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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; the opening device (3) comprises:
- a cap assembly (12a) comprising a cap (12) configured to close a passage (11) for said pourable product obtainable at an opening area of the package (1); and
- tamper-evidence means (21) configured to be fitted to the package (1) and initially connected to the cap assembly (12a) by means of a number of breakable connecting bridges configured to break during first opening of the opening device (3);
wherein said cap assembly (12a) comprises a connection element (26) permanently connecting the cap (12) to the tamper-evidence means (21), so as to tether the cap (12) to the package (1).

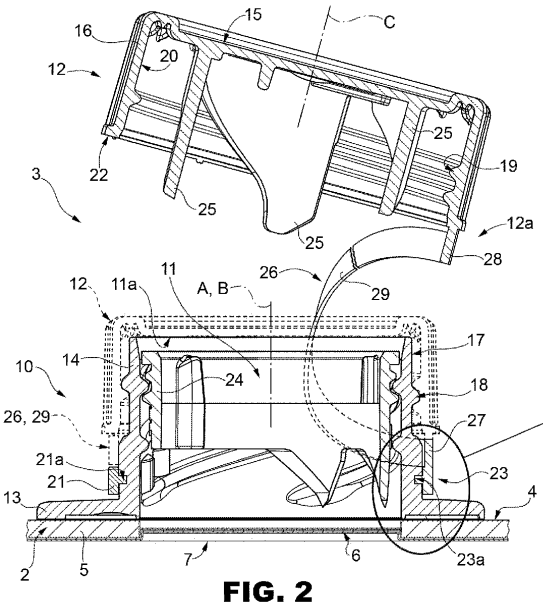

FIG. 2

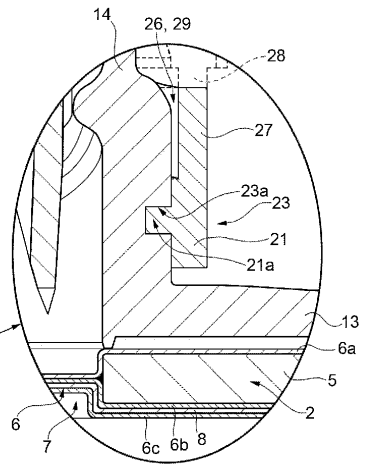

FIG. 3

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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 configured 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 torn 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 of the frame. 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 larger-scale, partially sectioned side view of the opening device and package of Figure 1, with parts removed for clarity; and

Figure 3 is a larger-scale sectioned side view, with parts removed for clarity, of a detail of the opening device and package of Figure 2.

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 2 and 3, 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] As visible in Figures 1 and 2, 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 and 2, opening device 3 comprises:

- a frame 10 defining a passage 11 for the pourable product ending with an opening 11a 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 assembly 12a comprising a cap 12 configured to cooperate in contact with frame 10 to close passage 11 and opening 11a.

[0045] In detail, opening 11a is arranged coaxially to axis A and cap 12 is configured to engage frame 10 coaxially to axis A to close passage 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, and having a longitudinal axis B coaxial, in use, to axis A. In particular, collar 14 coaxially defines passage 11. Hence, opening 11a is arranged coaxially also to axis B.

[0047] In greater detail, opening 11a is arranged at an axial end of collar 14, and therefore of passage 11, opposite to top wall 4.

[0048] 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 passage 11 and opening 11a.

[0049] 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.

[0050] 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 passage 11.

[0051] Opening device 3 further comprises tamper-evidence means, in particular a tamper-evidence ring 21, preferably formed integrally with cap assembly 12a, for example injection-molded together with cap assembly 12a, and initially connected coaxially to cap assembly 12a at least by means of a number of breakable connecting bridges.

[0052] In detail, cap assembly 12a is fitted initially to frame 10 in a closed position, in which cap 12 is screwed completely onto collar 14; in this condition, cap assembly 12a and tamper-evidence ring 21 are still connected to one another. Then, during first disengagement of cap 12 from collar 14, the connecting bridges are configured to break apart, thereby freeing cap assembly 12a from frame 10.

[0053] Tamper-evidence ring 21 is fitted to frame 10, in particular fitted around collar 14 coaxially to axis B.

[0054] More specifically, collar 14 comprises an engagement portion 23 configured to be engaged by tamper-evidence ring 21 and configured to retain tamper-evidence ring 21 during and after first unscrewing of cap 12.

[0055] In detail, the axial distance of engagement portion 23 from opening 11a is greater than the axial distance of outer thread 17 from opening 11a.

[0056] Hence, once cap assembly 12a has been fitted to frame 10, the axial distance of tamper-evidence ring 21 from opening 11a is greater than the axial distance of outer thread 17 from opening 11a.

[0057] In other words, tamper-evidence ring 21 is arranged beneath outer thread 17 of collar 14.

[0058] Preferably, tamper-evidence ring 21 is angularly fixed relatively to axis B in the screwing direction of cap 12 and is rotatable about axis B in the unscrewing direction of cap 12.

[0059] In other words, tamper-evidence ring 21 is rotatable in the closing direction of cap 12 relatively to collar 14 and angularly fixed relatively to axis B in the opening direction of cap 12 relatively to collar 14.

[0060] For this purpose, as visible in particular in Figures 2 and 3, engagement portion 23 comprises a number of recesses 23a configured to be engaged by corresponding protrusions 21a of tamper-evidence ring 21.

[0061] In particular, recesses 23a are distributed circumferentially onto external lateral surface 18 of collar 14, relatively to axis B, and protrusions 21a are distributed onto an internal lateral surface of tamper-evidence ring 21 facing external lateral surface 18.

[0062] During fitting of cap assembly 12a onto frame 10, tamper-evidence ring 21 is fitted to collar 14 so that protrusions 21a face recesses 23a, thereby engaging corresponding recesses 23a.

[0063] More precisely, each recess 23a acts as rotational and axial stop for the respective protrusion 21a, thereby preventing the angular motion, i.e. the rotation, of tamper-evidence ring 21 with respect to axis B, only in the above-mentioned unscrewing direction (opening direction).

[0064] It is hereby stated that recesses 23a could allow a minor angular motion of tamper-evidence ring 21 with respect to axis B in the opening direction, for example due to manufacturing tolerances.

[0065] According to an alternative embodiment not shown, tamper-evidence ring 21 is rotatably fitted to collar 14 with respect to both opening direction and closing direction - i.e. it is freely rotatable in both directions with

respect to collar 14.

[0066] According to a further alternative embodiment not shown, tamper-evidence ring 21 is angularly fixed with respect to axis B in both opening direction and closing direction.

[0067] Once unsealed, cap 12 is moveable between:

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

[0068] As stated above, 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 assembly 12a are broken.

[0069] More specifically, after the first disengagement of cap 12 from collar 14, i.e. during first opening of opening device 3, the connecting bridges break, due to the torque applied thereto by the user, thereby at least partially unconstraining cap assembly 12a from tamper-evidence ring 21 and permitting the unscrewing of cap 12 off collar 14.

[0070] 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.

[0071] 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.

[0072] 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 passage 11 (and also opening 11a).

[0073] 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.

[0074] 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.

[0075] According to an important aspect of the present invention, cap assembly 12a comprises a connection element 26 permanently connecting cap 12 to tamper-evidence ring 21, thereby tethering cap 12 to frame 10.

[0076] In particular, since tamper-evidence ring 21 is fixed to collar 14, i.e. to frame 10, through engagement portion 23, connection element 26 permanently tethers cap 12 to frame 10.

[0077] Accordingly, connection 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.

[0078] As visible in Figures 1 and 2, connection element 26 comprises a first unbreakable connection rib 27 and a second unbreakable connection rib 28, where first connection rib 27 is fitted to tamper-evidence ring 21 and second connection rib 28 is fitted to cap 12.

[0079] It is stated that the wording "unbreakable" is hereby intended to mean that such first connection rib 27 and second connection rib 28 will not break during normal operation of opening device 3, in contraposition with the breakable connecting bridges, which are destined to break during normal operation of opening device 3 (at first disengagement of cap 12 from collar 14) .

[0080] In the example shown, first connection rib 27 and second connection rib 28 are arranged at respective end portions of connection element 26.

[0081] In detail, connection element 26 comprises a flexible band 29 connecting first connection rib 27 and second connection rib 28 to one another.

[0082] Conveniently, when cap 12 is in the closed position, flexible band 29 is arranged around collar 14 coaxially to axis B.

[0083] To this end, flexible band 29 has a length such as to allow an almost complete winding of flexible band 29 coaxially around collar 14, thereby preventing connection element 26 from getting in the way and hindering normal use of opening device 3 and at the same time permitting a complete unscrewing of cap 12 off collar 14.

[0084] Accordingly, first connection rib 27 and second connection rib 28 are arranged in respective circumferential positions around collar 14 close to one another, when cap 12 is in its closed position.

[0085] In view of the above, flexible band 29 allows and follows the rotation, in particular the counterclockwise rotation, of cap 12 about axis B, during unscrewing of cap 12 off collar 14.

[0086] Correspondingly, flexible band 29 also allows the clockwise rotation of cap 12 about axis B to screw cap 12 onto collar 14.

[0087] In this way, flexible band 29 tethers cap 12 to frame 10 without interfering with the normal operation of opening device 3, i.e. with the normal unscrewing and screwing of cap 12 off/onto collar 14.

[0088] As stated above, tamper-evidence ring 21 is initially connected to cap assembly 12a by means of the breakable connecting bridges.

[0089] In particular, such connecting bridges connect tamper-evidence ring 21 to flexible band 29, in a coaxial manner.

[0090] In this way, cap assembly 12a is secured angularly to frame 10 before first disengagement of cap 12 from collar 14.

[0091] Moreover, flexible band 29 is further connected to a lower axial edge 22 of cap 12, in particular of cylindrical portion 16, at least by means of a number of additional breakable connecting bridges. Therefore, flexible band 29 is connected to tamper-evidence ring 21 and cap 12 by two respective sets of breakable connecting bridges arranged on opposite axial sides of flexible band 29.

[0092] In view of the above, connection element 26 defines a further tamper-evidence device for opening device 3.

[0093] Accordingly, after the first opening of opening device 3, i.e. after the first disengagement of cap 12 from collar 14, cap 12 is connected to flexible band 29 only by means of second connection rib 28.

[0094] Preferably, first connection rib 27 is formed integrally with tamper-evidence ring 21 and second connection rib 28 is formed integrally with cap 12.

[0095] Even more preferably, first connection rib 27 protrudes axially from tamper-evidence ring 21 and second connection rib 28 protrudes axially from axial edge 22 of cylindrical portion 16.

[0096] In addition, according to this specific example shown, first connection rib 27 and second connection rib 28 are formed integrally with flexible band 29.

[0097] Conveniently, flexible band 29 is formed integrally with cap 12, for example by injection-molding, thereby forming cap assembly 12a.

[0098] Furthermore, tamper-evidence ring 21 is formed integrally with cap assembly 12a, for example by injection-molding.

[0099] Subsequently, cap assembly 12a and tamper-evidence ring 21, which are therefore connected to one other by the above-mentioned breakable connecting bridges and by the unbreakable first connection rib 27, are fitted to frame 10. During such assembly, tamper-evidence ring 21 engages engagement portion 23 according to the manner described above.

[0100] As visible in Figures 2 and 3, the axial distance of engagement portion 23 from opening 11a is greater than the axial distance of flexible band 29 from opening 11a, when flexible band 29 is arranged coaxially around collar 14, i.e. when cap 12 is in its closed position.

[0101] In particular, flexible band 29 is arranged above engagement portion 23 when cap 12 is at its closed position.

[0102] Owing to this configuration, minor or no design modifications are required to opening device 3 to implement connection element 26 therein.

[0103] 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 closed on frame 10.

[0104] Starting from this condition, to open package 1, the user unscrews cap 12, thereby causing the connecting bridges connecting flexible band 29 to tamper-evidence ring 21 and the additional connecting bridges connecting flexible band 29 to edge 22 of cylindrical portion 16 to break and causing the activation of cutting member 24, which determines the tearing of pierceable portion 7.

[0105] The action of unscrewing displaces cap 12 from its closed position to its open position.

[0106] During the displacement of cap 12 from the closed position to the open position, cap 12 is tethered to frame 10 by means of connection element 26, as described above.

[0107] Once the desired amount of pourable product has been poured through passage 11, the user can close passage 11 by screwing again cap 12 on collar 14.

[0108] The advantages of opening device 3 according to the present invention will be clear from the foregoing description.

[0109] In particular, thanks to the presence of connection element 26 cap 12 is firmly tethered to frame 10 throughout the use of package 1 and after its disposal.

[0110] Accordingly, 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.

[0111] At the same time, the configuration of connection member 26 according to the present invention does not require cumbersome modifications to the design of existing opening devices not provided with a connection element 26 according to the invention.

[0112] 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.

[0113] In particular, cap assembly 12a could comprise further elements other than connection element 26 and cap 12.

[0114] Furthermore, 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.

[0115] 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. Therefore, in this case, connection element 26 is

fitted to cap 12 and to package 1, that is, it secures cap 12 to package 1, as frame 10 is part of package 1.

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 assembly (12a) comprising a cap (12) configured to close a passage (11) for said pourable product obtainable at an opening area of said package (1); and
   - tamper-evidence means (21) configured to be fitted to said package (1) and initially connected to said cap assembly (12a) by means of at least one breakable connecting bridge configured to break during first opening of said opening device (3);

   characterized in that said cap assembly (12a) comprises a connection element (26) permanently connecting said cap (12) to said tamper-evidence means (21), so as to tether said cap (12) to said package (1).

2. The opening device as claimed in claim 1, wherein said connection element (26) comprises a first unbreakable connection rib (27) fitted to said tamper-evidence means (21) and a second unbreakable connection rib (28) fitted to said cap (12).

3. The opening device as claimed in claim 2, wherein said second connection rib (28) is formed integrally with said cap (12).

4. The opening device as claimed in claim 2 or 3, wherein said first connection rib (27) is formed integrally with said tamper-evidence means (21).

5. The opening device as claimed in any one of claims 2 to 4, wherein said connection element (26) comprises a flexible band (29) connecting said first connection rib (27) and said second connection rib (28) to one another.

6. The opening device as claimed in claim 5, wherein said flexible band (29) is formed integrally with said first connection rib (27) and said second connection rib (28).

7. The opening device as claimed in claim 5 or 6, wherein said first connection rib (27) and said second connection rib (28) are arranged at respective end portions of said flexible band (29).

8. The opening device as claimed in any one of the claims 5 to 7, and comprising a frame (10) defining said passage (11) and being 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 passage (11);
   wherein said frame (10) comprises a cylindrical collar (14) having a first longitudinal axis (B) and coaxially defining said passage (11);
   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 passage (11);
   wherein said flexible band (29) is coaxially arranged around said collar (14), when said cap (12) is completely engaged onto said collar (14).

9. The opening device as claimed in claim 8, wherein said tamper-evidence means comprise a tamper-evidence ring (21) coaxially fitted to said collar (14).

10. The opening device as claimed in claim 9, wherein said tamper-evidence ring (21) is angularly fixed with respect to said first longitudinal axis (B).

11. The opening device as claimed in claim 9, wherein said tamper-evidence ring (21) is rotatable relatively to said first longitudinal axis (B).

12. The opening device as claimed in claim 9, wherein said tamper-evidence ring (21) is:

    - rotatable with respect to said first longitudinal axis (B) in a closing direction of said cap (12) relatively to said collar (14); and
    - angularly fixed with respect to said first longitudinal axis (B) in an opening direction of said cap (12) relatively to said collar (14).

13. The opening device as claimed in any one of claims 9 to 12, wherein said passage (11) defines an opening (11a) of said collar (14) arranged coaxially to said first longitudinal axis (B);
    wherein said tamper-evidence ring (21) is arranged in a position axially more distant from said opening (11a) than said flexible band (29), with respect to said first longitudinal axis (B).

14. The opening device as claimed in any one of claims 8 to 13 wherein said second connection rib (28) is connected to said cylindrical portion (16).

15. 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 passage (11) in a movable manner, and configured to cooperate in contact with said opening portion (7) to open said package (1).

16. 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).

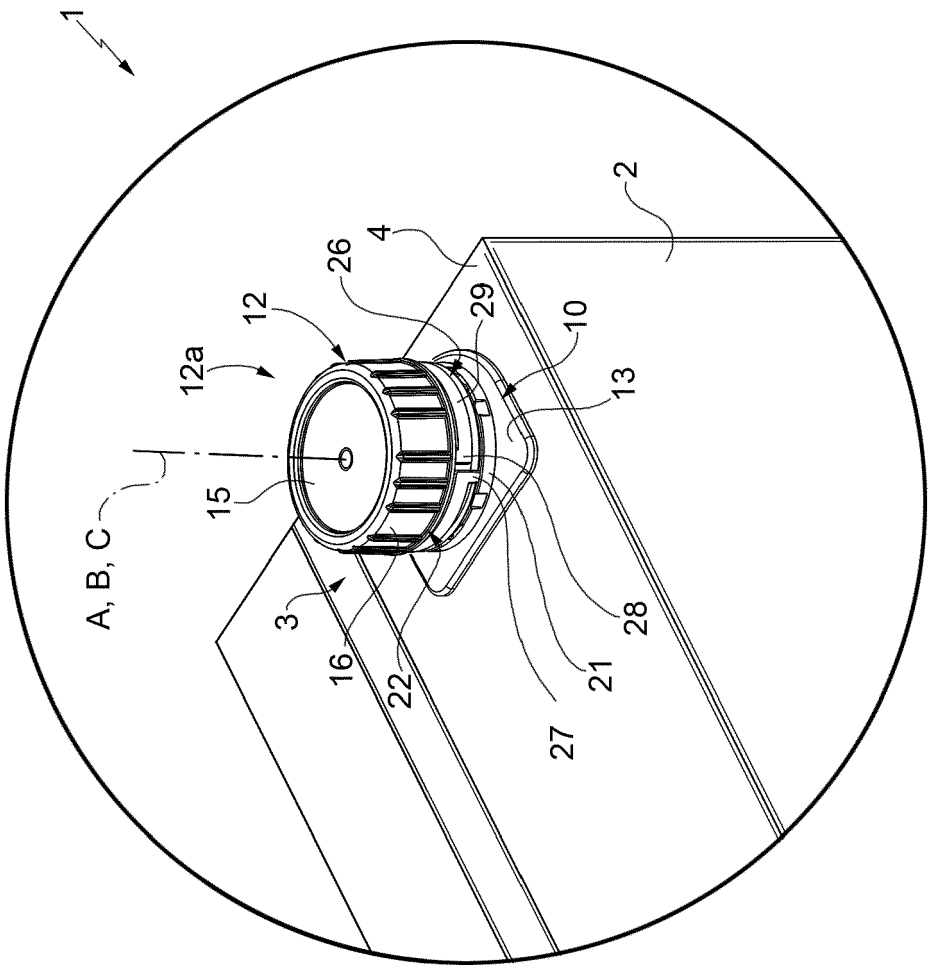

FIG. 1

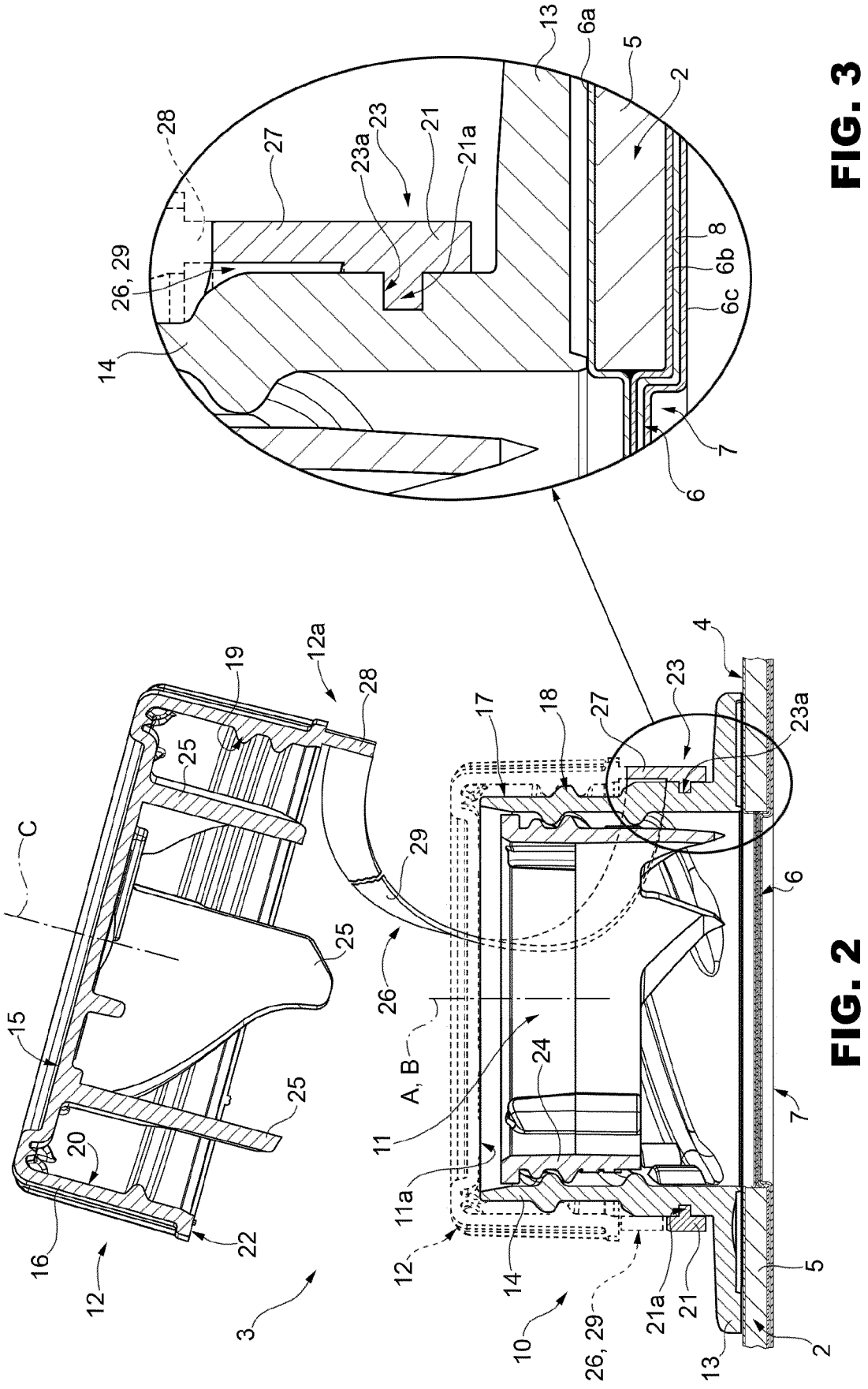
13
6a
5
2
28
27
23a
23
21
21a
8
6b
6c
26, 29
14
7
6
C
19
12a
28
25
29
17
18
27
23
4
23a
15
26
A, B
24
11
11a
12
14
10
26, 29
21a
21
13
2
5
7
6
20
16
22
12
3

FIG. 3

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 19 16 5234

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