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(54) CONTAINER HAVING A BOTTOM BASE PROVIDED WITH NOTCHES

BEHÄLTER MIT EINER BODENBASIS MIT KERBEN

CONTENEUR DOTÉ D'UN FOND FOURNI AVEC DES ENCOCHES

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Description

Field of the Invention

[0001] The invention relates to improvements made to containers, in particular bottles or jars, obtainable by blowing, blow-molding or stretch blow-molding of preforms made of thermoplastic material such as PET (polyethylene terephthalate), PE (polyethylene), or PEF (polyethylene furanoate).

Background

[0002] Manufacturing of containers by blow-molding ordinarily consists of inserting, into a mold with the imprint of the container, a preform previously heated to a temperature above the glass transition temperature of the thermoplastic material, and of injecting into the preform a fluid (particularly a gas such as air but it can also be an incompressible fluid such as water) under pressure. The blowing can be completed by a preliminary stretching of the preform by means of a sliding rod.

[0003] The dual molecular orientation (bi-orientation) that the material undergoes during blow-molding (axial and radial, respectively parallel and perpendicular to the general axis of the container) gives a certain structural rigidity to the container.

[0004] Such containers have a body extending between, at the top, a neck and, at the bottom, a base adapted for withstanding without marked deformation the hydrostatic pressure due to the liquid column which rises above them.

[0005] Containers intended to contain a still liquid (for example bottles intended to contain drinking water) are, in the majority of cases, provided with a rounded base in the general form of a spherical cap having a concavity turned outwards and of relatively small height. Such bases are often provided with substantially radially radiating grooves (also called ribs) which are distributed around a central recess, said grooves having various shapes and optionally extending possibly onto the lower part of the wall of the body in order to reinforce the foundation (peripheral zone with which the base rests on a support).

[0006] Document US 2015/136727 discloses a blow molded container with a base provided with radiating reinforcing grooves, according to the preamble of claim 1.

[0007] Such bases, in addition to withstanding the hydrostatic pressure due to the liquid column which rises above them, should offer sufficient resistance to withstand any additional stress, even though small, that may be due for example to palletization, logistic transportation or storage.

[0008] Indeed, in some cases, a hit on an edge of the container, a shock or a bump may result in a crack or in a rift in the container, especially at the base location, leading to a loss of water from the container rending to container useless.

[0009] In addition, in case of denting (nonreversible deformation of the container), the aspect of the container is damaged and the container will be considered by the consumer as a scrap. The container will not be sold.

[0010] This type of issue could easily be solved by using heavier preform but this requires both an increase in material, incompatible with the today's light weighting requirements, and a high blowing pressure reducing thereby the blowability (i.e. the ability of the container to be formed by blowing) of the container.

[0011] Therefore, a first objective of the present invention is to propose a container, the base of which offers good resistance to denting and cracks.

[0012] A second objective is to propose a container for which the optimized structure and geometry of the base gives it a good compromise between blowability, lightness and rigidity while avoiding generation of cracks at the container base location in case of bumps or shocks.

Summary of the Invention

[0013] In this respect, the invention provides a plastic container according to Claim 1, said container having a body and a bottom base extending from a lower end of the body in which the bottom base comprises a series of principal reinforcing grooves extending radially from the central zone to at least the peripheral seat and a series of notches, in which at least one of the series of principal reinforcing grooves is locally interrupted by at least one of the series of notches

[0014] The presence of notches and their specific location makes it possible to provide an additional area that is stretched in the base between the central zone and the concave arch making sure that amorphous thermoplastic material is limited to the zone of the injection point and central zone.

[0015] The distribution of the thermoplastic material in the base is better controlled.

[0016] In addition, the notches allow reducing the stiffness of the base by increasing flexibility in the zone comprising a high level of amorphous material around the central zone.

[0017] In a proposed embodiment, the series of notches are arranged on a circular line (L) concentric with the injection point. This arrangement is sufficient for small container to improve the resistance to breakage of the base due to denting and shocks.

[0018] Hence in all directions around the injection point a decoupling between the central zone (containing higher level of amorphous material) and the concave arch (containing mainly bi-oriented material) is made. The drawbacks of amorphous material and its extension on the base are then reduced.

[0019] According to a further embodiment, the series of notches are part of a circular groove (C) concentric with the injection point. Thanks to the circular groove (C), the decoupling is complete.

[0020] Alternatively, the series of notches are arranged on the perimeter of a circular groove (C) concentric with

the injection point. In this arrangement, the circular groove (C) is adding its advantages to the ones of the notches.

[0021] Due to these specific positioning of the notches, the notches interrupt the principal reinforcing grooves in an arcuate manner.

[0022] More particularly, the circular line (L) or the groove (C) has a radius within the range from 10 mm to 40 mm. The proposed range takes into account the base dimension according to the volume of the container.

[0023] According to a further feature the at least one of the series of principal reinforcing grooves is locally interrupted by at least one of the series of notches along an axis that is perpendicular to the main axis of said at least one of the series of principal reinforcing grooves.

[0024] As proposed, each principal reinforcing groove is interrupted by one notch.

[0025] However, according to another option, each principal reinforcing groove is interrupted by at least two notches. This may be the case for volumes higher than 2L.

[0026] According to a proposed feature the notches have a base dimension, corresponding to their opened side, ranging from 2mm to 6 mm

[0027] The proposed notches are then clearly identified a rupturing elements in the continuous base structure.

[0028] In the proposed embodiments, the notches have a triangular profile in cross section. This type of profile is quite easy to blow and very efficient for decoupling purpose.

[0029] In addition, the notches have a depth within the range from 0.5mm to the depth of the principal reinforcing groove.

[0030] According to an addition feature, the principal reinforcing grooves have an open angle comprised within the range from 20° to 80°.

[0031] These values of the open angle of the principal reinforcing grooves allows a good blowability of the principal reinforcing grooves.

[0032] The proposed base further comprises intermediate reinforcing grooves extending radially from the concave arch or the central zone to at least the peripheral seat, said intermediate reinforcing grooves being interspersed between the principle reinforcing grooves.

[0033] The use of intermediate reinforcing grooves allows diminishing the surface with flat structure on the base thereby reinforcing the bottom base of the container to resist pressure and denting.

[0034] The fact that the bottom base comprises a fully structured surface contributes to avoiding reversal of the bottom base and to resisting to pressure.

[0035] According to a possible feature, the principal and/or intermediate reinforcing grooves extend locally over the peripheral seat and rise up over the bottom base of the container to the body of the container.

[0036] This specific feature allows having good resistance to lateral denting.

[0037] Globally, the proposed features allow improving the performance of the base versus a base that does not have the proposed notches. The improved performances are particularly visible on the vertical drop test: no more breakage at the location of / or in alignment with the injection point is observed.

[0038] Other objects and advantages of the invention will be seen from the following descriptions.

Brief description of the Drawings

[0039] The invention is further described with reference to the following examples. It will be appreciated that the invention as claimed is not intended to be limited in any way by these examples.

[0040] Embodiments of the present invention will now be described, by way of examples, with reference to the accompanying figures in which:

- FIG. 1 is a general view of a container made of plastic;
- FIG. 2 is a bottom view of the container of FIG. 1 presenting a bottom base according to the invention;
- FIG. 3 is a perspective view, showing the bottom of the container of FIG. 2;
- FIG. 4 is an front view of the bottom base of the container of FIGS. 2 and 3;
- FIG. 5 is a view in cross section along the line A-A, of the bottom base of FIG. 4;
- FIG. 6 is a bottom view of the container of FIG. 1 presenting a bottom base according to a second embodiment of the invention.

Detailed description

[0041] As used in this specification, the words "comprises", "comprising", and similar words, are not to be interpreted in an exclusive or exhaustive sense. In other words, they are intended to mean including, but not limited to.

[0042] Any reference to prior art documents in this specification is not to be considered as an admission that such prior art is widely known or forms part of the common general knowledge in the field.

[0043] FIG. 1 shows a general view of a container 1, a bottle in this instance, produced by stretch blow molding a preform made of thermoplastic material, for example PET (polyethylene terephthalate, PE (polyethylene) or PEF (polyethylene furanoate).

[0044] Said container 1 comprises, at an upper end, a neck 2, provided with a mouth 3. In the extension of the neck 2, the container 1 comprises in its upper part a shoulder 4 that widens out in the direction opposite to the neck 2, said shoulder 4 being extended by a lateral wall or body 5, of a shape generally cylindrical in revolution around a main axis X of the container 1.

[0045] The container 1 further comprises at the bottom, a base 6 which extends, opposite the neck 2, from a lower

end of the body 5. The base 6 comprises a peripheral seat 7 in the form of an annular ridge which extends substantially axially in the extension of the body 5. The seat 7 terminates in a laying plane 8 (also called seating plane) perpendicular to the axis X of the container 1, said seating plane 8 defining the lower end of the container 1 and enabling it to be seated upright on a flat surface.

[0046] In FIG. 1, D denotes the diameter of the seating plane 8, the term "diameter" covering not only the case (illustrated) in which the container 1 (and thus the base 6) has a circular contour, but also a case in which the container 1 would have a polygonal contour (for example square), in which case the term "diameter" would designate the diameter of the circle in which said polygon is inscribed.

[0047] FIGS. 2 to 5 will be jointly described in the following part.

[0048] FIGS 2 and 3 presenting a bottom view and perspective view of the base of container of FIG. 1 integrating the features of the invention, show the bottom base 6 which from its peripheral part 7 to its center comprises the peripheral seat 7, already described, a concave arch 10, a central zone 11 comprising in the middle an injection point 12. Said injection point 12 being an amorphous pellet resulting from the formation of the preform and located in its center.

[0049] As visible in FIG. 5 presenting a cross section view of the base 6 of the invention along the line A-A of FIG. 4, and in FIG. 3, the concave arch 10 has a rounded general shape. It is in the form of a substantially spherical dome with the concavity turned towards the exterior of the container 1 in the absence of stress, i.e. in the absence of contents in the container 1. The arch 10 extends from the seat 7, to the central zone 11 of the bottom 6 forming a bump projecting towards the interior of the container 1.

[0050] From the figures, it can be seen that the base 6 comprises a series of principle reinforcing grooves 13. Said principal reinforcing grooves 13 are hollow towards the interior of the container 1. They extend radially from the central zone 11 to at least the peripheral seat 7 defining for each principal reinforcing groove a main axis (G, G', G").

[0051] According to a preferred embodiment, illustrated in the figures, the principal reinforcing grooves 13 extend beyond the seat 7, rising laterally over a lower part of the body 5 of the container 1.

[0052] In other words, the principal grooves 13 extend radially over the entire arch 10, over the peripheral seat 7 and part of the body 5. It will therefore be understood that the seating plane 8 is discontinuous because it is interrupted at each principal groove 13. In the present example, there are six principle grooves 13, but this number could be higher, specifically seven or eight for a container with a different volume.

[0053] In the proposed embodiment, the reinforcing grooves 13 have an open angle comprised within the range from 20° to 80°.

[0054] According to a preferred embodiment, the body 6 is further provided with a series of intermediate reinforcing grooves 14 situated between the principal grooves 13, and which extend locally over the concave arch 10 that they thus contribute to rigidifying. As represented in FIGS. 2 and 3, the intermediate ribs of 14 extend from the central region 15 of the concave arch 10 towards the exterior beyond the peripheral seat 7, rising laterally over a lower part of the body 5, like the principal reinforcing grooves 13.

[0055] As another embodiment not represented, the intermediate reinforcing grooves 14 may extend from the central region 15 to the peripheral seat 7 without extending over it.

[0056] In the present proposed embodiment of the invention, the intermediate reinforcing grooves 14 are each interposed between two adjacent principle reinforcing grooves 13.

[0057] Both principal 13 and intermediate 14 reinforcing grooves rise up to the body 5 of the container 1 to a height comprised within the range from 9 to 15 mm with respect to the laying plan 8.

[0058] According to the invention, the bottom base 6 further comprises a series of notches 15. The notches 15 locally interrupt the principal reinforcing grooves 13 so as to provide a discontinuity in the principal reinforcing grooves 13.

[0059] The notches 15 are arranged on a circular line L concentric with the injection point 12 located on the concave arch 10 proximate the central zone11.

[0060] This line may be a virtual line or a line coming from an imprint in the mold (as presented in FIGS. 2 and 3) in which the preform is introduced for the bi-orientation process (blow-molding process).

[0061] Hence due to the fact that the notches are positioned along a circular line L located on the concave arch 10 proximate the central zone 11. As visible in FIG. 2, the notches 15 interrupt the principal reinforcing grooves 13in the concave arch 10 in an arcuate manner.

[0062] This discontinuity in the extension of the principal reinforcing grooves 13 along their main axis G, G' or G" produces a decoupling between the central zone 11 (incorporating the injection point 12) and the main portion of concave arch 10.

[0063] Indeed, the injection point 12 and the central zone 11 comprise a high level of amorphous thermoplastic material (as they are not very much stretched during the bi-orientation process), which breaks easily when it is under stress (pressure or shock).

[0064] The decoupling allows creating an additional stretched zone in which the thermoplastic molecules are bi-oriented (and not anymore in an amorphous state). This bi-orientation generates a certain rigidity in the material while still allowing the material to undergo elastic deformation (which is not the case when the material is in the amorphous state).

[0065] In another embodiment of the base according to the invention as presented in FIG. 6, the notches are

part of a circular groove C concentric with the injection point 12. In this embodiment as in the previous one, the notches interrupt the principal reinforcing grooves 13 in an arcuate manner.

[0066] The circular groove C may have a different profile than the profile of the notches 15 and the notches may be located at the perimeter of the circular groove C

[0067] Both, the circular line L and the circular circle C are centered on the injection point 12. They have a radius ranging from 10 mm to about 40 mm.

[0068] The notches 15 have a base dimension (open side of the notches) ranging from 2mm to 6 mm.

[0069] In addition, the notches 15 have a depth within the range from 0.5mm to the depth of the principal reinforcing groove 13. The depth of the principal reinforcing groove 13 may rise up to 5mm or more according to the volume of the container.

[0070] As represented in the illustrated figures, each principal reinforcing groove 13 is interrupted by one notch 15. Thereby, decoupling between the central zone 11 and the concave arch 10 is realized.

[0071] It may also be envisage that each principal reinforcing groove 13 is interrupted by at least two notches 15 leading to at least two decoupling.

[0072] In the proposed embodiment of FIGS. 2 to 5, the notches have a triangular asymmetric profile in cross section (see FIG. 5) but the profile may vary in shape, geometry and dimension.

[0073] Among other possible characteristics of the profile, we can mention profile being symmetric or asymmetric and /or having trapezoidal or square geometry, but other alternatives are available.

[0074] According to a further embodiment of the invention (not represented), at least one of the series of principal reinforcing grooves 13 is locally interrupted by at least one of the series of notches 15 along an axis P, P', P" that is perpendicular to the main axis G, G', G" of said at least one of the series of principal reinforcing grooves 13.

[0075] This further embodiment, as the previous ones provides a decoupling a discontinuity in the extension of the principal reinforcing grooves 13 along their main axis G, G' or G".

[0076] A decoupling between the central zone 11 (incorporating the injection point 12) and the main portion of concave arch 10, providing an additional stretched zone, is hence achieved.

[0077] The base 6 comprising the notches 15 of the invention allows decoupling the amorphous zone (incorporating the injection point and part of the central zone) and the zone in which the thermoplastic material has been bi-oriented by creating an additional zone that need to be stretched.

[0078] This solution participates to enhancing bottle resistance to breakage.

[0079] These characteristics are essential to guarantee product stability and prevent losses during transportation. They also ensure having a solution that does not create negative impact on consumer satisfaction during bottle handling and consumption.

[0080] Indeed, the container 1 provided with the proposed base 6 offers a good compromise between the mechanical performance (i.e. the ability of the container 1 to resist deformations and denting) and blowability (i.e. the ability of the container 1 to be formed by blowing).

[0081] Although the invention has been described by way of example, it should be appreciated that variations and modifications may be made without departing from the scope of the invention as defined in the claims. Furthermore, where known equivalents exist to specific features, such equivalents are incorporated as if specifically referred in this specification.

References

[0082]

X	container axis
1	Container
2	neck
3	mouth
4	shoulder
5	body
6	bottom base
7	peripheral seat
8	laying plane
10	concave arch
11	central zone (push up)
12	injection point
13	principal reinforcing grooves
14	intermediate reinforcing grooves
15	notch(s) principal reinforcing grooves
16	notch(s) intermediate reinforcing grooves
G, G', G"	main axis principal reinforcing grooves
P, P', P"	axis perpendicular to main axis principal reinforcing grooves
D	Diameter base

Claims

1. Container (1) made of plastic, provided with a body (5) and a bottom base (6) extending from a lower end of the body (5), the bottom base (6) comprising:

- an annular central zone (11) concentric to an injection point (12) located approximately at the center of the bottom base (6);
- a peripheral seat (7) defining a laying plane (8);
- a concave arch (10) which extends from the periphery of the central zone (11) to the peripheral seat (7) and having a rounded general shape with a concavity turned towards the outside of the container (1);
- a series of principal reinforcing grooves (13) which extend radially from the central zone (11)

to at least the peripheral seat (7) defining for each principal reinforcing groove a main axis (G, G', G"),
characterized in that the bottom base (6) further comprises a series of notches (15) and **in that** at least one of the series of notches (15) locally interrupt at least one of the series of principal reinforcing grooves (13).

2. Container according to claim 1, **characterized in that** the series of notches are arranged on a circular line (L) concentric with the injection point (12).

3. Container according to claim 1 or 2, **characterized in that** the series of notches are part of a circular groove (C) concentric with the injection point (12).

4. Container according to any one of claims 1 to 3, **characterized in that** the series of notches are arranged on the perimeter of a circular groove (C) concentric with the injection point (12).

5. Container according to any of claim 1 to 4, **characterized in that** the notches interrupt the principal reinforcing grooves in an arcuate manner.

6. Container according to any of claim 1 to 5, **characterized in that** the circular line (L) or the circular groove (C) has a radius within the range from 10 mm to 40 mm.

7. Container according to claim 1, **characterized in that** the at least one of the series of principal reinforcing grooves (13) is locally interrupted by at least one of the series of notches (15) along an axis (P, P', P") that is perpendicular to the main axis (G, G', G") of said at least one of the series of principal reinforcing grooves (13).

8. Container according to any one of claims 1 to 7, **characterized in that** each principal reinforcing groove (13) is interrupted by one notch (15).

9. Container according to any one of claims 1 to 7, **characterized in that** each principal reinforcing groove (13) is interrupted by at least two notches (15).

10. Container according to any one of claims 1 to 9, **characterized in that** the notches have a base dimensions ranging from 2mm to 6mm.

11. Container according to any of claims 1 to 10, **characterized in that** the notches have a triangular profile in cross section.

12. Container according to any of claims 1 to 11, **characterized in that** the notches have a depth within the range from 0.5mm to the depth of the principal reinforcing groove (13).

13. Container according to any one of claims 1 to 12, **characterized in that** the principal reinforcing grooves (13) have an open angle comprised within the range from 20° to 80°.

14. Container according to any one of claims 1 to 13, **characterized in that** it further comprises intermediate reinforcing grooves (14) extending radially from the concave arch (10) or the central zone (11) to at least the peripheral seat (7), said intermediate reinforcing grooves (14) being interspersed between the principle reinforcing grooves (13).

15. Container according to any one of claims 1 to 14, **characterized in that** principal and/or intermediate reinforcing grooves extend locally over the peripheral seat and rise up over the bottom base of the container to the body of the container.

Patentansprüche

1. Behälter (1) aus Kunststoff, der mit einem Körper (5) und einer Bodenbasis (6) versehen ist, die sich von einem unteren Ende des Körpers (5) erstreckt, wobei die Bodenbasis (6) Folgendes umfasst:

   - eine ringförmige zentrale Zone (11), die konzentrisch zu einem Einspritzpunkt (12) ist, der sich ungefähr in der Mitte der Bodenbasis (6) befindet;
   - einen Umfangssitz (7), der eine Legeebene (8) definiert;
   - einen konkaven Bogen (10), der sich vom Umfang der zentralen Zone (11) zum Umfangssitz (7) erstreckt und eine abgerundete allgemeine Form mit einer zur Außenseite des Behälters (1) gewandten Konkavität aufweist;
   - eine Reihe von Hauptverstärkungsnuten (13), die sich radial von der zentralen Zone (11) zu mindestens dem Umfangssitz (7) erstrecken und für jede Hauptverstärkungsnut eine Hauptachse (G, G', G") definieren,
   dadurch gekennzeichnet, dass die Bodenbasis (6) ferner eine Reihe von Kerben (15) umfasst und dass mindestens eine der Reihe von Kerben (15) mindestens eine der Reihe von Hauptverstärkungsnuten (13) lokal unterbricht.

2. Behälter nach Anspruch 1, **dadurch gekennzeichnet, dass** die Reihen von Kerben auf einer Kreislinie (L) konzentrisch zum Einspritzpunkt (12) angeordnet sind.

3. Behälter nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Reihen von Kerben Teil einer

Kreisnut (C) sind, die konzentrisch zum Einspritzpunkt (12) ist.

4. Behälter nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Reihen von Kerben auf dem Umfang einer Kreisnut (C) angeordnet sind, die konzentrisch zum Einspritzpunkt (12) ist.

5. Behälter nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Kerben die Hauptverstärkungsnuten bogenförmig unterbrechen.

6. Behälter nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Kreislinie (L) oder die Kreisnut (C) einen Radius im Bereich von 10 mm bis 40 mm aufweist.

7. Behälter nach Anspruch 1, **dadurch gekennzeichnet, dass** die mindestens eine der Reihen von Hauptverstärkungsnuten (13) lokal durch mindestens eine der Reihen von Kerben (15) entlang einer Achse (P, P', P") unterbrochen ist, die senkrecht zur Hauptachse (G, G', G") der mindestens einen der Reihen von Hauptverstärkungsnuten (13) ist.

8. Behälter nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** jede Hauptverstärkungsnut (13) durch eine Kerbe (15) unterbrochen ist.

9. Behälter nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** jede Hauptverstärkungsnut (13) durch mindestens zwei Kerben (15) unterbrochen ist.

10. Behälter nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** die Kerben eine Basisabmessung im Bereich von 2 mm bis 6 mm aufweisen.

11. Behälter nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** die Kerben im Querschnitt ein dreieckiges Profil aufweisen.

12. Behälter nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** die Kerben eine Tiefe im Bereich von 0,5 mm zur Tiefe der Hauptverstärkungsnut (13) aufweisen.

13. Behälter nach einem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** die Hauptverstärkungsnuten (13) einen Öffnungswinkel im Bereich von 20° bis 80° aufweisen.

14. Behälter nach einem der Ansprüche 1 bis 13, **dadurch gekennzeichnet, dass** er ferner Zwischenverstärkungsnuten (14) umfasst, die sich radial von dem konkaven Bogen (10) oder der zentralen Zone (11) zu mindestens dem Umfangssitz (7) erstrecken, wobei die Zwischenverstärkungsnuten (14) zwischen den Hauptverstärkungsnuten (13) eingefügt sind.

15. Behälter nach einem der Ansprüche 1 bis 14, **dadurch gekennzeichnet, dass** sich Haupt-und/oder Zwischenverstärkungsnuten lokal über dem Umfangssitz erstrecken und über der Bodenbasis des Behälters bis zum Körper des Behälters ansteigen.

Revendications

1. Récipient (1) en matière plastique, muni d'un corps (5) et d'une base inférieure (6) s'étendant à partir d'une extrémité inférieure du corps (5), la base inférieure (6) comprenant :

- une zone centrale annulaire (11) concentrique à un point d'injection (12) situé approximativement au centre de la base inférieure (6) ;
- un siège périphérique (7) définissant un plan de pose (8) ;
- un arc concave (10) qui s'étend de la périphérie de la zone centrale (11) jusqu'au siège périphérique (7) et ayant une forme générale arrondie avec une concavité tournée vers l'extérieur du récipient (1) ;
- une série de rainures principales de renforcement (13) qui s'étendent radialement depuis la zone centrale (11) au moins jusqu'au siège périphérique (7) définissant pour chaque rainure principale de renforcement un axe principal (G, G', G"),

caractérisé en ce que la base inférieure (6) comprend en outre une série d'encoches (15) et **en ce qu'**au moins l'une de la série d'encoches (15) interrompt localement au moins l'une de la série de rainures principales de renforcement (13).

2. Récipient selon la revendication 1, **caractérisé en ce que** la série d'encoches est disposée sur une ligne circulaire (L) concentrique au point d'injection (12).

3. Récipient selon la revendication 1 ou 2, **caractérisé en ce que** la série d'encoches fait partie d'une rainure circulaire (C) concentrique au point d'injection (12).

4. Récipient selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** la série d'encoches est disposée sur le pourtour d'une rainure circulaire (C) concentrique au point d'injection (12).

5. Récipient selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les encoches interrompent les rainures principales de renforcement de manière arquée.

6. Récipient selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** la ligne circulaire (L) ou la rainure circulaire (C) présente un rayon compris entre 10 mm et 40 mm.

7. Récipient selon la revendication 1, **caractérisé en ce que** l'au moins une de la série de rainures principales de renforcement (13) est localement interrompue par au moins une de la série d'encoches (15) suivant un axe (P, P', P") qui est perpendiculaire à l'axe principal (G, G', G") de ladite au moins une de la série de rainures principales de renforcement (13).

8. Récipient selon l'une quelconque des revendications 1 à 7, **caractérisé en ce que** chaque rainure principale de renforcement (13) est interrompue par une encoche (15).

9. Récipient selon l'une quelconque des revendications 1 à 7, **caractérisé en ce que** chaque rainure principale de renforcement (13) est interrompue par au moins deux encoches (15).

10. Récipient selon l'une quelconque des revendications 1 à 9, **caractérisé en ce que** les encoches ont une dimensions de base comprise entre 2 mm et 6 mm.

11. Récipient selon l'une quelconque des revendications 1 à 10, **caractérisé en ce que** les encoches ont un profil triangulaire en section transversale.

12. Récipient selon l'une quelconque des revendications 1 à 11, **caractérisé en ce que** les encoches ont une profondeur comprise entre 0,5 mm et la profondeur de la rainure principale de renforcement (13).

13. Récipient selon l'une quelconque des revendications 1 à 12, **caractérisé en ce que** les rainures principales de renforcement (13) présentent un angle ouvert compris entre 20° et 80°.

14. Récipient selon l'une quelconque des revendications 1 à 13, **caractérisé en ce qu'** il comprend en outre des rainures intermédiaires de renforcement (14) s'étendant radialement depuis l'arceau concave (10) ou la zone centrale (11) jusqu'au moins au siège périphérique (7), lesdites rainures intermédiaires de renforcement (14) étant intercalées entre les rainures principales de renforcement (13).

15. Récipient selon l'une quelconque des revendications 1 à 14, **caractérisé en ce que** des rainures principales et/ou intermédiaires de renforcement s'étendent localement par dessus le siège périphérique et remontent sur la base inférieure du récipient jusqu'au corps du récipient.

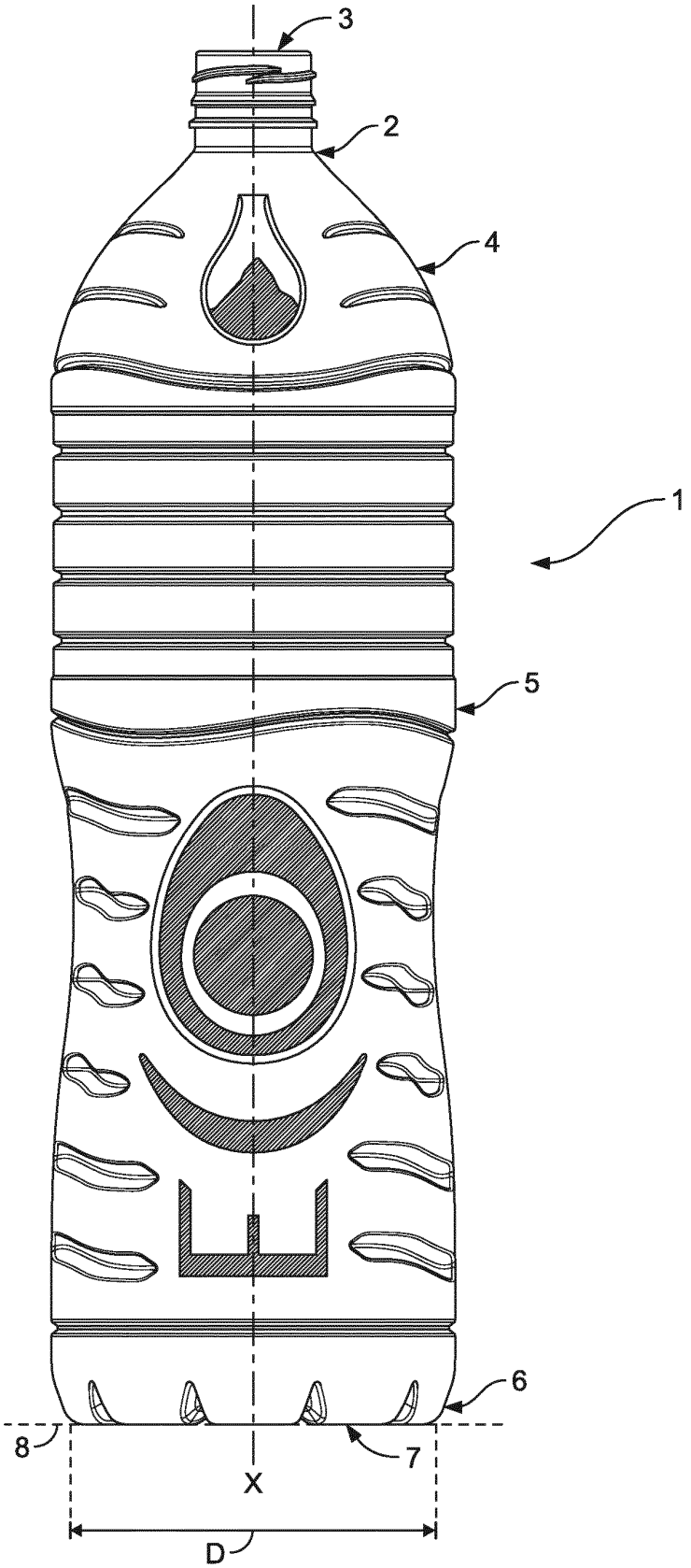


FIG. 1

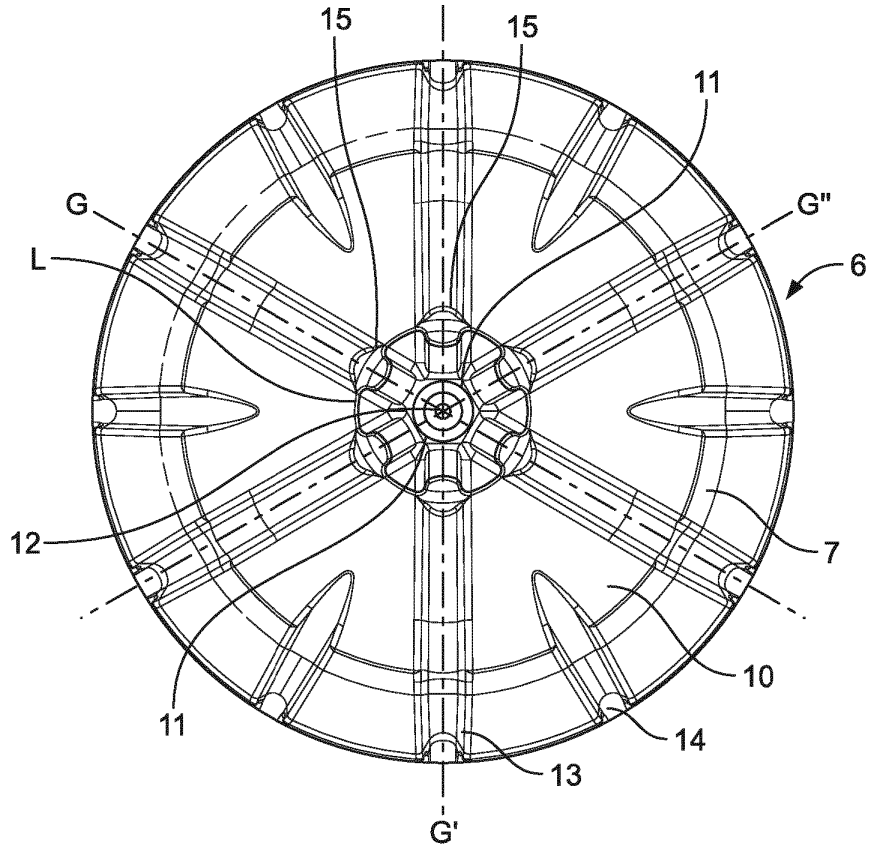


FIG. 2

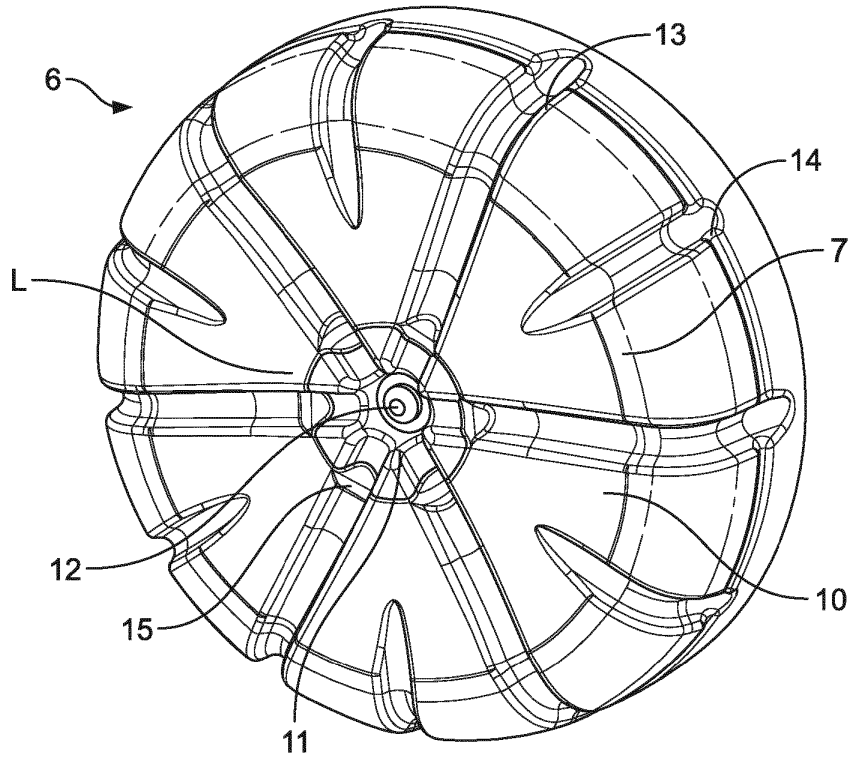


FIG. 3

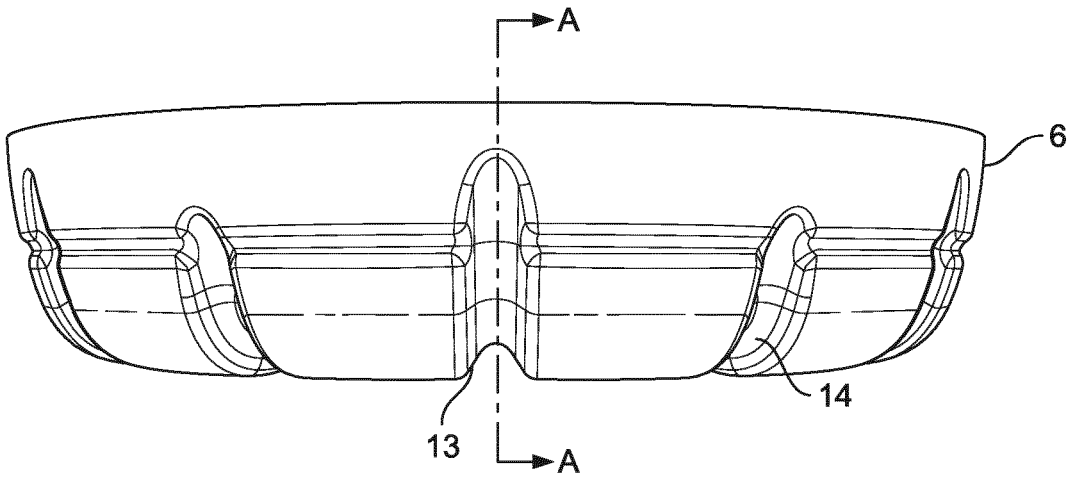


FIG. 4

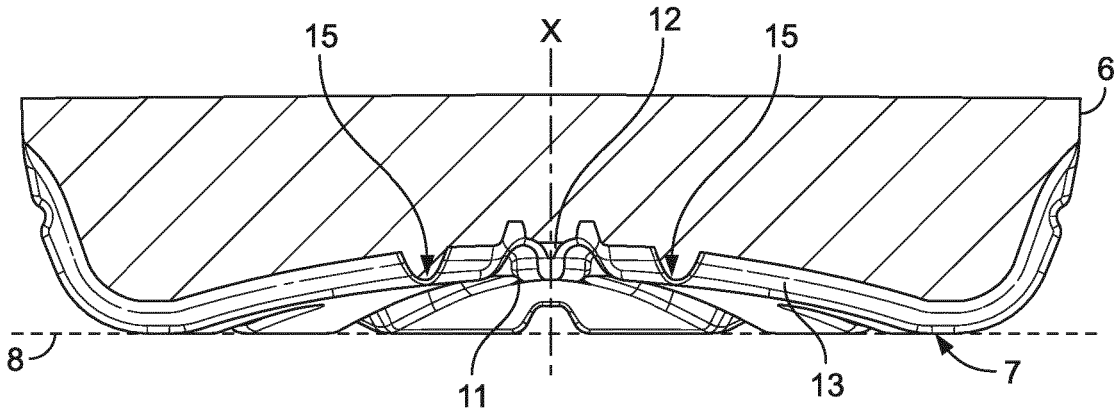


FIG. 5

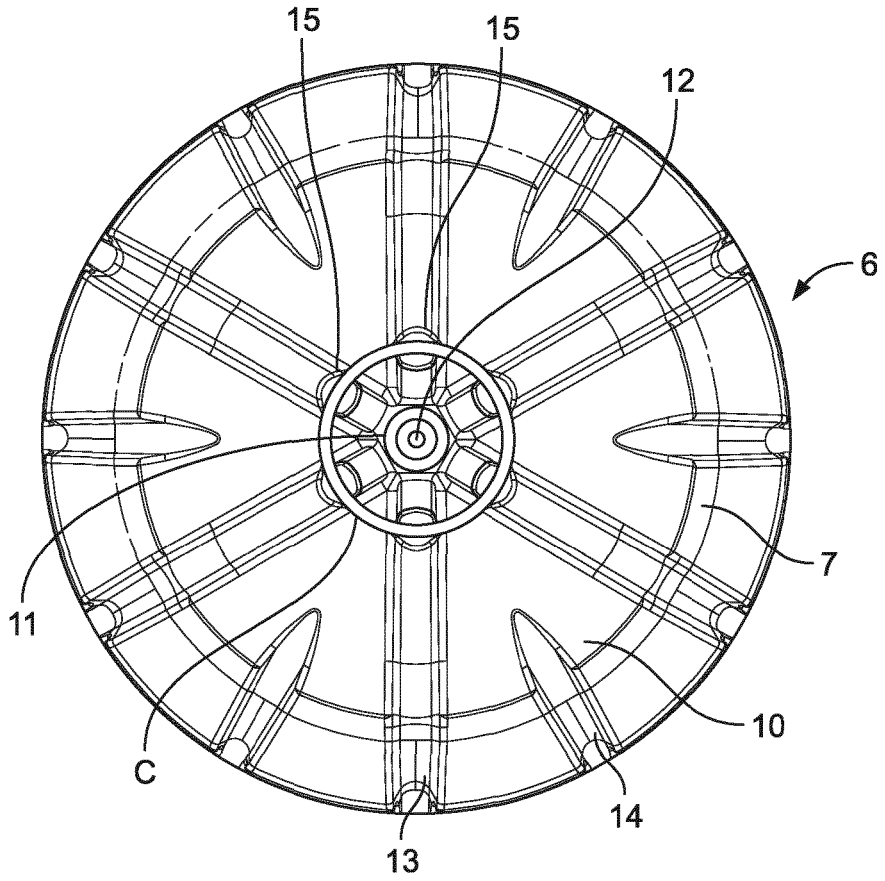


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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