May 14, 1968 B. B. LIPSKE 3,383,008

CAN END OPENER AND ATTACHING MEANS

Filed May 26, 1965 3 Sheets-Sheet 1

FIG. 1

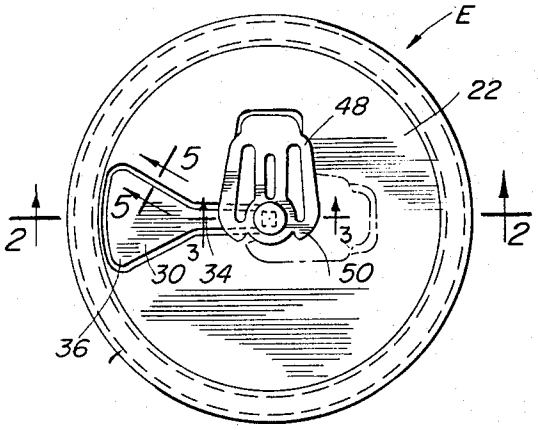


FIG. 2

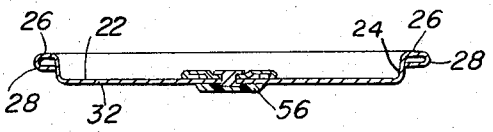


FIG. 3

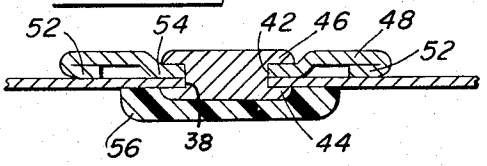


FIG. 4

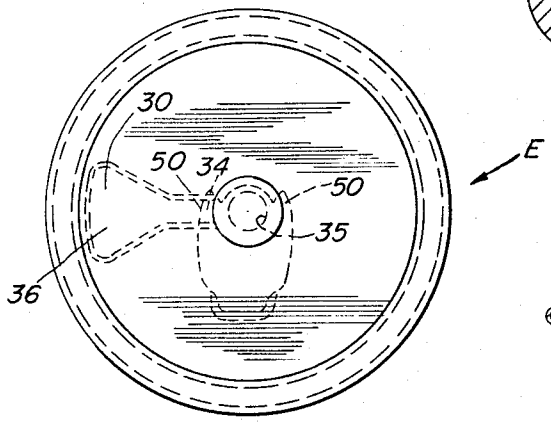


FIG. 5

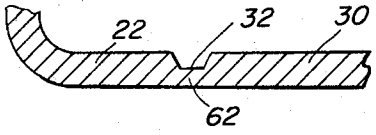


FIG. 6

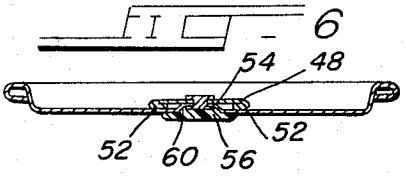


FIG. 7

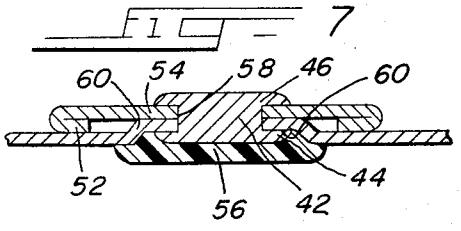
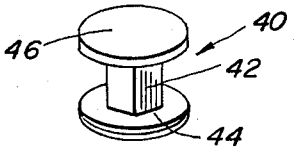


FIG. 8

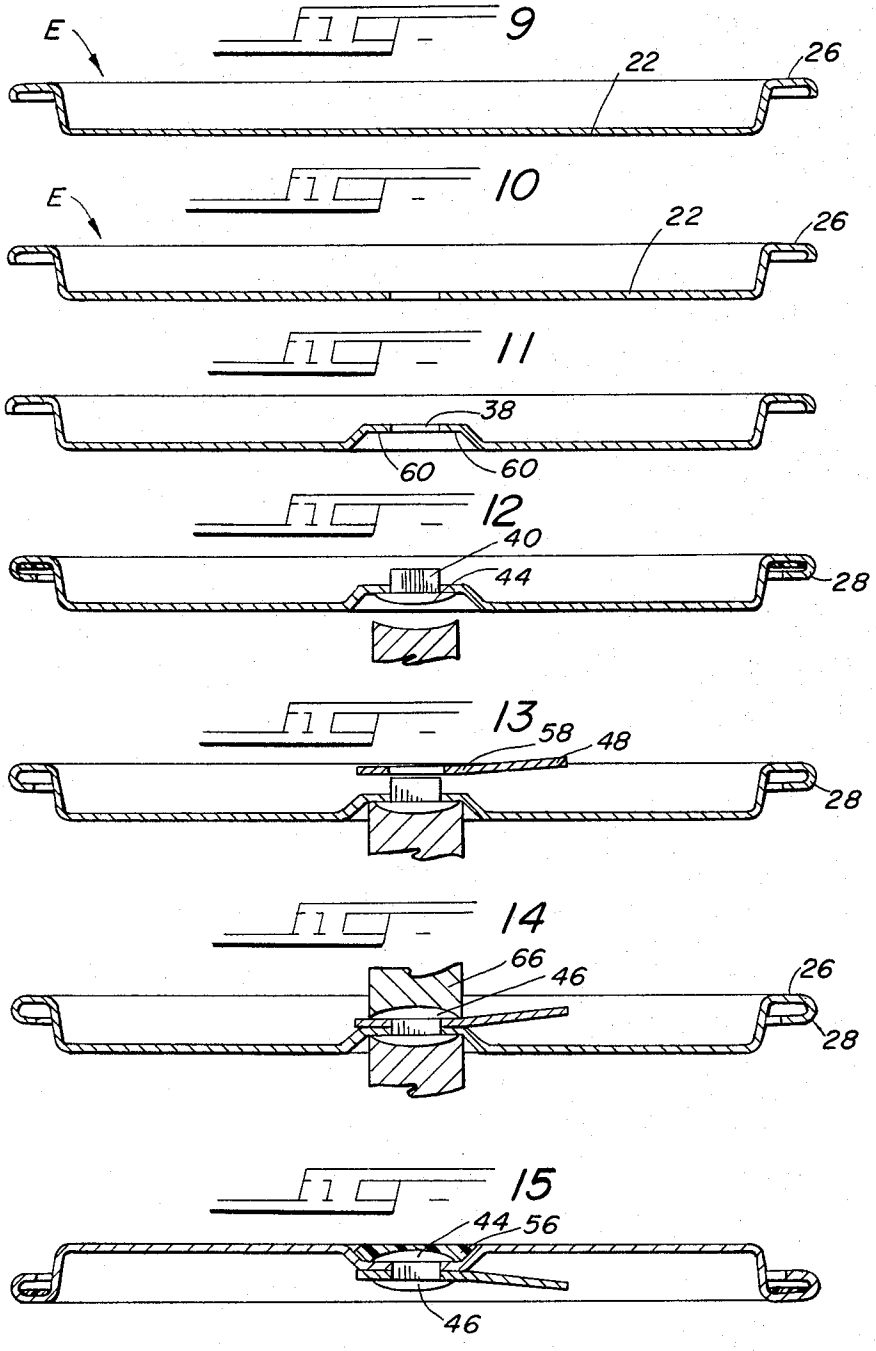


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May 14, 1968 B. B. LIPSKE 3,383,008

CAN END OPENER AND ATTACHING MEANS

Filed May 26, 1965 3 Sheets-Sheet 2



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May 14, 1968 B. B. LIPSKE 3,383,008

CAN END OPENER AND ATTACHING MEANS

Filed May 26, 1965 3 Sheets-Sheet 3

Fig. 16

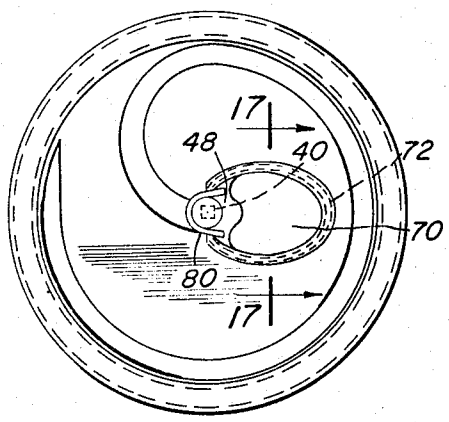


Fig. 17

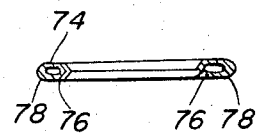


Fig. 18

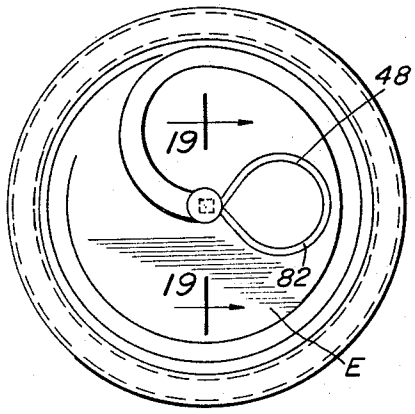


Fig. 19

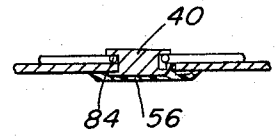


Fig. 20

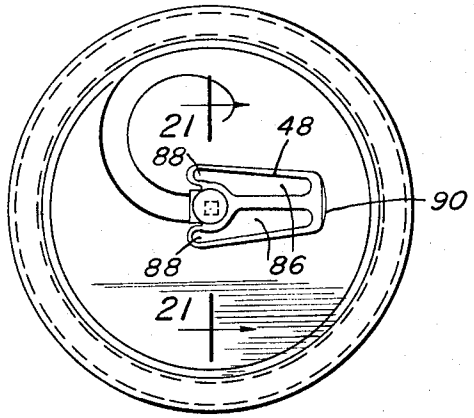
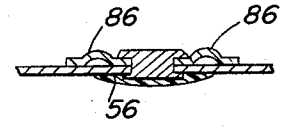


Fig. 21



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3,383,008

CAN END OPENER AND ATTACHING MEANS

Benjamin B. Lipske, Downers Grove, Ill., assignor to National Can Corporation, Chicago, Ill., a corporation of Delaware

Filed May 26, 1965, Ser. No. 458,932
4 Claims. (Cl. 220—54)

ABSTRACT OF THE DISCLOSURE

An easy opening can end with a line of weakness defining a tear out portion in the end, a finger tab attached to the tear out portion by a fastener which extends through both the end and the tab, and a synthetic resin material forming a seal covering the opening in the can end through which the fastener extends to prevent leakage of gas therethrough.

In some embodiments, the fastener is a rivet which has a square, serrated, or like shaped shank to prevent rotation of the rivet inside the can end, and, in some embodiments, the sealing material is located in an embossed or recessed area near the rivet. Processes for making the easy opening end are also described.

The present invention generally relates to easy opening can ends, and more particularly to ends for so-called tin cans in which a lifting tab, or portion adapted to be grasped by the fingers of the user, is attached to a preselected weakened area of the can end by means of a rivet which is a separate part from the can end, and which may be separate from the lifting tab.

Easy opening can ends are in great commercial demand, and billions of such can ends are sold every year in the United States. However, prior known easy opening can ends have been generally faced with the problem of providing a practical and economical construction in which the product must be protected from contamination entering the can from the outside thereof. Accordingly, the construction or prior known easy opening can ends is of a type wherein the rivet or connecting means for attaching the tab to the portion to be torn out from the can end is integrally formed with the can end. Such constructions possess a number of advantages, but, nonetheless, in spite of their substantial commercial success, such easy opening ends have been difficult to manufacture, particularly in view of the nature of the rivet which must be formed in order to afford a satisfactory product. These rivets are well known in the can making art. The principal disadvantage of such can ends is that an extremely high degree of quality control is necessary, and accordingly, large numbers of rejects occur, and the complex inspection and testing techniques which are required tend undesirably to raise the cost of making such can ends.

Can ends of the type referred to above are commercially made of aluminum, inasmuch as it is impossible to form a rivet of this type satisfactorily from tinplated steel. Thus, commercially satisfactory easy opening tinplate ends are not presently known in the United States.

Composite ends are known wherein an aluminum insert is crimped in place in an opening formed in a tinplate end, but the process of making such ends requires equipment which will perform the desired punching, crimping and sealing operations in an off-center location relative to the can end, and accordingly such equipment is highly complex and expensive.

The present invention, however, provides not only an end which may advantageously be made from aluminum, and which may be made without the quality control problems associated with the aluminum ends of the prior art,

but also and further makes it possible, for the first time, to make a practical, easy opening type tinplate end having the advantages of simplicity and low cost.

An additional advantage of the present invention of forming an easy opening end, particularly the removable portion **30** thereof, from tinplate, is that retrieval of the cut and discarded portions of an end may be readily recovered from beaches and streets, for example, reducing the safety hazards attendant thereto. When such ends are made from aluminum, magnetic methods of retrieving them are impractical.

In bief, the present invention provides a can end in which a desired pre-selected area is scored or partially cut, and an end in which a portion of this scored area is thereafter attached by a non-integral rivet to a lifting tab designed to be lifted by the fingers of one manipulating the end. That portion of the can end through which the rivet extends is adapted to be protected from the contents of the can and from the atmosphere, in the use of the device, by covering it with a coating of a substantially gas-impermeable plastisol or like resinous composition.

The use of the interior seal comprising the plastisol covering the base of the rivet, in combination with the other features of the invention, makes possible a simple and inexpensive easy opening can end having a number of desirable advantages and characteristics. The present invention, including the manner in which its objects and advantages are attained, will be better understood when considered in conjunction with a description of the preferred embodiments of the invention, as set forth in the specification and claims herein, and as shown in the accompanying drawings, in which like numbers indicate corresponding parts throughout, and in which:

FIG. 1 is a top plan view of one embodiment of the easy opening can end of the present invention;

FIG. 2 is a vertical sectional view of the can end of FIG. 1, taken along lines **2—2** thereof;

FIG. 3 is a greatly enlarged vertical section view of a portion of the can end of FIG. 1, taken along lines **3—3** thereof;

FIG. 4 is a bottom plan view of the end shown in FIG. 1;

FIG. 5 is an enlarged vertical sectional view of a portion of the end shown in FIG. 1, taken along lines **5—5** thereof;

FIG. 6 is a vertical sectional view of a modified form of the present invention;

FIG. 7 is a greatly enlarged vertical sectional view of a portion of the modified end shown in FIG. 6;

FIG. 8 is an isometric view of a rivet used in the present invention;

FIGS. 9 through 15, inclusive, are vertical sectional views through a can end, demonstrating sequential steps in one of the processes by which the can ends of the present invention are formed;

FIG. 16 is a top plan view of a modified form of the easy opening end, showing a modification of the finger tab member;

FIG. 17 is a vertical sectional view of the tab member taken along line **17—17** of FIG. 16;

FIG. 18 is a top plan view of a further modified form of the easy opening end;

FIG. 19 is a vertical sectional view of the tab member taken along line **19—19** of FIG. 18;

FIG. 20 is a top plan view of a further modified form of the easy opening end;

FIG. 21 is a vertical sectional view of the tab member taken along line **21—21** of FIG. 20.

Referring now to the drawings, in greater detail, there is shown generally in FIG. 1 a can end which is adapted to be received, as by a conventional double seam, over the end of an ordinary tin can, a fibre or so-called com-

posite container, or the like. The can end, E, is shown to have a flat central portion **22**, a generally vertically upstanding wall portion **24**, a top outer edge portion **26**, and an outermost curl **28**. As is well known in the art, in an end such as this, those portions **24**, **26** and **28** will form, in combination with the sidewall of the container, a double seam, wherein the wall **24** becomes the countersink of the end, and the curled surfaces **26** and **28**, are incorporated into the seam proper.

A removable portion **30** of the end E is defined by a scored line **32** which extends on one end to a point generally centrally of the can end, and, on the other end, to a location adjacent the edge of the wall **24** of the end E, the line **32** thus forming, in this embodiment, a continuous closed loop. The form of the removable portion defined by scored line **32** is conventional in the art, and forms a part of the present invention only in combination with the other features thereof. In a typical shape for use with beverages, the radially inner portion **34** of the removable portion **30** is generally used as an air vent, and is somewhat narrow, whereas the larger end portion **36** is located radially outwardly, and is used to empty the contents of the container therefrom. Variations in the shape of the scored line may be made, as is well known in the art, and as will be discussed further herein. In the drawings, for purposes of illustration, the width of the score line **32** is shown as being somewhat greater than is normally the case.

A central opening **38** is formed in the center of the end E, and the shape of this opening **38** is square in this embodiment of the invention. The opening **38** is adapted to accommodate a rivet **40** which includes a square shaped shank portion **42**, a lower flange **44**, and a top head **46**. In the assembled form of the can end, a lift tab **48** is held in place over the opening **38** by the head **46** of the rivet **40**. The tab **48** includes forwardly extending sections **50**, the purpose of which will be described in greater detail herein. The lift tab **48** preferably includes, in this embodiment, double thickness, turned under marginal edge portions **52** (FIG. 3) and a flat, rivet-receiving portion **54** therein. The flange **44** of the rivet **40** is covered over its entire extent on the inside of the end E by a plastisol sealing material **56**, the composition of which will be referred to in greater detail herein.

In all the embodiments of the invention, the plastisol **56** tenaciously adheres both to the can end E and the flange **44** of the rivet **40** to provide a seal, and consequently, in some embodiments, it is desirable that the shank **42** and the opening **48** accommodating it, be noncircular so that the rivet will not undesirably rotate and destroy the seal between the plastisol **56** and the end E.

In an alternate form of the invention, a round shank rivet is provided, but the opening **58** in the tab **48** (FIG. 13) is made considerably larger than the shank **42** of the rivet **40** so that rotation of the tab **48** will not rotate the rivet **40**, and destroy the adhesion between the end E, the rivet **40**, and the plastisol seal **56**.

In an alternate form of the present invention, illustrated in FIGS. 6 and 7 herein, it is shown that the marginal edge portions **60**, of the end E, surrounding and forming the opening **38**, are raised upwardly, in the orientation shown in FIGS. 6 and 7. In this way, when the riveting operation is completed and the tab **48** is fastened to the end E, the end may be inverted and the recess defined by the edge portions **60** provides means whereby the plastisol covering **56** will remain localized in an area adjacent the rivet flange **44**.

Further adavntages of the non-integral rivet and rivet seal construction just referred to will become more apparent as the description relating to the process of manufacture proceeds.

The tab **48** is shown as including two outwardly extending projections **50**, which, in the use of the device, may move downwardly as the radially outer edge portion of the tab **48** moves upwardly, whereby the projections **50** serve as a fulcrum for the tab **48**. This construction possesses further advantages when the end is made from tinplate, because greater initial effort is needed to open the tougher tinplate end, and accordingly, the additional mechanical advantage provided thereby may be utilized. The folded over outer edge portions **52** of the tab **48** provide the stiffness in the tab necessary for opening the container without bending the tab **48**.

The preferred process for making the easy opening ends of the present invention is somewhat diagrammatically indicated in FIGS. 9 through 15, inclusive. Basically, the steps comprise selecting a blank of raw material for an end E, and punching the opening **38** therein at the same time the end itself is punched or cut from sheet stock, on conventional double die presses for example, and prior to the time the curl **28** (FIG. 12) is imparted to the end. FIG. 11 shows the edge portions **60** forming the recess which may, if desired, be impressed into the end when the opening **38** is punched out.

Thus, FIG. 9 shows an end E which might be stamped by conventional double die stamping presses. This end includes a central portion **22** and a top outer edge portion **26**, before a curl is formed.

FIG. 10 shows the same end E, but the end includes the opening **38** which is formed by a suitable addition to the die used in the double die press.

FIG. 11 shows the marginal edge portions **60** near the opening **38** forming a recess surrounding the opening **38**. This recess may be formed contemporaneously with the punching of the opening **38**. In the practice of the invention, the recess and opening are formed in the same operation that cuts the end.

FIGS. 12 and following show that the curl **28** has been added to the outer edge of the ends. Curlers are conventional in the art and are well known. Their use to impart the curl forms no part of the present invention, and the curler may be used at whatever stage is desired in the process.

As illustrated in FIG. 12, a rivet **40** with the flange **44** formed thereon, is inserted through the opening **38** and a mandrel **64** is moved into position from below to support the rivet **40** in the desired position, as shown. The tab member **48** as shown in FIG. 13 is moved into the desired position with its opening **58** disposed above the upstanding shank **42** of the rivet **40**. This tab **48** may, as is now conventional in the manufacture of easy opening ends, be formed shortly before attachment and immediately thereafter fed into the position shown in FIG. 13 by conventional means known to those skilled in the art.

In FIG. 14 the tab **48** is shown to be lowered over the shank **42** of the rivet **40**, and the riveting mandrel **66** is shown to be in position for forming the head **46** on the rivet. Thereafter, the end is inverted and the Plastisol covering **56** is deposited in the desired location, whereupon the Plastisol **56** is cured by known means, such as by placing the end briefly in an oven or the like.

If a recess **60** is stamped into the end E, the Plastisol **56** may be deposited centrally of the recess in a viscous state, and the end may then be rapidly rotated or spun to distribute the Plastisol over the recess **60**, in an even covering, by centrifugal force. If desired, the end seam lining compound may be deposited at the same time the Plastisol is deposited. The end seam lining compound, known as "compound liner" in the art, is shown at **92** in FIGS. 12 and 15 only. This illustrates the fact that the compound liner may be applied at any time after the curl is formed. The manner of applying the liner is also conventional, namely by die lining or by a nozzle deposit system, such methods being known to those skilled in this art.

The steps referred to above, illustrating the process of the invention, and as referred to in the claims, are described in a preferred order, but their performance in the exact order indicated is not strictly necessary to the invention and is not intended to be so limited herein or in the appended claims. For example, the recess **60** may be

put into the end after forming the opening **38**. The opening **38** may be formed after the end is cut and curled; if desired, the entire process may be performed in a manner upside down relative to that shown in FIGS. 12 through 14, that is by placing the head **46** on the rivet on the inside surface of the can end E and leaving the preformed rivet head or flange **44** on the exterior thereof.

The process for cutting the score lines may be accomplished simultaneously with the placing and riveting of the tab **48** on the end, or may be accomplished therebefore. This process is well known in the art, and is accomplished by striking the end on the top surface thereof with a scoring punch of the desired configuration.

Another optional step in the process of the present invention comprises so-called post-repairing of the area of the end which is scored. The reasons for this operation, and applicant's novel method thereof are discussed below.

Normally, a problem is encountered with easy opening can ends of the type in which a scored or partially cut through portion is formed therein. In the manufacture of can ends, the metal from which the end is made is treated, as by placing one or more coats of lacquer or enamel thereon. For example, a modified epoxy resin primer, an oleoresinous primer, a phenolic primer, or like coating is applied to the end. A second, additional coating of a vinyl chloride-vinyl acetate copolymer may be applied over the primer. Certain of the coatings such as epoxy or phenolic type coatings, may not require primers, and accordingly the material from which the end is made may be one or more coats of the materials referred to above.

When the cutting or scoring operation is performed on the can end to define the region of weakness riveted to the finger tab portion, the bottom or inner end of the can end will often have the organic coating deposited thereon abraded or cracked. This breaking of the integrity of the coating results from the flow of the metal under impact and from the force of being struck by the die or punch impressing the score.

Where ends used for beer or like beverages are made from aluminum, small cracks or discontinuities in the coating are not necessarily deleterious, because metallic aluminum does not harm, and may in fact enhance, the flavor of the beer or ale.

However, because of the acidity and because of other reactive components present in soft drink beverages, and other foods and drinks, it is essential that the coating extend continuously over the can end. Accordingly, soft drinks and the like rapidly corrode metallic aluminum, especially in the area where the end is of a decreased cross sectional thickness because of the score line. Thus, a so-called post-repairing or further coating of scored aluminum ends is required before such ends are suitable for use with many of the products referred to above. In addition, the problem of corrosion exists in the case of all foods and beverages, including beer and the like, when a tinplated steel end is used. Thus, a post-repairing or interior coating operation is required on all tinplate ends.

Although it has been suggested that the coating operation remain to be performed after the end is formed, this is impractical in the can industry because the coatings are necessary to reduce friction in the curling and seaming operations performed on the can ends, and because it is impractical to apply an even, uniform coat to an already formed individual piece, such as a can end, of complex non-planar shape. The present invention overcomes this difficulty by coating the end, after it has been scored, with an interior coating material which will adhesively adhere to the primer or interior finished coating. After being sprayed with a coat of this material, the end is cured by passing it through a flash oven where it is cured for one minute or less at 400° F. This novel method of post-repairing the scored end of the type referred to herein or other known scored easy opening ends is simple and effective and eliminates the need for placing a wax or like coating on the ends, or for performing other more complex and less desirable operations to bring about the results set forth above.

In addition, this post-repair operation serves to coat the flange **44** of the rivet **40** to promote adhesion of the Plastisol **56** thereto, and thereby preserve the strength and gas-impermeability of the can end unit.

Referring now to FIGS. 16 through 21 inclusive, other variations of the invention are shown. For example, in FIG. 16 a lifting tab is shown which comprises a circular opening **70** surrounded by a generally ring-like member **72**. As is best shown in FIG. 17, this ring **72** comprises a flat top surface portion **74**, and inner and outer folded under bottom surfaces **76** and **78** respectively. In this construction the edges **76, 78** are rolled under so that there are no sharp edges projecting inwardly into the opening **70** formed by the ring **72**. The tab **48** includes a relatively flat rivet engaging front extension portion **80** adapted to engage the rivet **40**, in the manner set forth above. The score pattern illustrated may be used, if desired.

FIG. 18 shows a tab member **48** comprising an outer loop **82** of wire, adapted to be grasped by the fingers, and an inner loop **84** closely surrounding the rivet **40**. In this construction, the wire is smooth and round, and represents no rough edges to pose a cutting hazard to the fingers of the person manipulating the tab for removing the scored portion of the end.

FIG. 20 shows a form of tab **48** in which two somewhat centrally disposed stiffening ribs **86** are provided for the tab, and forward extensions **88** thereof may serve as a fulcrum for the lift tab **48**. An upwardly turned outer radial edge surface **90** may be provided to facilitate lifting the tab **48** when it is held in close contact with the can end E.

The configuration of the scored lines **32** imparted by the scoring punch may assume the alternate forms shown in the lines shown in FIGS. 16, 18 and 20. These are fully opening ends and may be provided as easily as beverage ends, differing therefrom only in the shape of the score pattern cut in the end.

The materials used in making the can end E of the present invention may be entirely aluminum or aluminum alloy, of the types and grades conventionally used for making aluminum can ends, normally 5082–H19 type aluminum alloy, of .0145 thickness, for example. In the alternative, the end E and the tab **48** may be made of tinplate, and the rivet **40** of aluminum or, all the elements or any combination may be made of any of the above materials. However, a soft and malleable material such as aluminum is generally preferred over a harder material for the rivet **40**. If the end is constructed of tinplate, a thickness of from about 0.006 to about .0100 is preferred, although thicker ends are sometimes used.

The thickness of residual portion **62** remaining under the score line **32** (FIG. 5) will normally be, in the case of an aluminum end, about 0.004 to 0.005 inch and in the case of a tinplate end, about 0.002 to 0.003 inch.

The material referred to above as Plastisol **56**, and used to cover the portion of the end surrounding the opening **38** and the rivet **40**, is preferably a plastisol material of a type well-known in the can and bottle cap industry. Although by "Plastisol" it is technically meant a dispersion of vinyl resin in a plasticizer, other materials are suitable for use in this invention, subject to the limitations set forth herein. The material for use must be approved by the Food and Drug Administration, in the event that the product is to be used for human consumption. Otherwise, such as in the case of motor oil and like products, any material compatible with the pressure and/or vacuum requirements and compatible with the contents of the container, may be used.

Plastisol and like synthetic materials suitable for use in the present invention are well known, and the characteristics of some of these are listed below: a typical Plastisol material I have found suitable for use in this in-

vention comprises a vinyl chloride resin, or vinyl chloride resin copolymerized with small amounts, say 5% or less, of vinyl acetate and/or vinyl alcohol. These resins are insoluble in, but dispersable in, typical plasticizers, such as dioctyl phthalate, dioctyl sebacate, diphenyl phosphate, tricresyl phosphate and the like. After the resin is dispersed in the plasticizer, it may be cured, as by heating 350° F. or more, whereupon solvation of the resinous component takes place, and the resulting cured composition is in the form of a solvated plastic, that is, an organic glass, solid solution, or ultra-high viscosity fluid, being somewhat flexible, and having excellent adhesion to the primers or inner end coatings referred to above.

Thus, a suitable material comprising 100% solids content is preferable for use in the present invention. Owing to manufacturing operations and speeds, a solvent base or volatile component system does not lend itself to advantageous application of such sealing material.

The materials referred to above are typically selected as those having the capability of adhering to the ordinary coatings applied to can ends, whether by way of the post-repairing operation referred to above, or otherwise. That is, such sealing material should be capable of tenaciously adhering to both enameled and enamel-free can ends. Typical interior coating enamels used on such can ends comprise, for example, oleoresinous lacquers or enamels, such as tung oil or linseed oil based materials, epoxy phenolics, epoxy esters, vinyl chlorides, modified vinyls or copolymerized epoxy phenolic type synthetic resin coatings.

On the other hand, some can ends are not coated, and the Plastisol should adhere equally well thereto.

It will be noted that although the Plastisol referred to above have a certain small but measurable permeability to gases, the design of the opening and the rivet therefor is such that the total area available for gas permeability is extremely small. Thus, for practical purposes, a gas-impermeable end may be provided by the present invention, although the seal material itself does have a measurable permeability to gases. In addition, other extrinsic factors, in practice, limit the shelf life of beverages and other like products possessing positive pressure or vacuums, to three to six months or less, thereby obviating the need for a permeability equal to that of a unitary metal end. Thus, the word gas-impermeable, as used herein, and as used in the appended claims, refers to a substantial, practical, although not necessarily complete, gas impermeability.

The other organic composition used in the present invention is the compound liner **92** referred to above. Typical compositions of such material generally comprises rubbery materials, for example, GR–S rubber (butadiene-styrene), or butyl rubbers, chloroprenes, chlorinated isoprenes, butadieneacrylonitrile copolymers, isobutylenes, chlorinated polyethylene rubbers or mixtures thereof. These materials are lined by the methods referred to above, in the form of water dispersion or in solvent based systems. Thereafter, the water or solvent is evaporated by air drying or heat, and the end is ready for the next step in the process.

It will thus be seen that the present invention provides a novel can end having novel advantages and characteristics, including those hereinbefore pointed out and others which are inherent in the invention.

It is also understood that certain modifications of the can end of the present invention may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. An easy opening can end unit comprising, in combination,

(a) a can end member and, included therein,

(b) a line of weakness in the form of a score line extending into but not through said end member at any point thereon and defining a removable portion of said end member, and, located in said removable portion,

(c) a first, non-circular opening adapted to receive a fastener therein,

(d) a tab unit, including a second opening therein to receive a fastener, said tab unit being adapted to be grasped by the fingers, and, connecting said tab to said removable portion,

(e) a fastener with two flanges and a shank portion extending therebetween, said shank portion being at least partly complementary in shape to said first opening, and of a size so as to prevent rotation of said shank portion within said first opening, said fastener fitting snugly in and extending through said first and second opening, and, covering said base of said fastener and the portions of the area immediately surrounding said fastener,

(f) a synthetic resinous sealing material, whereby a substantially gas-impermeable seal is formed across said opening in said can end member.

2. An easy opening can end unit comprising, in combination,

(a) a can end member and, included therein,

(b) a line of weakness in the form of a score line extending into but not through said end member at any point thereon and defining a removable portion of said end member, and, located in said removable portion,

(c) a first opening adapted to receive a fastener therein,

(d) a tab unit, including a second opening therein to receive a fastener, said tab unit being adapted to be grasped by the fingers, and, connecting said tab to said removable portion,

(e) a fastener with two flanges and a shank portion extending therebetween, said shank portion being relatively non-rotatably fixed in relation to said can end member, and in which said tab unit is rotatable relative to said shank portion, said fastener fitting snugly in and extending through said first and second opening, and, covering said base of said fastener and the portions of the area immediately surrounding said fastener,

(f) a synthetic resinous sealing material, whereby a substantially gas-impermeable seal is formed across said opening in said can end member.

3. An easy opening can end unit comprising, in combination,

(a) a can end member and, included therein,

(b) a line of weakness in the form of a score line extending into but not through said end member at any point thereon and defining a removable portion of said end member, and, located in said removable portion,

(c) a first opening adapted to receive a fastener therein,

(d) a tab unit, including a second opening therein to receive a fastener, said tab unit being adapted to be grasped by the fingers, and, connecting said tab to said removable portion,

(e) a fastener with two flanges and a shank portion extending therebetween, said fastener fitting snugly in and extending through said first and second opening, and, covering said base of said fastener and the portions of the area immediately surrounding said fastener,

(f) a synthetic resinous sealing material, and an upwardly extending recessed portion in said end member immediately surrounding said first opening, for receiving said synthetic resinous sealing material and locating it substantially entirely inside said recessed portion whereby a substantially gas-impermeable seal is formed across said opening in said can end member.

4. An easy opening can end unit comprising, in combination,

(a) a can end member and, included therein,

(b) a line of weakness in the form of a score line extending into but not through said end member at any point thereon and defining a removable portion of said end member, and, located in said removable portion,

(c) a first opening adapted to receive a fastener therein,

(d) a tab unit, including a second opening therein to receive a fastener, said tab unit being adapted to be grasped by the fingers, and, connecting said tab to said removable portion,

(e) a fastener with two flanges and a shank portion extending therebetween, said shank portion being relatively non-rotatably fixed in relation to said can end member, said fastener fitting snugly in and extending through said first and second opening, and, covering said base of said fastener and the portions of the area immediately surrounding said fastener,

(f) a synthetic resinous sealing material, whereby a substantially gas-impermeable seal is formed across said opening in said can end member.

References Cited

UNITED STATES PATENTS

2,029,328	2/1936	Ljungstrom	220—48
3,250,426	5/1966	Fraze	220—54
3,254,790	6/1966	Dunn	220—54
3,283,945	11/1966	Close	220—54
3,223,277	12/1965	Zundel	220—54

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