March 9, 1965 H. E. WILKINSON 3,172,558

CONTAINER WITH IMPROVED EASY-OPEN END

Filed Nov. 18, 1963

Fig. 1

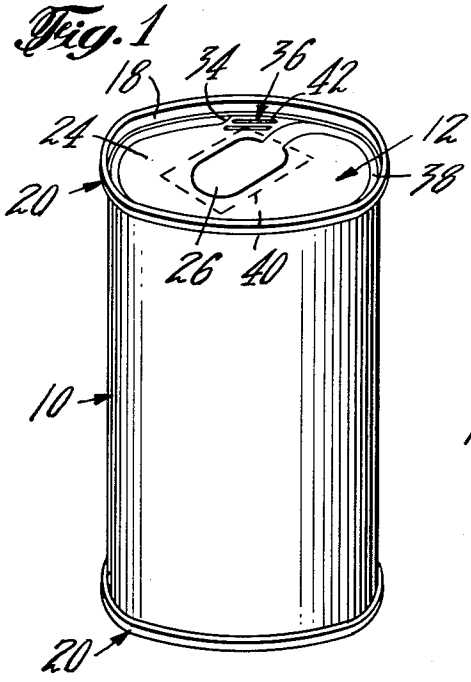
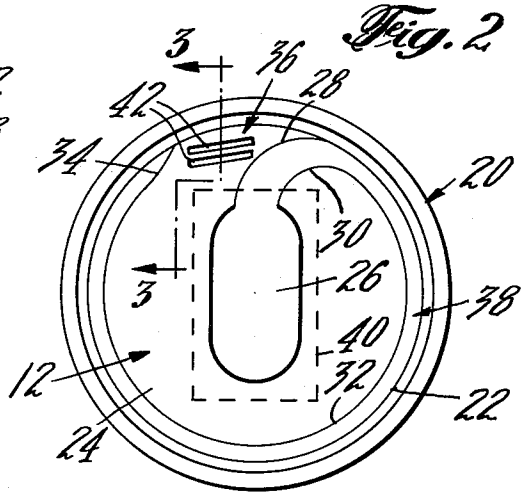


Fig. 2



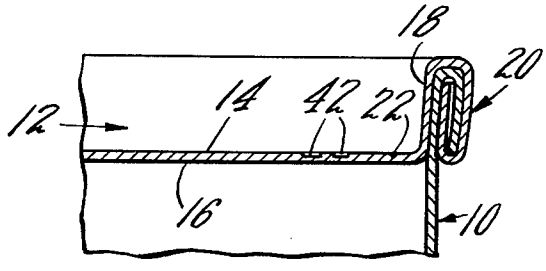


Fig. 3

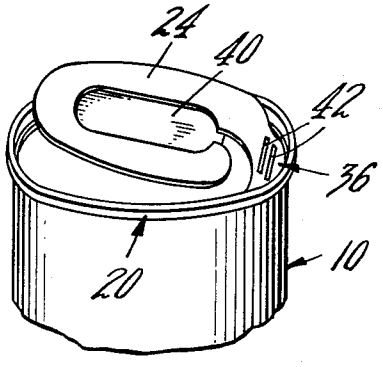


Fig. 4

INVENTOR.
HARLEN EDGAR WILKINSON
BY
Donald A. Kaul
ATTORNEY

United States Patent Office 3,172,558 Patented Mar. 9, 1965

3,172,558

CONTAINER WITH IMPROVED EASY-OPEN END

Harlen Edgar Wilkinson, Crystal Lake, Ill., assignor to American Can Company, New York, N.Y., a corporation of New Jersey

Filed Nov. 18, 1963, Ser. No. 324,271
14 Claims. (Cl. 220—54)

The present invention relates to a hermetically sealed container or can having an easy-open end which is manually openable without the use of tools, and more particularly it relates to an improved end structure in which a portion of the end member remains retained to the container body but allows the contents of said container body to be easily removed.

Easy-open containers have proved particularly adapted for use in containers or cans used for packaging comestibles since the consumer of such comestibles is able to open the container merely by manually removing an integral portion of the container, and he does not need to resort to the use of can openers, knives or other tools.

In the development of easy-open containers, there have been three substantially distinct approaches taken to the problem of forming a manually openable container; namely (1) the cover can be completely removed from the container in a manner such as shown in U.S. Patent No. 496,209 issued at Reiset et al.; (2) the cover can remain adhered to the container body but is perforated by removing a portion of the cover itself as evidenced by U.S. Patent No. 2,870,935 issued to Houghtelling; or (3) the cover can be partially removed from the container but remain adhered thereto by an unsevered portion such as shown in U.S. Patent No. 1,955,431 issued to Lymburner or U.S. Patent No. 2,011,778 issued to Sebell. This particular invention is directed toward containers having easy-open covers of the type discussed above in category (3).

In easy-open containers of this aforementioned type, where a peripheral tear strip extends substantially but not completely about the periphery of the central panel and when torn out leaves the central panel attached to the container body by a small hinge of unsevered metal, it has been found that the central panel which remains attached by the hinge of metal has a tendency to depress slightly into the mouth of the container and thus into contact with the container contents. This is undesirable for at least two reasons; namely, it is non-hygienic for the cover to come into contact with the container contents and, perhaps more serious, it is extremely difficult for the consumer to remove the cover portion when it assumes such a depressed position. Moreover, even under the most ideal conditions where the attached closure portion does not depress downward into the container, removal of the cover by the consumer still remains difficult. The reason for this difficulty is that the attached cover portion is not manually engageable unless the consumer tries to slip his fingers through the slot formed by removal of the tear strip and under the attached cover portion to lift the same to an upward or open position. This type of opening is extremely undesirable since there is not only a strong likelihood that the consumer may cut his finger on the sharp edges of the attached cover portion, but also it is very likely that his fingers will come into contact with the container contents. If the consumer chooses not to utilize his fingers to lift the attached cover portion, but rather utilizes a knife or other similar utensil to be slipped beneath the attached cover portion to lift the same, the very purpose of designing an easy-open container is defeated since it becomes necessary to ultimately use a tool or utensil to bring about opening of the container.

In spite of these aforementioned difficulties, however,

it is still considered to be an extremely desirable construction to have an easy-open container cover wherein the main portion or central panel of the cover remains adhered to the container body when the tear strip has been manually removed. The reason for this is that there are only two alternatives to such a construction and neither of them has proved satisfactory. One alternative is the type of closure where, when the tear strip is removed, the central panel is completely separated from both the tear strip and the container body. When this happens the main or central portion of the closure drops onto the top of the container contents and this is not only unsanitary but also is difficult to remove. The other alternative is a construction wherein the central or main portion of the closure remains adhered to the tear strip and is torn away from the container body along with the tear strip. This has also proved undesirable since it has been found that a certain amount of the container contents adhere to the bottom of the cover and when this cover is torn away quickly and sharply from the container along with the tear strip, these adhered droplets of contents tend to splatter on or about the consumer. Therefore, since neither of these two alternatives has proved to be particularly satisfactory, by a process of elimination the most desirable construction would appear to be that in which the tear strip becomes completely removed from the container body but the main or central portion of the cover remains attached to this container body by a small unsevered hinge of metal.

It is therefore an object of the present invention to provide an improved type of easy-open container which eliminates the aforementioned prior art difficulties encountered in containers of this type.

Another object of this invention is to provide a container having an easy-open closure which will not depress into contact with the container contents as it is opened.

Another object of the present invention is to provide an easy-open container closure construction wherein the problems of splatter from contents adhering to the under portion of the container closure are eliminated.

Another object of the present invention is to provide an easy-open end closure for a container such as a can, which end closure can be quickly and safely removed by a consumer without danger of cutting his fingers or bringing them into contact with the contents within the container.

Another object of the present invention is to provide an approved end closure construction which can be easily and inexpensively manufactured at high rates of production.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the foregoing description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

The foregoing objects are atttained by providing an end closure construction having a peripheral tear strip extending substantially, but not completely, about the periphery of the closure. A finger engageable tab is connected to one end of the tear strip. When this finger engageable tab is manually pulled, the tear strip is torn out of the end closure and the central panel thereof thus remains attached to the container body by means of the small hinge or strip of metal at the periphery of the closure over which one of the tear strip score lines did not extend. At this hinge of metal, an area of stress concentration is set up and when the tear strip is removed, the stress concentration at this point tends to become relieved thus raising the central panel through an upward angle of inclination whereat it is out of contact with the container contents but it can be easily gripped by the consumer to be folded backward to fully open the container. This

stress concentration in the hinge area is set up by suitably cold working the metal in that portion in any one of a variety of suitable ways as will be described in greater detail hereinafter.

Referring to the drawings:

FIG. 1 is a perspective view of a hermetically sealed container having an easy-open end embodying the features of the present invention;

FIG. 2 is a top end view of the container shown in FIG. 1 and showing in detail the construction of the easy-open end closure;

FIG. 3 is an enlarged fragmentary sectional view taken along line 3—3 of FIG. 2; and

FIG. 4 is a fragmentary perspective view of the container and end closure when the end closure tear strip has been removed.

As a preferred or exemplary form of the present invention, FIG. 1 illustrates a container having a tubular body generally designated **10** and an easy-open end closure generally designated **12** hermetically sealed to the body **10** and forming therewith the completed or sealed container.

As can be seen in FIG. 3, the container closure **12** is constructed from a sheet of material, preferably of metallic material of a low tearability value, and has an external surface **14** and an internal surface **16**. The end closure **12** is generally flat but as its outer edges has an upstanding vertical wall **18** which folds into a conventional double seam generally designated **20** along with the wall of the container body **10** to thus secure the end closure hermetically to the container body.

Referring now to FIGS. 1 and 2 for greater detail of the end closure construction **12**, it can be seen that a peripheral score line **22** completely circumscribes the entire end closure **12** at a point spaced just inward from the end closure vertical wall **18**. That portion contained within the outer score line **22** defines the end closure central panel **24**. At some point within the central panel **24**, a peninsular finger engageable tab **26** is substantially punched out from the central panel **24** but remains connected thereto at one end. From this connected tab end, a short curved score line **28** extends outward and merges into contact with the peripheral score line **22**. A substantially parallel curved score line **30** also extends from the connected portion from the finger engageable tab, but this score line **30** terminates short of the peripheral score line **22** and curvingly merges into a score line **32**, spaced inward from, but parallel to the score line **22**. This inner score line **32** does not extend completely around the circumferences of the end closure **12**, but rather it gradually merges by a curved line **34** into the outer peripheral score line **22**. This merging of the score lines **32** and **22** occurs at a point slightly before the curved score line **28**, and this area between the lines **34** and **28** defines a hinge of metal generally designated **36**. That portion of the end closure **12** set off by the curved score lines **28** and **30** and gradually merging into the score lines **22** and **32** and finally terminating at the line **34**, defines the closure tear strip which is generally designated **38**. When the finger engageable tab **26** is manually gripped and pulled, the tear strip **38** is torn out of the end closure thus leaving the central panel **24** attached to the container body **10** only by the small unsevered hinge **36**.

A patch **40** is sealingly affixed to the internal surface **16** of the closure **12** beneath that area where the tab **26** is pierced out. The patch **40** may be of any suitable material compatible with and affixable to the material from which the end **12** is made, for example, a continuous imperforate inert film or sheet of the same material as the end. The patch **40** is of a larger area than that of the tab **26** and is completely sealed to the under surface of the end closure to hermetically seal the container. The patch **40** may be sealingly affixed by bonding, adhering, soldering, welding, gluing, heat sealing, vulcanizing

or any other well-known method of fastening the parts together for the prescribed purpose. The size of the patch **40** is small enough so that it does not extend beyond circumferential score line **22**.

Within the hinge area **36**, the metal from which the end is fabricated is cold worked in such a manner that a stress concentration is set up. In the illustrated embodiment, the stress is concentrated in the hinge area by means of a pair of short parallel flat-bottom score lines **42**. It will be noted that the score lines **42** extend only a short distance across the hinge and terminate short of contact with the tear strip score line **28** and the tear strip score line **34**. While the score lines **42** set up a satisfactory stress concentration within the hinge area **36**, they are by no means the exclusive expedient for setting up such a stress concentration. Rather, it can also be set up by having two parallel beads covering approximately the same area as do the score lines **42** or it could be set up merely by striking a hard blow to the metal in the hinge area to thus cold work it and at the same time thin it.

Obviously, before the tear strip **38** is removed, the end **12** remains imperforate and substantially planar regardless of the stress concentration set up at the hinge portion **36**. However, when a consumer desires to open the container, he simply grasps the tab **26** manually and pulls back, thus lifting the tab **26** away from the underlying patch **40** and commencing tearing of the tear strip score lines **28** and **30**. As the consumer continues to pull on the tab the entire tear strip **38**, as defined by the lines **22** and **32**, tears away from the container body. When the tear strip portion reaches the curved line **34** where the tear strip defining lines merge, the tear strip becomes completely removed from both the container body **10** and the end **12**. At this time, due to the stress concentration present at the hinge area **40**, that portion of the central panel **24** which remains adhered to the container body via the hinge **36** assumes a slight but appreciable upward inclination, as illustrated in FIG. 4. The reason for this upward inclination of the central panel **24** may be attributed to the fact that the stress set up by the score lines **42** becomes relieved when the tear strip **38** is removed, and thus the central panel is free to pivot backward about the score line **22** where it crosses the hinge **36**.

It will, of course, be appreciated that when the attached central panel portion **24** assumes an upward inclination as illustrated in FIG. 4, it can be easily grasped by the consumer and during such grasping he neither brings his fingers into contact with the container contents nor with the sharp edges of the adhered central panel portion **24**. The consumer can either fold the adhered central panel portion back out of the way to allow the container contents to pour out, or if he desires to remove the adhered central panel portion completely, he may simply manually rock it to and fro or he may give it a twist, either of which will cause the metal of the hinge portion to rupture along the score line **22** whereupon the adhered portion will come off in the consumer's hand.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. An easy-open container comprising:
a tubular container body; and
a cover secured to said container body;
said cover having a peripheral tear strip formed by a pair of spaced score lines which extend substantially around the cover but which merge together short of completely surrounding the cover periphery thus leaving a small peripheral hinge over which the tear strip does not extend;

said hinge having an area of stress concentration set up therein whereby, when said tear strip is removed, that portion of the cover retained by said hinge is biased upward.

2. An easy-open container as defined in claim 1 wherein said area of stress concentration is formed by at least one depression in the cover at the hinge.

3. An easy-open container as defined in claim 1 wherein said area of stress concentration is formed by at least one bead in the cover at the hinge.

4. An easy-open container comprising:

a tubular container body;

end closures double seamed to opposite ends of said body;

one of said end closures having a peripheral score line completely surrounding it and spaced adjacent the double seam, said one end closure thus defining a cover;

a tab punched out of said cover but remaining connected thereto by a small unpunched appending portion;

a first score line extending from one end of said appended tab portion and merging with said peripheral score line;

a second score line extending from the other end of said appended tab portion but terminating short of said contact with said peripheral score line;

an inner score line substantially concentric with said peripheral score line but spaced inwardly therefrom;

said inner score line commencing at the terminus of said second score line and terminating with a terminal score line which merges said inner score line into said peripheral score line;

said terminal score line being located slightly away from said first score line and defining therebetween a hinge portion over which only said peripheral score line extends;

said hinge portion being cold worked to set up a stress concentration therein;

a portion of said cover being removable to open said container by manually pulling said tab to tear out the cover portion contained between said first and second score lines, and said inner and peripheral score lines, said tearing out terminating at the terminal score line;

said stress concentration in said hinge area being effective to cause the cover portion container within the torn-out portion to incline upward when the tearing out has been completed.

5. An easy-open container as defined in claim 4 wherein a patch is adhesively secured on said cover beneath the tab portion to thus hermetically seal said cover to said container body.

6. An easy-open container as defined in claim 5 wherein said cold working in the hinge portion is accomplished by at least one small score line which terminates short of contact with both the first score line and the terminal score line.

7. An easy-open container as defined in claim 5 wherein said cold working in the hinge portion is accomplished by at least one small bead which terminates short of contact with both the first score line and the terminal score line.

8. An easy-open container as defined in claim 5 wherein said cold working in the hinge portion is accomplished by thinning the cover material in that portion.

9. A metal end closure for a container body comprising:

a central panel; and

an upturned rim portion adapted to be double seamed to the container body;

said central panel having a pair of spaced concentric score lines defining therebetween a tear strip;

the outermost of said concentric score lines being located immediately adjacent said upturned rim portion and the innermost of said concentric score lines being spaced inward from said outermost line and having a terminal end portion which merges into said outermost line;

a tear tab being interconnected by spaced score lines to said tear strip;

a hinge portion defined by the area between said tear tab score lines and the innermost tear strip terminal line;

said hinge portion being adapted to retain that portion of the central panel within said innermost score line in appendancy with said upturned rim portion;

said hinge portion being cold worked to set up an area of stress concentration within it whereby when said tear tab is pulled to remove said tear strip, the portion of said central panel appended by said hinge will assume an upward angle of inclination.

10. A metal end closure as defined in claim 9 wherein the cold working of said hinge portion to set up an area of stress concentration is accomplished by providing at least one short score line within said hinge portion.

11. A metal end closure as defined in claim 9 wherein the cold working of said hinge portion to set up an area of stress concentration is accomplished by providing at least one short bead within the hinge portion.

12. A metal end closure as defined in claim 9 wherein the cold working of said hinge portion to set up an area of stress concentration is accomplished by thinning the metal in the hinge portion.

13. A metal end closure as defined in claim 9 wherein the outermost concentric score line extends completely around said central panel and thus extends through said hinge portion.

14. A metal end closure as defined in claim 13 wherein the cold working of the hinge portion to set up an area of stress concentration is accomplished by physically disrupting the metal of the hinge portion.

References Cited in the file of this patent

UNITED STATES PATENTS

1,643,958	Rooney	Oct. 4, 1927
1,955,431	Lymburner	Apr. 17, 1934
2,011,778	Sebell	Aug. 20, 1935