

DESCRIPTION

Title of the Invention: RESIN CAP

5

Technical Field

[0001]

The present invention relates to an attachable/detachable resin cap for use with a mouth of a container such as a PET bottle, the mouth
10 being formed of a non-crystallized resin.

Background Art

[0002]

As a resin cap of the above-noted type, there is widely used a
15 resin cap including a top plate portion, a cylindrical portion extending downward from a peripheral edge of the top plate portion, an outer ring formed on an inner face of the top plate portion and coming into contact with an outer peripheral face of a container mouth, and an inner ring also formed on the inner face of the top plate portion and coming into
20 contact with an inner peripheral face of the container mouth. The resin cap seals a container by clamping the container mouth between the outer ring and the inner ring having a greater length (the vertical distance from the top plate portion) than the outer ring (no appropriate document known representing this prior art).

25 **[0003]**

On the other hand, as a resin mouth of e.g. a PET bottle, there are two types, one being formed of crystallized white material (“crystallized container mouth” hereinafter) and the other being formed of non-crystallized transparent material (“non-crystallized container
30 mouth” hereinafter). In general, the crystallized container mouth is

used with a thickness of about 1.6 mm since the resin thereof has been increased in its strength by thermal crystallization treatment. Whereas, the non-crystallized container mouth is used while keeping sufficient strength with a thickness of 2 mm or more (generally 2.2 mm approximately) due to its lower resin strength than the crystallized container mouth.

Summary

Problem to be Solved by Invention

[0004]

If a content is charged at a high temperature into a container having the non-crystallized container mouth and the resin cap is fitted thereon, the non-crystallized container mouth will be softened by the heat, which can lead to inward collapsing thereof as being unable to withstand a pressing pressure from the outer ring, thus resulting in deterioration of the sealed state. For this reason, for a container to be charged with a high-temperature content, the crystallized container mouth having superior thermal resistance is being used. However, as the crystallized container mouth requires a crystallization treatment, there would occur such problems of increased manufacturing device cost and increased quality control difficulty in controlling irregularity in the crystallization process.

[0005]

In view of the above, in recent years, the art is beginning to contemplate provision of higher thermal resistance by increasing the thickness of the non-crystallized container mouth of the container to be charged with high-temperature content. However, due to the above-described risk of inward clapping of the non-crystallized container mouth, as yet, no resin cap is known which is configured to press the outer ring firmly against the non-crystallized container mouth with such

increased thickness. Thus, there remains room for improvement in the respect of sealing performance.

[0006]

The present invention has been made in view of the above-described state of the art. The object thereof is to provide a resin cap capable of effectively maintaining a container under a sealed state, even when the cap is used with a mouth of the container formed of non-crystallized resin and having a leading end with a thickness of 2 mm or more.

Solution

[0007]

As a result of intensive and extensive research efforts made by the present inventors, a cap arrangement based on a novel concept and allowing improvement of sealing performance has been invented by reducing the risk of inward collapsing due to thermal softening by setting the thickness of the leading end portion to 2 mm or more even when used with a container mouth formed of non-crystallized resin and also by shaping the outer ring inner face of the cap to conform to the outer face of the container mouth to allow firm and reliable contact of the outer ring with the container mouth outer face.

In particular, according to a characterizing feature of a resin cap relating to the present invention, the cap being for use with a container mouth having a leading end with a thickness of 2 mm or more and formed of non-crystallized resin, the resin cap comprises a top plate portion, a cylindrical portion extending downward from a peripheral edge of the top plate portion, an outer ring formed on an inner face of the top plate portion and coming into contact with an outer peripheral face of the container mouth, and an inner ring also formed on the inner face of the top plate portion and coming into contact with an inner peripheral

face of the container mouth;

wherein the outer ring has an inner peripheral face shaped to conform to the shape of the outer peripheral face of the leading end of the container mouth.

5 [0008]

With the above-described arrangement, in comparison with the conventional product, the contact area between the outer ring and the container mouth can be increased. As a result, when used with a container mouth having a leading end with a thickness of 2 mm or more,
10 the sealed state of the container can be maintained effectively.

[0009]

According to another characterizing feature of the present invention, the resin cap further comprises a support portion formed on the inner face of the top plate portion and between the outer ring and the
15 cylindrical portion, the support portion coming into contact with the outer peripheral face of the outer ring.

[0010]

With the above-described arrangement, it is possible for the support portion to reinforce the outer ring in the direction opposing the
20 pressure received from the container mouth. As a result, outward deformation of the outer ring can be suppressed more effectively.

[0011]

According to a still further characterizing feature of the present invention, the support portion is formed between the outer ring and the
25 cylindrical portion.

[0012]

With the above-described arrangement, the outer ring reinforcing effect by the support portion can be increased.

[0013]

30 According to a still further characterizing feature of the present

invention, the support portion is comprised of a plurality of ribs arranged equidistantly along the peripheral direction of the outer ring.

[0014]

5 With the above-described arrangement, the outer ring reinforcing effect by the support portion can be increased, without largely increasing the weight of the resin cap.

Brief Description of the Drawings

[0015]

10 [Fig. 1] is a section view showing an inventive resin cap as being fitted to a container mouth,

[Fig. 2] is an enlarged view of principal portions shown in Fig. 1,

[Fig. 3] is a perspective view showing an inside of the resin cap according to the invention, and

15 [Fig. 4] is a section taken along a line IV-IV in Fig. 1.

Embodiments

[0016]

20 Next, with reference to the accompanying drawings, a resin cap relating to the present invention will be explained.

[0017]

[Embodiment 1]

A resin cap 10 relating to this embodiment, as shown in Fig. 1, is used with a container mouth 20 formed of a non-crystallized resin.

25 The resin cap 10 relating to this embodiment, as shown in Figs. 1 and 2, includes a top plate portion 11, a cylindrical portion 12 extending downward from a peripheral edge of the top plate portion 11, an outer ring 13 formed on an inner face of the top plate portion 11 and coming into contact with an outer peripheral face of the container mouth 20, and
30 an inner ring 14 also formed on the inner face of the top plate portion 11

and coming into contact with an inner peripheral face of the container mouth 20. The outer ring 13 has an inner peripheral face shaped to conform to the shape of the outer peripheral face of the leading end of the container mouth 20 (shape substantially parallel with the outer peripheral face of the leading end of the container mouth 20).

[0018]

The material, manufacturing method, etc. of the resin cap 10 are not particularly limited. But, for instance, it can be manufactured by integral injection molding of the top plate portion 11, the cylindrical portion 12, the outer ring 13 and the inner ring 14, with using such resin as polyethylene, polystyrene, etc.

[0019]

The top plate portion 11 of the resin cap 10 is provided in a form of a circular plate corresponding to the shape of the container mouth 20. A threading 12a is provided in the inner peripheral face of the cylindrical portion 12, so that with threading engagement thereof with a threading 20a provided on the outer peripheral face of the container mouth 20, the resin cap 10 is fitted on the container mouth 20.

[0020]

The outer ring 13 and the inner ring 14 both have a shape protruding from the inner face of the top plate portion 11. As the inner peripheral face of the outer ring 13 comes into contact with the outer peripheral face of the container mouth 20 and the outer peripheral face of the inner ring 14 comes into contact with the inner peripheral face of the container mouth 20, the container is sealed.

[0021]

The outer ring 13, as shown in Fig. 1 and Fig. 2, has an inner peripheral face having a shape conforming to the shape of the outer peripheral face of the leading end of the container mouth 20. With this, when a high-temperature content is charged in the container, even if the

container is sealed with deep insertion of the container mouth 20 into the resin cap 10 as shown in Figs. 1 and 2, or a high-temperature sterilization is effected under this condition, inward collapsing of the container mouth 20 or outward deformation of the outer ring 13 can be suppressed so that the sealed state between the outer ring 13 and the outer peripheral face of the container mouth 20 can be maintained.

Further, the leading end of the outer ring 13 is designed to be located on more leading end side of the container mouth 20 than the threading 20a, when the resin cap 10 is fitted on the container mouth 20. The protruding length of the outer ring 13 from the inner face of the top plate portion 11 is not particularly limited, but can be set to a length similar to the conventional resin cap. However, by setting this length slightly longer, the degree of sealing between the resin cap 10 and the container mouth 20 can be improved.

[0022]

In the inner face of the top plate portion 11, the outer ring 13 is provided with a support portion 15 extending between the outer ring 13 and the cylindrical portion 12. More particularly, the support portion 15 is formed in contact with the outer peripheral face of the outer ring 13 and the inner peripheral face of the cylindrical portion 12. This arrangement reinforces the outer ring 13 and suppresses the outward deformation of the outer ring 13 even more effectively.

[0023]

The support portion 15, in this embodiment, as shown in Fig. 3 and Fig. 4, is provided in the form of 12 (twelve) ribs 16 which are arranged equidistantly along the outer peripheral face of the outer ring 13. With this, the reinforcing effect on the outer ring 13 by the support portion 15 can be enhanced without significantly increasing the weight of the resin cap 10.

[0024]

The ribs 16 are arranged obliquely and in the same direction relative to the radial direction of the outer ring 13. With this arrangement, it is possible to avoid excessive pressing of the outer ring 13 by the ribs 16 while increasing the reinforcing effect on the outer ring 13 by the ribs 16, so that damage of the outer ring 13 or deformation of the cylindrical portion 12 can be prevented.

[0025]

Further, in view of securing sufficient reinforcing effect, it is preferred that the height of the support portion 15 (rib 16) be 50% or more of the height of the outer ring 13, more preferably be 70% or more of the same. The upper limit of this height of the support portion 15 (rib 16) is not particularly limited as long as it is confined within a range not interfering with the threading 20a of the container mouth 20 or the threading 12a of the cylindrical portion 12. Yet, if the balance between the achieved reinforcing effect and the cost or weight is taken into consideration, it is preferred that the height be less than 100% of the outer ring 13.

[0026]

Regarding the shape of the inner ring 14, in this embodiment, there is shown an example in Fig. 1 and Fig. 2 in which a portion of its outer peripheral face is placed in contact with the inner peripheral face of the container mouth 20. However, the shape is not particularly limited as long as such modified shape still allows contact with the container mouth 20, and any other various standard shape can be employed than the shape shown in Fig. 1 and Fig. 2.

[0027]

The container mouth 20, in this embodiment, is provided in the form of non-crystallized transparent type having a leading end with a thickness set to 2.2 mm. However, the upper limit of the thickness of

the leading end of the container mouth 20 is not particularly limited, but can be from 3 to 4 mm approximately.

[0028]

5 The container having the container mouth 20 is not particularly limited as long as the leading end of its container mouth 20 has a thickness of 2 mm or more. However, it can be a resin container for beverage formed of a synthetic resin such as polyethylene terephthalate, etc. In particular, the container preferably comprises a resin container to be charged with content at at high temperature, for use with fruit
10 beverage, sports drink, tea, etc.

[0029]

[Other Embodiments]

In the foregoing embodiment, there was shown the case in which
15 12 (twelve) ribs 16 are provided in equidistant arrangement. However, the number of the ribs 16 is not limited thereto, but any desired number of ribs 16 can be provided instead. However, if the balance between the achieved reinforcing effect and the cost and weight is considered, the number of ribs 16 should range from 6 (six) to 24 (twenty four). Further,
20 the ribs 16 can be arranged only substantially equidistantly, and the ribs 16 need not be disposed perfectly equidistantly, with slight spacing irregularity therebetween being permissible.

[0030]

In the foregoing embodiment, regarding the shape of the ribs 16,
25 there was shown the case wherein the ribs 16 are shaped to extend between the outer ring 13 and the cylindrical portion 12. However, the shape of the ribs 16 is not limited thereto. For instance, as long as the contact with the outer peripheral face of the outer ring 13 is secured, even if the ribs 16 are spaced apart from the inner peripheral face of the
30 cylindrical portion 12, it still will be possible for such ribs 16 to reinforce

the outer ring 13. Further, in the instant embodiment, the ribs 16 are provided substantially parallel with the top plate portion 11. However, they can have such a shape that as they extend away from the outer ring 13, the distance thereof from the top plate portion 11 becomes shorter.

5 [0031]

In the foregoing embodiment, there was shown the case wherein the ribs 16 are arranged obliquely and in the same direction relative to the radial direction of the outer ring 13. However, the invention is not limited thereto. For instance, the respective ribs 16 can be arranged
10 along the radial direction, or adjacent ribs 16 can be arranged obliquely in directions different from each other.

[0032]

In the foregoing embodiment, there was shown the case wherein 12 (twelve) ribs 16 of a same shape are provided. However, the
15 invention is not limited thereto. Instead, for instance, a plurality of ribs 16 having shapes different from each other can be provided or ribs 16 having two different shapes are arranged in alternation. Thus, desired arrangement can be set.

[0033]

20 In the foregoing embodiment, there was shown the case wherein the support portion 15 is comprised of a plurality of ribs 16. However, the invention is not limited thereto. Instead, the support portion 15 can be comprised of an annular member extending along the outer periphery of the outer ring 13.

25

Description of Reference Marks/Numerals

[0034]

10:	resin cap
11:	top plate portion
30 12:	cylindrical portion

5

- 12a: threading
- 13: outer ring
- 14: inner ring
- 15: support portion
- 16: rib
- 20: container mouth
- 20a: threading

CLAIMS

1. A resin cap for use with a container mouth having a leading end with a thickness of 2 mm or more and formed of non-crystallized resin, the resin cap comprising:

a top plate portion;

a cylindrical portion extending downward from a peripheral edge of the top plate portion;

an outer ring formed on an inner face of the top plate portion and coming into contact with an outer peripheral face of the container mouth; and

an inner ring also formed on the inner face of the top plate portion and coming into contact with an inner peripheral face of the container mouth;

wherein the outer ring has an inner peripheral face shaped to conform to the shape of the outer peripheral face of the leading end of the container mouth,

wherein a support portion is formed on the inner face of the top plate portion and between the outer ring and the cylindrical portion, the support portion coming into contact with the outer peripheral face of the outer ring,

wherein the support portion is comprised of a plurality of ribs arranged equidistantly along the peripheral direction of the outer ring, and

wherein the ribs are arranged obliquely and in the same direction relative to a radial direction of the outer ring.

2. The resin cap according to claim 1, wherein the support portion is formed between the outer ring and the cylindrical portion.

3. The resin cap according to claim 1 or 2, wherein a height of the rib is in a range between 50% and less than 100% of a height of the outer ring.