CONTAINER OPENING DEVICE

Fig. 1.

Fig. 2.

Fig. 3.

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CONTAINER OPENING DEVICE

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9 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure concerns container ends or closures for containers having an easy opening feature. The container end has an integral opening device which is adapted to secure the container so as to hold the container end securely against the container body.

This invention relates to containers having integral opening devices and more specifically to venting systems for such containers. In a conventional form of containers employing an integral opening device, the container generally has an end wall provided with an elongated tear strip defined by weakened or scored lines. Within this tear strip a pull tab member is secured by appropriate means, such as an integral rivet, formed from the material of the end wall. The pull tab may conveniently be substantially rigid in order to provide the individual opening the container with the mechanical advantage of leverage action. This leverage action is effective in assisting with the initiation of score line fracture, which is the first step in the opening operation. The second step is the continuation of score line severance to remove the tear strip, and is materially affected by the rigidity of the tab and is generally the less difficult of the two opening steps. As a result, primary emphasis at improvement of ease of opening characteristics has been directed toward the first opening step. In addition to providing the mechanical advantage of the rigid lever, initiation of score line fracture has been substantially eased by scoring more deeply around the integral rivet.

With respect to pressurized containers having such an opening device, there are several problems which have arisen. When a sealed container is pressurized, the end panel is under stress. At the instant when the first portion of the scored line is fractured, the stress concentrations established by the initial rupture facilitate rapid progression of the fracture. The result is that the scored lines, the weakest portion of the end wall, yield and uncontrolled acceleration of tear strip severance occurs. This has not only produced injury to the fingers of the one opening the container, but has also been known to result in the tear strip being rapidly blown off of the container wall and travelling through the air. Contributing to this latter action is the escaping gas impinging upon the underside of the tear strip and pull tab. This, therefore, presents a hazard not only to the individual opening the container, but also to those persons in close proximity. One additional disturbing effect is the tendency for the escaping gas to bring with it some of the container contents and thereby shower the immediate surrounding area with the product.

It is an object of this invention to provide a pressurized sealed container having an integral opening device which is free from the hazard of uncontrolled tear strip severance.

It is a further object of this invention to provide a pressurized sealed container having such an opening device which is adapted to effectively prevent showering of the contents of the container during the opening thereof.

It is another object to accomplish the aforementioned objects without any modification to the existing opening device.

It is another object to provide these advantages without increasing the difficulty of effecting the two opening steps.

It is a further object to provide an improved container end wall adapted for use on a seal strip, such end wall may be simply and economically manufactured without any substantial modification to existing equipment and tooling.

These and other objects of the invention will be more fully understood from the following description of the invention, which reference is to the illustrations appended hereto, in which:

FIGURE 1 is a fragmentary perspective of a container wall having a conventional integral rivet opening device;

FIGURE 2 is a partial section of the container of FIGURE 1 at the instant of the initiation of opening;

FIGURE 3 is a plan view of a container wall falling within this invention;

FIGURE 4 is a partial section of the container end wall shown in FIGURE 3, taken along line 4—4, with a pull tab secured thereto;

FIGURE 5 shows the end wall of FIGURE 4 after initial vent severance has been accomplished;

FIGURE 6 shows the end wall of FIGURE 4 after the initiation of tear strip severance has begun; and

FIGURE 7 illustrates a modified embodiment of the invention.

Referring now to the drawings in greater detail, FIGURES 1 and 2 illustrate a conventional sealed container structure including a container 1 having an end wall 2 which has a tear strip 3 defined by scored lines 4. A pull tab 5 is secured within the tear strip by securing means 6, which for convenience of illustration has been shown as an integral rivet. The pull tab 5 has stiffening ribs 7, a gripping end 8 and a bearing end 9. In the position shown in FIGURE 2, the tab has been raised to initiate score line severance and establish relatively small orifice A, thereby establishing stress concentrations which permit rapid acceleration of the highly stressed panel and in turn produce the risk of the hazards which our invention avoids. Also, the escaping gases impinge upon the tear strip and pull tab, thus tending to urge them outwardly.

As shown in FIGURES 3 and 4, the hazards of the conventional opening device may be simply eliminated by providing an independent vent area 10 within the end wall 2, but without the tear strip 3. This vent area is partially defined by scored lines 11 with the remainder of the periphery, which is adapted to provide a hinge 12 upon opening, being intact. The vent area 10 should be disposed sufficiently close to the securing means 6 that a portion of the tab 5 will overlie the vent area. The configuration of the overlying tab portion 12 and the vent area 10 should be such that downward pressure applied to the tab 5 will create bearing engagement between tab portion 13, which has been generally indicated by dotted lines, and vent area 10 thereby severing lines 11 and causing vent area to rotate downward about hinge 12 into the container. The hinge 12 also serves to prevent vent 10 from falling into the container. As shown in FIGURE 5,
with this structure the internal container stress is harmlessly relieved and the internal gas is permitted to escape without having any effect upon the tear strip severance. Should the gases also bring out some of the contents, they will harmlessly strike the underside of tab portion 13 which serves as a shield to prevent spraying of the emerging contents. Finally, as shown in FIGURE 6, after the venting has been effected, the tab 5 may be raised to sever the scored lines 4 and remove the tear strip in conventional fashion.

As the tab portion 13 and end wall 2 in the conventional container ends are substantially parallel, the ease of fracturing scored line or lines 11 is improved by providing a raised portion 14 within the vent area 10. This portion 14 serves as a stress concentrator which facilitates the efficient transmission of the applied force and reduces the amount of force required to sever vent score line 11. In this structure, the amount of downward movement of pull tab 5 before bearing engagement between overlying tab portion 13 and vent area 10 and severance of score line 11 are effected is substantially reduced. This same advantage may conveniently be effected by providing a modified tab structure as is shown in the exemplary form of FIGURE 7 wherein overlying tab portion 13 has a dimple 15.

In essence, the preferred form contemplates at least one of the overlying tab portion and the vent area having a non-planar portion extending toward the other. While both of these preferred forms illustrate domed non-planar portions as providing complementary configurations which minimize the amount of downward movement required to sever the score line 10, it will be appreciated that numerous non-planar configurations will improve the ease of vent area score line severance. In fact, even a substantially flat overlying tab portion resting on a substantially flat bent area of container wall as a suitable venting means, although it would not function as well as complementary non-planar portions. It will be further appreciated that both the overlying tab portion and the vent area may have non-planar portions extending toward the other.

The configuration of the pull tab is not critical and it need not be of the same configuration as those illustrated. It may, for example, be of the ring type having one or more voids. It is, however, necessary that there be an overlying portion and be adapted for engagement with the vent area.

In applying the downward force to sever the score line 11 and vent the container, either a constant downward directed force or a sharp blow will effectively provide the requisite severance force. The most convenient means of obtaining score line severance will generally be obtained by simple downward pressure by the hand or thumb. As the vent is scored, only a minimum amount of force is required.

In another preferred feature of the invention, the overlying tab portion 13 is at a higher elevation with respect to the end wall than the bearing end of the tab 9. This facilitates the provision of non-planar regions in either the tabs or the vent area 10.

While the periphery of the vent area is shown in FIGURE 3 as being substantially circular, it may be of any configuration adapted for ready score line severance with hinged retention to prevent the area from falling into the container contents. It will, however, generally be preferable to make the vent area relatively small with respect to the tear strip size. Where the invention is employed with an end wall adapted for use in a container for flowable materials, a tear strip occupying only a minor portion of the end wall will generally be employed. The form illustrated in FIGURE 1, which is fairly common, is elongatedly substantially radially inwardly within the end wall. With the presence of our independent vent 10, the tear strip may be reduced in size while retaining excellent pouring properties for flowable materials as the orifice established at the tear strip need not serve as a vent. Where the tear strip includes a major portion of the end wall, venting during removal of the contents which may be solids or semi-solids, is generally no problem.

With our invention, the integrity of the panel is not impaired in the manufacture of the end wall and therefore there is no need to tolerate increased complexity of manufacture and expense by providing auxiliary sealing means. Also and more importantly, reliance upon the integrity of auxiliary sealing means for effective sealing of the container is avoided.

As the tab is adapted to overlie the vent, the end has an appearance which does not differ from the conventional ends. Also, no modification to existing conventional equipment or tooling needs to be made other than the addition of tooling to provide the vent. In view of the existing substantial capital investment in production equipment for the manufacture of conventional internal opening devices of this type, this factor is of great practical significance.

While the discussion of specific examples has centered about a pull tab which overlies the vent area in the as-made form, it will be appreciated that it is entirely consistent with this invention to provide a pull tab which does not overlie the vent area in the as-made form, but is adapted to be rotated about the fastening means to place it in the overlying position prior to fracturing the vent scoring. Also, while reference has been made to the application of downward force to move the pull tab into bearing engagement with the vent area, the term as used herein refers to effective bearing relationship and therefore it is immaterial whether or not the tab is actually in contact with the vent area in the as-made structure, prior to the application of downward force.

While a can end has been selected for purposes of illustration, it will be appreciated that the invention is equally applicable to walls of containers such as jars, bottles and other containers having conventional integral opening devices of this type.

It will further be appreciated that although the venting of pressurized containers has been discussed herein, it will be obvious that the invention is equally adapted to the venting of vacuumized containers.

Whereas particular embodiments of the invention have been described above for purposes of illustration, it will be evident to those skilled in the art that numerous variations of the details may be made without departing from the invention as defined in the appended claims.

What is claimed is:

1. In an end wall for containers
   a panel portion;
   a tear strip within said panel portion defined by first scored lines;
   a pull tab secured to the panel portion solely by securing means within said tear strip;
   a vent area within said panel portion and without said tear strip partially defined by second scored lines and adapted to be hingedly deformed inwardly upon severance of said second scored lines;
   said vent area being sufficiently close to said securing means to permit a portion of said tab to overlie said area;
   said overlying tab portion and said vent area being of such configuration that downward pressure applied to said tab will create bearing engagement between said tab portion and said area whereby severance of said second scored lines is effected.
2. A pressurized sealed container comprising the end wall of claim 1 sealingly joined to an elongate metallic container and at least one of said overlying tab portion and said vent area having a non-planar portion extending toward the other.
3. The pressurized sealed container of claim 2 wherein said vent area is relatively small with respect to said tear strip and contains an upwardly domed portion.
4. The pressurized sealed container of claim 2 wherein
in said overlying tab portion contains a downwardly domed portion.

5. The pressurized sealed container of claim 3 wherein said vent area has a substantially circular periphery.

6. The pressurized sealed container of claim 3 wherein said overlying tab portion is farther from said panel portion than the bearing end of said pull tab.

7. The pressurized sealed container of claim 3 wherein said overlying tab portion is disposed at the gripping end of said tab.

8. The pressurized sealed container of claim 5 wherein said second scored lines extend around more than half of the periphery of said vent area.

9. The pressurized sealed container of claim 5 wherein said end wall is substantially circular and said tear strip is elongated and extends substantially radially within said end wall.

References Cited
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GEORGE T. HALL, Primary Examiner.
U.S. Cl. X.R.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,441,169                     April 29, 1969
Lloyd G. Dunn et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 36, "af" should read -- of --; line 68, after "severing" insert -- scored --. Column 3, line 5, before "tear" cancel "the"; line 29, "illustrate" should read -- illustrated --; line 36, "bent" should read -- vent --. Column 4, line 64, "severance" should read -- severance --.

Signed and sealed this 14th day of April 1970.

(SEAL)
Attest:
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