March 4, 1969 L. T. LA CROCE ET AL 3,430,802

EASY-OPENING CAN

Filed May 15, 1967

Fig. 1

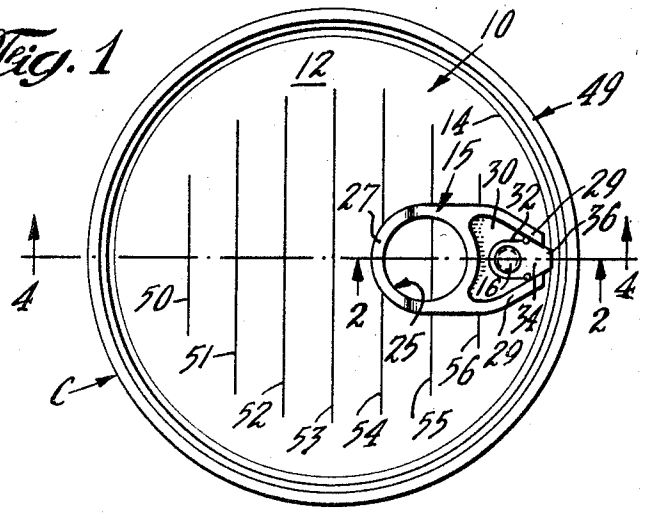
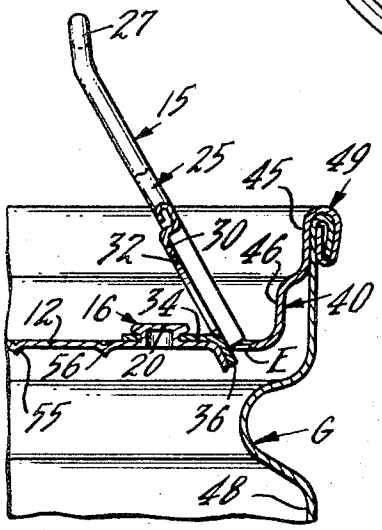


Fig. 2



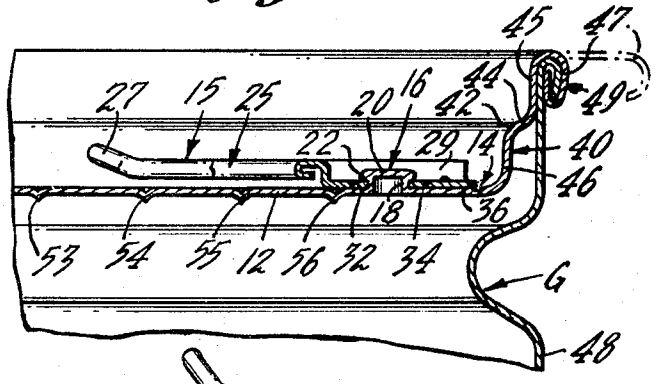


Fig. 3

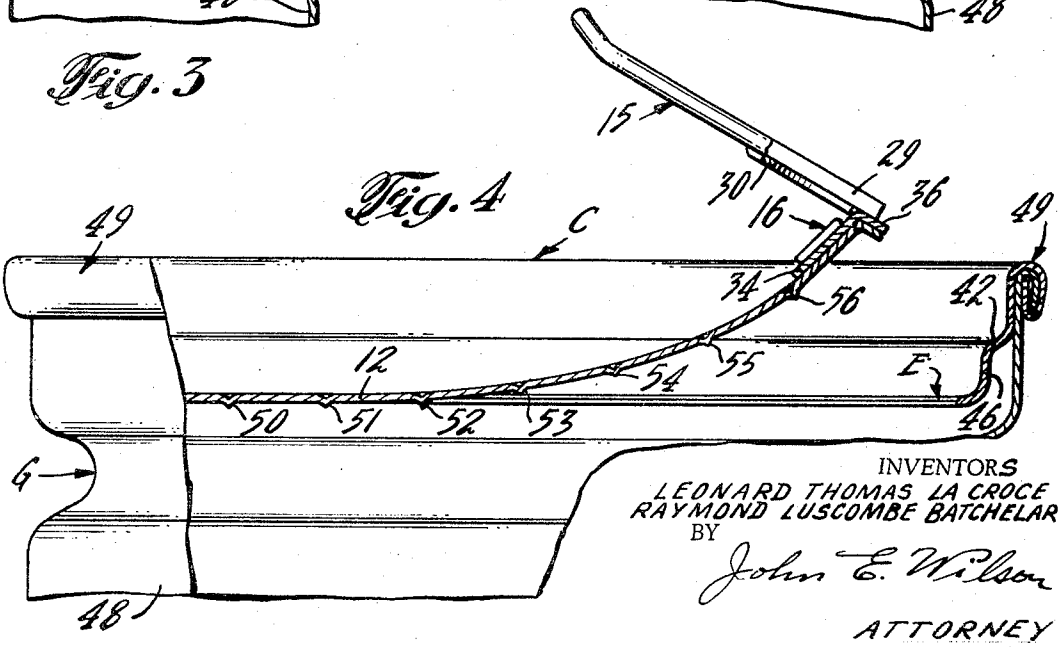


Fig. 4

INVENTORS
LEONARD THOMAS LA CROCE
RAYMOND LUSCOMBE BATCHELAR
BY
John E. Wilson
ATTORNEY

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EASY-OPENING CAN

Leonard Thomas La Croce, Paramus, and Raymond Luscombe Batchelar, Westwood, N.J., assignors to American Can Company, New York, N.Y., a corporation of New Jersey

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U.S. Cl. 220—54 5 Claims
Int. Cl. B65d 17/20

ABSTRACT OF THE DISCLOSURE

A container closure having a countersink wall which surrounds a large removable section defined by a peripheral score line and which has an opening tab secured to the removable section adjacent to the score line is provided with one or more beads which are formed in the removable section and extend in a direction generally transversely of the longitudinal axis of the opening tab. These beads prevent upward transverse bowing of the removable section and consequent distortion of the countersink wall during the opening operation and facilitate opening of the container.

BACKGROUND OF THE INVENTION

One of the more important recent developments in the can making industry has been the trend toward a type of "self-opening" can which is designed to be opened by means of an opening tab which is secured to a scored, removable section of a can end. One form of such a can is the "full-open" can in which substantially the whole of the top end panel of the can is removable. Such "full-open" cans are suitable for use in the packaging of solid or chunky products such as frozen juices and processed or frozen vegetables and fruits which are to be removed from the container in their entirety. They are also desirable for the packaging of products which are customarily removed by insertion of a hand or a spoon into the container. Examples of such products are candy and edible shelled nut meats.

In one form of full-open can, the removable section is defined by an endless score line which is disposed around the periphery of the top end panel, and the opening tab is secured to the removable section by a rivet at a point which is close to the score line so that the user can pull upwardly on one end of the opening tab to cause its other end to move downwardly and exert a downward force at or near the outer edge of the end panel to initiate the rupture of the score line. Thereafter, a continued upward and backward pulling on the opening tab causes further tearing of the metal in the score on both sides of the area of initial rupture and effects the eventual complete detachment of the removable section from the can.

Such a design has an inherent disadvantage, particularly when utilized in a round can having a circular score, in that after the breaking out of the removable section has been initiated by the upward pulling on the opening tab, further pulling on the opening tab to effect continued tearing of the score produces an upward bowing of the end panel into a generally transversely crowned or convex configuration which renders the end panel relatively stiff and inflexible. This crowning of the panel is particularly evident during the initial stages of this tearing of the score, since in these stages those portions of the score which are being torn extend laterally away from the direction in which the opening tab is being pulled, rather than being parallel to it. This condition is not conducive to easy tearing of the score, so that the pulling force on

the opening tab which is required to tear the score is often greater than that required to cause the upward bowing of the end panel, and thus the bowing does occur.

As a result of this upward bowing of the end panel and the consequent reduction of its diameter, the countersink wall of the end closure surrounding the end panel is pulled radially inwardly away from the can body wall to a position where its raw edge becomes a hazard to the subsequent user of the can. A considerable portion of the lifting force is wasted in effecting this distortion of the parts.

In addition, the bowed configuration of the end panel renders it relatively rigid and inflexible and prevents its torn out portion from curling or bending upwardly as the opening operation progresses so that the opening force, instead of being concentrated in those areas of the score where the tears are being made, is distributed by the stiffened end panel over a large portion of the score line on either side of the opening tab. This further increases the force required to open the container.

The present invention overcomes these problems by providing transverse beads in the removable section which reinforce it against upward bowing and thus prevent it from pulling the countersink wall inwardly during the opening operation. In addition, the beads provide break lines, or preformed lines of bend, which promotes the upward curling of the removable panel as it is being removed. As a result, the container can be easily removed without distortion of the countersink wall and with a relatively small opening force.

It is an object of the invention, therefore, to provide a full-open container of the type described wherein the removable section is so constructed that it does not bow upwardly when the container is being opened and thereby remains sufficiently flexible to enable it to be torn free from the remainder of the end panel with the exertion of minimum effort.

It is another object of the present invention to provide a full-open end closure which can be opened without having its countersink wall pulled inwardly away from the body of the can to a position where it could provide a hazard to the user.

It is a further object of the invention to provide a scored, removable end panel which is so constructed that it curls upwardly during the opening operation to a sufficient degree to insure that the force which is exerted on the opening tab by the user is concentrated in the score line at the ends of the tears to thus facilitate the tearing of the score.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Summary of the invention

According to the present invention, there is provided, in the end closure of a container having a removable central panel defined by a score line and having an opening tab secured to the central panel, one or more chordal beads in the central panel which extend substantially perpendicular to the general direction in which said central panel is removed from the container to prevent upward bowing of the end panel during the opening operation to thereby prevent the inward pulling of the countersink wall of the closure and to insure the requisite bending or curling of the already opened portions of the end panel during the opening operation so that a minimum force is necessary to separate the removable section from the panel.

Brief description of the drawing

FIG. 1 is a plan view of a can having an end closure made in accordance with the concepts of the present invention;

FIG. 2 is an enlarged sectional view taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view similar to FIG. 2 but showing the positions of the parts after the opening tab has been pulled upwardly to initiate the breaking out of the removable section; and

FIG. 4 is an enlarged sectional view taken substantially along the line 4—4 and showing the arrangement of the parts after the opening tab has been pulled upwardly and backwardly a sufficient distance to separate a portion of the removable section from the remainder of the end closure, the view clearly illustrating the desired upward curling or bending of the already separated portion of the removable section.

Detailed description of the drawing

There is shown in FIG. 1, as a preferred and exemplary embodiment of the instant invention, a cylindrical can C provided with a circular top end closure **10** having a generally flat wall with a removable section or central panel **12** which is defined by a peripheral circular score line **14** which encircles it. As shown in FIG. 2 an opening tab **15** is secured to the central panel **12** by a rivet **16** which is formed integral with the central panel **12** and which has an annular vertical shank wall **18** which extends through a hole formed in the opening tab **15**, a transverse top wall **20**, and an annular expanded bead **22** which holds the opening tab **15** against the central panel **12**.

The opening tab **15** includes a handle portion **25** which has an upturned end portion **27** which is easily grasped by the fingers of the user. Elongated hem portions **29** of the tab **15** border a central web portion **30** which is formed with a U-shaped slit **32** which defines a flap **34** wherein is located the hole in which the rivet **16** is secured.

The front end portion **36** of the opening tab **15** lies entirely outside of the U-shaped slit **32** so that when the handle portion **25** is lifted upwardly, the flap **34** is held flatly against the central panel **12** by the rivet **16** while a fold line develops between the ends of the U-shaped slit **32** as the rotating elongated hem portions **29** and the front end portion **36** of the tab **15** exert a downward force on the end panel **12** at or near the score line **14** to rupture the score and initiate the breaking out of the removable end panel **12**, as seen in FIG. 3.

The outer periphery of the removable panel **12** merges into an upwardly extending annular countersink wall **40** having a step **42** which includes a shoulder portion **44** and divides the countersink wall **40** into an upper portion **45** and a lower portion **46**. The tab **15** preferably is disposed below the level of the step **42**. Extending outwardly from the upper countersink wall portion **45** is an annular end flange **47** which is interfolded with the upper end portion of a can body **48** in a double seam **49**. The end flange **47** is shown in dot and dash lines in FIG. 2 as it exists prior to the double seaming operation. The general construction of the end closure heretofore described is covered by United States application for Letters Patent Ser. No. 624,051, filed Mar. 17, 1967, in the names of Leonard Thomas La Croce and Raymond Luscombe Batchelar.

An annular groove G is preferably provided in the can body **48** below the lower countersink wall portion **46** to shield the raw edge E which is created when the removable end panel **12** is stripped from the can. The can C contains a product (not shown) and is closed at its bottom in any suitable manner.

The removable central panel **12** has formed in it a series of beads, **50** through **56**, which are impressed downwardly in the panel and extend generally at right angles to the longitudinal axis of the opening tab **15** (which axis lies along the line 4—4) and to the direction in which the opening tab **15** is pulled to remove the end panel **12** from

the remainder of the end closure **10** after the opening tab has been lifted to initiate the tearing of the score line **14**. FIG. 4 shows the arrangement of the parts after the opening tab **15** has been further pulled upwardly and, also, to some extent, in a rearward direction diametrally of the end **10**, along its own axis to extend the tearing of the score line **14** in opposite directions from the point of original rupture to thereby separate a major portion of the removable central panel **12** from the end closure **10**. As seen in FIG. 4, the removable central panel curls or bends upwardly to assume a substantially curvilinear configuration as the opening tab **15** is thus pulled, the upward curling or bending of the end panel being promoted by the beads **50–56** which provide preformed break lines in the central panel **12**.

This upward curling of the panel **12** during the opening operation has the effect of concentrating the opening force exerted by the consumer on the opening tab **15** in those areas of the score line **14** where the tearing action is developing. This concentration of forces at such areas substantially reduces the effort required to remove the removable end panel **12** from the container.

The principal function of the beads **50–56** is to transversely reinforce the removable panel **12** against upward bowing during the opening operation, and thus prevent the countersink wall **40** from being pulled radially inwardly toward the center of the can C. If the countersink wall **40** could be pulled to a position where it would project inwardly beyond the protective groove G, the raw edge E created by the tearing of the score **14** would constitute a hazard to the consumer. The elimination of this distortion of the countersink wall **40** reduces the force required to open the can.

After the opening of the container has reached the stage of FIG. 4, further upward and rearward pulling of the opening tab **15** results in the full 360° tearing of the score **14** and full detachment of the end panel **12**.

It will be obvious that the beads **50–56**, instead of being indented into the end panel **14**, may also project upwardly therefrom and still function efficiently to reinforce the panel **12** against upward bowing and to facilitate the upward curling of the panel **12** during the opening operation. It is also obvious that the opening tab **15** may be seamed to the end panel in some other suitable manner, as by welding.

The foregoing treats only several preferred embodiments of the present invention and it is apparent that additions, deletions and modifications may be made hereto without departing from the principles of the present invention as defined in the following claims.

We claim:

1. An end closure for a can comprising a countersink wall, a score line defining a removable section surrounded by said wall, an opening tab extending from said section and adapted to be pulled upwardly to tear said removable section free from said can, and a plurality of parallel beads extending substantially perpendicular to the general direction in which said tab is pulled to prevent upward bowing of the removable section and permit the opened portion of said removable section to curl so that a comparatively small force is necessary to separate the removable section from the panel when said tab is pulled upwardly.

2. The component defined in claim **1** wherein said score is of circular configuration, said tab lies adjacent to the score on a diameter of said circle and said beads extend generally perpendicular to said diameter.

3. The component defined in claim **2** wherein said beads project interiorly of the can.

4. A circular end closure for a can comprising an end panel, a countersink wall, a circular score line adjacent to the periphery of said panel in proximity to said countersink wall to define a removable section, an opening tab extending from a location on said section adjacent to and on a diameter of said score line, a plurality of beads extend-

ing generally perpendicular to said diameter whereby said tab may be manipulated to pull said section free of said end closure by progressively tearing said closure along said score and said beads permit said section to bend in planes perpendicular to said beads but prevent said section from bowing upwardly during the opening operation so that only a comparatively small force is necessary to separate the removable section from said end panel.

5. The end closure defined in claim 4 wherein said beads project downwardly from the bottom of said end.

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GEORGE T. HALL, *Primary Examiner.*