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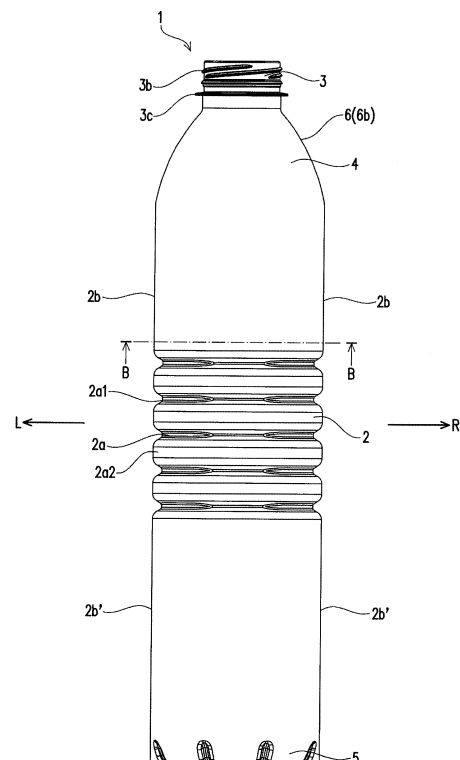
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(54) **BOTTLE CONTAINER**

(57) The present invention is a bottle container including a bottle body having a barrel, wherein the barrel includes a rib forming part, the barrel has an upper contact part and a lower contact part that are in surface contact with another bottle body, respectively, above and below the rib forming part, when it is aligned with the other bottle body in a standing state, and a virtual plane extended downwardly from the upper contact part, a virtual plane extended upwardly from the lower contact part, and an outer part of the rib forming part are flush with each other.

Fig. 1



Description

CROSS-REFERENCE TO RELATED APPLICATION

5 **[0001]** This application claims priority to Japanese Patent Application No. 2013-273511, the disclosure of which is incorporated herein by reference in its entirety.

FIELD

10 **[0002]** The present invention relates to a bottle container.

BACKGROUND

15 **[0003]** Bottle containers made of synthetic resin typified by PET bottles have excellent lightweight properties and thus are widely used as beverage containers.

[0004] Such a bottle container of this type is constituted by a bottle body having an opening, through which beverage or the like is filled in the bottle body or taken out therefrom, a cover for closing the opening of the bottle body, a label wrapped around the bottle body, and others.

20 **[0005]** The bottle container is handled by a user gripping a barrel constituting the center in the height direction of the bottle body when taking out the beverage.

[0006] In recent years, a reduction in thickness of the bottle body has been desired with the demand for resource saving.

[0007] However, when the thickness of the bottle body is reduced, the resistance force to the grip may possibly fail to be sufficiently exerted, for example, when the barrel of the bottle body is gripped, which may make it difficult to hold the bottle container.

25 **[0008]** In order to improve the difficulty in holding the bottle container, the barrel of the bottle body is formed to be slightly slimmer than a shoulder thereabove.

[0009] Further, as a method for improving the ease of holding a bottle container, providing a plurality of ribs in the circumference of the bottle body at the center in the height direction of the bottle body so as to improve the hooking on the fingertips is conventionally employed (for example, Patent Literature 1).

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CITATION LIST

Patent Literature

35 **[0010]** Patent Literature 1: JP 2010-507539 T

SUMMARY

Technical Problem

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[0011] Meanwhile, a reduction in packaging materials is becoming to be desired recently in general logistics.

[0012] Therefore, PET bottles or the like also are becoming to be conveyed in bundles of several bottles that are aligned in a standing state and are shrink-packaged with a heat-shrinkable film, instead of being conveyed while they are contained in a cardboard box, as in the conventional. At this time, a pressing force is applied to the shrink-packaged PET bottles from the outside, due to the heat shrinkage of the heat-shrinkable film. Since conventional PET bottles have curved outer surfaces, the PET bottles make point or line contact with each other when the PET bottles are aligned in a standing state.

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[0013] Then, bottle containers with their bottle bodies being slim at the center make point or line contact with each other at comparatively high positions or low positions of the bottle bodies, and are not in contact with each other in their barrels. The bottle containers located on the outer side cannot resist the pressing force in the barrels when a strong pressing force occurs when being packaged with a heat-shrinkable film, and thus have a problem of deformation of the bottle bodies.

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[0014] Further, the bundles of shrink-packaged bottle containers are generally stacked in multiple tiers in the vertical direction during transportation or during storage.

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[0015] This causes load to be applied in the vertical direction to the bottle containers, and therefore conventional bottle containers have a problem of further easy deformation due to the pressing force from the lateral sides by the heat-shrinking film and the aforementioned load.

[0016] Such deformation of bottle containers occurs not only when the shrink-packaged bottle containers are stacked,

and suppression of deformation is widely desired in conventional bottle containers.

[0017] In view of the above-described problems, it is an object of the present invention to provide a bottle container that is difficult to deform due to load even in the case where the weight of the bottle body is further reduced.

5 Solution to Problem

[0018] The present invention is a bottle container including a bottle body made of synthetic resin, wherein the bottle body has a cylindrical barrel having a quadrangular prism shape, the barrel has a cross section in the horizontal direction of a substantially rectangular shape having a long side and a short side, the barrel has a long side surface having the long side and a short side surface having the short side, the barrel includes a rib forming part having a rib projecting inwardly of the container, at the center in the height direction of the bottle body, the rib is provided in the circumferential direction of the barrel, the barrel has an upper contact part and a lower contact part that are in surface contact with another bottle body having the same shape, respectively, above and below the rib forming part, when the bottle body is aligned with the other bottle body in a standing state, and a virtual plane extended downwardly from the upper contact part, a virtual plane extended upwardly from the lower contact part, and an outer part of the rib forming part are flush with each other.

[0019] Further, preferably in the bottle container according to the present invention, the barrel has an upper bulging part and a lower bulging part that bulge in the horizontal direction outwardly of the outer part of the rib forming part, respectively, above and below the rib forming part on the short side surface.

[0020] Further, preferably in the bottle container according to the present invention, the bottle body includes a cylindrical neck formed at an upper end of the bottle body and having an opening, and a cylindrical shoulder tapered from an upper end of the upper contact part toward a lower end of the neck, the shoulder has a curved part curved toward the outer side of the bottle body, and the curved part has a radius of curvature of 83 mm or more.

25 BRIEF DESCRIPTION OF DRAWINGS

[0021]

Fig. 1 is a schematic front view of a bottle body of this embodiment.
 Fig. 2 is a schematic side view of the bottle body of this embodiment.
 Fig. 3 is a schematic perspective view of the bottle body of this embodiment.
 Fig. 4 is a sectional view taken along the line B-B in Fig. 1.
 Fig. 5 is a schematic front view of shoulder and neck of a bottle body of Example 1 (numerical unit: mm).
 Fig. 6 is a schematic side view of the shoulder and neck of the bottle body of Example 1 (numerical unit: mm).
 Fig. 7 is a schematic front view of shoulder and neck of a bottle body of Example 3 (numerical unit: mm).
 Fig. 8 is a schematic side view of the shoulder and neck of the bottle body of Example 3 (numerical unit: mm).
 Fig. 9 is a schematic front view of shoulder and neck of a bottle body of Example 4 (numerical unit: mm).
 Fig. 10 is a schematic side view of the shoulder and neck of the bottle body of Example 4 (numerical unit: mm).

40 DESCRIPTION OF EMBODIMENTS

[0022] Hereinafter, an embodiment of the present invention will be described with reference to the attached figures.

[0023] A bottle container of this embodiment includes a bottle body having an opening, through which a content such as beverage is filled in the bottle body or taken out therefrom, and a cap-shaped cover for closing the opening of the bottle body. The bottle container of this embodiment can be filled, for example, with liquid such as beverage (e.g., drinking water, tea, fruit juice, coffee, cocoa, soft drink, alcohol beverage, milk beverage, and soup) and liquid seasoning (e.g., source and soy sauce). Further, the internal volume of the bottle container is not specifically limited, and may be optionally set depending on the type or the like of liquid to be loaded, ranging from a comparatively small volume in a unit of several milliliters to a unit of several hundred milliliters, to a comparatively large volume in a unit of several liters. As the bottle container, a bottle container having an internal volume, for example, of 1 liter to 2 liters is suitable.

[0024] The bottle body and the cover are made of synthetic resin. Examples of the synthetic resin include polyethylene terephthalate resin, polypropylene resin, and high-density polyethylene resin. The bottle body and the cover may be made of the same synthetic resin, or may be made of different synthetic resins.

[0025] The bottle body will be described with reference to the figures.

[0026] Hereinafter, the perpendicular direction of the bottle body in a standing posture will be referred to as vertical direction or height direction.

[0027] As shown in Figs. 1 to 3, the bottle body 1 includes a bowl-shaped bottom 5 spreading in the horizontal direction, a cylindrical barrel 2 erected upward along the outer circumference of the bottom 5 with substantially the same width,

a cylindrical shoulder 4 extending upward from the upper end of the barrel 2 in a tapered manner, and a cylindrical neck 3 having an opening 3a at its upper end and extending upward from the shoulder 4.

[0028] The barrel has a quadrangular prism shape.

[0029] As shown in Fig. 4, the barrel 2 has a cross section in the horizontal direction of a substantially rectangular shape having long sides and short sides.

[0030] In the following description, lateral surfaces having the long sides in the cross section of the barrel 2 are referred to also as long side surfaces, and lateral surfaces having the short sides in the cross section of the barrel 2 are referred to also as short side surfaces. Further, in Figs. 1 to 4, the forward direction is denoted by F, the backward direction is denoted by B, the left direction is denoted by L, and the right direction is denoted by R.

[0031] The barrel 2 includes rib forming parts 2a having ribs 2a1 that project inwardly of the bottle body and non-projecting parts 2a2 that do not project inwardly, at the center in the height direction of the bottle body 1. The ribs 2a1 are formed in the circumference direction of the barrel 2.

[0032] As shown in Fig. 1, the bottle body 1 has a shape such that, when it is aligned with other bottle bodies having the same shape in a standing state, their non-projecting parts 2a2 abut each other, on each of the right surface and the left surface.

[0033] As shown respectively on the right and left in Fig. 1, the barrel 2 has upper contact parts 2b in surface contact with other bottle bodies above the rib forming parts 2a on the long side surfaces. Further, the barrel 2 has lower contact parts 2b' in surface contact with other bottle bodies below the rib forming parts 2a on the long side surfaces. The lower edges of the lower contact parts 2b' are provided continuously with the bottom 5.

[0034] The upper contact parts 2b, the lower contact parts 2b', and the non-projecting parts 2a2 that are the outer parts of the rib forming parts 2a are flush with each other. Further, the width of the bottle body is the same in the non-projecting parts 2a2 that are the outer parts of the rib forming parts 2a, the upper contact parts 2b, and the lower contact parts 2b', on the long side surfaces that are on the right and left in Fig. 1.

[0035] The length in the perpendicular direction of the total of the upper contact parts 2b, the lower contact parts 2b', and the rib forming parts 2a, that is, the length in the perpendicular direction of the barrel 2 is preferably 2/3 or more of the height of the bottle body 1.

[0036] As shown respectively on the front and back in Fig. 2, the barrel 2 has upper bulging parts 2c and lower bulging parts 2c' that bulge in the horizontal direction outwardly of the non-projecting parts 2a2 that are the outer parts of the rib forming parts 2a, respectively, above and below the rib forming parts 2a on the short side surfaces.

[0037] The neck 3 serves as the upper end of the bottle body 1.

[0038] The neck 3 includes a screw thread 3b so that the cover (not shown) can be screwed on the outside. The cover (not shown) is formed into a cap shape, and includes a thread groove thereinside so as to be screwed on the neck 3.

[0039] The bottle container of this embodiment is configured to be in a closed state by threadedly engaging the cover with the neck 3 and to be in an open state by releasing the engagement of the cover with the neck 3.

[0040] The neck 3 further includes a support ring 3c below the screw thread 3b.

[0041] The shoulder 4 is formed to have a diameter gradually increasing from the lower end of the neck 3 toward the upper ends of the upper contact parts 2b and the upper ends of the upper bulging parts 2c. That is, the shoulder 4 is a cylindrical portion that is tapered from the upper ends of the upper contact parts toward the lower end of the neck.

[0042] Further, the shoulder 4 has curved parts 6 curved toward the outer side of the bottle body 1.

[0043] Further, the shoulder 4 is a portion formed into a substantially quadrangular pyramid shape.

[0044] The shoulder 4 preferably has a length in the perpendicular direction of 1/3 or less of the height of the bottle body 1.

[0045] The curved parts 6 of the shoulder 4 preferably have a radius of curvature of 83 mm or more. The curved parts 6c (first curved parts 6c) on the lateral surfaces preferably have a radius of curvature of 119 mm or more. Further, the curved parts 6b (second curved parts 6b) on the long side surfaces preferably have a radius of curvature of 87 mm or more.

[0046] Further, the shoulder 4 preferably has a horizontal cross section in an elliptical shape that is infinitely close to a perfect circle. The ratio of the minor diameter with respect to the major diameter in the horizontal cross-sectional shape of the shoulder 4 is preferably larger than 1.0 and less than 1.2, more preferably larger than 1.0 and less than 1.15.

[0047] The bottle container of this embodiment is configured as described above, and thus has the following advantages.

[0048] That is, the bottle container of this embodiment is a bottle container including a bottle body made of synthetic resin.

[0049] The bottle body has a cylindrical barrel having a quadrangular prism shape.

[0050] The barrel has a cross section in the horizontal direction of a substantially rectangular shape having a long side and a short side.

[0051] The barrel has a long side surface having the long side and a short side surface having the short side.

[0052] The barrel includes a rib forming part having a rib projecting inwardly of the container, at the center in the height direction of the bottle body.

[0053] The rib is provided in the circumferential direction of the barrel.

[0054] The barrel has an upper contact part and a lower contact part that are in surface contact with another bottle body having the same shape, respectively, above and below the rib forming part, when the bottle body is aligned with the other bottle body in a standing state.

[0055] A virtual plane extended downwardly from the upper contact part, a virtual plane extended upwardly from the lower contact part, and an outer part of the rib forming part are flush with each other.

[0056] The bottle body of the bottle container has the upper contact part, the lower contact part, and the outer part of the rib forming part that are flush with each other, and therefore has a shape such that, when it is aligned with another bottle body having the same shape in a standing state, their long side surfaces abut each other through an area from the upper contact part above the rib forming part to the lower contact part therebelow. Therefore, the bottle container can disperse stress by the surface contact, even if a bending force is applied to the bottle body, so that deformation due to load is less likely to occur.

[0057] That is, this embodiment can provide a bottle container in which deformation due to load is less likely to occur, even in the case where the weight of the bottle body is further reduced.

[0058] Further, in the bottle container of this embodiment, the barrel has an upper bulging part and a lower bulging part that bulge in the horizontal direction outwardly of the outer part of the rib forming part, respectively, above and below the rib forming part on the short side surface.

[0059] Such a bottle container has the upper bulging part and the lower bulging part on the short side surface, and thus has an advantage of being capable of reducing the point contact or line contact with another bottle container, as compared with a bottle container having a bulging part on the long side surface. Further, such a bottle container has the upper bulging part and the lower bulging part, and thus has an advantage of being capable of preventing, when a label is attached to the rib forming part, separation of the label due to the contact with the other bottle container. Further, such a bottle container has the upper bulging part and the lower bulging part, and thus has an advantage of having excellent design properties.

[0060] Further, in the bottle container of this embodiment, the bottle body includes a cylindrical neck formed at the upper end of the bottle body and having an opening, and a cylindrical shoulder tapered from the upper end of the upper contact part toward the lower end of the neck.

[0061] The shoulder has a curved part that is curved toward the outer side of the bottle body.

[0062] The curved part preferably has a radius of curvature of 83 mm or more.

[0063] Such a bottle container has the curved part with a radius of curvature of 83 mm or more, and thus has an advantage of being capable of suppressing the deformation of the shoulder due to the load applied in the perpendicular direction.

[0064] Further, the bottle body of the bottle container of this embodiment has a shape such that, when it is aligned with another bottle body having the same shape in a standing state, their long side surfaces abut each other. Therefore, the bottle container can disperse stress on the entire surface, even if a bending force is applied to the bottle body. Accordingly, such a bottle container suppresses concentration of stress, so that deformation due to load is less likely to occur.

[0065] Further, in the bottle container of this embodiment, the ratio of the length of the shoulder with respect to the total length in the direction of the imaginary axis is preferably 0.33 or less, more preferably 0.17 to 0.21. Further, the bottle container of this embodiment has an advantage of being capable of further suppressing deformation of the shoulder 4 due to load applied in the perpendicular direction, by the shoulder 4 having a horizontal cross section in an elliptical shape that is infinitely close to a perfect circle, at least above the center of the shoulder 4.

[0066] Further, the barrel 2 has the upper bulging part 2c and the lower bulging part 2c' that bulge in the horizontal direction outwardly of the non-projecting part 2a' that is the outer part of the rib forming part 2a, respectively, above and below the rib forming part 2a on the short side surface. Therefore, the bottle container of this embodiment has an advantage of being capable of suppressing slipping-off of the bottle container, even if the bottle container is slipped on a hand when a point provided with the rib is gripped, by the upper bulging part 2c or the lower bulging part 2c' being caught by the hand. Further, the bottle container of this embodiment has an advantage of being capable of preventing, when a label is attached to the rib forming part, separation of the label due to the contact with the other bottle container, using the upper bulging part 2c and the lower bulging part 2c'. Further, the bottle container of this embodiment includes the upper bulging part 2c and the lower bulging part 2c', and thus has an advantage of having excellent design characteristics.

[0067] The bottle container of this embodiment has the above-described advantages by being configured as above. However, the bottle container of the present invention is not limited to the configurations of the above-described embodiment. Further, the bottle container of the present invention can be variously modified without departing from the gist of the present invention.

Examples

[0068] Next, the present invention will be further specifically described by way of Examples and Comparative Examples.

(Example 1)

[0069] Using polyethylene terephthalate resin, bottle bodies (with a height of bottle bodies: 336.0 mm, a radius of curvature of the curved parts on the short side surfaces: 64.1 mm, a radius of curvature of the curved parts on the long side surfaces: 78.7 mm, and a mass: 31 g) having the same shape as in Figs. 1 to 4 with their shoulders having the shapes shown in Figs. 5 and 6 were produced.

[0070] Next, 2.0 L of beverage was loaded into the bottle bodies, and covers were put on the bottle bodies to produce 24 bottle containers filled with beverage.

[0071] Then, the bottle containers filled with beverage that were aligned in a standing state, with three containers aligned in the longitudinal direction and two containers aligned in the lateral direction, were shrink-packaged with a heat-shrinkable film to produce a bundle. Further, another three bundles as above were produced, to produce four bundles in total. The surface contact parts in the longitudinal direction of the bottle containers were set to abut each other.

[0072] Next, load obtained by multiplying load obtained on the assumption that these bundles were stacked in four tiers in one pallet, and further this pallet was stacked in two tiers, by a safety factor of 1.5 times was applied onto the bundles for three days, and the degree of deformation of the bottle containers filled with beverage was checked by visual inspection. Thus, the deformation test of the bottle containers filled with beverage was conducted. The results are shown in Table 1.

(Example 2)

[0073] The deformation test of the bottle containers filled with beverage was conducted in the same manner as in Example 1 except that the overall thickness was increased (mass was changed to 34 g). The results are shown in Table 1.

(Comparative Example 1)

[0074] The deformation test of the bottle containers filled with beverage was conducted in the same manner as in Example 1 except that the bulging parts that bulge outwardly of the ribs above the ribs were provided along the entire perimeter of the barrel, and the bottle container had a length of 334 mm. The results are shown in Table 1.

Table 1

	Mass (g)	Percentage of the number of bottles for each deformation degree (%)			
		Large	Middle	Small	Total
Comparative Example 1	31	33.3	25	4.2	62.5
Example 1	31	16.7	8.3	8.3	33.3
Example 2	34	16.7	8.3	0.0	25.0

[0075] As shown in Table 1, the bottle containers filled with beverage of Examples 1 and 2 falling within the scope of the present invention did not deform so much as compared with the bottle containers filled with beverage of Comparative Example 1.

[0076] Therefore, it can be seen that the present invention can provide a bottle container in which deformation due to load is less likely to occur.

(Example 3)

[0077] Bottle bodies (with a height of bottle bodies: 336.0 mm, a radius of curvature of the curved parts on the short side surfaces: 119 mm, a radius of curvature of the curved parts on the long side surfaces: 87.69 mm, and a mass: 31 g) were produced in the same manner as in Example 1 except that the shoulders had the shapes shown in Figs. 7 and 8.

(Example 4)

[0078] Bottle bodies (with a height of bottle bodies: 336.0 mm, a radius of curvature of the curved parts on the short

side surfaces: 127.7 mm, a radius of curvature of the curved parts on the long side surfaces: 87.7 mm, and a mass: 31 g) were produced in the same manner as in Example 1 except that the shoulders had the shapes shown in Figs. 9 and 10. [0079] Figs. 1 to 4 show the shape of Example 4.

<Strength test of shoulder>

[0080] The bottle bodies of Examples 1, 3, and 4 were placed in a buckling test apparatus (for example, Top Load Tester ME-1000), and load was applied to the bottle bodies from above at a displacement speed of 50 mm/minute that had been initially set to measure the maximum buckling strength immediately before the shoulders buckle. Then, the ratio of the maximum buckling strength of each of Examples 3 and 4 with respect to the maximum buckling strength of Example 1 (hereinafter simply referred to also as "strength ratio") was calculated. The results are shown in Table 2.

[0081] This test was conducted on each bottle body with a label attached onto the rib forming parts.

Table 2

	Example 1	Example 3	Example 4
Strength ratio (-)	1.00	1.72	1.90

[0082] The bottle bodies of Examples 3 and 4 had a higher strength than the bottle body of Example 1.

REFERENCE SIGNS LIST

[0083]

- 1: Bottle body
- 2: Barrel
- 2a: Rib forming part
- 2a1: Rib
- 2a2: Non-projecting part
- 2b: Upper contact part
- 2b': Lower contact part
- 2c: Upper bulging part
- 2c': Lower bulging part
- 3: Neck
- 3a: Opening
- 3b: Screw thread
- 3c: Support ring
- 4: Shoulder
- 5: Bottom
- 6: Curved part
- 6c: First curved part
- 6b: Second curved part

Claims

1. A bottle container comprising:

a bottle body made of synthetic resin, wherein
the bottle body comprises a cylindrical barrel having a quadrangular prism shape,
the barrel has a cross section in the horizontal direction of a substantially rectangular shape having a long side and a short side,
the barrel has a long side surface having the long side and a short side surface having the short side,
the barrel comprises a rib forming part having a rib projecting inwardly of the container, at the center in the height direction of the bottle body,
the rib is provided in the circumferential direction of the barrel,
the barrel comprises an upper contact part and a lower contact part that are in surface contact with another

bottle body having the same shape, respectively, above and below the rib forming part, when the bottle body is aligned with the other bottle body in a standing state, and
a virtual plane extended downwardly from the upper contact part, a virtual plane extended upwardly from the lower contact part, and an outer part of the rib forming part are flush with each other.

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2. The bottle container according to claim 1, wherein
the barrel comprises an upper bulging part and a lower bulging part that bulge in the horizontal direction outwardly of the outer part of the rib forming part, respectively, above and below the rib forming part on the short side surface.
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3. The bottle container according to claim 1 or 2, wherein
the bottle body comprises a cylindrical neck formed at an upper end of the bottle body and having an opening, and
a cylindrical shoulder tapered from an upper end of the upper contact part toward a lower end of the neck,
the shoulder has a curved part curved toward the outer side of the bottle body, and
the curved part has a radius of curvature of 83 mm or more.
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Fig. 1

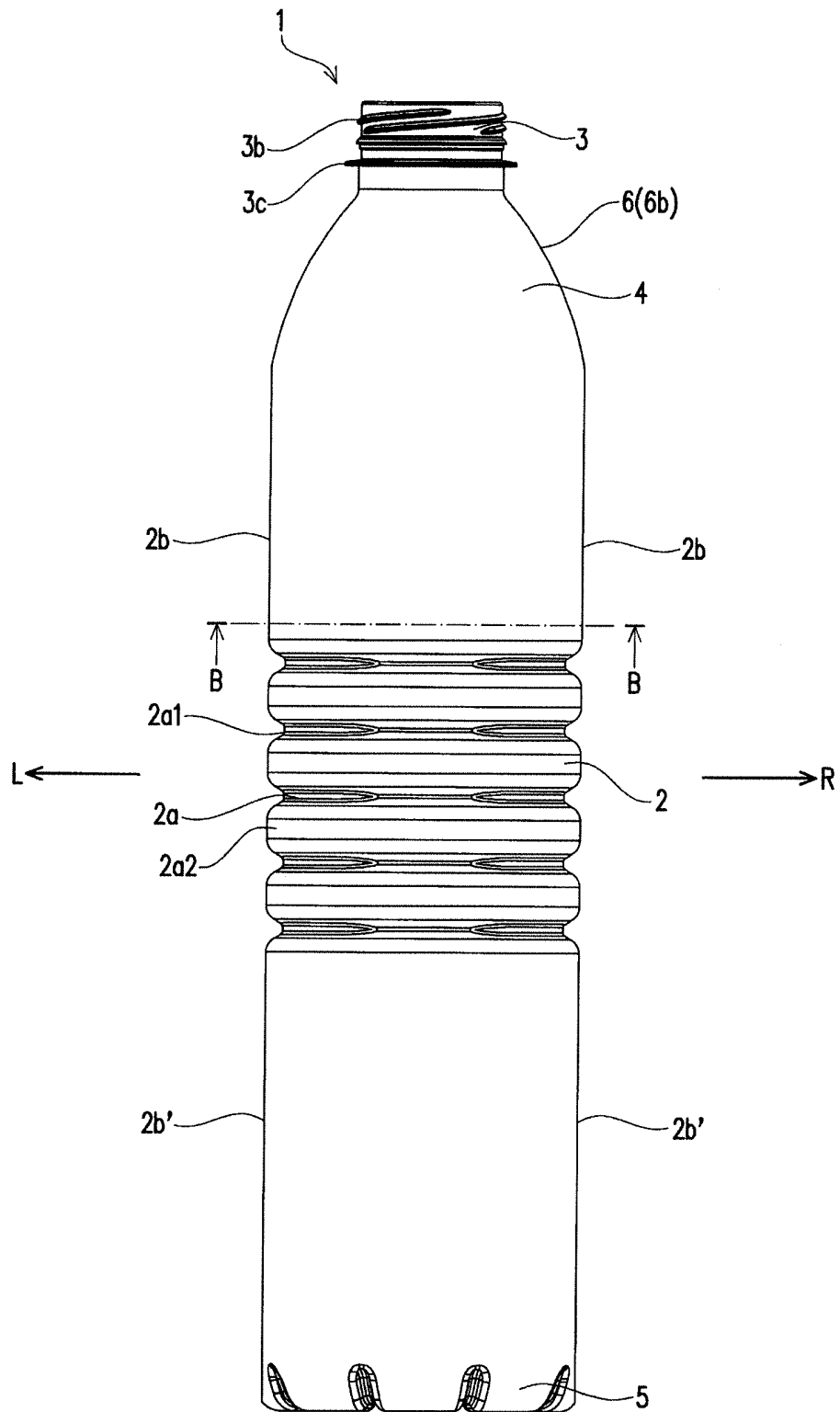


Fig. 2

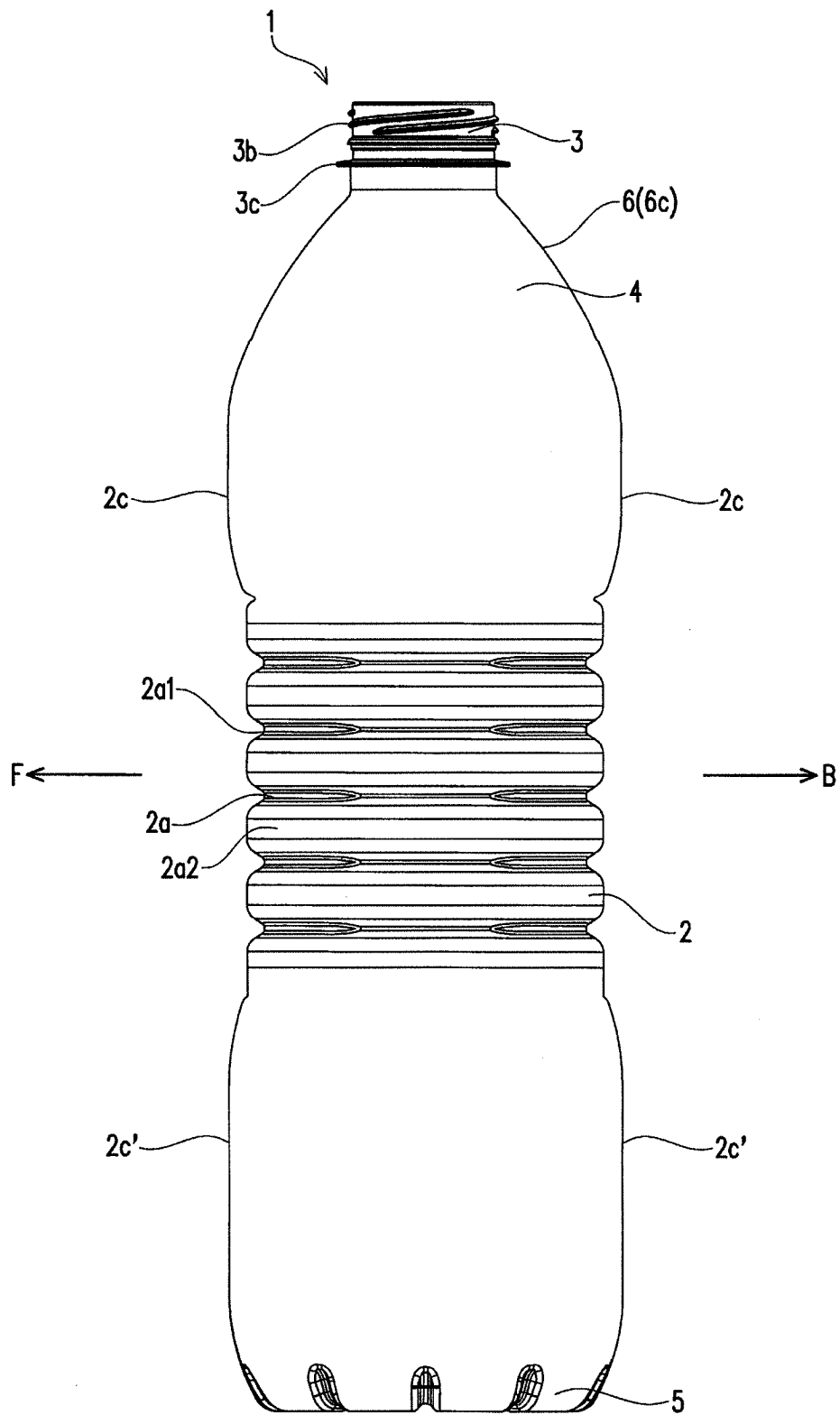


Fig. 3

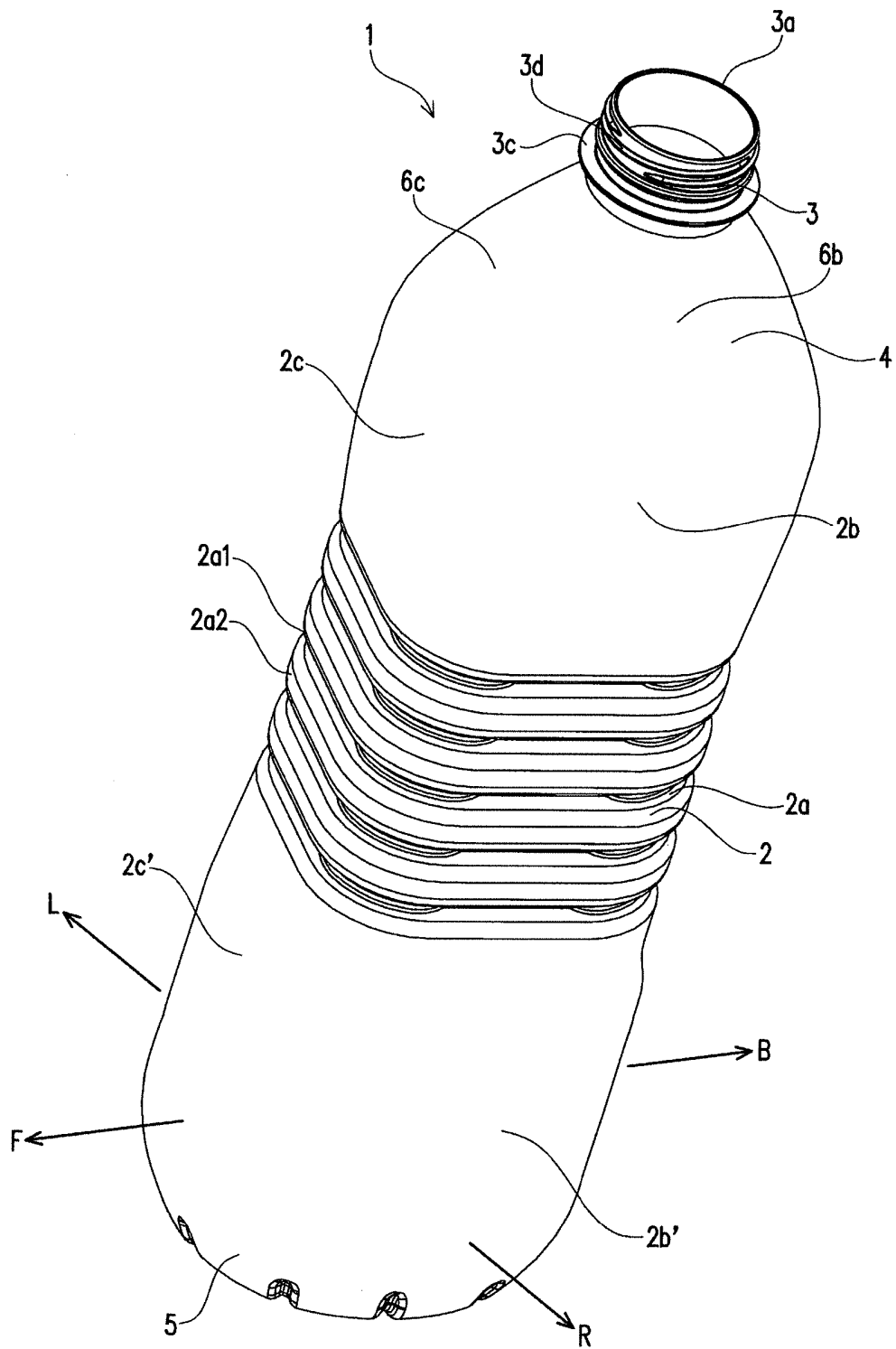


Fig. 4

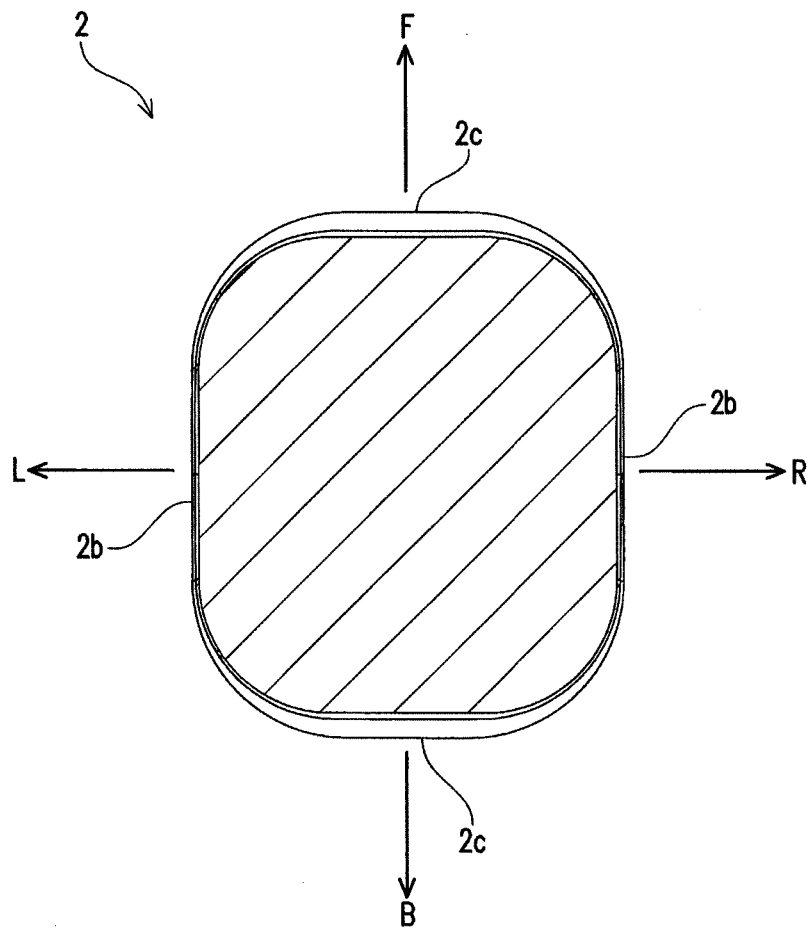


Fig. 5

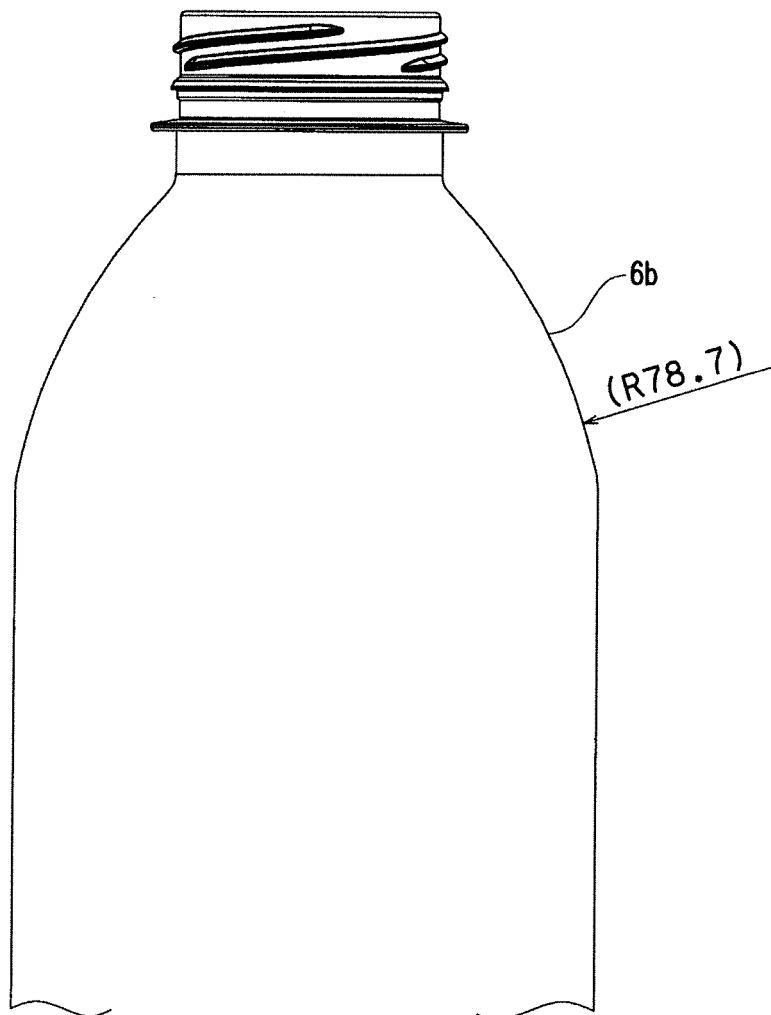


Fig. 6

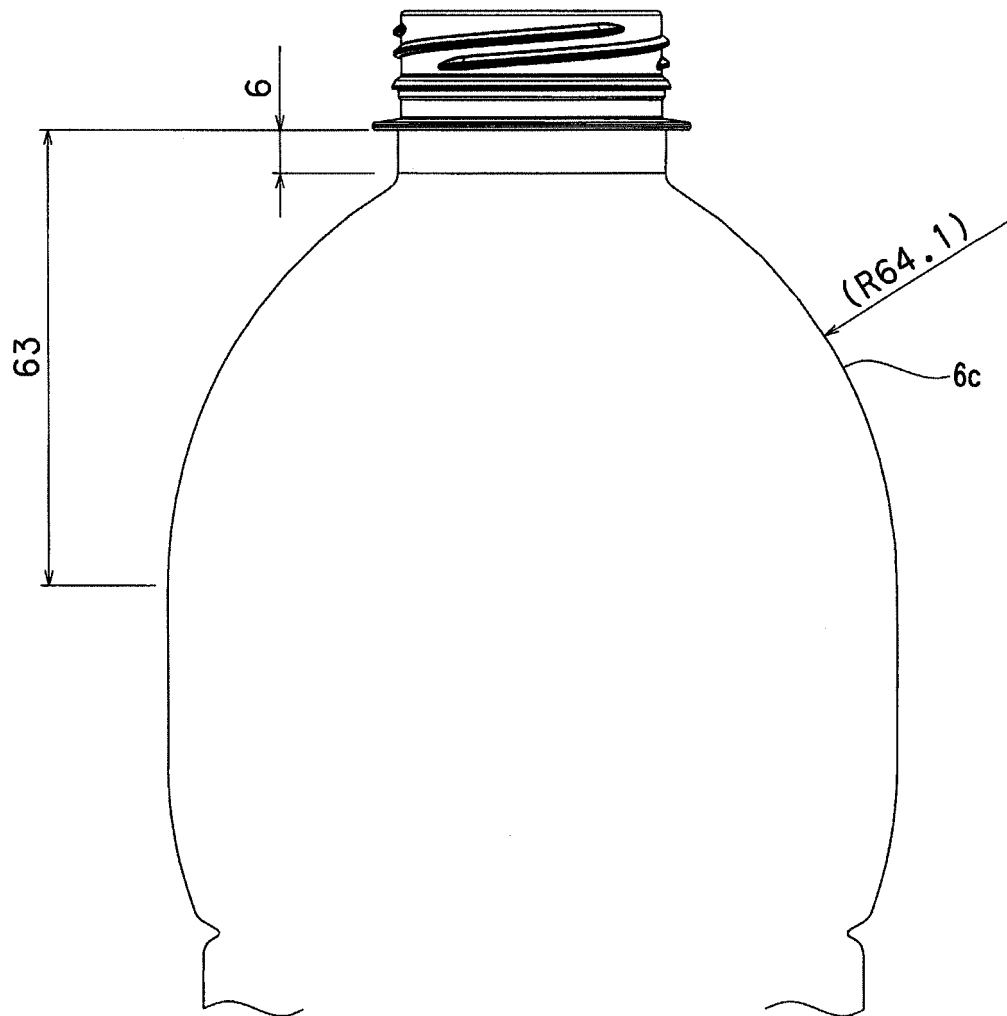
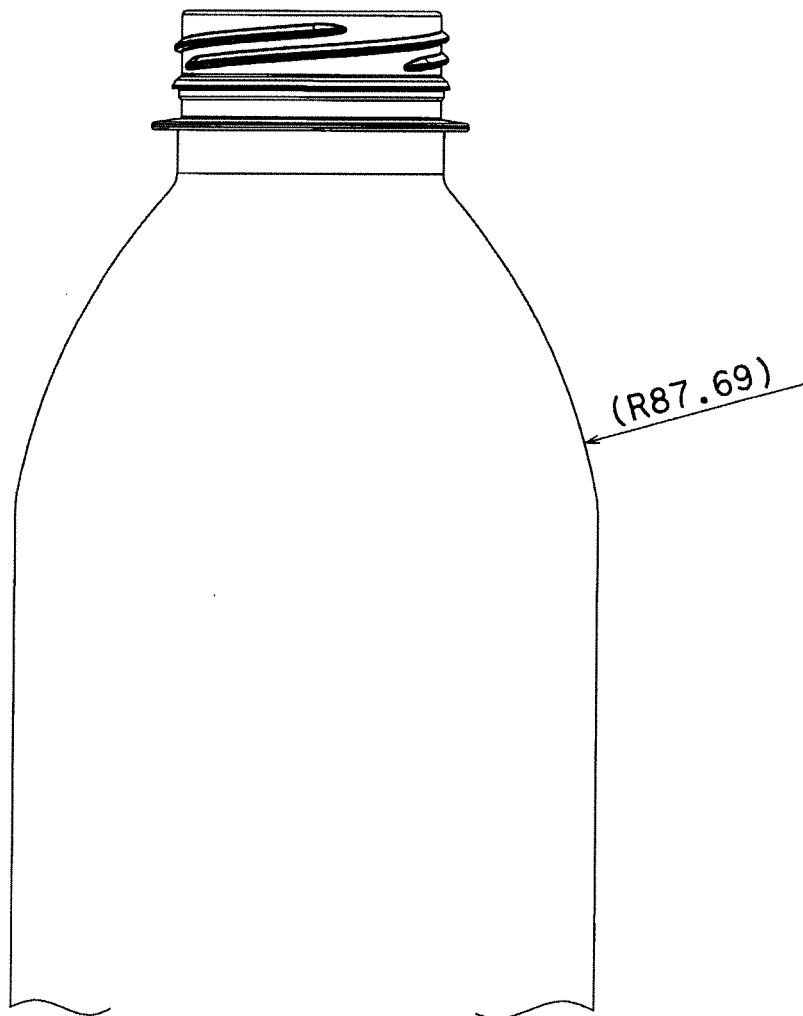


Fig. 7



F i g . 8

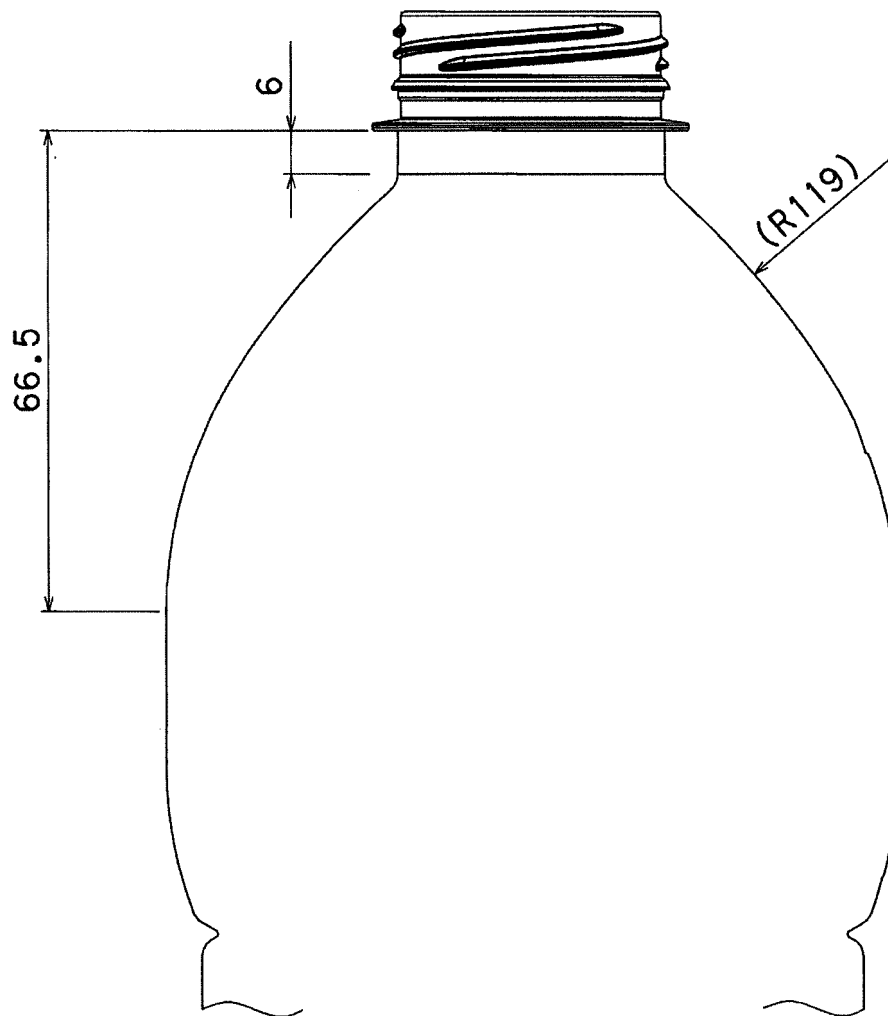
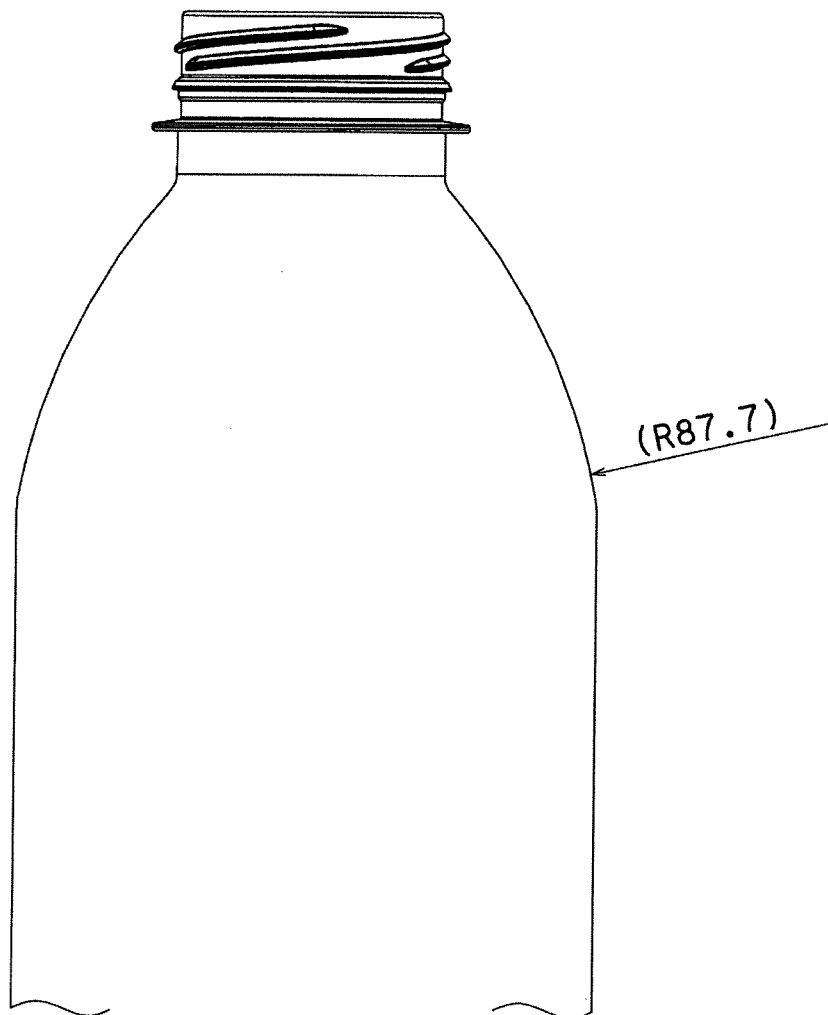
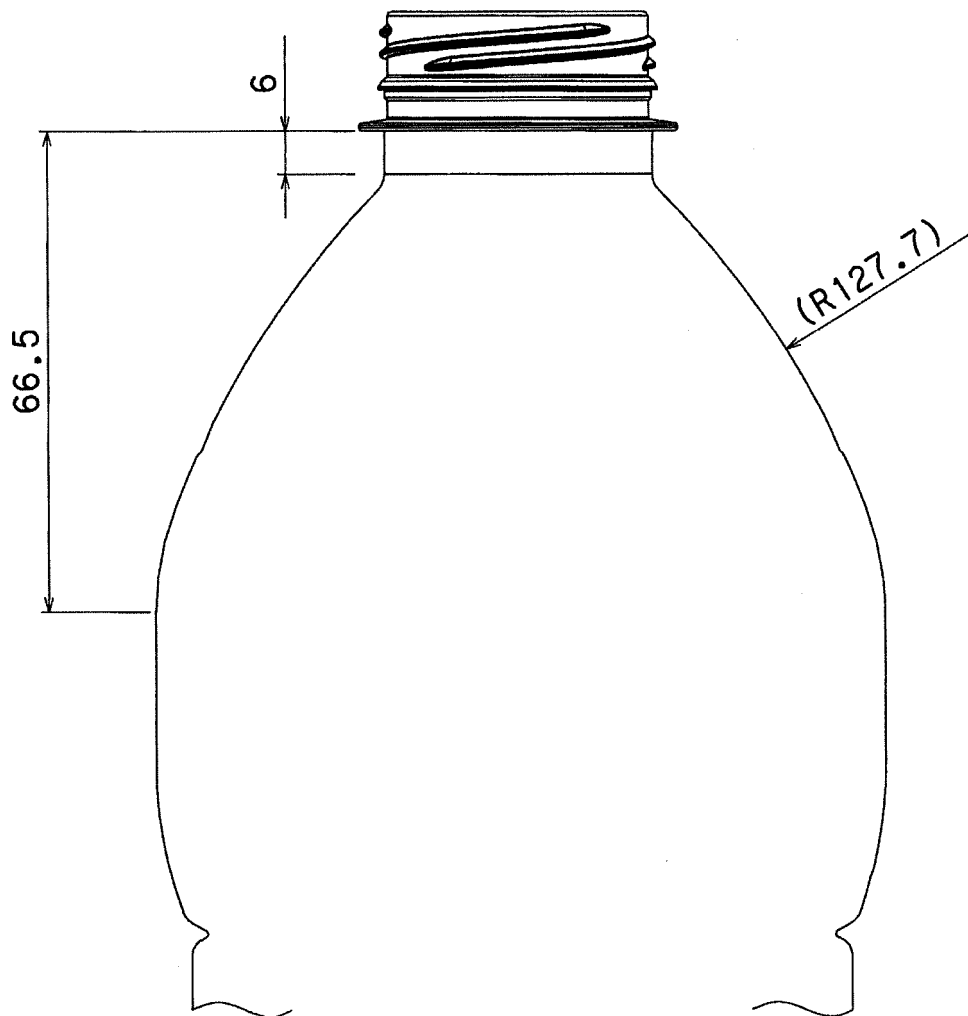


Fig. 9



F i g . 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/084141

A. CLASSIFICATION OF SUBJECT MATTER

B65D1/02(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D1/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015

Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2011-116427 A (Kirin Brewery Co., Ltd.), 16 June 2011 (16.06.2011), paragraphs [0001] to [0037]; fig. 1 (Family: none)	1, 3 2
Y	JP 2009-96511 A (The Coca-Cola Co.), 07 May 2009 (07.05.2009), paragraphs [0025] to [0033], [0054] to [0060]; fig. 11 to 14 (Family: none)	1-3
Y	US 4308955 A (LIQUI-BOX CORP.), 05 January 1982 (05.01.1982), entire text; fig. 1, 8 to 9 (Family: none)	1-3



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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REFERENCES CITED IN THE DESCRIPTION

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