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(54) **FACETED CONTAINER**

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## Description

FIELD OF THE INVENTION

**[0001]** Container for a product.

BACKGROUND OF THE INVENTION

**[0002]** Blow molded containers are commonly used for packaging consumer goods such as liquid fabric softeners, liquid detergent, powdered detergent, water, soda, beer, wine, tea, fruit juice, surface cleaning compositions, milk, particulate laundry scent additives, and the like. Marketers of such products must compete with others participants in the market to attract consumers to their brands. One way by which marketers attempt to differentiate their product from the products of others is to use a container shape that is proprietary or unique to their brand.

**[0003]** Blow molding can be used produce containers having a variety of shapes. One constraint on the shape of the container adopted by a marketer is that the container must have sufficient structural stability to endure the stresses applied to the container during the life-cycle of the container. The life-cycle of a container can include steps of production, filling, packing, transfer, storage as inventory, shipping, display, storage in-home, and use in-home.

**[0004]** One of the most stressful conditions imposed on a container during the life-cycle of the container is during storage. In a typical situation, a cardboard carton or tray and cap package is used to store a plurality of containers. For example, ten or more containers of fabric softener or water may be packed together. The cardboard cartons or tray and cap packages may be placed on a palate and multiple cartons or tray and cap packages may be stacked one on top of another. To provide for economy of handling the containers, marketers desire to stack cartons or tray and cap packages as high as possible so that a single palate carries as many containers as practical.

**[0005]** One limitation to how high cartons or tray and cap packages can be stacked is the top-load buckling strength of the containers since the containers on the bottom of the stack may carry some or all of the weight of the containers above. If the containers do not have sufficient top-load buckling strength, the containers may axially buckle. Marketers can improve the buckling strength of containers by using thicker walled containers or using container shapes that tend to having high top-load buckling strength. Containers having thick walls are more expensive than containers having thin walls. The shapes for containers that tend to have relatively high top-load buckling strength also may not generate the desired visual interest of a consumer when presented on the shelf of a retailer.

**[0006]** A container that is buckled may leak, may cause the overlying stack of cartons or tray and cap packages to become unstable, and may be unattractive to the consumer considering purchasing the container and contents thereof. A buckled container may be perceived by the consumer as being indicative of inferior goods, especially as compared to another competing brand displaying unmarred containers.

**[0007]** In view of the above, marketers face trade-offs between efficiency of handling of the containers, desired shape, and cost of the containers when choosing a particular container to carry their product. With these limitations in mind, there is a continuing unaddressed need for containers having sufficient top-load bucking strength.

**[0008]** US2006/065566 A1 relates to blow molded plastic containers, comprising a faceted region comprising a plurality of facets arranged edge to edge. US 2010/0252477 describes a composite container according to the preamble of claim 1, the container is suitable for holding a powdered or liquid material and comprises a hollow molded body made of a resin encased in a highly transparent faceted resin sheath.

SUMMARY OF THE INVENTION

**[0009]** A container comprising: an open end circumscribing a longitudinal axis; and a peripheral wall extending from said open end about said longitudinal axis to a closed end; wherein said peripheral wall and said closed end comprise a thermoplastic substrate; wherein said peripheral wall comprises a faceted region comprising a plurality of facets arranged edge to edge with at least one adjacent facet, at least a portion of said faceted region being located nearer to said closed end than to said open end; wherein said peripheral wall has a peripheral wall exterior surface oriented away from said longitudinal axis, said peripheral wall exterior surface having a peripheral wall exterior surface area; wherein each of said plurality of facets has a facet exterior surface area oriented away from said longitudinal axis and each of said facets has an exterior surface area that is between about 0.0001% and about 4% of said peripheral wall exterior surface area; wherein said facets have a radius of curvature of the principal curvatures at a centroid of said facets greater than about 60 mm; wherein at local positions along said longitudinal axis said container has a local maximum internal dimension orthogonal to said longitudinal axis, a local major axis coincident with said local maximum internal dimension, a local minor axis orthogonal to said local major axis and said longitudinal axis, a local minor internal dimension coincident with said local minor axis, and a local aspect ratio defined as a ratio of said local maximum internal dimension to said local minor internal dimension; wherein said peripheral wall is free from said facets above a location along said longitudinal axis at which said aspect ratio is between about 1 and about 1.1, and wherein individual said facets have a radius of curvature of the principal curvatures at a centroid of said facets greater than 60 mm, characterized in that said peripheral wall in said faceted region comprises an

outer skin layer (190).

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]**

Fig. 1 is perspective view of a container.
Fig. 2 is a cross sectional view of the container shown in Fig. 1 as marked in Fig. 1, the view being taken towards the closed end.
Fig. 3 is cut-out view of a portion of the peripheral wall shown in Fig. 2 as marked in Fig. 2.
Fig. 4 is profile view of a container.
Fig. 5 is a plurality of facets.
Fig. 6 is a plurality of facets.
Fig. 7 is a plurality of facets.
Fig. 8 is a plurality of facets.
Fig. 9 is a plurality of facets.
Fig. 10 is a profile view of a container having a sleeve label.
Fig. 11 is a profile view of a container having a bounded label.
Fig. 12 is a cross-section of a container 10 taken orthogonal to the longitudinal axis L, the closed end of the container being visible.
Fig. 13 is container having a plug-seal closure.
Fig. 14 is a carton containing a plurality of containers.

## DETAILED DESCRIPTION OF THE INVENTION

**[0011]** A container 10 having a neck 20 is shown in Fig. 1. The container 10 can be formed by injection stretch blow molding. The container 10 can be formed by injection molding, injection stretch blow molding, extrusion blow molding, or similar process. The container 10 can be a thermoformed container 10.

**[0012]** The container 10 has a closed end 30. The closed end 30 can have a closed end periphery 40. The closed end periphery 40 can define the extent of the closed end away from the longitudinal axis L. The closed end 30 can be shaped to have a structure that can be stably rested on a flat surface such as a table. The closed end 30 can be shaped as shown in Fig. 1. The closed end 30 can be provided with a plurality of feet upon which the closed end 30 can rest on a flat surface such as a table.

**[0013]** A peripheral wall 50 can extend from the closed end periphery 40 about a longitudinal axis L of the container 10 to the open end 60. The longitudinal axis L is an axis of the container 10 that passes through the open end 60 and the closed end 30 about which the peripheral wall 50 extends. The peripheral wall 50 extends from the open end 60 to the closed end 30. The peripheral wall 50 can be symmetric or asymmetric about the longitudinal axis L. The open end 60 is about the longitudinal axis L. If the open end is generally circularly shaped, the open end 60 circumscribes the longitudinal axis L.

**[0014]** The peripheral wall 50 and closed end 30 have a peripheral wall exterior surface 170 oriented away from the longitudinal axis L and an opposing interior surface 180. The interior surface 180 of the peripheral wall 50 is oriented towards the longitudinal axis L. The interior surface 180 of the closed end 30 is oriented towards the open end 60. The peripheral wall exterior surface 170 can have a peripheral wall exterior surface area 172, which is the total area of the peripheral wall exterior surface's 170 faces and curved surfaces above and below the neck.

**[0015]** The closed end 30 and peripheral wall 50 can comprise a thermoplastic material. The thermoplastic material can be a petroleum based thermoplastic material or a plant based thermoplastic material. The closed end 30 and peripheral wall 50 can be any polymeric material that can be blow molded. The container 10 can comprise a material selected from the group consisting of high density polyethylene, low density polyethylene, polypropylene, biaxially oriented polypropylene polyethylene, polyethylene terphthalate,polyethylene terephthalate glycol, processable polylactic acid, polyvinyl chloride, thermoplastic startch, cellulose bioplastic, aliphatic polyesters, and polylactic acid.

**[0016]** The peripheral wall 50 defines a variable open cross-section 70 of the container 10 in a plane orthogonal to the longitudinal axis L as function of distance from the closed end 30. A variable cross-section 70 of the container 10 at a particular height or location along the longitudinal axis L is stippled and labeled as 70 in Fig. 1. At various locations along the longitudinal axis L, the cross-section orthogonal to the longitudinal axis L can have different shapes and or sizes.

**[0017]** The variable open cross-section 70 defines an area within the container 10 within which the contents of the container 10 are held. The container 10 can be a bulbous shaped container 10 having a relatively narrow closed end 30 and a peripheral wall 50 that broadens in relationship to the height of the container 10, the height being taken along the longitudinal axis L moving away from the closed end 30.

**[0018]** Starting from the closed end 30 and moving along the longitudinal axis L, the area of the open cross-section 70 can have an initial value that gradually increases with height as measured from the closed end 30 along the longitudinal axis L. The area of the open cross-section 70 can have a maximum at a particular height, above which the area of the open cross-section 70 decreases with increasing height as measured from the closed end 30 along the longitudinal axis L. The maximum can be a global maximum or local maximum.

**[0019]** The container 10 can have a neck 20 having a neck open cross-section 80 orthogonal to the longitudinal axis L. The neck 20 can be a narrowed region of the container 10 that can be generally located proximal the open end 60 of the container 10. The neck open cross-section 80 is marked in Fig. 1 and stippled. The neck 20 can be sized and dimensioned to be able to be gripped by an adult female hand.

**[0020]** The peripheral wall 50 comprises a faceted region 90. The faceted region 90 comprises a plurality of facets 100. The facets 100 forming the faceted region 90 are arranged edge to edge with one or more adjacent facets 100. The faceted region 90 can comprise more than about 5 facets 100. The faceted region 90 can comprise more than about 10 facets 100.. The faceted region 90 can comprise more than about 20 facets 100. The faceted region 90 can comprise more than about 40 facets 100. The faceted region 90 can comprise more than about 80 facets 100. The faceted region 90 can comprise more than about 150 facets 100. The faceted region 90 can comprise more than about 300 facets 100. Without being bound by theory, it is thought that the greater the number of facets 100 in the faceted region 90, the more flashes of reflectance that can be generated as the relative position of the container 10 changes with respect to the consumer, e.g. by movement of the container 10 in the consumer's hands or movement of the consumer as she moves in proximity to the container 10. The faceted region can comprise between about 5 and about 15 facets. The faceted region can comprise between about 5 and about 25 facets. The faceted region can comprise between about 5 and about 50 facets. The faceted region can comprise between about 5 and about 100 facets. The faceted region can comprise between about 20 and about 40 facets.

**[0021]** A facet 100 can be a small plane surface. A facet 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis that is less than about 4 $cm^2$. A facet 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis that is less than about 2.5 $cm^2$. A facet 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis between about 0.1 $cm^2$ and about 4 $cm^2$. A facet 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis between about 0.1 $cm^2$ and about 2.5 $cm^2$.

**[0022]** Each of the plurality of facets 100 has a facet exterior surface area oriented away from the longitudinal axis L and each of the plurality of facets 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis L that is less than about 2% of the peripheral wall exterior surface area 172. The facet exterior surface area 102 oriented away from the longitudinal axis L is between about 0.0001% and about 4% of the peripheral wall exterior surface area 172. The facet exterior surface area 102 oriented away from the longitudinal axis L can be between about 0.0001% and about 2% of the peripheral wall exterior surface area 172.

**[0023]** Each of the plurality of facets 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis L and each of the plurality of facets 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis L that is less than about 1% of the peripheral wall exterior surface area 172. The facet exterior surface area 102 oriented away from the longitudinal axis L can be between about 0.0001% and about 1% of the peripheral wall exterior surface area 172.

**[0024]** Each of the plurality of facets 100 can have a facet exterior surface area 102 oriented away from the longitudinal axis L and each of the plurality of facets 100 can have an exterior surface area 102 oriented away from the longitudinal axis L that is less than about 0.5% of the peripheral wall exterior surface area 172. The facet exterior surface area 102 oriented away from the longitudinal axis L can be between about 0.0001% and about 0.5% of the peripheral wall exterior surface area 172.

**[0025]** The facets 100 can be small plane surfaces of individual panels. When a plurality of facets 100 are arranged to form a faceted region 90 on a container 10, individual facets 100 can present surfaces that reflect incident light in different directions. That is, the orthogonal directions away from the surfaces of individual facets 100 are divergent. The differences in intensity of light reflected to an observer's eyes are perceived to give the container 10 luster or make the container 10 look sparkly. Without being bound by theory, it is thought that containers having a faceted region 90 may shimmer as compared containers having the same general container shape that do not have faceted region 90. The shimmer, which can be perceived by consumers as flashes of light draw a consumer's eyes to the container 10 having a faceted region 90. Further, a container 10 formed of a thermoplastic material having a faceted region 90 can appear to be a glass container. As such, a lightweight container 10 can have the appearance of a more substantial glass container. By having a container 10 that shimmers when viewed on the shelf of the store, it is thought that more consumers may be attracted to the container and consider purchasing the container 10 and contents therein.

**[0026]** At least a portion of the faceted region 90 can be located nearer to the closed end 30 than the open end 60. Without being bound by theory, it is thought that such an arrangement can provide for enhanced luster when the position of the longitudinal axis L is changes front to back relative to an observer's eye and when container 10 is rotated about the longitudinal axis L.

**[0027]** Figure 2 is an approximate sectional view of the container 10 shown in Fig. 1 to illustrate one configuration of the structure of a section of the container 10. A variety of cross-sections orthogonal to the longitudinal axis are contemplated herein. As shown in Fig. 2, around the peripheral wall 50, at least a portion of the peripheral wall 50 about the longitudinal axis L in a plane orthogonal to the longitudinal axis L below the neck 20 can be defined by a plurality of substantially straight line segments 110. The line segments 110 can be arranged end to end, as shown in Fig. 2. At any particular location along the longitudinal axis L below the neck 20, at least a portion of the peripheral wall 50 about the longitudinal axis L in a plane orthogonal to the longitudinal axis L can be defined by a plurality of substantially straight line segments 110. The peripheral wall 50 about the longitudinal axis L in a plane orthogonal to the longitudinal axis L below the neck

20 can be entirely defined by a plurality of substantially straight line segments 110. Each line segment 100 can have length 120, as shown in Fig. 3 which is a cut-out view of a portion of the peripheral wall shown in Fig. 2 as marked in Fig. 2. The length of the transition segment 130 between adjacent line segments 100 can have a length less than about 10% of the length of an adjacent line segment 100. The length of the transition segment 130 between adjacent line segments 100 can have a length between about 0.0001% and about 10% of the length of an adjacent line segment 100. Without being bound by theory, it is thought that shorter transition segments 130 can provide for more visual definition of the facets 100.

**[0028]** As shown in Fig. 1, the peripheral wall 50 about the longitudinal axis L in a plane orthogonal to the longitudinal axis L above the neck 20 can be free from or substantially free from having line segments 110 arranged end to end.

**[0029]** As shown in Fig. 12, at local positions along the longitudinal axis L, the container 10 has a local maximum internal dimension 210 orthogonal to the longitudinal axis L, a local major axis 201 coincident with the local maximum internal dimension 210, a local minor axis 202 orthogonal to the local major axis 201 and the longitudinal axis L, a local minor internal dimension 220 coincident with the local minor axis 202. At local positions along the longitudinal axis L, the container 10 has a local aspect ratio defined as a ratio of the local maximum internal dimension 210 to the local minor internal dimension 220. The neck 20 can be considered to be a location at which the local aspect ratio is between 1 about 1.1.

**[0030]** The local aspect ratio can be thought of as descriptive of the shape of the various cross sections of the container 10 taken orthogonal to the longitudinal axis L of the container 10. If the local aspect ratio of a section of the container 10 taken orthogonal to the longitudinal axis L is 1, that section of the container 10 can be circular, recognizing that the aspect ratio as defined herein of non-circular cross sections could be 1 if the local maximum internal dimension 210 and the local minor internal dimension 220 are the same, for example as might occur for a square cross section..

**[0031]** It can be practical to provide a container 10 that when resting on the closed end 30 has a broad front dimension, taken to be from left to right of the observer, and a slimmer front to back dimension, which is taken to be front to back into a shelf on which the container 10 is observed. Such an arrangement can provide more space for branding and labeling of the container. Higher up on the container 10, the cross section of the container 10 orthogonal to the longitudinal axis L can become more circular to provide a circular open end 60 that can be conveniently fitted with a closure.

**[0032]** The container 10 can have a local aspect ratio between about 1.3 and about 5 mid-way along the longitudinal axis L, for example as shown in Fig. 12. Such a local aspect ratio can provide for a container 10 that has a broad dimension that can be suitable as a primary label face 501 of the container 10. The primary label face 501 of the container can contain the brand name of the product contained within the container 10 in a large enough font so as to be readable by an observer at a distance of less than about 2 m under typical lighting conditions that occur in a retail environment. The primary label face 501 of the container 10 can be generally in line with a local major axis 201 of the container 10, recognizing that the primary label face 501 may be a curved surface. Optionally, the container 10 can have a local aspect ratio between about 1.4 and about 5 mid-way along the longitudinal axis L. Optionally, the container 10 can have a local aspect ratio between about 1.5 and 5 mid-way along the longitudinal axis L. Optionally, the container 10 can have a local aspect ratio between about 1.7 and 5 mid-way along the longitudinal axis L. Optionally, the container 10 can have a local aspect ratio between about 2 and 5 mid-way along the longitudinal axis L.

**[0033]** Without being bound by theory, it is thought that containers 10 having a faceted region 90 can be practical for attracting the attention of consumers from a distance of between about 2 m and about 10 m. However, since the faceted region 90 has a plurality of facets 100, each of which reflect in divergent direction, labeling on the container 10 can be difficult for an observer to read at a close distance, such as between about 0.1 m and about 2 m of the container 10. A container 10 having a local aspect ratio between about 1.3 and about 5 mid-way along the longitudinal axis L can provide for a less rounded portion of the container 10 that can be labeled with brand identifying information. A faceted region 90 provided on such a container can balance the desire to provide for a container 10 having a luster when viewed from a distance yet be legibly labeled on a primary label face 501 of the container 10.

**[0034]** As the consumer approaches the container 10 when walking along an aisle, different portions of the container 10 will be visible depending on her position relative to the container. For instance, if the primary label face 501 is facing the front of the shelf, the consumer will first be exposed to a portion of the side of the container 10 after which she will be exposed to the front of the container 10. The sharper curved surfaces of the container 10 can provide more luster as compared to the less curved surfaces of the container 10 since the surfaces of the individual facets 100 are more divergent for the former as compared to the latter. Facets 100 provided on the primary label face 501 still can provide for luster yet branding information provided in that location can also be readable by the observer from a distance within 2 m under normal lighting conditions.

**[0035]** Along between about 20% and about 95% of the longitudinal axis L the container 10 can have a local aspect ratio between about 1.3 and about 5. Along between about 20% and about 95% of the longitudinal axis L the container 10 can have a local aspect ratio between about 1.5 and about 5. Along between about 40% and

about 95% of the longitudinal axis L the container 10 can have a local aspect ratio greater between about 1.3 and about 5. Along between about 40% and about 95% of the longitudinal axis L the container 10 can have a local aspect ratio between about 1.5 and about 5. Along between about 20% and about 85% of the longitudinal axis L the container 10 can have a local aspect ratio between about 1.3 and about 5. Along between about 20% and about 85% of the longitudinal axis L the container 10 can have a local aspect ratio between about 1.5 and about 5. Along between about 40% and about 85% of the longitudinal axis L the container 10 can have a local aspect ratio greater between about 1.3 and about 5. Along between about 40% and about 85% of the longitudinal axis L the container 10 can have a local aspect ratio between about 1.5 and about 5.

**[0036]** Surprisingly, it has been found that providing a peripheral wall 50 that is free from or substantially free from the facets 100 above a location along the longitudinal axis L at which the local aspect ratio is between about 1 and about 1.1 can provide for a higher top load buckling strength as compared to a container 10 having facets 100 above a location at which the local aspect ratio is between about 1 and about 1.1. That is, as the cross section taken orthogonal to the longitudinal axis L of the container 10 becomes more circularly shaped, the inclusion of facets 100 can reduce the top load buckling strength of the container 10. Without being bound by theory, it is thought that stress concentrates at the boundary between adjacent facets 100, thereby lowering the buckling strength of the container 10.

**[0037]** The neck 20 can be nearer to the open end 60 than to the closed end 30. By having the neck 20 located as such, a greater portion of the container 10 can be provided with a faceted region. Further, since the neck 20 can form a portion of the container 10 designed to be gripped, the center of mass of the container 10 plus the contents therein will tend to be lower than the neck 20. A lower center of gravity may be practical for providing a container from which it is easy to pour contents, is stable in the user's hand, and is stable when resting on a flat surface.

**[0038]** The neck 20 can have a neck open cross-section 80 between about 5 $cm^2$ and about 80 $cm^2$. A neck 20 dimensioned as such can provide for a convenient location at which to grip the container 10. The neck 20 can have a neck open cross-section 80 between about 5 $cm^2$ and about 60 $cm^2$. The neck 20 can have a neck open cross-section 80 between about 5 $cm^2$ and about 40 $cm^2$. The neck 20 can have a neck open cross-section 80 between about 5 $cm^2$ and about 40 $cm^2$. The neck 20 can have a neck open cross-section 80 between about 5 $cm^2$ and about 20 $cm^2$ or even less than about 20 $cm^2$. The neck 20 can have a neck open cross-section 80 between about 5 $cm^2$ and about 10 $cm^2$. Having a smaller neck 20 can be practical for containers 10 that designed for used by persons having small hands.

**[0039]** The container 10 can have a total volume defined by the closed end 30, the peripheral wall 50, and the open end 60. The total volume can be more than about 300 mL. The total volume can be more than about 500 mL. The total volume can be more than about 1000 mL. The total volume can be more than about 1500 mL. The total volume can be more than about 2000 mL. The total volume can be between about 300 mL and about 2000 mL.

**[0040]** The container 10 can have a partial volume above the neck 20. The partial volume is defined by the neck open cross-section 80 at the neck, the peripheral wall 50 above the neck 20, and the open end 60. The partial volume can be thought of as the volume of the part of the container 10 above the neck 20. The partial volume above the neck 20 can be less than about 20% of the total volume of the container 10. The partial volume above the neck 20 can be less than about 10% of the total volume of the container 10. By having a lower fraction of the total volume above the neck 20, the container 10 can be more ergonomic for the person gripping the container 10 about the neck 20 since most of the contents within the container 10 are located below the axis about which the container 10 is tipped when dispensing the contents. The partial volume above the neck 20 can be between about 1% and about 50% of the total volume of the container 10. The partial volume above the neck 20 can be between about 1% and about 20% of the total volume of the container 10. The partial volume above the neck 20 can be between about 1% and about 10% of the total volume of the container 10.

**[0041]** The faceted region 90 can comprise more than about 30% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. As shown in Fig. 4, faceted region 90 can be on a face 140 of the container 10. A faceted region 90 comprising more than about 30% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20 can be large enough so that the shimmer emanating there from can be noticeable by a consumer from a distance of about 1 meter under lighting conditions typically found in stores. The peripheral wall exterior surface 170 of the peripheral wall 50 is the surface of the peripheral wall 50 oriented away from the longitudinal axis L. The faceted region 90 can comprise more than about 50% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The faceted region 90 can comprise more than about 60% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The faceted region 90 can comprise more than about 90% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The faceted region 90 can comprise about 100% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The higher the percentage of the peripheral wall exterior surface 170 that the faceted region 90 comprises, the technical effect of flashes of reflection from the faceted region 90 is apparent from a wider viewing angle. The faceted region 90 can comprise between about 30% and about

100% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The faceted region 90 can comprise between about 40% and about 100% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The faceted region 90 can comprise between about 50% and about 100% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20. The faceted region 90 can comprise between about 60% and about 100% of the peripheral wall exterior surface 170 of the peripheral wall 50 below the neck 20.

**[0042]** The peripheral wall exterior surface 170 below the neck 20 can have a surface area. The faceted region 90 can comprise more than about 30% of the peripheral wall exterior surface area 172 below the neck 20. The faceted region 90 can comprise more than about 50% of the peripheral wall exterior surface area 172 below the neck 20. The faceted region 90 can comprise more than about 70% of the peripheral wall exterior surface area 172 below the neck 20. The faceted region 90 can comprise more than about 80% of the surface area of the peripheral wall exterior surface area 172 below the neck 20. The larger the faceted region 90, the more noticeable the faceted region 90 can be since the technical effect of flashes of reflection from the faceted region 90 is apparent from a wider viewing angle.

**[0043]** The peripheral wall exterior surface 170 below the neck 20 can have a surface area. The faceted region 90 can comprise between about 30% and 100% of the peripheral wall exterior surface area 172 below the neck 20. The faceted region 90 can comprise between about 50% and about 100% of the peripheral wall exterior surface area 172 below the neck 20. The faceted region 90 can comprise between about 70% and about 100% of the peripheral wall exterior surface area 172 below the neck 20. The faceted region 90 can comprise between about 80% and about 100% of the surface area of the peripheral wall exterior surface area 172 below the neck 20. The larger the faceted region 90, the more noticeable the faceted region 90 can be since the technical effect of flashes of reflection from the faceted region 90 is apparent from a wider viewing angle.

**[0044]** The faceted region 90 can extend around the peripheral wall 50, as shown in Figs. 1 and 2. By arranging the faceted region 90 as such, as the consumer rotates the container 10 around the longitudinal axis L to view all parts of peripheral wall 50, the movement of the facets 100 relative to her eyes will create flashes of reflection that provide the impression of a sparkly luster from a glass container to the consumer.

**[0045]** The area of the faceted region 90 can be greater than about 60 $cm^2$. The visibility of the faceted region 90 is thought to increase with increasing size of the faceted region 90. The faceted region 90 can be a discrete portion of peripheral wall 50 that is provided with facets 100. For example, a portion of the peripheral wall 50 can comprise a faceted region 90 and the remainder of the peripheral wall 50 can be free from or substantially free from facets 100. For example, a portion of the peripheral wall 50 can comprise a faceted region 90 and the remainder of the peripheral wall 50 can be smooth and or provided with ribs and or other surface contours that are decorative and or structural. The area of the faceted region 90 can be between about 60 $cm^2$ and about 2000 $cm^2$.

**[0046]** The facets 100 can have a facet exterior surface 150 oriented away from the longitudinal axis L. The facet exterior surface 150 of each of the facets 100 can have an opposing facet interior surface that is oriented towards the longitudinal axis L. The facet exterior surfaces 150 of the plurality of facets 100 can be positioned convexly relative to the longitudinal axis L.

**[0047]** For example, as shown in Fig. 1, a plurality of facets 100 can be positioned convexly relative to the longitudinal axis L. In this arrangement, the plurality of facets 100 can be arranged to extend in a direction from towards the closed end 30 towards the open end 60 of the container. This arrangement can be thought of as being generally up and down the container 10 when the container 10 is resting on the closed end 30. By arranging the plurality of facets 100 to be positioned in a direction from towards the closed end 30 towards the open end 60, the container 10 can generate flashes of reflectance when the longitudinal axis L of the container 10 is tipped relative to the observer. This can give the visual impression of a heavy faceted glass or crystal container yet have the weight of light plastic container.

**[0048]** Similarly, the facet exterior surfaces 150 of the plurality of facets 100 can be positioned convexly relative to the longitudinal axis L in a direction about the longitudinal axis L. That is, the plurality of facets 100 can be positioned to at least partially wrap around, or even entirely wrap around, the longitudinal axis L of the container 10 at a particular height of the container along the longitudinal axis L. By arranging the plurality of facets 100 in this manner, the container 10 can have the impression of a sparkly luster when the container 10 is rotated about the longitudinal axis L or when the consumer walks past the container 10 and is progressively exposed to different portions of the peripheral wall 50 as she walks to, in front of, and past the container presented on a shelf in a store.

**[0049]** The convex arrangement of the plurality of facets 100 relative to the longitudinal axis can be up and down the container 10, around the container 10, or both up and down and around the container 10, for example in a helical or spiral arrangement.

**[0050]** Another way of describing the facets 100 forming the faceted region 90 is that the facet exterior surfaces 150 of the facets 100 are divergent from one another. That is, the normal direction away from the facet exterior surface 150 of each of the facets 100 forming the faceted region can be unique for each facet 100. The normal direction away from the facet exterior surface 150 of each facet 100 can be divergent from the normal direction away from the facet exterior surface 150 each adjacent facet 100. Such an arrangement can provide for flashes of reflection with changes in the viewing angle of the fac-

eted region 90.

**[0051]** The facets 100 can have a variety of different shapes. All of the facets 100 on the container 10 can have a substantially similar shape. As the shape of the container 10 can be a function of location along the longitudinal axis L, the facets 100 can be scaled to fit such shape. Optionally, the shape of the facets 100 can be transformed such that the shape of each of the facets 100 is common with each of the other facets 100 when the surface of the peripheral wall 50 is transformed to have a common dimensional scale throughout the peripheral wall 50. Such an arrangement is illustrated in Fig. 1. As shown in Fig. 1, the number of facets 100 around the peripheral wall 50 is the same at all locations along the longitudinal axis L below the neck 20.

**[0052]** The size of the facets at a particular height on the container 10 can be a function of the perimeter of the container 10 which can be in turn a function of the location along the longitudinal axis L. The size of the facets 100 can decrease with decreasing perimeter.

**[0053]** A variety of shapes are suitable for the facets 100. For example, the facets 100 can have a substantially rhomboidal shape, as shown in Fig. 5. As shown in Figs. 5 and 6, each of the facets 100 can have a centroid 160.

**[0054]** The centroid 160 of adjacent facets 100 can be aligned with one another on the peripheral wall exterior surface 170 of the container 10 at positions along the longitudinal axis L, as shown in Figs. 1 and 4. Similarly, the centroids 160 of adjacent facets 100 can be aligned with one another on the peripheral wall exterior surface 170 of the container 10 at positions about the longitudinal axis L, as shown in Figs. 1, 5, 7, 8, and 9.

**[0055]** The facets 100 can have a shape selected from the group consisting of substantially polygonal, substantially triangular, substantially quadrilateral, substantially rhomboidal, substantially hexagonal, and combinations thereof. A faceted region 90 can comprise facets 100 having a plurality of shapes, by way of non-limiting example, as shown in Fig. 8.

**[0056]** Each of the adjacent facets 100 can have a facet exterior surface area 102 that is within about 20% of one another. For each facet 100, the facet exterior surface area 102 is the area of the facet exterior surface 150 of the facet 100. Each of the adjacent facets 100 can have substantially the same shape. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be less than about 10% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be between about 0.001 % and about 10% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be less than about 5% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be between about 0.001 % and about 5% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be less than about 3% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be between about 0.001 % and about 3% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be less than about 2% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be between about 0.001 % and about 2% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be less than about 1% of the surface area of the peripheral wall exterior surface 170 of the container 10. The facet exterior surface area 102 of each facet 100 forming the plurality of facets 100 can be between about 0.001 % and about 1% of the surface area of the peripheral wall exterior surface 170 of the container 10. Without being bound by theory, it is thought that if smaller facets 100 are used, more facets 100 can be provided on the peripheral wall exterior surface 170 of the container 10 which can provide for more flashes of reflectance as incident light is reflected off of the facets 100.

**[0057]** The facets 100 are substantially flat. The facets 100 can be flat. The flatter the facets 100 the more reflective the facets 100. Substantially flat surfaces are thought to provide for enhanced luster to the faceted region 100. Individual facets 100 have a radius of curvature of the principal curvatures at the centroid of the facet 100 greater than about 60 mm. Individual facets 100 can have a radius of curvature of the principal curvatures at the centroid of the facet 100 greater than about 70 mm.

**[0058]** Individual facets 100 can have a radius of curvature of the principal curvatures at the centroid of the facet 100 greater than about 90 mm. Individual facets 100 can have a radius of curvature of the principal curvatures at the centroid of the facet 100 greater than about 130 mm. Without being bound by theory, such facets 100 are thought to be flat enough so as to be sufficiently reflective to provide for the desired luster.

**[0059]** The facets 100 forming the faceted region 100 can have a Gaussian curvature between about -0.04 and about 0.04. The facets 100 forming the faceted region 100 can have a Gaussian curvature between about -0.01 and about 0.01. The Gaussian curvature of a facet 100 is the product of the principal curvatures of the facet 100.

**[0060]** To provide for enhanced flashes of reflectance from incident light reflecting off of the container 10, the peripheral wall 50 in the faceted region 90 comprises an outer skin layer 190. The outer skin layer 190 can be a sleeve 200 disposed about the peripheral wall 50 of the container, as shown in Fig. 10. The outer skin layer 190

can be provided, by way of non-limiting example, to the container after the container 10 is blow molded or during blow molding of the container 10. For example, the sleeve 200 can be a shrink sleeve that is heat shrunk around the finished container 10. Alternatively, the sleeve 200 can be stretch sleeve into which a pre-form or parison is blown to stretch the stretch sleeve to form the finished container 10.

**[0061]** The outer skin layer 190 can be a bounded label 2100, as shown in Fig. 11. A bounded label 190 is a label forming part of the container 10 that only partially extends about the longitudinal axis L. The bounded label 190 can be selected from the group consisting of a heat transfer label, an in-mold label, and an adhesive label.

**[0062]** The outer skin layer 190 can be selected from the group consisting of an in-mold label, an adhesive label, a heat transfer label, a stretch sleeve label, wet glue label, and a shrink sleeve label.

**[0063]** To enhance the reflective properties of the facets, the outer skin layer 190 can be selected from the group consisting of a biaxially oriented polystyrene, polyethylene terephthalate, and glycol modified polyethylene terephthalate. The outer skin layer 190 can be printed. The outer skin layer 190 can be reverse printed. The outer skin layer 190 can be a metallic ink printed outer skin layer 190. The printing can be a metallic ink or pearlescent ink. A metallic foil can be included in a laminate comprising the outer skin layer 190. A metallic ink comprises small particles of metal, such as aluminum, bronze, copper, zinc, or other metallic element. The labels can be printed by digital printing, flexographic printing, gravure printing, or other suitable printing technology. An outer skin layer 190 that is a metallic ink printed outer skin layer 190 can provide for a reflective surface that that generates more intense perceived flashes of reflectance.

**[0064]** A polyethylene terphthalate, polyethylene terephthalate glycol, or oriented polystyrene label may be used. This method of printing puts the reflective surface on the outside of the package. This can be enhanced by using metallic ink (ink mixed with small particles of aluminum, bronze, copper, zinc, or other elements), pearlescent ink, and metallic foils.

**[0065]** To provide for structural stability of the container 10 above the neck 20, the peripheral wall 50 above the neck 20 the neck 20 can be free from or substantially free from facets 100. The lack of facets 100 above the neck 20 is thought to provide for improved resistance to buckling of the container as compared to container 10 that is not free from or substantially free from facets 100 above the neck 20.

**[0066]** The container 10 can further comprise a plug seal closure 62 operatively engaged with the open end 60, as shown in Fig. 13. Together, the container 10 and plug seal closure can provide for an enclosed package 64 that does not leak the contents of the package 64 under stresses that are anticipated to occur during the manufacture, storage, distribution, sale, and use of the package and/or contents of the package 64. The plug seal closure 62 can be a closure that is threaded onto the open end 60 of the container 10 for fit into or over the open end 60 of the container. The open end 60 of the container 10 can be calibrated. For instance the open end 60 of the container 10 can have dimensional tolerance between about 0% and about 2% of the diameter of the open end 60.

**[0067]** A plurality of containers 10 can be contained within a carton 600, as shown in Fig. 14. The carton 600 can comprise paper. The carton 600 can comprise corrugated paper. The carton 600 can have an interior height dimension H. The container 10 can be sized and dimensioned to fit upright within the carton 600. The container 10 and plug seal closure 62 can be sized and dimensioned to fit upright within the carton 600. The container 10 can have a container height 11 that is the distance between the open end 60 and closed 30. The container height 11 can be less than or equal to the interior height dimension H of the carton 600. The interior height dimension H can be less than about 5 mm greater than the container height 11. A plurality of cartons 600 containing containers 10 as described herein can be stacked on top of one another. The containers 10 as described herein can have adequate top load strength so that the containers 10 in a carton 600 underneath another carton 600 containing containers 10 do not buckle under the stress applied from above.

## Claims

**1.** A container (10) comprising:

an open end (60) circumscribing a longitudinal axis (L); and

a peripheral wall (50) extending from said open end about said longitudinal axis to a closed end (30);

wherein said peripheral wall and said closed end comprise a thermoplastic material;

wherein said peripheral wall comprises a faceted region (90) comprising a plurality of facets (100) arranged edge to edge with at least one adjacent facet, at least a portion of said faceted region being located nearer to said closed end than to said open end;

wherein said peripheral wall has a peripheral wall exterior surface (170) oriented away from said longitudinal axis, said peripheral wall exterior surface having a peripheral wall exterior surface area (172);

wherein each of said plurality of facets has a facet exterior surface (150) oriented away from said longitudinal axis and each of said facets has a facet exterior surface area (102) that is between 0.0001% and 4% of said peripheral wall exterior surface area;

wherein at local positions along said longitudinal axis said container has a local maximum internal dimension (210) orthogonal to said longitudinal axis, a local major axis (201) coincident with said local maximum internal dimension, a local minor axis (202) orthogonal to said local major axis and said longitudinal axis, a local minor internal dimension (220) coincident with said local minor axis, and a local aspect ratio defined as a ratio of said local maximum internal dimension to said local minor internal dimension;
wherein said peripheral wall is free from said facets above a location along said longitudinal axis at which said aspect ratio is between about 1 and about 1.1; and
wherein individual said facets have a radius of curvature of the principal curvatures at a centroid (160) of said facets greater than 60 mm;
**characterised in that** said peripheral wall in said faceted region comprises an outer skin layer (190).

**2.** The container according to Claim 1, wherein said outer skin layer is a label selected from the group consisting of a shrink-sleeve label, a stretch-sleeve label, an in-mold label, a heat transfer label, and an adhesive label.

**3.** The container according to Claim 2, wherein said skin layer is a metallic ink printed shrink-sleeve label or a metallic ink printed stretch-sleeve label.

**4.** The container according to any one of the preceding claims, wherein said peripheral wall below said neck has a surface area, wherein said faceted region comprises between 50 % and 100 % of said surface area.

**5.** The container according to any one of the preceding claims, wherein said container comprises a plug seal closure (62).

**6.** The container according to any one of the preceding claims, wherein each of said adjacent facets have a facet exterior surface area (102) within 20 % of one another.

**7.** The container according to any one of the preceding claims, wherein said faceted region extends around said peripheral wall.

**8.** The container according to any one of the preceding claims, wherein said facet exterior surfaces of said plurality of facets are positioned convexly relative to said longitudinal axis about said longitudinal axis.

**9.** The container according to any one of the preceding claims, wherein said facet exterior surfaces of said plurality of facets are positioned convexly relative to said longitudinal axis.

**10.** The container according to any one of the preceding claims, wherein said facets have a shape selected from the group consisting of polygonal, triangular, quadrilateral, rhomboidal, hexagonal, and combinations thereof.

**11.** The container according to any one of the preceding claims, wherein each of said facets has a centroid (160), wherein said centroids of adjacent facets are aligned with one another on said peripheral wall exterior surface (170) at positions along said longitudinal axis L.

**12.** The container according to any one of the preceding claims, wherein each of said facets has a centroid (160), wherein said centroids of adjacent facets are aligned with one another on said peripheral wall exterior surface of said container at positions about said longitudinal axis L.

**Patentansprüche**

**1.** Behälter (10), umfassend:

ein offenes Ende (60), das eine Längsachse (L) umschreibt; und
eine Umfangswand (50), die von dem offenen Ende um die Längsachse zu einem geschlossenen Ende (30) verläuft;
wobei die Umfangswand und das geschlossene Ende ein thermoplastisches Material umfassen;
wobei die Umfangswand einen facettierten Bereich (90) umfasst, der eine Vielzahl von Facetten (100) umfasst, die Rand zu Rand mit wenigstens einer angrenzenden Facette angeordnet sind, wobei wenigstens ein Abschnitt des facettierten Bereichs näher an dem geschlossenen Ende angeordnet ist als das offene Ende;
wobei die Umfangswand eine Umfangswand-Außenoberfläche (170) aufweist, die von der Längsachse abgewandt ausgerichtet ist, wobei die Umfangswand-Außenoberfläche einen Umfangswand-Außenoberflächenbereich (172) aufweist;
wobei jede der Vielzahl von Facetten eine Facetten-Außenoberfläche (150) aufweist, die von der Längsachse abgewandt ausgerichtet ist, und jede der Facetten einen Facetten-Außenoberflächenbereich (102) aufweist, der zwischen 0,0001 % und 4 % der spezifischen Umfangswand-Außenoberfläche beträgt;
wobei an lokalen Positionen entlang der Längsachse der Behälter eine lokale maximale Innenabmessung (210) senkrecht zu der Längsachse, eine lokale Hauptachse (201), die gleich der

lokalen maximalen Innenabmessung ist, eine lokale Nebenachse (202), die senkrecht zu der lokalen Hauptachse und der Längsachse ist, eine lokale Nebeninnenabmessung (220), die gleich der lokalen Nebenachse ist, und ein lokales Seitenverhältnis, das als ein Verhältnis der lokalen maximalen Innenabmessung zu der lokalen Nebeninnenabmessung definiert ist, aufweist;
wobei die Umfangswand über einer Stelle entlang der Längsachse, bei der das Seitenverhältnis zwischen etwa 1 und etwa 1,1 liegt, frei von den Facetten ist; und
wobei einzelne der Facetten einen Krümmungsradius der Hauptkrümmungen an einem Schwerpunkt (160) der Facetten von mehr als 60 mm aufweisen;
**dadurch gekennzeichnet, dass** die Umfangswand in dem facettierten Bereich eine Außenhautschicht (190) umfasst.

**2.** Behälter nach Anspruch 1, wobei die Außenhautschicht ein Etikett ist, das ausgewählt ist aus der Gruppe bestehend aus einem Schrumpffolienetikett, einem Stretch-Sleeve-Etikett, einem In-Mold-Etikett, einem Wärmeübertragungsetikett und einem Klebeetikett.

**3.** Behälter nach Anspruch 2, wobei die Hautschicht ein mit metallischer Tinte bedrucktes Schrumpffolienetikett oder ein mit metallischer Tinte bedrucktes Stretch-Sleeve-Etikett ist.

**4.** Behälter nach einem der vorstehenden Ansprüche, wobei die Umfangswand unter dem Hals eine Oberfläche aufweist, wobei der facettierte Bereich zwischen 50 % und 100 % der Oberfläche umfasst.

**5.** Behälter nach einem der vorstehenden Ansprüche, wobei der Behälter einen Stopfenverschluss (62) umfasst.

**6.** Behälter nach einem der vorstehenden Ansprüche, wobei jede der angrenzenden Facetten einen Facetten-Außenoberflächenbereich (102) innerhalb von 20 % voneinander aufweist.

**7.** Behälter nach einem der vorstehenden Ansprüche, wobei der facettierte Bereich um die Umfangswand verläuft.

**8.** Behälter nach einem der vorstehenden Ansprüche, wobei die Facetten-Außenoberflächen der Vielzahl von Facetten konvex bezogen auf die Längsachse um die Längsachse angeordnet sind.

**9.** Behälter nach einem der vorstehenden Ansprüche, wobei die Facetten-Außenoberflächen der Vielzahl von Facetten konvex bezogen auf die Längsachse angeordnet sind.

**10.** Behälter nach einem der vorstehenden Ansprüche, wobei die Facetten eine Form aufweisen, die ausgewählt ist aus der Gruppe bestehend aus vieleckig, dreieckig, vierseitig, rautenförmig, sechseckig und Kombinationen davon.

**11.** Behälter nach einem der vorstehenden Ansprüche, wobei jede dieser Facetten einen Schwerpunkt (160) aufweist, wobei die Schwerpunkte angrenzender Facetten miteinander an der Umfangswand-Außenoberfläche (170) an Positionen entlang der Längsachse L ausgerichtet sind.

**12.** Behälter nach einem der vorstehenden Ansprüche, wobei jede der Facetten einen Schwerpunkt (160) aufweist, wobei die Schwerpunkte angrenzender Facetten an der Umfangswand-Außenoberfläche des Behälters an Positionen um die Längsachse L aneinander ausgerichtet sind.

**Revendications**

**1.** Récipient (10) comprenant :

une extrémité ouverte (60) entourant un axe longitudinal (L) ; et
une paroi périphérique (50) s'étendant de ladite extrémité ouverte autour dudit axe longitudinal jusqu'à une extrémité fermée (30) ;
dans lequel ladite paroi périphérique et ladite extrémité fermée comprennent un matériau thermoplastique ;
dans lequel ladite paroi périphérique comprend une région à facettes (90) comprenant une pluralité de facettes (100) disposées bord à bord avec au moins une facette adjacente, au moins une partie de ladite région à facettes étant située plus près de ladite extrémité fermée que de ladite extrémité ouverte ;
dans lequel ladite paroi périphérique a une surface extérieure de paroi périphérique (170) orientée à l'écart dudit axe longitudinal, ladite surface extérieure de paroi périphérique ayant une superficie extérieure de paroi périphérique (172) ;
dans lequel chacune de ladite pluralité de facettes a une surface extérieure de facette (150) orientée à l'écart dudit axe longitudinal et chacune desdites facettes a une superficie extérieure de facette (102) qui vaut entre 0,0001 % et 4 % de ladite superficie extérieure de paroi périphérique ;
dans lequel, au niveau de positions locales le long dudit axe longitudinal, ledit récipient a une

dimension interne maximale locale (210) orthogonale audit axe longitudinal, un grand axe local (201) coïncident avec ladite dimension interne maximale locale, un petit axe local (202) orthogonal audit grand axe local et audit axe longitudinal, une dimension interne mineure locale (220) coïncidente avec ledit petit axe local, et un rapport d'aspect local défini en tant que rapport de ladite dimension interne maximale locale à ladite dimension interne mineure locale ;
dans lequel ladite paroi périphérique est dépourvue desdites facettes au-dessus d'un emplacement le long dudit axe longitudinal au niveau duquel ledit rapport d'aspect est compris entre environ 1 et environ 1,1 ; et
dans lequel lesdites facettes individuelles ont un rayon de courbure des courbures principales au niveau d'un centroïde (160) desdites facettes supérieur à 60 mm.
**caractérisé en ce que** ladite paroi périphérique dans ladite région à facettes comprend une couche superficielle externe (190).

**2.** Récipient selon la revendication 1, dans lequel ladite couche superficielle externe est une étiquette choisie dans le groupe constitué d'une étiquette de type manchon thermorétractable, une étiquette de type manchon étirable, une étiquette dans le moule, une étiquette à transfert thermique et une étiquette adhésive.

**3.** Récipient selon la revendication 2, dans lequel ladite couche superficielle est une étiquette de type manchon thermorétractable imprimée avec une encre métallique ou une étiquette de type manchon étirable imprimée avec une encre métallique.

**4.** Récipient selon l'une quelconque des revendications précédentes, dans lequel ladite paroi périphérique en dessous dudit col a une superficie, dans lequel ladite région à facettes comprend entre 50 % et 100 % de ladite superficie.

**5.** Récipient selon l'une quelconque des revendications précédentes, où ledit récipient comprend une fermeture à bouchon d'étanchéité (62).

**6.** Récipient selon l'une quelconque des revendications précédentes, dans lequel chacune desdites facettes adjacentes a une superficie extérieure de facette (102) à plus ou moins 20 % l'une par rapport à l'autre.

**7.** Récipient selon l'une quelconque des revendications précédentes, dans lequel ladite région à facettes s'étend autour de ladite paroi périphérique.

**8.** Récipient selon l'une quelconque des revendications précédentes, dans lequel lesdites surfaces extérieures de facette de ladite pluralité de facettes sont positionnées de façon convexe par rapport audit axe longitudinal autour dudit axe longitudinal.

**9.** Récipient selon l'une quelconque des revendications précédentes, dans lequel lesdites surfaces extérieures de facette de ladite pluralité de facettes sont positionnées de façon convexe par rapport audit axe longitudinal.

**10.** Récipient selon l'une quelconque des revendications précédentes, dans lequel lesdites facettes ont une forme choisie dans le groupe constitué de polygonale, triangulaire, quadrilatérale, rhomboïdale, hexagonale, et leurs combinaisons.

**11.** Récipient selon l'une quelconque des revendications précédentes, dans lequel chacune desdites facettes a un centroïde (160), dans lequel lesdits centroïdes de facettes adjacentes sont alignés les uns sur les autres sur ladite surface extérieure de paroi périphérique (170) au niveau de positions le long dudit axe longitudinal L.

**12.** Récipient selon l'une quelconque des revendications précédentes, dans lequel chacune desdites facettes a un centroïde (160), dans lequel lesdits centroïdes de facettes adjacentes sont alignés les uns sur les autres sur ladite surface extérieure de paroi périphérique dudit récipient au niveau de positions autour dudit axe longitudinal L.

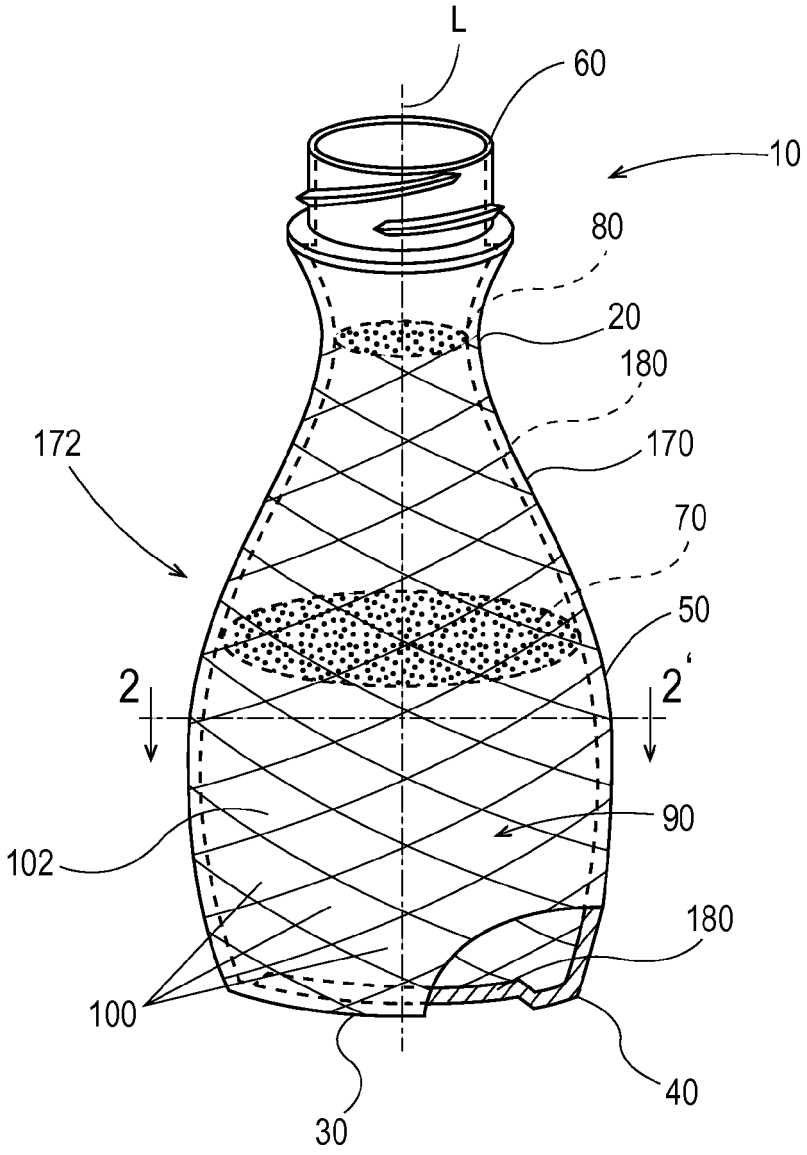


Fig. 1

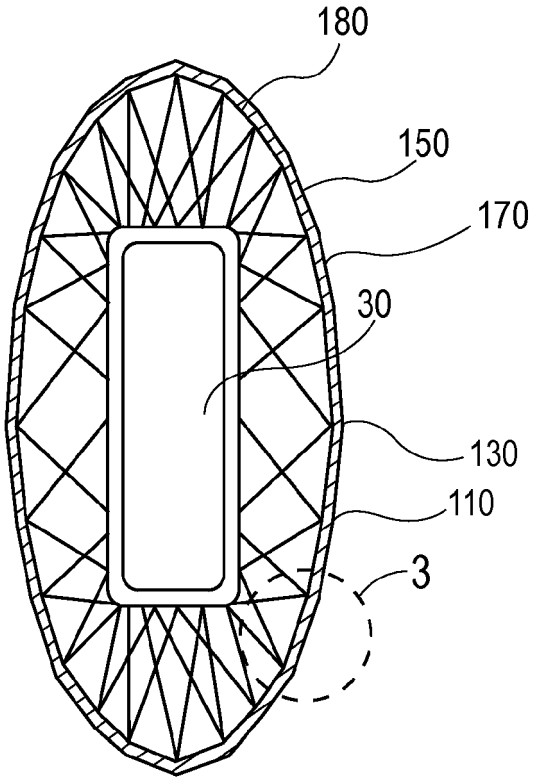


Fig. 2

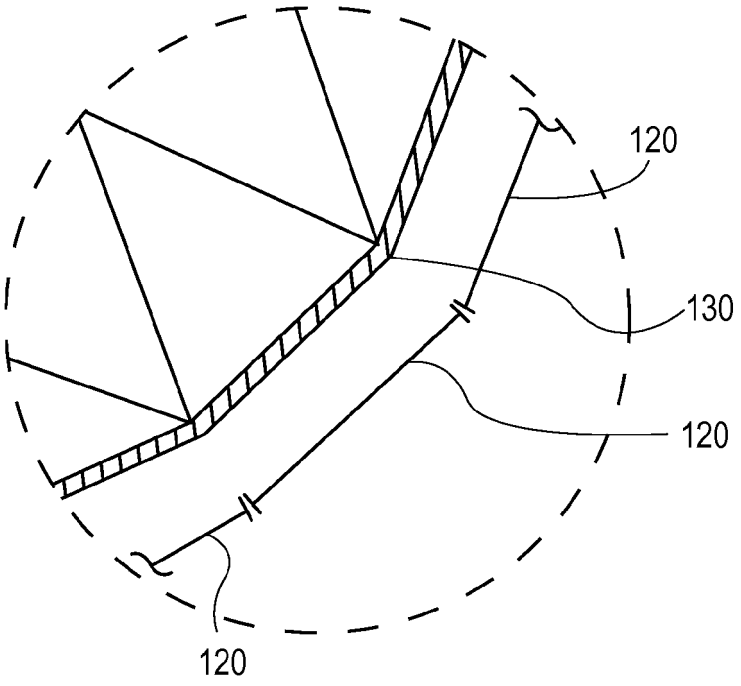


Fig. 3

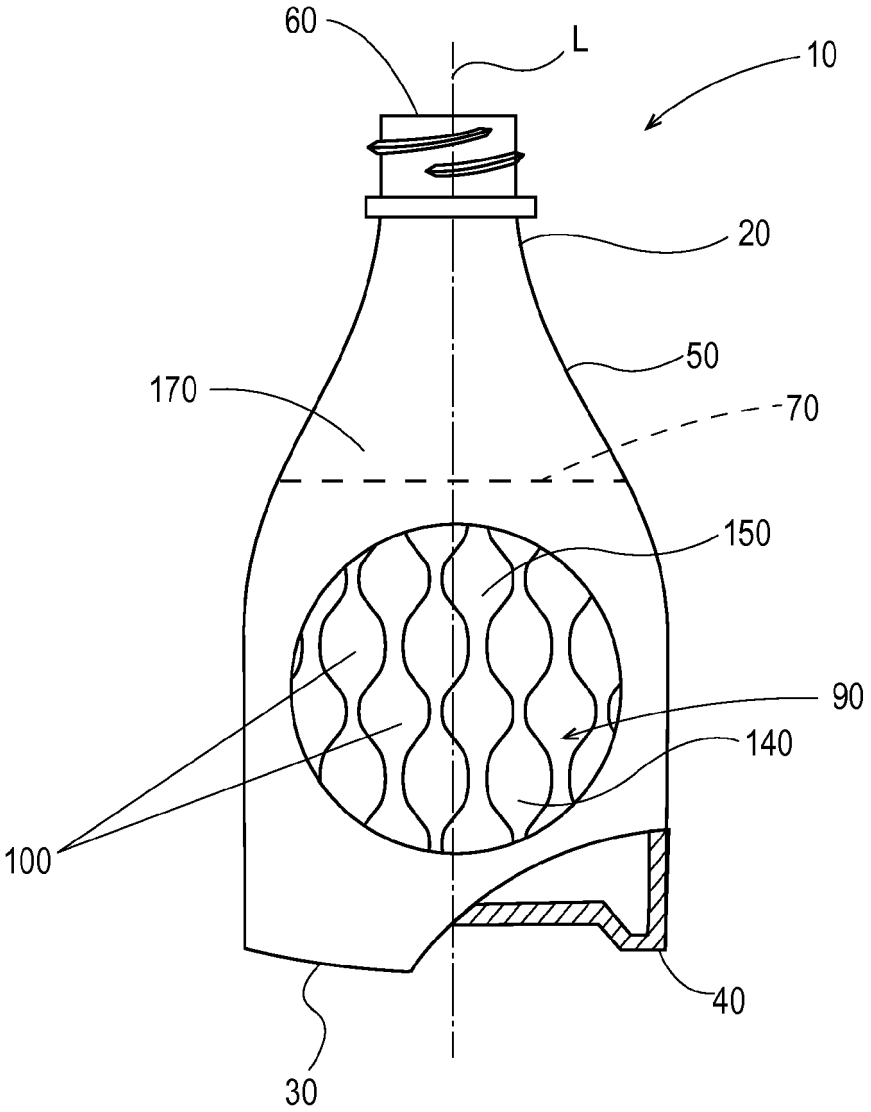


Fig. 4

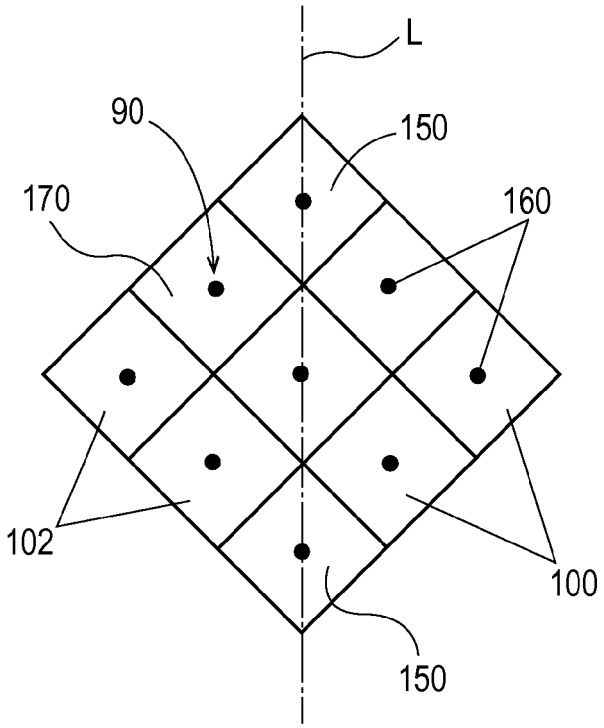


Fig. 5

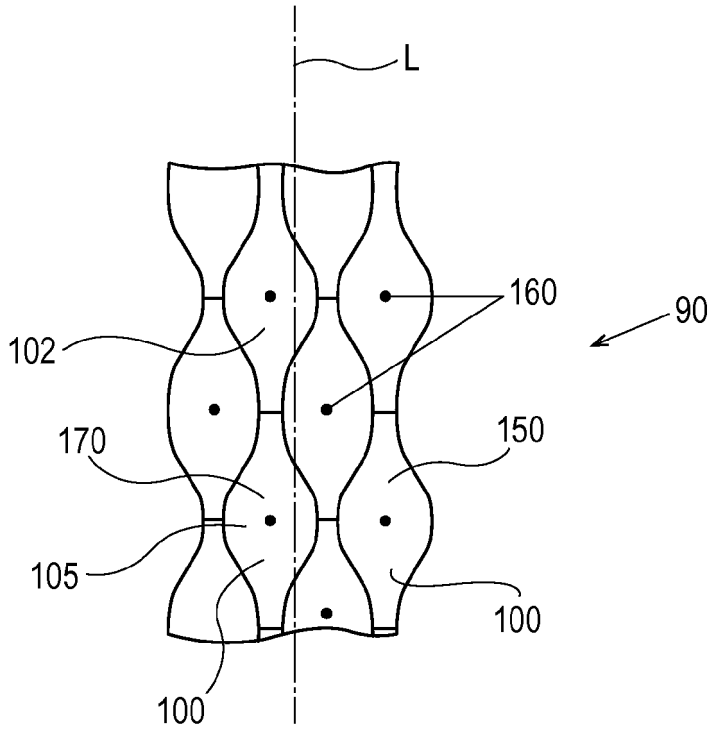


Fig. 6

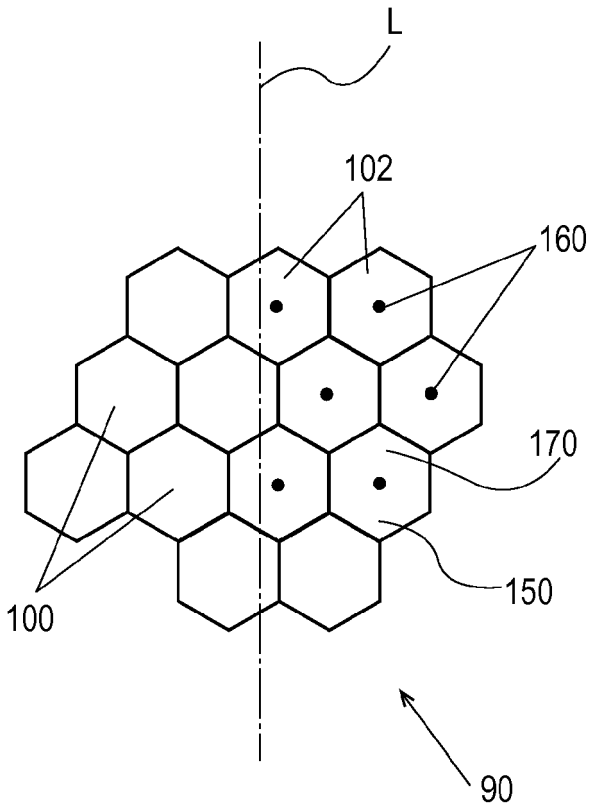


Fig. 7

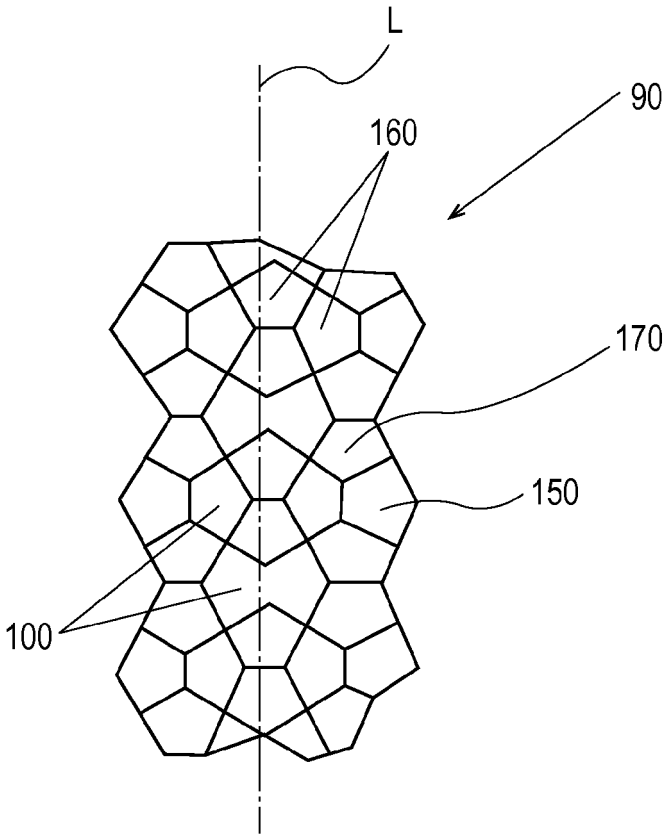


Fig. 8

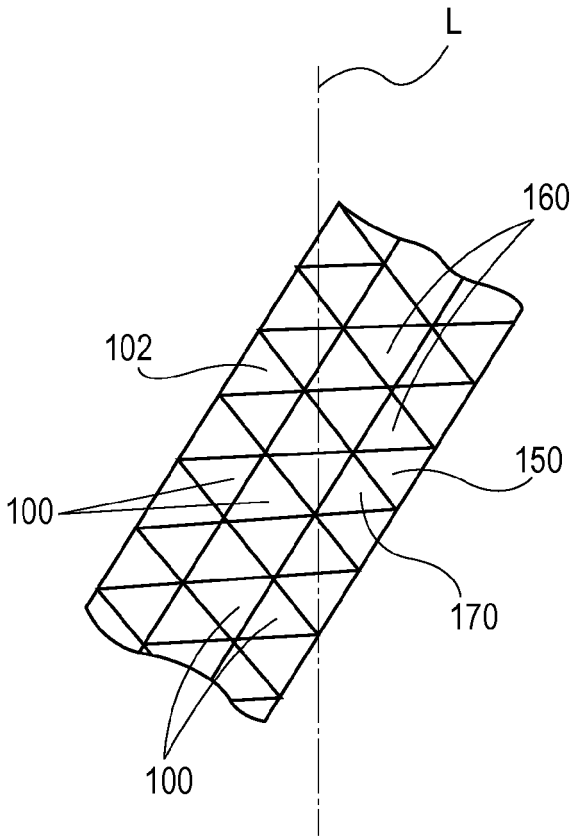


Fig. 9

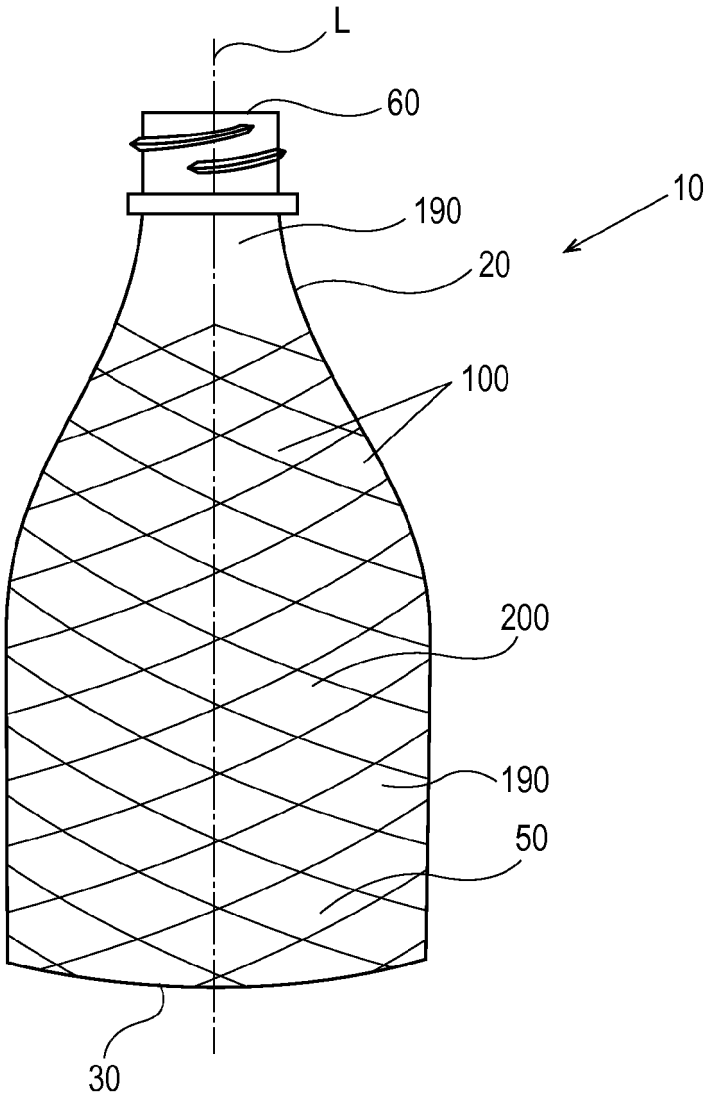


Fig. 10

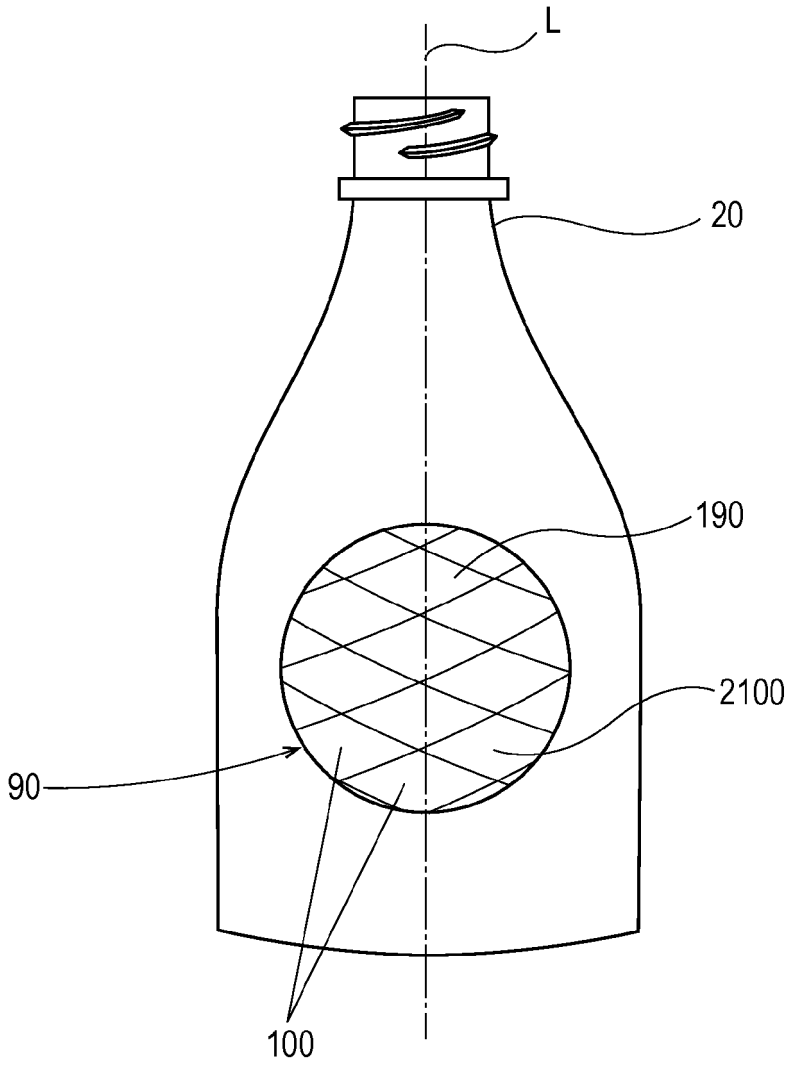


Fig. 11

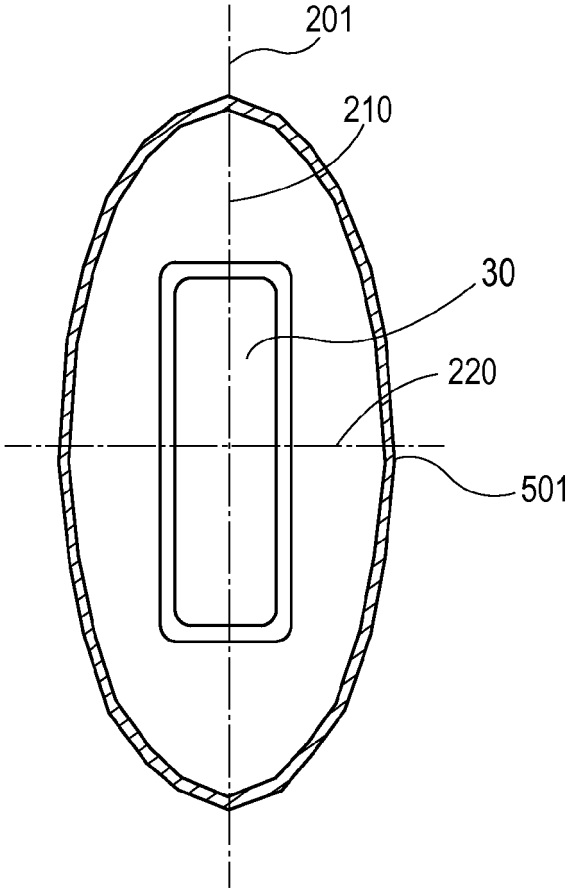


Fig. 12

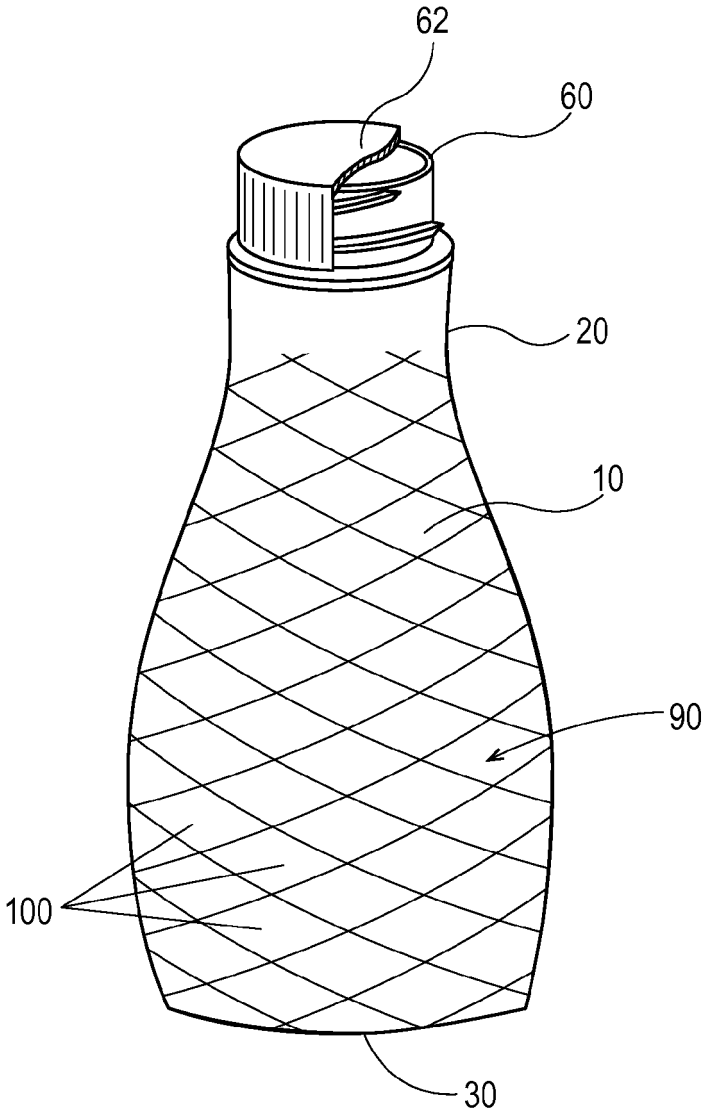


Fig. 13

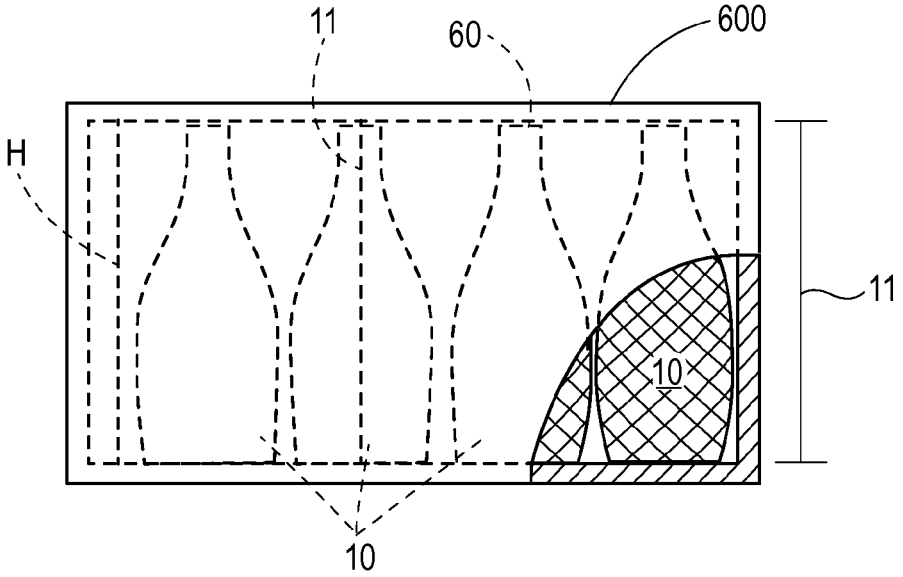


Fig. 14

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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