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Container for liquids

The invention relates to a container for liquids, such as beverages and oils, comprising a casing enveloped by a shell, both from a blow moulded thermoplastic material, and a valve for dispensing the liquid from the container.

5 EP 2 038 187 relates to a container for fluids, in particular liquids, such as beer or water, comprising an outer casing, preferably spheroid and preferably made of a rigid material, a gas and/or liquid tight inner casing of a flexible material located inside the outer casing, a valve
10 part for filling the container with a fluid, and at least one vent via which the inside of the outer casing (2) communicates with the outside at least during filling. In an embodiment, the casing is made of blow moulded PET.

Many containers for liquids are subjected during
15 use to high internal pressures. E.g., beverages containing a gas should be maintained at an elevated pressure, typically in a range from 1 to 4 bar (overpressure), to prevent the gas from escaping the beverage. Also, liquids having a relatively high viscosity and liquids that are dispensed
20 from a lower level, e.g. from a cellar, require a relatively high pressure in the container to overcome friction and hydrostatic pressure, respectively. High temperatures and non-observance of safety guidelines can also lead to high internal pressures. Further, many containers for liquids are
25 subjected during use to high external forces. E.g., containers are palletized and/or stacked.

It is an object of the present invention to provide a container that is more resistant to deformation resulting from internal pressure and/or external forces.

30 To this end, the container according to the invention is characterized in that the casing and the shell are, at least locally, positively fixed relative to each other, preferably at least in axial direction and/or preferably by means of an adhesive, welding or positive form

locking. It is preferred that the force needed to break the fixation and/or move the casing beyond the location of the fixation is at least 100 N, preferably at least 200 N, more preferably at least 300 N, preferably at least 400 N, preferably at least 500 N, exerted on both the casing and the shell and in opposite directions coinciding with or parallel to the central axis of the container.

In an embodiment, the casing and/or the shell comprises a circumferential, not necessarily continuous, e.g. continuous or intermittent, protrusion positively locking the two in axial direction.

Fixation as provided by the present invention prevents or reduces dislocation of the casing inside the shell, thus e.g. facilitating positioning the container on a filler head or positioning a dispense head on the valve and/or reducing the risk of the casing deforming the bottom of the container when the casing is pressurized and/or exposed to high pressures or temperatures. Uneven deformation of the bottom of the container results in wobbling of the container and impairs stacking of containers.

In an embodiment, the valve is part of or mounted on or in the casing, the shell comprises a neck fitting over the valve, and the protrusion is located at/in the neck and locks under, over or onto the valve. E.g., the valve provides an undercut and the shell an inwardly protruding rim locking in the undercut. In a refinement, the casing is snap-fitted into the shell. This facilitates assembly of the container and thus reduces costs.

In another embodiment, the fixation is located at the valve and provides a circumferential watertight seal between the valve and/or the casing on the one hand and the shell on the other hand. Thus, when liquid leaks or spills from the valve or dispense head, e.g. during coupling or decoupling, such liquid is prevented from entering the space

that, in some configurations, is present between the casing and the shell.

In an embodiment, the casing has an internal volume of at least 10 liters and the length to width ratio (L/D) of the casing is in excess of 1,3, preferably in excess of 1,8 and/or the container comprises a cylindrical portion that extends over at least 25%, preferably at least 40%, more preferably at least 50% of the height of the container and/or the shell supports the casing at least when the latter is pressurized.

In an embodiment, the shell comprises an upper portion abutting the casing and a lower portion, which lower portion comprises a circumferential protrusion positively locking the casing and the shell in axial direction. In a refinement, the protrusion is defined by or comprises a local constriction and/or abuts or near abuts the bottom of the casing.

In another embodiment, the casing and/or shell comprises a further circumferential protrusion positively locking the casing in axial direction. In a refinement, the first protrusion is located above the broadest part of the casing, e.g. a cylindrical part or equator, and/or the further protrusion is located below that part.

When the further protrusion is located below that part, it may support the casing when it expands and, when or once the casing rests on the further protrusion, help resist further expansion of the casing. It is preferred that the area of contact at the protrusion has a width of at least 1 mm, preferably at least 2 mm, preferably at least 3 mm. It is further preferred that the protrusion or protrusions have a height, e.g. relative to the inner wall of the shell, of at least 1 mm, preferably at least 2 mm, preferably at least 3 mm, e.g. 4 or 5 mm.

In an embodiment, the shell comprises an upper or middle portion abutting the casing and a lower portion free

from the casing and the lower portion comprises features, such as embossing, a regular pattern of inwardly and/or outwardly extending dents, or the further protrusion, locally increasing effective wall thickness and buckling resistance. Increased buckling resistance of the lower portion was found to enable stacking of more (pallets of) containers on top of each other and improves resistance to dynamic loads.

In an embodiment, which is also suitable for use in containers wherein the casing and shell are not positively fixed relative to each other, the shell comprises an upper portion abutting the casing and a lower portion free from the casing and the lower portion comprises features, such as one or more cuts, slits, or folds, the further circumferential protrusion or a plurality of further protrusions, e.g. two, three, four or five further protrusions, locally increasing flexibility of the wall, preferably at least in the axial direction of the container. Thus, when a load, e.g. another container, is placed on top of the container the shell shortens, e.g. vertically, until the casing rests on the surface or item, e.g. another container, beneath. As a result, the casing carries and/or transfers (part of) that load, the more so when it is pressurized.

In an embodiment, the features provide a bellows, e.g. formed by the mentioned plurality of further protrusions or a zigzag cross-section of the wall of the lower portion.

In the container according to the present invention, it is preferred that at least one of the protrusions is defined by a constriction of the wall of the shell, e.g. providing an annular protrusion on the inside of the shell and an annular notch on the outside of the shell. Such a constriction can be formed, e.g. by rotating and locally heating the shell.

In an embodiment, the container comprises a separately formed foot, optionally made of a different material, secured on or in the shell and/or to the casing en e.g. comprising all or a part of the features described
5 above.

In an embodiment, which is also suitable for use in containers wherein the casing and shell are not positively fixed relative to each other, a lubricant, such as water, silicon, a thermoplastic e.g. PE or PTFE film or sleeve,
10 oil, or powder, is present between the casing and the shell, preferably at the cylindrical portion (if present). It appeared that during expansion of the casing inside the shell, e.g. when the former is being filled or the pressure inside the casing increases, a stick slip phenomenon may
15 occur which is believed to be at the root of bursting of the casing below its nominal bursting strength. The lubricant reduces or even prevents such stick slip and thus the detrimental effects resulting from stick slip.

In an embodiment, the casing and the shell are made
20 from a blow moulded, preferably a stretch blow moulded thermoplastic material, preferably a polyester.

Another embodiment comprises a liquid-tight inner container, e.g. a bag, of a flexible material located inside the casing for containing the liquid and communicating with
25 the valve.

In another embodiment, the wall thickness of both the casing and the shell is in a range from 0,1 to 1,0 mm, preferably in a range from 0,3 to 0,6 mm, providing a total wall thickness of up to 2,0 mm, and, e.g. if parts of the
30 shell overlap each other, locally even up to 3,0 mm, which currently cannot be achieved by blowing a single preform.

In a further embodiment, the container is filled with a pressurized gas and no beverage, i.e. the container is pressurized prior to filling, e.g. with air or carbon
35 dioxide and/or nitrogen at a pressure in excess of 1,5 bar.

Thus, the container can be readily filled with a liquid containing a gas, such as beer, sparkling wine, and soft drinks.

WO 00/78665 relates to a beer container comprising
5 an inner hollow shell of blow moulded PET to hold beer, an outer hollow shell of molded high density polyethylene (HDPE) enclosing and supporting the inner shell and a spear structure including a dispenser tube extending from a bottom interior region of the inner shell through to a dispensing
10 outlet at the top of the outer shell.

US 2010/0077790 relates to a plastic beer keg including an outer container and an inner liner. A removable lid is secured over an opening to the container to enclose the liner. In use, the lid can be removed and ice placed in
15 the container directly on the liner, ice flows into gaps between the liner and the container to provide rapid cooling of the content of the liner.

WO 2011/134949 relates to a container for liquids, such as beverages and oils, comprising a blow moulded
20 polyester casing, a valve for dispensing the liquid from the container, and an inlet for introducing a propellant. The casing is enveloped by a stretch blow moulded polyester shell.

EP 1 947 029 relates to a liner-in-keg beer
25 dispensing package, which includes a vinylidene chloride based polymeric gas barrier liner for containing the beer, and dispensing same upon introduction of pressurized fluid in between the liner and the keg, as for example in the course of the operation of the appliance. Optionally, the
30 package includes a supporting shell having upper and lower chimes, with the shell enclosing the keg therein.

JP S5339599 U contains Figures that show what appears to be a (metal) keg.

Within the framework of the present invention
35 "stretch blow moulding" refers to blow moulding and thus

stretching a preform, in both the circumferential (hoop) direction and the axial direction. The term "spheroid" includes any shape generated by a half-revolution of a circle or a square or rectangle with rounded corners or an ellipse or oval about its major axis or minor axis.

The invention will now be explained in more detail with reference to the drawings, which show a preferred embodiment of the present invention.

Figure 1 is a perspective view of a container according to the present invention.

Figures 2A to 2C show a cross-section of a container in Figure 1 and enlarged details of the cross-section.

Figures 3 to 5 are side views of three containers according to the present invention, with different features for increasing buckling resistance of the lower part of the container.

The drawings are not necessarily to scale and details, which are not necessary for understanding the present invention, may have been omitted. Further, elements that are at least substantially identical or that preform an at least substantially identical function are denoted by the same numeral.

Figures 1 to 2C show a container 1 for a beverage containing a gas, in particular beer, comprises a casing 2 made by stretch blow moulding a polyester preform, in particular PET (polyethylene terephthalate). The casing 2 comprises a substantially cylindrical middle portion 2A and top and bottom domes 2B, 2C. The top dome 2B has a central opening formed by the non-deformed part of the preform.

A valve part 3 for dispensing the beverage from the container is snap-fitted to the opening. For more details on this and other suitable valve parts reference is made to International patent application WO 00/07902 (see especially page 8, line 12 ff. in conjunction with Figures 4A and 4B).

In this example, a gastight bag (not shown) for receiving the beverage is connected to the valve part 3 and located inside the casing 2.

5 The casing 2 is enveloped by a stretch blow moulded polyester shell 5. The shell was blow moulded from a preform similar to that used for the casing but with a different rim, i.e. the top part of the shell further comprises a collar 6 extending around the valve part, protecting the same and providing an external thread or annular protrusion
10 about the top opening for screwing or snapping e.g. grips onto the container.

In contrast to the casing, which preferably should have a smooth shape defined by a cylinder and two domes to withstand internal pressure and to avoid damage to the bag
15 containing a beverage, the shell may be provided with one or more features providing additional functionality.

The shell comprises two parts 5A, 5B, separated along a circumference, i.e. in hoop direction, of the shell 5, relatively close to the bottom of the shell, such that
20 the top part of the shell is longer than the casing. As a result, the lower rim of the upper part of the shell extends beyond the bottom of the casing and serves as the foot or part of the foot of the container. The base 5B can be discarded or be used to further increase the strength and
25 stability of the foot. In this example, the base part is provided with creased and radially extending segments to enhance the stiffness of the base, in turn facilitating a stable upright position of the container, and to provide a crumble zone protecting the container when it falls. More
30 specifically, the base part defines a petaloid foot and is placed, i.c. reversed and then pressed, inside the bottom end of the top part of the shell. The base part can be clamped, glued, and/or welded into the top part of the shell. The center of the base is shaped complementary to the

bottom end of the casing, thus providing support over a relatively large area.

To further increase stability, it is preferred that, at the rim, the wall is corrugated to increase its effective thickness and stiffness and/or the wall is actually thicker, preferably at least two times thicker, than the wall of the cylindrical section of the shell.

In this example, the internal diameter of the collar 6 of the shell 5 is smaller than the external diameter of the valve part 3 and wall of the shell 5 comprises a circumferential protrusion 8 defined by a local constriction and also providing a smaller internal diameter. The casing can be snap fitted and positively locked by pressing the valve part 3 past the protrusion.

In an elaboration, a further circumferential protrusion 9 defined by a local constriction is applied in the lower part of the shell 5, such that it abuts or near abuts the bottom of the casing 2.

Figure 3 shows an example wherein the lower portion of the shell 5 is free from the casing and provided with further constrictions, which effectively form a bellows, thus locally increasing flexibility of the wall, also in the axial direction of the container.

Figures 4 and 5 show an example wherein the lower part of the shell is embossed about its circumference with a series of indentations 11 protruding inwards (Figure 4) or outwards (Figure 5) so as to increase the actual or at least effective thickness in the radial direction. In general, embossing may comprise a large number of small protrusions on the outer surface of the shell, yielding e.g. a knurled surface, and/or a plurality of ribs extending in axial direction. Also, embossing may provide other, additional functions.

The invention is not restricted to the above-described embodiments which can be varied in a number of ways within the scope of the claims.

CLAIMS

1. Container (1) for liquids, such as beverages and oils, comprising a casing (2) enveloped by a shell (5), both (2, 5) made from a blow moulded thermoplastic material, and a valve (3) for dispensing the liquid from the container (1), **characterized in that** the wall of the shell (5) comprises a circumferential constriction (8, 9) positively locking the casing in axial direction.

2. Container (1) according to claim 1, wherein the valve (3) is part of or mounted on or in the casing (3), the shell (5) comprises a neck (6) fitting over the valve (3), and the constriction (8) is located at or in the neck (6) and locks under, over or onto the valve (3).

3. Container (1) according to any one of the preceding claims, wherein the casing (2) is snap-fitted into the shell (5).

4. Container (1) according to any one of the preceding claims, wherein the locking is located at the valve (3) and provides a circumferential watertight seal between the valve (3) and/or the casing (2) on the one hand and the shell (5) on the other hand.

5. Container (1) according to any one of the preceding claims, wherein the casing (2) has an internal volume of at least 10 liters and wherein the length to width ratio (L/D) of the casing (2) is in excess of 1,3, preferably in excess of 1,8 and/or wherein the container (1) comprises a

cylindrical portion (2A) that extends over at least 25%, preferably at least 40%, more preferably at least 50% of the height of the container (1) and/or wherein the shell (5) supports the casing (2) at least when the latter is pressurized.

6. Container (1) according to any one of the preceding claims, wherein the shell (5) comprises an upper portion abutting the casing (2) and a lower portion, which lower portion comprises a circumferential protrusion (8, 9) positively locking the casing (2) and the shell (5) in axial direction.

7. Container (1) according to claim 6, wherein the protrusion is defined by or comprises a local constriction (9).

8. Container (1) according to any one of the preceding claims 1-7, wherein the constriction (9) abuts or near abuts the bottom of the casing (2).

9. Container (1) according to any one of the preceding claims, wherein the casing (2) and/or shell (5) comprises a further circumferential protrusion (9) positively locking the casing in axial direction.

10. Container (1) according to claim 9, wherein the circumferential constriction (8) is located above or in the broadest part of the casing (2) and/or the further circumferential protrusion (9) is located below or in that part.

11. Container (1) according to any one of the preceding claims, wherein the casing (2) and the shell (5) are made from a stretch blow moulded thermoplastic material, preferably a polyester.