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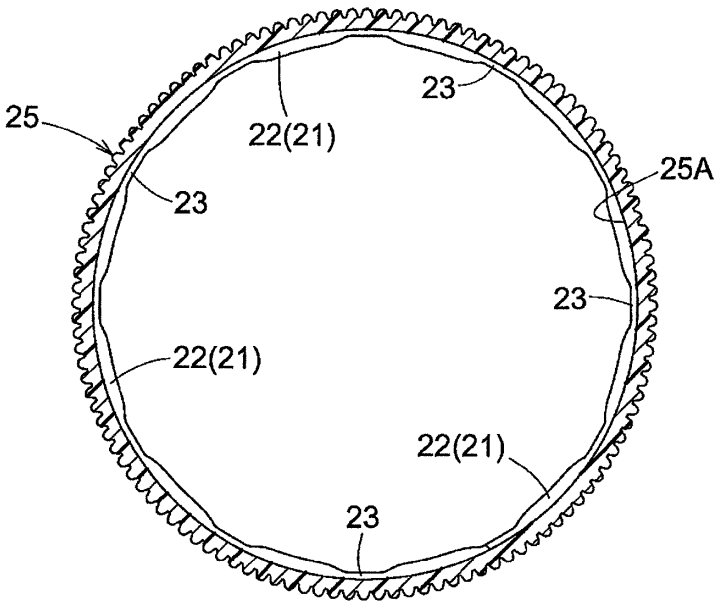
(54) CAP FOR USE WITH BOTTLE HAVING POSITIVE INTERNAL PRESSURE, AND BOTTLE WITH CAP ATTACHED THERETO

(57) A cap (20) used for a bottle having positive inner pressure includes a female screw part (21) engageable with a male screw part provided in an outer circumferential surface of a bottle mouth. The female screw part (21) includes a circumferential projection (22) protruding from an inner circumferential surface (25A) of a cap side wall (25) and continuously extending in spiral through at least 360 degrees. The circumferential projection (22) is radially cut away in part to form at least one cutaway portion (23).

Fig.3



EP 3 521 195 A1

Description

TECHNICAL FILED OF INVENTION

[0001] The present invention relates to a cap used for a bottle having positive inner pressure and a bottle with the cap attached.

BACKGROUND ART

[0002] A typical example of a conventional cap attached to a bottle is disclosed in Japanese Unexamined Patent Application Publication No. 2015-9853 (Patent Literature 1). Referring to Fig. 5 in the current application showing the conventional cap, the cap 100 includes a female screw part 101 engageable with a male screw part formed on an outer circumferential surface of a bottle mouth. The female screw part 101 is formed of a plurality of projections 102 running intermittently in a circumferential direction.

[0003] A bottle filled with carbonated drink, for example, has positive inner pressure. If the inner pressure of the bottle increases when stored in a high-temperature atmosphere, for example, a top 103 of the cap 100 may be pushed up and then a side wall 104 also may be pushed up entrained by the action of the top 103 as shown in Fig. 6. Such a condition may break a sealing condition of the bottle mouth established by the cap, which might lead to leakage of the contents.

CITATION LIST

PATENT LITERATURE

[0004] Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2015-9853

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] The cap side wall 104 is pushed up because it has stretched in the circumferential direction and then deformed to bulge outward. The conventional cap 100, which includes the female screw part 101 having the plurality of projections 102 running intermittently in the circumferential direction, cannot satisfactorily prevent the cap side wall 104 from stretching in the circumferential direction and thus cannot effectively prevent leakage of the contents.

[0006] To eliminate the above disadvantages, the object of the present invention is to provide a cap that effectively prevents leakage of the contents of a bottle.

SOLUTION TO PROBLEM

[0007] The present invention provides a cap used for a bottle having positive inner pressure. The cap includes a female screw part engageable with a male screw part provided in an outer circumferential surface of a bottle mouth. The female screw part includes a circumferential projection protruding from an inner circumferential surface of a cap side wall and continuously extending in spiral through at least 360 degrees. The circumferential projection is radially cut away in part to form at least one cutaway portion.

[0008] The above arrangement, in which the female screw part includes a circumferential projection continuously extending in spiral through at least 360 degrees, can effectively prevent the cap side wall from stretching in the circumferential direction and easily bulging outward and thus from being pushed up. Additionally, the cutaway portion formed by radially cutting the circumferential projection in part acts a gas vent to allow gas to escape when the cap is opened, which ensures safety in opening the cap.

[0009] According to one preferable embodiment, the at least one cutaway portion includes a plurality of cutaway portions provided at regular intervals.

[0010] Providing the plurality of cutaway portions are provided at regular intervals contributes to weight reduction and providing them at regular intervals contributes to uniform strength of the cap, which can prevent deformation of the cap side wall more effectively.

[0011] According to one preferable embodiment, the at least one cutaway portion has a gentle arc edge.

[0012] If the cutaway portion has a stepped edge, the male screw part of the bottle mouth would interfere with the cutaway portion when the cap is attached to the bottle mouth, which might hamper smooth attachment of the cap to the bottle. The above arrangement, in which the cutaway portion has the gentle and smooth arc edge, effectively prevents the male screw part of the bottle mouth from interfering with the cutaway portion when the cap is attached to the bottle mouth to allow the cap to be smoothly attached to the bottle.

[0013] According to one preferable embodiment, the cap further includes an outer seal for sealing the outer circumferential surface of the bottle mouth, and a rib provided between the outer seal and the inner circumferential surface of the cap side wall for connecting them to each other.

[0014] The above arrangement effectively prevents deformation of the seal, the cap top or the side wall, as a result of which leakage of the contents of the bottle can be effectively prevented.

[0015] According to one preferable embodiment, the cap is used for a bottle containing carbonated drink.

[0016] The cap according to the present invention can effectively prevent leakage of the contents owing to increase in inner pressure of the bottle, and thus is useful for a bottle filled with carbonated drink that would increase inner pressure easily.

[0017] According to one preferable embodiment, the cap is used for a bottle having an outer diameter of 25 mm or larger in the bottle mouth.

[0018] Typically, the larger the diameter of the cap becomes, the greater an amount deformation becomes, even though a rate of deformation is the same. Although the risk of leakage of the contents due to rise in inner pressure increases in such a condition, the cap having the structure according to the current embodiment is particularly useful for effectively preventing leakage of the contents even if the diameter of the cap increases with the outer diameter of 25 mm or larger in the bottle mouth.

[0019] The present invention provides a bottle with the cap according to any one of the above embodiments attached.

BRIEF DESCRIPTION OF DRAWINGS

[0020]

Fig. 1 is a front view of a bottle mouth;
Fig. 2 is a partially sectional front view of a cap;
Fig. 3 is a sectional view of the cap taken on line III-III in Fig. 2;
Fig. 4 is a sectional view of the cap taken on line IV-IV in Fig. 2;
Fig. 5 is a partially sectional front view of a conventional cap; and
Fig. 6 is an explanatory representation showing a condition with inner pressure increasing.

DESCRIPTION OF EMBODIMENTS

[0021] Embodiments of a cap and a bottle according to the present invention will be described in detail hereinafter in reference to the accompanying drawings. The present invention provides a cap 20 that prevents breakage of a sealing condition of a bottle mouth 10 established by the cap 20 when inner pressure of the bottle increases and thus prevents leakage of contents of the bottle. The cap is used for a bottle that may have positive inner pressure, and in particular, a bottle for containing carbonated drink in the current embodiment.

[0022] The cap 20 according to the current embodiment is attached to the bottle mouth 10 shown in Fig. 1. The bottle mouth 10 includes a male screw part 11 formed in an outer circumferential surface 10A thereof. More particularly, the male screw part 11 includes a plurality of projections 12 radially protruding from the outer circumferential surface 10A of the bottle mouth 10 and running intermittently in spiral. A gap 13 defined in adjacent projections 12 acts as a gas vent that allows gas escaped from liquid within the bottle to pass out of the bottle. The bottle mouth 10 has an outer diameter of 35 mm in the current embodiment. The outer diameter of the bottle mouth 10 is not limited to such a size, but is preferably 25 mm or larger, and more preferably 28 mm and larger. Typically, the larger the diameter of the bottle mouth 10 becomes, the more the risk of leakage of the contents due to rise in inner pressure increases. Accordingly, the cap 20 that can effectively prevent leakage of the contents as described herein is particularly useful.

[0023] The bottle may be a commercially available bottle that is primarily made of thermoplastic resin such as polyethylene, polypropylene and polyethylene terephthalate and integrally formed by stretch molding such as biaxial stretch blow molding. The capacity of the bottle is not particularly specified, but typically ranging from 200 mL to 2L that are common in the market. The bottle is filled with carbonated drink in the current embodiment, but may be filled with any other liquid that causes positive inner pressure after charged or with nitrogen charged, including drinkables such as drinking water, tea, juice, coffee, cocoa, freshener, alcohol drink, lactic drink and soup as well as liquid seasoning such as sauce and soy sauce.

[0024] Referring to Figs. 2 and 3, the cap 20 includes a female screw part 21 engageable with the male screw part 11. The female screw part 21 forms a circumferential projection 22 protruding from an inner circumferential surface 25A of a cap side wall 25 and continuously extending in spiral through at least 360 degrees (680 degrees in the current embodiment). More particularly, while the male screw part 11 of the bottle mouth 10 is formed of the plurality of projections running discontinuously and spaced from each other with the gaps 13, the female screw part 21 is formed of the single circumferential projection 22 running continuously in spiral through at least 360 degrees, i.e., making at least a round of the cap. This arrangement can effectively prevent leakage of the contents of the bottle. The contents or liquid would escape from the bottle when a top 24 of the cap 20 is pushed up with increase in inner pressure of the bottle, and the cap side wall 25 is also pushed up entrained with the action of the top 24. Such a condition would break a sealing condition of the bottle mouth 10 established by the cap 20. In this, the female screw part 21 forming the circumferential projection 22 running continuously in spiral through at least 360 degrees can effectively prevent the cap side wall 25 from stretching in the circumferential direction and easily bulging outward and thus from being pushed up.

[0025] Further, to provide a gas vent, the circumferential projection 22 is radially cut away in part (that is, so as not to reach the inner circumferential surface 25A of the cap side wall 25) to form at least one cutaway portion 23. In the current embodiment, a plurality of cutaway portions are provided at regular intervals. Providing the plurality of cutaway portions contributes to weight reduction and providing them at regular intervals contributes to uniform strength of the cap 20, which can prevent deformation of the cap side wall 25 more effectively. When the cap 20 is attached to the bottle mouth 10, each cutaway portion 23 is positioned to correspond to each of the gaps 13 of the male screw part 11. Additionally, the cutaway portion 23 has a gentle and smooth arc edge 23a. This effectively prevents the male screw part 11 of the bottle mouth 10 from interfering with the cutaway portion 23 when the cap 20 is attached to the bottle mouth 10 to

allow the cap 20 to be smoothly attached to the bottle. The cutaway portion 23 may have any desired depth that does not reach the inner circumferential surface 25A of the cap side wall 25, preferably a depth of 20 to 80% of a projecting height of the circumferential projection 22. While a depth of less than 20% of the projecting height would prevent bulging of the cap side wall 25 less easily, a depth of more than 80% of the projecting height would secure the gas vent less easily and hamper weight reduction.

[0026] Referring to Figs. 2 and 4, the top 24 of the cap 20 has an inner surface 24A provided with an inner seal 26 for sealing a distal end portion of the bottle mouth 10 from an inner circumferential surface thereof, and an outer seal 27 for sealing the distal end portion of the bottle mouth 10 from the outer circumferential surface 10A thereof. The distal end portion of the bottle mouth 10 is held between the inner seal 26 and the outer seal 27 to seal the bottle mouth 10. A plurality of ribs 28 (fourteen ribs in the current embodiment) are provided between the outer seal 27 and the inner circumferential surface 25A of the cap side wall 25 to connect them to each other, and a plurality of ribs 29 (fourteen ribs in the current embodiment) are provided between the inner seal 26 and the outer seal 27 to connect them to each other. The ribs 28 and 29 are provided at equal intervals in the circumferential direction. More particularly, each rib 28 radially diagonally extends between the outer seal 27 and the inner circumferential surface 25A of the cap side wall 25, and each rib 29 radially extends between the inner seal 26 and the outer seal 27. In the current embodiment, each rib 29 is located in a circumferential intermediate position between adjacent ribs 28, and each rib 28 is located in a circumferential intermediate position between adjacent ribs 29, thereby to effectively prevent deformation of the cap top and leakage of the contents or liquid.

[Alternative Embodiments]

[0027] Finally, alternative embodiments of the cap and the bottle according to the present invention will be described hereinafter. The arrangement disclosed in any one of the following embodiments may be combined with any other embodiment if there is no inconsistency.

[1] According to the above fist embodiment, the female screw part 21 is formed of the single circumferential projection 22. Instead, the female screw part 21 may include a plurality of projections spaced apart from each other in the same manner as the male screw part 11, in which at least one of the projections may form the circumferential projection 22 extending continuously through at least 360 degrees.

[2] According the above first embodiment, the plurality of ribs 28 are provided at equal intervals between the outer seal 27 and the inner circumferential surface 25A of the cap side wall 25 to connect them to each other, and the plurality of ribs 29 are provided at equal intervals between the inner seal 26 and the outer seal 27 to connect them to each other. The number of the ribs 28 and 29 may vary at need, and the ribs 28 and 29 may not be necessarily provided at equal intervals. Additionally, both of or one of the outer ribs 28 and the inner ribs 29 are dispensable.

[3] It is noted that the foregoing embodiments have been provided merely for the purpose of explanation and are in no way to be construed as limiting the present invention. Thus, it is understood by a person of ordinary skill in the art that changes may be made without departing from the scope and spirit of the present invention and that various variations and modifications may be possible without departing from the scope of the present invention.

INDUSTRIAL APPLICABILITY

[0028] The present invention is applicable to a cap of a bottle, for example.

DESCRIPTION OF REFERENCE SIGNS

[0029]

10	bottle mouth
10A	outer circumferential surface
11	male screw part
20	cap
21	female screw part
22	circumferential projection
23	cutaway portion
25	cap side wall
25A	inner circumferential surface
26	inner seal
27	outer seal
28	rib

Claims

1. A cap used for a bottle having positive inner pressure, the cap comprising a female screw part engageable with a male screw part provided in an outer circumferential surface of a bottle mouth,
wherein the female screw part includes a circumfer-

ential projection protruding from an inner circumferential surface of a cap side wall and continuously extending in spiral through at least 360 degrees, and wherein the circumferential projection is radially cut away in part to form at least one cutaway portion.

2. The cap according to claim 1, wherein the at least one cutaway portion comprises a plurality of cutaway portions provided at regular intervals.

3. The cap according to claim 2, wherein the at least one cutaway portion has a gentle arc edge.

4. The cap according to any one of claims 1 to 3, further comprising:

an outer seal for sealing the outer circumferential surface of the bottle mouth; and
a rib provided between the outer seal and the inner circumferential surface of the cap side wall for connecting them to each other.

5. The cap according to any one of claims 1 to 4 used for a bottle containing carbonated drink.

6. The cap according to any one of claims 1 to 5 used for a bottle having an outer diameter of 25 mm or larger in the bottle mouth.

7. A bottle with the cap according to any one of claims 1 to 6 attached.

Fig.1

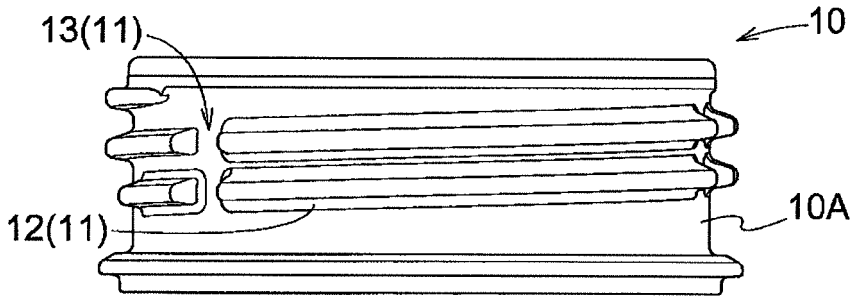
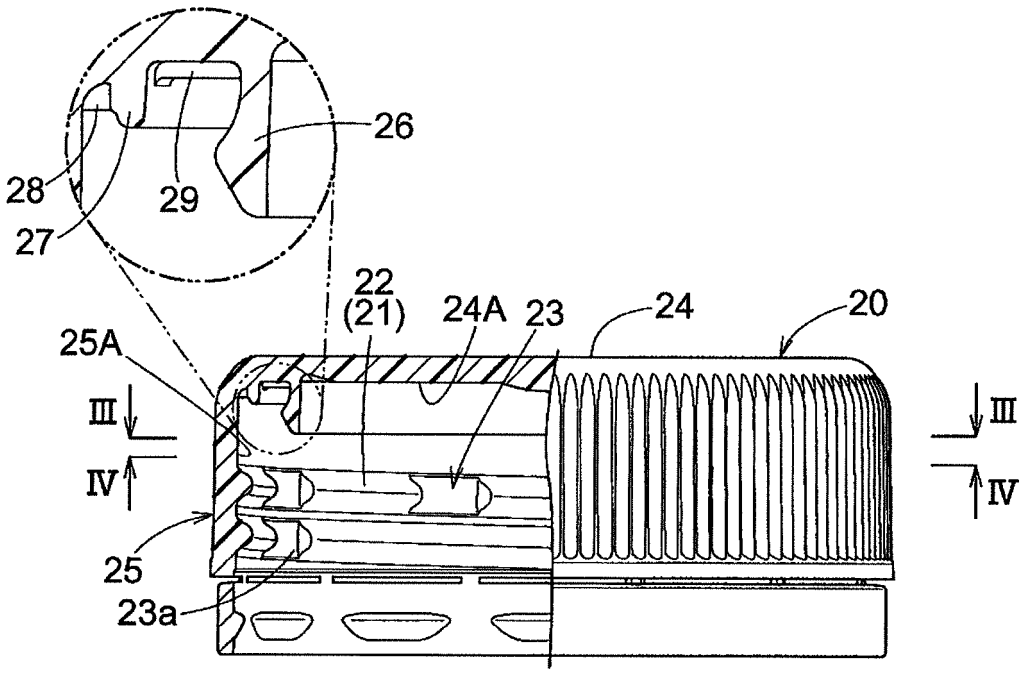

13(11)
10
12(11)
10A

Fig.2


26
28
29
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22
(21)
24A
23
24
20
25A
III
IV
III
IV
25
23a

Fig.3

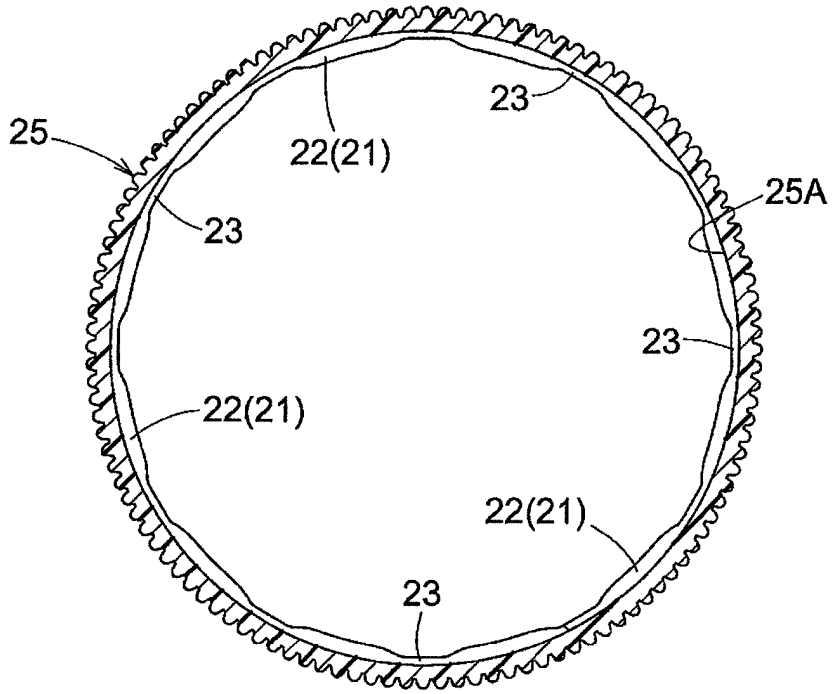
25
22(21)
23
25A
23
22(21)
23
22(21)
23

Fig.4

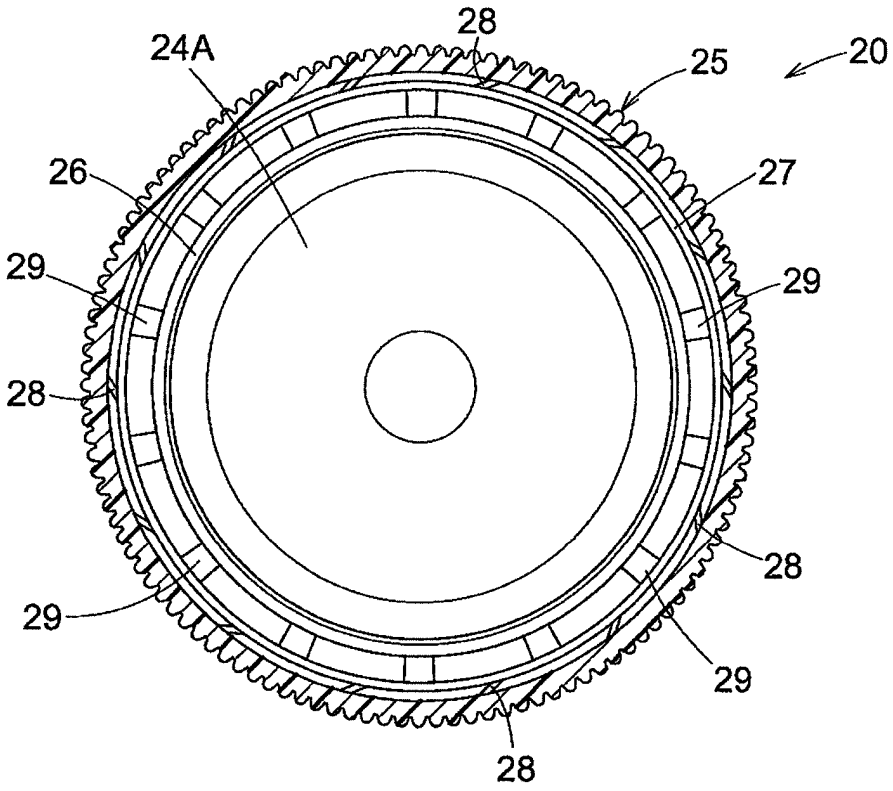
28
24A
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Fig.5

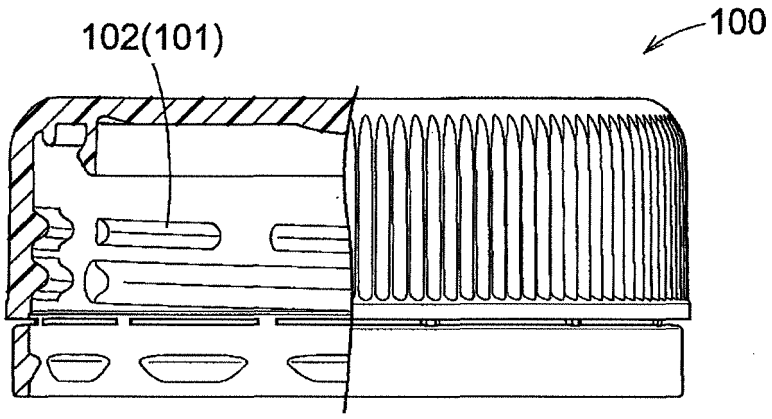
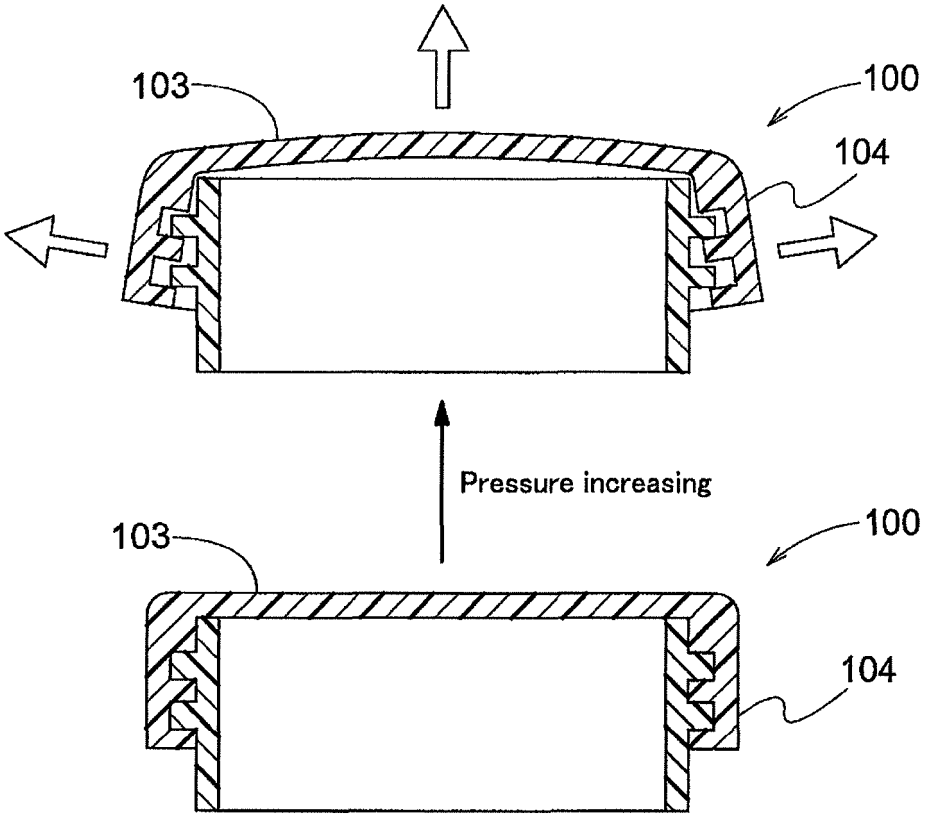


Fig.6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/035289

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. B65D41/04(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)
Int. Cl. B65D41/04, B65D41/32

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2017
Registered utility model specifications of Japan	1996-2017
Published registered utility model applications of Japan	1994-2017

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 Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 18276/1985 (Laid-open No. 150938/1985) (METAL CLOSURES LTD.) 07 October 1985, page 2, lines 8-11, page 3, lines 9-13, page 4, lines 5-7, page 5, lines 15-19, page 6, lines 4-12, fig. 3, 4 & JP 55-48055 A & EP 9854 A1, page 1, lines 4-8, page 2, lines 8-10, page 2, lines 26-28, page 4, lines 5-10, page 4, lines 14-18, fig. 1-6	1-3, 5-7 4, 6
Y	WO 2016/151746 A1 (SUNTORY HOLDINGS LTD.) 29 September 2016, paragraphs [0002], [0020], [0028], fig. 5, 6 & TW 201641379 A	4

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07.12.2017	19.12.2017
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/035289

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 10-203551 A (KISHIMOTO, Akira) 04 August 1998, paragraphs [0001], [0009], [0028], fig. 1 (Family: none)	6
Y	JP 63-272671 A (TOYO SEIKAN KAISHA, LTD.) 10 November 1988, claim 1, page 1, lower right column, lines 15-19, page 2, upper left column, lines 7-10, page 5, upper left column, line 13, page 5, upper right column, line 5 & US 4971213 A, column 1, lines 5-11, column 1, lines 22-27, column 6, lines 14, 15, column 6, lines 32-34 & WO 1988/008397 A1 & EP 311693 A1	6
A	JP 2005-193913 A (ALCOA CLOSURE SYSTEMS JAPAN LTD.) 21 July 2005, paragraphs [0007], [0009]-[0015], fig. 1, 2 (Family: none)	1-7
A	JP 63-162465 A (ETHYL MOLDED PRODUCTS COMPANY) 06 July 1988, entire text, all drawings & US 4747502 A & EP 263699 A2	1-7
A	US 2008/0110851 A1 (FUCHS et al.) 15 May 2008, entire text, all drawings & WO 2008/045150 A1	1-7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2015009853 A **[0002] [0004]**