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2,735,565

VENTING CLOSURES

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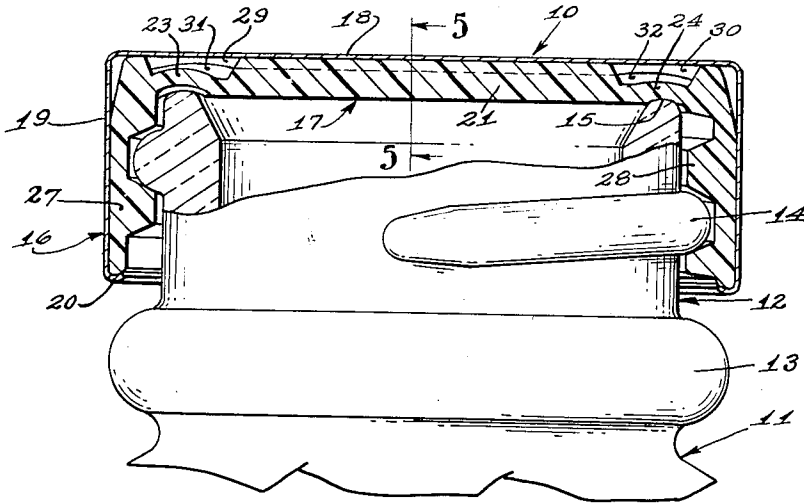


FIG-1-

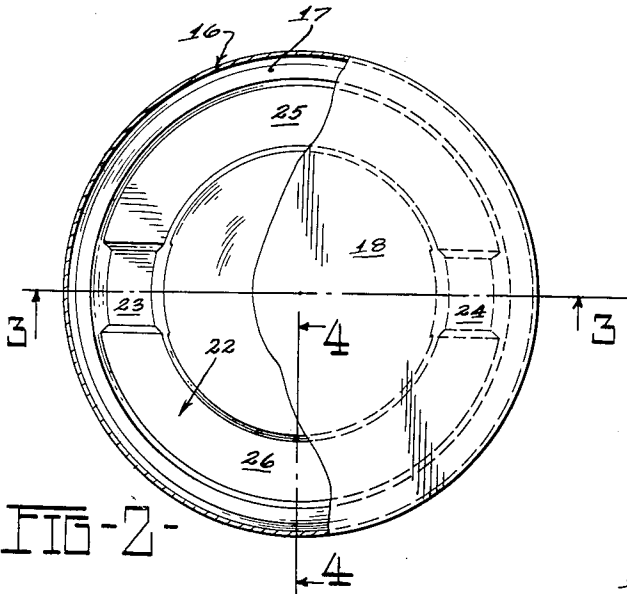


FIG-2-

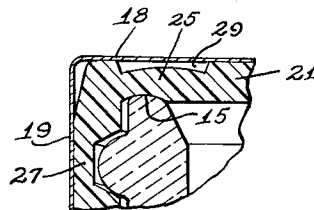


FIG-5-

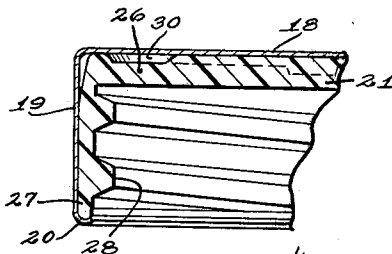


FIG-4-

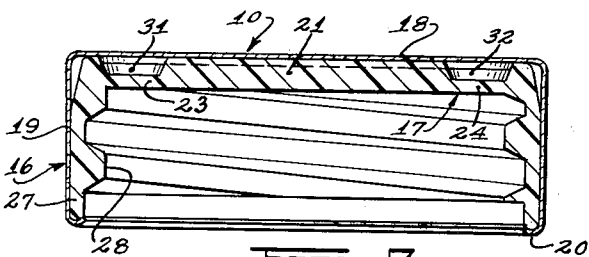


FIG-3-

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2,735,565

VENTING CLOSURES

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6 Claims. (Cl. 215-56)

This invention relates to the sealing of containers and particularly to the construction of closures therefor of the type which are commonly called "double-shell" closures.

Closures of this type generally comprise an inner metal shell having threads formed thereon, enclosed by an outer metal shell formed with a thread on the inner surface thereof. A separate gasket is used to provide an adequate seal.

It is an object of this invention to provide a closure of the double-shell type wherein a satisfactory air, gas, and liquid tight seal is obtained without the use of a separate gasket.

It is a further object of this invention to provide such a closure wherein the inner shell comprises a non-metallic material and wherein an effective seal is obtained by placing the inner shell material which overlies the sealing surface of the container under tension.

Another object of this invention is to provide such a closure incorporating a venting construction whereby internal pressure caused by gases in a container sealed with the closure, is relieved and the gasket thereafter reseals the container.

Other objects of the invention will appear hereinafter.

This application is a continuation-in-part of our application, Ser. No. 241,738, filed August 14, 1951, and titled "Closures."

Referring to the accompanying drawings:

Fig. 1 is a fragmentary part sectional elevational view of a container and a closure which comprises the invention, in sealing position on the neck of the container, showing the configuration of the closure during venting;

Fig. 2 is a part sectional plan view of the closure;

Fig. 3 is a sectional view of the closure at the line 3-3 on Fig. 2;

Fig. 4 is a fragmentary sectional view at the line 4-4 on Fig. 2; and

Fig. 5 is a sectional view at the line 5-5 on Fig. 1.

As shown in Fig. 1, the closure 10 is applied to the container 11. The container comprises a neck 12, formed with an annular bead or transfer ring 13 and screw threads 14. The neck is also formed with sealing surface 15.

The closure 10 comprises an outer shell 16 and an inner shell, or insert 17. The insert 17 is made of a material which is impervious to the action of mold, or bacteria, and imparts no characteristic odor, or taste, or products with which it may come in contact. In addition, the material is of the type which is relatively rigid when formed in thick sections and is relatively flexible and resilient when formed in thin sections. We have found that polyethylene is a particularly effective material from which the insert 17 may be formed. Other plastic materials such as vinyl resins having the desired properties, may also be used.

The metal shell 16 includes a flat horizontal panel 18 and a depending marginal skirt 19 normal to the panel 18. A lip, or locking rim 20, extends inwardly and up-

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wardly from the lower edge of the depending marginal skirt 19 to securely grip the lower margin of the insert 17.

As shown in Figs. 2 and 3, the insert comprises a flat horizontal top portion 21 having an annular depressed portion 22 formed on the top thereof, spaced inwardly of the marginal skirt and in position to overlie the sealing surface 15 of the container when the closure is applied to the latter. The annular depressed portion 22 comprises two small diametrically opposed arcuate sections 23, 24 (Fig. 2) separated by two arcuate sections 25, 26. The sections 23, 24 are of lesser thickness (Figs. 3, 4) than sections 25, 26 thus becoming the sections at which venting occurs, as presently described. More than two of these sections of lesser thickness may be used, if desired.

A marginal skirt 27 depends from the flat top portion 21 and is provided with threads 28 formed on the interior surface thereof. As further shown in Fig. 2, the thickness of the insert 17 is such that the insert is relatively hard and rigid throughout, except at the relatively thin portions, such as the sections 23, 24, 25 and 26 of the annular depressed portion 22.

The height of the insert 17 is such that the insert is firmly held within the outer shell 16 and thereby prevented from moving axially. The diameter of the insert is substantially equal to the inner diameter of the metal shell so that the insert is prevented from moving radially relative to the metal shell.

By this construction annular spaces 29 and 30 and venting channels 31, 32 are provided between the metal shell and the insert directly overlying the sealing surface 15 of the container. When the closure is applied to the neck of the container and screwed into sealing position, all sections 23, 24, 25, 26 of the annular depressed portion 22 are flexed upwardly into these spaces (Figs. 1, 5). By this action the annular depressed portion is placed under tension. An air, gas, and liquid tight seal is thereby obtained which is much more effective than would be possible by compressing the same material against the sealing surface. No separate gasket or liner is needed since the insert functions as such.

When excessive internal pressure is created in the container, due to gas formation in the contents thereof, the thinner venting sections 23, 24 or one of them may flex upwardly under the pressure and thereby release the pressure until it is reduced to a safe value, whereupon the sections 23, 24 again seat and reseal the container (Fig. 1).

The number and thickness of the venting sections may be adjusted in order that the venting will occur at any predetermined pressure. The venting sections are preferably equally spaced along the annular depressed portion 22.

In making the closure, the outer shell 16 and the insert 17 are formed separately and the insert is pushed upwardly into the shell in order to assemble the closure. To facilitate passage of the insert past the lip of the outer shell, the upper portion of the skirt adjacent to the flat portion may be beveled as shown in Figs. 1, 3, and 4.

We have found that the seal obtained by placing the portion of the insert overlying the sealing surface under tension is much more reliable and effective than if the same portion were compressed against the sealing surface. Moreover, the construction permits the accurate venting of the container, together with the sealing by placing the insert under tension.

Modifications may be resorted to within the spirit and scope of the appended claims.

We claim:

1. The combination of a closure and a container formed

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with a neck and an annular sealing surface, said closure comprising a relatively rigid shell and an insert formed of a material which is flexible and resilient when formed in thin sections, said shell comprising a flat top portion and a depending marginal skirt, said insert comprising a complementary flat top portion and a depending marginal skirt whereby the insert is securely held within said shell, means formed on the interior surface of the skirt of said insert for removably securing the closure to the neck of the container, said insert being formed with an annular depressed portion of uniform width on the top surface thereof overlying the sealing surface of the container, said shell and insert being substantially coextensive except at said annular depressed portion, and thereby providing an annular space between the top portion of the shell and the top portion of the insert, said annular depressed portion being in the form of a web substantially thinner than the adjoining top portion, the web being of greater width than the underlying sealing surface and of substantially uniform thickness throughout its width and being flexed upwardly into said space when the closure is secured to the neck of the container, said annular depressed portion having sections thereof which are equally spaced apart and are thinner than the remainder, whereby said sections may further flex upwardly under the action of internal pressure within the container and thereby relieve said pressure, the said shell forming a means to oppose downward movement of the skirt of the insert as a whole relative to the top portion when the closure is moved down on the container neck to sealing position.

2. The combination of a closure and a container formed with a neck and an annular sealing surface, said closure comprising a relatively rigid shell and an insert formed of a material which is flexible and resilient when formed in thin sections, said shell comprising a flat top portion and a depending marginal skirt, said insert comprising a complementary flat top portion and a depending marginal skirt whereby said insert is securely held within said skirt, means formed on the interior surface of the skirt of said insert for removably securing the closure to the neck of the container, the top portion of said insert having a thickness such that it is relatively rigid and an annular groove of uniform width formed on the top surface thereof overlying the sealing surface of the container, said shell and insert being substantially coextensive except at said annular groove, and thereby providing a space between the top portion of the shell and the top portion of the insert, the portion of said insert forming the base of the groove overlying said sealing surface being in the form of a web substantially thinner than the adjoining top portion, the web being of greater width than the underlying sealing surface and of substantially uniform thickness throughout its width and being sufficiently thin that said portion may be flexed upwardly into said space when the closure is secured to the neck of the container, portions of the annular groove having greater depth than others whereby the insert at said portions of greater depth is thinner so that said latter portions may be further flexed upwardly under the action of internal pressure within the container to thereby relieve the pressure, said portions of greater depth being spaced apart equally, the said shell forming a means to oppose downward movement of the skirt of the insert as a whole relative to the top portion when the closure is moved down on the container neck to sealing position.

3. A closure comprising a relatively rigid shell and an insert formed of a material which is flexible and resilient when formed in thin sections, said shell comprising a flat top portion and a depending marginal skirt, said insert comprising a complementary flat top portion and a depending marginal skirt whereby the insert is securely held within said shell, means formed on the interior surface of the skirt of said insert for removably securing the closure to the neck of a container, said insert being formed with an annular depressed portion of uniform

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width on the top surface thereof in position to overlie the sealing surface of the container, said shell and insert being substantially coextensive except at said annular depressed portion, and thereby providing an annular space between the top portion of the shell and the top portion of the insert, said annular depressed portion being in the form of a web substantially thinner than the adjoining top portion, the web being of greater width than the underlying sealing surface of the container and of substantially uniform thickness throughout its width and being flexed upwardly into said space when the closure is secured to the neck of the container, said annular depressed portion having sections thereof which are equally spaced apart and are thinner than the remainder, whereby said sections may further flex upwardly under the action of internal pressure within the container thereby relieving said pressure, the said shell forming a means for opposing downward movement of the skirt of the insert as a whole relative to the top portion when the closure is moved down on the container neck to sealing position.

4. A closure comprising a relatively rigid shell and an insert formed of a material which is flexible and resilient when formed in thin sections, said shell comprising a flat top portion and a depending marginal skirt, said insert comprising a complementary flat top portion and a depending marginal skirt whereby said insert is securely held within said skirt, means formed on the interior surface of the skirt of said insert for removably securing the closure to the neck of a container, the top portion of said insert having a thickness such that it is relatively rigid and an annular groove of uniform width formed on the top surface thereof overlying the sealing surface of the container, said shell and insert being substantially coextensive except at said annular groove, and thereby providing a space between the top portion of the shell and the top portion of the insert, the portion of said insert forming the base of the groove overlying said sealing surface being in the form of a web substantially thinner than the adjoining top portion, the web being of greater width than the underlying sealing surface of the container and of substantially uniform thickness throughout its width and being sufficiently thin that said portion may be flexed upwardly into said space when the closure is secured to the neck of a container, portions of the annular groove having greater depth than others whereby the insert at said portions of greater depth is thinner such that said latter portions may be further flexed upwardly under the action of internal pressure within a container to which they may be attached to thereby relieve the pressure, said portions of greater depth being spaced apart equally, the said shell forming a means for opposing downward movement of the skirt of the insert as a whole relative to the top portion when the closure is moved down on the container neck to sealing position.

5. A closure comprising a shell including a circular top portion and a depending marginal skirt, a polyethylene insert composed of a circular top portion and a depending marginal skirt, the latter having means for attaching the closure to a container, means for securing the insert within the shell against both axial and radial movement within said shell, said top portion of the insert formed near its periphery with an upwardly facing annular channel of non-uniform depth less than the thickness of the top portion to provide an area of wall thickness beneath said channel capable of axial flexing to a greater extent in one segment than in another, the adjacent top portions of the shell and insert being substantially coextensive except at said annular channel.

6. A closure comprising a shell including a circular top portion and a depending marginal skirt, a polyethylene insert composed of a circular top portion and a depending marginal skirt, the latter having means for attaching the closure to a container, means for securing the insert within the shell against both axial and radial movement within said shell, said top portion of the insert formed

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near its periphery with an upwardly facing annular channel, said channel being of uniform depth throughout a major portion of its length and of increased depth in a minor portion whereby to provide different degrees of axial flexibility in the wall which forms the bottom of said channel, the adjacent top portions of the shell and insert being substantially coextensive except at said annular channel.

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