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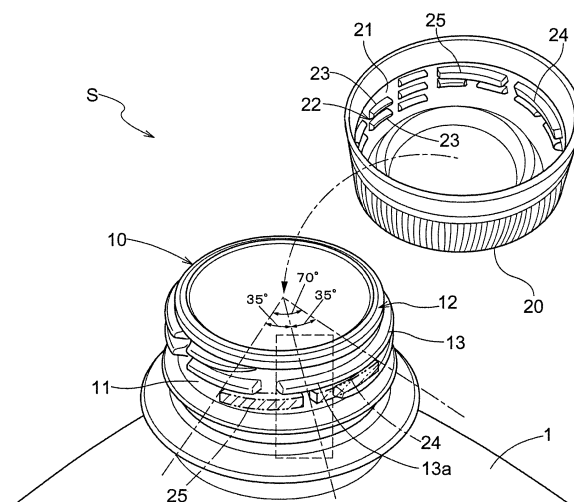
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(54) **CAP STRUCTURE FOR RESIN CONTAINER**

(57) A lid assembly (S) for a resin container (1) is provided for desirably maintain a sealed state in the resin container only by changing the design of a cap. The lid assembly (S) includes a mouth part (10) having a male screw (12) provided in its outer circumferential face (11), and the cap (20) having a female screw (22) provided in its inner circumferential face (21). The female screw (22) has a plurality of projections (23) that intermittently continue in a circumferential direction. The male screw (12) has a single thread portion (13a) formed at least in part

of a circumference of the screw where only one thread runs between a distal end and a proximal end of the mouth part (10). The female screw (22) of the cap (20) is engaged with the male screw (12) of the mouth part (10) to screw the cap (20) to seal the mouth part (10). The projections (23) include extended projections (24, 25) to be located under the single thread portion (13a) of the male screw (12). Each of the extended projections (24, 25) has a circumferential length greater than a circumferential length of the other projections (23).

Fig.1



Description

TECHNICAL FIELD

[0001] The present invention relates to a lid assembly for a resin container including a mouth part with a male screw provided in its outer circumferential face, and a cap with a female screw provided in its inner circumferential face, the female screw having a plurality of projections that intermittently continue in a circumferential direction, in which the male screw has a single thread portion formed at least in part of a circumference of the screw where only one thread runs between a distal end and a proximal end of the mouth part, and the female screw of the cap is engaged with the male screw of the mouth part to screw the cap to seal the mouth part.

RELATED ART

[0002] When the resin container is filled with a carbonated beverage, for example, and is stored at high atmosphere temperature, the liquid thermally expands and then loses carbonic acid to increase inner pressure of the container. While a top of the cap is pushed up with the increase of the inner pressure, the male screw provided in the mouth part engages with the female screw provided in the cap to prevent the female screw positioned under the male screw from being pushed up, which in turn prevents the top of the cap from being pushed up. As a result, the resin container is maintained in a sealed state to prevent loss of carbonic acid.

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0003] On the other hand, the inventors have found that the arrangement including the single thread portion formed in part of the circumference of the male screw where only one thread runs between the distal end and the proximal end of the mouth part decreases a force of preventing the female screw from being pushed up in the single thread portion. In such a case, the increase in inner pressure of the resin container might break the sealed state and lead to loss of carbonic acid. To eliminate such a disadvantage, a design change in the mouth part may be suggested so that the single thread portion may not be present. Such a change, however, should be accompanied by a design change in the cap as well. Further, increasing the number of threads might cause other disadvantages such as increasing the height of the mouth part or resulting in special specifications that do not meet the standards of the general-purpose mouth part.

[0004] An object of the present invention is to provide a lid assembly for a resin container for desirably maintaining a sealed state of the resin container only by changing a design of a cap.

MEANS FOR SOLVING PROBLEM

[0005] A lid assembly for a resin container according to the present invention includes a mouth part with a male screw provided in its outer circumferential face, and a cap with a female screw provided in its inner circumferential face. The female screw has a plurality of projections that intermittently continue in a circumferential direction. The male screw has a single thread portion formed at least in part of a circumference of the screw where only one thread runs between a distal end and a proximal end of the mouth part. The female screw of the cap is engaged with the male screw of the mouth part to screw the cap to seal the mouth part. The projections include extended projections to be located under the single thread portion of the male screw. Each of the extended projections has a circumferential length greater than a circumferential length of the other projections.

[0006] It is common to provide the plurality of projections that intermittently continue in the circumferential direction in female screw of the cap to form gaps in the screw, which provides a compact design, removes residual of the liquid spilled out of the container when the cap is screwed and attached to the female screw, and effectively releases inner pressure of the container. The inventors have found that a force of preventing the female screw from being pushed up can be enhanced by increasing the length of the projection engaging with the single thread portion (i.e., located under the single thread portion) in the arrangement of the female screw of the cap in which the plurality of projections that intermittently continue, which dispenses with the need for changing the design of the male screw in the mouth part. More particularly, while the projections would deform when the female screw is pushed up, such deformation can be prevented by increasing the length of the projections. As a result, the female screw is prevented from being pushed up.

[0007] Further, the above arrangement in which the projection located under the single thread portion has a circumferential length greater than a circumferential length of the other projections prevents the female screw from being pushed up and eventually prevents a top of the cap from being pushed up. Therefore, such an arrangement can desirably maintain the sealed state of the resin container only by changing the design of the cap.

[0008] Other preferable embodiments of the lid assembly for a resin container will be described hereinafter. It should be noted that the scope of the present invention is not limited by the following embodiments.

[0009] According to one preferable embodiment, the extended projection is located under the single thread portion over the range covering from a maximum screwed position in which the cap is screwed to the mouth part to a minimum amount, to a minimum screwed position in which the cap is screwed to the mouth part to a minimum amount required to seal the mouth part.

[0010] More particularly, to seal the mouth part tight,

the cap is not necessarily screwed to the mouth part to the maximum amount (maximum screwed position) but is only required to be screwed to the minimum necessary amount (minimum screwed position). In other words, the mount part can be sealed tight by screwing the cap to any position between the maximum screwed position and the minimum screwed position. In the above arrangement, the extended projection is located under the single thread portion over the range covering from the maximum screwed position to the minimum screwed position, which allows the extended projection to be located under the single thread portion in any position between the maximum screwed position and the minimum screwed position. Thus, the female screw is prevented more accurately from being pushed up.

[0011] According to one preferable embodiment, the extended projection projects from the inner circumferential face of the cap more outward than the other projections.

[0012] Such an arrangement allows the extended projection to come into contact with the single thread portion with a wider area, and thus can further prevent the female screw from being pushed up and eventually prevent the top of the cap from being pushed up.

[0013] According to one preferable embodiment, the extended projection has an angular edge portion.

[0014] Providing the extended projection with the angular edge portion allows the extended projection to engage with the single thread portion more firmly. Such an arrangement can further prevent the female screw from being pushed up and eventually prevent the top of the cap from being pushed up.

[0015] According to one preferable embodiment, a rib is provided at least in a portion of the cap corresponding to the single thread portion for connecting an outer seal provided in the cap to the inner circumferential face of the cap, the outer seal sealing the outer circumferential face of the mouth part.

[0016] The top of the cap is pushed up because it has been expanded and deformed. The above arrangement provides the rib between the outer seal and the inner circumferential face of the cap. Thus, the rib can prevent the top of the cap from expanding and deforming in the portion corresponding to the single thread portion, which can further prevent the top of the cap from being pushed up.

BRIEF DESCRIPTION OF DRAWINGS

[0017]

Fig. 1 is an illustrative perspective view of a lid assembly;

Fig. 2 is a partially sectional front view of a cap;

Fig. 3 is an illustrative perspective view of the lid assembly in a maximum screwed position;

Fig. 4 is an illustrative perspective view of the lid assembly in a minimum screwed position;

Fig. 5(a) is a sectional view showing a state in which an extended projection is located under a single thread portion;

Fig. 5(b) is a sectional view showing a state in which another projection is located under a single thread portion; and

Fig. 6 is a sectional view of the cap.

DESCRIPTION OF EMBODIMENTS

[0018] A lid assembly for a resin container according to preferred embodiments of the present invention will be described hereinafter in reference to the accompanying drawings. The lid assembly S for a resin container according to one of the preferred embodiments includes a mouth part 10 having a male screw 12 provided in its outer circumferential face 11, and a cap 20 having a female screw 22 provided in its inner circumferential face 21. The female screw 22 includes a plurality of projections 23 that intermittently continue in a circumferential direction. The male screw 12 has a single thread portion 13a formed at least in part of the circumference of the screw where only one thread runs between a distal end and a proximal end of the mouth part 10. The female screw 22 of the cap 20 is engaged with the male screw 12 of the mouth part 10 to screw the cap 20 to seal the mouth part 10 tight. The projections 23 include extended projections 24 and 25 to be located under the single thread portion 13a of the male screw 12. Each of the extended projections 24 and 25 has a circumferential length greater than a circumferential length of the other projections 23. Such an arrangement can increase a force of preventing the female screw 22 from being pushed up, which can eventually prevent a top 26 of the cap 20 from being pushed up. The lid assembly S according to the current embodiment will be described hereinafter in more detail when applied to a plastic bottle 1 ("bottle 1" hereinafter) as the resin container.

[0019] Referring to Fig. 1, the lid assembly S includes the mouth part 10 and the cap 20 attached to the mouth part 10. The mouth part 10 has the male screw 12 provided in its outer circumferential face 11, and the cap 20 has the female screw 22 provided in its inner circumferential face 21. The female screw 22 of the cap 20 is engaged with the male screw 12 of the mouth part 10 to screw the cap 20 to seal the mouth part 10 tight.

[0020] The bottle 1 may be made of a primary component of thermoplastic resin such as polyethylene, polypropylene, and polyethyleneterephthalate to be integrally molded by stretch molding such as biaxial stretch blow molding. The capacity of the bottle 1 may unlimitedly range from 200 milliliters to 2 liters, which are commonly distributed.

[0021] A liquid filling the bottle 1 is not limited and may be drinkables such as drinking water, tea, fruit juice, coffee, cocoa, refreshing beverages, alcoholic beverages, lactic beverages and soup, or liquid flavoring such as sauce and soy sauce. The lid assembly 1 according to

the current embodiment is particularly preferable when applied to the bottle 1 filled with a carbonated beverage, which may particularly increase inner pressure of the bottle 1 when the bottle 1 is stored at high atmosphere temperature to thermally expand the liquid and cause loss of carbonic acid. Other beverages than the carbonated beverage may also increase the inner pressure of the bottle 1 by thermal expansion of the content, and thus the lid assembly 1 according to the current embodiment may be preferably used for noncarbonated beverages as well.

[0022] The male screw 12 of the mouth part 10 includes threads 13 that radially project from its outer circumferential face 11 (in a direction normal to the outer circumferential face 11) and intermittently continue spirally in the circumferential direction. The male screw 12 has the single thread portion 13a formed at least in part of the circumference of the screw where only one thread runs between the distal end and the proximal end of the mouth part 10.

[0023] As shown in Figs. 1 and 2, the plurality of projections 23 formed in the female screw 22 of the cap 20 run intermittently continuously in the circumferential direction. The male screw 12 (threads 13) and the female screw 22 (projections 23) complement each other so that each of the threads 13 of the male screw 12 may be fitted to a gap defined by two vertically adjacent projections 23.

[0024] The projections 23 of the male screw 22 includes the extended projections 24 and 25 continuously provided and having a circumferential length greater than a circumferential length of the remaining projections 23. Those extended projections 24 and 25 are configured to be positioned under the single thread portion 13a of the male screw 12 (adjacent to the proximal end of the mouth part 10) when the cap 20 is screwed to seal the mouth part 10 tight.

[0025] To seal the mouth part 10 tight, the cap 20 is not necessarily screwed to the mouth part 10 to a maximum amount (maximum screwed position) but is only required to be screwed to a minimum necessary amount (minimum screwed position). In other words, the mount part 10 can be sealed tight by screwing the cap to any position between the maximum screwed position and the minimum screwed position. A difference in screw amount between the maximum screwed position and the minimum screwed position corresponds to a length of an arc of a circle with its central angle of 35 degrees when the outer circumferential face 11 of the mouth part 10 is defined as a circumference of the circle.

[0026] In view of the above, each of the extended projections 24 and 25 is designed to have a length corresponding to the length of the arc of the circle with its central angle of 35 degrees when the outer circumferential face 11 of the mouth part 10 is defined as the circumference of the circle. More particularly, the extended projections 24 and 25 are provided within a range of an arc with its central angle of 70 degrees. While the extended projection 24 is located under the single thread portion

13a in the maximum screwed position (see Fig. 3), the extended projection 25 is located under the single thread portion 13a in the minimum screwed position (see Fig. 4). In a screwed position between the maximum screwed position and the minimum screwed position (see Fig. 1), both the extended projections 24 and 25 are located under the single thread portion 13a. In other words, the extended projection 24 and/or the extended projection 25 is located under the single thread portion 13a over the range covering from the maximum screwed position and the minimum screwed position.

[0027] Fig. 5(a) shows a state in which the extended projection 24 is located under the single thread portion 13a, and Fig. 5(b) shows a state in which the other projections 23 are located under the single thread portion 13a. As seen from Figs. 5(a) and 5(b), the extended projection 24 projects from the inner circumferential face 21 of the cap 20 more outward than the other projections 23. Further, the extended projection 24 has an angular edge portion 24a. Similarly to the projection 24, the projection 25 also projects from the inner circumferential face 21 of the cap 20 more outward than the other projections 23 and has an angular edge portion.

[0028] Referring to Figs. 5 and 6, an outer seal 27 projects from an inner face 26a of the top 26 of the cap 20 to seal the outer circumferential face 11 of the outer mouth 10. A rib 28 is provided in a portion of the cap corresponding to the single thread portion 13a when the cap 20 is screwed to seal the mouth part 10 tight for connecting the outer seal 27 to the inner circumferential face 21 of the cap 20. More particularly, the rib 28 is provided above each of the extended projections 24 and 25.

[0029] The following will describe a state in which the cap 20 is screwed to seal the mouth part 10 tight. As shown in Figs. 1, 3 and 4, the extended projection 24 and/or the extended projection 25 is located under the single thread portion 13a. More particularly, the single thread portion 13a engages with the extended projection 24 or the extended projection 25 when the inner pressure of the bottle 1 increases to push up the top 26 of the cap 20. It is common that a force for preventing the engaged female screw 12 from being pushed up is decreased in the single thread portion 13a. On the other hand, the lid assembly S according to the current embodiment can prevent deformation of the engaged extended projections 24 and 25 because those projections have increased lengths in the circumferential direction. Consequently, the single thread portion 13a prevents the female screw 12 from being pushed up.

[0030] Referring to Figs. 5(a) and 5(b) again, the extended projection 24 projects from the inner circumferential face 21 of the cap 20 more outward than the other projections 23, which allows the extended projection 24 to come into contact with the single thread portion 13a with a wide area. The angular edge portion 24a of the extended projection 24 allows the projection 24 to engage with the single thread portion 13a more firmly. Such

an arrangement further prevents the female screw 13 from being pushed up. The extended projection 25 is shaped in a similar manner to the extended projection 24, and thus performs the same effect.

[0031] Further, the rib 28 is provided in the position of the cap corresponding to the single thread portion 13a to connect the outer seal 27 to the inner circumferential face 21 of the cap 20, which prevents expansion and deformation of the top 26 of the cap 20. Such an arrangement further prevents the top 26 of the cap 20 from being pushed up.

[0032] As described above, the lid assembly S according to the current embodiment increases the force of preventing the female screw 23 from being pushed up and prevents expansion and deformation of the top 26 of the cap 20, and eventually prevents the top 26 of the cap 20 from being pushed up. In this manner, the lid assembly S according to the current embodiment can desirably maintain the sealed state in the bottle 1 only by changing the design of the cap 20.

[Alternative Embodiments]

[0033] Lastly, alternative embodiments of the lid assembly for a resin container according to the present invention will be described hereinafter. It should be noted that any one of the following embodiments may be combined with any other embodiment if no inconsistency would arise.

(1) In the above embodiment, the two extended projections 24 and 25 are continuously provided. However, the lid assembly according to the present invention is not limited to such an arrangement. For example, only one extended projection, which has a length of the combined two extended projections 24 and 25, may be provided. The length of the extended projections 24 and 25 may vary depending on the circumferential length of the single thread portion in the resin container.

(2) In the above embodiment, the extended projection 24 and/or the extended projection 25 is located under the single thread portion 13a over the range covering from the maximum screwed position and the minimum screwed position. However, the lid assembly according to the present invention is not limited to such an arrangement. For example, the extended projection 24 and/or the extended projection 25 may be located under the single thread portion 13a only in the maximum screwed position, or in the minimum screwed position, or in a selected position between the maximum screwed position and the minimum screwed position.

(3) In the above embodiment, the projection 24 is projected from the inner circumferential face 21 of the cap 20 more outward than the other projections 23 and has the angular edge portion 24a as shown in Fig. 5(a). However, the lid assembly according to

the present invention is not limited to such an arrangement. For example, the projection 24 may be projected from the inner circumferential face 21 of the cap 20 by the same amount as the other projections 23. The edge portion 24a may not be angular. The extended projection 25 may be modified in the same manner.

(4) In the above embodiment, the rib 28 is provided in the position of the cap corresponding to the single thread portion 13a to connect the outer seal 27 to the inner circumferential face 21 of the cap 20. However, the lid assembly according to the present invention is not limited to such an arrangement. For example, the rib is dispensable and may be provided in any position other than the portion corresponding to the single thread portion 13a.

(5) It should be understood that the embodiments disclosed here are exemplary in nature and that the scope of the present invention should not be limited by such embodiments. Any person of ordinary skill in the art will readily understand that variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Thus, the present invention naturally includes any other embodiment that is modified without departing from the gist of the present invention.

INDUSTRIAL APLICABILITY

[0034] The present invention is applicable to any lid assembly for a resin container to be filled with a liquid, for example.

DESCRIPTION OF REFERENCE SIGNS

[0035]

S	lid assembly
1	resin container
10	mouth part
11	outer circumferential face
12	male screw
13a	single thread portion
20	cap
21	inner circumferential face
22	female screw
23	projection
24, 25	extended projection
24a, 25a	edge portion
27	outer seal
28	rib

Claims

1. A lid assembly for a resin container, the lid assembly comprising:

a mouth part including a male screw provided in its outer circumferential face; and
 a cap including a female screw provided in its inner circumferential face, the female screw having a plurality of projections that intermittently continue in a circumferential direction, wherein the male screw has a single thread portion formed at least in part of a circumference of the screw where only one thread runs between a distal end and a proximal end of the mouth part, wherein the female screw of the cap is engaged with the male screw of the mouth part to screw the cap to seal the mouth part, and wherein the projections include extended projections to be located under the single thread portion of the male screw, each of the extended projections having a circumferential length greater than a circumferential length of the other projections.

2. The lid assembly according to claim 1 or 2, wherein the extended projection is located under the single thread portion over the range covering from a maximum screwed position in which the cap is screwed to the mouth part to a maximum amount, to a minimum screwed position in which the cap is screwed to the mouth part to a minimum amount required to seal the mouth part.
3. The lid assembly according to claim 1 or 2, wherein the extended projection projects from the inner circumferential face of the cap more outward than the other projections.
4. The lid assembly according to any one of claims 1 to 3, wherein the extended projection has an angular edge portion.
5. The lid assembly according to any one of claims 1 to 4, wherein a rib is provided at least in a portion of the cap corresponding to the single thread portion for connecting an outer seal provided in the cap to the inner circumferential face of the cap, the outer seal sealing the outer circumferential face of the mouth part.

Fig.1

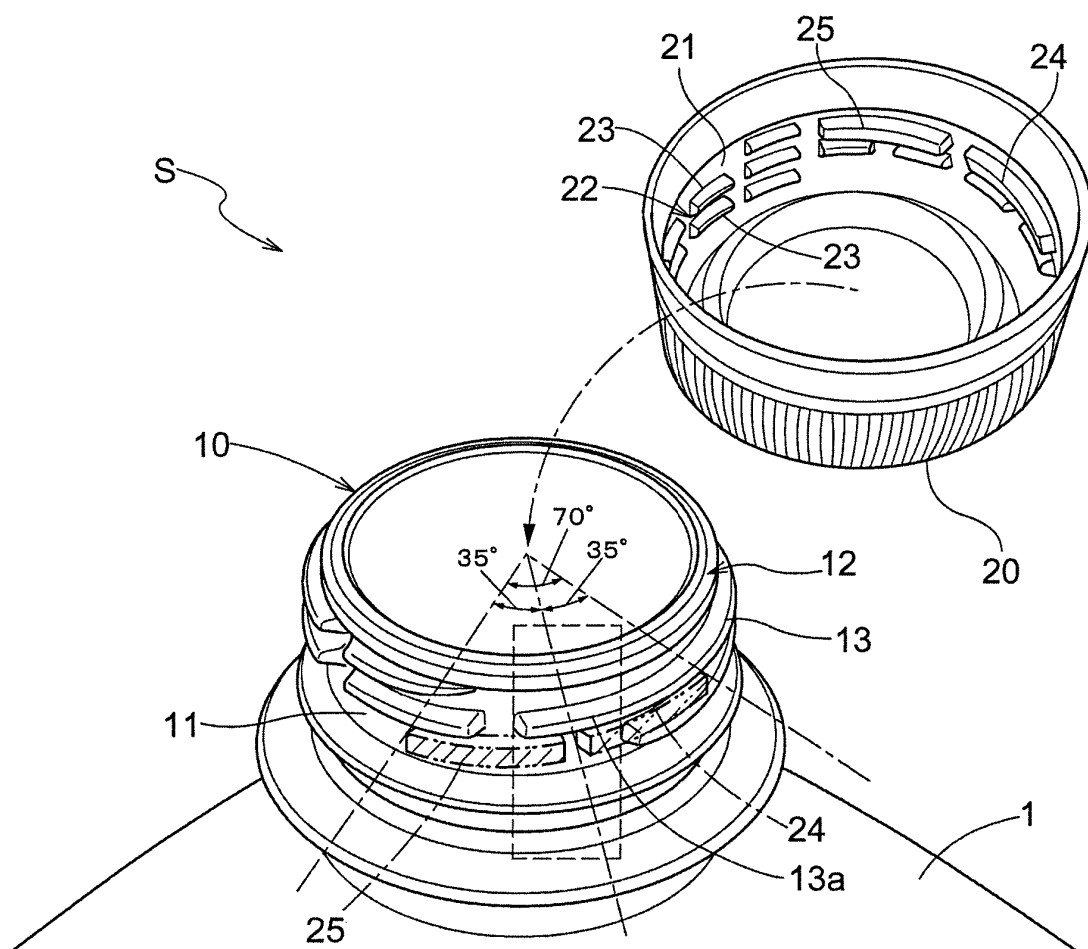


Fig.2

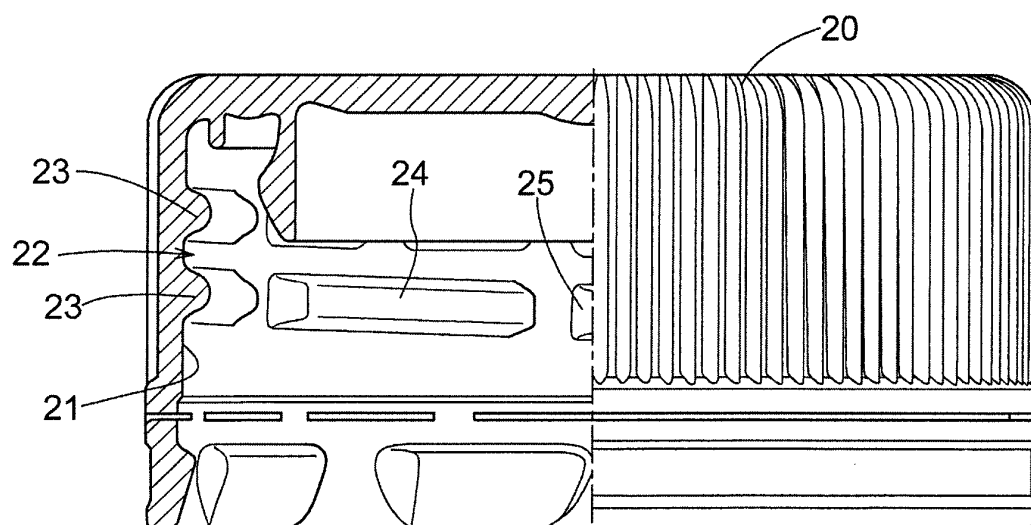


Fig.3

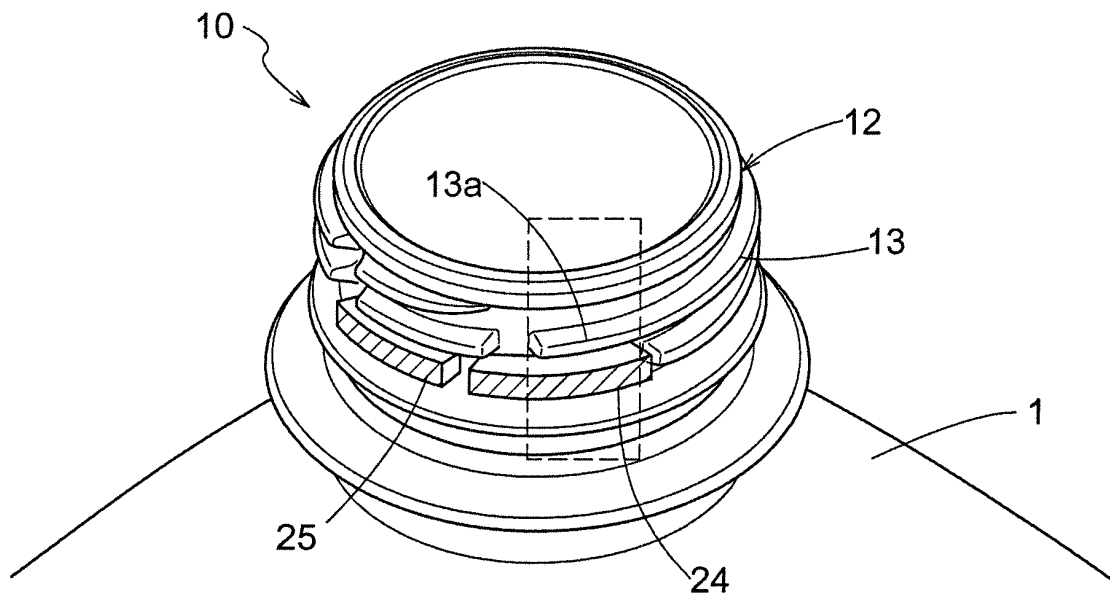


Fig.4

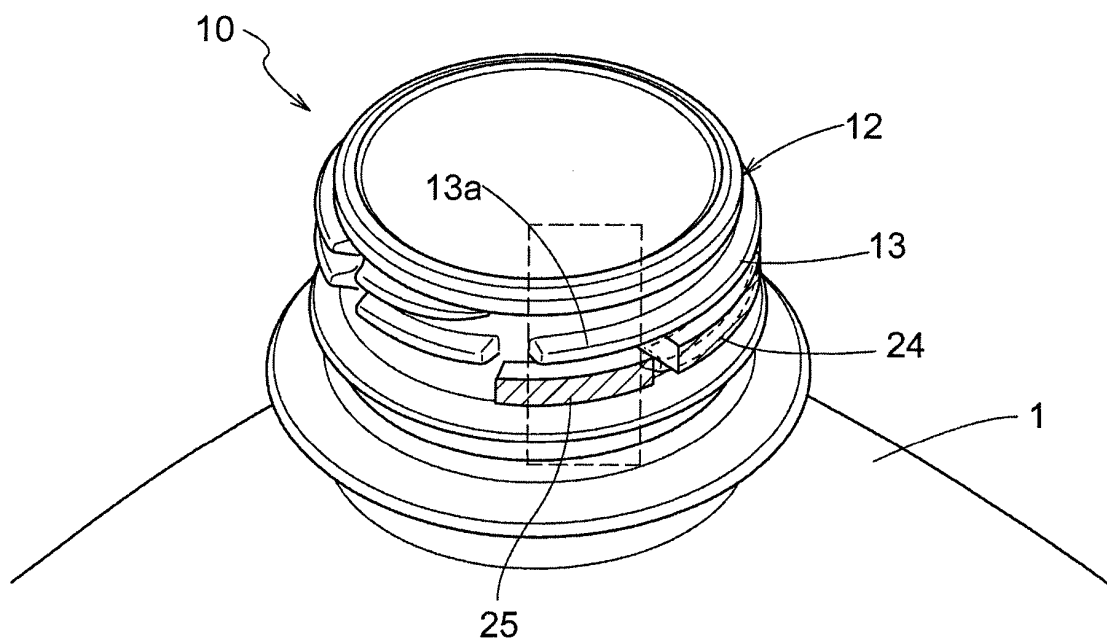


Fig.5

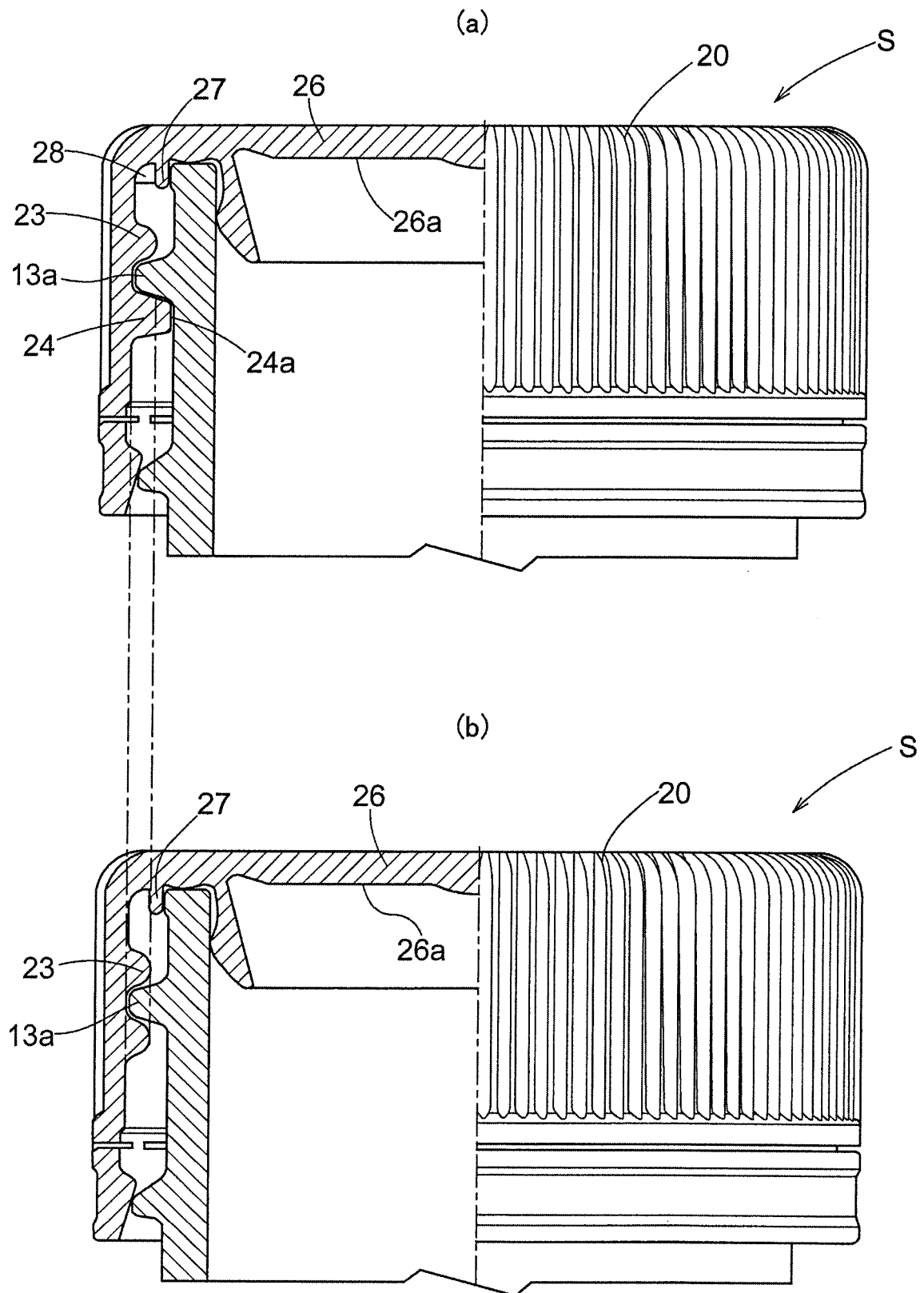
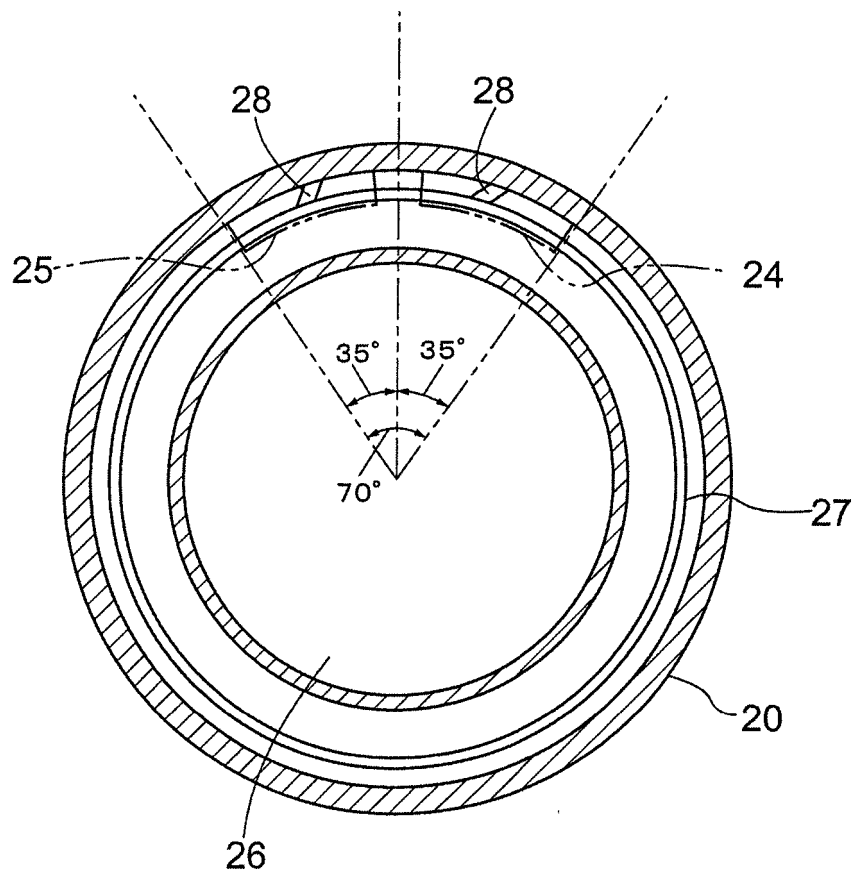


Fig.6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/058840

A. CLASSIFICATION OF SUBJECT MATTER

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)

B65D41/04, B65D41/34

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 Y	GB 2476089 A (BEESON AND SONS LTD.), 15 June 2011 (15.06.2011), page 11, lines 16 to 20; page 15, line 7 to page 21, line 26; fig. 1 to 2, 3a & WO 2011/070326 A1	1-4 5
Y	JP 2004-35066 A (Toppan Printing Co., Ltd.), 05 February 2004 (05.02.2004), paragraph [0009]; fig. 1 (Family: none)	5
A	JP 2013-189246 A (Nihon Yamamura Glass Co., Ltd.), 26 September 2013 (26.09.2013), paragraphs [0014], [0024], [0033] to [0038]; fig. 7 (Family: none)	1, 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 of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search
19 June 2015 (19.06.15)Date of mailing of the international search report
30 June 2015 (30.06.15)
 Name and mailing address of the ISA/
 Japan Patent Office
 3-4-3, Kasumigaseki, Chiyoda-ku,
 Tokyo 100-8915, Japan

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Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/058840

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4090629 A (INTERNATIONAL TOOLS (1973) LTD.), 23 May 1978 (23.05.1978), column 3, line 37 to column 5, line 28; fig. 1 to 6 (Family: none)	1

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