Sept. 17, 1968 E. C. FRAZE 3,401,823

EASY OPEN CAN END

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Fig. 1

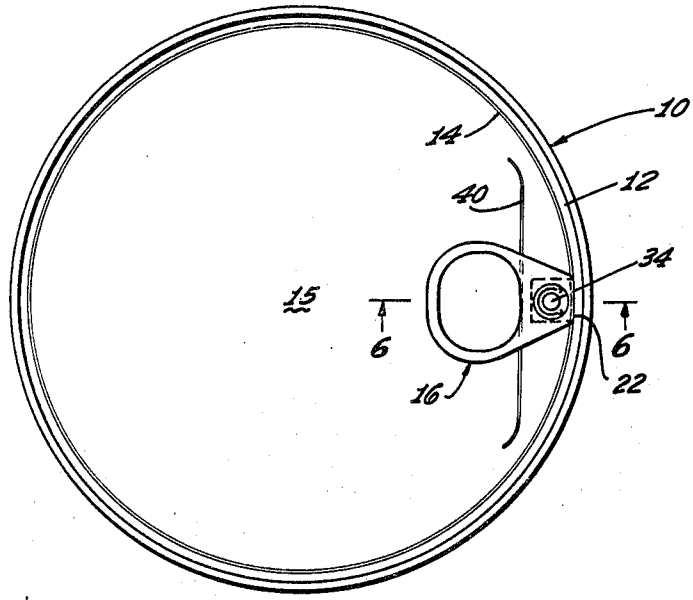


Fig. 2

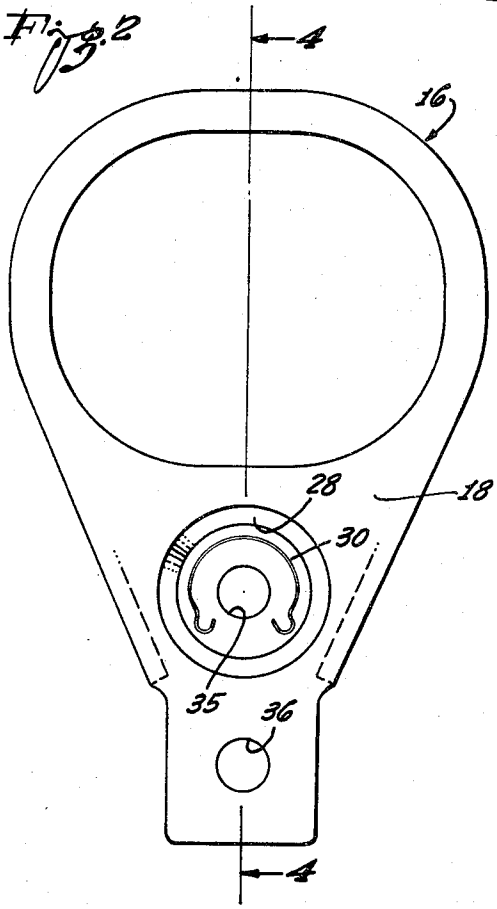
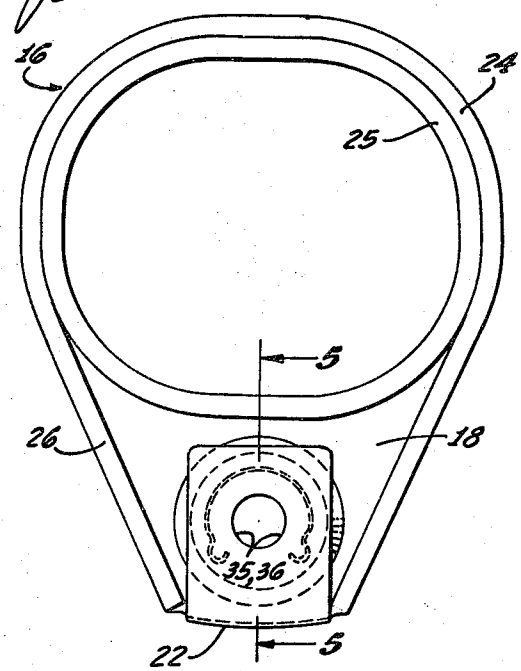


Fig. 3



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Fig. 4

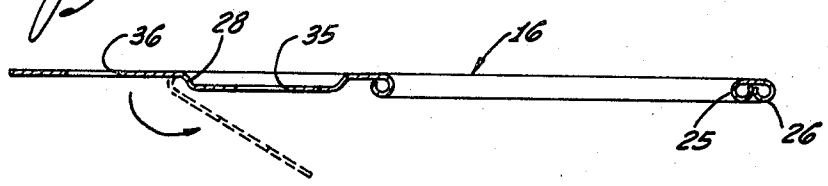


Fig. 5

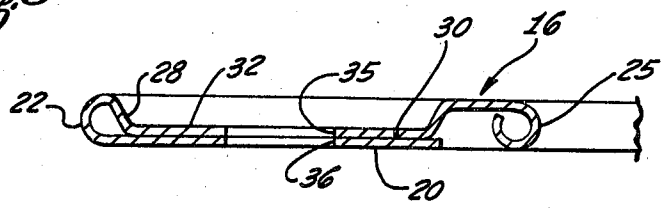


Fig. 6

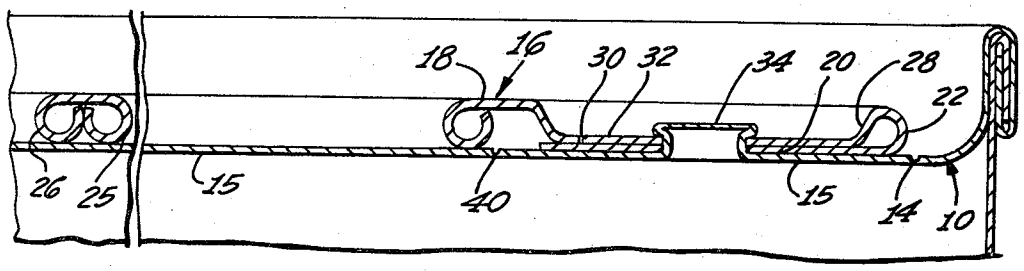
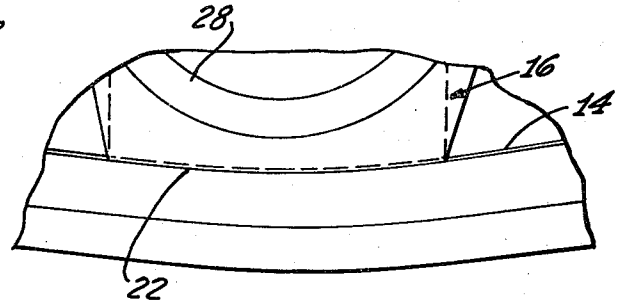


Fig. 7



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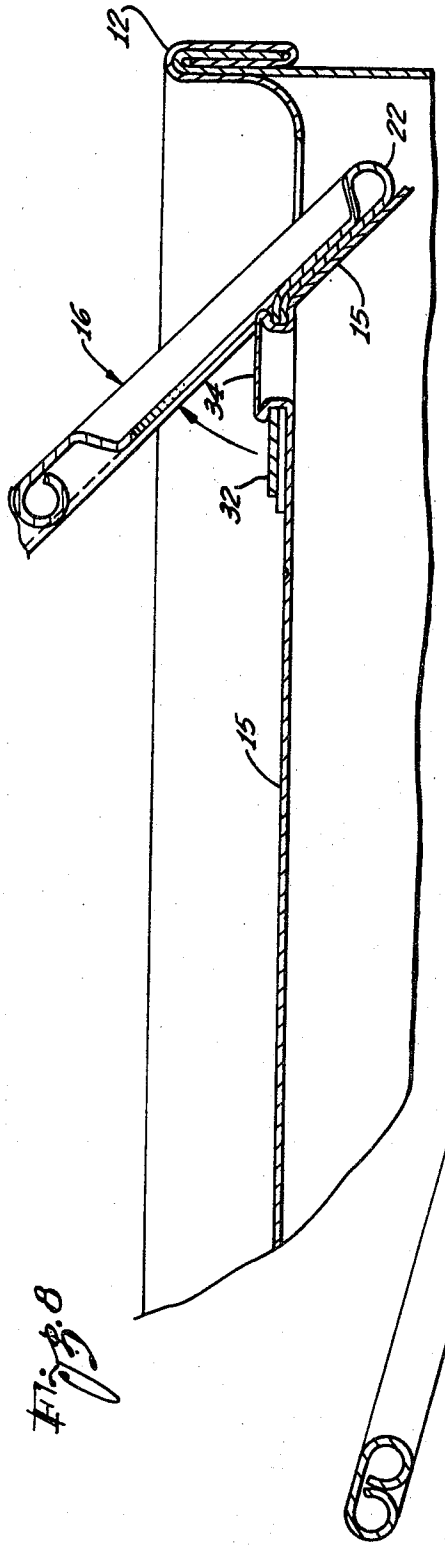


Fig. 8

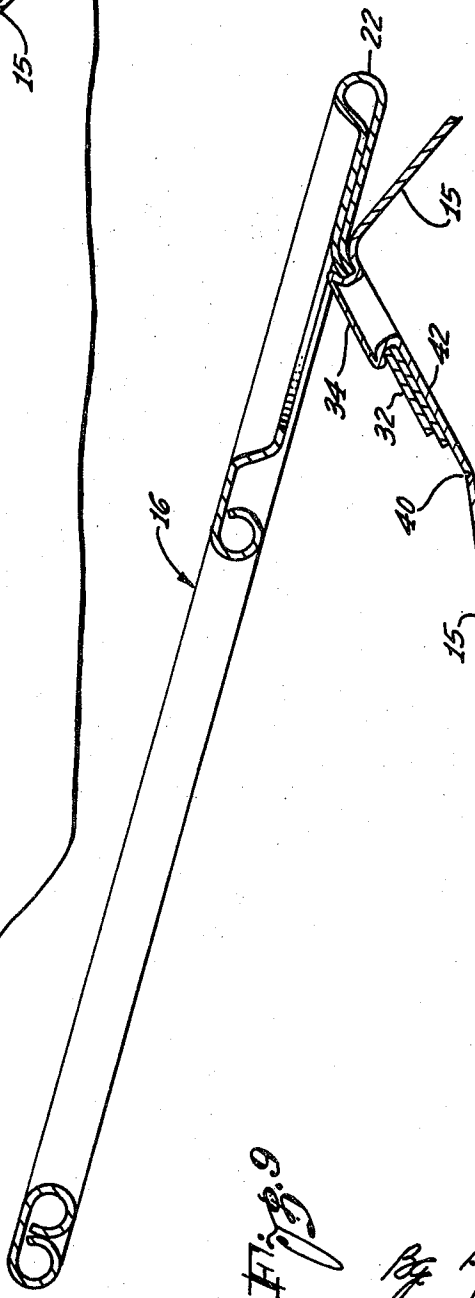
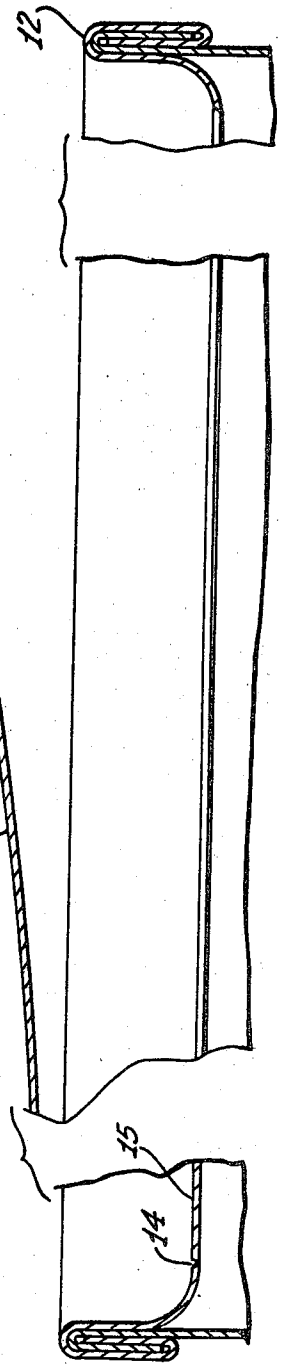


Fig. 9



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3,401,823

EASY OPEN CAN END

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11 Claims. (Cl. 220—54)

ABSTRACT OF THE DISCLOSURE

A tab for manual severance of a tear-panel of a can lid is divided into a main upper lever section and a lower folded-under section with the fold of the metal forming the forward working end of the lever section. The upper lever section is lanced to form a rearwardly extending tongue overlying the folded-under section and the tab is attached to the tear-panel by a rivet that extends through both the tongue and the folded-under section of the tab.

Background of the invention

For the purpose of manual severance of a tear-panel from a sheet metal can end, it is common practice to attach to the tear-panel a sheet metal tab which initially functions as a lever to initiate severance along a minor portion of the perimeter of the tear-panel and subsequently serves as a handle for exerting pulling force on the panel to complete the severance. Among the numerous types of such tabs heretofore deveoped for this purpose, one type that has had some measure of commercial success has a ring-shaped rearward handle end and a forward working end, the tab being flanged along its edges for stiffness. The tab is lanced along a U-shaped line forward of the ring-shaped handle to form a rearwardly extending tongue and the tongue is riveted or otherwise attached to the tear panel.

When the handle end of this prior art tab is swung upward and forward, the tab functions as a first class lever with a forward working end that depresses a peripheral portion of the tear-panel to initiate severance of the panel by rupture of the can end along an initial arc. The rearwardly extending tongue bends to accommodate rocking of the tab relative to the panel, the tongue serving in effect as a hinge connection between the tab and the tear-panel.

There is always a possibility that the tab will break loose from the panel instead of serving its purpose of completely severing the panel from the can end and this possibility is greatly increased when the user grasps the ring-shaped handle in a manner that cants the tab about its longitudinal axis as the tab is swung upward for the lever action. Such canting commonly causes rupture of the tab along a diagonal line extending forward from the base of the tongue to one side of the forward nose or working end of the tab, the diagonal rupture making the tab useless.

In other instances the metal cracks and ruptures along a line extending substantially straight forward from one of the two ends of the U-shaped lance to incapacitate the tab. The metal may even fail along two such forward lines simultaneously for complete separation of the tab from the tear-panel when severance of the panel is barely started.

In many instances the tab functions effectively as a lever to initiate severance of the tear-panel but is incapable of withstanding the subsequent pulling force for completing the severance. The pulling force may cause the tab to rupture along the above-mentioned forwardly extending lines or may cause the metal to fail along the transverse bend line of the rearwardly extending tongue

for complete separation of the tab from the tear-panel.

A primary problem solved by the present invention is to prevent the various described premature failures of the tab.

A related problem solved by the invention is to reduce the magnitude of the pulling force that is required for removal of the panel after initial severance by the lever action. The reduction in the required pulling force not only is a further safeguard against structural failure of the tab but is also important in making it easy for the user to carry out the second step of the severing operation.

Summary of the invention

To solve the problem of preventing rupture of the tab, the sheet metal tab of the present invention has an upper main lever section and a lower folded-under section underlying the lever section, the upper lever section having a rearward handle end and having a forward working end that extends into proximity with the arcuate edge of the tear-panel. The folded-under section of the tab is joined integrally to the main lever section by a transverse bend in the sheet material at the working end of the lever section. Thus the lever section and the folded-under section together with the underlying can end form a lamination of three layers of sheet material. For the purpose of attaching the tab to the tear-panel, the three layers are suitably connected together in the region of the rearwardly extending tongue, for example by means of a rivet extending through the three layers. In the preferred practice of the invention a hollow rivet to serve this purpose is formed in the sheet material of the tear-panel in a well known manner.

Initial lifting of the handle end of the lever section results in downward bending of the three layer lamination relative to the plane of the can lid, the bending occurring forwardly of the tongue to initiate severance of the tear-panel without changing the position of the three layers in the region of the rearwardly extending tongue.

The reinforcing layer of metal provided by the folded-under portion of the tab prevents structural failure of the tab in two ways. In the first place, the additional layer doubles the amount of sheet material that anchors the tab to the tear-panel. In the second place, the additional layer of sheet metal increases the radius at which the metal is bent with consequent reduction in the extent to which the sheet material is fatigued by the bending action. It is further apparent that the additional layer of metal at the joint between the tab and the panel greatly increases the strength of the joint to prevent failure of the joint when the pulling force is applied to the panel by means of the tab to complete the severance of the panel.

The problem of reducing the pulling force that is required to complete the removal of the tear-panel after the initial rupture of the metal by the lever action is accomplished by scoring the panel relatively lightly along a transverse line under the tab. The light scoring is insufficient to make the sheet material vulnerable to rupture but is sufficient to form a transverse bend line along which the sheet metal of the panel bends upwardly in response to the initial pulling force. The bend line formed by the light scoring defines with the perimeter of the tear-panel a segment of the tear-panel and the tab is attached to this segment.

When the handle end of the tab is lifted to carry out the initial severance of the tear panel, the metal is ruptured along a substantial arc at the perimeter of the tear panel, the extent of the arc being at least approximately 30–50 degrees. Wi h the sheet material initially severed along this relatively liberal arc, it has been found that the second step of pulling on the tear-panel to complete

the severance of the tear-panel may be carried out with only moderate pulling force providing that the initial pulling force results in upward bending of a forward segment of the tear-panel because of the initial upward bending of the sheet material. The initial upward bend makes possible a peeling action that requires relative little manual force because it creates highly effective shearing stress along the periphery of the panel. The purpose of lightly scoring the tear-panel along the transverse line under the tab is to facilitate this initial upward bending of a forward segment of the tear panel and thereby minimizes the magnitude of pulling force that is required to complete the severance of the tear-panel from the can lid.

The various features and advantages of the invention may be understood from the following detailed description and the accompanying drawings.

Brief description of the drawings

In the drawings, which are to be regarded as merely illustrative:

FIG. 1 is a plan view of a can lid of relatively large diameter incorporating the presently preferred embodiment of the invention;

FIG. 2 is an enlarged plan view of the tab at an intermediate stage in the fabrication of the tab before the sheet material is bent to form the folded-under section of the tab;

FIG. 3 is a bottom plan view of the completed tab prior to the riveting of the tab to the tear-panel;

FIG. 4 is a longitudinal section along the line **4—4** of FIG. 2 indicating in broken lines how the sheet material of the tab is bent to form the folded-under section;

FIG. 5 is a greatly enlarged fragmentary longitudinal section of the tab along the line **5—5** of FIG. 3 showing how the lever section of the tab is offset downwardly into intimate face-to-face relation with the folded-under section of the tab;

FIG. 6 is a fragmentary longitudinal section of the can lid longitudinally of the tab showing the relation of the tab to the can lid prior to the manipulation of the tab for removal of the tear-panel;

FIG. 7 is a greatly enlarged fragmentary plan view showing how the nose or working end of the lever section of the tab extends into proximity with the perimeter of the tear panel;

FIG. 8 is a greatly enlarged section showing a portion of the can lid and a portion of the forward end of the tab, the view illustrating how initial elevation of the handle end of the tab causes initial rupture of the tear-panel along an arc at the perimeter of the tear panel; and

FIG. 9 is a similar view showing the effect of the application of pulling force to the partially severed panel, the view showing how the pulling force initially tilts a forward segment of the tear panel upward in a manner that reduces the magnitude of the continued pulling force that is necessary for completing the severance of the tear-panel.

Description of the preferred embodiment

FIGS. 1 and 6 show a can end, generally designated by numeral **10**, having the usual peripheral flange **12** by means of which it may be joined to a cylindrical can body in a well known manner. The can end is scored along a continuous circular line **14** that lies close to the flange **12** to define a full sized tear-panel **15**, the scoring being relatively deep to leave a relatively thin residual web of metal along the score line. A tab, generally designated **16**, is constructed in accord with the teachings of the invention and is suitably attached to the tear-panel with the tab aligned longitudinally along a diameter of the tear-panel.

The tab **16** which is made of suitable sheet material has an upper lever section **18** and an underlying folded-under section **20** which is best shown in the bottom plan view in FIG. 3, the two sections being integrally interconnected by a rounded fold **22**. The upper lever section **18** of the tab has a rearward end forming a ring-shaped handle **24** and has a forward working end, the nose of which is formed by the fold **22**. The fold or nose **22** extends into close proximity to the line of scoring **14** and preferably the nose or fold is arcuate in plan view as shown in FIG. 7 to conform more or less with the curvature of the score line **14**.

The tab **16** is suitably flanged for stiffness and for this purpose the sheet metal of the tab may be rolled under to the configuration shown in FIG. 6 to form an inner rolled bead **25** that follows the inner circumference of the ring-shaped handle **24** and to form the similar outer bead **26** that follows the outer circumference of the ring-shaped handle. The outer bead **26** extends forward on the opposite sides of the lever section with the two ends of the outer bead extending to the region of the nose or fold **22**, as may be seen in FIG. 3.

In the construction shown, the forward portion of the lever section **18** of the tab is formed with an offset or depression **28** which is circular in plan as shown in FIG. 2 and which, as shown in FIG. 5, is of sufficient depth to place the forward portion of the lever section of the tab in intimate face-to-face relationship to the folded-under section **20** of the tab. At the bottom of the circular depression **28**, the forward portion of the lever section **18** of the tabe is lanced along a generally U-shaped line **30** to form a rearwardly extending tongue **32** in the material of the lever section. Preferably the two ends of the U-shaped lance **30** are turned towards each other with each of the two ends of the lance of U-shaped configuration as shown in FIG. 2.

When the tab is mounted on the can lid in firm anchorage with the tear-panel **15**, the described construction provides a lamination of the three layers of sheet material as may be seen in FIG. 6, the upper layer being the depressed forward portion of the lever section **18** of the tab, the bottom layer being the tear-panel **15** and the intermediate layer being the folded-under section **20** of the tab. These three layers of sheet metal are fixedly interconnected in the region of the rearwardly facing tongue **32** that is formed by the lance **30**. Preferably, as shown in FIG. 6, the three layers are interconnected in a well known manner by a hollow rivet **34** that is formed in the material of the tear-panel **15**. For this purpose as best shown in FIG. 5, the rearwardly extending tongue **32** of the lever section is formed with a circular aperture **35** and the folded-under section **20** of the tab is formed with a similar aperture **36** with the two apertures in register with each other.

As heretofore stated, a feature of the invention is the provision of a relatively light line of scoring **40** in the tear panel transversely of the longitudinal axis of the tab and rearwardly or radially inwardly of the rivet **34**. Preferably the opposite ends of the score line **40** are curved as shown in FIG. 3. The light score line **40** defines with the heavier circular score line **14** that may be termed a forward segment **42** of the tear panel **15**.

When the tab **16** is swung upward by means of the ring-shaped handle to a relatively steep angle as shown in FIG. 8, the previously mentioned three-layer lamination bends as shown to provide the required pivot for the lever action. The downward pressure of the forward end of the lever section against the perimeter of the tear panel causes initial severance of a portion of the perimeter of the tear-panel in the manner shown in FIG. 8, the perimeter being severed along an arc at least approximating 30–40 degrees.

With the initial severance of the perimeter of the tear-panel along such an extensive arc and with the sheet material of the tear-panel weakened along the score line **40**, the initial pulling force applied to the tab **16** causes the forward segment **42** of the tear-panel to bend upward along the score line **40** as shown in FIG. 9. As heretofore stated this initial upturn of the forward portion of the tear-panel is highly favorable for relatively easy comple-

tion of the severance of the tear-panel by the pulling force.

My description in specific detail of the presently preferred embodiment of the invention will suggest to those skilled in the art various changes, substitutions and other departures from my disclosure within the spirit and scope of the appended claims.

I claim:

1. In an easy open can end of sheet material having a relatively deep line of scoring defining a tear-panel with an arcuate edge and having a tab of sheet material attached to the tear-panel to serve as a lever to initiate severance of the tear-panel and subsequently to serve as a pull handle to complete the severance, the improvement comprising:

said tab having a forward transverse fold dividing the tab into a lever section and a folded-under section underlying the lever section,

the lever section having a rearward handle end and a forward working end extending into proximity with said arcuate edge,

said folded-under section being joined to the lever section by a transverse bend of the sheet material at the working end of the lever section,

said lever section, folded-under section and the can lid forming a lamination of three layers of sheet material,

the forward portion of the lever section that overlies the folded-under section being lanced to form a rearwardly extending tongue,

said three layers being united with each other in the region of said rearwardly extending tongue to anchor the tab to the tear-panel,

whereby initially lifting the handle end of the lever section results in inward bending of said three-layer lamination relative to the plane of the can lid forwardly of the tongue to initiate severance of the tear-panel without substantially changing the position of the three layers relative to the plane of the can top in the region of the tongue.

2. An improvement as set forth in claim **1** in which said forward transverse fold of the tab forms the working end of the lever section of the tab.

3. An improvement as set forth in claim **2** in which said forward transverse fold is rounded in plan configuration to form a rounded nose at the working end of the lever section of the tab.

4. An improvement as set forth in claim **1** in which said three layers are united by a rivet.

5. An improvement as set forth in claim **4** in which said rivet is a hollow rivet formed of the sheet material of the tear-panel.

6. An improvement as set forth in claim **1** in which said forward portion of the lever section is lanced along a line of generally U-shaped configuration to form said tongue with the two ends of the lance forming U-shaped curves turned towards each other.

7. An improvement as set forth in claim **1** in which the handle end of the lever section of the tab is ring-shaped and in which marginal portions of the lever section form stiffening flanges that extend forward on both sides of the tab to the region of the transverse fold.

8. An improvement as set forth in claim **7** in which said stiffening flanges are rolled flanges on the under side of the lever section and said forward portion of the lever section is offset downward into face-to-face relation to said folded-under section of the tab.

9. An improvement as set forth in claim **1** in which the can end has a second line of scoring under the tab extending transversely of the tab, said second line of scoring defining with said arcuate edge of the panel a forward segment of the panel, the second line of scoring being shallow to form a bend line to facilitate upward bending of said forward segment relative to the remainder of the tear panel when pulling force is initially applied to the lever section of the tab to complete the severance of the tear panel.

10. An improvement as set forth in claim **9** in which the tab is attached to said segment radially outwardly of the can end from said bend line.

11. A lever-tab for use with a can end having a line of score defining a segment, removable from the can end by rupture of the line of score, having fastening means for securing the lever-tab to said removable segment, comprising:

a ring-like handle element;

a lever section formed as a rigid integral extension of said handle element;

said lever section being formed with U-shaped slit defining a tongue having its free end adjacent said ring-like handle element;

a second lever section engaged with the lower face of said first mentioned lever section and integrally joined therewith by an interconnecting fold forming a nose for said lever-tab and reinforcing the first mentioned lever section against forces tending to enlarge said slit;

the tongue and second lever section being formed with registering openings for receiving the fastener means of the removable segment of the can end whereby said tongue and second lever section can be secured to the removable segment of the can end with the said second lever section facewisely engaged with said can end.

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