

DESCRIPTION

RESIN CAP

5 Technical Field

[0001] The present invention relates to a removable resin cap to be used on a mouth part of a container such as a PET bottle.

Background Art

10 [0002] A resin cap that is widely used as such a resin cap includes a top plate part, a tubular part that extends downward from a circumferential edge of the top plate part, an outer ring that is formed on an inner surface of the top plate part and is capable of coming into contact with an outer circumferential surface of a container mouth part, and an inner ring that is formed on the
15 inner surface of the top plate part and is capable of coming into contact with an inner circumferential surface of the container mouth part, and seals a container by the outer ring and the inner ring holding the container mouth part therebetween, the inner ring having a length (distance from the top plate part in a vertical direction) longer than that of the outer ring.

20 [0003] In recent years, with a rise in the awareness of environmental problems, weight reduction of containers has been in demand. When focus is given to a container mouth part as a target of weight reduction, a technique as disclosed in Patent Document 1 in which the thickness of an upper end surface is reduced to not more than 50% of the thickness of a part in which a
25 screw stripe is formed can be used.

Prior Art Documents

Patent Documents

[0004] Patent Document 1: JP 2014-37257A

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Disclosure of Invention

Problem to be Solved by the Invention

[0005] However, when the thickness of the front end part of the container mouth part is reduced as disclosed in Patent Document 1, the rigidity of the
35 container mouth part is reduced. Therefore, when a resin cap is attached to the container mouth part, inward collapsing of the container mouth part may

occur (the container mouth part may collapse inward) due to pressure applied from the outer ring.

[0006] The present invention was achieved in light of such circumstances, and an object thereof is to provide a resin cap that is less likely to cause the inward collapsing of a container mouth part whose front end part has a reduced thickness even when the resin cap is attached to such a container mouth part.

Means for Solving Problem

[0007] A feature of a resin cap according to the present invention is that the resin cap is to be attached to a container mouth part and includes a top plate part, a tubular part that extends downward from a circumferential edge of the top plate part, an outer ring that is formed on an inner surface of the top plate part and is capable of coming into contact with an outer circumferential surface of the container mouth part, and an inner ring that is formed on the inner surface of the top plate part and is capable of coming into contact with an inner circumferential surface of the container mouth part, a thin part that has a thickness reduced by being cut out from the inner circumferential surface side is formed at least at a front end part of the container mouth part, and the inner ring is capable of coming into contact with the thin part.

[0008] With this configuration, the thin part can be supported (reinforced) in a direction opposed to pressure applied to the thin part from the outer ring by bringing the inner ring into contact with the thin part in which the rigidity decreases due to the thickness reduction, thus making it possible to effectively suppress the inward collapsing of the container mouth part.

[0009] Another feature of the present invention is that the thin part is formed such that a thickness gradually decreases toward the front end part.

[0010] With this configuration, when the resin cap is opened, a period of time when the inner ring and the thin part are in contact with each other can be made longer to prevent the container from being unsealed at an early stage.

[0011] Another feature of the present invention is that a plurality of the inner rings are formed, and at least one of the inner rings is capable of coming into contact with the thin part.

[0012] With this configuration, the supporting force from the inner ring can be increased, thus making it possible to enhance the effect of suppressing the inward collapsing of the container mouth part. Also, the effect of enhancing

the sealing performance of the container is obtained.

[0013] Another feature of the present invention is that the container mouth part includes the thin part and a main part that does not undergo thickness reduction in this order from the front end part, at least one of the inner rings is capable of coming into contact with the thin part, and at least one of the inner rings is capable of coming into contact with the main part.

[0014] With this configuration, the sealing performance and tamper evident property of the container can be enhanced while the effect of suppressing the inward collapsing of the container mouth part is enhanced. With a conventional configuration, the sealing performance of the container is sometimes deteriorated due to exposure of the inner ring to a content of the container. However, with this configuration, even when the inner ring that is in contact with the main part is exposed to a content of the container, the inner ring that is in contact with the thin part is not exposed to the content of the container, thus making it possible to favorably maintain the sealing performance of the container.

[0015] Another feature of the present invention is that the container mouth part includes a first thin part and a second thin part that has a shape different from that of the first thin part and has a maximum thickness larger than that of the first thin part in this order from the front end part, at least one of the inner rings is capable of coming into contact with the first thin part, and at least one of the inner rings is capable of coming into contact with the second thin part.

[0016] With this configuration, in the same manner as mentioned above, the sealing performance and tamper evident property of the container can be enhanced while the effect of suppressing the inward collapsing of the container mouth part is enhanced. With a conventional configuration, the sealing performance of the container is sometimes deteriorated due to exposure of the inner ring to a content of the container. However, with this configuration, even when the inner ring that is in contact with the second thin part is exposed to a content of the container, the inner ring that is in contact with the first thin part is not exposed to the content of the container, thus making it possible to favorably maintain the sealing performance of the container.

[0017] Another feature of the present invention is that a protruding curved part that projects in a curved shape outward in a radial direction of the inner

ring is formed at least at the front end part of the inner ring, and the protruding curved part is capable of coming into contact with the thin part.

[0018] In general, pressure is applied to the container mouth part from an inner seal in a lateral direction. However, with this configuration, pressure
5 can be applied to the container mouth part not only in the lateral direction but also in the vertical direction due to the protruding curved part of the inner ring, thus making it possible to enhance the sealing performance of the container. Also, the protruding curved part can be used to obtain an effect of reducing resistance (capping resistance) that is generated while the resin cap
10 is being attached to the container mouth part.

[0019] Another feature of the present invention is that a plurality of projecting parts that project outward in the radial direction of the inner ring and are capable of coming into contact with the inner circumferential surface of the container mouth part are formed on an outer circumferential surface of
15 the inner ring, and at least one of the projecting parts is capable of coming into contact with the thin part.

[0020] With this configuration, the supporting force from the inner ring can be increased, thus making it possible to enhance the effect of suppressing the inward collapsing of the container mouth part. Also, the effect of enhancing
20 the sealing performance of the container is obtained.

[0021] Another feature of the present invention is that the container mouth part includes the thin part and the main part that does not undergo thickness reduction in this order from the front end part, at least one of the projecting parts is capable of coming into contact with the thin part, and at least one of
25 the projecting parts is capable of coming into contact with the main part.

[0022] With this configuration, the sealing performance and tamper evident property of the container can be enhanced while the effect of suppressing the inward collapsing of the container mouth part is enhanced. With a conventional configuration, the sealing performance of the container is
30 sometimes deteriorated due to exposure of the inner ring to a content of the container. However, with this configuration, even when the projecting part that is in contact with the main part is exposed to a content of the container, the projecting part that is in contact with the thin part is not exposed to the content of the container, thus making it possible to favorably maintain the
35 sealing performance of the container.

[0023] Another feature of the present invention is that the thin part includes

a first thin part and a second thin part that has a shape different from that of the first thin part and has a maximum thickness larger than that of the first thin part in this order from the front end part, at least one of the projecting parts is capable of coming into contact with the first thin part, and at least one of the projecting parts is capable of coming into contact with the second thin part.

[0024] With this configuration, in the same manner as mentioned above, the sealing performance and tamper evident property of the container can be enhanced while the effect of suppressing the inward collapsing of the container mouth part is enhanced. With a conventional configuration, the sealing performance of the container is sometimes deteriorated due to exposure of the inner ring to a content of the container. However, with this configuration, even when the projecting part that is in contact with the second thin part is exposed to a content of the container, the projecting part that is in contact with the first thin part is not exposed to the content of the container, thus making it possible to favorably maintain the sealing performance of the container.

[0025] Another feature of the present invention is that the outer ring is obliquely cut out from the inner circumferential surface side such that the thickness gradually decreases toward the front end part, and an end part of a base part of the outer ring on the inner side in the radial direction is configured to be located on the inner side with respect to an end part of the front end part of the container mouth part on the outer side in the radial direction in a plan view.

[0026] With this configuration, the outer ring comes into contact with the container mouth part in a biting manner, thus making it possible to increase pressure applied to the container mouth part from the outer ring to enhance the sealing performance of the container. With a conventional resin cap, when pressure applied to the container mouth part from the outer ring is increased, inward collapsing of the container mouth part is likely to occur. However, with the present invention, the thin part of the container mouth part, which is likely to collapse inward, is supported by the inner ring, and therefore, even when pressure applied to the container mouth part from the outer ring is increased, inward collapsing of the container mouth part is less likely to occur.

Brief Description of Drawings

[0027] FIG. 1 is a cross-sectional view showing a state in which a resin cap of the present invention is attached to a container mouth part.

FIG. 2 is an enlarged view of main parts of the resin cap of the present invention.

FIG. 3 is a cross-sectional view taken along line III-III in FIG. 1.

FIG. 4 is an enlarged view showing main parts of a modified example of the resin cap of the present invention.

FIG. 5 is an enlarged view showing main parts of a modified example of the resin cap of the present invention.

FIG. 6 is an enlarged view showing main parts of a modified example of the resin cap of the present invention.

FIG. 7 is an enlarged view showing main parts of a modified example of the resin cap of the present invention.

FIG. 8 is an enlarged view showing main parts of a modified example of the resin cap of the present invention.

Best Mode for Carrying out the Invention

[0028] Hereinafter, a resin cap of the present invention will be described with reference to the drawings.

Embodiment 1

[0029] As shown in FIG. 1, a resin cap 10 according to this embodiment is to be used on a container mouth part 20 made of resin. The container mouth part 20 includes a thin part 20a that has a thickness reduced by being cut out from the inner circumferential surface side and a main part 20b that does not undergo thickness reduction in this order from the front end part. The thin part 20a is formed such that the thickness gradually decreases toward the front end part.

[0030] As shown in FIGS. 1 to 3, the resin cap 10 according to this embodiment includes a top plate part 11, a tubular part 12 that extends downward from a circumferential edge of the top plate part 11, an outer ring 13 that is formed on an inner surface of the top plate part 11 and is capable of coming into contact with an outer circumferential surface of the container mouth part 20, and inner rings 14a and 14b that are formed on the inner surface of the top plate part 11 and are capable of coming into contact with an

inner circumferential surface of the container mouth part 20.

[0031] Although there are no limitations on a material of the resin cap 10, a method for manufacturing the resin cap 10, and the like, the resin cap 10 can be manufactured by integrally forming the top plate part 11, the tubular part 12, the outer ring 13, and the inner rings 14a and 14b by injection molding using resin such as polyethylene or polystyrene, for example.

[0032] The top plate part 11 of the resin cap 10 is formed in a disk shape so as to correspond to the shape of the container mouth part 20. The resin cap 10 is configured to be attached to the container mouth part 20 by screwing a screw thread 12a formed on the inner circumferential surface of the tubular part 12 on a screw thread 20a formed on the outer circumferential surface of the container mouth part 20.

[0033] The outer ring 13, and the inner rings 14a and 14b have a shape projecting from the inner surface of the top plate part 11. The inner circumferential surface of the outer ring 13 comes into contact with the outer circumferential surface of the container mouth part 20, and the outer circumferential surfaces of the inner rings 14a and 14b comes into contact with the inner circumferential surface of the container mouth part 20, and thus the container is sealed.

[0034] The inner rings 14a and 14b are configured to come into contact with the thin part 20a and the main part 20b, respectively. The inner ring 14a comes into contact with the thin part 20a, and thus the thin part 20a having reduced rigidity is supported by the inner ring 14a, thus making it possible to suppress inward collapsing of the container mouth part 20. Moreover, the inner rings 14a and 14b are used to seal the container in a dual manner, thus making it possible to enhance the sealing performance of the container.

[0035] Although it is sufficient that the lengths (distances from the top plate part 11 in a vertical direction) of the inner rings 14a and 14b are set as appropriate depending on the shape of the container mouth part 20, it is preferable that the length of the inner ring 14a, which is capable of coming into contact with the thin part 20a, is made shorter than the length of the inner ring 14b, which is capable of coming into contact with parts other than the thin part 20a.

[0036] In this embodiment, a shape that allows a part of the outer circumferential surface of the outer ring 13 to come into contact with the inner circumferential surface of the container mouth part 20 is shown as an

example of the shape of the outer ring 13, but there is no limitation on the shape of the outer ring 13 as long as the outer ring 13 is capable of coming into contact with the container mouth part 20, and various shapes can be adopted in addition to the shapes shown in FIGS. 1 to 3. The same applies to the inner rings 14a and 14b.

[0037] Although there is no particular limitation on types of the containers having the container mouth part 20, resin containers for a beverage that are made of synthetic resin such as polyethylene phthalate can be used, for example. In particular, resin containers for a fruit drink, an isotonic drink, tea, and the like that are filled with a content at a high temperature are preferable.

Other embodiments

[0038] As shown in FIG. 4, the outer ring 13 may be obliquely cut out from the inner circumferential surface side such that the thickness gradually decreases toward the front end part, and an end part of a base part of the outer ring 13 on the inner side in the radial direction may be configured to be located on the inner side with respect to an end part of the front end part of the container mouth part 20 on the outer side in the radial direction in a plan view. With this configuration, the outer ring 13 comes into contact with the container mouth part 20 in a biting manner, thus making it possible to enhance the sealing performance of the container.

[0039] Although the case where the container mouth part 20 includes the thin part 20a and the main part 20b is shown as an example in the above-mentioned embodiment, the configuration of the container mouth part 20 is not limited thereto, and the container mouth part 20 may include only the thin part 20a by reducing the thickness of the entirety of the container mouth part 20.

[0040] Although the case where the thin part 20a has a shape obtained by cutting out the inner circumferential surface of the container mouth part 20 such that a vertical cross-section has a linear shape is shown as an example in the above-mentioned embodiment, the shape of the thin part 20a is not limited thereto. For example, the thin part 20a may have a shape obtained by cutting out the inner circumferential surface of the container mouth part 20 such that a vertical cross-section has a curved shape protruding inward, or may be a combination of a part having a shape obtained by being cut out such

that the vertical cross-section has a linear shape, and a part having a shape obtained by being cut out such that the vertical cross-section has a curved shape protruding inward.

[0041] As shown in FIG. 5, the thin part 20a may be formed so as to include a first thin part 20a-1 and a second thin part 20a-2 that has a shape different from that of the first thin part 20a-1 and has a maximum thickness larger than that of the first thin part 20a-1 in this order from the front end part. In this case, it is preferable that the inner ring 14a is configured to come into contact with the first thin part 20a-1 and the inner ring 14b is configured to come into contact with the second thin part 20a-2.

[0042] It should be noted that the container mouth part 20 includes the main part 20b and the thin part 20a constituted by the first thin part 20a-1 and the second thin part 20a-2 as shown in FIG. 5, the inner ring 14a may be configured to come into contact with the first thin part 20a-1 and the inner ring 14b may be configured to come into contact with the main part 20b.

[0043] Also, three inner rings may be formed, and the respective inner rings may be configured to come into contact with the first thin part 20a-1, the second thin part 20a-2, and the main part 20b.

[0044] Although the case where two or three inner rings are formed is shown as an example in the above-mentioned embodiment, the number of inner rings is not limited thereto, and a single inner ring or four or more inner rings may be formed. When a single inner ring is formed, it is preferable that the inner ring has a shape in which a protruding curved part that projects in a curved shape outward in the radial direction of the inner ring is formed at the front end part, or a shape in which a plurality of inner rings are integrally formed.

[0045] FIG. 6 is an enlarged view of main parts showing a case where an inner ring is formed in a shape in which a protruding curved part that projects in a curved shape outward in the radial direction of the inner ring is formed at the front end part. In FIG. 6, a protruding curved part 14c-1 is formed at the front end part of an inner ring 14c and is capable of coming into contact with the thin part 20a. This makes it possible to apply pressure to the container mouth part 20 not only in the lateral direction but also in the vertical direction.

[0046] It is sufficient that the protruding curved part 14c-1 is formed at least at the front end part of the inner ring 14c, and the protruding curved part 14c-1 may be formed over the entirety of the outer circumferential surface of

the inner ring 14c.

[0047] FIG. 7 is an enlarged view of main parts showing a case where an inner ring is formed, as an example of an inner ring (integrated inner ring) having a shape obtained by integrally forming a plurality of inner rings, in a shape in which a plurality of projecting parts that project outward in the radial direction of the inner ring and are capable of coming into contact with the inner circumferential surface of the container mouth part are formed on the outer circumferential surface. In FIG. 7, two projecting parts 14d-1 and 14d-2 that project outward in the radial direction of an inner ring 14d are formed on the outer circumferential surface of the inner ring 14d. The projecting part 14d-1 is configured to come into contact with the thin part 20a, and the projecting part 14d-2 is configured to come into contact with the main part 20b. This makes it possible to bring a single inner ring 14d into contact with both the thin part 20a and the main part 20b to support the container mouth part 20 and seal the container.

[0048] Although it is sufficient that the lengths (distances from the base part in the horizontal direction) of the projecting parts 14d-1 and 14d-2 are set as appropriate depending on the shape of the container mouth part 20, it is preferable that the length of the projecting part 14d-1, which is capable of coming into contact with the thin part 20a, is made longer than the length of the projecting part 14d-2, which is capable of coming into contact with parts other than the thin part 20a.

[0049] When the inner ring 14d is used on the container mouth part 20 including the thin part 20a constituted by the first thin part 20a-1 and the second thin part 20a-2 as shown in FIG. 5 above, it is preferable that the projecting part 14d-1 is configured to come into contact with the first thin part 20a-1, and the projecting part 14d-2 is configured to come into contact with the second thin part 20a-2.

[0050] When the inner ring 14d is used on the container mouth part 20 including the main part 20b and the thin part 20a constituted by the first thin part 20a-1 and the second thin part 20a-2 as shown in FIG. 5 above, it is preferable that the projecting part 14d-1 is configured to come into contact with the first thin part 20a-1, and the projecting part 14d-2 is configured to come into contact with the main part 20b.

[0051] Also, three projecting parts may be formed on the inner ring, and the respective projecting parts may be configured to come into contact with the

first thin part 20a-1, the second thin part 20a-2, and the main part 20b.

[0052] It should be noted that the shape of the integrated inner ring described above is merely a preferable example, and the shape of the integrated inner ring is not limited thereto. For example, as a case of an inner ring 14e shown in FIG. 8, an inner ring may be formed in a shape in which the outer circumferential surface is cut out from the front end part side, and arranged such that the cut-out part faces the border between the thin part 20a and the main part 20b to bring the outer circumferential surface of the inner ring 14e into contact with both the thin part 20a and the main part 20b.

[0053] Although not shown in figures, a single projecting part that projects outward in the radial direction of the inner ring may be formed on the outer circumferential surface of the inner ring and is configured to come into contact with the thin part (or the first thin part), and the outer circumferential surface of the inner ring excluding the projecting part may be configured to come into contact with the main part (or the second thin part).

Reference Signs List

[0054]	10	: Resin cap
20	11	: Top plate part
	12	: Tubular part
	12a	: Screw thread
	13	: Outer ring
	14a	: Inner ring
25	14b	: Inner ring
	14c	: Inner ring
	14c-1	: Protruding curved part
	14d	: Inner ring
	14d-1	: Projecting part
30	14d-2	: Projecting part
	14e	: Inner ring
	20	: Container mouth part
	20a	: Thin part
	20a-1	: First thin part
35	20a-2	: Second thin part
	20b	: Main part

20c : Screw thread

CLAIMS

1. A resin cap to be attached to a container mouth part, the resin cap comprising:
 - 5 a top plate part;
 - a tubular part that extends downward from a circumferential edge of the top plate part;
 - an outer ring that is formed on an inner surface of the top plate part and is capable of coming into contact with an outer circumferential surface of the container mouth part; and
 - 10 an inner ring that is formed on the inner surface of the top plate part and is capable of coming into contact with an inner circumferential surface of the container mouth part,
 - wherein a thin part that has a thickness reduced by being cut out from the inner circumferential surface side is formed at least at a front end part of the container mouth part, and
 - 15 the inner ring is capable of coming into contact with the thin part.
2. The resin cap according to claim 1, wherein the thin part is formed such that a thickness decreases gradually toward the front end part.
3. The resin cap according to claim 1 or 2, wherein a plurality of the inner rings are formed, and at least one of the inner rings is capable of coming into contact with the thin part.
- 25 4. The resin cap according to claim 3,
 - wherein the container mouth part includes the thin part and a main part that does not undergo thickness reduction in this order from the front end part, and
 - 30 at least one of the inner rings is capable of coming into contact with the thin part, and at least one of the inner rings is capable of coming into contact with the main part.
5. The resin cap according to claim 3,
 - 35 wherein the thin part includes a first thin part and a second thin part that has a shape different from that of the first thin part and has a maximum

thickness larger than that of the first thin part in this order from a front end part, and

at least one of the inner rings is capable of coming into contact with the first thin part, and at least one of the inner rings is capable of coming into
5 contact with the second thin part.

6. The resin cap according to claim 1 or 2,

wherein a protruding curved part that projects in a curved shape outward in a radial direction of the inner ring is formed at least at the front
10 end part of the inner ring, and

the protruding curved part is capable of coming into contact with the thin part.

7. The resin cap according to claim 1 or 2, wherein a plurality of
15 projecting parts that project outward in a radial direction of the inner ring and are capable of coming into contact with the inner circumferential surface of the container mouth part are formed on an outer circumferential surface of the inner ring, and at least one of the projecting parts is capable of coming into contact with the thin part.

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8. The resin cap according to claim 7,

wherein the container mouth part includes the thin part and the main part that does not undergo thickness reduction in this order from the front end part, and

25 at least one of the projecting parts is capable of coming into contact with the thin part, and at least one of the projecting parts is capable of coming into contact with the main part.

9. The resin cap according to claim 7,

30 wherein the thin part includes the first thin part and the second thin part that has a shape different from that of the first thin part and has a maximum thickness larger than that of the first thin part in this order from the front end part, and

at least one of the projecting parts is capable of coming into contact
35 with the first thin part, and at least one of the projecting parts is capable of coming into contact with the second thin part.

10. The resin cap according to any one of claims 1 to 9,
wherein the outer ring is obliquely cut out from the inner
circumferential surface side such that the thickness gradually decreases
5 toward the front end part, and
an end part of a base part of the outer ring on the inner side in the
radial direction is configured to be located on the inner side with respect to an
end part of the front end part of the container mouth part on the outer side in
the radial direction in a plan view.

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