

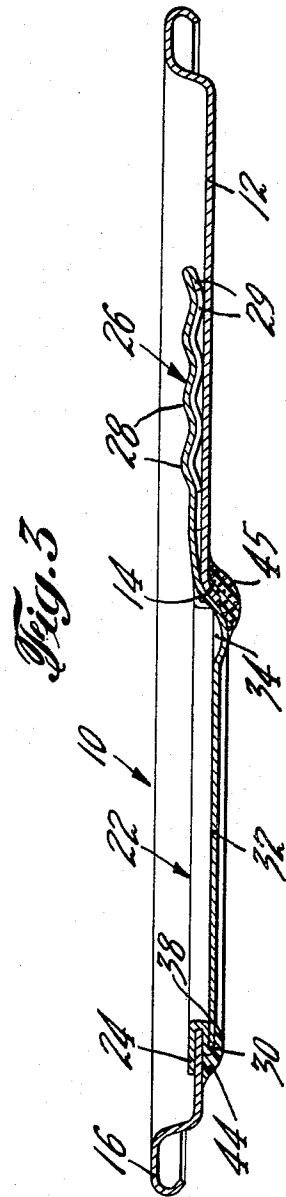
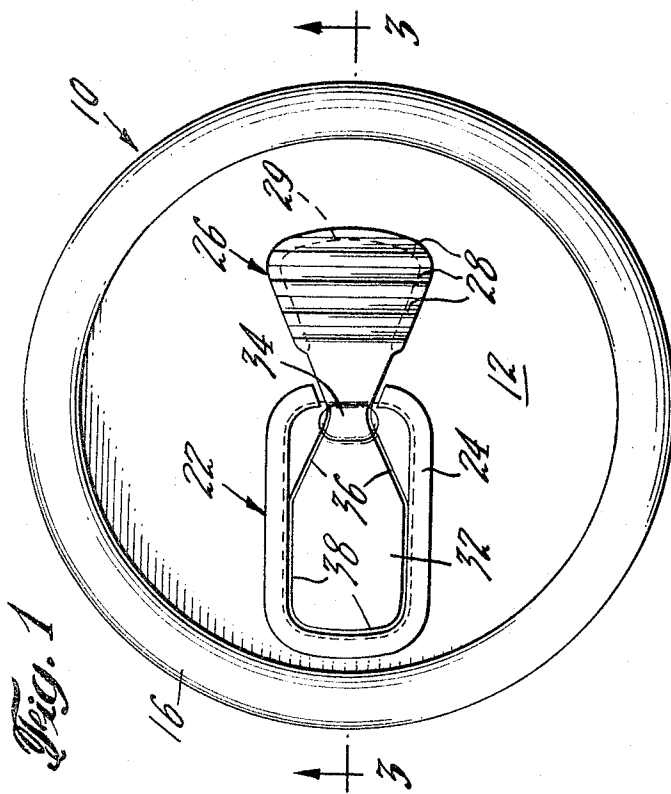
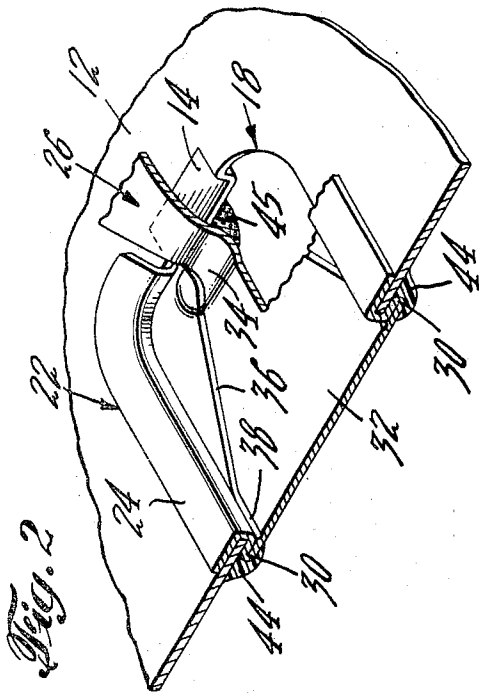
March 14, 1967

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3,308,986

PLASTISOL COATINGS FOR EASY-OPEN CONTAINER ENDS

Filed Sept. 30, 1964



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3,308,986

PLASTISOL COATINGS FOR EASY-OPEN
CONTAINER ENDS

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Filed Sept. 30, 1964, Ser. No. 400,386
7 Claims. (Cl. 220-53)

This invention relates to a container end closure. It has particular reference to an easy-open end closure which comprises an apertured panel, a plug secured within the panel aperture and a positioning of plastisols to insure, along the juncture of the plug and panel, both an hermetic seal and a readily opened end closure. This invention is an improvement on the end closure disclosed in the instant assignee's copending application Ser. No. 329,440, now United States Patent 3,223,277.

The container industry has recently experienced a trend in the so-called "easy-open" type containers, i.e. a container which is opened by using the hand alone. An example of such an easy-open end closure is disclosed in the above-identified patent and comprises an apertured panel and a plug which is positioned within the panel aperture and attached therewithin, along a major portion of its periphery, by crimping the periphery of the plug within the panel aperture, thereby leaving a minor portion of the plug periphery uncrimped. A pair of score lines extend across the plug and define therebetween a tear-out strip which terminates at the uncrimped portion of the plug and merges thereat with a pull tab. The crimped and uncrimped portions of the plug are coated with a single sealant to provide the necessary sealing action between the plug and the end closure panel.

A sealant employed in the instant environment must insure an hermetic seal along the crimped and uncrimped portions of the plug periphery. To provide an easy-open end the sealant should also offer minimum resistance to the removal of the tear strip at the uncrimped portion of the plug periphery. Further, since the plastisol is stretched and broken by the pull tab, the plastisol must fracture readily to prevent breaking of the pull tab. Additionally, the sealant must be non-toxic and capable of maintaining, under high pressure, an hermetic seal along both the crimped and uncrimped portions of the plug periphery. The experts in the container and chemical fields have experienced considerable difficulty in their attempts to find a sealant which would meet all the above requirements.

It is therefore an object of the instant invention to provide an end closure having plastisol sealant-adhesives which insure the above-discussed requirements.

An additional object is to provide a container end closure having a sealant-adhesive which allows the removal of a portion of the end closure with a minimum of effort.

Another object is to provide an easy-open end closure having a disposition of plastisols, each plastisol supplying a different property for the particular environment in which the plastisol is located.

A further object is to provide an end closure having a plastisol sealant-adhesive which allows a tear-out strip to be hermetically sealed to the end closure and manually removed therefrom when the tear strip is removed to open the container.

Yet another object is to provide a plastisol sealed end closure which is readily opened by a pull tab with little probability of breaking the pull tab during the opening of the container.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in conjunction

with the accompanying drawings, discloses a preferred embodiment thereof.

The above objects are accomplished by locating a scored plug within an aperture formed in a panel and attaching the plug therewithin by crimping almost the entire periphery of the plug against the surfaces of the panel adjacent the aperture, leaving uncrimped the remaining portion of the plug, after which the crimped peripheral portion of the plug is coated with a non-foamed plastisol and the uncrimped portion of the plug is coated with a foamed plastisol. To open the container, a pull tab, attached to the uncrimped portion at the terminus of the score lines, is pulled vertically causing the foamed plastisol to stretch and break along the longitudinal edges of the pull tab, thereby allowing a tearing of the plug along the score lines without fracture of the pull tab.

Referring to the drawings:

FIG. 1 is a plan view of an end closure embodying the instant invention;

FIG. 2 is a fragmentary perspective view of the end closure partly in section and with parts broken away; and

FIG. 3 is an enlarged sectional view taken substantially along line 3-3 of FIG. 1.

As an exemplary embodiment of the instant invention there is shown in FIG. 1 a sheet metal end closure generally designated 10. The end closure 10 has a substantially circular panel 12 and, surrounding said circular panel, an annular, outwardly extending cover hook 16, which is adapted to be secured to a container body by means of a conventional doubleseam (not shown). The end closure 10 is preferably formed from tin platé. Further, the end closure need not necessarily be circular but may have other configurations.

The panel 12 along its diameter but spaced from the center thereof has an aperture or opening 18. The aperture 18 may be of any substantially regular shape; but it is preferred that the aperture 18 be of generally rectangular shape, i.e. having opposed parallel sides, with appreciably rounded corners and with the long axis of the rectangle coinciding with the panel diameter. It has been found that such a configuration is best for the firm securement of a plug therewithin, as will be more fully described hereinafter. To improve end closure strength and sealability, the panel 12 is angled downwardly at 14 for reasons which will be more fully explained hereinafter.

Attached to the panel 12 and closing the aperture 18 is a one-piece sheet metal plug generally designated 22 having the same general configuration or shape as the aperture 18. Because of its relative tearability and corrosion resistance, the plug 22 is preferably formed from sheet aluminum. The plug has a peripheral flange 24 contiguous and overlying the portion of the plug surrounding the aperture 18. A pull tab 26 extends along the diameter of the panel from the short side of the plug adjacent the center of the panel 12. To provide improved gripping, the pull tab 26 has a series of corrugations 28. The major portion of the peripheral edge of the pull tab 26 is provided with a hem 29. The hem 29 is formed by folding over the peripheral margins of the pull tab to obviate in the hemmed portions the presence of readily accessible sharp edges having any tendency to cut.

A peripheral wall 30 extends laterally from the inner edge of the flange 24 through the aperture 18 and merges with an imperforate wall 32 extending across and substantially closing the aperture 18. To mechanically lock the plug to the panel 12, the peripheral wall 30 is collapsed around its entire periphery, except for the portion which merges with the pull tab 26. When so collapsed, the portion of the panel surrounding the aperture

18, except for that adjacent the pull tab, is crimped for a tight mechanical or frictional engagement with the peripheral flange 24 and the overlying portion of the wall 30. The width of the inner end of the pull tab 26 is reduced and made substantially equal to the width of the downwardly angled portion 14 of the panel 12 as shown in FIG. 1.

The inner free end of the pull tab 26 must not be crimped or collapsed as is the remainder of the lateral or peripheral wall 30. An uncrimped disposition of the inner end of the pull tab 26 permits easy rupturing of the end wall upon pulling of the pull tab and reduces the possibility of breaking the pull tab at its juncture with the end wall.

Immediately adjacent the juncture of the pull tab and the imperforate wall 32, there is provided in the wall a debossment 34. The debossment 34 provides a reservoir or gathering spot for the excess metal at and around the connection of the pull tab 26, thereby eliminating or at least reducing, any undesirable stresses in this portion which might cause tab fracture. This excess metal results from the fact that there is no collapsed wall at the inner end of the pull tab 26. It is also believed that the debossment 34 increases the rigidity of the end wall adjacent its connection to the pull tab 26, thereby facilitating rupturing of the imperforate wall 32. To achieve maximum rigidity from the debossment 34 it is extended transversely along the imperforate wall 32.

Extending from each side edge of the pull tab 26 in and generally longitudinally of the imperforate wall 32 are score lines 36. The score lines 36 extend across the debossment then diverge from each other rather rapidly to the side of the end wall contiguous the collapsed wall 30 and then continue parallel to each other along the side of the end wall 32 to the outer short side of the plug 22 adjacent the cover hook 16. The ends of the score lines 36 are joined by a score line 38 extending therebetween along the short side of the plug. The score line 38 is also disposed in the imperforate wall 32 contiguous the collapsed wall 30. By locating the scores lines 36 and 38 along the collapsed wall 30, the collapsed wall tends to cover and sheath the raw metal edge remaining after the area within the score lines has been torn out. Such sheathing of these raw edges protects any body part of the ultimate user of the can from accidental cuts.

To provide an hermetic, liquid-tight seal between the plug 22 and the panel 12 and to simultaneously insure that the pull tab 26 and the tear strip can be readily removed without fracturing, the periphery of the plug 22 is provided with two different plastisols at its juncture with the panel 12. A hard solid plastisol 44 is located along the peripheral wall 30 and the juxtaposed surfaces of the panel 12 but outwardly of the tearable area of the end wall 32 defined by the score lines 36 and 38. A typical plastisol formation suitable for employment at this location is disclosed in U.S. Patent No. 3,002,641.

A foamed plastisol 45 is employed along the uncrimped side of the plug 22 at the juncture of the debossment 34 and the angled wall 14. A typical plastisol formation suitable for use at this juncture is also disclosed in the above-mentioned U.S. patent.

The foamed plastisol 45 and the hard plastisol 44 are applied, in liquid form, to the appropriate sides of the plug as previously described, thereby allowing the plastisol to flow into any interstices between the plug 22 and the panel 12. The end closure is placed in an oven to fuse and cure the plastisols.

The heat of the baking operation causes unfoamed plastisol 44 to fuse and cure in a known manner. In addition to fusing and curing the foamed plastisol 45, the heat of the baking operation also produces a foamed or cellular structure in the hot, liquid plastisol.

During cooling, subsequent to the baking operation, the plastisol 44 hardens and forms a strong, permanent, liquid-type hermetic seal along the peripheral wall 30

where the plug periphery is crimped to the panel service adjacent the aperture 18. This plastisol seal and the mechanical and frictional crimping of the plug periphery coact to establish a strong rigid connection between the crimped periphery of the plug and the panel, thereby causing the instant two-piece end closure to function as a conventional unitary end closure. Upon cooling the foamed plastisol 45 retains its cellular disposition and thereby insures a soft, pliable structure inherently weaker than that of the hard plastisol 44. It is preferred that the cross-sectional dimensions of the foamed plastisol 45 be larger than the corresponding dimensions of the hard plastisol 44. By enlarging the cross-sectional area of the foamed plastisol 45, adequate strength and sealing of the uncrimped side of the plug 22 is insured. If desired, other soft, pliable materials with low internal strength may be substituted for the foamed plastisol. Examples of substitutes are well known sealing compounds, low strength wax, hot melts and ethyl cellulose film formers.

While the above application of plastisol is preferred, it is within the purview of the instant invention to apply the plastisol to the plug 22 before its insertion in the aperture 18, or before the crimping of the plug 22 within the panel 12.

To open a container having the instant end closure construction, the tab is raised from its horizontal position to an elevated position by inserting the tip of a fingernail thereunder; thereafter the tab is grasped at the corrugations 28, preferably between the thumb and forefingers and pulled back along the axis of the plug 22. As previously discussed, the debossment maintains the wall 32 rigid which facilitates initial rupturing along the score lines 36 and 38. The foamed plastisol 45 located along the edges of the pull tab at the debossment is stretched during this initial rupturing.

Continued pulling of the tab 26 causes the stretched foamed plastisol 45 to break along the edges of the pull tab. After the foamed plastisol 45 breaks, the tearing continues until the area within the score lines 36 and 38 is completely removed from the remainder of the plug to provide a dispensing opening in the container end closure.

While not wishing to be bound by any particular theory, it is believed that during initial opening of the end closure, the pull tab transmits a tearing force to effect a tearing of the plug along the score lines 36 and 38; and a second force is also required to rupture the foamed plastisol 45. The tearing force is a maximum when tearing of the plug is initiated and the rupturing force is naturally a maximum when the plastisol is ruptured. When hard, known resilient plastisols are employed adjacent the pull tab, maximum forces are simultaneously transmitted by the pull tab for both the rupture of the plastisol and the initial tearing of the plug along the score lines 36 and 38. This resulted in pull tab fractures at the inner end of the pull tab where it merges with the tear-out strip.

By employing a foamed plastisol, or equivalent material, the pull tab is not simultaneously subjected to the two maximum forces. During initial tearing of the plug along the score lines 36 and 38, the plastisol is merely stretched. Thereafter, the tearing force is reduced and the plastisol is ruptured. The foamed plastisol is large in cross-section and, in consequence, the force which the pull tab must transmit to rupture the plastisol is distributed over a large portion of the tearing action. The employment of foamed plastisol at the juncture of the pull tab and the panel has virtually eliminated fracturing of the pull tab.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages,

5

the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. An end closure adapted to be attached to a tubular container body, comprising:

a substantially flat panel having an aperture therein;

a thin relatively rigid plug within said aperture and secured to said panel along the major portion of the periphery of said plug;

a pull tab for manually removing a tear out area in said plug, said tab extending away from said aperture at a point where said plug is free from securement to said panel;

said tear out area defined by weakened lines in said plug;

a relatively hard sealing material sealing said plug with said panel along said major secured portion of the periphery of said plug;

and a soft pliable sealing material hermetically sealing said plug with said panel where said plug and said tab join so that when said tab is manually pulled to remove said tear out area from said plug, said soft pliable sealing material will stretch during initial rupture along the lines of weakness and said soft material will subsequently tear to reduce the tensional forces tending to fracture said pull tab from said plug when both metal rupture and sealing mate-

6

rial tearing occur substantially simultaneously during pulling of said tab.

2. The end closure of claim 1 wherein said plug is an aluminum metal alloy.

3. The end closure of claim 1 wherein said weakened lines are scores.

4. The end closure of claim 1 wherein said hard sealing material is a solid plastisol.

5. The end closure of claim 1 wherein said soft sealing material is a foamed plastisol.

6. The end closure of claim 1 wherein the cross-section of said soft sealing material is greater than the cross-section of said hard sealing material in order to provide adequate strength where said plug is free from securement to said panel.

7. A container end closure of the type defined in claim 1 wherein said major portion of the periphery of said plug is secured to the panel by crimping.

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