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(54) **OPENING DEVICE FOR A PACKAGE CONTAINING A POURABLE PRODUCT**

(57) There is described an opening device (3) configured to be applied to a package (1) containing a pourable product and comprising a cap (12) configured to close an opening (11) obtained at an opening area of the package (1), wherein the opening device (3) comprises

a leash element (26) configured to movably tether the cap (12) to the package (1), wherein the leash element (26) is configured to be movably coupled to the package (1), and wherein the cap (12) and the leash element (26) are movably coupled to one another.

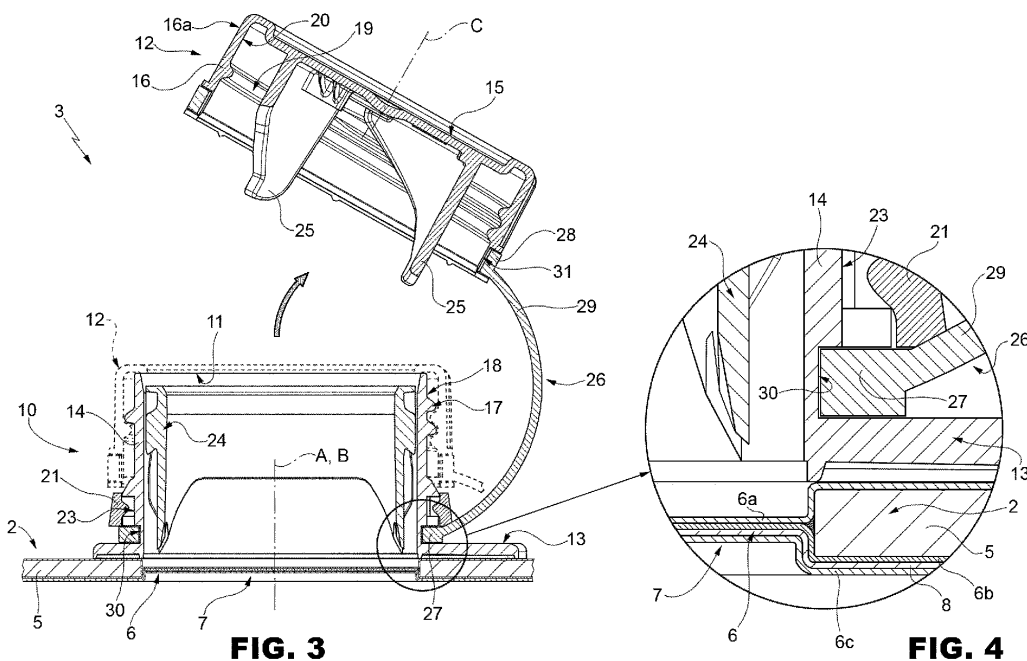


FIG. 3

FIG. 4

Description

TECHNICAL FIELD

[0001] The present invention relates to an opening device, in particular to a reclosable opening device, configured to be applied to a package containing a pourable product, preferably a pourable food product.

BACKGROUND ART

[0002] As it is generally known, many pourable food products, such as fruit juice, UHT (ultra-high temperature-treated) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

[0003] A typical example is the parallelepiped-shaped package for pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by folding and sealing a laminated sheet of packaging material.

[0004] In particular, the packaging material has a multilayer structure substantially comprising a base layer for stiffness and strength, which may be made of fibrous material, e.g. paper or mineral-filled polypropylene material, and a number of lamination layers made of heat-seal plastic material, e.g. polyethylene films, covering both sides of the base layer.

[0005] In the case of aseptic packages for long-storage products, such as UHT milk or fruit juice, the packaging material also comprises a layer of gas-barrier material, e.g. aluminum foil or ethyl vinyl alcohol (EVOH) film, which is superimposed on a layer of heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material. This latter layer of plastic material forms the inner face of the package eventually contacting the pourable food product.

[0006] Packages of this sort are normally produced on fully automatic packaging machines, in which a continuous tube is formed from the sheet of packaging material.

[0007] Furthermore, the sheet of packaging material is sterilized in the packaging machine by applying a chemical sterilization agent, which is then removed after sterilization is completed.

[0008] Subsequently, the sheet of packaging material is maintained in a closed, sterile environment and is folded and sealed longitudinally to form the tube.

[0009] In order to complete the forming operations, the tube is filled from above, by means of a pipe, with the pourable food product and is formed, sealed and subsequently cut along equally spaced transversal cross sections.

[0010] Pillow packs are obtained thereby, which have a longitudinal sealing band, a top transversal sealing band and a bottom transversal sealing band, and which are then folded mechanically to form respective finished substantially parallelepiped-shaped packages.

[0011] Alternatively, the packaging material may be cut into blanks, which are formed into packages on forming spindles, and the resulting packages are filled with the

food product and sealed. One example of such package is the so-called "gable top" package commonly known by the trade name Tetra Rex (registered trademark).

[0012] To open the packages described above, various solutions have been proposed, one of which involves the use of reclosable opening devices made of plastic material.

[0013] Opening devices of such type generally comprise:

- a frame defining an opening and fitted over a hole or a pierceable or tear-off portion in a wall of the package; and
- a cap configured to be coupled to the frame in order to close the opening.

[0014] According to a known solution, the frame is fitted over a so-called prelaminated hole, i.e. a hole formed through the base layer only and covered, by means of a lamination process, by the other lamination layers of the packaging material, including the layer of gas-barrier material.

[0015] In other words, the frame is fitted, typically glued, onto the pierceable portion of the prelaminated hole, which is made of such lamination layers.

[0016] According to an alternative solution, the pierceable portion may be defined by a patch attached to the packaging material to close a hole formed, in this case, through the full thickness of the packaging material.

[0017] Threaded opening devices are known, in which the frame typically comprises an externally threaded, substantially cylindrical-shaped collar, whereas the cap comprises an internal thread and is initially screwed to the collar. Furthermore, the cap is normally injection-molded integrally with a relative tamper-evidence ring, which is coaxially connected to the cap itself by means of a plurality of breakable bridges and which is destined to remain fitted to the collar once the bridges are broken and the cap is unscrewed.

[0018] It is known in the field that, after unsealing the cap, i.e. after detaching the cap from the tamper-evidence ring and unscrewing the cap from the frame by applying torque, the user must also remove (i.e. cut or tear) the pierceable portion covering the prelaminated hole, in order to access the inside of the package.

[0019] For this purpose, according to a known configuration, the opening device comprises a pull-off tongue coupled to the pierceable portion and configured to be pulled by the user, once the cap has been unscrewed from the frame.

[0020] According to an alternative solution, the known opening devices comprise a substantially tubular cutting member screwed inside the collar and having an edge with a number of substantially triangular end teeth, which cooperate with and partly detach the pierceable portion from the relative wall, preferably with the exception of a small-angle portion, so as to avoid the torn pierceable portion to fall into the inside of the package after cutting.

[0021] More precisely, the cutting member is activated by the cap by means of a one-way ratchet-type transmission means, operated during disengagement of the cap from the collar. In detail, the cutting member is movable along a spiral path with respect to the frame, from a raised rest position, in which the end teeth face the pierceable portion, into successive lowered cutting positions, in which the end teeth interact with the pierceable portion, thereby cutting the pierceable portion.

[0022] It is known in the field the constantly growing need for reducing the environmental impact that comes along with packaging and bottling of foodstuff and non-foodstuff products. In particular, due care must be taken with regard to the plastic components of the packages, which can pollute aquatic and terrestrial environments.

DISCLOSURE OF INVENTION

[0023] It is therefore an object of the present invention to provide an opening device for a package containing a pourable product, which is designed to meet the above-mentioned need in a straightforward and low-cost manner.

[0024] This object is achieved by an opening device as claimed in claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] A non-limiting embodiment 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 top portion of a sealed package for containing pourable products, onto which an opening device according to the present invention is fitted;

Figure 2 is a perspective view of the package of Figure 1 showing the opening device of Figure 1 in a different operating condition;

Figure 3 is a larger-scale, partially sectioned side view of the opening device and package of Figure 1, with parts removed for clarity; and

Figure 4 is a larger-scale sectioned side view, with parts removed for clarity, of a detail of the opening device and package of Figure 3.

BEST MODE FOR CARRYING OUT THE INVENTION

[0026] With reference to Figure 1, number 1 indicates as a whole a package made of a multilayer sheet of packaging material 2, adapted to contain a pourable product, and having a wall, in particular a top wall 4, onto which an opening device 3, preferably made of plastic material, is fitted.

[0027] In particular, package 1 is adapted to contain a pourable food product, such as milk, water, fruit juice or the like.

[0028] In the example shown, opening device 3 is fitted

to an opening area of package 1 by conventional fixing means, such as adhesive substances, e.g. glue, or by means of welding systems, e.g. laser welding or micro-flame welding.

[0029] With reference to Figures 3 and 4, packaging material 2 comprises a base layer 5 for providing stiffness and strength, which may be made of fibrous material, e.g. paper or mineral-filled polypropylene material, and a cover layer arrangement 6.

[0030] In detail, cover layer arrangement 6 comprises a first covering layer 6a and a second covering layer 6b, both made of heat-seal plastic material, e.g. polyethylene film, and covering both sides of base layer 5.

[0031] Packaging material 2 comprises, at top wall 4 of package 1, a pierceable portion 7 which is covered externally, in use, by opening device 3 and which is configured to be detached, at least partially, from top wall 4 in order to allow the pourable product to exit package 1.

[0032] In one embodiment, pierceable portion 7 defines the opening area to which opening device 3 is fitted.

[0033] In another embodiment not shown, opening area may be a through hole made in the packaging material 2, in particular in the portion of packaging material 2 forming top wall 4.

[0034] In the present case, package 1 is an aseptic package for long-storage food products; accordingly, cover layer arrangement 6 also comprises a barrier layer 8 made of gas-barrier material, e.g. aluminum foil or ethyl vinyl alcohol (EVOH) film, which is superimposed on the second covering layer 6b and is in turn covered with a third covering layer 6c of cover layer arrangement 6, made of heat-seal plastic material.

[0035] In particular, third covering layer 6c forms the inner face of package 1 eventually containing the pourable food product.

[0036] In other words, first covering layer 6a, second covering layer 6b, barrier layer 8 and third covering layer 6c define lamination layers applied, by a lamination process, to base layer 5 when producing packaging material 2 in the form of a continuous sheet, before cutting and folding it to form package 1.

[0037] Pierceable portion 7 is defined by a through hole formed only through base layer 5 and covered by first covering layer 6a, second covering layer 6b, barrier layer 8 and third covering layer 6c.

[0038] In practice, pierceable portion 7 is made of the above-mentioned lamination layers and closes the through hole formed in base layer 5.

[0039] Preferably, pierceable portion 7 is an integral part of cover layer arrangement 6.

[0040] According to an alternative embodiment not shown, pierceable portion 7 may be made of only one or more of first covering layer 6a, second covering layer 6b, barrier layer 8 and third covering layer 6c. For example, pierceable portion 7 may be made solely of barrier layer 8.

[0041] In a further alternative embodiment not shown, pierceable portion 7 may be defined by a patch attached to packaging material 2 to cover a hole formed, in this

case, through the full thickness of packaging material 2.

[0042] Pierceable portion 7 has an axis A, preferably orthogonal relative to top wall 4, in particular vertical when package 1 stands on a bottom wall (not shown and substantially parallel to top wall 4).

[0043] According to the non-limiting example shown, pierceable portion 7 has a substantially circular shape concentric to axis A.

[0044] With reference to Figures 1 to 4, opening device 3 comprises:

- a frame 10 defining an opening 11 through which the pourable product is poured, in use, and fitted about pierceable portion 7, onto top wall 4 of package 1; and
- a cap 12 configured to cooperate in contact with frame 10 to close opening 11.

[0045] In detail, opening 11 is arranged coaxially to axis A and cap 12 is configured to engage frame 10 coaxially to axis A to close opening 11.

[0046] More specifically, frame 10 comprises a base plate 13, preferably flat, configured to be attached to package 1 substantially parallel to top wall 4 and surrounding pierceable portion 7, and a cylindrical collar 14 projecting transversally, in particular orthogonally, from base plate 13, having a longitudinal axis B coaxial, in use, to axis A and defining opening 11 at one end portion thereof opposite to base plate 13.

[0047] Cap 12 comprises a substantially flat circular portion 15 and a cylindrical portion 16, which projects from flat portion 15 along a longitudinal axis C of cap 12 itself and which is configured to coaxially engage collar 14 in order to close opening 11.

[0048] For this purpose, collar 14 is provided with an outer thread 17 extending onto an external lateral surface 18 of collar 14 itself, and cap 12 is provided with an inner thread 19 extending onto an internal lateral surface 20 of cylindrical portion 16.

[0049] In detail, outer thread 17 and inner thread 19 are configured to mutually engage so as to determine, in use and under the action of the user, unscrewing and screwing of cap 12 relative to frame 10, and therefore collar 14, thereby causing opening and closing of opening 11.

[0050] Opening device 3 further comprises tamper-evidence means, in particular a tamper-evidence ring 21 formed integrally with cap 12 and initially connected coaxially to an edge 22 of cap 12 by means of a number of breakable connecting bridges.

[0051] In detail, cap 12 is fitted initially to frame 10 in a closed position, in which cap 12 is screwed completely onto collar 14, with edge 22 and tamper-evidence ring 21 still connected to one another.

[0052] In greater detail, collar 14 comprises a groove 23 engaged by tamper-evidence ring 21 and configured to retain tamper-evidence ring 21 after unscrewing of cap 12.

[0053] According to one embodiment, blocking means are provided which prevent the rotation of tamper-evidence ring 21 with respect to collar 14.

[0054] According to an alternative embodiment, tamper-evidence ring 21 is rotatably fitted to collar 14 - i.e. it is freely rotatable with respect to collar 14.

[0055] Once unsealed, cap 12 is moveable between:

- an open position, in which cap 12 is unscrewed off collar 14 and detached from frame 10; and
- the closed position, in which cap 12 is screwed again on collar 14 thereby closing opening 11.

[0056] During first disengagement of cap 12 from collar 14, that is during first movement of cap 12 from its closed position to its open position, the connecting bridges initially connecting tamper-evidence ring 21 and cap 12 are broken.

[0057] More specifically, after the first disengagement of cap 12 from collar 14, tamper-evidence ring 21 remains engaged into groove 23.

[0058] According to this non-limiting embodiment shown, opening device 3 further comprises a known tubular cutting member 24 which engages collar 14 axially and in a movable manner and is activated by cap 12 to interact with pierceable portion 7 to open package 1.

[0059] In detail, cutting member 24 is provided with cutting means (known per se and not described in detail) and is connected to collar 14 by means of a guiding arrangement such as thread elements or cam elements (also known per se and not described in detail) and is configured to move between a raised resting position and a lowered opening position, during first disengagement of cap 12 from collar 14.

[0060] In greater detail, in the raised resting position, cutting member 24 is entirely housed within collar 14, with the cutting means facing pierceable portion 7; in the lowered position, cutting member 24 projects axially from collar 14 to cut, penetrate and tear off pierceable portion 7 in a known manner, thereby allowing a fluid connection between the inside of package 1 and opening 11.

[0061] Displacement of cutting member 24 is controlled via a one-way angular transmission device 25 carried by cap 12, in particular fitted to flat portion 15, in a manner known and not described in detail.

[0062] In an alternative embodiment not shown, opening device 3 comprises a pull-off tongue coupled to pierceable portion 7 and configured to be pulled by the user, once cap 12 has been unscrewed from collar 14, in order to manually tear off pierceable portion 7.

[0063] According to an important aspect of the present invention, opening device 3 comprises a leash element 26 movably tethering, i.e. binding, cap 12 to frame 10.

[0064] Leash element 26 is so configured as to allow cap 12 to be unscrewed from collar 14 and to prevent cap 12 from being detached (and in particular disposed of separately) from frame 10, i.e. from package 1.

[0065] In detail, leash element 26 comprises a first loop

portion 27, a second loop portion 28 and a connecting portion 29 binding first loop portion 27 and second loop portion 28 to one another.

[0066] In greater detail, first loop portion 27 and second loop portion 28 are formed integrally with connecting portion 29 and protrude from respective opposite ends of connecting portion 29.

[0067] As visible in Figures 1 to 3, first loop portion 27 is movably coupled to frame 10, whereas cap 12 is movably coupled to second loop portion 28; in this way, leash element 26 binds cap 12 to frame 10, as stated above.

[0068] For this purpose, frame 10, in particular collar 14, has, on external surface 18, a groove 30 movably engaged by first loop portion 27; and cap 12, in particular cylindrical portion 16 has, on an external surface 16a thereof, a groove 31 movably engaged by second loop portion 28 (Figure 3).

[0069] More specifically, groove 30 is defined by a radial recess extending circumferentially around axis B onto external surface 18. Similarly, groove 31 is defined by a radial recess extending circumferentially around axis C onto external surface 16a.

[0070] Accordingly, first loop portion 27 has a substantially circular configuration and engages groove 30 coaxially to axis B. Similarly, second loop portion 28 has a substantially circular configuration and engages groove 31 coaxially to axis C.

[0071] Hence, first loop portion 27 rotatably engages groove 30 and second loop portion 28 rotatably engages groove 31.

[0072] In this way, leash element 26 binds cap 12 to frame 10 and, at the same time, does not prevent, i.e. allows, the rotation of cap 12 relatively to second loop portion 28 and the rotation of first loop portion 27, and therefore of the whole leash element 26, relatively to frame 10 and collar 14.

[0073] In view of the above, leash element 26 defines a region of maximum distance of cap 12 from frame 10, within which cap 12 can be moved away from and towards frame 10.

[0074] It is specified that the terms "binding" and "tethering" are intended to express the above-stated concept.

[0075] In the non-limiting example shown, groove 30 has an axial width, relative to axis B, substantially equal to that of first loop portion 27, thereby preventing, in use, an axial movement of first loop portion 27 relative to collar 14.

[0076] Similarly, groove 31 has an axial width, relative to axis C, substantially equal to that of second loop portion 28, thereby preventing, in use, an axial movement of second loop portion 28 relative to cylindrical portion 16 of cap 12.

[0077] In this way, leash element 26 is axially secured to frame 10 and its movement is limited to the rotation about axis B. In the same way, cap 12 is axially secured to leash element 26 and its movement is limited to the rotation about axis C.

[0078] As visible in particular in Figure 3, groove 30 is

axially spaced from thread 17 of collar 14. In particular, thread 17 is axially closer to opening 11 than groove 30. More in particular, groove 30 is arranged in a position axially more distant from opening 11 than groove 23.

[0079] In detail, groove 30 is arranged below groove 23.

[0080] In this way, there is no need for design modifications and adaptations of internal surface 20 of cap 12.

[0081] The operation of opening device 3 is described hereinafter with reference to Figure 1 and 2 and starting from a condition in which cap 12 is still screwed on frame 10.

[0082] Starting from this condition, to open package 1, the user unscrews cap 12, thereby causing the connecting bridges of tamper-evidence ring 21 to break and the activation of cutting member 24, which determines the tearing of pierceable portion 7.

[0083] The action of unscrewing displaces cap 12 from its closed position to its open position.

[0084] During the displacement of cap 12 from the closed position (Figure 1) to the open position (Figure 2), cap 12 is tethered to frame 10 by means of leash element 26, as described above.

[0085] Once the desired amount of pourable product has been poured through opening 11, the user can close opening 11 by screwing again cap 12 on collar 14.

[0086] The advantages of opening device 3 according to the present invention will be clear from the foregoing description.

[0087] In particular, thanks to the presence of leash element 26, cap 12 is firmly tethered to frame 10 and the risk of dispersing cap 12 in the environment after use of package 1 is consistently reduced, thereby preventing plastic pollution of the environment deriving from packages 1 of the above-mentioned type.

[0088] In addition, since leash element 26 is bound to frame 10 and cap 12 in a rotatable manner, i.e. in a loose way, it does not affect the normal operation and use of opening device 3, maintaining at least the same versatility of the opening devices known in the art and not provided with leash element 26, and at the same time being more environment-friendly.

[0089] Clearly, changes may be made to opening device 3 as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

[0090] In particular, frame 10 of opening device 3 could be directly molded, for example by injection molding, at the opening area of package 1. In this case, a predetermined amount of molten plastic material is injected onto, and through, the pierceable portion 7 by means of a known molding device. During molding, the plastic material is forced to pierce the pierceable portion 7 from a first side thereof, due to the injection pressure and the geometry of the molding device used to form the opening device 3, so as to pass through the pierceable portion 7, and protrude from a second side of the pierceable portion 7, opposite to the first side. The lamination layers forming

the pierceable portion 7 and closing the hole of the base layer 5 are first pierced through and then resealed by the plastic material forming frame 10.

[0091] In such a case, the finished package 1 is defined by the assembly comprising the filled, folded and sealed package 1 and the frame 10 which has been injection molded on the top wall 4 of package 1, in particular at the opening area thereof. In other words, frame 10 can be regarded as part of both package 1 and opening device 3.

Claims

1. An opening device (3) configured to be applied to a package (1) containing a pourable product; said opening device (3) comprising a cap (12) configured to close an opening (11) obtainable at an opening area of said package (1);
characterized by comprising a leash element (26) configured to movably tether said cap (12) to said package (1);
wherein said leash element (26) is configured to be movably coupled to said package (1);
and wherein said cap (12) and said leash element (26) are movably coupled to one another.
2. The opening device as claimed in claim 1, wherein said leash element (26) comprises a first loop portion (27) and a second loop portion (28), and a connecting portion (29) binding said first loop portion (27) and second loop portion (28) to one another.
3. The opening device as claimed in claim 2, wherein said first loop portion (27) is configured to be movably coupled to said package (1); and wherein said cap (12) is movably coupled to said second loop portion (28).
4. The opening device as claimed in claim 1, and comprising a frame (10) defining said opening (11) and fittable about said opening area of said package (1); said cap (12) being configured to cooperate in contact with said frame (10) to close said opening (11); wherein said leash element (26) movably tethers said cap (12) to said frame (10);
and wherein said leash element (26) is movably coupled to said frame (10).
5. The opening device as claimed in claim 4, wherein said leash element (26) comprises a first loop portion (27) and a second loop portion (28), and a connecting portion (29) binding said first loop portion (27) and second loop portion (28) to one another;
and wherein said first loop portion (27) is movably coupled to said frame (10) and said cap (12) is movably coupled to said second loop portion (28).
6. The opening device as claimed in claim 5, wherein said frame (10) has a first groove (30) movably engaged by said first loop portion (27) and said cap (12) has a second groove (31) movably engaged by said second loop portion (28).
7. The opening device as claimed in claim 6, wherein said frame (10) comprises a cylindrical collar (14) having a first longitudinal axis (B) and defining said opening (11), said opening (11) being coaxial to said first longitudinal axis (B);
said cap (12) comprising a cylindrical portion (16) having a second longitudinal axis (C) and configured to coaxially engage said collar (14) in order to close said opening (11);
wherein said first groove (30) is obtained on said collar (14), and wherein said second groove (31) is obtained on said cylindrical portion (16).
8. The opening device as claimed in claim 7, wherein said first loop portion (27) rotatably engages said first groove (30), so that said leash element (26) is rotatably coupled to said collar (14).
9. The opening device as claimed in claim 7 or 8, wherein said second loop portion (28) rotatably engages said second groove (31), so that said cap (12) is rotatably coupled to said leash element (26).
10. The opening device as claimed in any one of claims 7 to 9, wherein said first loop portion (27) is coaxial to said first longitudinal axis (B); and wherein said second loop portion (28) is coaxial to said second longitudinal axis (C).
11. The opening device as claimed in claim 10, wherein said first groove (30) has an axial width substantially equal to an axial width of said first loop portion (27), so that said first groove (30) prevents, in use, an axial movement of said first loop portion (27) relative to said collar (14).
12. The opening device as claimed in claim 10 or 11, wherein said second groove (31) has an axial width substantially equal to an axial width of said second loop portion (28), so that said second groove (31) prevents, in use, an axial movement of said second loop portion (28) relative to said cylindrical portion (16).
13. The opening device as claimed in any one of claims 7 to 12, wherein said first groove (30) is obtained onto an external surface (18) of said collar (14), and wherein said second groove (31) is obtained onto an external surface (16a) of said cylindrical portion (16).
14. The opening device as claimed in claim 13, wherein said collar (14) is provided with a first thread (17)

extending onto said external lateral surface (18); said cap (12) having, onto an internal lateral surface (20) thereof, a second thread (19) configured to engage said first thread (17);
 said first groove (30) being axially spaced from said first thread (17) onto said external lateral surface (18).

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15. The opening device as claimed in any one of claims 7 to 14, and further comprising tamper-evidence means (21) initially connected to said cap (12) by means of a number of breakable connecting bridges and detachable from said cap (12) during first disengagement of said cap (12) from said collar (14);
 said collar (14) comprising a third groove (23) engaged by said tamper-evidence means (21);
 wherein said first groove (30) is arranged in a position axially more distant from said opening (11) than said third groove (23).

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16. The opening device as claimed in any one of the foregoing claims, wherein said opening area defines an opening portion (7) of said package (1);
 said opening device (3) comprising a cutting member (24) configured to engage said opening (11) in a movable manner, and configured to cooperate in contact with said opening portion (7) to open said package (1).

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17. A package (1) containing a pourable product and obtained from a sheet of packaging material (2) having an opening portion (7);
 said package (1) comprising an opening device (3) as claimed in any one of the foregoing claims and fitted about said opening portion (7).

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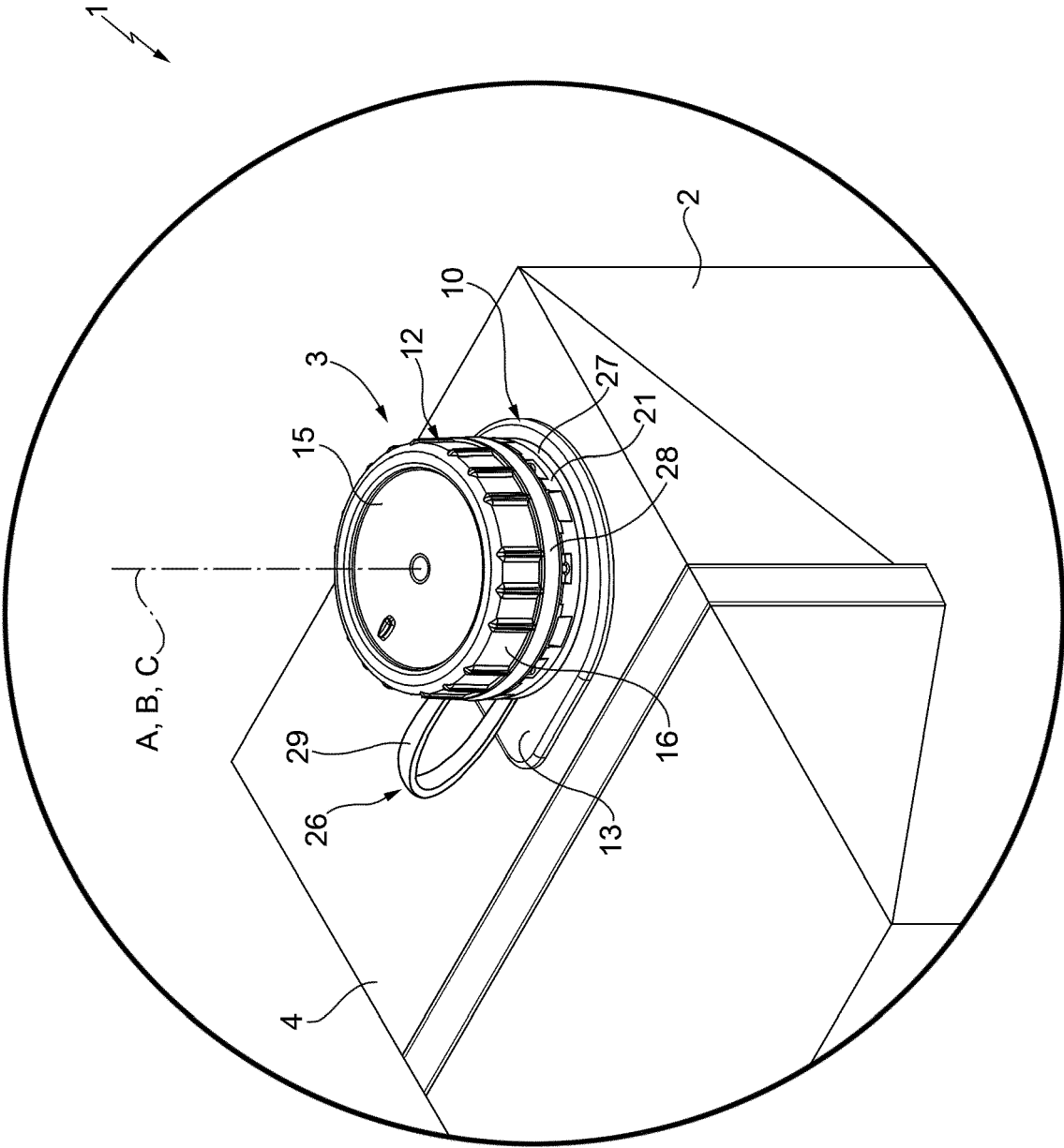


FIG. 1

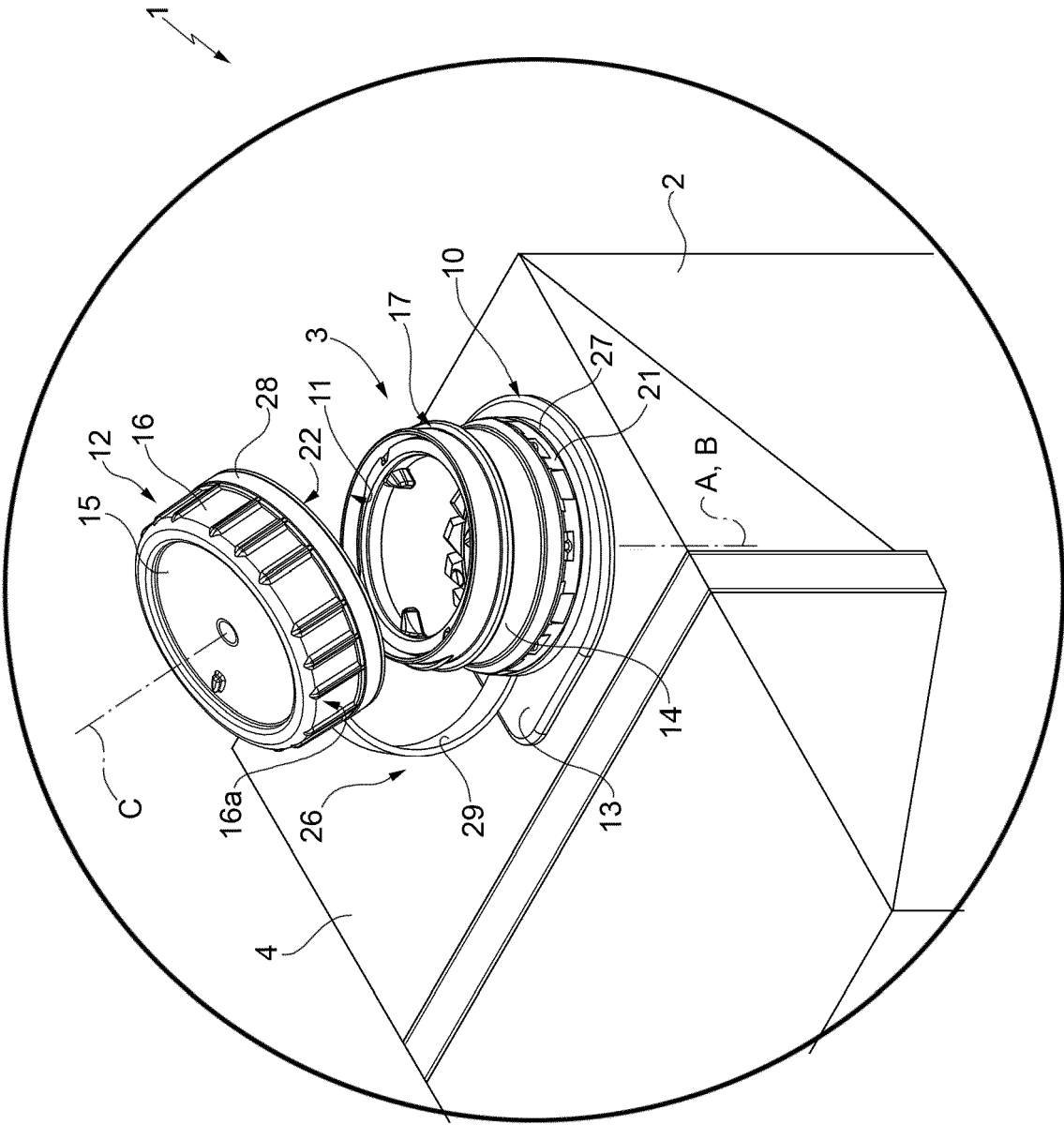


FIG. 2

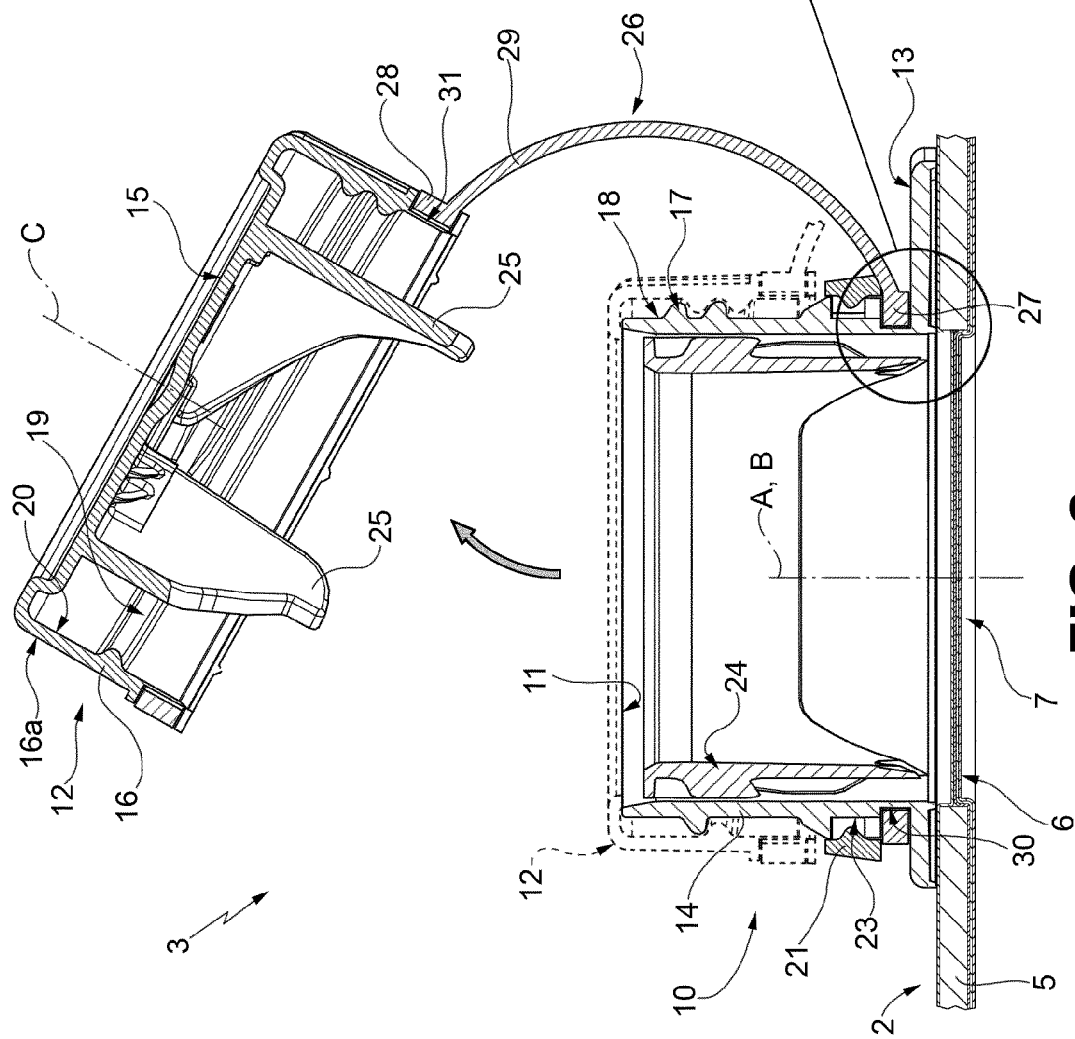


FIG. 3

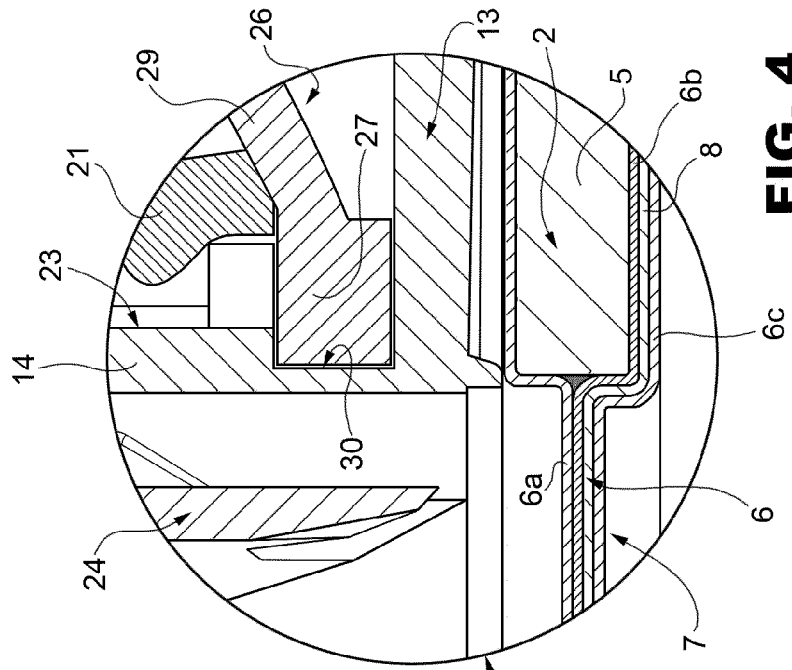


FIG. 4



EUROPEAN SEARCH REPORT

 Application Number
 EP 19 16 5226

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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	US 2017/107023 A1 (MIKSOVSKY CHRISTOPHER A [US] ET AL) 20 April 2017 (2017-04-20) * paragraphs [0001] - [0047] * * figures 1-13C *	1-14,16,17	INV. B65D5/74 B65D55/16 B65D41/34
X	FR 1 312 248 A (THOMPSON WERKE G M B H) 14 December 1962 (1962-12-14) * pages 1-3 * * figures 8-10 *	1-14,16,17	
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A	WO 2004/000667 A1 (SIG TECHNOLOGY AG) 31 December 2003 (2003-12-31) * pages 1-23 * * figures 1-22 *	1-17	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 May 2019	Examiner Duc, Emmanuel
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