United States Patent [19]

Heffner

[11] **3,744,666**

[45] **July 10, 1973**

[54] **EASY OPENING DEVICE IN A CONTAINER WALL**

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[21] Appl. No.: **212,561**

[52] **U.S. Cl.** ..... **220/48,** 220/44 R, 220/54

[51] **Int. Cl.** **B65d 17/20,** B65d 17/00

[58] **Field of Search** 220/48, 54, 27, 44

[56] **References Cited**

UNITED STATES PATENTS

3,618,815	11/1971	Heffner	220/48
3,604,589	9/1971	Fraze	220/54

Primary Examiner—George T. Hall

Attorney—David W. Brownlee

[57] **ABSTRACT**

An easy opening device is provided in a container wall including a score line in the container wall defining a panel which is at least partially severable from the wall and a tab with a nose end overlying the container wall and affixed to the removable panel near its starting end and a handle end toward the opposite edge of the container wall, and which further includes a tear strip defined by a U-shaped score with its open end toward the starting end of the removable panel and the handle end of the tab attached to the starting end of the tear strip.

11 Claims, 8 Drawing Figures

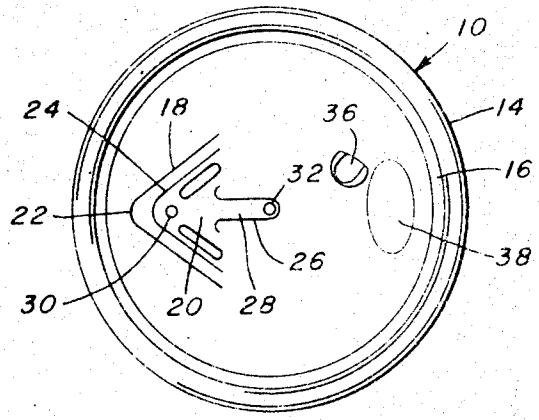


FIG. 1.

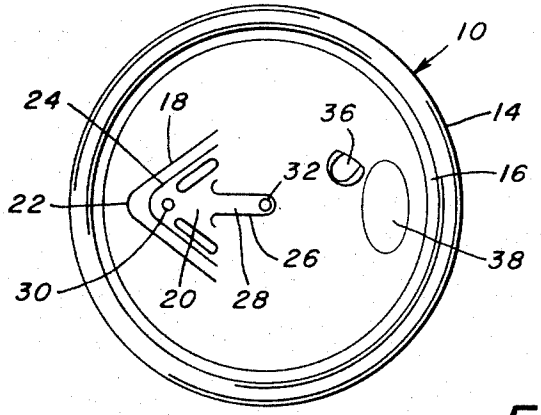


FIG. 3.

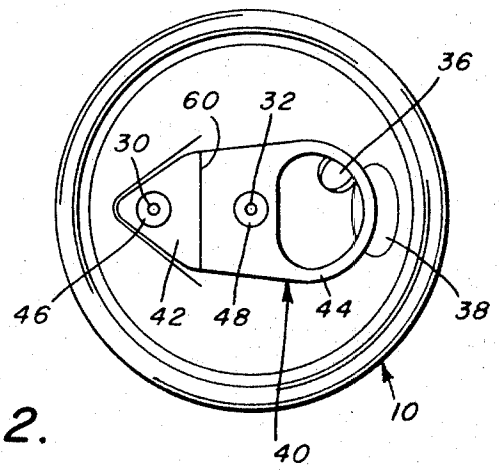


FIG. 2.

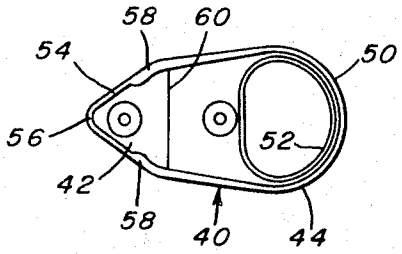


FIG. 4.

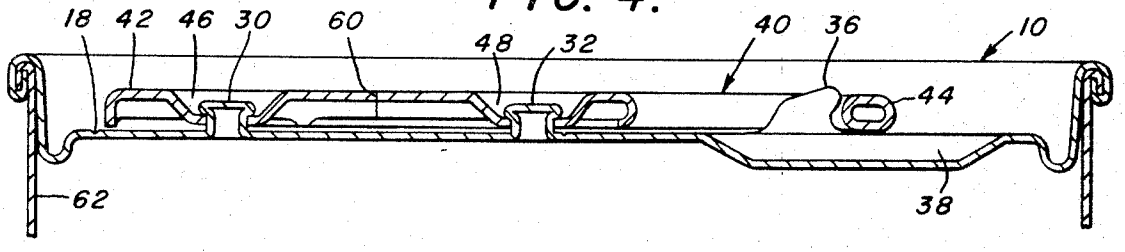


FIG. 5.

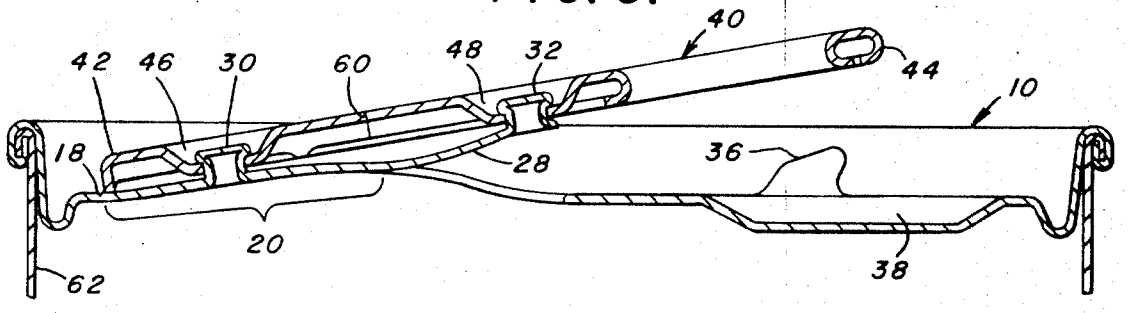


FIG. 6.

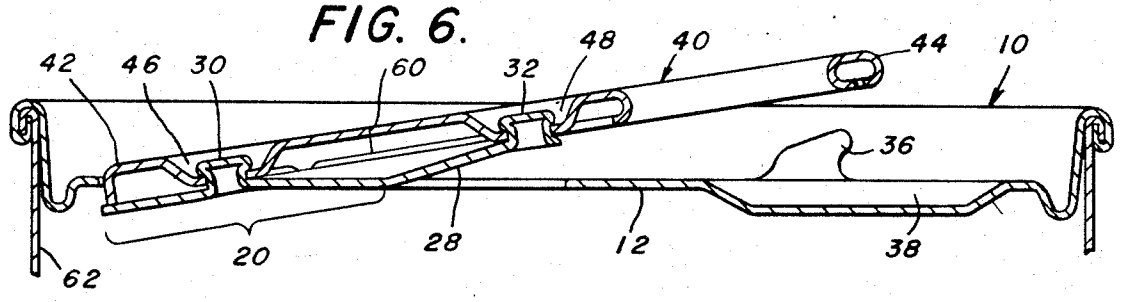


FIG. 7.

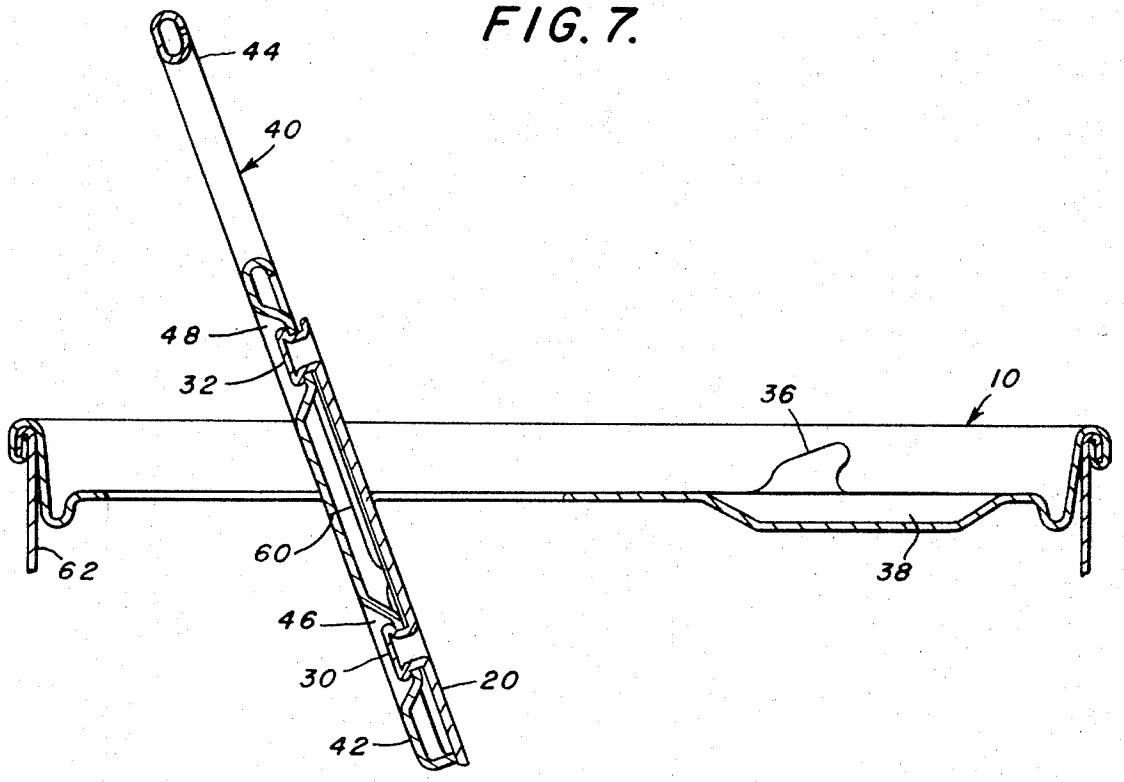
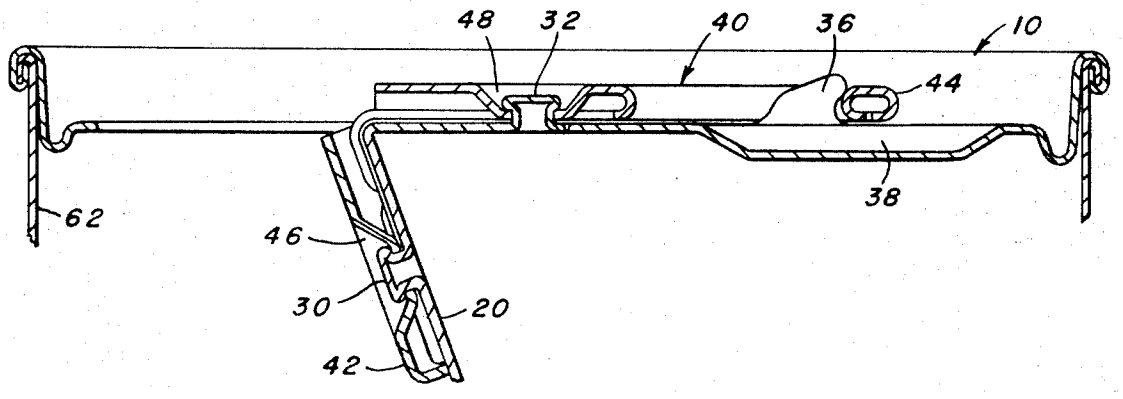


FIG. 8.



EASY OPENING DEVICE IN A CONTAINER WALL

BACKGROUND OF THE INVENTION

It is known to provide easy opening devices with pull tabs thereon which remain attached to a container wall after opening in order to reduce litter problems which may be caused by small tabs which are carelessly discarded. For example. U.S. Pat. No. 3,618,815 illustrates and describes an easy opening device comprising a V-shaped opening flap in a container wall and a tab attached to the opening flap for plunging the flap into a container on which the container wall is attached. The tab on the easy opening device disclosed in the patent has a nose end and a handle end with a weakening line therebetween so that, after opening, the handle end of the tab can be depressed to a nonobstructing position on the container wall without closing the pouring orifice which has been formed. Such easy opening device also includes a tear strip in the container wall adjacent the opening flap and attached to the handle end of the tab for providing a vent opening in the container wall. This tear strip is completely severed from the container. The patent discloses no connection of the handle end of the tab to the container wall for controlling bending of the opening flap during opening.

SUMMARY OF THE INVENTION

This invention provides an improvement for an easy opening device such as that which is illustrated and described in U.S. Pat. No. 3,618,815, which improvement comprises means attached to the handle end of a tab and to a container wall for controlling bending of the tear panel in the container wall during opening. In a preferred embodiment of the invention, such bend control means comprises a U-shaped tear strip in a container wall having its open end toward an opening flap and its closed end attached to the handle end of a tab.

Accordingly, an object of the invention is to provide an easy opening device which includes means for controlling bending of a removable panel portion during opening.

Another object of the invention is to provide an improved easy opening device which remains attached to the can end after opening.

A further object of the invention is to provide a nonremovable easy opening device which forms a relatively large pouring orifice and a small vent opening in a can end.

Another object of the invention is to provide means in an easy opening device with a tab thereon which can be lifted to open a container wall with a minimum of force while plunging a relatively large portion of the container wall downward into a container.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be more fully understood and appreciated with reference to the following description and the drawings appended hereto wherein:

FIG. 1 is a top plan view of a container wall of the invention prior to attachment of a tab to the end;

FIG. 2 is a bottom plan view of a tab for attachment to the container wall of FIG. 1;

FIG. 3 is a top plan view of the container wall of FIG. 1 after attachment of the pull tab of FIG. 2 to the end;

FIG. 4 is a cross-sectional view of a container wall of the invention affixed to a container;

FIG. 5 is a cross-sectional view similar to FIG. 4 and further illustrating initiation of opening;

FIG. 6 is a cross-sectional view similar to FIG. 4 and further illustrating initiation of rupture of an opening flap in the container wall;

FIG. 7 is a cross-sectional view similar to FIGS. 4–6 and further illustrating completion of the lifting portion of the opening sequence; and

FIG. 8 is a cross-sectional view similar to FIGS. 4–7 and further illustrating the handle end of the tab depressed to a non-obstructing position on the container wall.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. 1, a sheet metal container end wall 10 for a can or other container is illustrated before a tab is attached to the end. Preferably, can end 10 is made of aluminum or an alloy thereof, although it can also be made of other metals or plastic materials. Wall 10 may have peripheral seam 14 therearound for joining it to a container body by conventional methods, and may have a peripheral groove 16 adjacent seam 14 to strengthen the end against reversal or outward doming. To provide a pouring orifice in the can end, a V-shaped score line 18 may be formed in the wall 10 to define a flap 20 which can be depressed into a can to which the end wall is affixed. A rounded apex 22 of flap 20 is located adjacent the periphery of wall 10 to provide a starting end on the flap, and the ends of score 18 extend outwardly from the apex at an angle of approximately 60° to locations approximately one-third of the distance across the end wall so that a relatively large pouring orifice can be formed. An anti-fracture score 24 may also be provided in opening flap 20 adjacent and parallel to score 18 as is well known in the art.

It is a feature of this invention that container wall 10 includes a U-shaped score 26 defining a tear strip 28 which is only partially severable from the container end. Previously known container walls, as exemplified by the container wall described in U.S. Pat. No. 3,618,815, have included a second score line defining vent opening which was completely removed from a container wall rather than only partially severable as in the present invention. By providing a tear strip which is only partially severable, the present invention provides a permanent connection between container wall 10 and handle end 44 of tab 40 which controls bending of opening flap 20 along a predetermined line. The location of such a predetermined bend line is generally dependent on the location of the connection of tear strip 28 to container wall 10. By locating the furtherest outward extent of score 26 on or near a line drawn through the ends of score 18, the predetermined bend line will occur near the base of opening flap 20 defined by score 18. So locating the bend line means that a relatively large pouring orifice will be formed in container wall 10 as will be described. As illustrated, the ends of score 26 may have an outwardly curved tail of approximately 180° to resist accidental severance of tear strip 28 from end wall 10.

Container wall 10 further includes two integral upstanding hollow rivets 30 and 32, one in the starting end of opening flap 20 and one in the starting end of tear strip 28 for attachment of a tab to the opening flap and the tear strip. Rivet 30 in opening flap 20 is preferably located near the apex 22 of the flap in order to facilitate initiation of rupture of score 18 around such

apex. U-shaped score **26** may be formed closely adjacent the base of rivet **32** and preferably in the area around the base of the rivet which was worked during forming of the rivet. This is intended to reduce the force which is required to rupture such score as is well known in the art.

It is another feature of the invention that container end wall **10** includes two downwardly embossed ribs **34** in opening flap **20** which help to control bending of the opening flap along a line drawn through the outermost extent of score **26** in the end wall. Ribs **34** are preferably substantially parallel to score line **18** along opposite sides of flap **20** and extend from approximately the desired line of bending of the flap toward the apex of the flap. The ends of ribs **34** toward the center of container wall **10** are preferably located approximately equal distance between the ends of score **18** and score **26** so that flap **20** is reinforced centrally between the end of such scores. The function of ribs **34** will be further explained in the description of the opening of a container end of the invention.

Container end **10** may further include an upwardly projecting embossed hook formed therein for restraining handle end **44** of tab **40** against the container wall after the tab has been manipulated to open flap **20.** An embossed hook of this type and a method of forming the same are illustrated and described in application Ser. No. 212,562, filed concurrently herewith on Dec. 27, 1971. Embossed hook **36** may be formed in a variety of locations but is preferably located on end wall **10** so that it can be hooked over a bead around an aperture in the handle end of a tab to restrain such handle end against the end wall of the container end. This will be more fully understood and appreciated with reference to FIGS. **3** and **7,** and the description of such figures. Container wall **10** may further include an embossed depression or finger well **38** in the container wall under handle end **44** of tab **40** (FIGS. **2** and **3**) which is hereinafter described to facilitate gripping such a tab.

Turning to FIG. **2,** a tab **40** is illustrated for attachment to a container wall **10.** Tab **40** may be formed from sheet metal, preferably aluminum or an alloy thereof, and has a triangular shaped nose end **42** and a handle end **44** with a large aperture therein to facilitate gripping by a user. Referring further to FIGS. **3** et.-seq., tab **40** has a substantially planar upper wall with two downwardly embossed wells **46** and **48** therein and with apertures in the bottom of the wells for receiving integral rivets **30** and **32** for attachment of the tab to container wall **10.** To strengthen tab **40** and avoid sharp edges, the sheet metal of the tab may be curled downwardly and inwardly around the large finger aperture in the handle end of the tab and along the outer edges of the tab to form beads **50** and **52** respectively. Nose end **42** of tab **40** may also be reinforced by means of the downwardly directed flange **54** which may have a point **56** on the end of the tab nose to facilitate rupture of the score line at the starting end of opening flap **20** in the can end.

Re-entrant flanges **58** are preferably provided on the bottom of tab **40** intermediate bead **50** and flange **54** along both sides of the tab to provide hinge elements on the tab as will be described. Re-entrant flanges **58** may be substantially parallel to the upper wall of the tab and are directed inwardly toward the longitudinal axis of the tab. Except for these flanges **58,** tab **40** is weakened along line **60** between nose end **42** and handle end **44** so that the handle end of the tab can be depressed to a non-obstructing position on a can end after opening. This weakening may be in the form of a cut through the sheet metal of the tab along line **60.** Uncut flanges **58** provide ligaments of metal for maintaining tab **40** substantially rigid during lifting, and thereafter form bendable hinge elements for depressing handle end **44** of tab **40** to a non-obstructing position on a can end after opening. The sheet metal in flanges **58** preferably lies substantially parallel to the plane of tab **40** and to a container end upon attachment of the tab thereto to permit relatively easy bending of the flanges and the tab in a downward direction, but provide adequate strength to resist bending of the tab in an upward direction.

FIG. **3** illustrates a tab **40** attached to a container end **10** by means of two integral rivets **30** and **32.** As attached, nose end **42** of tab **40** overlies opening flap **20,** and handle end **44** of the tab overlies tear strip **28** toward the opposite side of the container end. The outer end of handle end **44** is disposed over finger well or depression **38** in container end **10** so that a user can more easily grip the handle end of the tab. Lock-down hook **36,** which is upwardly embossed in wall **10,** is disposed within the large finger aperture in handle end **44** of the tab closely adjacent the bead around the inside of the finger aperture. As will be explained, the purpose of lock-down hook **36** is to engage handle end **44** of the tab **40** subsequent to opening of the opening flap so that the handle end of the tab will be held in non-obstructing position on the can end during emptying. Lock-down hook **36** preferably does not engage the bead around the finger aperture in the tab prior to opening of opening flap **20** so as to avoid restraint against initially lifting the tab to open flap **20.**

FIGS. **4-8** illustrate plunging of opening flap **20** into container **62** and depression of handle end **44** of tab **40** downward to a non-obstructing position on container wall **10.** It is seen in FIG. **4** that initial lifting of handle end **44** of tab **40** exerts an upward force on rivet **32** to rupture score line **26** around tear strip **28** to partially sever the tear strip from the end. This forms a vent in container wall **10** to permit pressurized gases to escape from the can upon opening, and also permits air to enter the can during emptying. Since the vent is located under tab **40,** the vent opening is shielded by the tab and accidental spraying of the contents of the can on the user during opening is substantially prevented.

Since tab **40** is connected to flap **20** near the apex or starting end of the flap, rupture of score line **18** around tear strip **28** permits a substantial length of the tab to be raised slightly above the surface of end wall **10** as illustrated in FIG. **5.** This facilitates griping of tab **40** for application of force against the starting end of flap **20** by the nose of the tab to initiate rupture of score line **18.** This initial lifting of tab **40** may be, in part, further facilitated by upward doming or flexing of end wall **10.** Unless tab **40** can be lifted off the surface of end wall **10** to facilitate gripping its handle end, initiation of rupture of score **18** may be difficult. With the prior end wall structures such as that illustrated and described in U.S. Pat. No. 3,618,815, the rivet connection was located a substantial distance from the starting end of the opening flap (closer to the bend line) and prevented lifting of the handle end of the tab prior to initiation of rupture of the score line around the starting end of the

tab. Prior end wall structures of this type were therefore substantially more difficult to open than are easy opening devices of the present invention.

As illustrated in FIG. **6**, end wall **10** of this invention is unique in that tear strip **28** remains attached to can end **10** as opening flap **20** is plunged into a can. Tear strip **28** thereby provides a connection between handle end **44** of the tab **40** and container end **10** and, as discussed above, forces bending of the opening flap to occur along a predetermined line. The outermost extent of score **26** establishes the predetermined line of bending of flap **20.** This line may or may not be located approximately on a line through the ends of score line **18.** FIGS. **5** and **6** show a three bar linkage which it is believed is formed by tear strip **28,** tab **40** between rivet attachments **30** and **32,** and opening flap **20** between rivet attachment **30** and tear strip **28.** Since tab **40** remains substantially rigid during lifting and since tear strip **28** and flap **20** are attached to end wall **10** on substantially a common line after score line **18** is initially ruptured, bending is effected substantially along the line of attachment. Continued lifting of tab **40** therefore plunges the entire opening flap **20** into container **62** as illustrated in FIG. **7.** Since bending has been controlled to occur along the desired predetermined line, a relatively large pouring orifice is formed in container wall **12.** Although FIG. **7** does not so illustrate, tab **40** is preferably rotated until it contacts seam **14** to insure that flap **20** will not obstruct the pouring orifice after opening, and to insure that handle end **44** of the tab can be locked down after opening as will be explained.

Embossed ribs **34** in flap **20** provide reinforcing means in the flap to resist bending of the flap at an angle with respect to a line through the ends of score **18.** In the absence of such ribs **34,** flap **20** could bend on an oblique angle to the axis of tab **40** if a lifting force is applied to one side of the longitudinal centerline of the tab. Such a force application tends to twist tab **40** and flap **20** attached thereto to effect rupture of one leg of score line **18** along its entire length and rupture of the other leg along only a portion of its length. With embossed ribs **34** in flap **20,** the flap is substantially rigid along the length of the ribs so that twisting of the flap which can cause bending of the flap on an oblique angle is resited. Accordingly, ribs **34** insure opening the full extent of flap **20** to provide a relatively large opening in container wall **10.**

After a pouring orifice and vent opening have been formed, it is next desired to move handle end **44** of tab **40** to a position in which it will not interfere with pouring or drinking from a can. This is done by pushing handle end **44** downward against end wall **10** as shown in FIG. **8.** For this purpose, end wall **10** is designed so that flap **20** is stronger or more unyielding against bending than is tab **40.** As described above, tab **40** is easily bendable about cut line **60** when handle end **44** of the tab is depressed. Flanges **58** on the undersurface of the tab provide relatively thin sections of metal which are easily bent to depress the tab to a nonobstructing position. Tab **40** bends or folds along cut line **60** between its handle end and its nose end, and flap **20** remains depressed in the end rather than hinge upwardly to again fill the pouring orifice in the end.

As more fully illustrated and described in application Ser. No. 212,562, filed concurrently herewith, a lock-down hook **36** on end wall **10** engages bead **52** around the inside of the finger aperture in the handle end **44** of tab **40** to hold such handle end on the container end when the handle end is depressed to a non-obstructing position. In the absence of such a lock-down hook, spring back of handle end **44** of tab **40** could result in the handle end of the tab becoming raised above the surface of container wall **10.** If this were to happen, the handle end of the tab could interfere with drinking through the pouring orifice in the container end. As mentioned above, it is recommended that tab **40** be rotated against seam **14** during opening in order to assure that handle end **44** of the tab can be locked down by hook **36.** This rotation of tab **40** plunges nose end **42** of the tab as far as possible into a can to move handle end **44** forward on end wall **10** so that lock-down hook **36** will engage an edge of the handle end of the tab when it is depressed against the end wall.

It is therefore seen that in accordance with the invention an integral easy opening device is provided on a can end whereby, after opening has been effected by lifting the tab, the tab can be depressed to a non-obstructing position and remains on the can end. Although a particular embodiment of the invention has been illustrated and described, it will be apparent to those skilled in the art that numerous variations can be made in the details of the invention without departing from the invention.

What is claimed is:

1. In an easy opening device in a container wall comprising a score line in the container wall defining a panel which is at least partially severable from the container wall and having a starting end adjacent the periphery of the container wall and a tab attached to the starting end of the panel, the improvement comprising a second score line in the container wall defining a tear strip having a starting end toward the center of the container wall and a terminal unscored end toward the starting end of said removable panel, said tab being attached to said tear strip near its starting end, said second score line being adapted to be ruptured upon lifting of the tab, and said tear strip remains attached to the container wall to control bending of said removable panel during opening.

2. An easy opening device as set forth in claim **1** in which the score line defining said panel is substantially V-shaped toward one edge of the container wall and said second score defining a tear strip is substantially U-shaped and the ends of both score lines are located closely adjacent a common line.

3. An easy opening device as set forth in claim **2** which includes embossed ribs in said panel aligned substantially parallel to opposite edges of the panel.

4. An easy opening device as set forth in claim **3** in which said tab includes a nose end overlying the panel and a handle end overlying said tear strip and a weakening line in the upper portions of the tab between said nose end and said handle end.

5. An easy opening device as set forth in claim **4** in which said tab has downwardly formed wells therein and apertures in the bottoms of the wells through which the tab is attached to the panel and tear strip.

6. An easy opening device as set forth in claim **1** in which said tab is made of sheet metal and has reinforced portions along at least its longitudinal edges.

7. In an easy opening device in a container wall including a score line therein defining a panel which is at least partially severable from the wall with a starting end thereof adjacent one edge of container wall, said

device further including a tab having a nose end overlying the starting end of the severable panel and affixed thereto, and a handle end toward an opposite edge of the container wall, the improvement comprising:

connecting means attached to the handle end of the tab and extending therefrom toward the starting end of the severable panel to a permanent attachment of the connecting means to the container wall at a location short of the attachment of the nose end of the tab to the starting end of the panel, said connecting means being adapted to control bending of said panel during opening.

8. An easy opening device as set forth in claim **7** in which said connecting means comprises a U-shaped tear strip in the container with its open end toward said starting end of said panel and its closed end attached to the handle end of the tab.

9. An easy opening device as set forth in claim **7** in which said panel is defined by a substantially V-shaped score having its apex adjacent one edge of the container wall.

10. An easy opening device as set forth in claim **9** which includes embossed ribs in the opening flap aligned substantially parallel to opposite edges of the opening flap.

11. An easy opening device as set forth in claim **7** which includes an embossed depression in the end wall under the outer end of the handle end of the tab.

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