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CONTAINERS WITH OPENING MEANS

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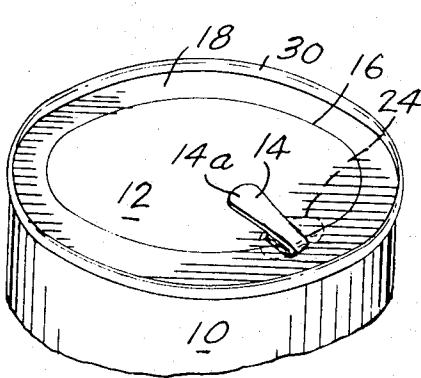


Fig. 1

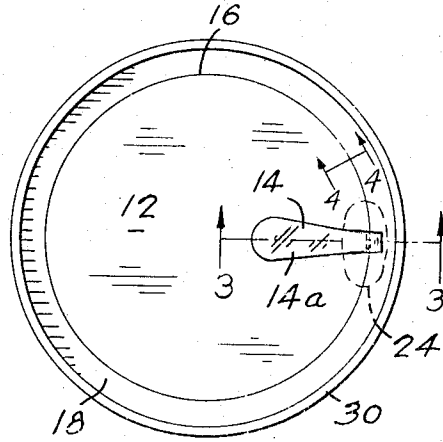


Fig. 2

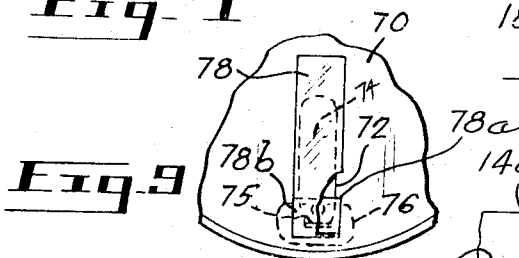


Fig. 3

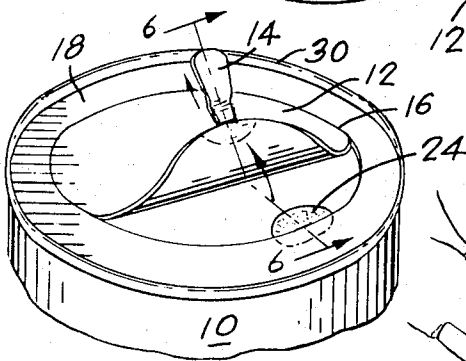


Fig. 4

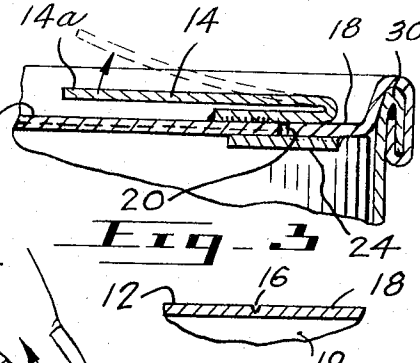


Fig. 5

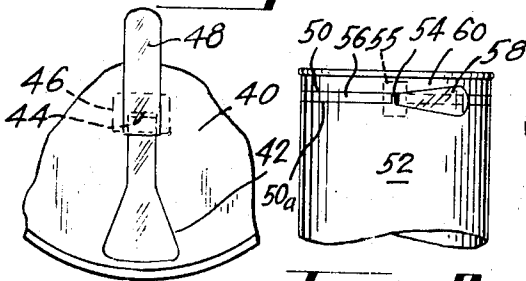


Fig. 6

Fig. 7

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CONTAINERS WITH OPENING MEANS

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7 Claims. (Cl. 220-54)

ABSTRACT OF THE DISCLOSURE

A container to be opened only by direct, finger-applied tension in which a weakened line defines a tear-out area and the material and depth of the weakened line will withstand normal stresses of manufacture and handling without rupture, in which the weakened line includes a minute, cut-score extending through the material and completing the weakened line and forms a tear-initiation point therein, a tab having a portion secured to the tear-out area immediately adjacent said slit and having a finger-graspable portion so located that force is initially applied at the cut-score when the tear-out area is being removed, and a patch adheringly secured in underlying relation over the minute cut-score slit on the inner surface of the material and having a margin extending on all sides of said slit to prevent leakage through said slit, said patch being releasably secured to said tear-out area adjacent said slit and being of a small area as compared with said tear-out area.

This invention relates to containers.

More particularly, this invention relates to containers having a tear-out portion provided with grasping means mounted on the tear-out portion for removal thereof without the necessity of exerting a large amount of pull.

In containers provided with tear-out portions, and particularly those in which the contents are packaged under pressure, the art has been confronted with the problem of providing a container which is capable of effectively retaining the contents of the container and at the same time providing a type of tear-out portion which can be removed without exerting a large amount of pull.

By "effectively" retaining the contents of the container, it is meant that the walls of the container have to be capable to withstand the normal pressures encountered in manufacture and handling without rupturing, yet at the same time be thin as possible for economic reasons. This must be coupled with the fact that the walls of the container must be provided with a weakened line defining the tear-out area. Therefore, the thickness of the wall must be sufficient so that its weakest point, i.e. the portion defining the tear-out area, will not rupture.

In common types of containers now used for this purpose the user must exert a large amount of pull to rupture the weakened line and initiate the tear.

To overcome the amount of initial pull required, some types of containers have been provided with a further weakened portion in the weakened line defining the tear-out area. This further weakened line is normally 50% to 75% of the thickness of the weakened line. However, in containers in which the contents are packaged under pressure, e.g. beverages, etc., the pressure from the inside (which may be as high as 100 or more pounds per square inch) adds to the possibility of the weakest portion of the container wall rupturing during filling or handling. Therefore the further weakened line where the lip is ruptured for the purpose of opening must be sufficiently strong and this results in quite a pull having to be exerted by the user. This pull effort is so high that the pull tab

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may cut the user's finger unless special steps are taken to protect the edges of the pull tab.

Applicant's development

Applicant now has developed an improved container, which according to this invention, includes a plurality of walls made of sheet material defining therebetween an enclosure for retaining a commodity. One of the container walls is provided with a weakened line defining a tear-out portion. The thickness of the wall and the depth of the weakened line in applicant's container are such that the container walls and the weakened line will withstand the normal stresses of manufacturing and handling without rupturing, but will readily tear along the weakened line once the tear is initiated. The weakened line includes a slit extending right through the container wall at a tear-initiation region. A pull tab is permanently secured to the tear-out area on the outside thereof, and is affixed adjacent the slit. On the underside of the container wall there is provided a patch protectively covering the slit, and releasably secured to the tear-out area. Thus, when the pull tab is pulled, the only resistance which need be overcome is the resistance of the adhesive or other means by which the patch is releasably secured to the tear-out area, to tear the tear-out area free from the wall of the container along the weakened line.

The weakened line defining the tear-out portion of the container wall may be of various shapes and sizes, as will be understood by those skilled in the art. Generally, the shape and size of the tear-out area will depend on the nature of the contents of the container, and also the different shapes of containers used. For example, in containers packaging liquids under pressure, it is desirable that the tear-out area take the shape of a "key hole" in the lid. In other containers, for example, those retaining food commodities, it is desirable that as much an area as possible of the container lid be removed so that easy access may be had to the contents. In such cases, the top of the tear-out area may be defined by a single continuous weakened line surrounding substantially one wall of the container so that substantially all of the wall will be removed when the tear-out area is pulled free. Alternatively, there may be a pair of weakened lines, preferably parallel, extending around a cylindrical wall and being joined by a terminating slit extending transversely of the lines. This defines a tear-out ribbon.

It will also be understood that the container wall in which the tear-out area is located may either be in the top wall or lid of a container, or alternatively in the side, so that in the latter instance when the tear-out area is pulled free, the complete top of the container will be removed.

The type of material from which the container is made will, of course, vary according to the various types and sizes of articles being packaged. Thus, in the case of commodities such as food stuffs, it is practical to use plastics, while in packaging liquids, particularly those under pressure, metal containers are normally employed in this art. The thickness of the container walls, regardless of the type of material employed, will vary according to different requirements, it being understood that the wall having the weakened line must be of sufficient thickness so that the wall will not rupture along the weakened line under the normal stresses of manufacture and handling. Typical examples of plastics used in packaging include polyethylene, polyvinylchloride, polypropylene, laminates of various resinous materials, etc. In containers made of metals, the metal may be, for example, aluminum, aluminum coated tin, tin plate, etc. Typical thicknesses for the containers made of metals may be from 8 to 16 thousandths of an inch, with 10 to 15 thousandths being a

normal value. In such cases, the typical depth of the weakened line will be from 4 to 6 thousandths of an inch. Similar thicknesses for plastic materials would also be encountered.

Normally, the thickness of the weakened line in the container wall will be less than 50% of the thickness of the wall. However, this may vary according to the different materials being used since with plastics, an increased thickness might be required. In some embodiments of this invention, the weakened lines will run 80% to 85% of the thickness of the wall.

In providing the slit as described above and as illustrated in the accompanying drawings, the invention also contemplates that there may be provided a very thin easy rupturable ligament possessing substantially little resistance to rupturing and containing a plurality of apertures therein which can be utilized in place of the score slit. The use of a container with an easily rupturable ligament may be desirable in some cases, depending on the nature of the container and its contents. Thus, the term "slit" as used throughout the disclosure and claims is intended to denote a thin elongated line extending through the portion of the container wall provided with the tear-out area and the case where there is a very thin easy rupturable ligament as defined above. The length of the slit may vary depending on the type of material from which the container is made and the size of the tear-out area. Typical lids provided with score slits will be in the range of from about two-sixteenths of an inch to six-sixteenths of an inch or larger, with four-sixteenths of an inch being preferable.

The patch covering the score slit, located on the inside of the tear-out area and releasably secured to the tear-out area, may vary in thickness according to the type of contents being packaged and the type of material being used. Applicant has found through experiments that containers which package liquids under pressure of 100 p.s.i. or more need only have a patch 8 to 10 mils in thickness to provide sufficient protection to prevent the contents of the container from escaping. In other forms the thickness may be greater.

The patch protectively covering the score slit can be made of any desired material possessing the required properties of sufficient strength and being compatible with the material from which the container is made. The patch may be made of rigid or non-rigid materials. If the container is made of a metal material, the patch may either be of a plastic or metal material such as those mentioned above. If a plastic container is contemplated, a patch of plastic material is preferable.

The shape of the patch covering the slit may also vary, the only criteria being that it extends on all sides of the slit sufficiently to cover the slit and so that there is sufficient surface available to secure the same to the underside of the container wall. In containers which retain liquids under pressure, and for example, the patch preferably extends between one-eighth of an inch and one-quarter of an inch on all sides of the slit.

The manner in which the patch is applied to the underside of the tear-out area, and protectively covering the score slit, may be accomplished in several ways. For example, on the non-tear-out area of the lid portion, high frequency means may be used to permanently secure a plastic patch to a plastic lid, with a suitable adhesive being used to releasably secure the patch to the tear-out area. Other methods of permanently securing the patch to the non-tear-out area include heat-sealing to form a permanent bond or the use of suitable adhesives possessing the required degree of adhesion. In using a metal patch on a metal container, the same may be riveted to form a permanent bond between the non-tear-out area and the patch, while an adhesive may be used to form a releasable bond between the patch and the tear-out area. According to one aspect of the invention, it is desirable that the patch be releasably secured to both the non-tear-

out area and the tear-out area by use of suitable adhesives.

The pull or grasping tab applied to the tear-out area can, like the patch, be made of different materials and may also assume different geometrical configurations. Typical of the many different types are those which are elongated rectangular fingers applied permanently at one end to the tear-out area. A preferred form for use in this invention is a tab made of semi-rigid plastic material, such as the above mentioned, which is doubled back on itself to form two limbs joined by a curved portion, with the lower of the two limbs being permanently affixed adjacent the score slit. The other limb provides a grasping surface. It is also preferable that, in this form, a portion of the lower limb overlies the score slit so that any accidental heavy blows on this area will not prematurely rupture the container.

In a still alternate embodiment of this invention, the applicant contemplates the use of a grasping tab affixed in the above-described manner to the tear-out area, but in which the tab has a surface area sufficient to protectively overlie the complete weakened line so as to further guard against the possibility of the tear-out area being ruptured by accidental blows from other containers or during handling. In this embodiment of the invention, applicant prefers to have the grasping tab made of two portions joined together by a curved ligament. The bottom of the two portions is secured to the tear-out area as described above—i.e. a portion of the bottom limb is permanently affixed adjacent the score slit on the tear-out area. The upper of the two portions is of an area sufficient to protectively overlie the complete tear-out area. In this case, the weakened line defining the tear-out area can therefore be reduced by as much as 60% while still retaining the safety features against accidental rupturing. This embodiment is desirably incorporated into the type of containers packaging liquids under pressure, and in which the tear-out area defined by the weakened line is of a "keyhole shape."

The grasping tab may be affixed to the container in any desired manner, e.g. by the use of adhesives, mechanical means, etc.

Having thus generally described the invention, reference will now be made to the accompanying drawings illustrating preferred embodiments and in which

FIGURE 1 is a perspective view illustrating a container embodying this invention wherein the tear-out area is located in the top wall or lid;

FIGURE 2 is a top plan view of the container shown in FIGURE 1;

FIGURE 3 is a vertical section taken along the line 3—3 of FIGURE 2;

FIGURE 4 is a section taken along the line 4—4 of FIGURE 2;

FIGURE 5 is a perspective view of the container of FIGURE 1 showing the tear-out area partially pulled free of the container lid;

FIGURE 6 is a cross-section of the container on the line 6—6 of FIGURE 5 and shows the motion by which the tear-out area is removed;

FIGURE 7 is a fragmentary top plan view of a container having a different type of tear-out area;

FIGURE 8 is a side elevation of a container having a still further type of tear-out portion;

FIGURE 9 is a fragmentary top plan view of a further embodiment of this invention, in which a portion of the grasping tab completely overlies the tear-out area, with a part thereof removed to show a lower portion of the tab.

Referring now to the drawings, and in particular to FIGURES 1 to 6, there is illustrated a container according to this invention provided with one type of tear-out portion. The container has a continuous metal side wall 10 connected to a top wall 18 as at 30. The top wall 18 of the container is provided with a single continuous weakened line 16 defining a tear-out portion 12. The weakened

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line 16, as will be seen from FIGURE 4, extends through the wall 18 to a depth of about 65% of the wall, and surrounds the portion 12. The container top wall 18 will withstand the normal stresses of manufacturing and handling, but will readily tear along the line 16 once the tear is initiated.

At a tear initiation point of the wall 18, there is provided a score slit 20 extending through the wall. The score slit 20 "joins" the respective ends of the weakened line 16.

A pull tab 14 has a portion thereof permanently affixed to the tear-out portion 12 immediately adjacent the score slit 20 and overlaps the score slit 20. The terminal end portion of the pull tab 14, identified by reference numeral 14a, is free to be lifted from the surface of the tear-out portion 12, and is evident from FIGURE 3.

At the point where the score slit 20 is located in the top wall 18, and at the underside thereof, there is provided a patch 24 covering and surrounding the slit 20. The patch 24 is, in a preferred embodiment shown in FIGURES 1 and 6, releasably secured to the tear-out portion 12 and releasably secured to the non-tear-out portion of the top wall 18 by means of a pressure-sensitive adhesive.

In FIGURE 7, there is shown an alternative arrangement of the tear-out area of a container lid 40. The weakened line defining the tear-out area is shown by reference numeral 42 and is in the shape of an elongated "keyhole." At one end of the the tear-out area there is provided a score slit 44 and a patch 46 protectively covering the score slit and secured to the underside of the lid 40 by means of a pressure-sensitive adhesive. A pull tab 48 is permanently secured to the tear-out area.

A still further arrangement of a tear-out area is shown in FIGURE 8, wherein there is provided a pair of parallel spaced-apart endless weakened lines 50 and 50a located in the side wall 52 of a cylindrical container. The pair of weakened lines 50 and 50a are joined at one location by a score slit 54. A patch 55 is releasably secured to the underside of the container lid and surrounds the slit 54. The lines 50 and 50a thus define a tear-out ribbon 56 in the container wall 52. A pull tab 58 is permanently secured to the tear-out ribbon 56. In this arrangement, upon pulling the pull tab 58 and removing the tear-out ribbon 56, the complete top portion of the container identified by reference numeral 60 is removed.

In FIGURE 9, there is illustrated an alternative embodiment of this invention. This form of a container includes a lid 70, a weakened line 72 defining a portion of the tear-out area indicated by reference numeral 74 with a score slit 75 completing the perimeter of the tear-out area. Releasably and protectively covering the score slit is a patch 76 of material adhesively secured on the underside of the lid 70, and which surrounds the slit 75. In this embodiment, the grasping tab illustrated by reference numeral 78 consists of a lower portion 78a. The area of the lower portion 78a adjacent the score slit 75 is permanently affixed to the tear-out area 74 by means of adhesive. The tab 78 has an upper limb 78b joining the lower portion 78a. The upper limb 78b has an area sufficient to protectively cover the weakened line 72 defining a portion of the tear-out area. In this embodiment, and due to the grasping tab 78 protectively overlying the weakened line, the weakened line is of a depth approximately 80% of the thickness of the lid 70.

In order to demonstrate the advantageous features of this invention, experiments were conducted with cans of this invention and with similar cans provided with only a further weakened line in the weakened line defining the tear-out area.

Specifically, the representative container according to this invention was made, and which consists of a cylindrical body of sheet tin plate having a thickness of about 0.12 of an inch. The container was provided with a bottom of similar metal with normal overlap procedures having been employed to attach the bottom to the body.

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A lid was constructed of aluminum and provided with a tear-out area defined by a weakened line in the shape of a "keyhole" similar to that shown in FIGURE 7. The thickness of the lid was approximately .0155 of an inch with the thickness of the weakened line running between about .004 to .006 of an inch. At the narrow end of the "keyhole" of the keyhole tear-out area (approximately the center of the lid) the score slit was made in the weakened line having a length of about three-eighths of an inch. A pull tab having a length of approximately one inch was applied to the tear-out area adjacent the score slit, and permanently affixed thereto. The tab was of aluminum and had a thickness of about .022 of an inch.

On the underside of the lid, a rectangular patch of approximately a dimension of .50 by .50 of an inch and having a thickness of about 0.010 of an inch was affixed over and surrounding the slit. The patch was applied by means of a pressure-sensitive adhesive, thus making the patch releasably secured to the tear-out area. The lid was then applied to the cylindrical body in a conventional manner.

For purposes of the test, the bottom of the container was equipped with a one-way air valve, and hooked up to a pressure-reading device.

A similar container made of similar material and consisting of a cylindrical body of identical capacity and a bottom was formed. A lid was prepared which had a weakened line defining a keyhole tear-out area. The thickness of the lid was .0155 of an inch and the thickness of the weakened line was between .004 and .006 of an inch. In a like manner to the container of this invention, the lid was provided with a further weakened portion on the narrow end of the "keyhole" tear-out area. A pull tab was permanently affixed to the tear-out area of the container adjacent the further weakened portion, and the lid subsequently applied to the container in a conventional manner. The bottom of this container was also equipped with a one-way air valve and a pressure reading device. In both cases—i.e. the container of this invention and a conventional type container, the pull tabs were aligned axially to the axial direction of the keyhole.

Air was introduced into each container at a pressure of 100 pounds per square inch.

Subsequently, means for determining the amount of pull required for initiating an opening in each type of container was connected to the pull tabs and tension applied to the tear initiation. The results are as follows.

Test Number	Container of this Invention, pounds	Conventional Container, pounds
1-----	2.05	7.05
2-----	1.90	7.15
3-----	1.95	7.50
4-----	2.00	7.25

The average of many experiments using the above described containers indicated that the average amount of pull required to initiate a tear in a container according to this invention, under 100 p.s.i. was approximately 1.75 plus or minus 3%.

In many other experiments applicant carried out using the above described container of this invention but provided with a .50 of an inch slit in the weakened line, and conducted tests according to the above procedure, it was found that an average of a 1 pound pull was required to initiate the tear in the container. This represents a fraction of the amount of pull required as will be seen from the above table in a container which is not constructed according to this invention.

Advantages

With the container and opening means of the invention, a product possessing many advantageous features over and above previously known containers of the same general type is obtained. In utilizing the container of this

invention for packaging liquids under pressure, and comparing the same to an otherwise identically manufactured container which does not have a score-slit, an amount of pull approximately one-third or one-quarter that required for the conventional container is used to open applicant's container.

Moreover, in the prior art containers, it was substantially essential to provide a container with a further weakened portion in the form of a semi-circle at the tear-initiation region. This was due to the fact that it is easier to initiate a tear in the form of a semi-circle rather than on a straight line. In applicant's container, according to this invention, this requirement is not necessary and in fact, the score slit can occur anywhere it is desired to have the tear-initiation point. Moreover, a wide selection of different tear-out areas was not possible with many of the prior art containers, but in contrast, the tear-out area of applicant's container may assume any shape desired.

A further advantage arising from this invention is that the amount of tear-out area can be considerably increased since the design of the tear-out area is not critical. Accompanying this fact is the point that the grasping tab of applicant's containers may even be flexible in contrast to the tabs of the prior art containers, in which it was essential to have a rigid pull tab to provide sufficient leverage.

I claim:

1. In a container to be opened only by direct, finger-applied tension comprising sheet material defining an enclosure for retaining a product, and a weakened line defining the periphery of a tear-out area, and in which the thickness of the sheet material and depth of the weakened line are such that the weakened line and material will withstand normal stresses of manufacture and handling without rupture, the improvement comprising: a relatively short minute, cut-score slit forming a relatively imperceptible portion of said weakened line and extending through said material and defining a tear-initiation point in said weakened line, said slit completing said weakened line and forming only a relatively short portion thereof, a tab having a portion permanently secured to the tear-out area immediately adjacent and overlying said slit on the outer surface of said material and having a free, finger-graspable portion, said tab finger-graspable portion being so located adjacent said slit whereby force is initially applied directly to said slit when said tab is pulled away from said tear-out area, and a patch adheringly secured on the inner surface of said material in underlying rela-

tion over said minute, cut-score slit with a margin extending on all sides of said slit and sufficiently therebeyond to prevent leakage thereby and through said minute slit, said patch being releasably secured to said tear-out area immediately adjacent said slit, said patch having a relatively small area as compared with the overall area of said tear-out area.

2. The structure as claimed in claim 1 in which said tab comprises a strip element doubled upon itself and forms juxtaposed limbs, one of said limbs being secured to said tear-out area immediately adjacent said slit and extending thereacross, the other limb also overlying said slit and providing said free, manually-engageable, grasping portion.

3. The structure as claimed in claim 2 in which said tear-out area is less than the area of said other limb and completely underlies said other limb and is protected from rupture thereby.

4. The structure as claimed in claim 1 in which said weakened line is circular and said tab extends radially inwardly over said tear-out area.

5. The structure as claimed in claim 1 in which said enclosure includes a side wall in which said weakened line is formed, said weakened lines comprising a pair of parallel lines extending completely around said said wall, said slit extending transversely between adjacent ends of said parallel lines, said tab being doubled upon itself and having a transverse fold line portion overlying said tear-out area and spaced from but adjacent said slit.

6. The structure as claimed in claim 2 in which said weakened line forms a "keyhole" shape narrow at one end, said tab overlying the narrow end of said "keyhole slot."

7. The structure as claimed in claim 1 in which said weakened line is from 50 to 85% of the thickness of said material, said material having a thickness from 8 to 16 thousandths of an inch.

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