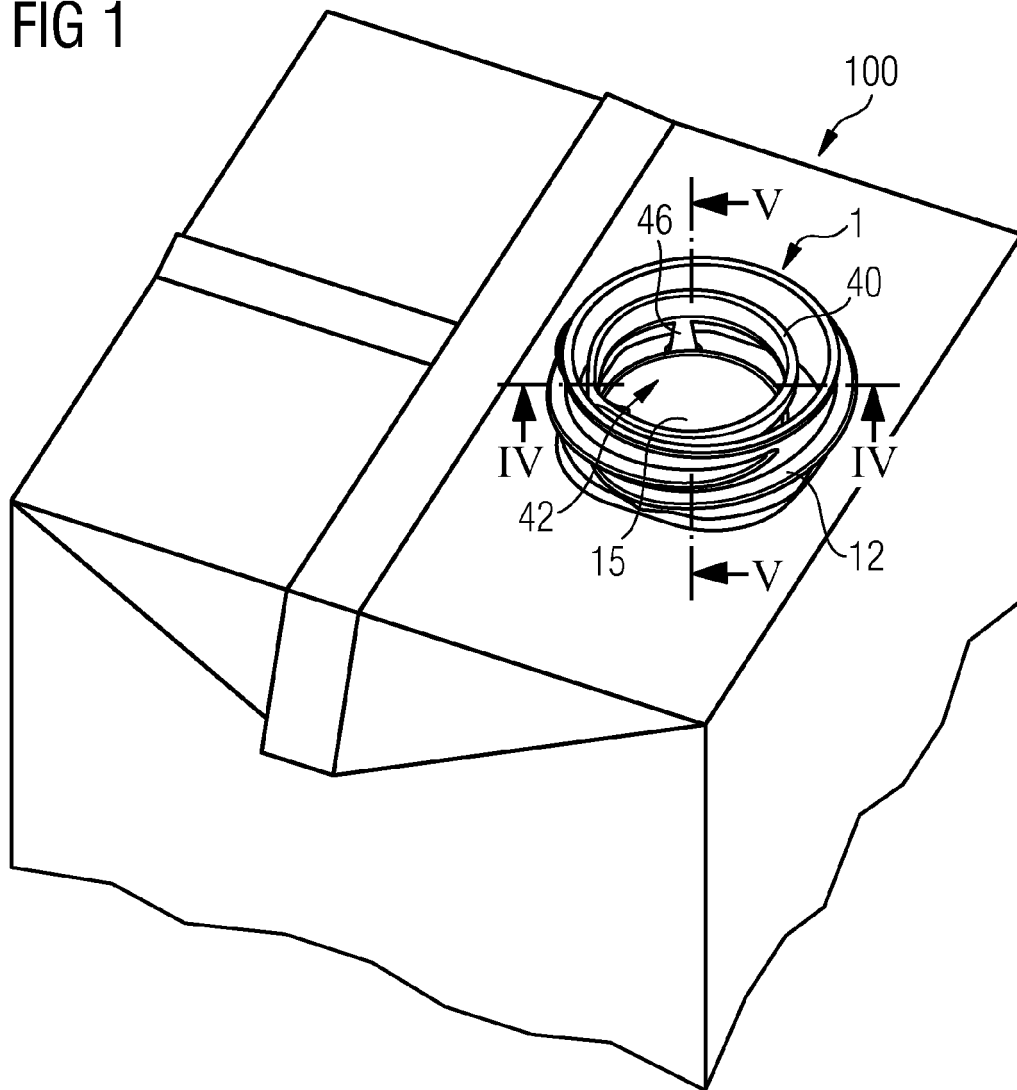


FIG 2

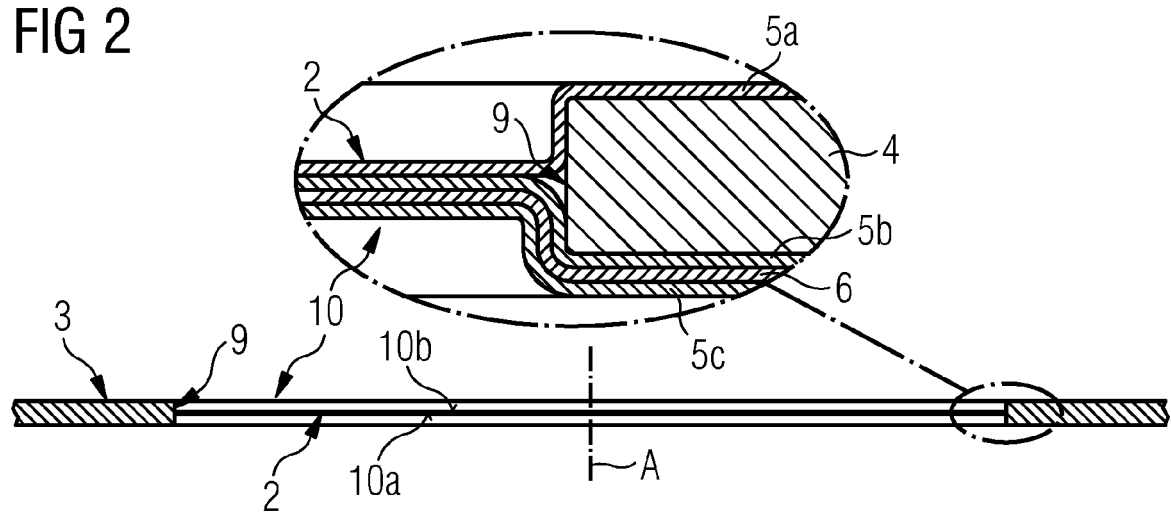
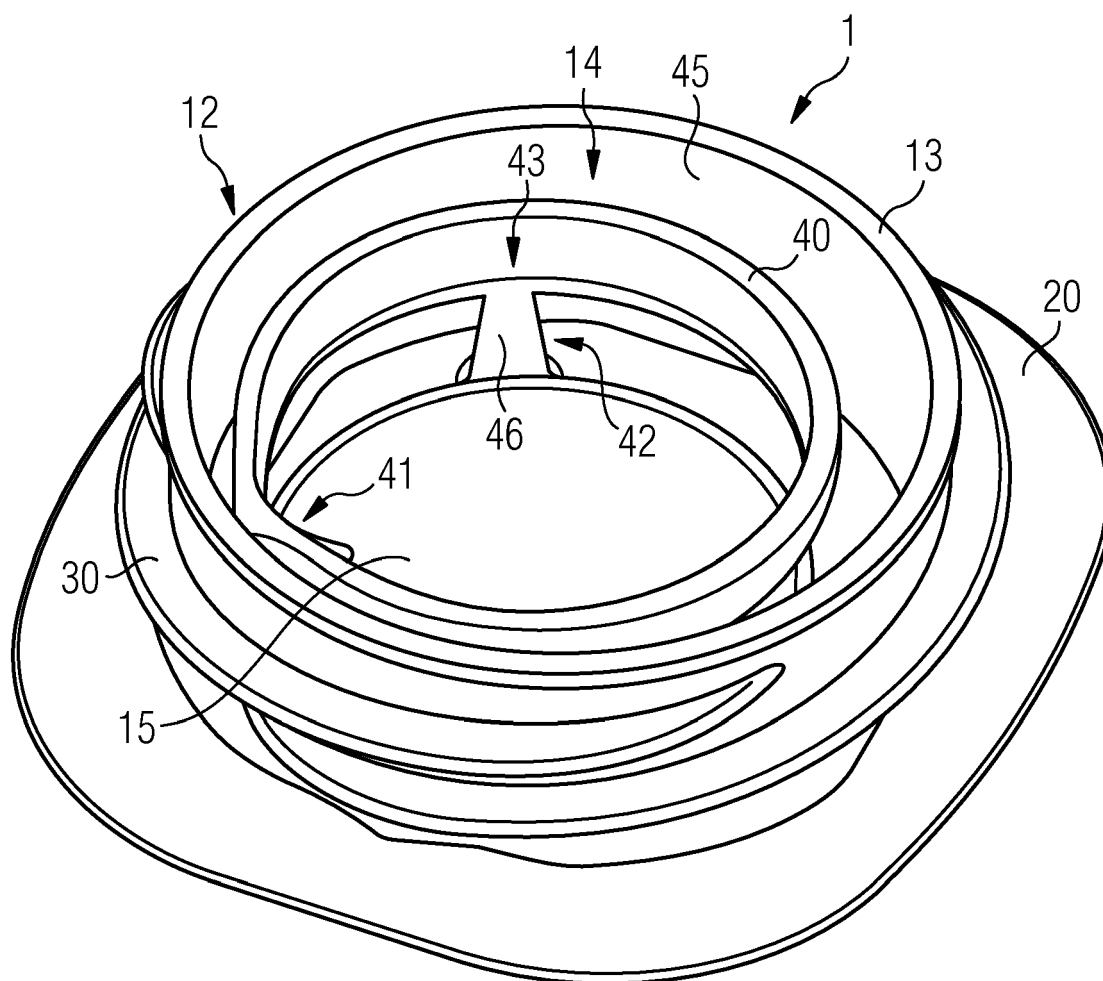


FIG 3



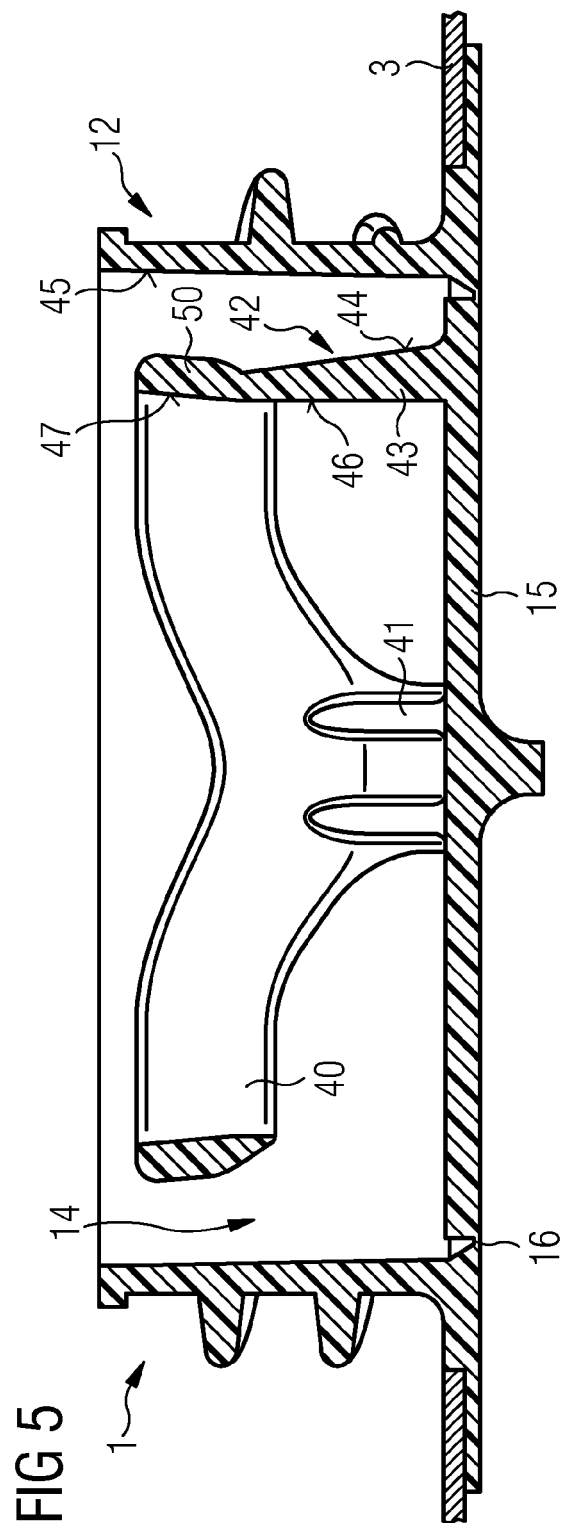
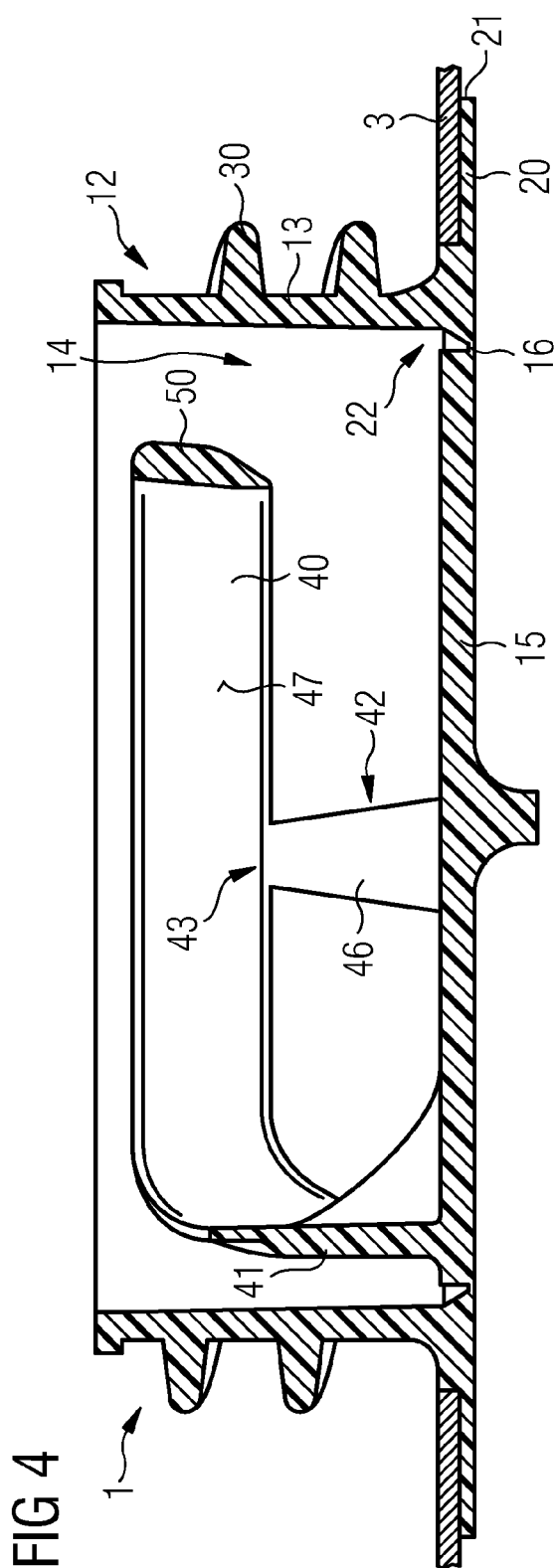


FIG 6

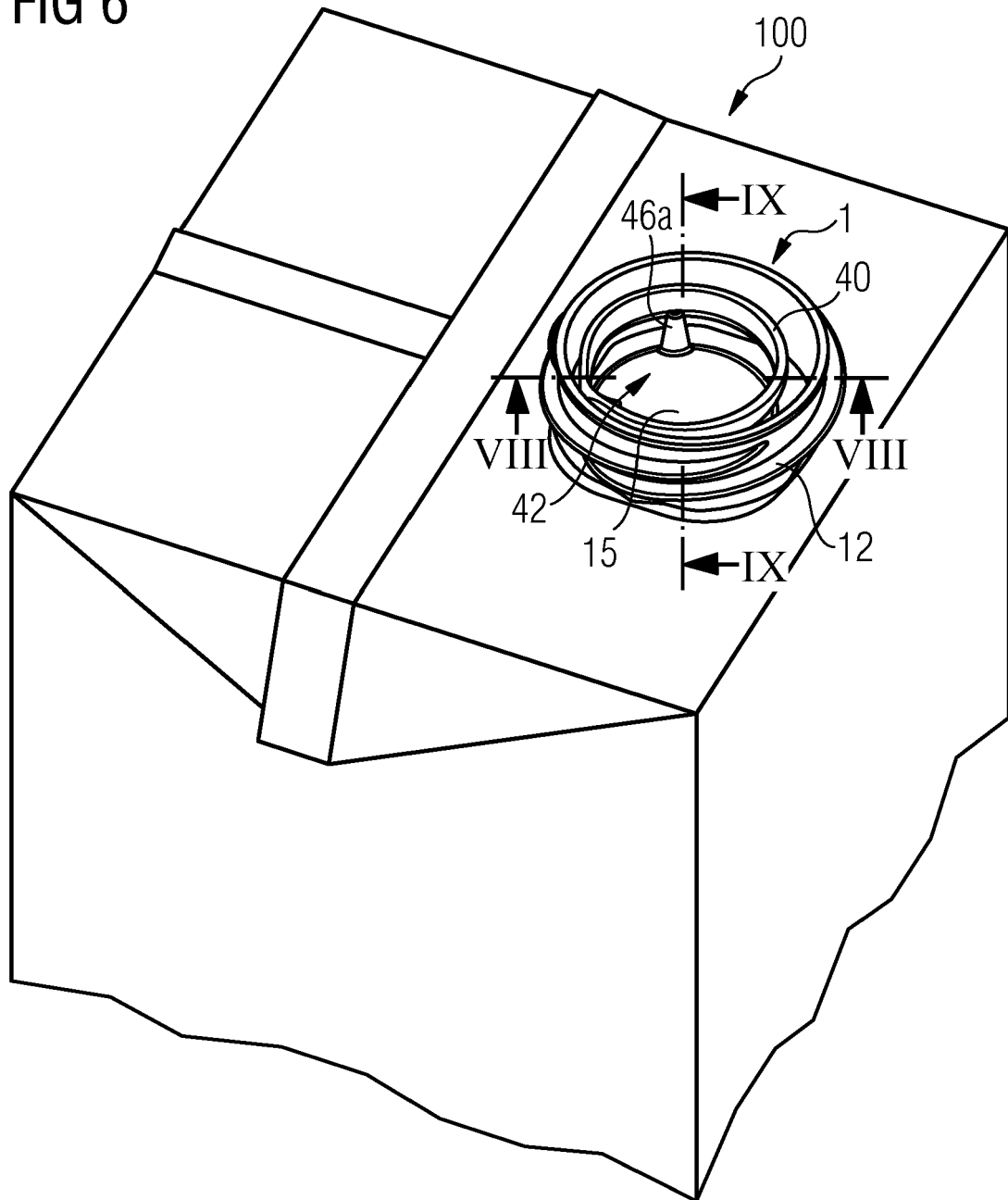


FIG 7

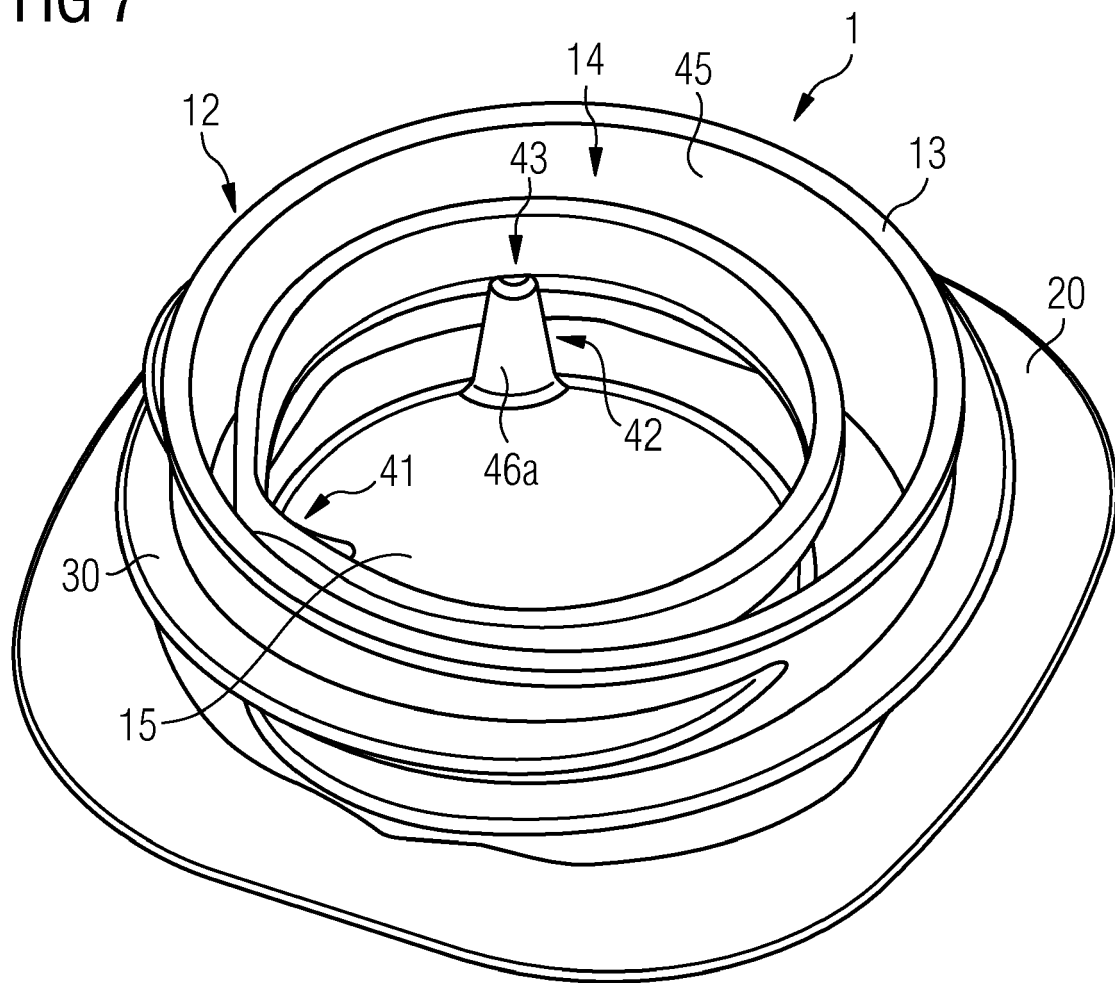


FIG 8

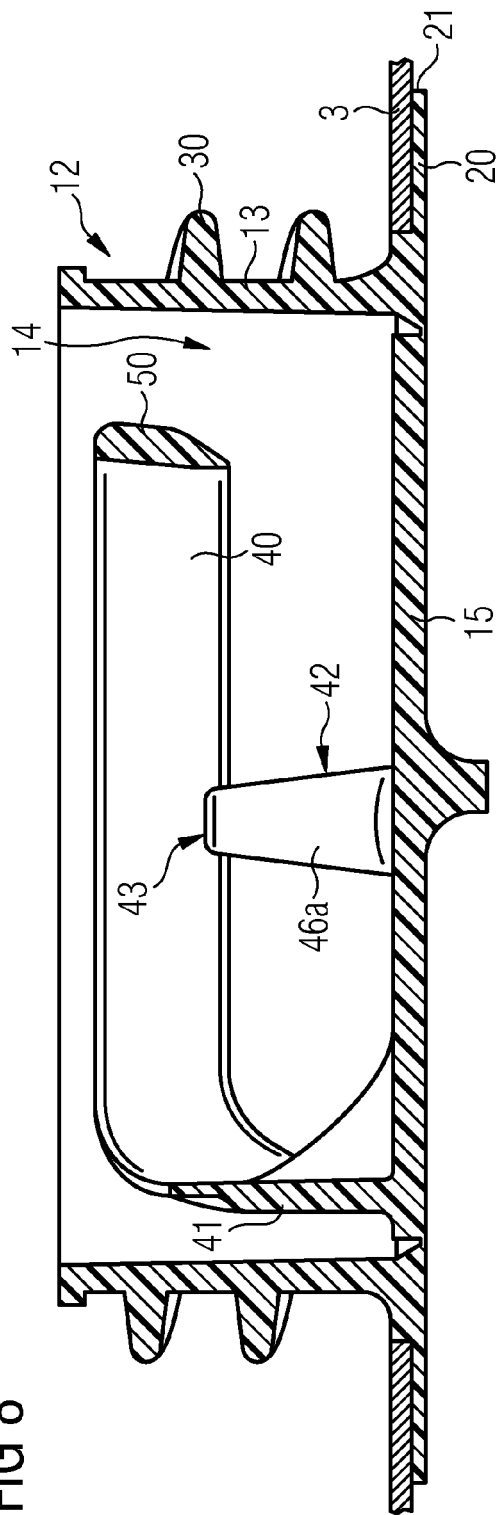
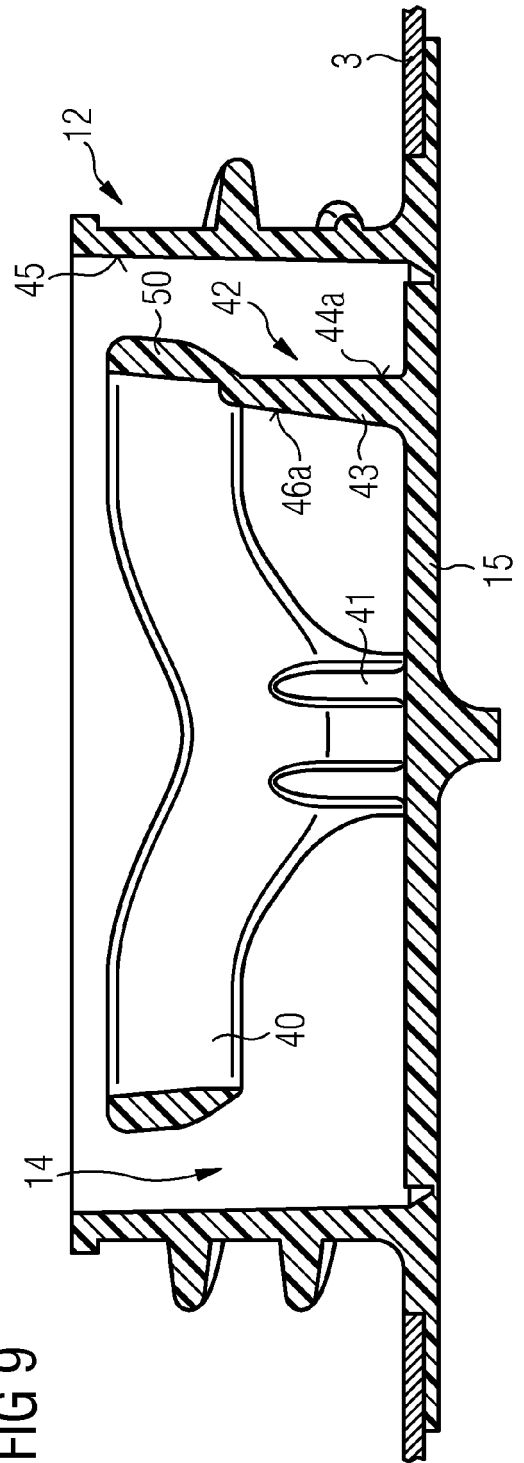


FIG 9





EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6437

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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	WO 02/40360 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]; SCHELLENBERG FRANK MARIO [DE]; S1) 23 May 2002 (2002-05-23)	1-3,5,6,8-11	INV. B65D47/10 B65D5/74
A	* page 4, paragraph 3 - page 10, paragraph 1 *	4,7,12	
	* page 11, last paragraph - page 15, paragraph 2; figures 1-3 *		
X	US 2003/071042 A1 (ADAMS BRIAN M [US]) 17 April 2003 (2003-04-17)	1-6,8-12	
Y	* paragraph [0081] - paragraph [0087]; figures 21, 22 *	7,13-15	
X	US 3 610 484 A (MATZKA JOHANN) 5 October 1971 (1971-10-05)	1-5,8	
A	* column 1, line 48 - column 2, line 29; figures 1, 4 *	6	
Y	EP 2 008 787 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 31 December 2008 (2008-12-31)	7,13-15	
	* the whole document *		
A	FR 2 380 956 A1 (RICAL SA [FR]) 15 September 1978 (1978-09-15)	1-12	
	* page 2, line 27 - line 40; figure 1 *		
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		23 March 2015	Mans-Kamerbeek, M
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 14 16 6437

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 14 16 6437

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

One-piece opening device with a frangible connecting element to keep a part from sticking out and a method of forming such device.

2. claims: 13-15

method of forming a multilayered packaging material with a directly attached opening device

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 16 6437

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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