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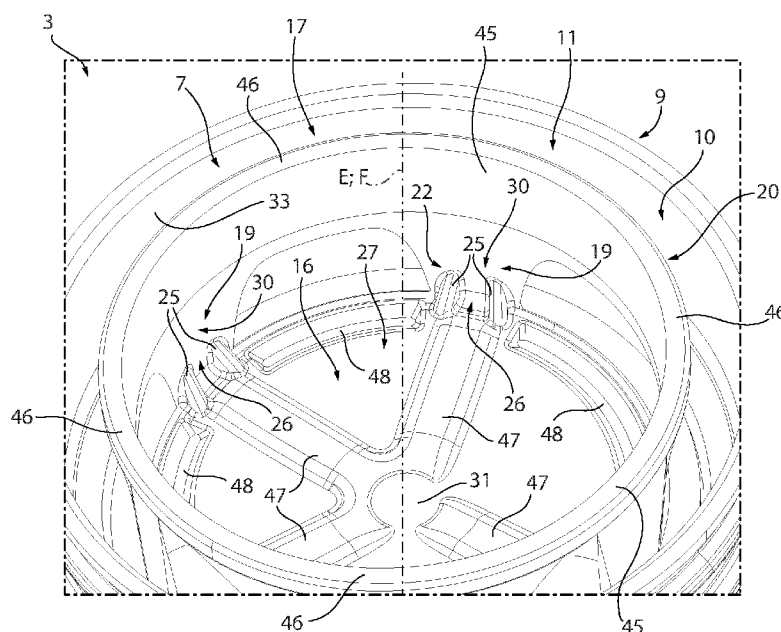


FIG. 3

(57) Abstract: There is described an opening device (3, 3') for a package (1) having a designated pour opening. The opening device (3, 3') comprises a contact portion and a closing element (7) detachably and/or rupturably attached to the contact portion. The closing element (7) comprises a main wall (16) detachably and/or rupturably attached to the contact portion and a pulling device (17) connected to the main wall (16) and configured to allow for the exertion of a separation force on the main wall (16) so as to detach the closing element (7) from the contact portion. The pulling device (17) comprises a plurality of leg elements (19) connected to and transversally extending from the main wall (16) and a coupling structure (20) connected to the plurality of leg elements (19). Each leg element (19) comprises an elongated pillar (22) extending along a longitudinal axis (F) and at least one stiffening rib (25) connected to a connection (26).

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portion (26) of the pillar (22). Each connection portion (26) has a first extension (E1) along the respective longitudinal axis (G) that equals or is less than half of a second extension (E2) along the respective longitudinal axis (G) of the respective pillar (22) from a first end (23) to a second end (24) of the pillar (22).

OPENING DEVICE FOR A PACKAGE, MOLD FOR MOLDING AN OPENING
DEVICE FOR A PACKAGE AND PACKAGE HAVING AN OPENING DEVICE
TECHNICAL FIELD

The present invention relates to an opening device for
5 a package, in particular a package having a main body, filled
with a pourable product, even more particular filled with a
pourable food product.

Furthermore, the present invention also relates to a
mold for molding an opening device for a package, in
10 particular a package having a main body, filled with a
pourable product, even more particular filled with a pourable
food product.

Advantageously, the present invention also relates to
a package, in particular a package having a main body, filled
15 with a pourable product, even more particular filled with a
pourable food product, and comprising an opening device.

BACKGROUND ART

As is known, many liquid or pourable food products,
such as fruit juice, milk, milk-based drinks, drinking
20 yoghurt, wine, tomato sauce, salt, sugar etc., are sold in
packages, in particular sealed packages, made of a sterilized
packaging material.

A typical example is the parallelepiped-shaped package
for pourable food products known as Tetra Brik Aseptic
25 (registered trademark), which is made by sealing and folding
a laminated strip packaging material. The packaging material
has a multilayer structure comprising a carton and/or paper
base layer, covered on both sides with layers of heat-seal
plastic material, e.g. layers of polyethylene. In the case
30 of aseptic packages for long-storage products, the packaging
material also comprises a layer of oxygen-barrier material,
e.g. an aluminum foil, which is superimposed on a layer of

heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material forming the inner face of the package eventually contacting the food product.

Thus, such a type of package comprises a main body
5 formed from a multilayer packaging material and has a designated pour opening, which allows the outpouring of the pourable product from the package. Preferentially, the package is also provided with an opening device, which allows a sealing of the designated pour opening prior to a first
10 use of the package.

A typical opening device is arranged about the designated pour opening and is designed to seal the package prior to a first opening of the opening device.

Therefore, some kinds of opening devices comprise a
15 closing element having a main wall rupturably connected to a collar or base frame of the opening device. A user needs to remove the main wall, which when the opening device is used for the very first-time, leads to a rupturing of the main wall from the collar or the base frame.

20 In order to facilitate the removal, the closing element also comprises a pulling device connected to the main wall. Any separation force is transferred to the main wall by means of the pulling device.

A known pulling device comprises a leg element
25 integrally connected to the main wall and a coupling ring integrally connected to the leg element.

The leg element needs to be sufficiently stiff and secured onto the main wall such that during the exertion of a separation force the leg element remains attached to the
30 main wall.

Even though the currently known opening devices provide for good results, a need is felt in the sector to further

improve the opening devices and/or packages.

DISCLOSURE OF INVENTION

It is therefore an object of the present invention to provide in a straightforward and low-cost manner an improved
5 opening device for a package, in particular a package having a main body formed from a multilayer packaging material, filled with a pourable product, even more particular filled with a pourable food product.

It is another object of the present invention to provide
10 in a straightforward and low-cost manner a mold for molding an improved opening device.

It is a further object of the present invention to provide in a straightforward and low-cost manner a package,
in particular a package having a main body formed from a
15 multilayer packaging material, filled with a pourable product, in particular filled with a pourable food product, having an improved opening device.

According to the present invention, there is provided an opening device according to the independent claim.

20 Further advantageous embodiments of the opening device are specified in the claims directly or indirectly depending on claim 1.

According to the present invention, there is also provided a mold according to claim 13.

25 According to the present invention, there is also provided a package according to claim 14, claim 15 or claim 16.

BRIEF DESCRIPTION OF THE DRAWINGS

Two non-limiting embodiments of the present invention
30 will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a portion

of a package having an opening device according to a first embodiment of the present invention, with parts removed for clarity;

Figure 2 is a perspective view of the package of Figure 1 and focusing on a detail of the opening device of Figure 1, with parts removed for clarity;

Figure 3 is an enlarged perspective view of the detail of the opening device of Figure 2, with parts removed for clarity;

Figure 4 is an enlarged perspective section view of a portion of the detail of Figure 3, with parts removed for clarity;

Figure 5 is an enlarged perspective and partially sectioned view of the portion of Figure 4, with parts removed for clarity;

Figures 6a and 6b are top and partially sectioned views of the portion of Figures 4 and 5, with parts removed for clarity; and

Figure 7 is a perspective view of an opening device according to a second embodiment of the present invention, with parts removed for clarity.

BEST MODES FOR CARRYING OUT THE INVENTION

Number 1 indicates as a whole a package (only partially shown to the extent necessary for the comprehension of the present invention) comprising:

- a main body 2, in particular a main body 2 formed from a multilayer packaging material, being filled and/or being fillable with a pourable product, in particular a pourable food product, and in particular having a designated pour opening (not shown and known as such) configured to allow for an outflow of the pourable product from main body 2; and

- an opening device 3, in particular formed from a polymer material, coupled to main body 2 about the designated pour opening and configured to seal the designated pour opening and to be controllable so as to open the designated
5 pour opening and to allow for the outpouring of the pourable product.

The pourable product may be milk, tomato sauce, milk-based drinks, drinking yoghurt, water, sugar, salt, juices, emulsions, and the like.

10 According to some preferred non-limiting embodiments, the packaging material may comprise at least a layer of fibrous material, such as e.g. a paper or cardboard layer, and at least two layers of heat-seal plastic material, e.g. polyethylene layers, interposing the layer of fibrous
15 material in between one another. One of these two layers of heat-seal plastic material may define the inner face of main body 2 contacting the pourable product.

Preferably, the packaging material may also comprise a layer of gas- and light-barrier material, e.g. aluminum foil
20 or ethylene vinyl alcohol (EVOH) film, in particular being arranged between one of the layers of heat-seal plastic material and the layer of fibrous material. Preferentially but not necessarily, the packaging material may also comprise a further layer of heat-seal plastic material being
25 interposed between the layer of gas- and light-barrier material and the layer of fibrous material.

Preferentially, each package 1, in particular the respective main body 2, may be obtained from a respective packaging blank of the multilayer packaging material. In
30 particular, the packaging blank may define a precursor of the respective package 1, in particular the respective main body 2.

In more detail, the respective packaging blank may comprise the respective designated pour opening, which in particular may be covered by a separation membrane. The separation membrane may be formed from a gas-barrier material. In particular, the separation membrane may be defined by a portion of the layer of the gas- and light-barrier material.

According to some preferred non-limiting embodiments, the multilayer packaging material may be provided in the form of a web, thereby the packaging blanks may be successively arranged with respect to one another. During the formation of packages 1, the web is formed into a tube, longitudinally sealed, filled with the pourable product and transversally sealed and cut in correspondence with the extensions of the packaging blanks.

According to a preferred non-limiting embodiment, each opening device 3 may be applied, in particular molded, to the respective main body 2 or onto the respective packaging blank. Preferentially, each opening device 3 may be molded onto the respective packaging blank and about the designated pour opening. In particular and as will be explained further below, a first portion of opening device 3 may be molded onto the respective packaging blank and a second portion may be applied onto the first portion after molding of the first portion.

With particular reference to Figures 1 and 2, main body 2 may extend along a longitudinal axis A, a first transversal axis B perpendicular to longitudinal axis A and a second transversal axis C perpendicular to first transversal axis B and longitudinal axis A. In particular, the extension of package 2 along longitudinal axis A may be larger than the extension of package 2 along first transversal axis B and

second transversal axis C.

Preferentially, main body 2 may be parallelepiped-shaped.

According to some preferred non-limiting embodiments,
5 main body 2 may comprise a first wall (not shown and known as such), in particular being transversal, even more particular perpendicular, to longitudinal axis A, from which main body 2 may extend along longitudinal axis A. Preferably, the first wall may define a support surface of package 1, in
10 particular main body 2, which may be designed to be put in contact with a support, such as e.g. a shelf, when, in use, being e.g. exposed within a sales point or when being stored. In particular, when being arranged on the support the first wall may define a bottom wall.

15 Preferably, main body 2 may also comprise a side wall 4 being (fixedly) connected to the first wall and extending, in particular substantially parallel, along longitudinal axis A, from the first wall.

Preferentially, main body 2 may also comprise a second
20 wall 5 opposite to the first wall and being (fixedly) connected to side wall 4. In particular, side wall 4 may be interposed between the first wall and second wall 5.

In particular, when package 1 is arranged on a support second wall 5 may define a top wall.

25 According to the shown non-limiting embodiment, the first wall and second wall 5 may be parallel to one another.

According to non-limiting alternative embodiments not shown, the first wall and second wall 5 may be inclined with respect to one another. In particular, second wall 5 may
30 define a slanted top or may define a portion of a gable-top.

According to some non-limiting embodiments, second wall 5 may carry and/or comprise the designated pour opening.

According to some preferred non-limiting embodiments, package 1, in particular main body 2, may comprise an inner space configured to contain and/or containing the pourable product. In particular, the first wall, side wall 4 and
5 second wall 5 may delimit the inner space.

With particular reference to Figures 2 to 5, opening device 3 may comprise a contact portion, in particular an annular contact portion, and a closing element 7 detachably and/or rupturably attached to, in particular fixed to, the
10 contact portion and configured to close, in particular also to seal, the designated pour opening.

Furthermore, closing element 7 may be configured to (rupturably) detach from the contact portion so as to free and/or open the designated pour opening for allowing the
15 outpouring of the pourable product.

Moreover, opening device 3 may comprise:

- a base frame 8 coupling and/or configured to couple opening device 3 to package 1, in particular main body 2, even more particular to second wall 5, and about the
20 designated pour opening; and

- a collar 9 extending, in particular transversally, even more particular perpendicularly, from base frame 8 and defining and/or delimiting a flow channel 10.

More specifically, flow channel 10 may extend between
25 a pouring outlet 11 (of collar 9) configured to allow for the outpouring of the pourable product and an inlet (of collar 9) configured to allow for the introduction of the pourable product into flow channel 10.

In particular, collar 9 may extend along a central axis
30 E and pouring outlet 11 and the inlet may be arranged at respective axial ends of collar 9.

In particular, closing element 7 may be arranged, in

particular coaxially arranged, within flow channel 10.

Preferentially, closing element 7 may be coaxially positioned with respect to collar 9. In particular, closing element 7 may be coaxially arranged with respect to central axis E.

Preferentially, closing element 7 may be interposed between pouring outlet 11 and base frame 8 before the first opening of opening device 3 and after re-closing of opening device 3.

Additionally, opening device 3 may also comprise a closure 13 coupled and/or couplable to collar 9 and configured to selectively open and close pouring outlet 11.

Preferentially, closing element 7 and closure 13 may be connected, in particular fixed, to one another such that any movement of closure 13 results in a concurrent movement of closing element 7. In particular, closing element 7 and closure 13 may be connected to one another by means of fusing and/or welding and/or bonding and/or molding.

Preferentially, base frame 8, collar 9 and closing element 7 may be integrally formed, in particular in a single piece. In particular, base frame 8, collar 9 and closing element 7 may be formed during a molding process, in particular during molding of opening device 3 onto the respective packaging blank.

Furthermore, closure 13 may be coupled to collar 9 after formation of base frame 8, collar 9 and closing element 7.

In other words, base frame 8, collar 9 and closing element 7 may define the first portion of opening device 3 and closure 13 may define the second portion of opening device 3. Thus, closure 13 is applied to collar 9 after molding of base frame 8, collar 9 and closing element 7.

According to some preferred non-limiting embodiments,

base frame 8 or collar 9, in the specific embodiment shown collar 9, may comprise the contact portion.

In more detail, an annular portion of collar 9 may define the contact portion. In particular, the annular
5 portion faces flow channel 10.

With particular reference to Figures 2 to 5, closing element 7 may comprise:

- a main wall 16, in particular a circular main wall 16, detachably and/or rupturably attached to the contact
10 portion; and

- a pulling device 17 connected to main wall 16 and configured to allow for the exertion of a separation force on main wall 16 so as to detach main wall 16 and closing element 7 from the contact portion.

15 Preferentially, prior to detaching closing element 7, in particular main wall 16, from the contact portion, in particular for the first time, closing element 7, in particular main wall 16, may be configured to seal the designated pour opening and the inner space, in particular
20 in cooperation with the contact portion. Afterwards, it may be possible to place closing element 7, in particular main wall 16, again within flow channel 10 such that closing element 7, in particular main wall 16, may close the designated pour opening, but may not seal the designated
25 pour opening and the inner space anymore.

In more detail, main wall 16 may be controllable between an active position (see Figures 2 to 5) in which main wall 16 is configured to cover and/or close the designated pour opening and an inactive position (not shown) in which main
30 wall 16 may be configured to free the designated pour opening. Prior to a first-time movement of main wall 16 from the active position to the inactive position, main wall 16

may be configured to seal the designated pour opening and the inner space of main body 2. After the first-time movement of main body 16 from the active position to the inactive position, it may be possible to newly place main body 16 in the active position for covering (but not sealing) the designated pour opening.

Pulling device 17 may be configured to allow for a user to exert through pulling device 17 a separation force on main wall 16 such that main wall 16 irreversibly ruptures from the contact portion and/or that main wall 16 moves from the active position to the inactive position.

Preferentially, pulling device 17 may be connected to, in particular fused and/or welded and/or bond onto, closure 13. In this way, a user can, in use, exert the separation force by operating closure 13 and any movement of closure 13 is transferred to main wall 16 by pulling device 17. Such a solution can be considered to increase the user-friendliness of opening device 3.

Alternatively, a user could directly operate pulling device 17. In particular, according to some possible alternative embodiments, closure 13 and closing element 7 are not coupled and after removal of closure 13 a user could operate pulling device 17 so as to control closing element 7 from the active position to the inactive position.

In more detail, closure 13 may be movable between:

- a closing configuration, in which closure 13 covers pouring outlet 11, in particular for impeding an outflow of the pourable product out of pouring outlet 11; and

- an opening configuration in which closure 13 may be detached from pouring outlet 11, in particular for allowing an outflow of the pourable product through pouring outlet 11.

According to some possible embodiments, opening device 3 may comprise a ring 18 arranged about collar 9 and being connected to closure 13. In particular, closure 13 may be hinged to ring 18 and may be configured to angularly move
5 between the opening configuration and the closing configuration.

Preferentially, closure 13 may be reversibly moved between the closing configuration and the opening configuration.

10 In particular, as closing element 7, in particular pulling device 17, may be connected, in particular fused and/or welded and/or bonded, to closure 13, the movement, in particular the angular movement, of closure 13 between the closing configuration and the opening configuration may
15 result in movement of main wall 16 between respectively the active position and the inactive position.

It should be noted that package 1 may be immediately after its formation arranged in an initial configuration in which closure 13 and main wall 16 may be respectively in the
20 closing configuration and in the active position. Package 1 may be distributed and/or sold to a user while being in the initial configuration.

With particular reference to Figures 2 to 5, pulling device 17 may comprise:

25 - a plurality of leg elements 19, in the specific embodiment shown four, connected, in particular integrally connected to, and extending, in particular transversally, even more particular substantially perpendicularly, from main wall 16; and

30 - a coupling structure connected to the plurality of leg elements 19.

In more detail, the coupling structure may comprise a

coupling ring 20.

According to some preferred non-limiting embodiments, the coupling structure, in particular coupling ring 20, may be connected, in particular fused and/or welded and/or bond, to closure 13, in particular an inner surface of closure 13. Preferentially, the inner surface of closure 13 may face flow channel 10 and/or pouring outlet 11 when closure 13 is arranged in the closing configuration.

Preferentially, leg elements 19 may be angularly displaced from one another about a central axis F of main wall 16. In particular, central axis F may be coaxial to central axis E with main wall 16 being in the active position.

Even more preferentially, leg elements 19 may be unevenly distributed from one another about central axis F. In this manner, it is possible to more precisely obtain the separation of main wall 16 from the contact portion.

Alternatively, leg elements 19 could be equally spaced about central axis F.

Preferentially, leg elements 19 may be integrally connected to main wall 16.

With particular reference to Figures 3 to 5, each leg element 19 may comprise:

- an elongated pillar 22 extending along a longitudinal axis G, having a first end 23 and a second end 24 and being connected, in particular integrally connected, to main wall 16 at first end 23 and to the coupling structure, in particular coupling ring 20, at second end 24; and

- one or more stiffening ribs 25, in the specific case shown two, connected to a connection portion 26 of pillar 22.

Advantageously, each connection portion 26 may comprise

the respective first end 23 and has a first extension E1 along the respective longitudinal axis G, which equals or is less than half of a second extension E2, along the respective longitudinal axis G, of the respective pillar 22 from the
5 respective first end 23 to the respective second end 24. Preferentially, first extension E1 may equal or may be less than one third of second extension E2.

By having the stiffening ribs 25 connected to the respective connection portion 26, which has a limited
10 extension, it is possible on the one side to stabilize the respective pillar 22 and on the other side to guarantee a good deformability of the respective pillar 22 as it is e.g. advantageous during demolding i.e. during extraction of opening device 3 from a mold in which it has been
15 manufactured.

In particular, each pillar 22 may consist of connection portion 26 and a further portion extending from the respective connection portion 26 and to the respective second end 24.

Furthermore, each first extension E1 may be less than
20 one third of a third extension E3, along the respective longitudinal axis G, of the respective pillar 22 together with the respective portion of the coupling structure, in particular coupling ring 20, connected to the respective
25 pillar 22.

Preferentially, main wall 16 may comprise a first surface 27 facing away from and/or being designed to face away from the designated pour opening. In particular, first face 27 may extend within a plane H perpendicular to central
30 axis E and/or central axis F and/or longitudinal axes G.

In particular, each pillar 22 transversally, in particular perpendicularly, extends from first surface 27.

Even more particular, each first end 23 is in contact with first surface 27.

In particular, each first extension E1 and each second extension E2 may be measured along a direction D orthogonal to main wall 16, in particular first surface 27, even more particular to plane H. Even more particular, each third extension E3 may be measured along direction D.

In particular, each stiffening rib 25 may be integrally connected to main wall 16.

Preferentially, each leg element 19 may comprise two stiffening ribs 25 spaced apart from one another and connected to the respective connection portion 26.

Even more preferentially, each stiffening rib 25 may be connected to a respective lateral section of the respective connection portion 26.

With particular reference to Figures 4 and 5, each pillar 22 may comprise an inner surface 30 facing towards a center 31 of main wall 16 and an outer surface 32 opposite to inner surface 30.

Preferentially, outer surface 32 may face an inner wall 33 of collar 9. Preferentially, inner wall 33 may delimit flow channel 10.

Reverting again to Figure 4, each stiffening rib 25 may be connected to inner surface 30.

In particular, each stiffening rib 25 may be arranged radially inside with respect to the respective leg element 19, and in particular with respect to central axis F.

With particular reference to Figure 5, each outer surface 32 may comprise a central surface portion 34 and two lateral surface portions 35, in particular interposing central surface portion 34 between one another.

In more detail, each lateral surface portion 35 may

transversally extend from the respective central surface portion 34. In particular, each lateral surface portion 35 may also radially extend inside from the respective central surface portion 34.

5 Moreover, each outer surface 33 may be axially symmetric.

 Preferentially, each lateral surface portion 35 may have a concave shape, in particular with respect to inner wall 33. Such lateral surface portions 35 allow to further
10 facilitate demolding, in particular as leg elements 19 can be more easily separated from the respective mold.

 Preferentially, each inner surface 30 may have a concave shape with respect to central axis E. In more detail, each inner surface 30 may correspond to a respective surface
15 portion of a respective cylinder, in particular a cylinder having a central axis coaxial to central axis F.

 With particular reference to Figures 6a and 6b, each pillar 22 may have a trapezoidal-like cross-section profile with respect to a cross-section plane perpendicular to the
20 respective longitudinal axis G.

 It should be noted that trapezoidal-like means that the obtained cross-section can be approximated by means of a trapezoid.

 In the specific embodiment disclosed, each cross-section comprises a first base 36, a second base 37 and two
25 lateral sides 38. In particular, each first base 36 is longer than the respective second base 37.

 Moreover, each first base 36 results from the intersection with the respective inner surface 30, each
30 second base 37 results from the intersection with the respective central surface portion 34 and each lateral side 38 results from the intersection with the respective lateral

surface portion 35.

It can be noted that each first base 36 and the respective two lateral sides 38 may be curved. If one connects the respective intersection points with linear
5 lines, one obtains the trapezoid, which approximates the trapezoidal-like cross-section. In particular, the linear lines approximating/associated with/corresponding to the two lateral sides 38 are not parallel, while the linear line approximating/associated with/corresponding to first base 36
10 and the linear line approximating/associated with/corresponding to second base 37 are parallel to one another.

In particular, each pillar 22 may widen from the respective first end 23 towards and to the respective second
15 end 24.

Preferentially, the size of the respective first base 36 of a first cross-section profile (see Figure 6a) of a first section closer to the respective second end 24 may be larger than the respective first base 36 of a second cross-
20 section profile (see Figure 6b) of a second section farther distanced from the respective second end 24 than the first section.

With particular reference to Figures 2 and 3, coupling ring 20 may comprise, in particular may consist of, a
25 plurality of main portions 45, each one connected to one respective pillar 22, and a plurality of auxiliary portions 46, each one interposed between two respective main portions 45.

In particular, each main portion 45 may also be
30 interposed between two respective auxiliary portions 46.

Moreover, main portions 45 and auxiliary portions 46 may be integrally connected to one another and/or may be

made in a single piece.

According to some preferred non-limiting embodiments, main wall 16 may comprise an annular coupling membrane rupturably connected to the contact portion. In particular, the coupling membrane may be configured such that during the first-time removal of closing element 7, the coupling membrane ruptures so as to allow for the detachment of closing element 7 from the contact portion. In other words, the coupling membrane is configured to rupture the first time main wall 16 is moved from the active position to the inactive position.

Preferentially, the coupling membrane may define an annular and peripheral portion of main wall 16.

According to some preferred-non limiting embodiments, main wall 16 may comprise

- a plurality of radially extending ridge elements 47, in the specific embodiment shown four, each one being interposed between one respective leg element 19 and center 31; and/or
- a plurality of grooves 48, in the specific embodiment shown four, each one extending between a respective pair of leg elements 19 (i.e. each groove 48 may be interposed between a respective first leg element 19 and a respective second leg element 19).

Preferentially, one end of each ridge element 47 is interposed between two respective stiffening ribs 25.

Preferentially, each ridge element 47 may protrude from first surface 27 and/or each groove 48 may be depressed with respect to first surface 27.

According to another aspect of the present invention, opening device 3 may be coupled to main body 2 by means of a molding process. In particular, opening device 3 may be

coupled to main body 2 by molding the first portion of opening device 3 to the respective packaging blank.

In order to do so, a mold needs to be provided, which is configured to allow for molding of opening device 3 onto
5 main body 2 and/or the packaging blank. In more detail, the mold may be configured to allow for molding and forming the first portion of opening device 3.

In particular, the mold may be configured to allow for the formation of base frame 8, collar 9 and closing element
10 7.

Even more particular, the mold may be configured to mold base frame 8, collar 9 and closing element 7 in a single piece.

In more detail, the mold may be designed such to allow
15 for the formation of leg elements 19, main wall 16 and the contact portion.

In use, a user receives package 1 with closure 13 and main wall 16 being respectively in the closing configuration and the active position so as to respectively cover pouring
20 outlet 11 and the designated pour opening.

Prior to the first control of closure 13 from the closing configuration to the opening configuration and of main wall 16 from the active position to the inactive position, closing element 7, in particular main wall 16,
25 even more particular the coupling membrane, is rupturably fixed to the contact portion.

The user, in order to access the pourable product, needs to control closure 13 from the closing configuration to the opening configuration leading, as main wall 16 is
30 operationally coupled to closure 13 through pull device 17, to a movement of main wall 16 from the active position to the inactive position and a rupturing of closing element 7,

in particular of main wall 16, even more particular of the coupling membrane, from the contact portion. This then allows the pourable product to flow from the inner space through and out of flow channel 10.

5 Each time main wall 16 is arranged again in the active position (by moving closure 13 in the closing configuration) main wall 16 covers the designated pour opening.

10 With reference to Figure 7, number 3' indicates an alternative embodiment of an opening device according to the present invention; as opening device 3' is similar to opening device 3, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

15 In particular, opening device 3' differs from opening device 3 in that each auxiliary portion 46 may comprise a recess 49.

20 More specifically, one or more recesses 49, in the specific case shown two, may be centered with respect to the respective two main portions 45. Alternatively, or additionally, one or more recesses 49, in the specific case shown two, may be arranged closer to one of the respective two main portions 45 than to the other one of the respective two main portions 45.

25 Preferentially, each recess 49 is designed so as to allow for the respective auxiliary portion 46 to deform, in particular to deform along a direction radial with respect to central axis F and/or longitudinal axes G.

 Moreover, each recess 49 may define a weakening of the respective auxiliary portion 46.

30 According to some possible non-limiting embodiments, each recess 49 may define a recessed surface 50 of the respective auxiliary portion 46.

In particular, by providing for recesses 49 and/or deformable and/or weakened auxiliary portions 46, the extraction from the mold of closing element 7, in particular of the coupling structure, even more particular of coupling ring 20, is furthermore facilitated.

As operation of opening device 3' is similar to operation of opening device 3, we refer to the above-provided description.

The advantages of opening device 3 and/or opening device 3' and/or of package 1 according to the present invention will be clear from the foregoing description.

In particular, opening device 3 and opening device 3' are provided with pull device 17, which guarantees the needed stability when detaching main wall 16 from the contact portion, but which also ensures to be easily removed from a mold, which is used for molding opening device 3 or opening device 3' onto main body 2 and/or the respective precursor.

Moreover, during demolding, leg elements 19 may elastically deform. Therefore, it is possible to avoid modification of the shape of leg elements 19.

Additionally, leg elements 19 do not break during movement, in particular during the first movement of main wall 16 from the active position to the inactive position.

A further advantage resides, in the opening device 3' has a deformable coupling ring 20 due to recesses 49 and/or recessed surfaces 50.

Clearly, changes may be made to opening device 3 and/or opening device 3' and/or package 1 as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

CLAIMS

1.- Opening device (3, 3') for a package (1) having a designated pour opening and being filled with a pourable product;

5 the opening device (3, 3') comprises a contact portion and a closing element (7) detachably and/or rupturably attached to the contact portion and configured to close and/or cover the designated pour opening;

 wherein the closing element (7) comprises:

10 - a main wall (16) detachably and/or rupturably attached to the contact portion; and

 - a pulling device (17) connected to the main wall (16) and configured to allow for the exertion of a separation force on the main wall (16) so as to detach the closing
15 element (7) from the contact portion;

 wherein the pulling device (17) comprises:

 - one or more leg elements (19) connected to and transversally extending from the main wall (16); and

 - a coupling structure (20) connected to the plurality
20 of leg elements (19);

 wherein each leg element (19) comprises:

 - an elongated pillar (22) extending along a longitudinal axis (G), having a first end (23) and a second end (24), and being connected to the main wall (16) at the
25 first end (23) and to the coupling structure (20) at the second end (24); and

 - at least one stiffening rib (25) connected to a connection portion (26) of the pillar (22);

 wherein each connection portion (26) comprises the
30 respective first end (23) and has a first extension (E1) along the respective longitudinal axis (G) that equals or is less than half of a second extension (E2) along the

respective longitudinal axis (G) of the respective pillar (22) from the first end (23) to the second end (24).

2.- Opening device according to claim 1, wherein each leg element (19) comprises two stiffening ribs (25) spaced
5 apart from one another and connected to the respective connection portion (26).

3.- Opening device according to claim 2, wherein each stiffening rib (25) is connected to a respective lateral section of the respective connection portion (26).

10 4.- Opening device according to any one of the preceding claims, wherein each stiffening rib (25) is integrally connected to the main wall (16).

5.- Opening device according to any one of the preceding claims, wherein each pillar (22) comprises an inner surface
15 (30) facing towards a center (31) of the main wall (16) and an outer surface (32) opposite to the inner surface (30);

wherein each outer surface (32) comprises a central surface portion (34) and two lateral surface portions (35);

20 wherein each lateral surface portion (35) has a concave shape.

6.- Opening device according to any one of the preceding claims, wherein each pillar (22) has a trapezoidal-like cross-section profile with respect to a cross-section plane perpendicular to the respective longitudinal axis (G).

25 7.- Opening device according to claim 6, wherein each cross-section profile has a first base (36) and a second base (37) shorter than the first base (36);

wherein the size of the respective first base (36) of a first cross-section profile of a first section closer to
30 the respective second end (24) is larger than the respective first base (36) of a second cross-section profile of a second section farther distanced from the respective second end

(24) than the first section.

8.- Opening device according to any one of the preceding claims, wherein the coupling structure comprises a coupling ring (20) integrally connected to the respective second ends
5 (24) of the plurality of leg elements (19).

9.- Opening device according to claim 8, wherein the coupling ring (20) comprises a plurality of main portions (45), each one connected to one respective pillar (22), and a plurality of auxiliary portions (46), each one interposed
10 between two respective main portions (45).

10.- Opening device according to claim 9, wherein one or more auxiliary portions (46) is/are deformable and/or at least partially weakened.

11.- Opening device according to claim 9 or 10, wherein
15 at least one auxiliary portion (46) comprises a recess (49) and/or a recessed surface (50).

12.- Opening device according to any one of the preceding claims, and further comprising:

- a base frame (8) coupling and/or configured to couple
20 the opening device (3, 3') about the designated pour opening;

- a collar (9) extending from the base frame (8) and defining and/or delimiting a flow channel (10) and having a pouring outlet (11); and

- a closure (13) coupled to the collar (9) and
25 configured to selectively open and close the pouring outlet (11);

wherein the base frame (8) or the collar (9) comprises the contact portion;

wherein the coupling structure (20) and the closure
30 (13) are connected to one another.

13.- Mold configured to allow for molding the opening device (3, 3') according to any one of the proceeding claims

onto a main body (2) of a package (1) for a pourable product and/or onto a precursor of a package (1) for a pourable product.

14.- Package (1) filled and/or fillable with a pourable
5 product and comprising at least one opening device (3, 3') according to any one of claims 1 to 12.

15.- Package according to claim 14, wherein the package
(1) comprises a main body (2) having a designated pour
opening and being formed from a multilayer composite
10 packaging material, wherein the opening device (3, 3') is
coupled onto the main body (2) and about the designated pour
opening.

16.- Package according to claim 14 or 15, wherein the
opening device (3, 3') is molded to a main body (2) of the
15 package (1) and/or onto a precursor of the package (1).

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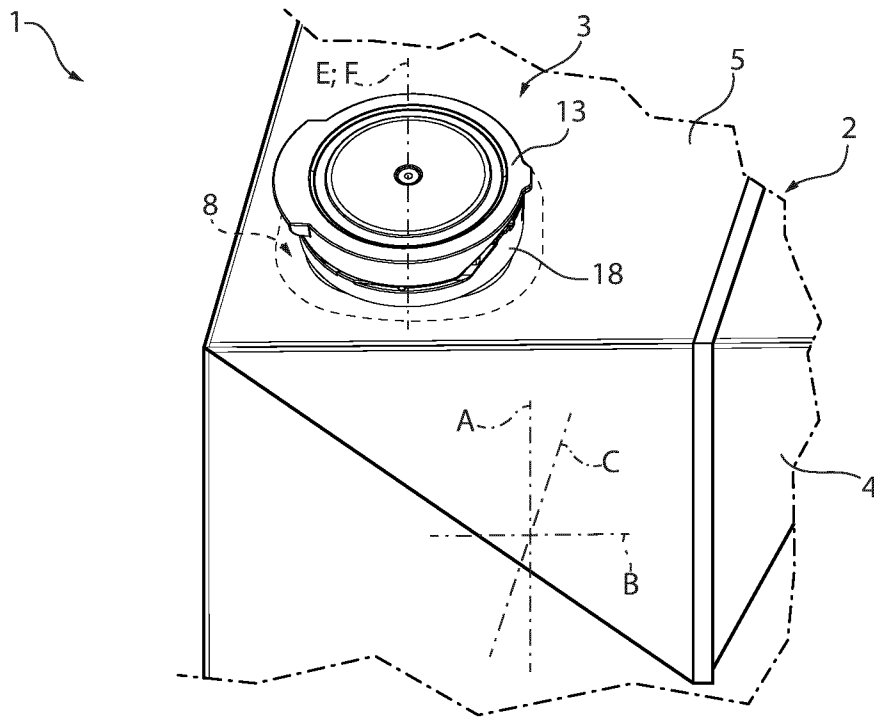


FIG. 1

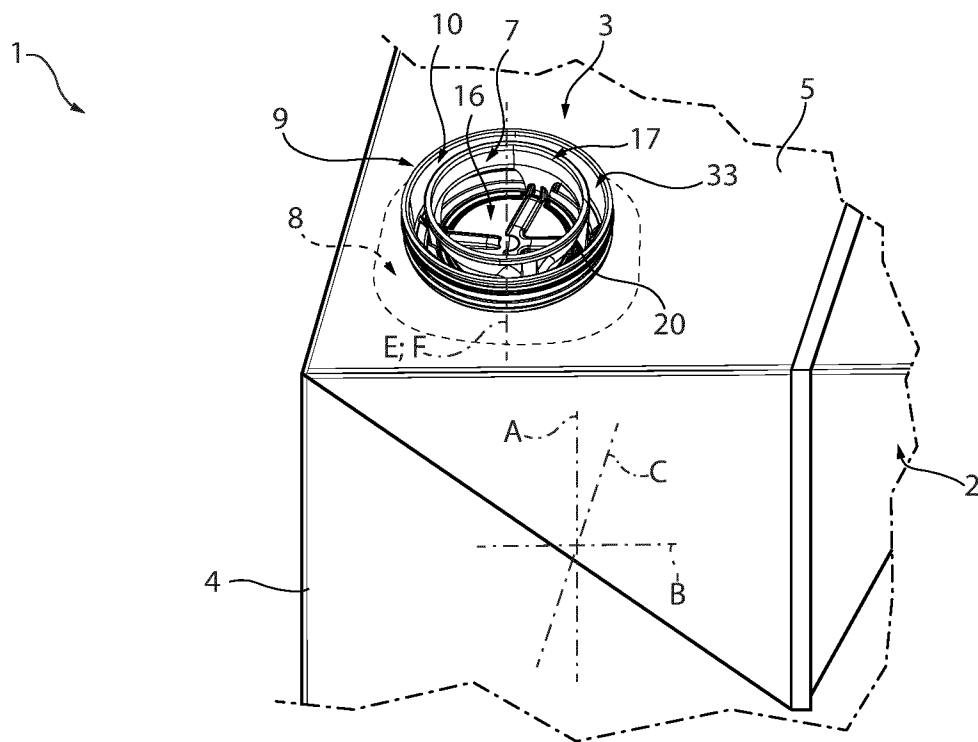


FIG. 2

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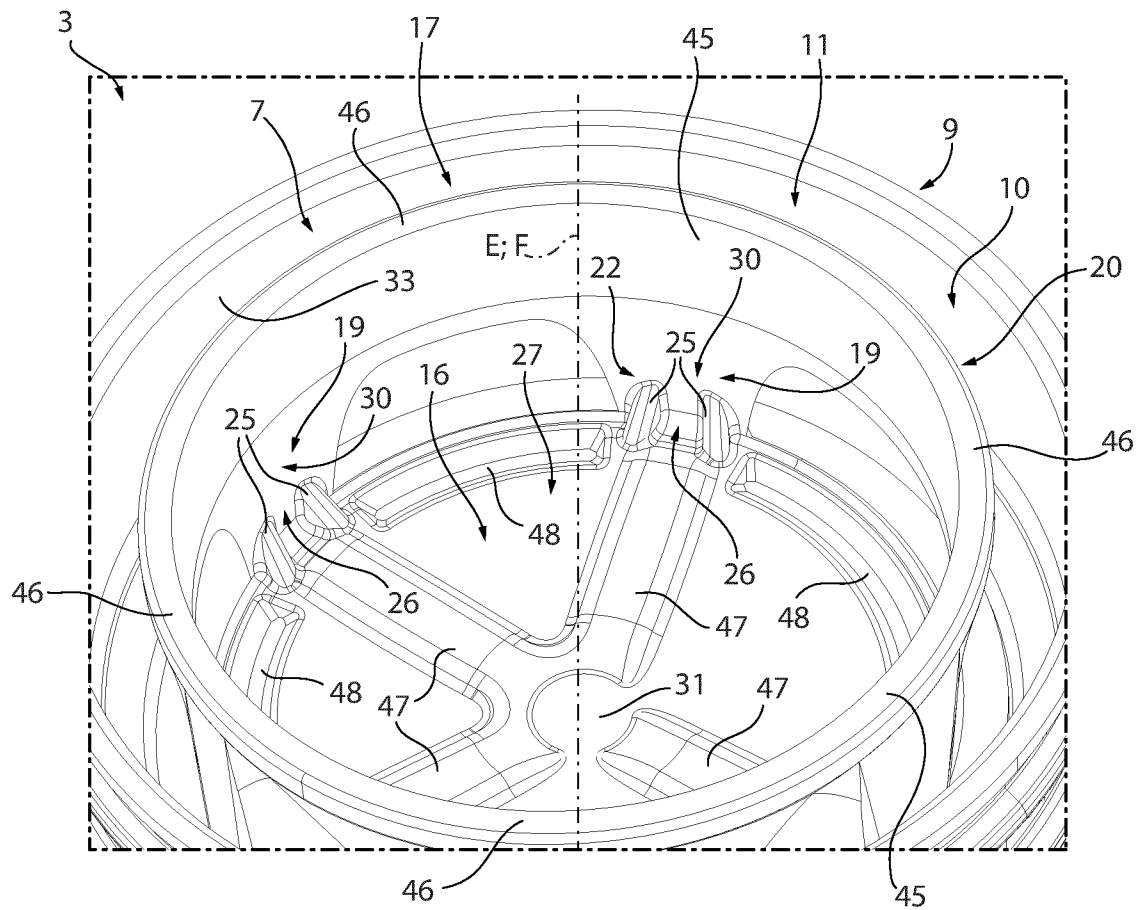


FIG. 3

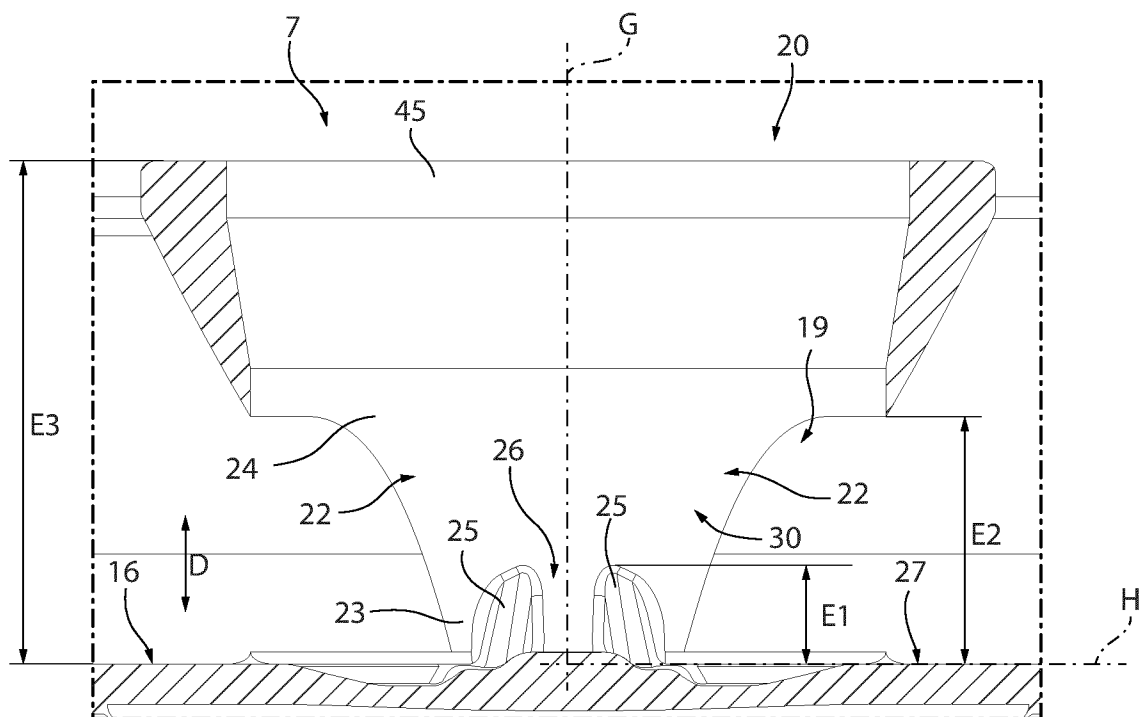


FIG. 4

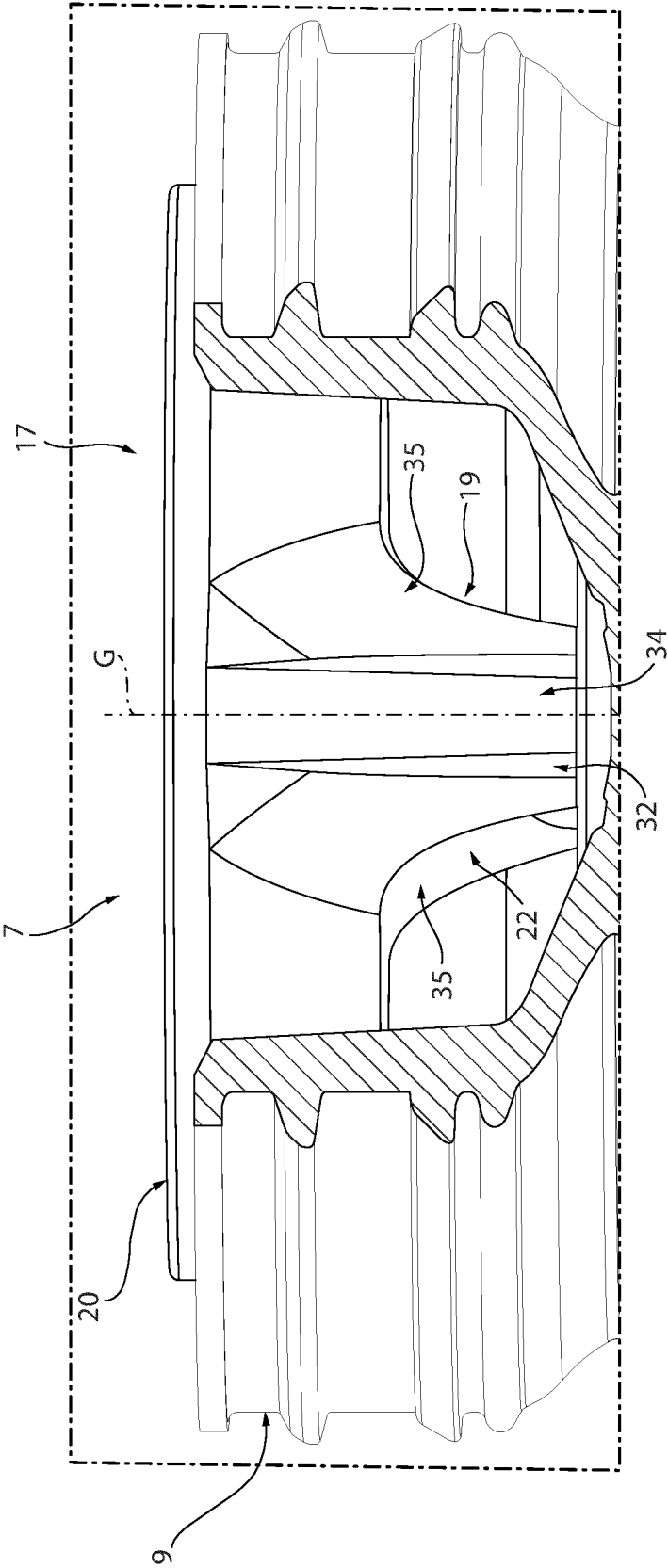
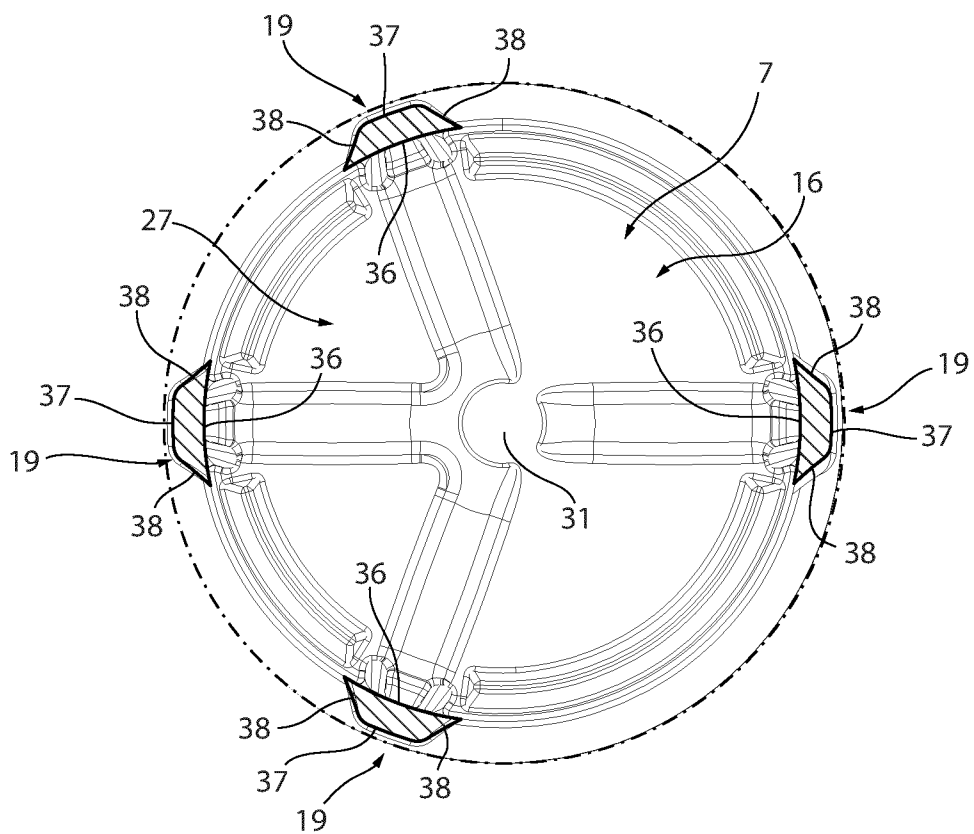
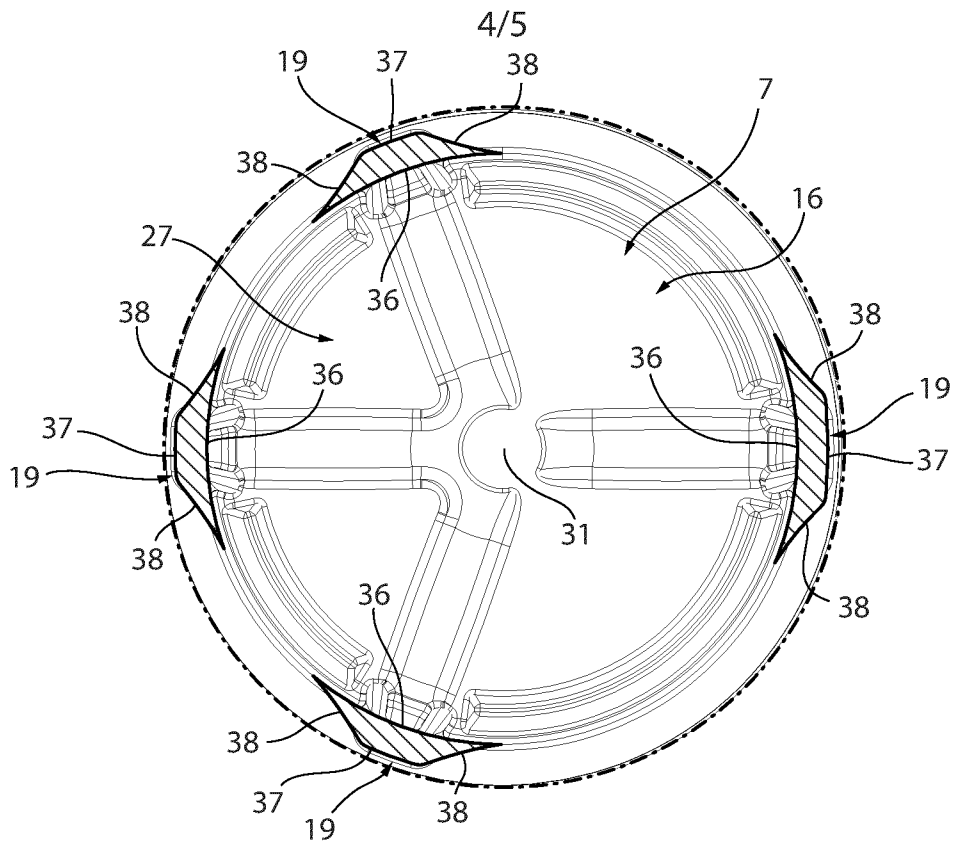


FIG. 5



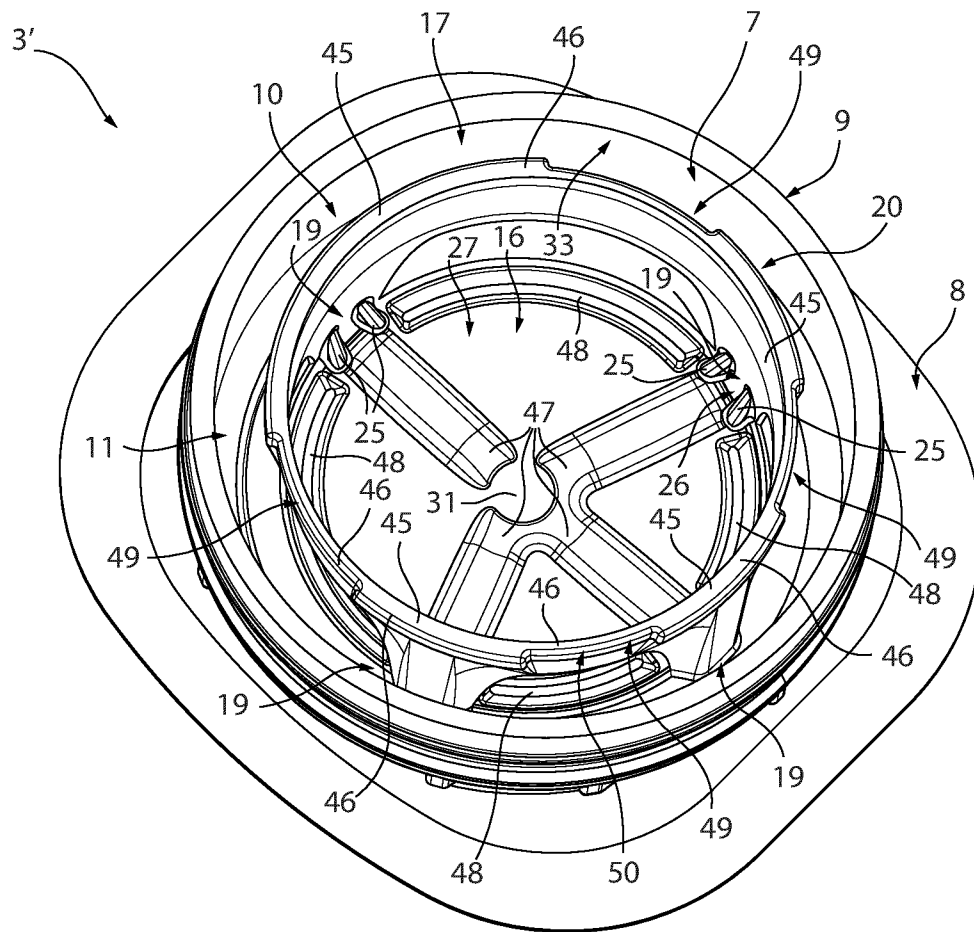


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/076024

A. CLASSIFICATION OF SUBJECT MATTER		
INV.	B65D5/74	B65D47/10
		B65D41/32
		B65D51/22
		B29C37/00
ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
B65D B29C		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2017/327276 A1 (MARTINI PIETRO [IT] ET AL) 16 November 2017 (2017-11-16) figures 1, 4	1-16
Y	US 2019/359370 A1 (WINBERG PETRA [SE] ET AL) 28 November 2019 (2019-11-28) figure 2	1-16
A	JP 2014 084141 A (TOPPAN PRINTING CO LTD) 12 May 2014 (2014-05-12) figures 2, 3, 4, 6	1-16
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
12 January 2023		20/01/2023
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Tzianetopoulou, T

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2022/076024

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 01/25106 A1 (ARGO SA PLASTIC PACKAGING MATE [GR]; PAGIDAS JANNIS [GR] ET AL.) 12 April 2001 (2001-04-12) figures 1, 6 -----	1-16

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