Jan. 31, 1967 B. F. WADE 3,301,433

CONTAINER AND METHOD OF MAKING SAME

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Fig. 1.

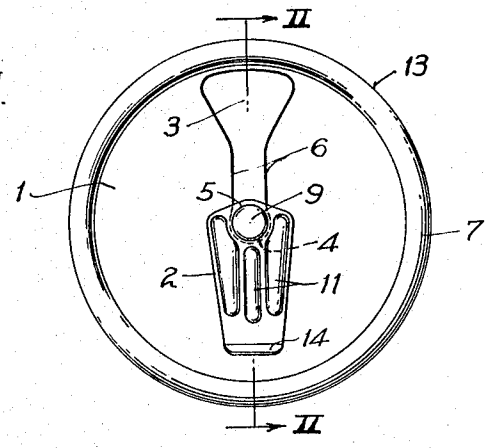

Fig. 2.

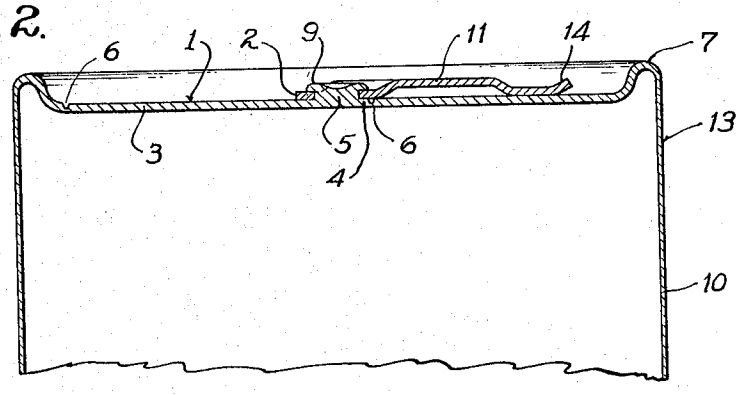

Fig. 3.

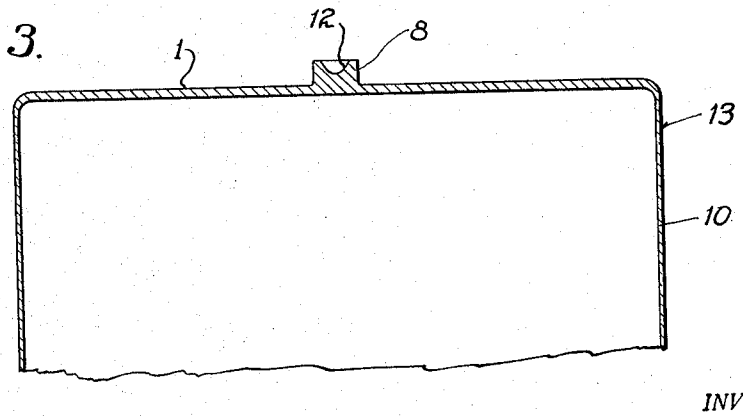

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Fig. 4.

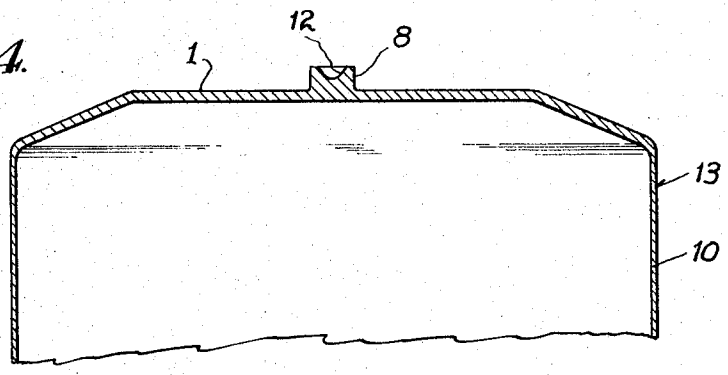

Fig. 5.

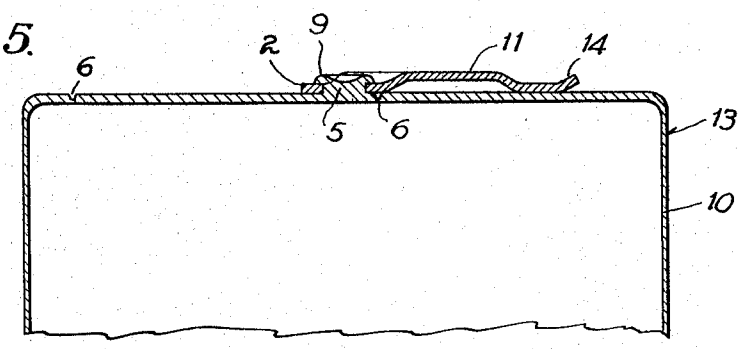

Fig. 6.

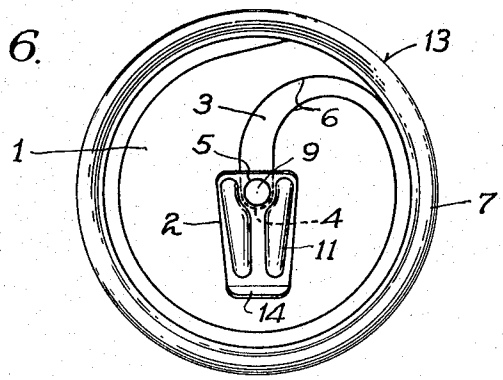

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Fig. 7.

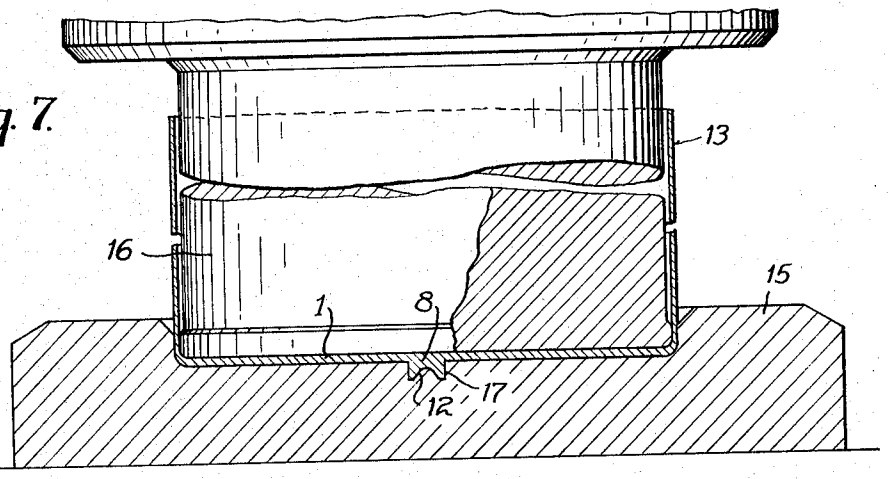


Fig. 8.

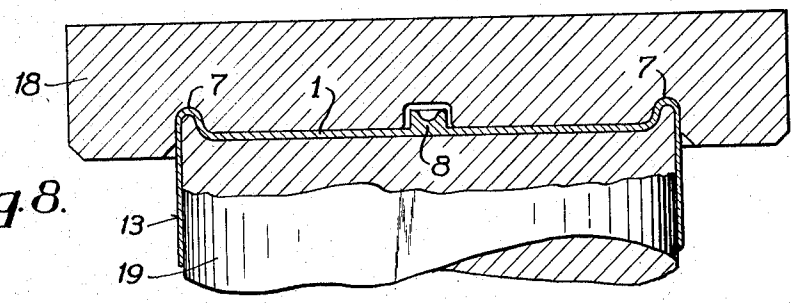


Fig. 9.

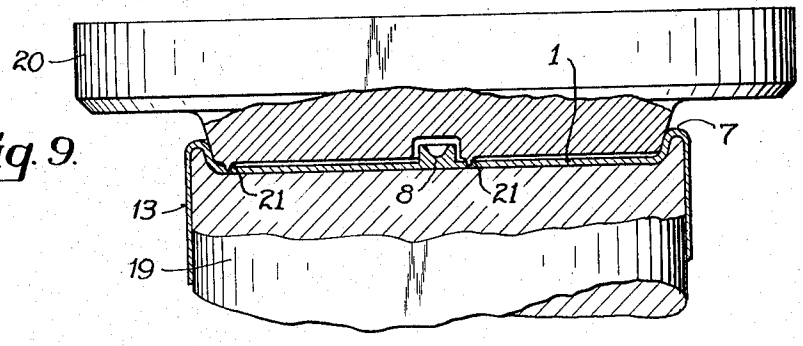
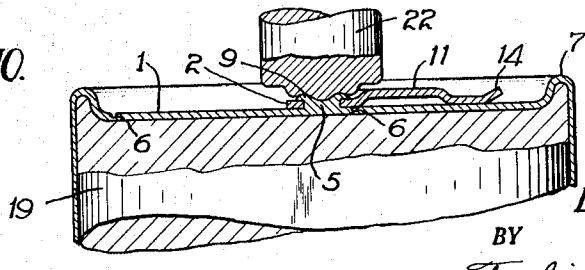


Fig. 10.



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3,301,433

CONTAINER AND METHOD OF MAKING SAME

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6 Claims. (Cl. 220—54)

This invention relates to impact extruded containers with attached opening tabs and to a method of making such containers. More particularly the invention relates to an impact extruded container with an attached opening tab and an end wall having a tear-out section so that the container may be opened by exerting opening force on the attached tab without the use of a special opening tool, and to a method of making such a container.

In incorporating an attached tab opening feature in a container, it is important to be able to attach securely the opening tab to the container so that the joint between the tab and the tear-out section will not fail when force is exerted on the tab to rupture initially the score line or lines and to continue such rupture therealong during the opening process. It is also important for many tab opening container applications that the container to which the opening tab is attached to imperforate so that the contents of the container are not subject to deterioration by contact with the atmosphere.

It is an object of this invention to provide an impact extruded container with an opening tab.

A further object of this invention is to provide an impact extruded container with an opening tab which is attached to a tear-out section of the container so that the container may be opened without the use of a special opening tool.

This invention is utilized in connection with containers which are made by the well-known method of impact extrusion. Impact extrusion containers are made from a slug or blank of ductile metal that is placed in a recessed die of the outside diameter of the container to be formed. A punch, or inner die, of the internal shape and dimensions of the container to be formed, is forced against the blank or slug and into the recessed die.

As the punch is forced into the recessed die, it compresses the slug first into the space between the dies and then, upon further movement of the punch causes some of the metal to flow through a narrow space or slot between the recessed die and the punch and along the punch in a thin, seamless shape to form the side wall of the container, with some of the metal being left at the bottom of the recessed die to form the end wall. The extruded container body is removed or stripped from the punch and the container completed by trimming, filling the container with the desired product and then sealing the open end by some suitable means.

Metals used in producing impact extruded containers are those metals or alloys which are capable of being deformed easily. Aluminum and aluminum base alloys have been found to be quite satisfactory for impact extruded containers, including those utilizing the present invention. As used herein the term "aluminum" includes aluminum and aluminum base alloys containing at least fifty (50) percent by weight of aluminum.

In accordance with this invention there is provided a rivet stud in the end wall of the formed container body by providing a suitable cavity for the rivet stud in the recessed die and allowing the metal to flow into the cavity during the forming of the container body by impact extrusion. An apertured tab is placed on the container end wall so that the rivet stud protrudes through and beyond the aperture in the tab and the rivet stud headed to attach securely the opening tab to the container.

The container end wall has a section defined by a score line or score lines, which is to be removed by the ultimate consumer to gain access to the container contents by exerting force on the opening tab to rupture initially the score line and to continue severance along the score line to remove the defined tear-out section. In some instances this tear-out section is a relatively small panel defined by one continuous score line. This type of tear-out section or panel is normally employed on containers used for liquids such as beverages. On the other hand, in the case of containers for solids or semi-solids, a larger opening is usually desired to facilitate easy access to the contents, and a large tear-out panel may be defined either by one continuous score line or by a peripheral tear strip formed by two substantially parallel score lines.

Providing an impact extruded container with an opening tab in accordance with this invention has numerous advantages. The rivet stud for receiving the apertured tab is formed at the same time as the container itself is made and the rivet stud is integral with the container. A separate rivet and satisfactory means for securing a separate rivet to the container body is not required. Neither is it necessary to employ drawing steps to form an integral hollow rivet from the container end wall. The rivet stud initially formed in accordance with this invention is in condition for receiving the opening tab without further alteration or working. That is, the rivet stud in the as-extruded condition is ready to receive the tab and be headed. Moreover, by forming a rivet stud in a container body in accordance with this invention there is neither risk of metal failure nor other perforation of the container at the rivet area which would allow deterioration of the contents packaged therein. This advantage is not always assured when an opening tab is attached to a container by a hollow integral rivet formed by working sheet metal stock or by a separate rivet which extends through an aperture in the container end. The rivet stud formed in accordance with this invention assures adequate metal for heading and the rivet stud can be made in various suitable geometric shapes. Furthermore, in heading the rivet the back-up support can be a flat faced die whereas in hollow integral rivets registration of the die projecting into the hollow rivet to prevent inward collapse during heading is difficult.

The invention may be further understood from the following detailed description, referring to the accompanying drawings, in which:

FIG. 1 is a plan view of a top of a container utilizing the invention;

FIG. 2 is a fragmentary cross-sectional view of the container utilizing the invention taken on line II—II of FIG. 1;

FIG. 3 is a fragmentary cross-sectional view of the container without the end wall recessed;

FIG. 4 is a fragmentary view of an alternate form of the container without the end wall recessed;

FIG. 5 is a fragmentary cross-sectional view of an alternate shape of a container utilizing the invention;

FIG. 6 is a plan view of a top of a container utilizing the invention with an alternate score configuration;

FIG. 7 is a schematic cross-sectional view showing forming the container body by impact extrusion;

FIG. 8 is a schematic cross-sectional view showing reforming the container;

FIG. 9 is a fragmentary cross-sectional view showing scoring the container;

FIG. 10 is a fragmentary cross-sectional view showing heading the rivet.

Referring to FIGS. 1 and 2 the container body 13 having an end wall 1 has an opening tab 2 attached to a tear-out section 3, defined by score line 6, in close proximity to the terminal end 4 of the tear-out section, by

means of a solid rivet 5 that is integral with the container end wall 1 and is headed to bear upon the tab in firmly overlapping relationship thereto. The word "solid" in respect of the rivet means that the rivet either has no recess that opens towards the interior of the container, or if provided with any such recess, the recess is of such modest dimensions that there need be no interior supporting element within the recess during the heading operation. The scoring can vary from that shown in FIG. 1 and is not restricted to any particular tear-out configuration.

The opening tab 2 provides the gripping means for force to be manually exerted on the tear-out section 3 to rupture initially the container end wall 1 at the terminal end 4 of the tear-out section 3 and to continue severance along the score line 6, for removal of the tear-out section from the container member. The opening tab 2 may be of either the flexible inelastic type or the rigid lever type. A rigid lever opening tab with reinforcing ribs 11 is shown in FIGS. 1 and 2. The tab 2 may, if desired, have an upturned end 14 to afford greater ease in gripping the tab. The size of the aperture of the tab in relation to the rivet stud dimension is such that the tab fits easily over the rivet stud without a looseness of a degree that impairs a firm overlapping bearing of the rivet head upon the tab.

As shown in FIG. 2, the container end wall 1 may be recessed with respect to the container side wall end portion 7 by a reforming operation. An adequately recessed container end wall prevents interference of the opening tab and rivet in stacking of containers and helps prevent premature rupture of the scored tear-out section when containers are so stacked. In providing a container utilizing this invention with a recessed end wall, the container body would first be impact extruded to a shape that would permit subsequent reforming. Representative extruded shapes which are suitable for reforming to recess the end wall are shown in FIGS. 3 and 4.

FIG. 3 shows a cross-sectional view of the shape of the impact extruded container body 13 having an end wall 1 and side wall 10, prior to scoring and attaching the opening tab. The end wall 1 has formed integral with it a rivet stud 8 at the same time as the extruded container body is formed. The upper portion of the rivet stud shown in FIG. 3 has a cavity 12 that opens toward the exterior of the end wall; however, the rivet stud may be formed without such. The heading of a rivet with a cavity is somewhat easier and yet a sufficiently strong jointure between the opening tab and the container is accomplished. The rivet stud 8 is of sufficient height to protrude through and beyond the aperture in the opening tab and then be headed to attach securely the tab to the container with firm overlapping relationship of rivet head to the tab.

FIG. 4 shows an alternate form of the shape of the container body as extruded. The shape is particularly desirable when the end wall of the container is recessed by reforming to a shape similar to that shown in FIG. 2. The shape of the end wall provides sufficient metal so that stretching and thereby thinning the metal to obtain a recessed end is kept to a minimum.

FIG. 5 shows the impact extruded container 13 having an opening tab 2 attached to the end wall 1 by a headed solid rivet 5 integral with the end wall 1. The headed portion 9 of the solid rivet 5 overlies the periphery of the aperture in the tab to securely attach the opening tab 2 to the container body. The rivet is headed by supporting the end wall on the interior side of the container in the area of the rivet and compressively upsetting in any conventional manner the rivet end that protrudes beyond the tab. There is also shown in FIG. 5 the score line 6.

FIG. 6 shows one of many alternate forms of tear-out sections applicable to the impact extruded container end wall 1. The container end wall 1 is scored or weakened along the lines 6 to form a tear-strip 3 that extends around the container end wall 1 near the periphery. Thus, severance and removal of the tear-strip removes a substantial portion of the container end wall 1 allowing access to the packaged contents. This tear-out section is particularly useful for packaging solids or semi-solids. The scoring can vary from that shown in FIG. 6 and is not restricted to any particular tear-strip configuration. As shown in FIG. 6, the opening tab 2 is attached to the tear-strip 3, in close proximity to the terminal end 4, by means of a solid headed integral rivet 5.

Referring to FIGS. 7 to 10 there is illustrated schematically various stages in producing an impact extruded container with an attached opening tab in accordance with the invention.

FIG. 7 shows the completed forming step of the impact extruded container body. Recessed die 15 having a cavity dimensioned to the outside diameter of the container body 13 and a punch 16 having the internal shape and dimensions of the container body 13 are shown in the closed position. The rivet stud 8 in the end wall 1 of the container body 13 is provided by a rivet cavity 17 in the recessed die 15 which allows the metal to flow into the cavity 17 during the forming of the container body 13. After forming of the container body is complete, it is stripped from the punch and trimmed.

FIG. 8 schematically shows the reforming operation of the container body 13 to recess the container end wall 1 with respect to the container side wall end portion 7, if desired. The die 18 has a recess of the size and shape desired for reforming the container end wall. There is a cooperating mandrel 19 inside the container body 13 so that when the die and mandrel are closed, as shown in FIG. 8, the container is reformed to the desired shape.

FIG. 9 schematically illustrates scoring the container end wall to provide a tear-out section. Scoring of the container end wall is done in a conventional manner, and is usually done prior to placing the tab on the container end wall for attachment. The rivet stud 8 is located within the tear-out section and usually in close proximity to the terminal end thereof.

The scoring die 20 carries a suitable scoring projection 21 so that when the die 20 and mandrel 19 are closed, with the container therebetween the desired score configuration and depth will be achieved on the container end wall 1. The dimensions of the score projections 21 to achieve the desired shape and depth of the score will depend upon the metal used and the type of product to be packaged in the container.

FIG. 10 shows the rivet heading operation to attach the opening tab 2 to the container end wall 1. Prior to heading, the apertured opening tab is superimposed over the container end wall so that the rivet stud protrudes through the aperture in the tab. The mandrel 19 supports the interior of the container end wall at the rivet area. When the cooperating die 22 is closed to compressively upset the rivet, the rivet end protruding beyond the tab forms the headed portion 9 of the rivet which overlies the periphery of the aperture in the tab and securely attaches the tab to the container in firm relationship.

The description in specific detail of the selected practice 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.

What is claimed is:

1. In a method of making an easy opening metal container having a rivet attached opening tab, the steps of;

impact extruding a body having a side wall, one end wall and a solid rivet stud projecting outwardly from said end wall,

scoring said end wall to provide a tear-out section therein,

placing upon said end wall an opening tab having a rivet receiving aperture so that said rivet stud protrudes through and beyond said aperture, and

heading said rivet stud into firm overlapping relationship with said tab to attach the same to said end wall.

2. In a method of making an aluminum easy opening container having a rivet attached opening tab, the steps of;

impact extruding an aluminum body having a side wall, one end wall and a solid rivet stud projecting outwardly from said end wall,

scoring said end wall to provide a tear-out section therein,

placing upon said end wall an opening tab having a rivet receiving aperture so that said rivet stud protrudes through and beyond said aperture, and

heading said rivet stud into firm overlapping relationship with said tab to attach the same to said end wall.

3. In a method of making an easy opening metal container having a rivet attached opening tab, the steps of;

impact extruding a body having a side wall, one end wall and a solid rivet stud projecting outwardly from said end wall,

reforming the said body to recess the end wall below the upper portion of said side wall,

scoring said end wall to provide a tear-out section therein,

placing upon said end wall an opening tab having a rivet receiving aperture so that said rivet stud protrudes through and beyond said aperture, and

heading said rivet stud into firm overlapping relationship with said tab to attach the same to said end wall.

4. An impact extruded metal container, comprising:

a body having an integral side wall, end wall and solid rivet projecting outwardly from said end wall,

a score defined tear-out section in said end wall, and

an apertured opening tab attached to said tear-out section by said rivet headed into firm overlapping relationship with said tab.

5. An impact extruded aluminum container comprising:

a body having an integral side wall, end wall and solid rivet projecting outwardly from said end wall,

a score defined tear-out section in said end wall, and

an apertured opening tab attached to said tear-out section by said rivet headed into firm overlapping relationship with said tab.

6. An impact extruded metal container, comprising:

a body having an integral side wall, end wall and solid rivet projecting outwardly from said end wall, said end wall being recessed below the upper portion of said side wall,

a score defined tear-out section in said end wall, and

an apertured opening tab attached to said tear-out section by said rivet headed into firm overlapping relationship with said tab.

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