May 7, 1968 G. F. SMYTH 3,381,847

EASY OPENING CONTAINER WITH WIRE LEVER

Filed March 4, 1965 2 Sheets-Sheet 1

Fig. 1

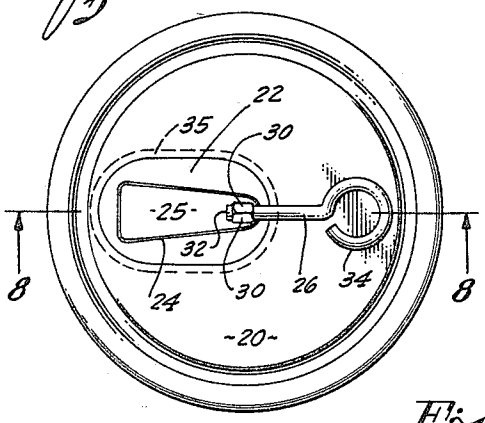


Fig. 2

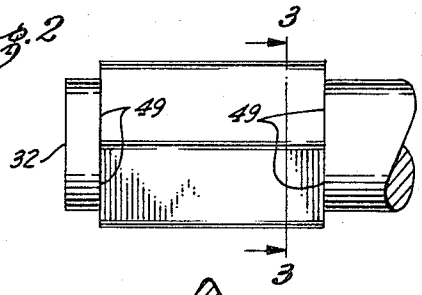


Fig. 3

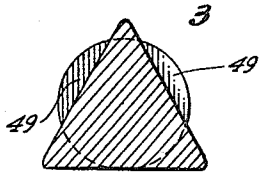


Fig. 5

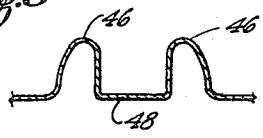


Fig. 4

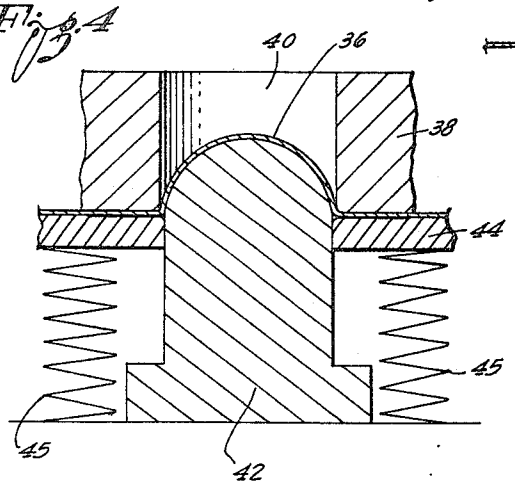


Fig. 6

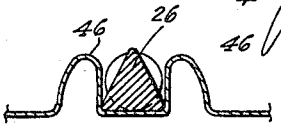
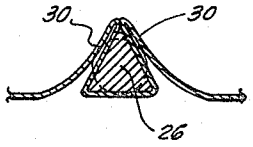


Fig. 7



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Fig. 8

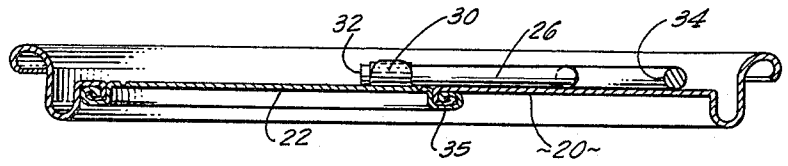


Fig. 9

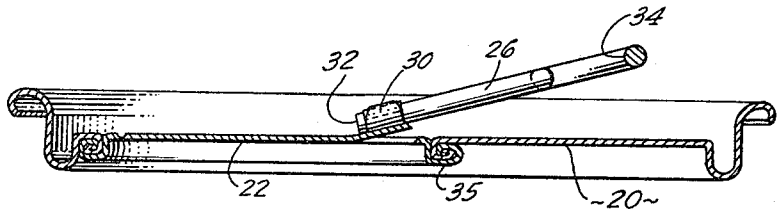


Fig. 10

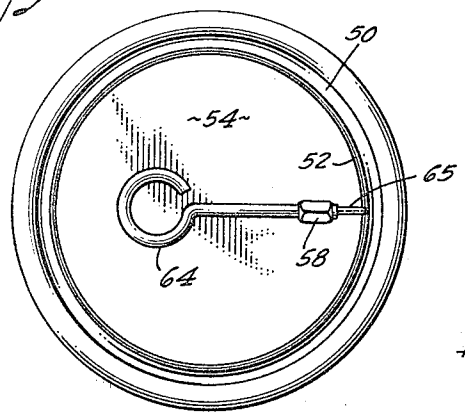


Fig. 11

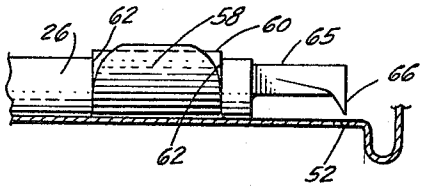
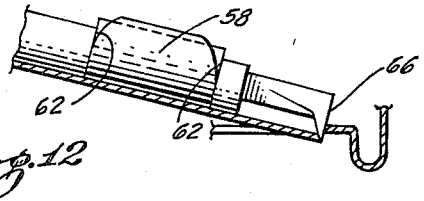


Fig. 12



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EASY OPENING CONTAINER WITH WIRE LEVER

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11 Claims. (Cl. 220—54)

ABSTRACT OF THE DISCLOSURE

This disclosure describes an easy opening container in which a lever-like member is affixed to a tear portion by attachment means formed integrally with the tear portion. The lever-like member can be utilized as a front opening or rear opening member for removing the tear portion from the container. In a preferred form, the attachment means may include laterally deformable means.

This invention relates to containers having tear portions formed by score lines with tabs or levers attached to the tear portions to serve as manual means for severance of the tear portions.

Easy opening containers of the general type to which the invention pertains have a tab or lever in the form of a sheet metal stamping which is attached to the tear portion of the container by a hollow rivet, the hollow rivet being formed in the sheet material of the tear portion and extending through an aperture in the sheet metal stamping. Such a sheet metal tab of the required stiffness is relatively expensive because of the cost of the sheet metal and the added cost of forming the sheet metal.

The present invention is directed specifically to the problem of reducing the cost of such an easy opening container by substituting a relatively inexpensive short piece of stiff wire for the usual sheet metal tab. More specifically, the invention is directed to the problem of attaching such an inexpensive wire member to a tear portion of the container wall in an efficient but inexpensive manner.

It is a simple matter to employ some kind of special fitting to attach such a wire member to a tear portion of the container wall. For this purpose a metal clip or bracket adapted for engagement with the wire member may be soldered, spot welded, riveted or otherwise bonded to the tear portion of the container. Such a fitting, for example, may comprise an angular clip with an upstanding flange and with the wire member extending through an aperture in the upstanding flange. The cost of such an added fitting together with the added cost of attaching the fitting both to the container and to the wire member may largely if not entirely offset the saving gained by substituting a wire member for the usual sheet metal tab.

The present invention is based on the concept of eliminating the need for any such fitting by using the sheet metal of the tear portion itself as sole means for anchoring the wire member. To carry out this concept the sheet material of the tear strip is offset and formed into a pair of spaced double layer tongues without breaking the continuity of the sheet material and the two double layer tongues are bent towards each other over the wire member to clamp the wire member flat against the container wall.

To make the joint between the wire member and the tear portion completely satisfactory, provision must be made to lock the wire member against longitudinal movement relative to the container wall. In some practices of the invention the working end of the stiff wire is formed with a downwardly extending point to pierce the wall of the container and therefore a further provision is required to keep the anchored wire member from rotating about its longitudinal axis.

A feature of the invention is that both of these provisions are made simply by deforming a relatively short longitudinal portion of the wire to a noncircular configuration for engagement by the pair of double layer tongues. Preferably the wire is deformed in cross section to the configuration of a triangle with the base of the triangle positioned flat against the container wall. For example, the wire may be deformed in cross section to the configuration of an isosceles triangle. Such a triangular cross sectional configuration is advantageous in providing maximum stiffness in the plane perpendicular to the wall of the container and at the same time in providing a flat or planar base surface that may be clamped firmly against the container wall to prevent relative rotation of the wire member about its longitudinal axis. In addition the triangular cross sectional configuration desirably provides two convergent outer surfaces for clamping engagement by the pair of double layer tongues. Finally, deforming the short longitudinal portion of the wire to a noncircular configuration provides two shoulders at the opposite ends of the longitudinal portion which face towards each other and may be firmly engaged by the edges of the double layer tongues to anchor the wire member against longitudinal movement.

In the simplest practice of the invention, the wire serves as a second class lever. For this purpose the wire is deformed to noncircular configuration near one end of the wire and this end is left blunt to serve as the fulcrum of the lever. In a second practice of the invention, the wire serves as a first class lever that has its fulcrum at the pair of double layer tongues and has a short working arm formed with a downwardly directed point to pierce the wall of the container.

A feature of the second practice of the invention is that while the major portion of the length of the wire lever lies flat against the container wall, the short working arm that carries the piercing point may be offset to be spaced outwardly from the plane of the container wall. One advantage of this arrangement is that it prevents accidental piercing of the container wall by the point on the working arm of the lever and another advantage is that it permits the lever to be lifted through an initial arc before the point penetrates the sheet material of the container.

A further feature of the invention is the application of the above concepts to a container made of relatively tough sheet metal, such as tin-coated steel which is relatively inexpensive but can not be scored to form a tear portion that is readily removable by simple manual means. The invention teaches that the tough sheet material of the container may be formed with an opening and a panel of relatively soft and deformable material may be mounted across the opening in a sealed manner

to provide the required easily removable scored tear portion of the container wall.

Further features of the invention relate to the method of fabricating such an easy opening container. One feature is the concept of first forming a relatively large dimple in the sheet material of the container wall; then converting the dimple into a pair of smaller dimples and, finally, converting the two smaller dimples into the pair of double layer tongues. This procedure of forming the two double layer tongues in three steps instead of one step has the advantage of initially displacing sheet material into the region of the pair of tongues to minimize the thinning of the sheet material involved in the forming of the pair of tongues.

The various features and advantages of the invention may be understood by referring to the following detailed description and the accompanying drawings.

In the drawings which are to be regarded as merely illustrative:

FIG. 1 is a plan view of a can top embodying one practice of the invention;

FIG. 2 is an enlarged fragmentary plan view of one end of the deformed wire that serves as the lever in FIG. 1;

FIG. 3 is an enlarged transverse cross section of the deformed portion of the wire taken along the line **3—3** of FIG. 2;

FIG. 4 is a somewhat diagrammatic sectional view showing how dies may be employed to form a relatively large dimple in the deformable sheet material of the container wall as the first step in the forming of the two double layer tongues;

FIG. 5 is an enlarged fragmentary sectional view showing a pair of smaller dimples produced by deformation of the large dimple;

FIG. 6 is a similar cross sectional view showing the wire in cross section as positioned between the pair of small dimples;

FIG. 7 is a similar sectional view showing the pair of dimples bent and flattened to form the desired pair of double layer tongues with the tongues clamping the wire firmly against the container wall;

FIG. 8 is an enlarged sectional view along the line **8—8** of FIG. 1 showing the completely installed wire lever;

FIG. 9 is a view similar to FIG. 8 showing the lever lifted sufficiently to initiate severance of the tear portion of the container wall;

FIG. 10 is a plan view similar to FIG. 1 showing a can top embodying a second practice of the invention;

FIG. 11 is a fragmentary sectional view taken along the line **11—11** of FIG. 10 and showing the working portion of the wire lever in side elevation; and

FIG. 12 is a fragmentary view similar to FIG. 11 showing how lifting the lever causes the pointed end of the lever to pierce the sheet material at the score line to initiate severance of the tear portion of the container wall.

Referring to the first embodiment of the invention, FIGS. 1 to 9, FIG. 1 shows a can top **20** of relatively tough but inexpensive tin-coated steel with a panel **22** of softer sheet material such as a sheet of aluminum alloy mounted in an opening in the can top in a sealed manner. The panel **22** is scored along a continuous line **24** to form a tear portion **25** which is elongated and therefore may be aptly termed a tear strip.

A second class lever in the form of a relatively stiff wire member **26** is anchored to the leading end of the tear strip **25** by a pair of cooperating double layer tongues **30** which are formed in the sheet metal of the tear strip without breaking the continuity of the sheet metal. A short end portion **32** of the wire member **26** extends in one direction beyond the pair of tongues **30** and constitutes the fulcrum arm of the lever to press against the tear strip when the longer arm or handle of the tear strip is lifted as shown in FIG. 9. Preferably the wire member **26** is formed with a loop **34** to serve as a handle for the lever.

The sheet metal panel **22** of relatively soft sheet material may be mounted in the can top **20** in any suitable manner. In the construction shown, the panel **22** is joined to the can top **20** by a continuous bead **35** wherein a continuous flange around the rim of the openings of the can top and a mating continuous flange around the panel **22** are rolled together and flattened in a well known manner to form a continuous fluid-tight seam. If desired, a suitable sealant may be incorporated in the seam.

Within the scope of the invention, the short deformed longitudinal portion of the wire that is engaged by the two tongues **30** may be of any configuration but a noncircular configuration is preferred. In this instance, the wire is deformed as shown in FIGS. 2 and 3 to a cross sectional configuration that approximates an isosceles triangle with one side of the triangle abutting the container wall between the two tongues **30**. Since the ratio between one side of an isosceles triangle and the diameter of a circle of the same area is approximately 1.34, the three sides of the isosceles triangle may be approximately 34% larger than the diameter of the wire as shown in FIGS. 2 and 3. If desired, however, the operation of deforming the wires to triangular cross sectional configuration may be carried out in a manner to elongate the wire with corresponding reduction of the sides of the isosceles triangle. It is also to be understood that where a triangular cross sectional configuration is employed the cross section may be of the configuration of an equilateral triangle as distinguished from an isosceles triangle.

The steps for forming the pair of double layer tongues in engagement with the triangular portion of the wire member may be understood by reference to FIGS. 4–7. FIG. 4 shows how the means may be employed to form a relatively large dimple **36** in the can top **20** as the initial step. The die means shown in FIG. 4 comprises an upper male die **38** with a cavity **40** and a lower male die **42** surrounded by a pressure pad **44** that is urged upward against the upper die **38** by suitable springs **45**. When the two dies close as shown in FIG. 4 the male die **42** offsets the sheet material of the can top **20** to form the relatively large dimple **36**.

It is important to note that the pressure exerted by the springs **45** is relatively light to permit the sheet material to slip radially inward towards the dimple to feed the sheet material to the dimple. Thus the dimple **36** is formed with minimum thinning of the sheet material and the dimple greatly increases the volume of sheet material within the plan area of the dimple to minimize the thinning of the sheet material by the subsequent formation of the double layer tongues.

Suitable die means (not shown) is employed to convert the dimple **36** into two smller spaced dimples **46** shown in cross section in FIG. 6. It is to be noted that the pair of dimples **46** are spaced apart by a web **48** in the plane of the can top. The next step is to place the wire member **26** between the two dimples **46** with the base of the triangular cross sectional configuration flat against the web **48** as shown in FIG. 6. The final step is to employ suitable die means (not shown) to flatten the two dimples **46** and to bend the two dimples towards each other to form the double layer tongues **30** shown in FIG. 7.

FIG. 8 shows how the wire member **26** lies flat against the can top **20** in a manner that does not interfere with handling of the can tops in the course of completing the fabrication of the cans and does not interfere with stacking the finished cans. It is to be noted that the tongues **30** clamp the wire member flat against the can top to hold the wire member captive against rotation and against movement away from the plane of the can top and it is to be further noted in FIGS. 1, 8 and 9 that the cooperating pairs of tongues engage two shoulders **49** at the opposite ends respectively of the triangular portion to anchor

the wire member in a positive manner against longitudinal movement relative to the can top.

To open the can, the wire member **26** is lifted by the loop-shaped handle **34** as shown in FIG. 9 with the consequence that the end portion **32** of the wire member fulcrums against the tear strip to lift the two tongues **30** and thereby lift the leading end of the tear strip sufficiently to initiate rupture of the metal along the score line **24**. Once the tearing action is initiated the wire member is employed as a handle to pull the remainder of the tear strip free.

From the foregoing it can be readily appreciated that the advantages of the triangular configuration are: maximum stiffness in bending of the wire in the plane normal to the can top; cooperation of a flat side of the wire member with the can top to prevent relative rotation of the wire member about its longitudinal axis; the provision of converging planar faces for engagement by the pair of confronting double layer tongues; and the provision of a pair of shoulders at the opposite ends respectively of the deformed portion of the wire for engagement by the double layer tongues to prevent longitudinal movement of the wire member relative to the can top.

In the second embodiment of the invention illustrated by FIGS. 10–12, a can top **50** is scored along a continuous circular line **52** to form a tear portion **54** that extends over a major portion of the area of the can top. A wire member **56** is anchored flat against the tear portion **54** in the previously described manner by a pair of cooperating double layer tongues **58**. For this purpose the wire member **56** has a short longitudinal portion **60** of triangular configuration bounded by a pair of shoulders **62** in the manner heretofore described. The wire member **56** is looped in the usual manner to form a handle **64** by means of which one end of the wire member may be lifted.

In this second embodiment of the invention the wire member **56** is a first class lever with its fulcrum at the pair of tongues **58** and with a short working arm **65** extending beyond the two tongues. As may be seen in FIG. 11 the material of the wire member along the short arm **65** is offset or spaced away from the plane of the can top **50** and the outer end of the short arm is formed with a downwardly directed point **66** that is designed for penetration of the sheet material. Thus the wire member **56** is not only deformed in the same manner as the previously described wire member **26** to provide a longitudinal portion of triangular cross section but is also deformed by suitable die means to provide the offset arm **65** and the downwardly directed point **66**.

It is important to note that the point **66** is directly over the score line **52** as may be seen in FIG. 11. It is also important to note that the tongues **58** hold the wire member **56** firmly against the can top **50** to keep the point **66** spaced away from the can top to prevent accidental puncturing of the can top by the point.

The first step in the removal of the tear portion **54** from the can top **50** is to lift the operating arm of the wire lever by means of the handle **64** thereby to cause the point **66** to penetrate the sheet material at the score line **52** in the manner shown in FIG. 12. In this initial operation the lever fulcrums about its attachment to the can top by the two tongues **58** and therefore the can top bulges outwardly in the region of the two tongues in reaction to the resistance of the sheet metal to penetration by the point **66**. After the lever is manipulated in this manner to pierce the can top at the score line, the lever is employed as a handle for manipulating the tear portion **54** to complete the severance of the tear portion or at least to sever the metal for a sufficient distance along the score line **52** to make the contents of the can accessible.

My description in specific detail of the selected embodiments of the invention will suggest various changes, substitutions and other departures from my disclosure within the spirit and scope of the appended claims.

I claim:

1. In the construction of a container wherein a wall of the container made of deformable sheet material is weakened to form a tear portion and manually operable means is attached to the tear portion to facilitate severance thereof, the improvement comprising:

the manually operable means being in the form of a length of relatively stiff wire;

the wire having two shoulders spaced longitudinally thereof to define a longitudinal portion of the wire, the two shoulders facing towards each other; and

the wire being attached to the tear portion by two folded offset portions of the sheet material with the sheet material coninuous at the offset portions,

the two offset portions being in the form of double layer tongues on opposite sides respectively of a longitudinal portion of the wire and confining the longitudinal portion of the wire against lateral movement, the two tongues overhanging the longitudinal portion of the wire and clamping the longitudinal portion against the wall of the container between the two tongues,

said tongues engaging both of said two shoulders of the wire to anchor the wire against longitudinal movement.

2. An improvement as set forth in claim **1** in which said longitudinal portion of the wire is of generally triangular cross sectional configuration with a longitudinal planar surface lying flat against the tear portion.

3. An improvement as set forth in claim **1** in which the wire is formed with a point on one end to penetrate the sheet material in the region of an edge of the tear portion.

4. An improvement as set forth in claim **1** in which the wire is formed with a blunt end to bear against the tear portion when the wire is manipulated to sever the tear portion.

5. In a construction of an easy opening can having a wall of relatively tough sheet metal, the improvement comprising:

a panel of relatively soft deformable sheet material inserted in the wall and forming a portion of the wall, the panel being weakened to form a tear portion of the wall;

a piece of wire having a longitudinal attachment portion attached to the tear portion to serve as manual means for severance of the tear portion, the wire being attached to the tear portion by two folded offset portions of the sheet material with the sheet material continuous at the offset portions,

the two offset portions being in the form of double layer tongues on opposite sides respectively of the longitudinal attachment portion of the wire and confining the longitudinal portion of the wire against lateral movement, said tongues forming a longitudinally extending tunnel through which said longitudinal attachment portion projects, the two tongues overhanging the longitudinal attachment portion of the wire and clamping the longitudinal portion against the wall of the container between the two tongues.

6. An improvement as set forth in claim **5** in which:

the wire is formed with two shoulders at the opposite ends respectively of said longitudinal portion with the two shoulders facing each other; and

in which the two tongues engage both of the two shoulders to anchor the wire against longitudinal motion relative to the panel.

7. In an easy opening container, the combination of:

a circular container wall of sheet material having a circular peripheral flange for attaching the container wall to the container;

a circular line of score formed in said container wall concentric with the circular container wall and defining a circular tear portion extending over a major portion of said container wall, said score line lying

closely adjacent said circular peripheral flange;

a longitudinally rigid member formed of a single piece of material having an acuate terminal element at one end thereof for rupturing said container wall along said line of score to sever and remove said tear portion from said container wall;

said member having a ring-like element fixedly carried at the end thereof opposite said acuate terminal element as an integral and rigid extension of said member, said ring-like element forming a handle for manipulation of said member by a user;

means, including means formed integrally with a preselected segment of the sheet material of said container wall radially inwardly of said line of score and interlockingly engaged with a predetermined segment of the rigid member adjacent said terminal element, for rigidly attaching said member to the container wall and holding said rigid member against pivotal and axial movement whereby said ring-like handle element is flatly disposed over the tear portion of said container wall and the said acuate terminal element is disposed above a preselected starting point on said circular score, said member and said handle element forming with the attaching means an elongate rigid first-class lever, whereby a user grasping said handle element and raising the handle element upwardly from said container wall causes the acuate terminal element of said rigid member to apply a downwardly directed force against said preselected starting point on said circular score to initiate rupture of said line of score at said starting point whereby the entire tear portion of the container wall can thereupon be removed from said container wall by the application of a pulling force to said handle element to complete rupture of said line of score.

8. In an easy opening container, the combination of:

a container wall of deformable sheet material, said container wall being scored to define a tear portion at least partially removable from the container wall;

manually operable means for initiating severance of the tear strip, said manually operable means including an elongated relatively stiff wire having a longitudinal attachment portion thereon; and

two separate offset portions of the container wall on opposite sides of the longitudinal attachment portion for attaching the wire to the container wall, each of said offset portions including a double layer tongue extending longitudinally along the longitudinal attachment portion and laterally over at least a portion of the longitudinal attachment portion, said tongues forming a longitudinally extending tunnel through which said longitudinal attachment portion projects, said tongues confining the wire against lateral movement and clamping the wire to the container wall.

9. A combination as defined in claim **8**, wherein each of said tongues project upwardly above the plane of the container wall and said longitudinal attachment portion is not substantially wider than the adjacent portions of said wire.

10. A combination as defined in claim **8**, wherein said longitudinal attachment portion of the wire is non-circular in cross-section and has a planar surface which is clamped firmly against the container wall.

11. In a construction of an easy opening can having a wall of relatively tough sheet material, the improvement comprising:

a panel of relatively soft deformable sheet material inserted in the wall and forming a portion of the wall, the panel being weakened to form a tear portion of the wall; and

a piece of wire attached to the tear portion to serve as manual means for severance of the tear portion, the wire being attached to the tear portion by two folded offset portions of the sheet material with the sheet material continuous at the offset portions, the two offset portions being in the form of double layer tongues on opposite sides respectively of a longitudinal portion of the wire and confining the longitudinal portion of the wire against lateral movement, the two tongues overhanging the longitudinal portion of the wire and clamping the longitudinal portion against the wall of the container between the two tongues, the longitudinal portion of the wire being generally triangular in cross-section and having a planar surface lying flat against the container wall.

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