



(51) International Patent Classification:

B65D 5/74 (2006.01) *B29C 45/14* (2006.01)
B65D 47/10 (2006.01) *B65D 51/22* (2006.01)
B29C 45/00 (2006.01) *B29L 31/56* (2006.01)
B29C 37/00 (2006.01)

(21) International Application Number:

PCT/EP2022/076025

(22) International Filing Date:

20 September 2022 (20.09.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

21200035.0 30 September 2021 (30.09.2021) EP

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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE,

(54) Title: OPENING DEVICE FOR A PACKAGE, MOLD FOR MOLDING AN OPENING DEVICE FOR A PACKAGE AND PACKAGE HAVING AN OPENING DEVICE

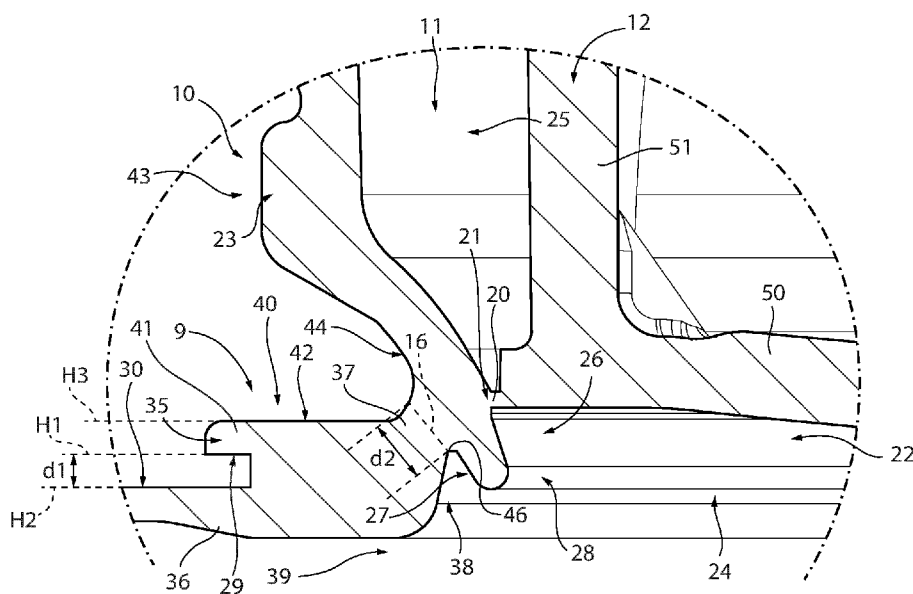


FIG. 3

(57) Abstract: There is described an opening device (4, 4') for a package (1) of a packaging material (3) having a designated pour opening. The opening device (4, 4') comprises a base frame (9), a collar (10) integrally connected to and extending from the base frame (9) and a closing element (12) configured to cover and/or close the designated pour opening. The closing element (12) is detachably fixed to an initial contact portion (21) of the collar (10). The collar (10) comprises a sealing ring (24) having a first inner surface (26) facing the flow channel (11) and an outer surface (27) opposite to the first inner surface (26). The base frame (9) comprises a second inner surface (38) facing the outer surface (27). The base frame (9) comprises a first contact surface (29) configured to contact the packaging material (3) from a first face (7) and a second contact surface (30) configured to contact the packaging material (3) from

KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

a second face (8). The initial contact portion (21) is interposed between the first contact surface (29) and the pouring outlet (13). A thickness (d2) of an annular interface (16) interposed between the base frame (9) and the collar (10) is larger than a distance (d1) between the first contact surface (29) and the second contact surface (30).

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. Additionally, the package can comprise an opening device arranged about the designated pour opening. The opening device is designed to seal the
10 package prior to a first opening of the opening device and to allow for a controlled outpouring.

A typical opening device comprises a base frame coupling the opening device onto the packaging material forming the package and about the designated pour opening, a collar
15 extending from the base frame and delimiting a flow channel and a closing element arranged within the flow channel and configured to close the designated pour opening.

When the package is delivered to the final customer, the closing element is rupturably connected to an inner wall
20 of the collar so as to close and seal the designated pour opening. Afterwards it is possible to re-arrange the closing element into the flow channel so as to newly close the designated pour opening and to avoid an unwanted spillage of the pourable product.

It is known that during molding of the base frame onto the packaging material and about the designated pour opening, it must be guaranteed that the base frame covers the edge of the packaging material delimiting the pour opening so as to guarantee that the edge does not get into contact with the
30 pourable product.

Even though the known opening devices work satisfyingly well, a need is felt in the sector to further improve the

known opening devices.

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 opening device.

It is a further object of the present invention to provide in a straightforward and low-cost manner an improved package, in particular a package having a main body formed
15 from a 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 12.

25 According to the present invention, there is also provided a package according to claim 13, claim 14 or claim 15.

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 section view of the opening device of Figure 1, with parts removed for clarity;

Figure 3 is an enlarged detail of Figure 2, with parts removed for clarity; and

Figure 4 is a section 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 3, 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 4, 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 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.

According to some preferred non-limiting embodiments, packaging material 3 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 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, packaging material 3 may also comprise a layer of gas- and light-barrier material, e.g. aluminum foil 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, packaging material 3 may also comprise a further layer of heat-seal plastic material being 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 blank of multilayer packaging material 3. In particular, the blank may define a precursor of the respective package 1, in particular the respective main body 2.

In more detail, the respective 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, multilayer packaging material 3 may be provided in the form of a web, thereby the 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 blanks.

According to a preferred non-limiting embodiment, each opening device 4 may be applied, in particular molded, to the respective main body 2, in particular packaging material
5 3 from which main body 2 is formed or onto the respective blank. Preferentially, each opening device 4 may be molded onto the respective blank and about the designated pour opening. In particular and as will be explained further below, a first portion of opening device 4 may be molded
10 onto the respective blank and a second portion may be applied onto the first portion after molding of the first portion.

In particular, opening device 4 may be molded by means of a respective mold.

With particular reference to Figure 1, main body 2 may
15 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
20 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,
25 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
30 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.

Preferably, main body 2 may also comprise a side wall 5 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 wall 6 opposite to the first wall and being (fixedly) connected to side wall 5. In particular, side wall 5 may be interposed between the first wall and second wall 6.

In particular, when package 1 is arranged on a support, second wall 6 may define a top wall.

According to the shown non-limiting embodiment, the first wall and second wall 6 may be parallel to one another.

According to non-limiting alternative embodiments not shown, the first wall and second wall 6 may be inclined with respect to one another. In particular, second wall 6 may define a slanted top or may define a portion of a gable-top.

According to some non-limiting embodiments, second wall 6 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 5 and second wall 6 may delimit the inner space.

In further detail and with particular reference to Figures 1 and 2, packaging material 3 may comprise a first face 7 and a second face 8 opposite to first face 7. In particular, second face 8 may be configured to contact the pourable product and/or to face the inner space of package 1, in particular main body 2. Moreover, first face 7 may face away from the inner space and/or may face an external

space.

With particular reference to Figures 1 to 3, opening device 4 may comprise:

- a base frame 9 configured to couple and/or coupling opening device 4 on packaging material 3 forming main body 2 and about the designated pour opening;

- a collar 10 integrally connected to and extending from base frame 9 and delimiting a flow channel 11; and

- a closing element 12 arranged and/or being arrangeable within flow channel 11 and configured to close and/or cover, and, in particular at least prior to a first movement of closing element 12 away from collar 10 and/or flow channel 11, to seal, the designated pour opening.

More specifically, flow channel 11 may extend between a pouring outlet 13 (of collar 10) configured to allow for the outpouring of the pourable product and an inlet 14 (of collar 10) configured to allow for the introduction of the pourable product into flow channel 11, in particular from the inner space of package 1, in particular main body 2, into flow channel 11.

In further detail, collar 10 may extend along a central axis E and pouring outlet 13 and inlet 14 may be arranged at respective axial ends of collar 10.

In even more detail, collar 10 may comprise a first delimiting rim 15 delimiting pouring outlet 13 and a second delimiting rim delimiting inlet 14, each one being arranged at the respective axial end of collar 10.

Preferentially, closing element 12 may be coaxially positioned with respect to collar 10. In other words, a central axis F of closing element 12 may be coaxial to central axis E.

With particular reference to Figures 2 and 3, opening

device 4 may also comprise an annular interface 16 interposed between base frame 9 and collar 10 and/or connecting base frame 9 and collar 10 with one another.

Preferentially, annular interface 16 may be defined by a portion of opening device 4 being interposed between base frame 9 and collar 10. In particular, annular interface 16 may be defined by a portion of opening device 4 which is interposed between base frame 9 and collar 10 and which comes along with a minimum thickness.

Preferentially, base frame 9, collar 10 and closing element 12 may be realized in a single piece.

Additionally, opening device 4 may also comprise a closure coupled and/or couplable to collar 10 and configured to selectively open and close pouring outlet 13, in particular for respectively allowing and impeding an outpouring of the pourable product.

Preferentially, closing element 12 and the closure may be connected, in particular fixed, to one another such that any movement of the closure results in a concurrent movement of closing element 12. In particular, closing element 12 and the closure may be connected to one another by means of fusing and/or welding and/or bonding and/or molding.

With particular reference to Figures 2 and 3, closing element 12 may comprise a coupling membrane 20 being detachably and/or rupturably fixed to collar 10 along an (annular) initial contact portion 21 (of an inner wall 22 of collar 10).

Furthermore, closing element 12 may be configured to (rupturably) detach from initial contact portion 21 so as to free and/or open the designated pour opening for allowing the outpouring of the pourable product.

Preferentially, prior to the first-time detachment of

closing element 12 from initial contact portion 21, closing element 12 may be configured to seal the designated pour opening and the inner space. Afterwards, it may be possible to place closing element 12 such that closing element 12 may
5 close the designated pour opening, but may not seal the designated pour opening and the inner space anymore.

Moreover, when closing element 12 detaches, in use, for the first time from initial contact portion 21, coupling membrane 20 irreversibly ruptures from initial contact
10 portion 21.

In more detail, closing element 12 may be controllable between an active position in which closing element 12 is configured to cover and/or close the designated pour opening and an inactive position in which closing element 12 frees
15 and/or opens the designated pour opening.

In other words, closing element 12 may be configured to interrupt and/or at least obstruct a fluidic connection between pouring outlet 13 and inlet 14 when being in the active position and to allow for a fluidic connection between
20 pouring outlet 13 and inlet 14 when being in the inactive position.

Preferentially, closing element 12 may be arranged within flow channel 11 and/or may be interposed between pouring outlet 13 and base frame 9 when being in the active
25 position.

Furthermore (see Figures 1 to 3), initially closing element 12 is controlled in the active position and prior to the first-time movement from the active position to the inactive position, closing element 12 is rupturably
30 connected to initial contact portion 21 so as to also seal the designated pour opening.

Moreover, after the first-time movement of closing

element 12 from the active position to the inactive position, closing element 12 can be newly placed in the active position. Then, closing element 12 can newly contact collar 10, in particular inner wall 22, so as to close and/or cover the designated pour opening and/or to interrupt and/or
5 obstacle the fluidic connection between pouring outlet 13 and inlet 14.

Furthermore, in particular in order to ensure that closing element 12 can interact with collar 10, in particular
10 inner wall 22, after the first-time movement of closing element 12 from the active position to the inactive position, collar 10 may comprise:

- a main portion 23 comprising pouring outlet 13 and extending from initial contact portion 21 to pouring outlet
15 13; and

- a sealing ring 24 comprising inlet 14 and extending from initial contact portion 21 to inlet 14.

In particular, sealing ring 24 may be designed such to ensure that closing element 12 closes the designated pour
20 opening and/or interrupts and/or at least obstacles the fluidic connection between inlet 14 and pouring outlet 13 when being in the active position and after the first-time movement of closing element 12 from the active position to the inactive position. In particular, even if the exact
25 position of at least a portion of closing element 12 is below initial contact portion 21, it is ensured that closing element 12 contacts inner wall 22 of collar 10.

In more detail, main portion 23 may comprise a first surface portion 25 of inner wall 22 and sealing ring 24 may
30 comprise a second surface portion of inner wall 22.

Preferentially, sealing ring 24 may comprise a (curved) tip portion delimiting inlet 14 and/or defining the second

delimiting rim.

Moreover, inlet 14 may be arranged at an axial end of sealing ring 24 opposite to an axial end of sealing ring 24 that is arranged at initial contact portion 21.

5 In further detail, sealing ring 24 may be connected to and may protrude from main portion 23 in such a manner so as to extend towards and/or into the inner space of package 1. In other words, sealing ring 24 may be designed to protrude towards and/or into the inner space.

10 Sealing ring 24 may delimit an auxiliary space, in particular having a frustoconical shape. More specifically, the auxiliary space may taper from (substantially) initial contact portion 21 to inlet 14.

Preferentially, sealing ring 24 may present rotational
15 symmetry with respect to central axis E.

Advantageously, sealing ring 24 may comprise a first inner surface 26, in particular having an annular shape, facing flow channel 11 and an outer surface 27, in particular having an annular shape, opposite to first inner surface 26.
20 In particular, first inner surface 26 may delimit the auxiliary space.

Moreover, first inner surface 26 may define the second surface portion of inner wall 22.

Preferentially, outer surface 27 may face base frame 9.

25 In further detail, sealing ring 24 may also comprise a curved tip surface 28 connecting first inner surface 26 and outer surface 27 with one another.

With particular reference to Figures 2 and 3, base frame 9 may comprise a first contact surface 29, in particular
30 having an annular shape, configured to contact and/or contacting first face 7 and a second contact surface 30, in particular having an annular shape, configured to contact

and/or contacting second face 8.

In particular, first contact surface 29 and second contact surface 30 may face one another. Even more particular, first contact surface 29 and second contact surface 30 may define an interspace within which packaging material 3 is and/or is to be placed.

Preferentially, first contact surface 29 and second contact surface 30 may extend within respectively a first plane H1 and a second plane H2, in particular parallel to one another.

Moreover, first contact surface 29, in particular also first plane H1, and second contact surface 30, in particular second plane H2, are spaced apart from one another by a distance d1. In particular, distance d1 substantially corresponds to a thickness of packaging material 3.

Advantageously, initial contact portion 21 may be interposed between first contact surface 29 and pouring outlet 13.

Advantageously, a thickness d2 of annular interface 16 is larger than distance d1. Preferentially, thickness d2 is at least 1,2 times, in particular at least 1,3 times, even more particular at least 1,4 times, larger than distance d1. In this way, it is ensured that during molding of opening device 4 onto packaging material 3 the flow of the molten polymer is such to cover the edge of packaging material 3 delimiting the designated pour opening. Even if packaging material 3 is not placed within the mold in a nominal position (i.e. the position defined during the design of the mold), the edge of packaging material 3 will be covered. Additionally, the flow of the molten polymer may be such to more easily reach second face 8 of packaging material 3.

In more detail, base frame 9 may comprise a first

annular frame 35 having first contact surface 29 and a second annular frame 36 having second contact surface 30. In particular, first annular frame 35 and second annular frame 36 may be integrally connected to one another.

5 Preferentially, first annular frame 35 and second annular frame 36 may be configured to be placed respectively outside of and inside of the inner space of main body 2.

In even more detail, base frame 9 may also comprise an annular coupling portion 37 integrally connected to first
10 annular frame 36 and second annular frame 35. In particular, annular coupling portion 37 is arranged radially inside with respect to first annular frame 35 and second annular frame 36.

More specifically, first annular frame 35 and second
15 annular frame 36 may radially protrude from annular coupling portion 37.

More in particular, annular interface 16 is interposed between annular coupling portion 37 and collar 10.

Advantageously, base frame 9, in particular annular
20 coupling portion 37, may comprise a second inner surface 38 facing flow channel 11 and/or outer surface 27.

In particular, sealing ring 24 may be placed within a space delimited by second inner surface 38.

Moreover, base frame 9 may comprise an inlet aperture
25 39 for the pourable product. Preferentially, inlet 14 may be axially displaced from inlet aperture 39. In particular, inlet 14 may be interposed between initial connecting portion 21 and inlet aperture 39.

With particular reference to Figures 1 to 3, first frame
30 35 may comprise a plurality of radially protruding ridge elements 40, in particular each ridge element 40 may comprise a free peripheral portion 41 (i.e free peripheral portions

41 are not interconnected with respect to one another).

Preferentially, ridge elements 40 may be angularly spaced apart from one another about central axis E and/or central axis F.

5 In particular, one or more ridge elements 40 may carry a respective portion of first contact surface 29, i.e. first contact surface 29 comprises a plurality of discrete portions or, in even other words, first contact surface 29 is not continuous.

10 According to some preferred non-limiting embodiments, first frame 35 may comprise an external surface 42 opposite to first contact surface 29, and in particular extending within a third plane H3. In particular, third plane H3 may be parallel to first plane H1 and/or second plane H2.

15 Preferentially, external surface 42 may have a planar shape.

Moreover, collar 10 may comprise a further outer surface 43, in particular opposite to inner wall 22, having a curved portion 44.

20 Preferentially, curved portion 44 may contact and/or intersect with external surface 42.

Additionally, second inner surface 38 intersects outer surface 27 at a circumferential curve 46. In particular, inner surface 38 comprises circumferential curve 46.

25 In particular, circumferential curve 46 may result from the intersection of an intersection plane perpendicular to central axis E with second inner surface 38.

According to some preferred non-limiting embodiments, thickness d2 may correspond to the minimum distance between
30 curved surface 44 and second inner surface 38.

Preferentially, thickness d2 may correspond to the minimum distance between curved surface 44 and

circumferential curve 46.

Furthermore, annular interface 16 may extend between curved surface 44 and circumferential curve 46.

In further detail and with reference to Figures 2 and 3, a cross-section profile of sealing ring 24 with respect to a cross-section plane containing central axis E of collar 10 may comprise a first linear line and a second linear line radially displaced from the first linear line and being arranged radially outside with respect to the first linear line, in particular with respect to central axis E. In particular, the first linear line and the second linear line may result from the intersection of the cross-section plane with respectively first inner surface 26 and outer surface 27.

In more detail, the second linear line may present an extension corresponding to at least 50% of an extension of the first linear line. Preferentially, the extension of the first linear line is larger than the extension of the second linear line.

Moreover, the cross-section profile may also comprise a curved line connecting the first linear line and the second linear line with one another.

In further detail and with particular reference to Figures 2 and 3, closing element 12 may comprise:

- a central main wall 50 peripherally connected to coupling membrane 20; and

- a coupling structure 51 extending from central main wall 50 and configured to connect and/or connecting closing element 12 to the closure.

More specifically, coupling structure 51 may be connected, in particular welded and/or bonded and/or fused, to the closure, in particular an inner surface of the

closure.

According to some preferred non-limiting embodiments, the closure may be moveable between:

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

- an opening configuration in which the closure may be detached from pouring outlet 13, in particular for allowing an outflow of the pourable product through pouring outlet
10 13.

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

According to some preferred non-limiting embodiments,
15 closing element 12 may be connected, in particular fused and/or welded and/or bonded, to the closure, in particular by means of coupling structure 51, such that movement of the closure between the closing configuration and the opening configuration may result in movement of closing element 12
20 between respectively the active position and the inactive position.

According to some non-limiting embodiments, base frame 9, collar 10 and closing element 12 may be integrally formed, in particular in a single piece. In particular, base frame
25 9, collar 10 and closing element 12 may be formed during a molding process, in particular during molding of opening device 4 onto the respective blank.

Furthermore, the closure may be coupled to collar 10 after formation of base frame 9, collar 10 and closing
30 element 12.

In other words, base frame 9, collar 10 and closing element 12 may define the first portion of opening device 4

and the closure may define the second portion of opening device 4. Thus, the closure is applied to collar 10 after molding of base frame 9, collar 10 and closing element 12, in particular about the designated pour opening.

5 In use, a user receives package 1 with the closure and closing element 12 being respectively in the closing configuration and the active position so as to respectively cover pouring outlet 13 and the designated pour opening.

10 Prior to the first control of the closure from the closing configuration to the opening configuration and of closing element 12 from the active position to the inactive position, closing element 12, in particular through annular coupling membrane 20, is fixed to initial contact portion 21.

15 The user, in order to access the pourable product, needs to control the closure from the closing configuration to the opening configuration leading to a movement of closing element 12 from the active position to the inactive position and a rupturing of closing element 12, in particular of
20 coupling membrane 20, from initial contact portion 21. This then allows the pourable product to flow from the inner space through flow channel 11 and out of flow channel 11 through pouring outlet 13.

Each time closing element 12 is arranged again in the
25 active position (by moving the closure in the closing configuration) closing element 12 covers the designated pour opening. Thereby, the presence of sealing ring 24 ensures that closing element 12 engages inner wall 22 so as to close the designated pour opening and/or to interrupt or to
30 obstacle a fluid connection between inlet 14 and pouring outlet 13.

With reference to Figure 4, number 4' indicates an alternative embodiment of an opening device according to the present invention. As opening device 4' is similar to opening device 4, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

In particular, opening device 4' differs from opening device 4 in that external surface 42 is inclined with respect to first contact surface 35 and/or third plane H3 is inclined with respect to first plane H1 (i.e. third plane H3 and first plane H1 are not parallel to one another).

As operation of opening device 4' is similar to operation of opening device 4, we refer to the above-provided description.

The advantages of opening device 4 and opening device 4' and/or of package 1 according to the present invention will be clear from the foregoing description.

In particular, by having thickness d2 being larger than distance d1, one guarantees a flow of the molten polymer such that second face 8 and the edge of packaging material 3 delimiting the designated pour opening are covered by the plastic. This is also ensured in case packaging material 3 is not perfectly placed within the mold.

CLAIMS

1.- Opening device (4, 4') for a package (1) of a packaging material having a designated pour opening and being filled with a pourable product;

5 the opening device (4, 4') comprises:

- a base frame (9) configured to couple the opening device (4, 4') on the packaging material (3) and about the designated pour opening;

- a collar (10) integrally connected to and extending
10 from the base frame (9), delimiting a flow channel (11) for the pourable product, and having an inlet (14) and a pouring outlet (13); and

- a closing element (12) arranged and/or being arrangeable within the flow channel (11) and being configured
15 to cover and/or close the designated pour opening;

wherein the closing element (12) is detachably fixed to an initial contact portion (21) of the collar (10);

wherein the collar (10) comprises:

- a main portion (23) comprising the pouring outlet
20 (13) and extending from the initial contact portion (21) to the pouring outlet (13); and

- a sealing ring (24) comprising the inlet (14) and extending from the initial contact portion (21) to the inlet (14);

25 wherein the sealing ring (24) comprises a first inner surface (26) facing the flow channel (11) and an outer surface (27) opposite to the first inner surface (26);

wherein the base frame (9) comprises a second inner surface (38) facing the outer surface (27);

30 wherein the base frame (9) comprises a first contact surface (29) configured to contact the packaging material (3) from a first face (7) and a second contact surface (30)

configured to contact the packaging material (3) from a second face (8);

wherein the initial contact portion (21) is interposed between the first contact surface (29) and the pouring outlet
5 (13);

wherein a thickness (d2) of an annular interface (16) interposed between the base frame (9) and the collar (10) is larger than a distance (d1) between the first contact surface (29) and the second contact surface (30).

10 2.- Opening device according to claim 1, wherein the thickness (d2) is at least 1,2 times larger than the distance (d1) between the first contact surface (29) and the second contact surface (30).

3.- Opening device according to claim 1 or 2, wherein
15 the first contact surface (29) extends within a first plane (H1) and the second contact surface (30) extends within a second plane (H2), wherein the distance between the first contact surface (H1) and the second contact surface (H2) corresponds to the distance (d1) between the first plane
20 (H1) and the second plane (H2).

4.- Opening device according to any one of the preceding claims,

wherein the collar (10) comprises a further outer surface (43) having a curved portion (44);

25 wherein the thickness (d2) of the annular interface (16) corresponds to a minimum distance between the second inner surface (38) and the curved portion (44).

5.- Opening device according to claim 4, wherein the second inner surface (38) intersects the outer surface (27)
30 at a circumferential curve (46);

wherein the thickness (d2) of the annular interface (16) corresponds to a minimum distance between the curved

portion (44) and the circumferential curve (46).

6.- Opening device according to any one of the preceding claims, wherein the base frame (9) comprises a first frame (35) having the first contact surface (29) and a second frame
5 (36) having the second contact surface (30);

wherein the first frame (35) comprises an external surface (42) opposite to the first contact surface (29);

wherein the first frame (35) comprises a plurality of radially protruding ridge elements (40).

10 7.- Opening device according to any one of the preceding claims, wherein the second face (8) of the packaging material (3) is configured to contact the pourable product and/or to face an inner space of the package (1).

8.- Opening device according to any one of the preceding
15 claims, wherein the sealing ring (24) delimits an auxiliary space of the flow channel (11), wherein the auxiliary space has a frustoconical shape.

9.- Opening device according to any one of the preceding claims, wherein the sealing ring (24) further comprises a
20 curved tip surface (28) connecting the first inner surface (26) and the outer surface (27) with one another.

10.- Opening device according to any one of the preceding claims, wherein the sealing ring (24) comprises an annular coupling section (29) connecting the sealing ring
25 (24) to the annular interface.

11.- Opening device according to any one of the preceding claims, wherein the sealing ring (24) is designed to protrude towards and/or into an inner space of the package (1).

30 12.- Mold configured to allow for molding the opening device (4, 4') according to any one of the preceding 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.

13.- Package (1) filled and/or fillable with a pourable product and comprising at least one opening device (4, 4')

5 according to any one of claims 1 to 11.

14.- Package according to claim 13, wherein the package (1) comprises a main body (2) having a designated pour opening and being formed from a multilayer composite packaging material (3), wherein the opening device (4, 4')

10 is coupled onto the packaging material (3) of the main body (2) and about the designated pour opening.

15.- Package according to claim 13 or 14, wherein the opening device (4, 4') is molded to a main body (2) of the package (1) and/or onto a precursor of the package (1).

15

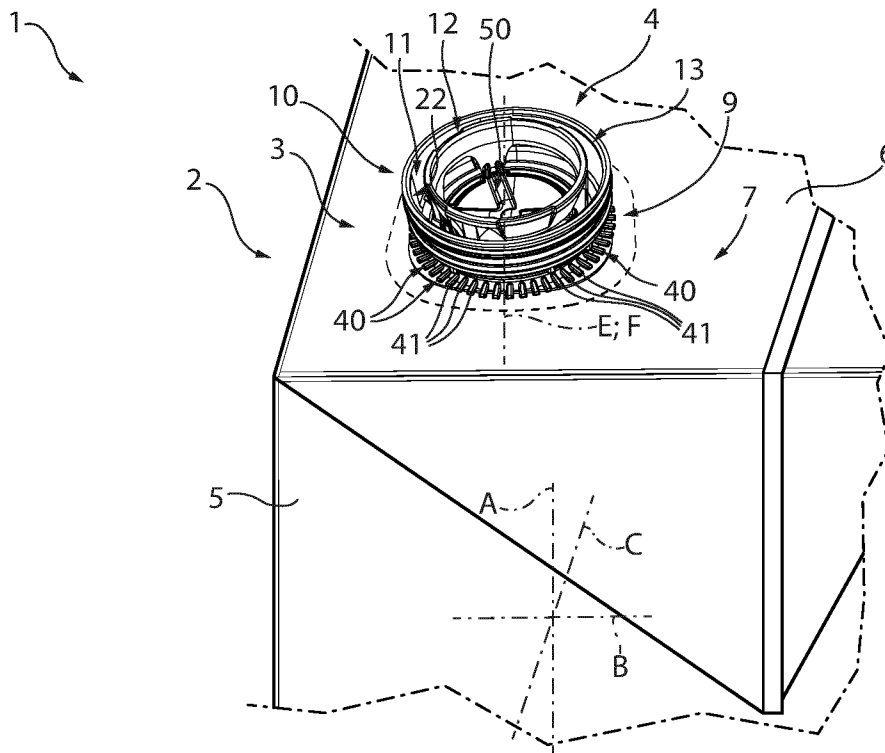


FIG. 1

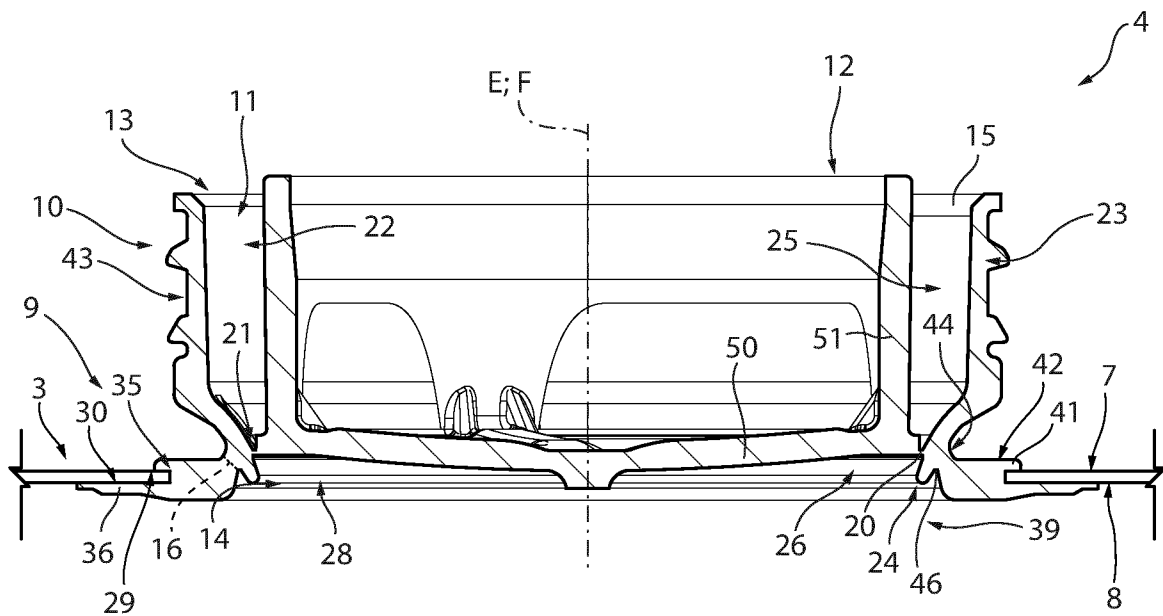


FIG. 2

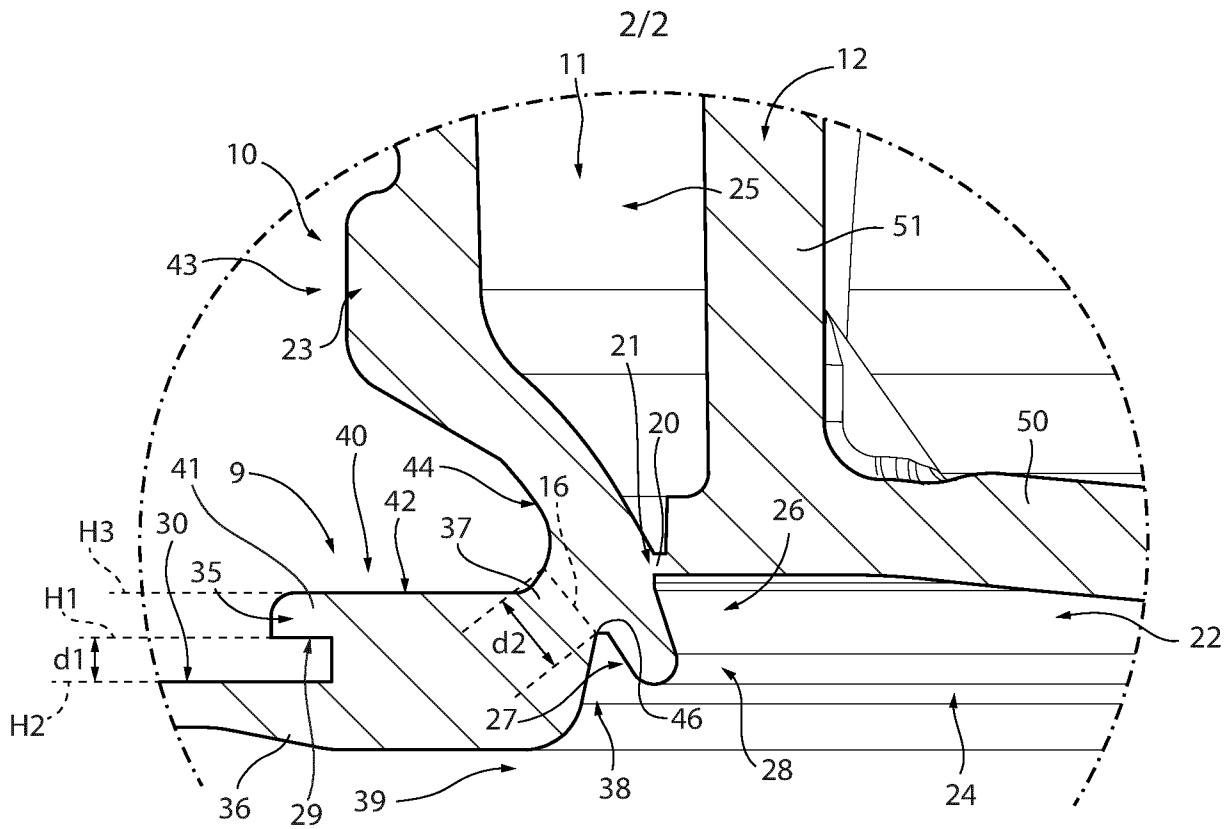


FIG. 3

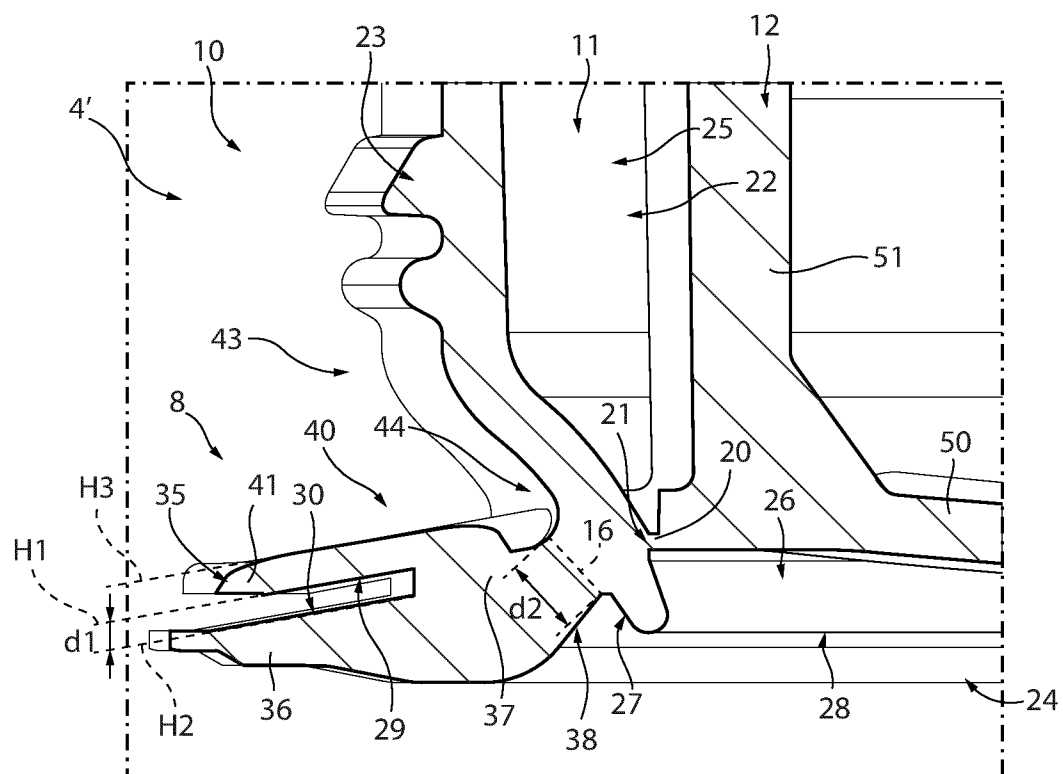


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/076025

A. CLASSIFICATION OF SUBJECT MATTER INV. B65D5/74 B65D47/10 B29C45/00 B29C37/00 B29C45/14 B65D51/22 B29L31/56 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.
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Y	JP 2018 172136 A (TOPPAN PRINTING CO LTD) 8 November 2018 (2018-11-08) paragraphs [0005] - [0008], [0025], [0026]; figures 1-9 -----	1-15
A	EP 3 153 413 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 12 April 2017 (2017-04-12) figure 2 -----	1-15
A	SE 526 048 C2 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 21 June 2005 (2005-06-21) paragraphs [0019] - [0022]; figures 1-4 ----- -/--	1-15
☒ 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 20 January 2023		Date of mailing of the international search report 27/01/2023
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

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	US 2002/033395 A1 (IWANO FUMIYUKI [JP] ET AL) 21 March 2002 (2002-03-21) figures 1-7 -----	1-15

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International application No

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