EASY OPENING CONTAINER PROVIDED WITH OPENING EDGE PROTECTIVE HOT MELT ADHESIVE BAND

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References Cited
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ABSTRACT
A container having an easy opening end closure including a chuck wall portion and removable and non-removable panel portions defined by a score line. A band of a hot melt adhesive superimposed over the score line is permanently bonded to the chuck wall and releasably removal to the top face of the removable panel. Upon removal of the panel, the band is released from contact with the panel but remains bonded to the chuck wall so as to provide a protective ledge for the raw edge of the non-removable panel portion which remains about the opening.

A protective shield for the raw edge of the severed panel portion is provided by a hot melt adhesive applied to the underside of the closure which is permanently adhered to the removable panel portion and releasably adhered to the non-removable panel portion.

8 Claims, 6 Drawing Figures
EASY OPENING CONTAINER PROVIDED WITH OPENING EDGE PROTECTIVE HOT MELT ADHESIVE BAND

BACKGROUND OF THE INVENTION

1. Field of the Invention
The present invention relates to easy opening containers and more particularly to an improved easy opening container of the full panel opening type.

2. The Prior Art
Full opening containers of the type to which the present invention relates include a metal end closure of which the end panel is formed with a weakening line located closely adjacent and substantially concentric to the chuck wall. The weakening line is formed by scoring and defines a non-removable panel portion and a removable panel portion to which a pull tab is attached. The pull tab is mounted so that upon initial lifting thereof the nose penetrates the weakening line to initiate the severance of the removable panel portion from the end panel. Thereafter, the pull tab is pulled upwardly so that the remainder of the weakening line is ruptured and the removable panel portion separated from the remainder of the panel in the form of a disc.

The opening formed in the end closure is bounded by the non-removable panel portion of the end closure in the form of a horizontal ledge. The horizontal ledge terminates in a sharpen edge resulting from the severance of the removable panel portion therefrom along the weakening line. The sharpen edge is objectionable because it may cause injury by cutting the user when attempting to remove the contents of the container.

SUMMARY OF THE INVENTION

By the present invention, there is provided a container closed with a metal end closure of the easy opening type having a chuck wall portion, removable and non-removable panel portions defined by a weakening line and a protective band of a hot melt adhesive which is adherently attached to the chuck wall and releasably superimposed over and spanning the weakening line of the closure. After removal of the removable panel portion, the band is released from the removable panel but remains attached to chuck wall to provide a protective edge projecting beyond the raw edge about the opening.

A protective shield for the sharpen edge of the severed panel portion is provided by a hot melt adhesive band applied to the underside of the closure spanning the weakening line and permanently bonded to the removable panel portion and releasably adhered to the non-removable portion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of an end closure embodying the structure of the present invention;
FIG. 2 is an enlarged cross sectional view of the end closure applied to a container body taken generally along the line 2-2 of FIG. 1 and showing the structure of the present invention when the container closure is intact;
FIG. 3 is a fragmentary cross-sectional view similar to FIG. 2 but showing the condition of the protective band upon initial rupturing of the weakening lines;
FIG. 4 is a fragmentary view showing the condition of the protective band after severance of the removable panel portion.

FIG. 5 is a cross-sectional view of another embodiment of the invention showing the structure of the present invention when the closure is intact.
FIG. 6 is a cross-sectional view similar to FIG. 5 but showing the condition of the removable panel upon initial rupturing of the weakening line.

Fig. 4 is a fragmentary view showing the condition of the removable panel upon initial rupturing of the weakening line.

Referring now to the drawing, there is illustrated a container or can 10 including a body wall 11 of which only the upper portion is illustrated. The lower portion of the body 11 is closed in the conventional manner by an end closure, not shown. The upper end of the body 11 is closed by means of an easy opening end closure 12 made from metal which is secured to the body 11 by means of a conventional double seam 13.

The metal end closure 12 includes a chuck wall 14 and an end panel 15 both coated with an enamel coating 16. The end 12 is of a conventional full opening type and the end panel 15 is provided with a peripheral weakening or score line 17 concentric with the chuck wall and defining a removable panel portion 18 which constitutes a major portion of the end closure 12. The end panel 15 is provided with anti-fracture scoreline 19 which prevents fracture of the metal upon removal of the panel.

In order to facilitate initial rupture of the panel 15, the removable panel portion 18 is provided with an integral rivet 20 by means of which a pull tab 21 is secured thereto. The pull tab 21 is utilized to initially place a downwardly or inwardly directed force on the removable panel portion 18 along a starting portion of the score line 17 sufficient to affect the initial rupture of the removable panel portion from the panel 15. A further movement of the pull tab 21 will result in folding or bending of a part of the removable panel portion 18 downwardly into the interior of the can 10. Thereafter, an upwardly directed pull on the pull tab 21 is effective to completely tear out the removable panel portion 18 along the score line 17.

The can 10 as described above is deficient because of the fact that the raw edge on the remaining or non-removable panel portion 22 resulting from the tear out of the removable panel portion 18 remains exposed. Thus, if a user inserts his hand into the opening to remove the contents thereof, there is a possibility of injury by cutting the hand.

In accordance with the present invention, this deficiency is overcome by the provision of a pliable ring or band member 23 which is adhesively attached to the chuck wall 14. The band 23 is preferably made from a hot melt adhesive which may be applied in the form of an annular ring 23 on the enamel coated surface of the chuck wall 14 to which it is permanently adhered. In applying the hot melt adhesive, the band 23 is caused to be deposited and extend over the area of the panel 15 encompassed by the weakening line 17. Before application of the adhesive band 23, the area of the panel over which the hot melt adhesive is superimposed is coated with release coating 25 to which the adhesive is poorly adherent. Because of the presence of the release coating 25, the adhesion of the adhesive band 23 in this panel area is substantially destroyed and the band 23 is releasable from the panel 18 upon the removal of the panel 18 from the end closure.

The enamel coating 16 is made from a thermosetting or thermoplastic resin. The enamel coatings are applied to the metal sheet surfaces prior to forming the end closure 15 described above.
Typical thermosetting resins which may be employed in the enamel coating 16 include epoxy resins of the type which are polymeric reaction products of polyfunctional halohydrins with polyhydric phenols.

Thermoplastic resins which may be employed in the enamel coating include the vinyl chloride/polymer resins, such as polyvinyl chloride, vinyl chloride/vinyl acetate copolymers, vinyl chloride/vinylidene chloride copolymers, vinyl chloride/alkyl maleate copolymers, vinyl chloride/acrylonitrile copolymers, vinyl chloride/vinyl acetate/maleic anhydride terpolymers and the like. These thermoplastic resins may be used in combination with any of the thermosetting resins to prepare a suitable enamel coating.

For application to metal surfaces, the above described resins or mixtures of these resins are dissolved in suitable solvent system, such as organic ketones, such as methyl ethyl ketone, methyl isobutyl ketone, and aromatic hydrocarbons, such as xylene and toluene, and mixtures thereof, to provide a coating solution of the necessary viscosity for application to the metal surfaces.

The enamel coating compositions are applied as a liquid solution to the metal surface such as steel, aluminum and the like, by any of the conventional methods employed by the coating industry. In the coating of the metal sheet used in container fabrication, gravure coating is the preferred method, as the desired coating configuration and weight is easily and conveniently applied in a single coat.

The applied coating 16 after substantial volatile loss of the solvent is cured to a hard film by heating the coated substrate at a temperature between about 150° and about 230°C for about 1 to 10 minutes. The preferred coating weight for coating metal sheet substrates with an adequately protective coating for use as an enamel for containers is in the range of about 1 to 10 milligrams of dry coating per square inch of substrate surface.

The hot melt adhesive band 23 ranges in thickness from about 0.010 to 0.020 inches and may be applied to the chuck wall 14 of the closure 12 by various known techniques, one being the so called spin lining technique, wherein he hot melt adhesive composition in a molten condition e.g., about 200°-470°F is squirted using automatic nozzle equipment onto the panel in the weakening line area of the end closure which is secured to a chuck rotating at high speed. Due to centrifugal force, the molten hot melt adhesive material will assume the desired band contour and shape and be caused to contact and bond to the chuck wall area immediately adjacent the weakening line area. After being thus deposited the hot melt adhesive is allowed to cool. The band of hot melt adhesive will permanently adhere to the enamel coated surface of the chuck wall, and will be releaseably in contact with the panel portion 18 because of the presence of the release coating 25.

The release coating material 25 may be of any material which creates a low order of adhesion between the band 23 and the enamel coated panel. The release coating 25 is formulated from materials with which the hot melt adhesive has limited compatibility or is substantially non-adherent. Suitable release coatings include fluorocarbons, such as Teflon, silicones, and soaps, that is, a salt of one or more of the higher fatty acids with an alkali or metal. Soaps derived from coco-
nut oil and hospital green soap have been found particularly advantageous in the practice of the present invention.

In carrying out the present invention, any conventional hot melt adhesive composition may be used. The term "hot melt adhesive" as used herein refers to a synthetic resin which can be applied to substrates as a molten liquid mass and achieve the solid state and resultant cohesive strength by cooling, whereas other types of adhesives achieve the solid state through evaporation, removal of solvents or polymerization. At room temperature, a hot melt adhesive is a thermoplastic non-volatile solid material. When the hot metal adhesive is heated, it liquefies and after removal of heat, it solidifies on cooling. Hot melt adhesives are used in preference to other adhesives in the practice of the present invention because of the speed with which they bond to the enameled portions of the closure and because they do not require flashoff of volatiles prior to making bond. Hot melt adhesives are particularly advantageous in the practice of the present invention as their use eliminates the expense of solvents and the attendant pollution problems and the cost reductions which result from the time saved in application of the adhesive when compared to other adhesive systems.

The hot melt adhesive compositions used in the practice of the present invention may consist of polyamides of the nylon type, ethylene/ acrylic acid copolymers, petroleum wax, in either paraffin or microcrystalline form or they may be a combination of both wax forms containing from 10 to as high as 90 percent by weight of an ethylene copolymer such as ethylene/vinyl acetate (known under the Registered Trade Mark ELVAX™), ethylene/ethylen acrylate and ethylene/isobutyl acrylate. The hot melt adhesive compositions may also contain 5-30 percent by weight of additional resin modifiers such as hydrocarbon resins, rosins or rosin derivatives, 1,2-pentene resins, and methyl styrene/vinyl toluene copolymer resins.

Hot melt adhesive derived from major proportions of ELVAX™ have been found to be particularly suitable for the practice of the present invention.

When the pull tab 21 is initially lifted as shown in FIG. 3, the nose thereof is operative to sever the end closure along the weakening line 17 and break the contact at the inner marginal edge of the band 23 with the release coating 25.

It is to be particularly noted that the hot melt adhesive band 23 overlies the weakening line 17 of the panel but because of the application of the release coating 25, the band 23 is bonded poorly to the end closure panel 15 and merely is in releaseable contact therewith. Thus, the band 23 is only permanently bonded to the chuck wall 14.

During the initial severance, the band 23 yields and is separated from the removable panel 18 but remains adhered to the wall 14. Upon upward pulling to complete the separation of the removable panel portion 18, the band 23 remains adhered to the chuck wall 14 and extends beyond the edge of the non-removable panel portion 22. In this manner as shown in FIG. 4, the band 23 provides a protective ledge and prevents a hand inserted in the opening from contacting the raw edge of the panel portion 22.

In another embodiment of the invention, an enamel coating 30 is applied to the underside of the panel 15, and a band of hot melt adhesive 31 is applied to the un-
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derside of the panel in the area immediately adjacent to the container wall 11. Prior to the application of the hot melt adhesive 31 a release coating material 33 is applied to the underside of the panel in the area of the weakening line 17. The enamel coating 30 is one to which the hot melt adhesive band 31 will permanently adhere. Generally, the enamel coating 31 is of substantially the same composition as the enamel coating 16, previously described. The release coating 33 and the hot melt adhesive 31 are also prepared from substantially the same materials used for release coating 25 and hot melt adhesive 23 previously described and these materials are applied to the underside of the panel 15 in substantially the same manner as previously described.

It is to be particularly noted that the hot melt adhesive band 31 applied to the underside of the end panel 15 is strongly adherent to the removable portion 18 but because of the presence of the release coating 33, the band 31 is poorly adherent to the non-removal panel portion 22 and is in releasable contact therewith.

During severance of the panel 15, the band 31 is released and separated from the remaining portion 22 of the closure and remains adhered to the underside of the removable panel portion 18. Upon complete severance of the panel portion 18, the band 31 remains permanently adhered thereto and provides a protective shield for the sharp edge 34 of the severed panel portion 18.

What is claimed is:

1. An easy opening container comprising an end closure having an end panel and an upstanding chuck wall about the periphery thereof, a weakening line formed by scoring the end panel, the weakening line defining a removable panel portion and a non-removable panel portion, a plastic band bonded to the chuck wall and spanning the area of the weakening line, and coating means for releasably adhering the band to the removable panel portion.

2. The container of claim 1 wherein the weakening line of the closure is closely adjacent to and concentric with the chuck wall.

3. The container of claim 1 wherein the closure is provided with an enamel coating to which the plastic band is adherent.

4. The container of claim 1 wherein the plastic band is a hot melt adhesive.

5. The container of claim 1 wherein the band comprises an ethylene/vinyl acetate based hot melt adhesive.

6. The container of claim 1 wherein the coating means is a release coating to which the hot melt adhesive is poorly adherent and is applied to the area of the panel over which the plastic band is superimposed.

7. The container of claim 6 wherein the release coating is a soap.

8. The container of claim 1 having a plastic band applied to the underside of the end panel spanning the weakening line and bonded to the removable panel portion and coating means for releasably adhering the band to the non-removable panel portion.

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