

DESCRIPTION

BOTTLE

5 TECHNICAL FIELD

[0001] The present disclosure relates to a bottle for storing a liquid.

BACKGROUND ART

10 [0002] Patent Literature 1 discloses a bottle that stores a liquid which generates gas, and that discharges only the generated gas to the outside of a container.

[0003] The bottle in Patent Literature 1 includes a case having a substantially rectangular parallelepiped shape, a cap that detachably seals an opening of the case, and a packing that has waterproof and air permeability effects and is attached to an inner surface of the cap. The packing covers the entire opening in a state where the cap seals the opening, and
15 discharges gas generated inside the case to the outside of the container.

Citation List

Patent Literature

[0004] PTL 1: Unexamined Japanese Patent Publication No. 2003-026222

20 SUMMARY OF THE INVENTION

[0005] When a conventional bottle is laid down on its side, a position of an opening is lower than a liquid level of the liquid, and thus there is a problem that generated gas is filled in the bottle without being discharged from a packing.

25 [0006] The present disclosure provides a bottle for storing a liquid that generates gas, the bottle being capable of discharging the gas to the outside even when the bottle is placed in a placement manner different from a normal placement manner.

[0007] The bottle in the present disclosure is a bottle in a columnar shape for storing a liquid that generates gas, the bottle including: a body part that stores the liquid; a spout provided on an upper surface of the body part and opened to an outside; a lid that openably
30 covers the spout; and a packing that is attached between an opening of the spout and the lid and allows the gas to pass the packing without allowing the liquid to pass the packing. The body part includes a first column part having a semicircular columnar shape in which the spout is provided on an upper surface of the first column part, and a second column part

having a columnar shape in which a cross-sectional area becomes smaller as relatively separating from the spout.

[0008] The bottle according to the present disclosure stores a liquid that generates gas, and is allowed to discharge the gas to the outside even when the bottle is placed in a

5 placement manner different from the normal placement manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Fig. 1 is a perspective view of an external appearance of a bottle according to a first exemplary embodiment.

10 Fig. 2 is a cross-sectional view of the bottle according to the first exemplary embodiment.

Fig. 3 is a schematic view illustrating movement of gas around a spout of the bottle according to the first exemplary embodiment.

15 Fig. 4 is a schematic view illustrating a liquid level when the bottle is placed in a normal placement manner according to the first exemplary embodiment.

Fig. 5 is a schematic view illustrating a liquid level when the bottle is placed such that a second plane is grounded according to the first exemplary embodiment.

20 Fig. 6 is a schematic view illustrating movement of the bottle when the bottle is placed such that a semicircular column part is grounded according to the first exemplary embodiment.

Fig. 7 is a schematic diagram illustrating movement of the bottle when the bottle is placed such that a protrusion is grounded according to the first exemplary embodiment.

Fig. 8 is a perspective view of an external appearance of a bottle according to another exemplary embodiment.

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DESCRIPTION OF EMBODIMENT

[0010] In the following, exemplary embodiments will be described in detail with reference to the accompanying drawings. Note that the accompanying drawings and the following description are only presented to help those skilled in the art fully understand the present disclosure and are not intended to limit subject matters as recited in the claims.

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[0011] (First exemplary embodiment)

[Configuration of bottle]

Fig. 1 is a perspective view of an external appearance of bottle 1 according to a

first exemplary embodiment. Fig. 2 is a cross-sectional view of bottle 1 according to the first exemplary embodiment. Bottle 1 includes body part 3 formed of a resin material.

[0012] Body part 3 is formed in a bottomed tubular shape having bottom surface 20, and is capable of storing liquid 4 (See Figs. 3 and 4) in an inner space. As shown in Figs. 1 and 2, body part 3 has semicircular column part 15 formed so as to be convex outward, i.e., curved so as to have a convex shape from the inside to the outside of body part 3 when viewed from above in a vertical direction, and prismatic part 11 formed so that all side surfaces are flat surfaces (including substantially flat surfaces).

[0013] Prismatic part 11 is formed in a trapezoidal shape in which its width becomes narrower as relatively separating from the semicircular column part when viewed from above in the vertical direction, i.e., its cross-sectional area becomes smaller as relatively separating from the semicircular column part. First planes 12 and second plane 13 are provided on the sides of prismatic part 11. Protrusion 7 is provided on an upper surface of prismatic part 11. Protrusion 7 is formed in an arc shape so as to be convex upward, i.e., to have a convex shape from the inside toward the outside of body part 3. Grip parts 8 are provided on two opposing first planes 12, respectively. Grip part 8 is formed to be recessed from first plane 12. Grip part 8 is provided for a user to grip body part 3 by hooking a finger. Specifically, grip part 8 is formed to have a concave shape from the outside toward the inside of body part 3.

[0014] A side surface of semicircular column part 15 includes first curved surface 16 having a relatively large curvature, second curved surface 17 having a smaller curvature than first curved surface 16, and third curved surface 18 having a smaller curvature than second curved surface 17 and adjacent to prismatic part 11. The three curved surfaces, i.e., first curved surface 16, second curved surface 17, and third curved surface 18 are formed to be circular arcs having different curvatures in a cross section in a horizontal direction. Due to these three curved surfaces, semicircular column part 15 is formed in a semicircular columnar shape (including a substantially semicircular columnar shape) whose distal end becomes narrower from the inside toward the outside (outward) of body part 3.

[0015] On an upper surface of semicircular column part 15, spout 5 through which liquid 4 stored in body part 3 flows out is formed. Spout 5 is formed in a tubular shape that opens upward, i.e., from the inside toward the outside of body part 3. On a side surface of spout 5, spout-side rib 5a is formed so as to be screwed with a cap-side rib 9a (see Fig. 3) formed inside cap 9.

[0016] Fig. 3 is a schematic view illustrating a longitudinal section taken in the vicinity of spout 5 of bottle 1, and illustrating movement of gas 6 around spout 5 indicated by a thick arrow. As illustrated in Fig. 3, packing 2 is provided on a back side of cap 9. Packing 2 is configured with a base material having air permeability and cushioning property, and a thin film formed on a surface of the base material and having an infinite number of micropores. Packing 2 is a waterproof and air permeable material, and has a function of transmitting only gas 6 and not transmitting liquid 4. Packing 2 is sandwiched between cap 9 and spout 5 in a state where cap 9 closes spout 5. This enables packing 2 to prevent liquid 4 from leaking to the outside.

10 [0017] [Relationship between bottle and liquid]

Bottle 1 according to the present exemplary embodiment stores a washing tub cleaner liquid as liquid 4.

[0018] A washing tub cleaner liquid is used to remove mold and the like inside a washing tub of a washing machine, and contains sodium hypochlorite diluted to several % as a main component. Sodium hypochlorite generates oxygen by spontaneous decomposition or thermal decomposition. When sodium hypochlorite is stored in a container in a sealed state, an internal pressure of the container is increased by generated gas, so that the container might be deformed or damaged. Therefore, it is necessary to discharge the gas containing oxygen in the container to the outside of the container to reduce the internal pressure in the container.

[0019] In general, a rated capacity of a container for storing a liquid is set to 75% or more of a capacity allowing storage of a general liquid so as not to make a consumer feel uneasy. Bottle 1 according to the present exemplary embodiment also stores liquid 4 so as to be about 78% of the capacity allowing storage of a general liquid. On the other hand, the remaining part of the inner space of bottle 1 is occupied by gas 6. Gas 6 is a mixed gas containing oxygen as will be described later.

[0020] Fig. 4 is a schematic view illustrating a liquid level when bottle 1 is placed in a normal placement manner. As shown in Fig. 4, when bottle 1 is placed in a placement manner in which a bottom surface of body part 3 is grounded, liquid level 10 is positioned below spout 5. Note that a placement manner in a case where bottle 1 is placed so that the bottom surface of body part 3 is grounded is also referred to as the normal placement manner. In a case where bottle 1 is preserved in the normal placement manner, oxygen generated by spontaneous decomposition of sodium hypochlorite is mixed with gas 6 to fill

a part of the bottle above liquid level 10, and is discharged from packing 2 to the outside.

[0021] As shown in Fig. 5, in a case where bottle 1 is placed horizontally so that second plane 13 is grounded, liquid level 10 is positioned below an upper end of spout 5. In other words, a part of spout 5 is positioned above liquid level 10. Also in this case, a part of packing 2 is positioned above liquid level 10. Therefore, gas 6 containing oxygen generated from liquid 4 is discharged from packing 2 to the outside.

[0022] As illustrated in Fig. 6, in a case where bottle 1 is placed horizontally so that the side surface of semicircular column part 15 is grounded, bottle 1 rolls over by its own weight and stands still with first plane 12 grounded. Prismatic part 11 has a width that becomes narrower as relatively separating from spout 5, and is configured such that spout 5 is positioned above when prismatic part is grounded at first plane 12. In other words, prismatic part 11 is configured so as to have the cross-sectional area becoming smaller as relatively separating from spout 5. As a result, when grounded at first plane 12, a part of spout 5 is positioned above liquid level 10. Accordingly, it is configured such that a part of packing 2 and gas 6 come into contact with each other. Therefore, oxygen generated by the spontaneous decomposition of sodium hypochlorite is mixed with gas 6 and discharged from packing 2 to the outside.

[0023] First curved surface 16 positioned at the center of the side surface of semicircular column part 15 is configured to have a relatively large curvature with respect to second curved surface 17 and third curved surface 18. Center X of an arc of first curved surface 16 is lower than center of gravity W of bottle 1.

[0024] Here, in a case where first curved surface 16 is formed such that center X is higher than center of gravity W, when bottle 1 is placed such that first curved surface 16 is grounded, bottle 1 is balanced to stand still like a tumbler doll in a state where first curved surface 16 is grounded.

[0025] In the present exemplary embodiment, it is configured to have center X lower than center of gravity W. Therefore, bottle 1 easily falls in a direction in which first plane 12 is grounded. Furthermore, as bottle 1 is inclined, liquid 4 moves inside body part 3, and the position of center of gravity W is shifted in the direction in which first plane 12 is grounded. As a result, once bottle 1 loses its balance, gravity acts on bottle 1 in the direction in which first plane 12 is grounded. Therefore, bottle 1 is configured to be grounded at first plane 12, without standing still with the side surface of semicircular column part 15 being grounded.

[0026] As illustrated in Fig. 7, when bottle 1 is placed upside down, protrusion 7 formed in an arc shape causes bottle 1 to roll over by its own weight without standing by itself, and then stand still in a state where first plane 12 is grounded.

[0027] As described in the foregoing, bottle 1 according to the present exemplary
5 embodiment is configured such that when the bottle is placed horizontally or upside down, body part 3 rolls and prismatic part 11 is grounded, and a part of packing 2 and gas 6 come into contact with each other. As a result, even when placed in a placement manner different from the normal placement manner, bottle 1 is allowed to shift by itself to a placement
10 manner for discharging gas 6 from packing 2. Therefore, during preservation or transfer of bottle 1, it is possible to suppress liquid leakage due to breakage, deformation, or the like of bottle 1 caused by an increase in the internal pressure of bottle 1 as a result of generation of gas.

[0028] [Actions and others]

Bottle 1 according to the present exemplary embodiment is a columnar bottle for
15 storing therein liquid 4 that generates gas, and includes: body part 3 that stores liquid 4 therein; spout 5 provided on the upper surface of body part 3 and opened to the outside; cap 9 that openably covers spout 5; and packing 2 that is attached between the opening of spout 5 and cap 9 and allows gas to pass without allowing a liquid to pass therethrough. Body part 3 includes semicircular column part 15 having a semicircular columnar shape in
20 which spout 5 is provided on the upper surface, and prismatic part 11 having a columnar shape in which a cross-sectional area becomes smaller as relatively separating from spout 5.

[0029] As a result, in a case where bottle 1 is laid down on its side, when semicircular column part 15 is grounded, bottle 1 swings laterally, i.e., rolls over and moves so as to be
25 grounded at prismatic part 11. This causes bottle 1 to stand still with spout 5 being placed at an upper position of bottle 1. Even if bottle 1 is laid down on its side, this enables gas 6 to flow out from spout 5 of bottle 1 through packing 2. It is accordingly possible to prevent dripping or the like of liquid 4 due to an increase in the internal pressure.

[0030] As in the present exemplary embodiment, semicircular column part 15 has the
30 side surfaces (first curved surface 16, second curved surface 17, and third curved surface 18). Prismatic part 11 has first planes 12. It may be configured such that when bottle 1 is placed to have the side surface of semicircular column part 15 grounded, rolling over of bottle 1 to have first plane 12 grounded brings at least a part of spout 5 to be positioned

above liquid level 10 of liquid 4 stored at the rated capacity.

[0031] Accordingly, even when bottle 1 is laid down on its side, spout 5 of bottle 1 is not closed by liquid 4. This enables gas 6 to flow out through packing 2. It is accordingly possible to prevent dripping or the like of liquid 4 due to an increase in the internal pressure.

[0032] As in the present exemplary embodiment, the upper surface of body part 3 may be formed into a convex shape from the inside toward the outside of body part 3.

[0033] As a result, when bottle 1 is placed upside down, bottle 1 in an unstable state falls sideways so as to be grounded at prismatic part 11, and stands still in a state where spout 5 is positioned upward. This enables gas 6 to flow out from spout 5 of bottle 1 through packing 2. It is accordingly possible to prevent dripping or the like of liquid 4 due to an increase in the internal pressure.

[0034] As in the present exemplary embodiment, semicircular column part 15 may be formed to have a relatively large curvature at a distal end position relatively away from prismatic part 11 when viewed from above in the vertical direction so that center X of the arc of semicircular column part 15 is closer to the distal end position than center of gravity W of bottle 1 is.

[0035] Thus, since when bottle 1 is placed such that semicircular column part 15 is grounded, center X of the arc of first curved surface 16 is lower than center of gravity W, the bottle easily swings laterally. This prevents the bottle from stably standing still while having semicircular column part 15 grounded, and enables gas 6 to flow out from packing 2 while having prismatic part 11 grounded. It is accordingly possible to prevent dripping or the like of liquid 4 due to an increase in the internal pressure.

[0036] As in the present exemplary embodiment, prismatic part 11 may be formed in a quadratic prism having a trapezoidal shape when viewed from above in the vertical direction.

[0037] As a result, since a volume of body part 3 can be increased while suppressing a depth dimension, a large rated capacity of bottle 1 can be set.

[0038] (Other exemplary embodiments)

The first exemplary embodiment has been described above as an example of the technique disclosed in the present application. The technique according to the present disclosure is not, however, limited thereto.

[0039] Accordingly, other exemplary embodiments will be described below.

[0040] In the first exemplary embodiment, liquid 4 containing sodium hypochlorite as a main component that generates oxygen by spontaneous decomposition or thermal decomposition has been described as an example of a liquid that generates gas. However, the liquid may be any liquid as long as it generates gas, and is not limited to a liquid containing sodium hypochlorite as a main component. The liquid may be, for example, hydrogen peroxide water or the like.

[0041] In the first exemplary embodiment, as an example of the body part, body part 3 has been described which is formed to be line-symmetric (including substantially line-symmetric) when viewed from above in the vertical direction. However, the body part only needs to be configured with a semicircular columnar shape (including a substantially semicircular columnar shape) and a prismatic shape (including a substantially prismatic shape) in which its width becomes narrower as relatively separating from the spout, i.e., its cross-sectional area becomes smaller as relatively separating from the spout, and is not limited to a line-symmetric shape as viewed from above in the vertical direction. The body part may be asymmetric, for example.

[0042] In the first exemplary embodiment, as an example of the body part, body part 3 configured by prismatic part 11 and semicircular column part 15 has been described. However, the body part only needs to have a columnar shape, and is not limited to a pillar. The body part may have a shape of, for example, a cone or a combination of a pillar and a cone.

[0043] In the first exemplary embodiment, prismatic part 11 having a trapezoidal shape when viewed from above in the vertical direction has been described as an example of a prismatic shape (including a substantially prismatic shape). However, the prismatic shape (including a substantially prismatic shape) is not limited to a trapezoidal shape as viewed from above in the vertical direction as long as the prism has a prismatic shape in which its width becomes narrower as relatively separating from the spout, i.e., its cross-sectional area becomes smaller as relatively separating from the spout. As illustrated in Fig. 8, the prismatic shape (including the substantially prismatic shape) may be triangular prismatic part 41 having a triangular shape when viewed from above in the vertical direction. Bottle 31 shown in Fig. 8 includes, for example, semicircular column part 45 formed in a semicircular columnar shape (including a substantially semicircular columnar shape), spout 35 provided on an upper surface of semicircular column part 45, protrusion 37 provided on an upper surface of triangular prismatic part 41, cap 39 that openably covers spout 35, and

the like.

[0044] In the first exemplary embodiment, semicircular column part 15 formed to have a large curvature on the distal end side has been described as an example of a semicircular columnar shape (including a substantially semicircular columnar shape). However, the semicircular columnar shape (including the substantially semicircular columnar shape) is not limited to semicircular column part 15 as long as the spout is provided on the upper surface and the side surface is formed to be curved so as to be convex outward, i.e., convex from the inside toward the outside of body part 3. Semicircular column part 15 may be, for example, a semicircular column whose horizontal cross section is a part of a perfect circle. The semicircular columnar shape (including a substantially semicircular columnar shape) may be formed so as to have a curvature gradually increasing toward the distal end side.

[0045] In the first exemplary embodiment, first curved surface 16, second curved surface 17, and third curved surface 18 have been described as examples of side surfaces having a semicircular columnar shape (including a substantially semicircular columnar shape).

However, the semicircular columnar shape (including a substantially semicircular columnar shape) is not limited to first curved surface 16, second curved surface 17, and third curved surface 18 as long as the bottle is configured to roll over by its own weight when the bottle is placed to have the side surface grounded. For example, the side surface of semicircular column part 15 may have a polygonal shape such that the bottle rolls over by its own weight when the bottle is placed to have the side surface grounded.

INDUSTRIAL APPLICABILITY

[0046] The present disclosure is applicable to a container for storing a liquid that generates gas. Specifically, the present disclosure is applicable to a container that stores a cleaning agent, a disinfectant, a bleaching agent, a pharmaceutical product, a chemical product, or the like.

REFERENCE MARKS IN THE DRAWINGS

[0047]	1	bottle
	2	packing
	3	body part
	4	liquid
	5	spout

	5a	spout-side rib
	6	gas
	7	protrusion
	8	grip part
5	9	cap
	9a	cap-side rib
	10	liquid level
	11	prismatic part
	12	first plane
10	13	second plane
	15	semicircular column part
	16	first curved surface
	17	second curved surface
	18	third curved surface
15	20	bottom surface
	31	bottle
	35	spout
	37	protrusion
	39	cap
20	41	triangular prismatic part
	45	semicircular column part
	W	center of gravity
	X	center

CLAIMS

1. A bottle in a columnar shape for storing a liquid that generates gas, the bottle comprising:

- 5 a body part that stores the liquid;
 a spout provided on an upper surface of the body part and opened to an outside;
 a lid that openably covers the spout; and
 a packing that is attached between an opening of the spout and the lid and allows
the gas to pass the packing without allowing the liquid to pass the packing,
10 wherein the body part includes a first column part having a semicircular columnar
shape in which the spout is provided on an upper surface of the first column part, and
 a second column part having a columnar shape in which a cross-sectional area
becomes smaller as relatively separating from the spout.

- 15 2. The bottle according to Claim 1, wherein
 the first column part has a first plane, and
 the second column part has a second plane,
 the bottle being configured to have at least a part of the spout positioned above a
liquid level of the liquid stored at a rated capacity as a result of rolling over of the bottle to
20 have the second plane grounded when the bottle is placed to have the first plane grounded.

3. The bottle according to Claim 1 or 2, wherein the upper surface of the body
part is formed into a convex shape from an inside toward an outside of the body part.

- 25 4. The bottle according to any one of Claims 1 to 3, wherein the first column
part is formed to have a relatively large curvature at a distal end position relatively away
from the second column part when viewed from above in a vertical direction to cause a
center position of an arc of the first column part to be closer to the distal end position than
a position of a center of gravity of the bottle is.

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5. The bottle according to any one of Claims 1 to 4, wherein the second column
part is a quadratic prism.

6. The bottle according to any one of Claims 1 to 4, wherein the second column part is a triangular prism.