SELF-SEALING AND LOCKING COLLAR AND CONTAINER

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Filed: May 11, 1970
Appl. No.: 36,010

U.S. Cl. 222/153, 215/9, 222/546, 222/551
Int. Cl. B65d 55/02
Field of Search 222/546, 551, 153, 215/9

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ABSTRACT

A container having an annular neck is sealed liquid tight to a cap having two annular flanges. The neck fits between the two flanges, the inner surface of the neck creating a seal with the outer surface of the inner flange, and the outer diameter of the neck having an annular bead which creates a seal with the inner surface of the outer flange. The thickness of the neck at the bead is greater than the space between the flanges. The outer diameter of the inner flange is greater than the inner diameter of the neck. The cap and container may be made of dissimilar plastic materials. The cap may snap or screw onto the container. Locking means may be provided to prevent removal of the cap from the container.

2 Claims, 9 Drawing Figures
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SELF-SEALING AND LOCKING COLLAR AND CONTAINER

BACKGROUND OF THE INVENTION

The present invention relates to a cap or collar and container combination to be used for creating a liquid tight seal. More particularly, the present invention relates to such devices used for creating a seal between dissimilar plastic materials. Even more particularly, the present invention relates to such devices for use in dispensers possibly of the double aerosol type where the outer container is non-pressurized but must contain a product in a leakproof and/or tamperproof state.

For some time now the use of plastic containers has been very desirable in several industries. For instance, in the use of so-called double aerosol dispensers (see Roth U.S. Pat. No. 3,289,949) it may be desirable for economic and other reasons to provide the basic neck of the container out of a suitable plastic material. However, it is necessary in the use of such dispensers and plastic materials to provide a liquid tight seal between the cap and container. Many attempts have thus been made to provide such a seal. Since these seals are created at the factory and do not need to be opened by the user, it is desirable for the seal to be permanent. One such solution involves the sonic welding of the container to the cap or collar. This is only possible when the parts are chemically compatible or of similar plastics.

However, more recently it has become desirable to use a different type of plastic in the cap or collar than is used in the container. For instance, it may be desirable to use a blow-molded high density polyethylene container. It might also be desirable to use an injection molded PVC collar or cap. It is presently commercially impractical to sonic weld two dissimilar plastic materials and achieve a satisfactory liquid tight seal. Thus, the use of two dissimilar plastic materials, the problem of achieving a satisfactory seal without using expensive and complicated gasketing means still exits.

With this problem in mind, it is an object of the present invention to provide a plastic container and plastic cap or collar for use in achieving a liquid tight seal without using gaskets or gasketing materials.

It is yet another object of the present invention to provide such a seal on a one-way self-locking container and collar or cap arrangement which once engaged cannot be removed.

These providing are achieved in accordance with the present invention by This a plastic container having an inward annular neck. On the upper outer periphery of the neck is provided an annular bead. On the lower portion of the neck is provided an annular ridge. The collar or cap made of a plastic material dissimilar from the plastic material used in the container has two annular depending flanges. The outer of these flanges has a ridge portion which is adapted to contact the ridge on the container neck. The upper portion of this flange has a smaller inner diameter base portion which presents a flat surface for contact with the bead of the container neck. The inner flange of the cap has a slightly larger outside diameter than the inside diameter of the bottle neck. This flange presents a surface which contacts the inner diameter surface of the container neck. The thickness of the container neck at the bead is greater than the space between the cap flanges. Thus, when the cap is snapped onto the container whichever of the cap or container that is made of the softer material will be forced to give. When this occurs, the inner surface of the container neck will be forced against the outer surface of the inner cap flange. For instance, if the flange is PVC, and the container is polyethylene, the container will give. Thus, the inner surface of the container neck will be forced against the outer surface of the inner cap flange generally by the force of the head on the outer cap flange, thereby creating a primary seal. A secondary seal will be created between the bead and the inner surface of the outer cap flange. A third seal will be created between the ridge of the container neck and the ridge of the outer cap flange.

Furthermore, the present invention provides means for preventing the cap from being removed from the container once it is in place thereon. One-way notches may be provided at various locations on the container and cap to interengage, whereby the cap may not be removed from the container.

Other features of the invention will be made clear by the following description, taken together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG 1 is a cross-sectional view of a first embodiment of the present invention;

FIG 2 is a cross-sectional view of a second embodiment of the present invention;

FIG 3 is a cross-sectional view taken along line III—III of FIG 2;

FIG 4 is a cross-sectional view of a third embodiment of the present invention;

FIG 5 is a cross-sectional view taken along line V—V of FIG 4;

FIG 6 is a cross-sectional view of a fourth embodiment of the present invention;

FIG 7 is a cross-sectional view taken along line VII—VII of FIG 6;

FIG 8 is a cross-sectional view of a fifth embodiment of the present invention; and

FIG 9 is a cross-sectional view taken along line IX—IX of FIG 8.

With reference now to FIG. 1 of the drawings, a first embodiment of the present invention will be described. A plastic container generally indicated by 1 includes a main base portion 2 and a neck generally of smaller diameter than main portion 2. The neck consists of a first portion 3 and a second portion 4 having a generally smaller diameter than the first portion 3. On the outer surface of the first portion 3 of the container neck is a ridge portion 5. Ridge portion 5 presents a generally horizontal annular flat surface 5a and a generally vertical annular flat surface 5b. The second portion 4 of the container neck includes on its outer diameter an annular bead 4a and on its inner diameter a generally vertical annular surface 4b.

Plastic cap or collar, generally indicated at 6, includes an outer flange 7 and an inner flange 8. Flange 7 includes on the inner diameter of its lowermost extremity a ridge portion 9. Ridge portion 9 presents a generally horizontal annular surface 9a and a generally vertical annular surface 9b. Flange 7 also includes at its upper portion thereof a base portion 10 presenting a generally vertical inner annular surface 10a.
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flange 8 presents on its outer diameter a generally vertical annular surface 8a.

The thickness of neck 4 of the plastic container at the area of the bead 4a is greater than the distance between surfaces 10a and 8a of cap 6. The diameter of flange 8 is larger than the diameter of surface 4b. Thus, when neck 4 is forced into the space between surfaces 10a and 8a of the cap, the neck portion is forced to give whereby a 360° surface contact exists between surface 8a and 4b. Also a 360° contact surface is created between surface 10a and bead 4a. By this action, a first liquid tight seal is created between the surfaces 4b and 8a. Simultaneously, a liquid tight seal is created between bead 4a. Also, it will be seen that as cap 6 is placed onto container 1, ridge 9 of flange 7 hooks under ridge 5 of neck portion 3.

The diameter of ridge portion 5 at surface 5bis approximately equal to the inner diameter of flange 7 at surface 9b. Therefore, as the cap is placed over the container, ridge 9 of flange 7 is deformed to slide over surface 5b. Thus, it will be apparent from FIG. 1 that the engagement of surfaces 5a and 9a creates a lock whereby cap 6 may not be removed from container 1. Also, it will be apparent that due to the relative dimension of surfaces 5b and 9b, a third seal is created therebetween.

Further it will be apparent from FIG. 1 that the dimension A between the surface 9a and the surface 7a between flanges 7 and 8 is not critical. Also, the dimension B between surface 5a and the top 4d of the bottleneck is not critical. This of course is due to the fact that the sealing is done at the three above described points. As a result of dimensions A and B not being critical, the molding of the neck of container 1 and of cap 6 are simplified and therefore, less expensive. This is particularly true since it is common in the molding of a container that flash occurs in the area of 4d at the top of the container neck. It is manifest then that the arrangement of the present invention eliminates the criticality of removing any such flash or of placing a gasket at surface 4d to ensure a liquid tight seal.

It is to be understood that a container and collar as described in this embodiment to the present invention may be made of any suitable plastic material. For instance, the container 1 may be made of high density polyethylene by means of blow molding. Cap 6 may be made of rigid PVC by injection molding wherein a collapsible inner core in the mold is employed. It is to be understood that these materials are meant to be by example only, since it is apparent that the scope of the present invention includes any suitable material for either the container or cap.

With reference now to FIGS. 2 and 3, a second embodiment of the present invention will be described. Container 21 is similar to container 1 in FIG. 1, with the exception that the outer surface of the neck portion thereof is threaded to receive a threaded cap. Cap 26 is similar to cap 6 in FIG. 1 with the exception that the inner surface of outer flange 27 is threaded. The outer diameter of inner flange 28 provides a generally vertical annular surface 28a which contacts the generally vertical inner surface 24b of the neck portion 24 of container 21. The outer diameter of neck portion 24 includes a bead 24a thereon which contacts the generally vertical annular inside surface 30a of the base portion 30 of the outer flange 27. In the same manner as with the embodiment in FIG. 1, a first sealing action occurs between surface 24b and 28a. A second seal occurs between bead 24a and surface 30a.

The present invention as embodied in FIG. 2 also includes notch means whereby, as cap 26 is screwed onto container 21, the cap locks on container 21 and may not be removed. The upper horizontal surface 24c of neck 24 of container 21 includes notches 32. The corresponding horizontal surface of cap 26 between flanges 27 and 28 contains notches 31, adapted to engage and lock with notches 31. Thus, as cap 26 is screwed onto container 21 in the direction of arrow 33 in FIG. 3, the sloped surfaces 31a and 32a of notches 31 and 32 allow notches 31 to slip over notches 32. However, when the cap is completely screwed onto container 21, and when the seals above discussed are created, the cap may not be turned in the reverse direction, since surfaces 31b and 32b of notches 31 and 32, respectively will engage. Thus, a one-way screwing cap and container having at least two liquid tight seals are provided.

With reference now to FIGS. 4 and 5 of the drawings, a third embodiment of the present invention will be described. The device shown in FIGS. 4 and 5 is similar to the device shown in FIGS. 2 and 3 with the exception that the notches are located in the lower end of flange 47 and in the lower end of the neck of the container, rather than in the upper portions thereof. In the embodiment shown in FIGS. 4 and 5, the first seal occurs between surface 44b of the inner diameter of neck portion 44 of container 41 and between surface 48a on the outer diameter of inner flange 48. The second seal occurs between bead 44a on the outer diameter of neck portion 44, and surface 50a on the inner diameter of base portion 50 of outer flange 47.

On the lower extremity of the inner surface of flange 47 are located notches 51. On the lower extremity of the neck of container 41 are located notches 52. Notches 51 and 52 are positioned such that as cap 46 is completely screwed onto container 41, in the direction of rotation as shown by arrow 53 in FIG. 5, sloped surfaces 51a of notches 51 slip over sloped surfaces 52a of notches 52. However, it is not possible to rotate cap 46 in a direction opposite to the arrow since the surfaces 51b and 52b of notches 51 and 52, respectively, will interengage to prevent such reverse rotation. Thus, a one-way cap and container having at least two liquid tight seals are provided.

In FIGS. 6 and 7, an additional embodiment of the present invention is described. This embodiment is similar to the previous two embodiments, with the exception that the notches are located on the lowermost extremity of the inner flange 68 and on an inner surface of neck portion 64 of container 61. As with the previous embodiments, the first seal occurs between surfaces 64b of the inner diameter of neck portion 64 and surface 68a of the outer diameter of inner flange 68. The second seal occurs between bead 64a on the outer surface of neck 64 and surface 70a of the inner diameter of base 70 of outer flange 67.

On the lowermost extremity 68a of flange 68 are located notches 71. Notches 71 are adapted to be positioned opposite notches 72 located on an inward extension 74 of neck 64. Thus, it will clear that as cap 66 is
rotated in the direction of arrow 73 sloped surfaces 71a of notches 71 will slip over sloped surfaces 72a of notches 72 until cap 66 is screwed completely onto container 61. However, when an attempt is made to turn cap 66 in a direction opposite to that shown by arrow 73, surfaces 71b of notches 71 will engage with surfaces 72b of notches 72 thereby preventing such movement. Therefore, it is apparent that a one-way locking self sealing cap and container combination is created.

With reference now to FIGS. 8 and 9 of the drawings, a further embodiment of the present invention will be described. This embodiment is similar to that shown in FIG. 1, but also illustrates an alternative locking device to the notches shown in FIGS. 2 through 7. The cap 86 of the present embodiment fits onto the container 81 in a manner very similar to that shown in FIG. 1. The first seal occurs between surface 84b of the inner diameter of the upper portion 84 of the neck of container 81 and surface 88a of the outer diameter of inner flange 88. A second seal occurs between bead 84a on the outer diameter of neck portion 84 and surface 90a on the inner diameter of base 90 of outer flange 87. Around the outer periphery of the lower neck portion 83 of container 81 are provided one or more locking elements 92. Locking elements 92 each have a stop portion 92a and sloped surface slide portion 92b. Around the inner periphery of the lowermost portion of flange 87 are located one or more locking cogs 91. Locking cogs 91 have sloped surfaces 91a thereon. After cap 86 is pressed down onto container 81, the cap may be rotated in a direction generally shown by arrow 93. As cap 86 is rotated, sloped surfaces 91a of locking cogs 91 slip over sloped surfaces 92b. After locking cog 91 has passed over sloped surfaces 92b, the forward end of the locking cogs abut against flat surface 92d of stop portion 92a. However, when an attempt is made to turn cap 86 in a direction opposite to that shown by arrow 93, surface 91b of locking cog 91 will contact surface 92c of locking element 92, thereby preventing such movement. Therefore, it is apparent that a one-way cap and container having at least two liquid tight seals are provided.

Although several embodiments of the invention have been described in detail, such description is intended to be illustrative only, and not restrictive, since many details of the construction of the invention may be altered or modified without departing from the spirit or scope thereof. For instance, although it is not necessary in accordance with the present invention, a gasket may be provided in the recess between the two flanges of the cap if so desired.

What is claimed is:

1. A device for creating a liquid tight seal comprising a container with an annular neck portion, said neck portion having a generally vertical inner surface forming a first container sealing surface and an annular bead on the outer diameter thereof forming a second container sealing surface; a cap to be screwed onto said container and having first and second annular flanges and an annular space between said flanges, said first flange having a generally vertical outer surface forming a first cap sealing surface adapted to contact said first container sealing surface to form a first seal, and said second flange having a generally vertical inner surface forming a second cap sealing surface adapted to contact said second container sealing surface to form a second seal; said neck portion at said bead having a thickness greater than said annular space, and the outer diameter of said first flange being greater than the inner diameter of said neck portion; and locking means to prevent the removal of said cap from said container, said locking means comprising interengaging notches on the top surface of said neck portion and the bottom surface of said cap in said annular space between said flanges.

2. A device for creating a liquid tight seal comprising a container with an annular neck portion, said neck portion having a generally vertical inner surface forming a first container sealing surface and an annular bead on the outer diameter thereof forming a second container sealing surface; a cap to be screwed onto said container and having first and second annular flanges and an annular space between said flanges, said first flange having a generally vertical outer surface forming a first cap sealing surface adapted to contact said first container sealing surface to form a first seal, and said second flange having a generally vertical inner surface forming a second cap sealing surface adapted to contact said second container sealing surface to form a second seal; said neck portion at said bead having a thickness greater than said annular space, and the outer diameter of said first flange being greater than the inner diameter of said neck portion; and locking means to prevent the removal of said cap from said container, said locking means comprising interengaging notches on the inner surface of said neck portion and the bottom of said first flange.

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