United States Patent [19]

Prayer et al.

[11] **3,785,522**

[45] **Jan. 15, 1974**

[54] **LID FOR EASY OPENING CANS**

[75] Inventors: **Gerard Prayer; Jean-Marie Ferrat,** both of La Fleche, France

[73] Assignee: **Cebal GP,** Paris, France

[22] Filed: **Dec. 30, 1970**

[21] Appl. No.: **102,761**

[30] **Foreign Application Priority Data**

Jan. 8, 1970 France 7000589

[52] **U.S. Cl.** **220/54**

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

[58] **Field of Search** 220/54, 48; 215/46, 215/19

[56] **References Cited**

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Primary Examiner—George T. Hall

Attorney—McDougall, Hersh & Scott

[57] **ABSTRACT**

A lid for use in an easy open can including a lid panel provided with a weakened portion defining a tear line, a tab fixed to the lid panel near the tear line having an end portion adapted to cut into the lid panel and a concave rib formed in the lid panel adjacent to the tab to permit deformation of the lid panel when the tab is lifted during the opening of the can to prevent the tab from breaking off the lid panel.

8 Claims, 4 Drawing Figures

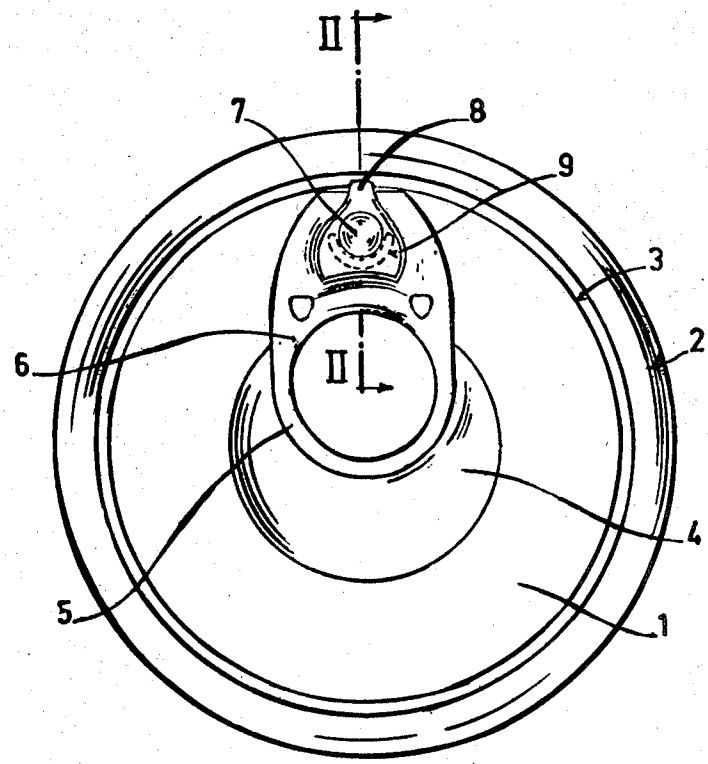

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FIG. 1

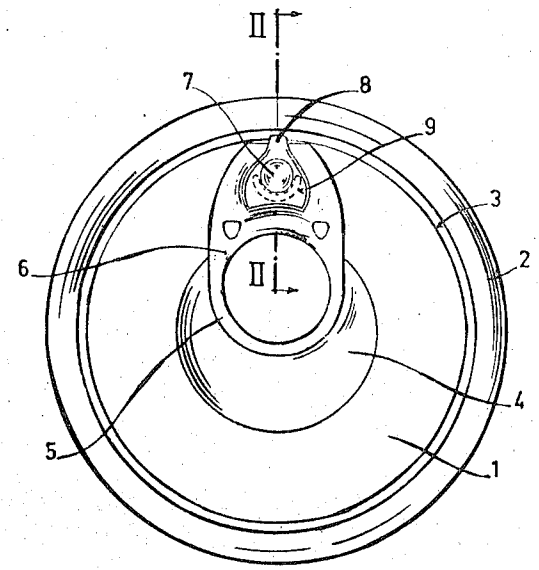
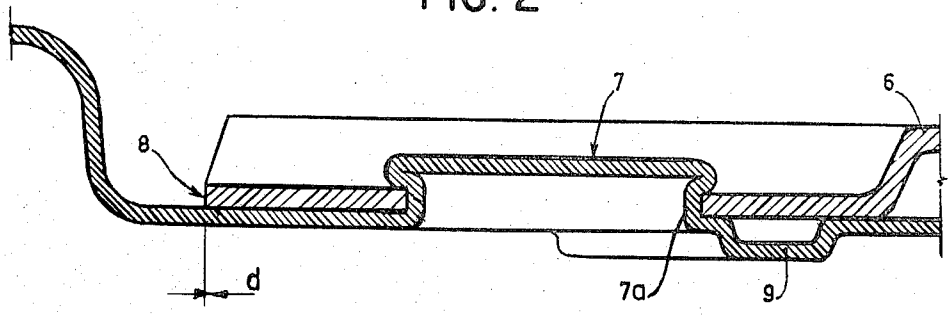


FIG. 2



INVENTORS
Gerard Prayer
Jean-Marie Ferrat
BY McDougall, Hersh and Scott

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SHEET 1 OF 2

FIG. 1

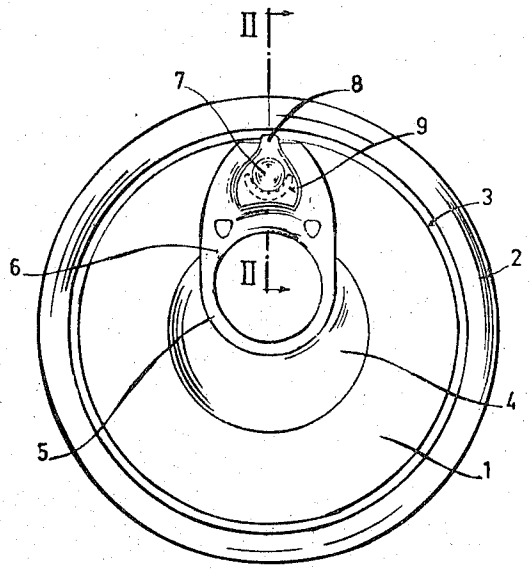
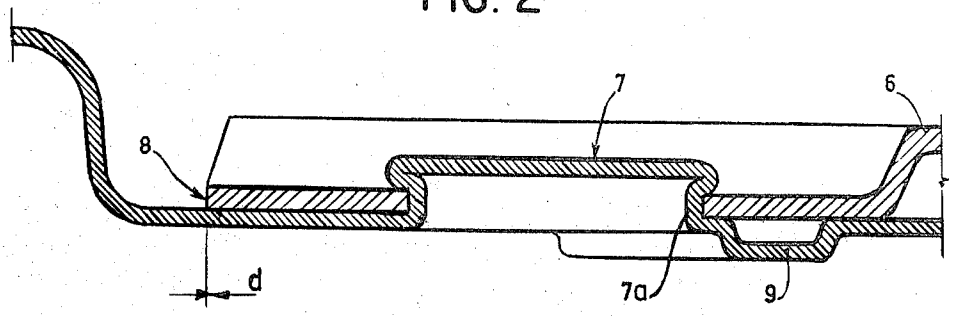


FIG. 2



INVENTORS
Gerard Prayer
Jean-Marie Ferrat
BY McDougall, Hersh and Scott

LID FOR EASY OPENING CANS

This invention relates to a lid for easy opening cans carrying a tab with a perforating point or nose, more particularly to the type of can which includes a single tearing line closed on itself, defining a detachable zone which covers all or a part only of the surface of the said lid whereby the initial rupturing of the tearing line is caused by rocking the tab about its fixing point and perforating the said tearing line by means of its piercing end or point.

Easy opening cans have become widely used at the present time, and their applications are extended over a wide range of products.

Such cans still have certain disadvantages in that during transportation, incorrect handling can cause a premature rupturing of the tearing line, or at the moment of opening the can, an incorrect action by the consumer can cause the rivet, which normally fixes the pull tab to the can, to break off.

The force exerted on the tab to cause the opening movement is first transmitted to the fixing rivet. As the part of the metal which forms this rivet has already been subjected to a certain stress at the time it is formed, the danger of the tab breaking off exists in this zone before starting the tearing operation on the lid.

Several solutions have been proposed for avoiding the problem of the tab being broken off such cans. A first solution, involves making a cut-out in the tongue; this cut-out, which surrounds the rivet, has a substantially horseshoe shape and the straight line which joins the two ends of the cut-out are situated between the rivet and the tearing line. This procedure practically eliminates the breaking off of the rivet, but a torsional movement on the gripping member can prevent the correct operation.

A second solution involves forming in the lid, a line of lesser resistance situated behind this rivet, that is to say, on the side opposite to the tearing line. This weakened portion permits a small rupture in the lid during the opening maneuver if the tension in the metal becomes too great. This solution, which is completely satisfactory from a mechanical point of view, does however have certain practical disadvantages. Apart from an additional weakening of the lid, it provides a danger to the contents of the can during storage, because an accidental partial lifting of the tab without damaging the tearing line proper, can result in the small weakening line being ruptured with the result that the rupture is not visible due to the fact that the said line is positioned beneath the tab.

It is accordingly an object of the invention to provide a lid for an easy opening can in which the tab is fixed to the lid by means of a rivet mounted adjacent to a concave rib in the lid whereby the lid is deformed during opening to prevent the breaking off of the opening tab.

This and other objects and advantages of the invention will appear more fully hereinafter, and, for purposes of illustration, and not of limitation, embodiments of the invention are shown in the accompanying drawing in which:

FIG. 1 is a plan view of the lid according to the invention on a can which is circular in shape;

FIG. 2 is a diagrammatic section to a larger scale, taking the line II—II of FIG.1;

FIG. 3 shows the application of the invention to a rectangular can; and,

FIG. 4 shows the application of the invention to an oval can.

The concepts of the present invention involve forming a concave rib or depression in the lid panel in immediate proximity to the rivet and on the side opposite to the tearing line relative to the rivet. This rib, the depth of which is greater than the thickness of the lid, permits a deformation of the metal of the lid in the critical zone when the can is opened and thus prevents the rivet from being torn off.

The shape of the concave rib can be linear whereby the rib extends perpendicular to the longitudinal axis of the tab. However, it is preferably curved with the center of the radius of curvature being to one side of the vertical axis of the rivet or even coinciding with the latter; the groove then forms an arc of a circle surrounding the rivet, for example, over 180°.

This rib is deformed when the gripping ring is raised and facilitates the rocking movement of the tab. This increases the force with which the nose of the tab starts the tearing operation and, on the other hand, reduces to a minimum the part of the lid which rocks beneath its level at the moment of opening to thereby prevent the tab from being broken off.

Referring now to the drawings, the lid panel **1** is provided along its rim **2** with a tearing line **3** made according to one of the known methods. The lid has in its center a depression **4** which gives a greater resistance to the lid and which permits the gripping ring **5** of the tab **6** to be more easily gripped.

This tab **6** is fixed to the lid **1** by an integral rivet **7**, that is to say, by a rivet formed in the actual material of the lid; on the side opposite the gripping ring **5**, the tab is formed with a pointed end or nose **8**, which forms the perforating tip and which extends beyond the tearing line **3** by a distance d which is between 50 and 100 microns.

The effect of the pointed end **8** extending beyond the tearing line **3** is to provide several advantages. For example, when the lids are manufactured, the precision required for the fixing of the tongue can be slightly less strict than if the nose has to be exactly perpendicular to the tearing line; when handling the can, the tearing line is protected at the most delicate position, that is to say, where a pressure exerted on the lid would cause the rupturing of the latter if the end of the tab were just above this line; and finally, with the opening of the lid, the nose first of all cuts into the unweakened metal and thus permits a certain force to be accumulated before reaching the tearing line.

The essential feature of the invention resides in a concave rib **9** formed in the lid close to the rivet **7**. The depth of this rib **9**, which extends toward the interior, is greater than the thickness of the lid, its width preferably being about **2** millimeters. In the examples illustrated in FIG. **1**, rib **9** is kidney-shaped, in the form of an arc of a circle surrounding the rivet over about 180°.

Referring to FIG. **2**, the consequences arising from the presence of this rib **9** can be more easily understood. By lifting the gripping ring, the tab **6** starts to be lifted and its first action consists of a pulling effect on the rivet **7**, the force being transmitted first of all to the part **7***a* of the rivet, which is closest to the gripping ring **5**. This part is thus pulled upwardly and with it lifts the lid. The deformation of the rib **9** permits this lifting

movement to be increased while avoiding any sudden tensions in the metal.

Just before the tearing line is ruptured, the tab has assumed an oblique position, the rib **9** being drawn out, thus giving play to the movement of the tab. The lifting of the gripping ring is greater as the center of the rivet **7** is placed closer to the tearing line.

Simultaneously, the nose **8** of the tab has started to cut into the subjacent part of the lid, pressing back the metal and thus enlarging the tearing line, which eventually gives way under the force exerted on the gripping ring at the other end of the tab.

However, this force is less than that which is necessary in the known cans, because of the deformation of the rib, which increases the flexibility of the lid at the moment of opening. The necessary force for opening the can is therefore considerably reduced.

The invention has been described by means of a can with a round lid and with a rib concentric to the rivet. However, the invention is useful with all the easy opening cans which use a tab having a nose which perforates a tearing line, and those using other forms of a rib providing flexibility.

Thus, FIG. **3** provides an example of a rectangular can, the cover of which has a rib **9'** at a tangent to the rivet, the longitudinal axis of which is straight and perpendicular to the tongue.

FIG. **4** provides an example of an oval can, of which the cover has a rib **9''** forming an arc of a circle, of which the center of curvature is situated between the rivet and the tearing line, on the straight line passing through the center of the rivet and the tip of the nose.

It will be apparent that various changes and modifications may be made in the details of construction and use without departing from the spirit of the invention, especially as defined in the following claims.

We claim:

1. A lid for an easy open can comprising a lid panel including a weakened portion defining a tear line, a tab fixed to the lid panel near the tear line having an end portion adapted to cut into the lid panel, said tab being fixed to the panel by a rivet formed in the material fo the panel, and a concave rib formed in the lid panel directly adjacent to the rivet to permit deformation of the lid panel on lifting of the tab and thereby prevent the tab from breaking off the lid panel.

2. A lid as defined in claim **1** wherein the concave rib is curved, and has a center of curvature coincident with the axis of the rivet.

3. A lid as defined in claim **1** wherein the rib is linear and extends substantially perpendicular to the longitudinal axis of the tab.

4. A lid as defined in claim **1** wherein the tab includes a gripping portion opposite the end portion.

5. A lid as defined in claim **1** wherein the end portion of the tab extends beyond the tear line.

6. A lid as defined in claim **5** wherein the end portion of the tab extends beyond the tear line by a distance of 50 to 100 microns.

7. A lid as defined in claim **1** wherein the depth of the concave rib is greater than the thickness of the lid panel.

8. A lid for an easy open can comprising a removable lid panel defined by a score line having a relatively high residual, a pull-tab fixed to the panel by means of a rivet formed from the material of the panel and a concave rib formed in said panel directly adjacent to the rivet and displaced from said rivet base toward the center of said panel and thereby prevent the tab from breaking off the lid panel.

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