(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 328 143 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.02.2024 Bulletin 2024/09

(21) Application number: **23181484.9**

(22) Date of filing: **26.06.2023**

(51) International Patent Classification (IPC):
B65D 3/08 *(2006.01)* ***B65D 5/02*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65D 3/08; B65D 5/0209

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **02.08.2022 EP 22188314**

(71) Applicant: **Tetra Laval Holdings & Finance S.A.**
1009 Pully (CH)

(72) Inventors:
- **BARBIERI, Marcello**
  41123 Modena (IT)
- **FEDELE, Francesca**
  41123 Modena (IT)
- **MALAVASI, Filippo**
  41123 Modena (IT)
- **GERARDI, Daniele**
  41123 Modena (IT)

(74) Representative: **Tetra Pak - Patent Attorneys SE**
AB Tetra Pak
Patent Department
Ruben Rausings gata
221 86 Lund (SE)

(54) **PACKAGING BLANK FOR FORMING A PACKAGE AND PACKAGE FORMED FROM A PACKAGING BLANK**

(57) There is described a packaging blank (2, 2', 2", 2‴) for forming a package (40) filled with a pourable product comprising at least a first transversal crease line (4) and a second transversal crease line (5) extending transversally to a longitudinal axis (A) of the packaging blank (2, 2', 2", 2‴) and dividing the packaging blank (2, 2', 2", 2‴) into a top region (6) containing a top crease pattern (7) and a bottom region (8) containing a bottom crease pattern (9) and an intermediate region (10) contained between the first transversal crease line (4) and the second transversal crease line (5). The first transversal crease line (4) delimits the top crease pattern (7) and the second transversal crease line (5) delimits the bottom crease pattern (9). The packaging blank (2, 2', 2", 2‴) further comprises a plurality of linear crease lines (19a, 19b, 19c) parallel to the longitudinal axis (A) and extending from the first transversal crease line (4) and towards the second transversal crease line (5). Each linear crease line (19a, 19b, 19c) is parallel to the longitudinal axis (A) and extends along only a portion of the intermediate region (10) .

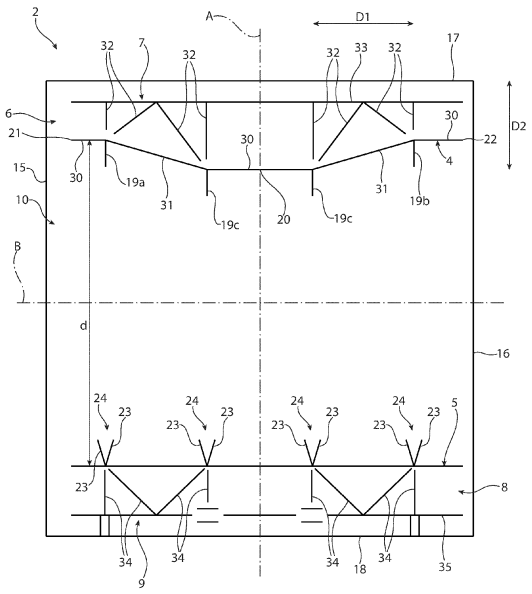

FIG. 2

EP 4 328 143 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a packaging blank, in particular having a multilayer structure, for forming a package filled with a pourable product, in particular with a pourable food product.

[0002] Advantageously, the present invention also relates to a package filled with a pourable product, in particular a pourable food product, and being formed from a packaging blank.

BACKGROUND ART

[0003] As is known, many liquid or 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.

[0004] A typical example is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by sealing and folding a laminated packaging blank. The packaging blank has a multilayer structure comprising a fibrous base layer, e.g. of paper or cardboard, covered on both sides with layers of heat-seal plastic material, e.g. polyethylene. In the case of aseptic packages for long-storage products, such as UHT milk, the packaging blank also comprises a layer of oxygen-barrier material (an oxygen-barrier layer), 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.

[0005] Packages of this sort are normally produced on fully automatic packaging apparatuses, which form the packages from respective packaging blanks. These packaging blanks can be provided in the form of single packaging blanks or in the form of a web, which is formed from a plurality of successively arranged packaging blanks.

[0006] In the case of the packaging apparatus being designed to form the packages from a web, the packaging apparatus advances and sterilizes the web, which is then formed into a tube and filled with the pourable product before the tube is formed into individual sealed packages.

[0007] In order to facilitate the formation and for defining the shape of the packages, the packaging blanks are provided with a plurality of crease lines.

[0008] It is for example known to produce packages from respective packaging blanks that comprise a respective at least partially rounded side wall, which is interposed between a respective bottom wall and a respective top wall.

[0009] Even though the known packaging blanks allow to satisfyingly well define packages with rounded side walls, a desire is felt in the sector to further improve the packaging blanks.

DISCLOSURE OF INVENTION

[0010] It is therefore an object of the present invention to provide an improved packaging blank, in particular for forming packages with at least partially rounded side walls.

[0011] It is another object of the present invention to provide an improved package formed from a packaging blank.

[0012] According to the present invention, there is provided a packaging blank as claimed in claim 1.

[0013] Preferred non-limiting embodiments of the packaging blank are claimed in the respective dependent claims.

[0014] According to the present invention, there is also provided a package according to claim 17.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Four non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a packaging machine for forming packages, with parts removed for clarity;
Figure 2 is a top view of a packaging blank according to a first embodiment of the present invention, with parts removed for clarity;
Figure 3 is a top view of a packaging blank according to a second embodiment of the present invention, with parts removed for clarity;
Figure 4 is a top view of a packaging blank according to a third embodiment of the present invention, with parts removed for clarity; and
Figure 5 is a top view of a packaging blank according to a fourth embodiment of the present invention, with parts removed for clarity.

BEST MODES FOR CARRYING OUT THE INVENTION

[0016] Number 1 indicates as a whole a packaging machine for producing (sealed) packages 40 of a pourable product, in particular a pourable food product such as pasteurized milk, fruit juice, wine, tomato sauce, etc., from respective packaging blanks 2 (see Figures 2 to 5).

[0017] Preferentially, packaging blanks 2 may have a multilayer structure.

[0018] In more detail, each packaging blank 2 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, interposing the layer of fibrous material in between one another.

[0019] One of these two layers of heat-seal plastic material may define an inner face of the respective package 40 obtained from the respective packaging blank 2 and eventually contacting the pourable product.

[0020] Preferably but not necessarily, each packaging blank 2 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 the heat-seal plastic material and the layer of fibrous material. Preferentially but not necessarily, packaging blank 2 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.

[0021] According to the example shown in Figure 1, packaging blanks 2 are provided in the form of a web 3.

[0022] In more detail, web 3 may be formed from a plurality of successively arranged packaging blanks 2.

[0023] In other words, the successively arranged packaging blanks 2 define a plurality of repeat units of web 3. In particular, each repeat unit (i.e. the respective packaging blank 2) forms the precursor of one respective package 40. In other words, packaging machine 1 may be configured to produce packages 40 from web 3 such that each package 40 results from one respective packaging blank 2.

[0024] In particular, each packaging blank 2 may comprise a desired pattern/decoration.

[0025] Each packaging blank 2 may be designed to form a package 40 comprising:

- a first portion, in particular having a first wall;
- a second portion, in particular having a second wall, displaced from the first portion along a longitudinal direction of package 40; and
- an intermediate portion, in particular having a side wall, being (fixedly) connected to and extending from the first portion, in particular the first wall.

[0026] In more detail, each first portion and each second portion may define respectively a bottom portion and a top portion of the respective package.

[0027] Additionally, each intermediate portion may be interposed between the respective first portion and the respective second portion.

[0028] In particular, when each package 40 is in its nominal position (i.e. when being used by a user in an intended manner), the user recognizes the first portion as the bottom portion and the second portion as the top portion.

[0029] Preferentially, each second portion may be defined as the portion of the package, which can be manipulated such to allow for the outpouring of the pourable product. For example, the second portion may be manipulated so as to obtain a pouring opening or the second portion may comprise an opening device (e.g. a cap), which can be manipulated.

[0030] Preferentially, each intermediate portion may be defined to be gripped by a user.

[0031] In further detail, each first wall may define a support surface of the respective package, 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.

[0032] In particular, each first wall may define a bottom wall of the respective package 40 (i.e. when the respective package 40 is arranged on the support the first wall is in contact with the support).

[0033] More specifically, each side wall may be rounded or may have at least one or more rounded portions.

[0034] Furthermore, each side wall may be interposed between the respective first wall and the respective second wall.

[0035] In particular, when the package 40 is arranged on the support, the respective second wall may define a respective top wall.

[0036] According to some possible embodiments, each first wall and the respective second wall may be parallel to one another. Alternatively, the first wall and the second wall may be inclined with respect to one another. In particular, the second wall may define a slanted top or may define a portion of a gable-top.

[0037] Figure 2 shows a first embodiment of packaging blank 2.

[0038] Packaging blank 2 comprises at least a first transversal crease line 4 and a second transversal crease line 5 extending transversally to a longitudinal axis A of packaging blank 2 and dividing packaging blank 2 into:

- a top region 6 containing a top crease pattern 7 and configured to form the top portion, preferentially the top wall, even more preferentially the top wall and top flaps, of the respective package 40;
- a bottom region 8 containing a bottom crease pattern 9 and configured to form the bottom portion, preferentially the bottom wall, even more preferentially the bottom wall and bottom flaps, of the respective package 40; and
- an intermediate region 10 interposed between first transversal crease line 4 and second transversal crease line 5 and being interposed between top region 6 and bottom region 8 and designed to form the intermediate portion, in particular the side wall, of the package.

[0039] In further detail, each first transversal crease line 4 may delimit, and preferentially may be adjacent to, the respective top crease pattern 7 and each second transversal crease line 5 may delimit, and preferentially may be adjacent to, the respective bottom crease pattern 9.

[0040] In further detail, each packaging blank 2 may extend along longitudinal axis A and a transversal axis B, perpendicular to longitudinal axis A.

[0041] Moreover, each packaging blank 2 has a (substantially) 2-dimensional shape, i.e. respective extensions of each packaging blank 2 along longitudinal axis A and transversal axis B are significantly larger than a thickness of packaging blank 2.

[0042] Preferentially, each packaging blank 2 may have a rectangular or square shape.

[0043] In more detail, each packaging blank 2 may comprise:

- a first longitudinal boundary edge 15 and a second longitudinal boundary edge 16 spaced apart from one another along a first direction D1 transversal, preferentially perpendicular, to longitudinal axis A; and
- a first transversal boundary edge 17 and a second transversal boundary edge 18 spaced apart from one another along a second direction D2 parallel to longitudinal axis A and/or transversal, preferentially perpendicular, to first direction D1 and/or transversal, preferentially perpendicular, to transversal axis B.

[0044] Additionally, first direction D1 may be parallel to transversal axis B.

[0045] Moreover, each first longitudinal boundary edge 15 and each second longitudinal boundary edge 16 may be connected to and interposed between the respective first transversal boundary edge 17 and the respective second transversal boundary edge 18.

[0046] Preferentially, each first longitudinal boundary edge 15 and each second longitudinal boundary edge 16 may be arranged at an angle of about 90° with respect to the respective first transversal boundary edge 17 and the respective second transversal boundary edge 18.

[0047] It should be noted that in the case of each packaging blank 2 being arranged singularly, i.e. separated from the other packaging blanks 2, the respective first longitudinal boundary edge 15, the respective second longitudinal boundary edge 16, the respective first transversal boundary edge 17 and the respective second transversal boundary edge 18 may be real edges.

[0048] In the case of packaging blanks 2 being arranged in the form of a web 3, the respective first longitudinal boundary edge 15 and the respective second longitudinal boundary edge 16 may be real edges (as also shown in Figure 2) and the respective first transversal boundary edge 17 and the respective second transversal boundary edge 18 may be imaginary edges. In particular, each first transversal boundary edge 17 of one packaging blank 2 may be adjacent to, or coincide with, the respective second transversal boundary edge 18 of another packaging blank 2.

[0049] Alternatively, the respective first transversal boundary edge 17 and the respective second transversal boundary edge 18 may be real edges and the respective first longitudinal boundary edge 15 and the respective second longitudinal boundary edge 16 may be imaginary edges. In particular, each first longitudinal boundary edge 15 of one packaging blank 2 may be adjacent to the respective second longitudinal boundary edge 16 of another packaging blank 2.

[0050] Moreover, each longitudinal axis A may allow to define the respective longitudinal axis of the respective package 40 formed from the respective packaging blank 2.

[0051] Advantageously, each packaging blank 2 further comprises a plurality of linear crease lines, in particular at least a first linear crease line 19a and a second linear crease line 19b, extending from the respective first transversal crease line 4 and towards, but preferentially not up to, the respective second transversal crease line 5.

[0052] Preferentially, each linear crease line, in particular the respective at least a first linear crease line 19a and the respective at least a second linear crease line 19b, may extend along only a portion of the respective intermediate region 10, i.e. linear crease lines do not extend up to the respective second transversal crease line 5.

[0053] The Applicant has found that the presence of linear crease lines, in particular of at least a first linear crease line 19a and at least a second linear crease line 19b, facilitates the formation of side walls having a rounded shape or having portions having a rounded shape.

[0054] According to some preferred non-limiting embodiment, each first linear crease line 19a may be adjacent to, and preferentially also parallel to, the respective first longitudinal boundary edge 15. Preferentially, no other linear crease line parallel to longitudinal axis A and/or extending from first transversal crease line 4 and towards second transversal crease line 5 may be interposed between each first linear crease line 19a and the respective first longitudinal boundary edge 15.

[0055] According to some preferred non-limiting embodiments, each second linear crease line 19b may be adjacent to, and preferentially also parallel to, the respective second longitudinal boundary edge 16. Preferentially, no other linear crease line parallel to longitudinal axis A and/or extending from first transversal crease line 4 and towards second transversal crease line 5 may be interposed between each second linear crease line 19b and the respective second longitudinal boundary edge 16.

[0056] In further detail, each first linear crease line 19a and each second linear crease line 19b may be closer to respectively the respective first transversal boundary edge 15 and the respective second transversal boundary edge 16 than to a center point 20 of the respective first transversal crease line 4.

[0057] In particular, each center point 20 may be defined as the point of the respective first transversal crease line 4 being equally distanced from a first end 21 and a second end 22 opposed to the respective first end 21 of the respective first transversal crease line 4.

[0058] With particular reference to Figure 2, each packaging blank 2 may further comprise one or more additional linear crease lines 19c interposed between the respective first linear crease line 19a and the respective second linear crease line 19b. In particular, each additional linear crease line 19c defines a portion of the plurality of linear crease lines of the respective packaging blank 2.

[0059] In particular, the respective linear crease lines, in particular the respective first linear crease line 19a,

the respective second linear crease line 19b, and preferentially the respective additional linear crease lines 19c, of each packaging blank 2 may be designed to facilitate the formation of a rounded shape and/or rounded portions of the respective side wall of the respective package 40.

[0060] More specifically, the respective linear crease lines, in particular the respective first linear crease line 19a, the respective second linear crease line 19b and the respective additional linear crease lines 19c, of each packaging blank 2 may be equally spaced from one another, in particular with respect to first direction D1.

[0061] According to some preferred non-limiting embodiments, each linear crease line, in particular the respective first linear crease line 19a, the respective second linear crease line 19b, and preferentially the respective additional linear crease lines 19c, of each packaging blank 2 may be (substantially) parallel to the respective longitudinal axis A.

[0062] According to some preferred non-limiting embodiments, each linear crease line, in particular each first linear crease line 19a, each second linear crease line 19b and in particular also each additional linear crease line 19c, of each packaging blank 2 may have a respective extension, which is at most 30 %, preferentially at most 20 %, even more preferentially at most 17 %, of a respective distance d between the respective first transversal crease line 4 and the respective second transversal crease line 5.

[0063] According to some preferred non-limiting embodiments, each linear crease line, in particular each first linear crease line 19a, each second linear crease line 19b and in particular also each additional linear crease line 19c, of each packaging blank 2 may have a respective extension, which may range between 4% to 20%, preferentially between 6% to 18%, even more preferentially between 8% to 16%, of the respective distance d between the respective first transversal crease line 4 and the respective second transversal crease line 5. In particular, each distance d between the respective first transversal crease line 4 and the respective second transversal crease line 5 may be defined with respect to a linear axis being coaxial to the respective linear crease line, i.e. to first linear crease line 19a or second linear crease line 19b or the additional linear crease line 19, and extending from the respective first transversal crease line 4 to the respective second transversal crease line 5.

[0064] According to some preferred non-limiting embodiments, each linear crease line, in particular each first linear crease line 19a, each second linear crease line 19b and in particular also each additional linear crease line 19c, of each packaging blank 2 may have an extension (length) ranging between 5 mm to 25 mm, preferentially between 8 mm to 22 mm, even more preferentially between 10 mm to 20 mm.

[0065] According to some preferred non-limiting embodiments, each linear crease line, in particular the respective first linear crease line 19a, the respective second linear crease line 19b and in particular also the respective additional linear crease line 19c, of each packaging blank 2 may have the same extension (length) as the other linear crease lines of the respective packaging blank 2. In other words, each first linear crease line 19a may have the same extension (length) as the respective second linear crease line 19b, and in particular also the respective additional linear crease line 19c.

[0066] According to some preferred non-limiting embodiments, each packaging blank 2 may further comprise a plurality of auxiliary linear crease lines 23, in the specific example shown four, extending from the respective second transversal crease line 5 towards, but not up to the respective first transversal crease line 4. In other words, each auxiliary linear crease line 23 may extend along only a portion of the respective intermediate region 10.

[0067] Preferentially, at least some, in the specific example shown all, auxiliary linear crease lines 23 may face one respective linear crease line.

[0068] More specifically, at least a auxiliary linear crease line 23 and at least another auxiliary linear crease line 23 may face respectively the corresponding first linear crease line 19a and the corresponding second linear crease line 19b.

[0069] With particular reference to Figure 2, each packaging blank 2 may comprise a plurality of pairs 24 of auxiliary linear crease lines 23.

[0070] Preferentially, the respective auxiliary linear crease lines 23 of each pair 24 may be arranged such to define a V-shape, preferentially with an intersection point lying on or at least being adjacent to the respective second transversal crease line 5 and/or diverging towards the respective first transversal crease line 4.

[0071] According to such an embodiment, auxiliary linear crease line 23 may allow to form respective edges of the respective package 40 having an increased strength.

[0072] According to some preferred non-limiting embodiments, each second transversal crease line 5 may have a linear shape, preferentially being perpendicular to longitudinal axis A.

[0073] According to some preferred non-limiting embodiments, each first transversal crease line 4 may comprise a plurality of first linear portions 30 perpendicular to the respective longitudinal axis A and a plurality of second linear portion 31 transversal to the respective longitudinal axis A.

[0074] Preferentially, each second linear portion 31 may be interposed between two respective first linear portions 30.

[0075] In further detail, each top crease pattern 7 may comprise a plurality of additional crease lines 32, preferentially some being parallel and some being transversal to the respective longitudinal axis A.

[0076] Furthermore, each top crease pattern 7 may also comprise an auxiliary top transversal crease line 33, in particular transversal, even more particular perpendicular, to the respective longitudinal axis A.

[0077] More specifically, additional crease lines 32 may be interposed between the respective first transversal crease line 4 and the respective top transversal crease line 33.

[0078] Preferentially, each top transversal crease line 33 may be adjacent to and parallel to the respective first transversal boundary edge 17.

[0079] In further detail, each bottom crease pattern 9 may comprise a plurality of additional crease lines 34, preferentially some being parallel and some being transversal to the respective longitudinal axis A.

[0080] Furthermore, each bottom crease pattern 9 may also comprise an auxiliary bottom transversal crease line 35, in particular transversal, even more particular perpendicular, to the respective longitudinal axis A.

[0081] More specifically, additional crease lines 34 may be interposed between the respective second transversal crease line 5 and the respective bottom transversal crease line 35.

[0082] Preferentially, each bottom transversal crease line 35 may be adjacent to and parallel to the respective second transversal boundary edge 18.

[0083] According to some preferred non-limiting embodiments, the respective crease lines, e.g. first transversal crease line 4 and/or second transversal crease line 5 and/or first linear crease line 19a and/or second linear crease line 19b and/or additional linear crease lines 19c and/or auxiliary linear crease lines 23 and/or additional crease lines 32 and/or top transversal crease line 33 and/or additional crease lines 34 and/or bottom transversal crease line 35, of each packaging blank 2 may define a plurality of panels. More specifically, the panels may give origin and/or may correspond to various sections of the respective package 40.

[0084] More specifically, the panels may give origin and/or may correspond to the respective first portion, preferentially the respective bottom portion, the respective intermediate portion and the respective second portion, preferentially the respective top portion.

[0085] Even more specifically, some of the panels may give origin and/or may correspond to the respective first portion and/or some of the panels may give origin and/or may correspond the second portion and/or some panels give origin and/or may correspond to the intermediate portion.

[0086] According to some preferred non-limiting embodiments, the respective linear crease lines of each packaging blank 2, i.e. each first linear crease line 19a and each second linear crease line 19b, and preferentially each additional linear crease line 19c, may be arranged in correspondence of a respective section defined by one or more respective panels, which in turn corresponds to a respective corner of the respective second portion, preferentially of the respective top portion, even more preferentially of the respective second wall.

[0087] According to some possible non-limiting embodiments, each auxiliary linear crease line 23, may be arranged in correspondence of a respective section defined by one or more respective panels, which in turn correspond to respective corners of the respective first portion, preferentially of the respective bottom portion, even more preferentially of the respective first wall.

[0088] In particular, top crease pattern 7 defines the panels that form the top portion, preferentially the top wall, of package 40.

[0089] Similarly, bottom crease pattern 9 defines the panels that form the bottom portion, preferentially the bottom wall, of package 40.

[0090] In this case, each linear crease line of the packaging blank 2, i.e. the first linear crease line 19a and the second linear crease line 19b, and preferentially the additional linear crease line 19c, may be arranged in correspondence of a section defined by one or more respective panels, which in turn correspond to a respective corner of the top portion, even more preferentially of the second wall.

[0091] Similarly, each auxiliary linear crease line 23 of the packaging blank 2 may be arranged in correspondence of a section defined by one or more respective panels, which in turn correspond to a respective corner of the bottom portion, even more preferentially of the first wall.

[0092] With reference to Figure 3, number 2' indicates an alternative embodiment of packaging blank according to the present invention; as packaging blank 2' is similar to packaging blank 2, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

[0093] In particular, packaging blank 2' differs from packaging blank 2 in that no further linear crease line extending from the respective first transversal crease line 4 and towards the respective second transversal crease line 5 is interposed between the respective first linear crease line 19a and the respective second linear crease line 19b.

[0094] With reference to Figure 4, number 2" indicates an alternative embodiment of packaging blank according to the present invention; as packaging blank 2" is similar to packaging blank 2, the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

[0095] In particular, packaging blank 2" differs from packaging blank 2 in that each auxiliary linear crease line 23 may be parallel to the respective longitudinal axis A.

[0096] In particular, according to such an embodiment it is possible to further improve the formation of a rounded shape and/or of rounded portions of each package 40.

[0097] Alternatively or in addition, one auxiliary linear crease line 23 and another auxiliary linear crease line 23 may be coaxial to respectively first linear crease line 19a and second linear crease line 19b.

[0098] Moreover, only one auxiliary linear crease line 23 may face a respective linear crease line.

[0099] With reference to Figure 5, number 2"' indi-

cates an alternative embodiment of packaging blank according to the present invention; as packaging blank 2" ' is similar to packaging blank 2'', the following description is limited to the differences between them, and using the same references, where possible, for identical or corresponding parts.

[0100] In particular, packaging blank 2‴ differs from packaging blank 2" in that no further linear crease line extending from the respective first transversal crease line 4 and towards the respective second transversal crease line 5 is interposed between the respective first linear crease line 19a and the respective second linear crease line 19b.

[0101] With particular reference to Figure 1, packaging machine 1 may be configured to form respective packages 40 filled with the pourable product from any one of packaging blanks 2, packaging blanks 2', packaging blanks 2" and packaging blanks 2‴, preferentially when being provided in the form of a respective web 3.

[0102] In more detail, packaging machine 1 may comprise at least:

- a conveying device 41 configured to advance web 3 along a web advancement path P at least to a tube forming station at which web 3 is formed into a tube 42; and
- a tube forming and sealing device 43 configured to form tube 42 from web 3 and to longitudinally seal tube 42 at the tube forming station;
- a filling device 44 configured to fill tube 42 with the pourable product; and
- a package forming unit 45 configured to form, transversally seal and cut tube 42 for obtaining packages 40.

[0103] The advantages of packaging blank 2 or packaging blank 2' or packaging blank 2" or packaging blank 2" ' according to the present invention will be clear from the foregoing description.

[0104] In particular, by having the linear crease lines, in particular at least first linear crease line 19a and second linear crease line 19b the formation of a rounded shape and/or of rounded portions of each package 40 is facilitated.

[0105] Clearly, changes may be made to packaging blank 2 or packaging blank 2' or packaging blank 2" or packaging blank 2‴ as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. Packaging blank (2, 2', 2'', 2" ') for forming a package (40) filled with a pourable product comprising:

   - at least a first transversal crease line (4) and a second transversal crease line (5) extending transversally to a longitudinal axis (A) of the packaging blank (2, 2', 2", 2‴) and dividing the packaging blank (2, 2', 2", 2‴) into:
   - a top region (6) containing a top crease pattern (7) and configured to form a top portion of the package (40) ;
   - a bottom region (8) containing a bottom crease pattern (9) and configured to form a bottom portion of the package (40); and
   - an intermediate region (10) contained between the first transversal crease line (4) and the second transversal crease line (5), interposed between the bottom region (8) and the top region (6) and designed to form a side wall of the package (40);
   wherein the first transversal crease line (4) delimits the top crease pattern (7);
   wherein the second transversal crease line (5) delimits the bottom crease pattern (9);
   wherein the packaging blank (2, 2', 2", 2‴) further comprises a plurality of linear crease lines (19a, 19b, 19c) extending from the first transversal crease line (4) and towards the second transversal crease line (5) and each each one of the linear crease lines (19a, 19b, 19c) being parallel to the longitudinal axis (A);
   wherein each linear crease line (19a, 19b, 19c) extends along only a portion of the intermediate region (10) .

2. Packaging blank according to claim 1, wherein each linear crease line (19a, 19b, 19c) has a respective extension, which is at most 30 % of a respective distance (d) between the first transversal crease line (4) and the second transversal crease line (5).

3. Packaging blank according to claim any one of the preceding claims, and further comprising:

   - a first longitudinal boundary edge (15) and a second longitudinal boundary edge (16) spaced apart from one another along a first direction (D1) transversal to the longitudinal axis (A) of the packaging blank (2, 2', 2", 2‴); and
   - a first transversal boundary edge (17) and a second transversal boundary edge (18) spaced apart from one another along a second direction (D2) parallel to the longitudinal axis (A);

   wherein at least a first linear crease line (19a) is adjacent to the first longitudinal boundary edge (15) and at least a second linear crease line (19b) is adjacent to the second longitudinal boundary edge (16).

4. Packaging blank according to claim 3, wherein no other linear crease line parallel to the longitudinal axis (A) and/or extending from the first transversal

crease line (4) and towards the second transversal crease line (5) is interposed between the first linear crease line (19a) and the first longitudinal boundary edge (15) and no other linear crease line parallel to the longitudinal axis (A) and/or extending from the first transversal crease line (4) and towards the second transversal crease line (5) is interposed between the second linear crease line (19b) and the second longitudinal boundary edge (16) .

5. Packaging blank according to claim 3 or 4, wherein the first linear crease line (19a) and the second linear crease line (19b) are closer to respectively the first transversal boundary edge (15) and the second transversal boundary edge (16) than to a center point (20) of the first transversal crease line (4).

6. Packaging blank according to any one of claims 3 to 5, wherein no further linear crease line extending from the first transversal crease line (4) and towards the second transversal crease line (5) is interposed between the first linear crease line (19a) and the second linear crease line (19b).

7. Packaging blank according to any one of claims 3 to 5, and further comprising one or more linear crease lines (19c) interposed between the first linear crease line (19a) and the second linear crease line (19b).

8. Packaging blank according to any one of the preceding claims, wherein at least the first transversal crease line (4) and the second transversal crease line (5) define respective panels, which give origin and/or correspond to at least the top portion, the intermediate portion and the bottom portion of the respective package (40) ;
wherein each linear crease line (19a, 19b, 19c) is arranged in correspondence of a respective section defined by one or more respective panels, which in turn corresponds to a respective corner of the respective top portion.

9. Packaging blank according to any one of the preceding claims, wherein the top crease pattern (7) defines panels that form the top portion of the package (40) and the bottom crease pattern (9) defines panels that form the bottom portion of the package (40);
wherein each linear crease line (19a, 19b, 19c) is arranged in correspondence of a section defined by one or more panels, which in turn corresponds to a corner of the top portion.

10. Packaging blank according to any one of the preceding claims, wherein each linear crease line (19a, 19b, 19c) has an extension ranging between 5 mm to 25 mm.

11. Packaging blank according to any one of the preceding claims, wherein each one of the linear crease lines (19a, 19b, 19c) has the same extension as the other linear crease lines (19b, 19c, 19a).

12. Packaging blank according to any one of the preceding claims, and further comprising a plurality of auxiliary linear crease lines (23) extending from the second transversal crease line (5) and towards the first transversal crease line (4);
wherein each auxiliary linear crease line (23) only extends along a portion of the intermediate region (10).

13. Packaging blank according to claim 12, wherein each auxiliary linear crease line (23) is parallel to the longitudinal axis (A).

14. Packaging blank according to claim 12, comprising a plurality of pairs (24) of auxiliary linear crease lines (23);
wherein the respective auxiliary linear crease lines (23) of each pair (24) are arranged such to define a V-shape.

15. Packaging blank according to any one claims 12 to 14, wherein at least the first transversal crease line (4) and the second transversal crease line (5) define respective panels, which give origin and/or correspond to at least the top portion, the intermediate portion and the bottom portion of the respective package (40);
wherein each auxiliary linear crease line (23) is arranged in correspondence of a respective section defined by one or more respective panels, which in turn corresponds to a respective corner of the respective bottom portion.

16. Packaging blank according to any one claims 12 to 15, wherein the top crease pattern (7) defines panels that form the top portion of the package (40) and the bottom crease pattern (9) defines panels that form the bottom portion of the package (40);
wherein each auxiliary linear crease line (23) is arranged in correspondence of a section defined by one or more panels, which in turn corresponds to a corner of the bottom portion.

17. Package (40) filled with a pourable product formed from a packaging blank (2, 2', 2", 2‴) according to any one of the preceding claims.

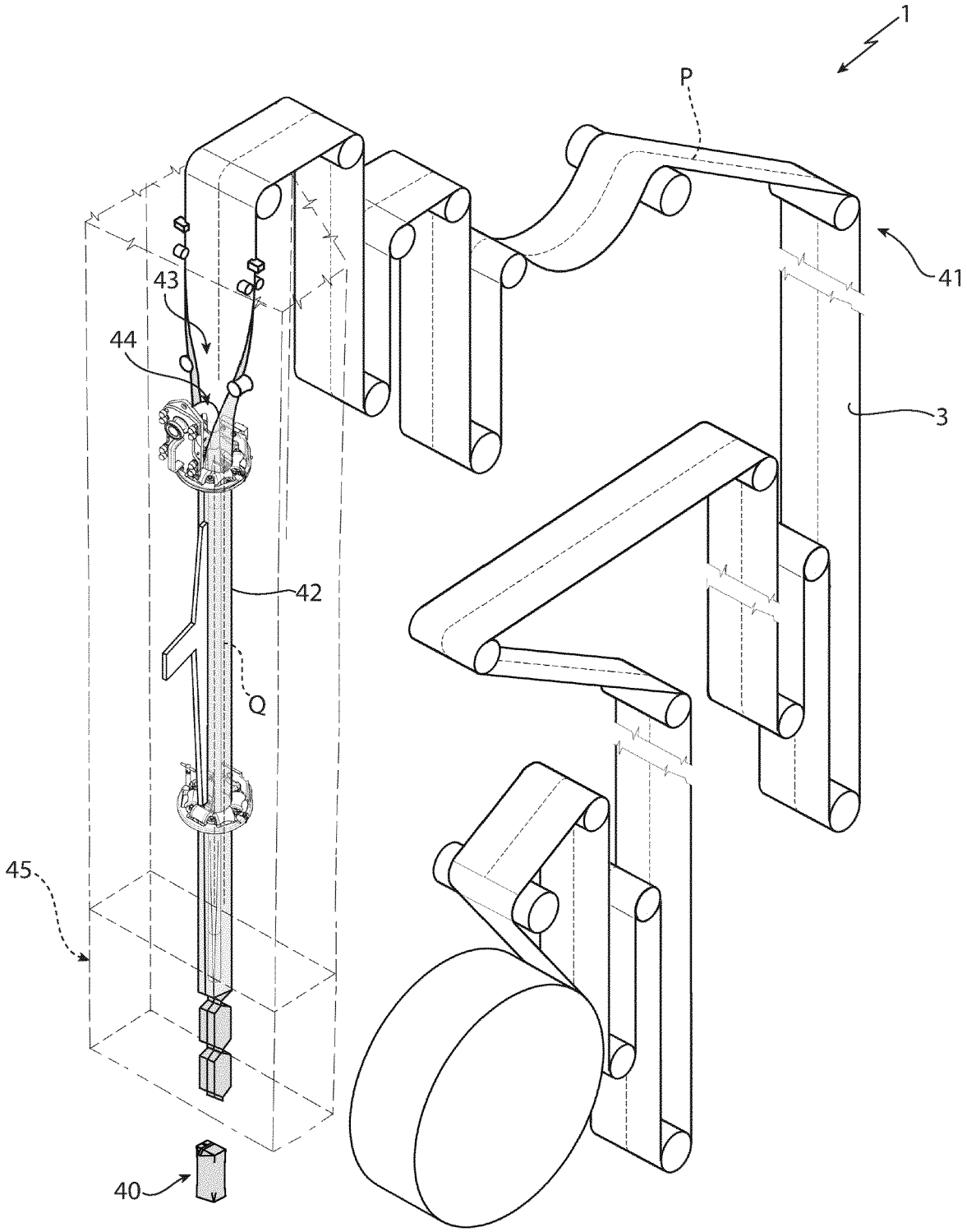

FIG. 1

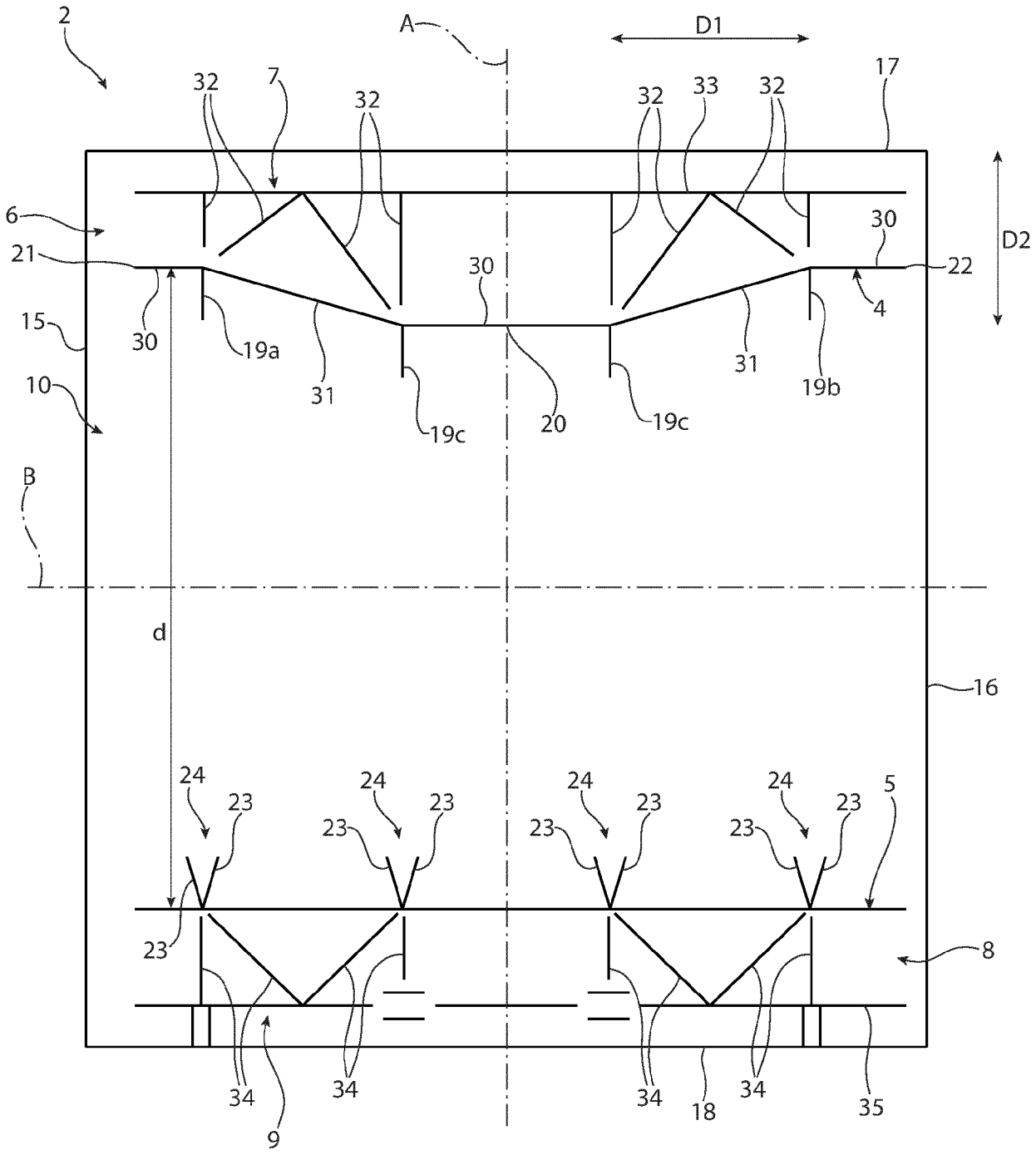
2
A
D1
17
32
7
32
32
33
32
6
21
30
30
22
D2
4
15
30
19a
31
30
31
19b
10
19c
20
19c
B
d
16
24
23
24
23
24
23
24
23
5
23
23
23
23
23
8
34
9
34
34
18
34
35

FIG. 2

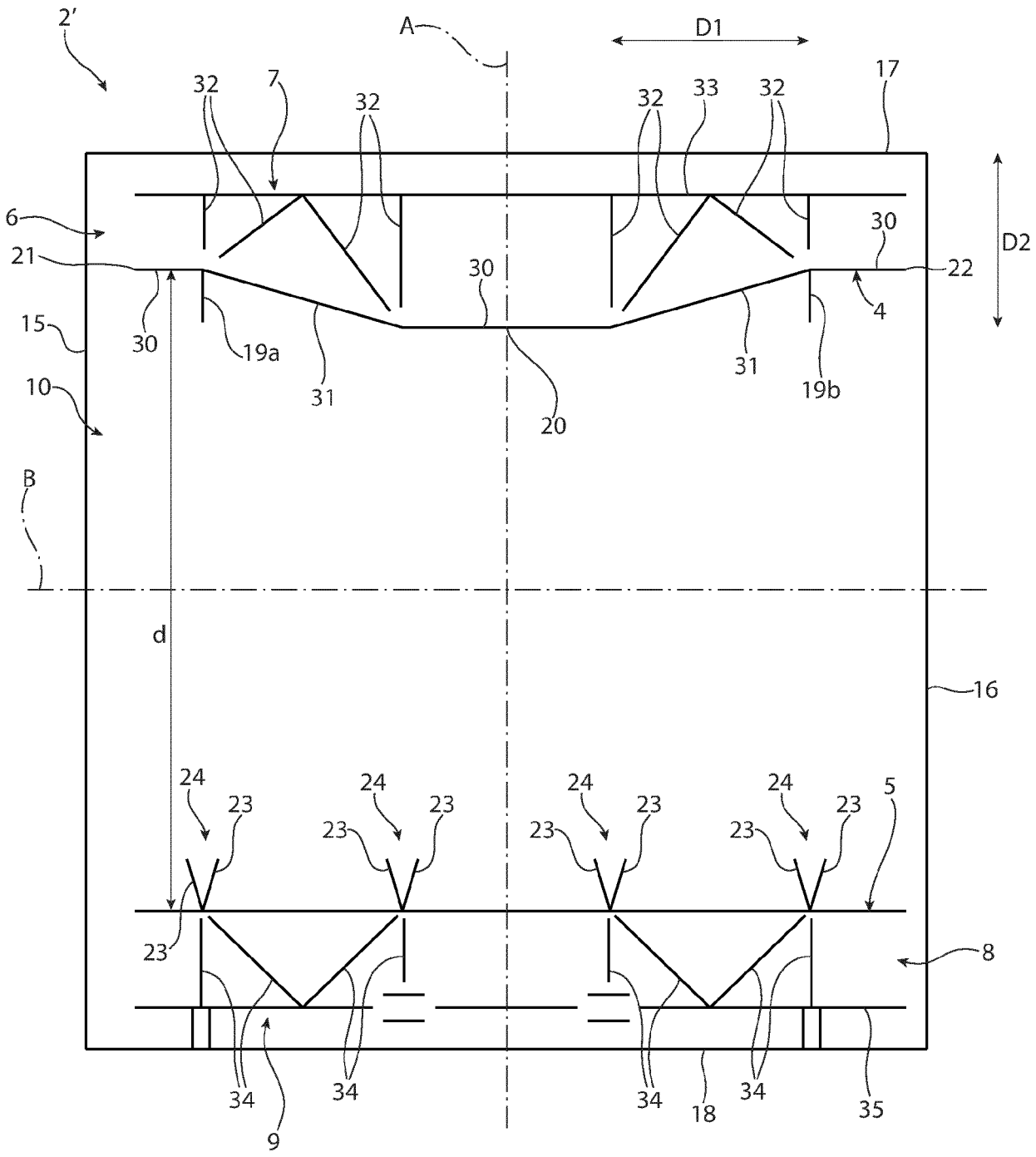
2'
A
D1
17
32
7
32
32
33
32
6
21
30
30
22
D2
4
15
30
19a
31
31
19b
10
20
B
d
16
24
23
24
23
24
23
24
23
5
23
23
23
23
23
8
34
34
34
34
9
18
35

FIG. 3

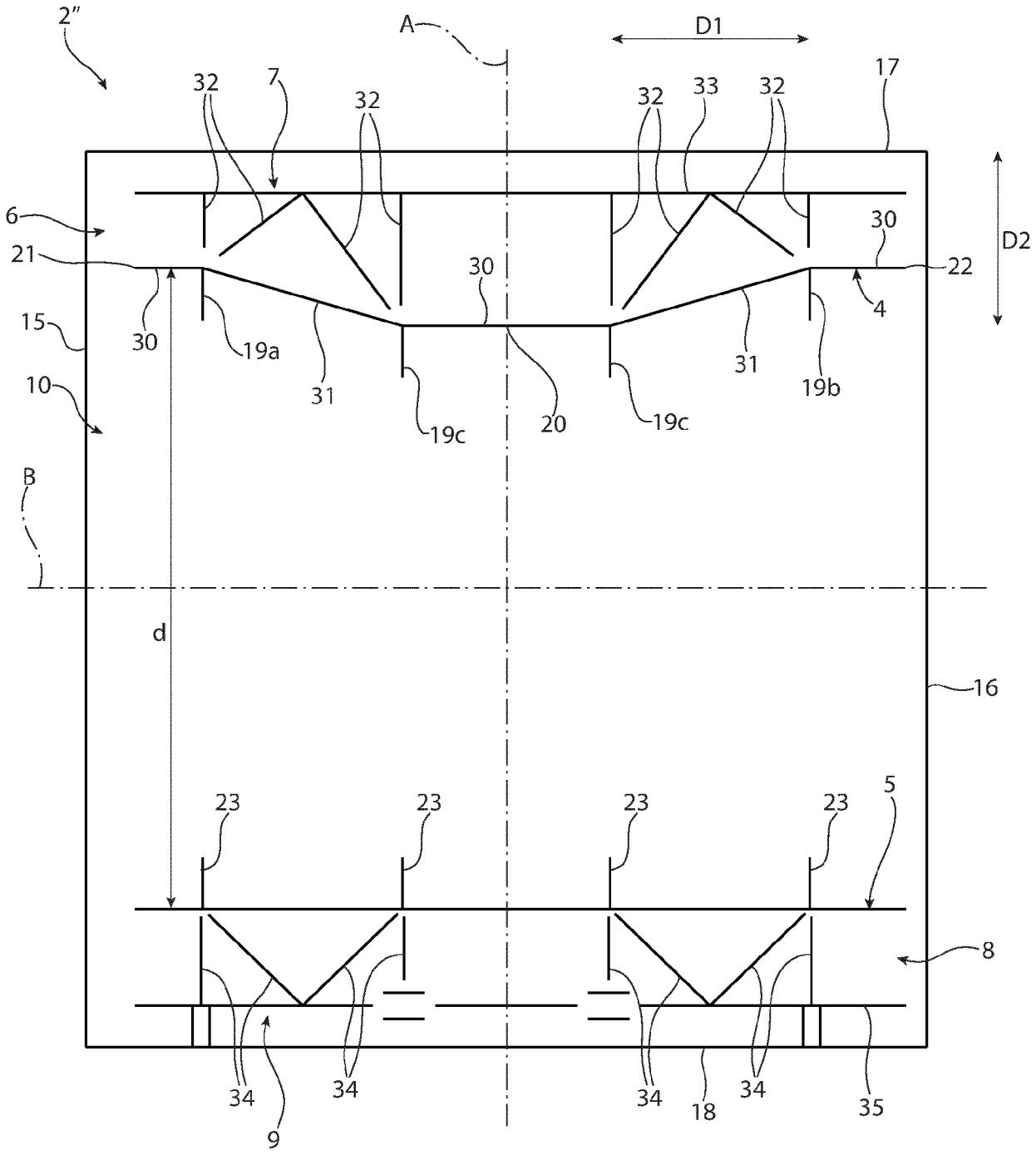
2"
A
D1
17
32
7
32
32
33
32
6
21
30
30
22
D2
4
15
30
19a
31
30
31
19b
10
19c
20
19c
B
d
16
23
23
23
23
5
8
34
34
34
34
9
18
35

FIG. 4

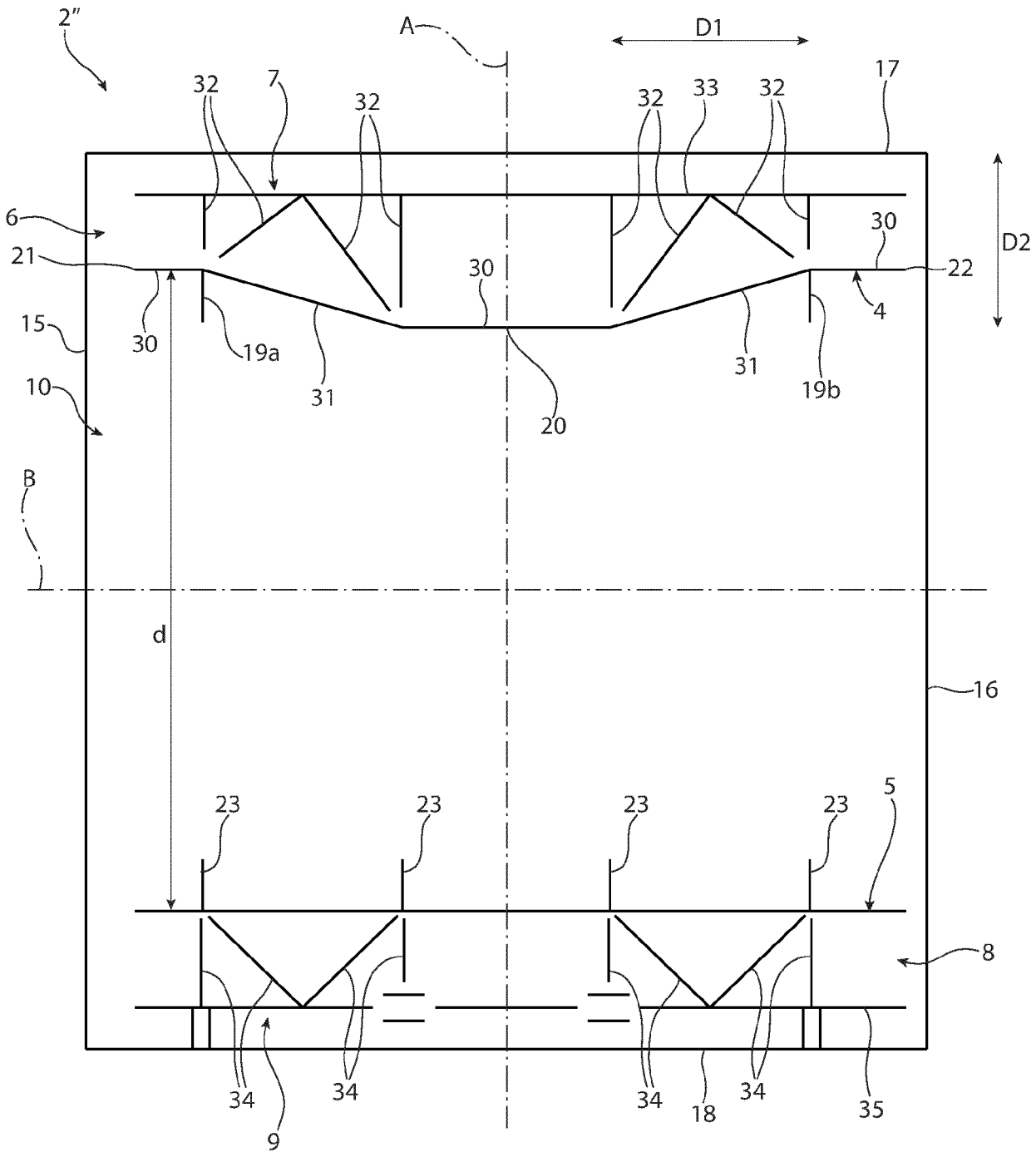
2"
A
D1
17
32
7
32
32
33
32
6
21
30
30
22
D2
4
15
30
19a
31
31
19b
10
20
B
d
16
23
23
23
23
5
8
34
34
34
34
9
18
35

FIG. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 18 1484

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 5 738 272 A (ANCHOR DAVID [US] ET AL) 14 April 1998 (1998-04-14) * figures 9,10 *	1-13, 15-17 14	INV. B65D3/08 B65D5/02
Y	WO 2019/201860 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 24 October 2019 (2019-10-24) * figure 6 *	14	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 December 2023	Bridault, Alain

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 1484

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

11-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5738272 A	14-04-1998	RU 2157330 C2	10-10-2000
		UA 62928 C2	15-01-2004
		US 5738272 A	14-04-1998
		US 6027016 A	22-02-2000
WO 2019201860 A1	24-10-2019	BR 112020018388 A2	22-12-2020
		CN 110386317 A	29-10-2019
		CN 210761729 U	16-06-2020
		EP 3556673 A1	23-10-2019
		EP 4279408 A2	22-11-2023
		JP 2021522114 A	30-08-2021
		US 2021237925 A1	05-08-2021
		WO 2019201860 A1	24-10-2019

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82