Aug. 23, 1966 J. A. GEIGER 3,268,105

FIBROUS RIP-OPEN MEANS FOR METALLIC CONTAINERS

Filed July 14, 1964 4 Sheets-Sheet 1

Fig. 1

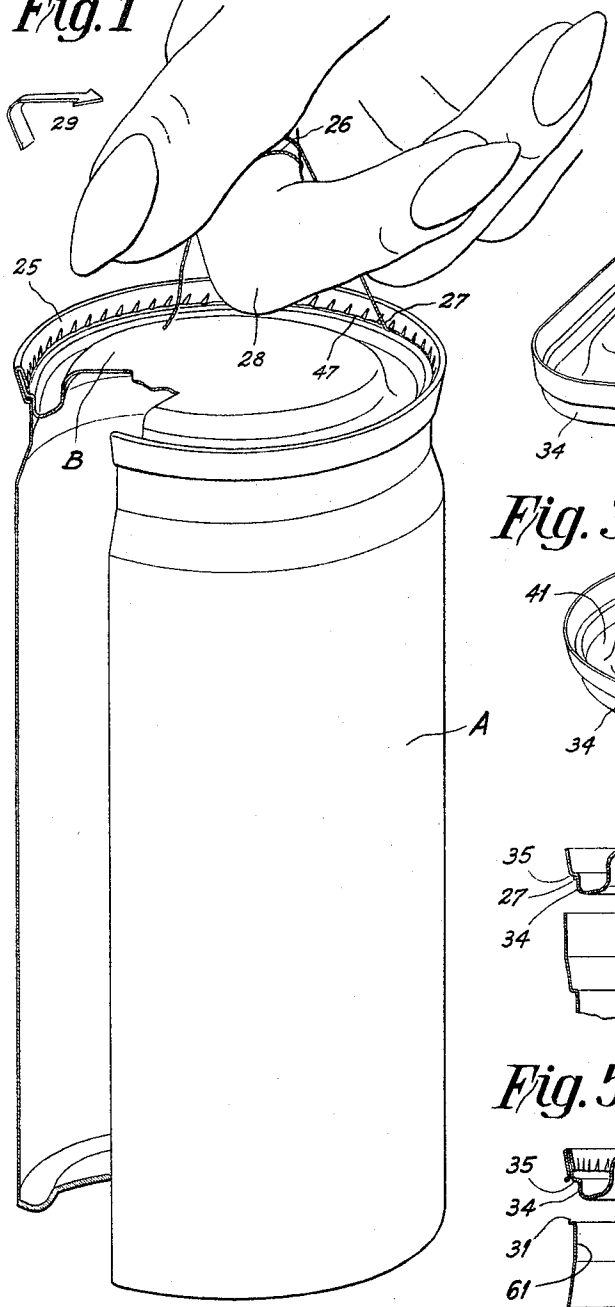


Fig. 2

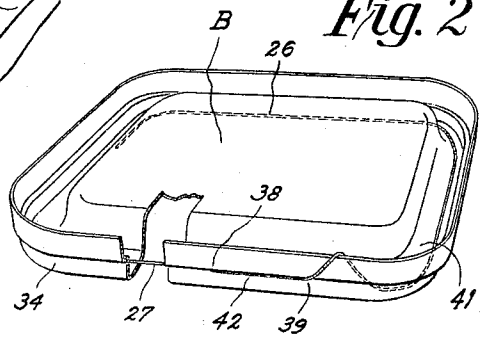


Fig. 3

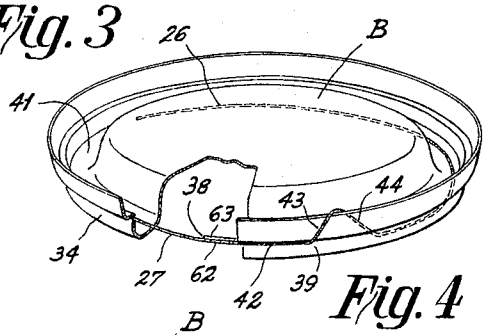


Fig. 4

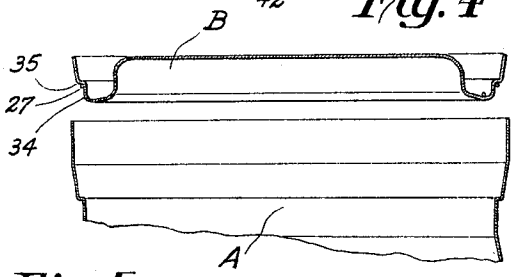
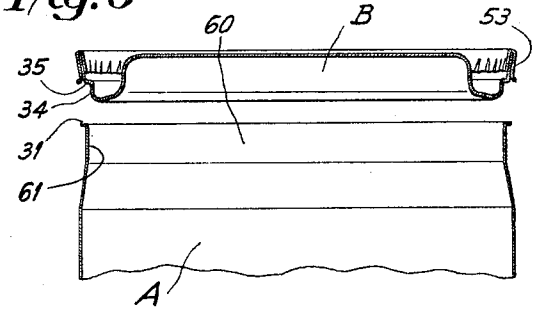


Fig. 5



INVENTOR

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FIBROUS RIP-OPEN MEANS FOR METALLIC CONTAINERS

Filed July 14, 1964 4 Sheets-Sheet 2

Fig. 6

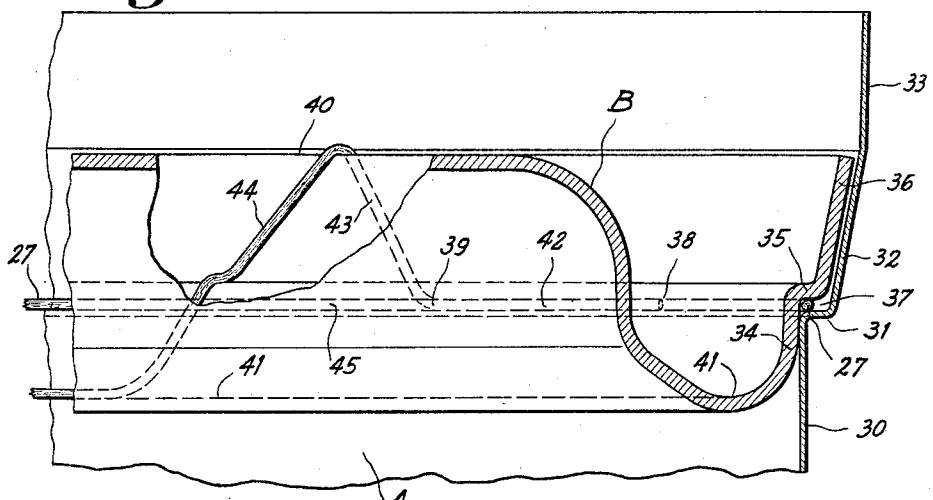


Fig. 7

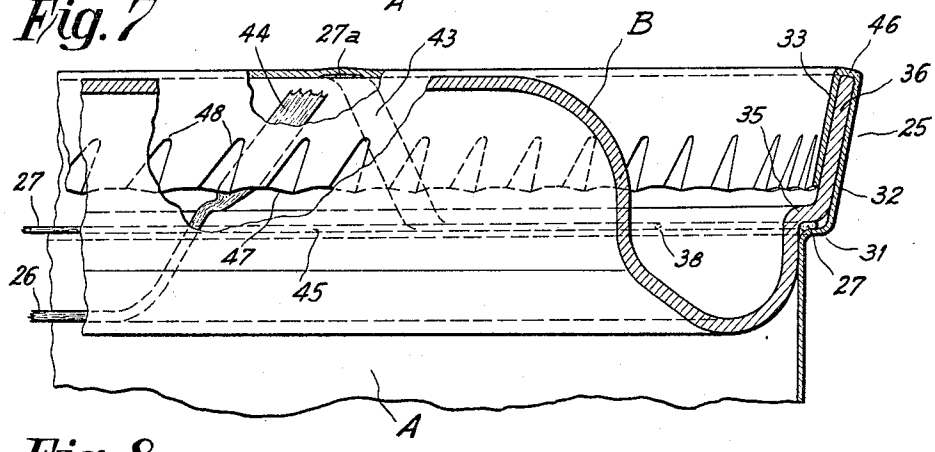
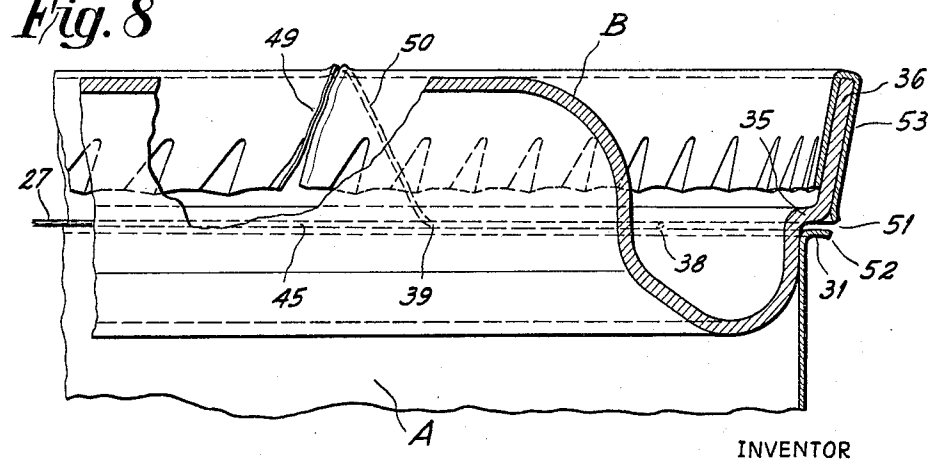


Fig. 8



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Aug. 23, 1966 J. A. GEIGER 3,268,105

FIBROUS RIP-OPEN MEANS FOR METALLIC CONTAINERS

Filed July 14, 1964 4 Sheets-Sheet 3

Fig. 9

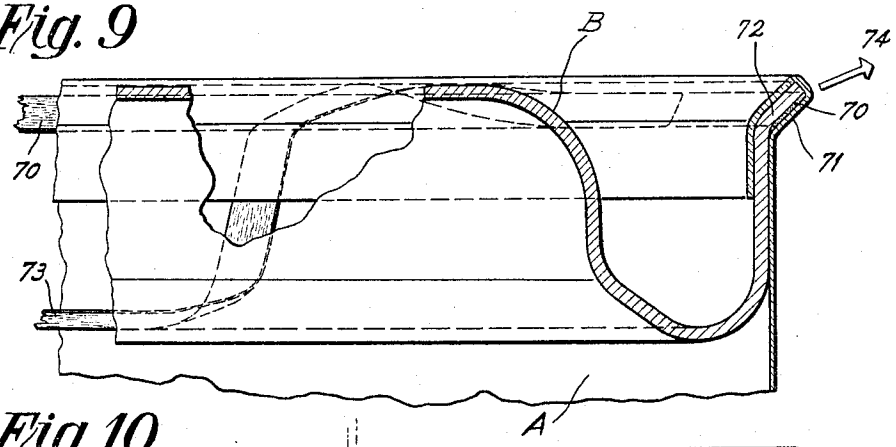


Fig. 10

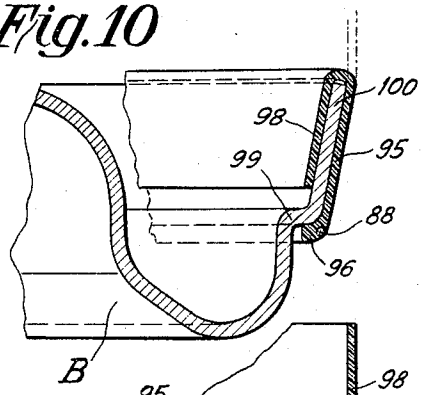


Fig. 11

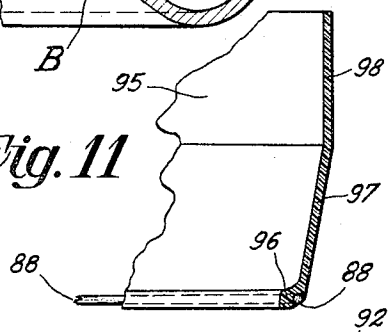


Fig. 12

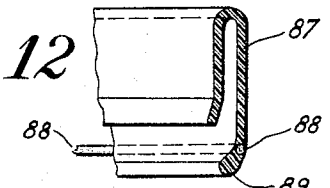


Fig. 13

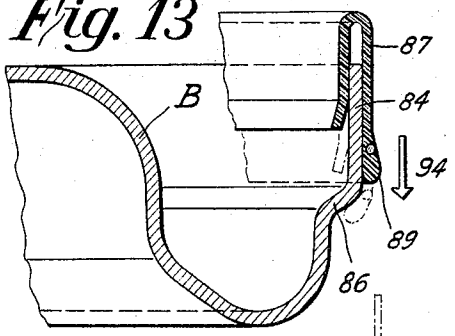
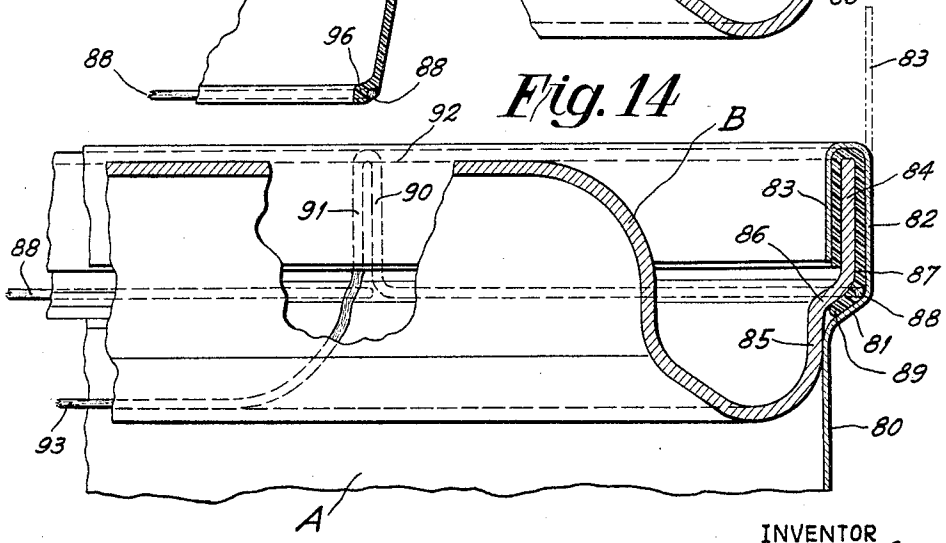


Fig. 14



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FIBROUS RIP-OPEN MEANS FOR METALLIC CONTAINERS

Filed July 14, 1964 4 Sheets-Sheet 4

Fig. 15

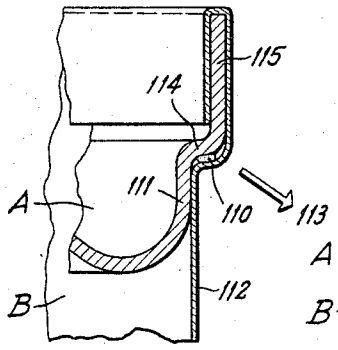


Fig. 16

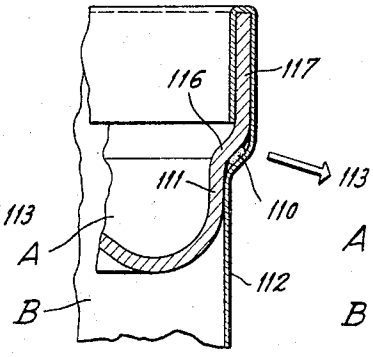


Fig. 17

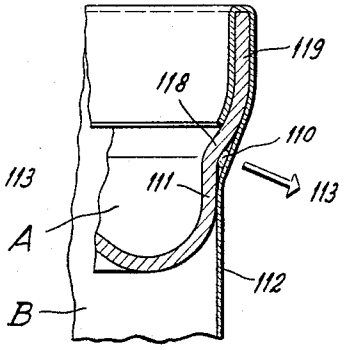


Fig. 18

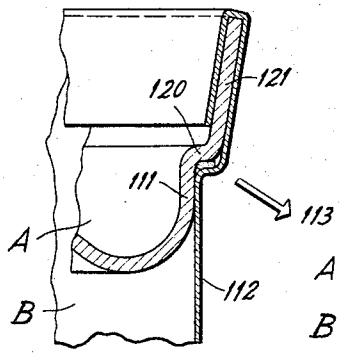


Fig. 19

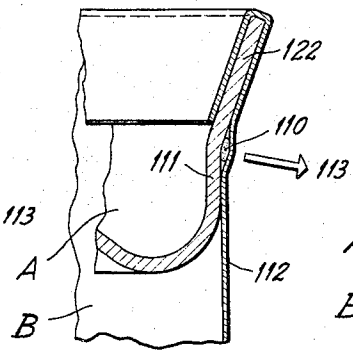


Fig. 20

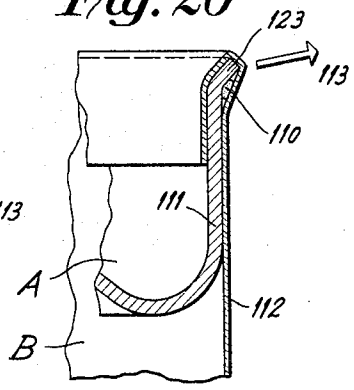


Fig. 21

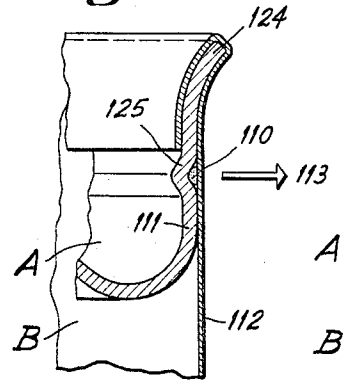
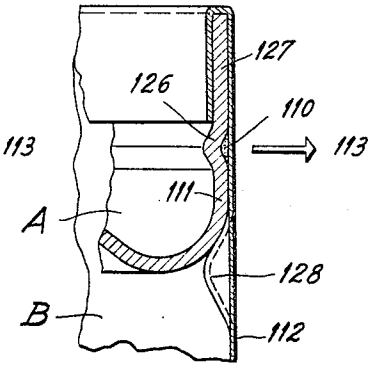


Fig. 22



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United States Patent Office 3,268,105 Patented August 23, 1966

3,268,105

FIBROUS RIP-OPEN MEANS FOR METALLIC CONTAINERS

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Filed July 14, 1964, Ser. No. 382,479
25 Claims. (Cl. 220—49)

The present invention relates to rip-open means for containers and more particularly to non-metallic or fibrous rip-open devices designed to be incorporated in metallic containers such as cans. The invention has particular merit when embodied in food or beverage cans with a hermetically sealed end closure or lid, suitable to resist internal pressures.

A conventional way of opening cans for removal of their contents is by the use of a special cutting tool such as a manually or automatically operated can opener which cuts the can lid close to its peripheral seam, so that the lid can either be removed or bent open to produce an opening slightly smaller in size than the can diameter. However, if no such can opener is at hand, it may become difficult to remove the contents of the can. Simple puncturing may suffice to remove liquid contents but when it is necessary to remove the entire lid, it may be an arduous task to do so without a can opener.

The desire to provide an effective built-in rip-open device for cans is a long-standing one, as manifested by the great number of inventions already made in this field. Many good solutions to this problem have only failed because their elevated cost made mass-marketing impossible.

It is, therefore, one of the objects of this invention to provide an inexpensive, non-metallic opening means for incorporation in metallic containers where it is confined between wall portions of the container and which, upon being pulled, causes severance of one of the container confining walls and consequently permits opening of the container thereby eliminating the need for a special opener tool.

It is another object of this invention to provide an opening means of the type mentioned above which is compressible and thereby capable of serving as a sealing element when it is confined inside the container seam.

A further object of this invention is to provide a non-metallic opening means of fibrous material, capable of being impregnated with a compound that will make it adhere to the container lid for easier handling and assembly and at the same time improve its sealing capability after assembly.

A still further object of this invention is to provide the earlier-mentioned compressible non-metallic opening means for confinement inside a container seam with a transition portion between its confined and free portions of length, whereby the transition from within to without the seam does not require any hole or slot or other penetration in the seam walls.

With the advent of aluminum as a suitable material for food and beverage cans and the introduction of the impact-extrusion technique in the art of producing aluminum containers it has become possible to economically mass-produce aluminum cans. These cans are characterized by their two-piece design, as compared to the conventional three-piece design of tin cans. As is well known, the latter normally comprise a cylindrical body with a longitudinal seam and two circular end closures. Impact-extruded cans consist of a body with a single-piece bottom and shell, and an end closure of the type used on tin cans. The body is pressed into shape from a small disc of soft aluminum by a single stroke on a heavy press, using an impact-extrusion die. The can bodies

produced by this method are characterized by a comparatively heavy bottom of flat or inwardly recessed configuration and a thin seamless shell. With this production method it has become possible to produce can bodies of other than circular cross section, such as hexagonal or square ones, for example, the difference being only one of die design and entirely within the art. The advantages offered by square cans in their reduced space requirements are obvious and need not be elaborated upon.

In my application for Letters Patent No. 326,816 filed with the United States Patent Office on November 29, 1963, I have disclosed a method and apparatus for seaming metallic containers, taking into consideration the special characteristics of container bodies produced by the impact-extrusion method. The above-mentioned application is teaching the art of constructing a container seam by interlockingly folding the end portion of the container wall over a parallel, contiguous and inwardly positioned lid wall portion, thereby producing a hermetic seam for a pressure-resistant container. The method disclosed is equally suitable for circular as well as for non-circular seams. It is thus possible to make seams of square contour with only a certain minimum corner radius, as required for proper closure.

In view of the above developments, it is therefore a still further object of this invention to provide an opening means for metallic containers which can be adapted equally well to all contours of container seams which, then, may be designed to be round, square or of any other suitable contour.

In accordance with the above objects, and as a feature of this invention, there is provided a fibrous rip-open means of the thread-type or band-type, comprising a plurality of pull resistant fibres, and resiliently compressible in its cross section, impregnable and therefore having improved sealing capabilities, but sufficiently resistant to sever the wall of a pressure-resistant container.

Accordingly, as another feature of this invention, provision is made for a seam construction where the rip-open means is confined between an inner wall which is a peripheral part of the container lid and an outer wall which is art of the body shell, whereby, upon pulling of the ripping element, the outer or body wall portion of the seam will be severed. Engineering theory and practice reveal that it is possible, and even advantageous, to keep the longitudinal shell of a pressure vessel thinner than its end members, even more so when it is not possible, as in the case with cans, to provide those end members with an outwardly domed shape.

Accordingly also, as another feature of this invention, provision is made for a seam construction in which the seam is formed from the two container parts without thereby bending or deforming the container lid. Such a lid, after having been removed from a container by means of the rip-open device, can be re-used on a new container together with a new rip-open element.

Lastly, as still another feature of this invention, provision is made for a seam and lid construction permitting the temporary re-closure of the container after operation of the rip-open device and removal of the lid. The removed lid can be re-placed over the open end of the container, fitting snugly onto its initial seat.

The above and other features of the invention, including various novel details of construction and combination of parts will now be more particularly described with reference to the accompanying drawings and pointed out in the claims. It will be understood that the particular rip-open devices embodying the invention are shown by way of illustration only and not as a limitation of the invention. The principles and features of this invention may be employed in varied and numerous embodiments without departing from the scope of the invention.

In the drawings in which like reference characters indicate like parts throughout the several views:

FIGURE 1 is a perspective view of a container or can embodying the invention, the container being partially cut open for illustrative purposes.

FIGURE 2 is a perspective view of a square end closure for use with a square container body embodying the same invention.

FIGURE 3 is a perspective view of a similar but circular end closure.

FIGURE 4 is a cross section of the upper part of a container body and of an end closure and rip-thread ready for assembly thereto.

FIGURE 5 is similar to FIG. 4, showing the end closure after it has been severed and removed from the body in accordance with the invention.

FIGURE 6 is an enlarged cross section of fragments of a container body and of an end closure with a rip-thread. The parts are positioned for the seaming operation.

FIGURE 7 is similar to FIG. 6, showing the same parts after the seaming operation.

FIGURE 8 is similar to FIGS. 6 and 7, showing the same parts after the rip-open operation.

FIGURE 9 is an enlarged cross section of fragments of a container body and of an end closure with a rip-band representing a different embodiment of the invention.

FIGURES 10 and 11 are enlarged cross sections of fragments of an end closure and of a spacer ring with a rip-thread before and after attachment to the end closure, representing still another embodiment of the invention.

FIGURES 12 and 13 are similar to FIGS. 10 and 11, showing an end closure and a spacer ring with a rip-thread before attachment and after partial attachment to the end invention.

FIGURE 14 is an enlarged cross section of fragments of the parts shown in FIG. 13 and of a container body, showing all parts locked together after the seaming operation.

FIGURES 15 through 22 are enlarged cross sections of fragments of a container body and of an end closure with a rip-open thread, the parts being shown locked together after the seaming operation. These eight figures represent a selection of different embodiments of the invention.

Referring to the figures enumerated above, the reference character A indicates generally a container body closed at its bottom end, while the character B is applied to the upper end closure, more commonly designated as the lid. In combination with the rip-open means described hereinafter they represent embodiments of the present invention.

In general, the illustrations suggest the use of impact-extruded aluminum container bodies, characterized by a one-piece seam-free bottom and shell construction. Container bodies of this kind normally have a side wall of .005 to .010 inch in thickness and an inwardly domed bottom of much heavier gauge. Constructed in this manner, and closed with a suitable lid, a container with a diameter of two and one-half inches is capable of withstanding internal pressures of 120 pounds per square inch or more. Such pressures may occur, for example, at the inside of containers for carbonated beverages, as is the case for beer during the process of pasteurization, and also in containers for foods which are cooked inside the container. The one-piece bottom and shell construction, as referred to above, is not a restrictive pre-requisite for the embodiment of this invention. For the successful implementation of this invention it is preferable, however, to use container bodies of relatively soft material having no longitudinal seam of the conventional overlapping type. A body with a welded and flattened longitudinal seam would be equivalent to a seam-free one with respect to this invention.

Referring now more specifically to the drawings, FIG. 1 illustrates a particular embodiment of the invention,

comprising a body A and lid B, an endless seam **25** securing the lid to the body, and a free end **26** of a rip-thread **27** being pulled by a human hand **28** in the direction of arrow **29**. The construction of the endless seam **25**, as well as the effect of the pulling action are illustrated more distinctly in FIGURES 6, 7 and 8.

FIG. 6 shows a body wall **30** as part of the container body A, said body wall having a horizontal shoulder **31**, a tapered wall portion **32** and a vertical uppermost wall portion **33**. Positioned inside the body A is shown a lid B, comprising a neck portion **34**, closely fitting the body wall **30**, a horizontal shoulder **35**, similar to the body wall shoulder **31**, and a tapered peripheral wall portion **36** parallel to the tapered portion **32** of the body. A rip-thread **27** is interposed in the annular space **37** defined by the shoulders **31** and **35**. Starting from its inner end **38** the thread **27** encircles the lid until it reaches the end point of annular confinement **39**, from which it leads uppward between the tapered portions **32** and **36** of the body and lid, over the lid edge **40** and downward along the inside of the lid taper **36** into the annular groove **41** of the lid.

The overlap **42** between the inner end **38** and the point **39** of the rip-thread has the purpose of assuring frictional confinement of the rip-thread **27** during the last part of the ripping operation. Reduction or elimination of the overlap **42** would result in severance of the body wall over less than its entire circumference.

The transitional thread portions **43** and **44** which follow the annular portion **45**, starting at point **39** and ending in the lid groove **41**, are shown to have a diagonal direction with respect to the lid edge **40** in order to avoid the higher compression of the thread portions **43** and **44** which would result from a perpendicular transition.

The lid A is shown in FIG. 6 to be resting on the rip-thread **27**, thereby leaving a slight clearance between the tapered portions **32** and **36** of the body and lid. This clearance will disappear during the seaming operation and the rip-thread **27** will be compressed as shown in FIG. 7.

In FIG. 7 of the lid B is shown to be firmly attached to the container body A by an endless seam **25**. The initially vertical body wall portion **33** has been folded over and to the inside of the lid taper **36**. The lid is thus firmly held between the tapered portion **32** and the fold edge **46** of the body wall. On its annular portion **45** the rip-thread **27** is compressed between the shoulders **31** and **35** to a predetermined thickness and therefore longitudinally confined. On its transitional portions **43** and **44** the rip-thread is shown to be compressed to a very thin flattened band **27***a*. Theoretically the thickness of this band would be zero, but in practice the body wall portions **32** and **33** will be slightly thinned and bulged along the transitional lines **43** and **44** of the rip-thread.

The inner edge **47** of the body wall is shown to have identations **48** in approximately the same direction as the transition portion **44**. These indentations are produced during the seaming operation by receding ridges on the closing tool (not included in this specification).

A pulling force, when applied to the free end **26** of the rip-thread **27** in a direction away from the container and substantially perpendicular to the inner edge **47** of the body wall, such as shown by arrow **29** in FIG. 1, will initially lift the wall portion **33** at its edge **47** a slight amount, enough to permit the rip-thread portion **44** to be shifted until it is in alignment with an adjacent indentation **48**. From this point on the rip-thread will sever the confining wall portions **33** and **32** of the body along the transition lines **44** and **43**, producing transitional severance lines **49** and **50**, as shown in FIG. 8. From point **39** onward the severance line **51** will follow the outer edge **52** of the body shoulder **31** along the annular confinement **45** until, after 360 degrees of severance, it has reached point **39** again. At this point the com-

pression of the rip-thread 27 between the shoulders 31 and 35 will be released and the inner end 38 of the rip-thread will be free.

The lid B, with the severed part 53 of the seam attached to its taper 36 can be removed from the container body A as shown also in FIG. 5.

In FIG. 5 it is also shown how the lid B can be replace over the open end 60 of the container, whereby the neck portion 34 of the lid will come to fit inside the mouth portion 61 of the body A, with the lid shoulder 35 resting on the body shoulder 31. The container thus re-closed will offer a temporary protection for the contents from foreign objects, exposure and/or other undesired influences. Also, a container accidentally tipped over will not shed its contents instantaneously.

Referring back to FIGURES 6, 7 and 8, it can be readily seen that an endless seam of other than circular contour would offer exactly the same construction features as a circular seam with respect to the rip-open means. A suitable lid of square contour, for example, is illustrated in FIG. 2.

In FIG. 2 a rip-thread 27 is shown attached to the lid B in essentially the same manner as shown in FIG. 3, which illustrates a circular lid corresponding to the one shown also in FIGURES 6, 7 and 8. A square container offers advantages with respect to its storage, such as: Reduced overall space requirements, the capability of containers in horizontal position to form unsupported piles on shelves and other advantages depend upon the use of the containers. It also makes possible various improvements in the handling, filling and shipping systems of the canning industry.

As can best be seen from FIGURES 6, 7 and 8 the lid B does not undergo any deformation during the operations of seaming and opening. Any lid can therefore be re-used for a new container after the severed part 53 has been stripped off its periphery. A new rip-thread must be attached to the lid for this purpose. From the foregoing it becomes obvious that the lid in question is no longer subjected to the requirements of being easy to cut, pierce or tear, as is required of lids for conventional containers. A lid embodying this invention can, therefore, be made of the most inexpensive material, as long as it is suitable to withstand the internal pressures the container is subjected to pressure tests reveal that containers constructed in accordance with this specification will not fail at the endless seam or at the lid. Failure will in most cases occur at some weak point or line on the container wall.

The attachment of the rip-thread to the lid is illustrated in FIGURES 2, 3 and 4. Starting at the inner end 38 the rip-thread 27 is wound around the neck portion 34 of the lid B, adjacent to and guided by the shoulder 35. After somewhat more than a full encirclement the rip-thread leaves this line at point 39 and from there on follows the transitional lines 43 and 44 to the inside of the lid profile. A free portion 26 of the rip-thread, long enough to be safely gripped between the fingers of a hand is positioned in the groove 41. On the overlap portion 42 of the rip-thread, defined by the end 38 and the point 39, the last-applied partial convolution 62 will come to rest horizontally contiguous and parallel to the inner convolution 63.

To ensure adherence of the rip-thread to the lid it is preferable to impregnate the said thread with an adhesive compound which will lose its surface adhesion after the attachment of the thread to the lid but will retain the interface adherence between the thread and the lid metal. It is also preferable that the said adhesive compound does not dry to a hard and brittle state but retains a certain elasticity.

As can be readily seen in FIG. 7, the rip-thread 27, being compressible in its cross section, is also capable of serving as a sealing element between the confining shoulders 31 and 35, thereby rendering the seam leakproof. The sealing capabilities of the rip-thread are improved still further by the above-mentioned impregnation of the thread. The adhesive compound referred to may be of the latex-type, similar to the kind used for sealing conventional can closures.

In accordance with this invention, and as an alternate method of thread attachment, it is also possible to spray the adhesive compound onto the lid surface, and in particular on the area occupied by the thread, before or after the rip-thread is wound around the lid.

The material used for the rip-thread is preferably nylon, the thread cross section being composed of a plurality of fine strands. For example, a thread with a diameter of .010 inch could contain up to fifty such strands.

In FIG. 9 is shown a different embodiment of the invention, where the rip-open element is shown to be a rip-band 70 confined by a tapered body wall portion 71 and a similarly tapered peripheral lid wall portion 72. In its attachment to the lid B and its behavior during the seaming and ripping operations the band element 70 can be compared to the thread element 27 referred to in the preceding paragraphs. Pulling of the free end 73 of the rip-band 70 will cause the seam to be severed at the line designated by arrow 74.

FIGURES 10 to 14 show two similar types of still another embodiment of the invention. In FIG. 14 is illustrated a container A with a vertical body wall 80, a tapered shoulder 81 and a vertical wall portion 82 of which the uppermost part 83 is folded over and to the inside of a vertical peripheral end portion 84 of the lid B. The said lid comprises a neck portion 85 closely fitting the body wall 80 and a tapered shoulder 86 similar to the body wall shoulder 81. An endless spacer ring 87, with a rip-thread 88 imbedded within its wall, is confined between the horizontal shoulders 81 and 86 of the body and lid, as well as between the wall portions 82 and 83 of the body, and wall portion 84 of the lid. The said spacer ring 87 is of a thickness at least equal the diameter of the rip-thread 88. At the lip 89, where it is compressed between the shoulders 81 and 86, it is preferably twice as thick as the rip-thread 88 before being compressed as shown.

Comparing FIG. 14 with FIG. 6 it can readily be seen that the rip-thread is in both cases arranged in substantially the same spatial relationship with the container seam. The transitional thread portions 90 and 91, corresponding to portions 43 and 44 of FIG. 6, are positioned at right angles to the lid edge 92. The essential difference between the two embodiments resides in the fact that in the construction illustrated in FIG. 14 the rip-thread 88 is not being compressed by any substantial amount and therefore it is not required to be compressible. In this case, therefore, the rip-thread 88 could be replaced by an equivalent metallic means, such as a wire of suitable flexibility. The material used for the spaced ring 87 is preferably a comparatively heat-resistant plastic molding. Compressed at its lip 89 between the shoulders 81 and 86 it serves as a sealing element within the seam. Opening of this type of container is performed in substantially the same manner as described earlier. The rip-thread 88, when pulled by its free end 93, severs the wall portions 83 and 82 while simultaneously being ripped loose from the spacer ring 87.

The endless spacer ring 87 is shown in FIG. 12 before being assembled to the lid B. In FIG. 13 the same spacer ring is shown during the assembly operation to the lid, whereby the lip 89 is slightly stretched while the spacer ring 87 is being pushed in the direction of arrow 94 over the peripheral wall portion 84 of the lid until the lip 89 snaps onto the lid shoulder 86.

FIGURES 10 and 11 show a different endless spacer ring 95 before and after assembly to the lid B which is of similar cross section as the one suggested in FIGURES 6 through 8. This type of lid is unsuitable for the snap-

on spacer ring as described above. A different method of assembly is therefore suggested in this case. The spacer ring **95** consists of a flange **96**, a tapered portion **97** and a vertical portion **98**. The rip-thread **88** is imbedded in the spacer ring material in the same manner as illustrated in FIG. 14 and described above. In order to attach the spacer ring **95** to the lid B, its flange **96** is aligned with the shoulder **99** of the lid and the vertical portion **98** of the spacer ring is folded over and to the inside of the tapered peripheral wall portion **100** of the lid, thereby embracing its tightly from both inside and outside.

A selection of eight different embodiments of the invention is given in FIGURES 15 through 22. They suggest different profiles of container lids with a rip-thread **110** confined between the wall **111** of the lid B and the outer interlocking wall **112** of the body. The arrow **113** indicates the severance line and the direction in which the rip-thread **110** has to be pulled in order to open the container.

FIG. 15 shows a lid profile with a horizontal shoulder **114** and a vertical end portion **115**.

FIG. 16 shows a lid profile with an inclined shoulder **116** and a vertical end portion **117**, similar to the profile of FIG. 14.

FIG. 17 shows a lid profile with an inclined shoulder **118** and a vertical end portion **119** linked by a large radius to the said shoulder.

FIG. 18 shows a lid profile with a horizontal shoulder **120** and a tapered end portion **121**, similar to the profile of FIGURES 6 through 8.

FIG. 19 shows a lid profile with a tapered end portion **122** but with out a shoulder.

FIG. 20 shows a lid profile with an inclined shoulder **123** but without an upright end portion.

FIG. 21 shows a lid profile with a bell-shaped end portion **124** but without a shoulder, the rip-thread **110** being positioned by a groove **125**.

FIG. 22 shows a lid profile without shoulder or tapered end portion, the rip-thread **110** being positioned by a groove **126** in the vertical wall **127** of the lid B, the said lid being positioned inside the body wall **112** by indentations **128**.

In the foregoing the invention has been described in reference to specific illustrative devices. It will be understood, however, that certain variations and modifications, as well as the substitution of equivalent elements for those shown for illustration, may be made without departing from the scope and spirit of the invention as defined in the appended claims. The foregoing specification and drawings are accordingly to be regarded in an illustrative rather than in a restrictive sense.

I claim:

1. The combination with a metallic container, of a non-metallic opening means consisting of a thin elongated and resiliently compressible member of substantially continuous cross section, said opening means being arranged in such relation to said container that over at least part of its length it is resiliently compressed and longitudinally confined between wall portions of said container, whereby, under application of a pulling force to said opening means the said container is opened at least partially through severence of the metal of a confining wall portion by said opening means.

2. The combination with a metallic container comprising at least two separate sections connected by a seam formed from wall portions of said sections, of a non-metallic opening means consisting of a thin elongated and resiliently compressible member of substantially continuous cross section, said opening means being arranged in such relation to said container that over at least part of its length it is resiliently compressed and longitudinally confined between the wall portions forming said seam, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said confining wall portions by said opening means.

3. The combination with a metallic container comprising at least two separate sections connected by a seam formed from wall portions of said sections, of a non-metallic opening means consisting of a thin elongated and resiliently compressible member of substantially continuous cross section, said opening means being arranged in such relation to said container that over at least part of its length it is resiliently compressed and longitudinally confined between the wall portions forming said seam thereby serving as a sealing element within said seam, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said confining wall portions by said opening means.

4. The combination with a metallic container comprising at least two separate sections connected by a seam formed from wall portions of said sections, of a non-metallic opening means consisting of a resiliently compressible thread-like member comprising at least one longitudinally pull-resistant fibre, said opening means being arranged in such relation to said container that over at least part of its length it is resiliently compressed and longitudinally confined between the wall portions forming said seam, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said confining wall portions by said opening means.

5. The combination of claim **4**, wherein the opening means consists of a resiliently compressible band-like member comprising at least one longitudinally pull-resistant fibre.

6. The combination with a metallic container comprising at least two separate sections connected by a seam formed from wall portions of said sections, of a non-metallic opening means consisting of a resiliently compressible thread-like member, said thread-like member being impregnated with an adhesive sealing compound and arranged in such relation to said container that over at least part of its length it is resiliently compressed and longitudinally confined between the wall portions forming said seam thereby serving as a sealing element within said seam, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said confining container wall portions by said opening means.

7. The combination with a metallic container comprising at least two separate sections connected by a seam formed from interlockingly joined wall portions of said sections of a non-metallic opening means consisting of a resiliently compressible thread-like member, said thread-like member being arranged in such relation to said container that over a portion of its length it is resiliently compressed and longitudinally confined between said interlockingly joined small portions while over another portion of its length it remains free and outside of the said container and a transition portion between those two portions follows a direction of the folding lines of said seam, leading from within said seam-forming wall portion to the outside thereof without the need of penetrating through any of said wall portions, whereby, under application of a pulling force to the free portion of said thread-like member in the direction away from the container and approximately perpendicular to the outermost confining wall portion of said seam, the said thread-like member will sever the aforementioned outermost wall portion along the direction of its transitional confinement and upon further application of pulling force will sever the outer one of the confining wall portion of said seam close to and along the line of confinement of said thread-like element, thereby permitting at least partial separation of the two sections of the container.

8. The combination with a metallic container compris-

ing a body of substantially tubular but not necessarily round shape and at least one separate end closure or lid of substantially flat configuration joined to said body by an endless seam, of a non-metalic opening means consisting of a resiliently compressible thread having a plurality of pull-resistant fibres, said thread being arranged in such relation to said container that a portion of its length is resiliently compressed and longitudinally confined between an inner wall portion comprising the peripheral edge of said lid and an outer body wall portion, said body wall portion being folded over and to opposite side of said peripheral lid wall portion to provide a intimate contact between both parts thus constituting the aforementioned endless seam wherein said confined portion of said thread is resiliently compressed and thereby serving as a sealing element within said seam, said thread having another portion of its length free and outside of said seam and a transition portion between those two portions following a direction substantially transverse to the direction of the folding lines of said seam, leading from within said semi-forming wall portions to the outside thereof without the need of penetrating through one of said wall portions, whereby under application of a pulling force to the free portion of said thread in the direction away from the container and approximately perpendicular to the edge of said seam-forming body wall portion, the said thread will sever the aforementioned body wall starting at its edge, then following the direction of its transitional confinement and upon further application of pulling force will sever the body wall on the outside of said seam close to and along the line of confinement of the thread, thereby separating the said container lid at least partially from the said container body.

9. The combination of claim 8, wherein the edge of said seam-forming body wall portion is indented to facilitate the initiation of its severance when said thread is pulled.

10. The combination of claim 8, wherein the fibres of said thread run substantially parallel to one another thereby permitting flattening of said thread to near the thickness of one fibre under compression between two parallel surfaces.

11. The combination of claim 8, wherein the fibres of said thread are intertwined to restrict and limit separation of the fibres under compression between two parallel surfaces.

12. The combination of claim 8, wherein the confined portion of said thread is longer than the circumference of said seam, thereby forming more than one full convolution within said seam and permitting severance of the container wall over the entire circumference of said seam.

13. The combination of claim 8, wherein the confined portion of said thread is of such length that less than the entire circumference of the said seam will be severed by pulling said thread, thereby leaving a short portion of said seam-forming container wall unsevered, said last-mentioned portion serving as a hinge when the lid is removed.

14. The combination with a metallic container comprising a body of substantially tubular but not necessarily round shape and at least one separate end closure or lid of substantially flat configuration made from stronger material than the said body and joined to it by an endless seam, of a non-metallic opening means consisting of a thin elongated member of substantially continuous cross section, said opening means being arranged in such relation to said container that over at least part of its length it is confined between an inner wall portion comprising the peripheral edge of said lid and an outer body wall portion, said body wall portion being of weaker material than said lid, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said body wall portion close to and along the line of outer confinement of said opening means.

15. The combination with a metallic container comprising a body of substantially tubular but not necessarily round shape and at least one separate end closure or lid of substantially flat configuration joined to said body by an endless seam, of a non-metallic opening means consisting of a thin elongated member of substantially continuous cross section, said opening means being arranged in such relation to said container that over at least part of its length it is confined between interlockingly joined wall portions forming the said seam, the outer one of the confining wall portions being weakened close to and along the line of confinement, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said outer confining wall along the said line of weakening.

16. The combination of a metallic container comprising a body of substantially tubular but not necessarily round shape and at least one separate end closure or lid of substantially flat configuration made from stronger material than said body and joined to it by an endles seam, of a non-metallic opening means consisting of a thin elongated member of substantially continuous cross section, said opening means being arranged in such relation to said container that over at least part of its length it is confined between an inner wall portion comprising the peripheral edge of said lid and an outer body wall portion being of weaker material than said lid, said outer wall portion having an outside kink in its cross-sectional contour close to and along the line where it confines said opening means, whereby, under application of a pulling force to said opening means the container is opened at least partially through severance of the metal of said body wall portion along the said kink.

17. The combination with a metallic container comprising a body of substantially tubular but not necessarily round shape and at least one separate end closure or lid of substantially flat configuration joined to the said body by an endless seam, of a non-metallic opening means consisting of a thread and an endless band-like member of compressible and comparatively much weaker material, embracing the said thread over part of its length, said opening means being arranged in such relation to said container that the said endless band-like member is compressed and confined within interlockingly joined wall portions of said body and lid constituting said endless seam, said endless band-like member thereby serving as a sealing element within said seam, whereby, under application of a pulling force to said thread it is ripped out of said endless band-like member and the container is opened at least partially through severance of the metal of the outer of said interlockingly joined wall portions by said thread.

18. For the combination of a non-metallic opening means with a metallic container, an end closure or lid, adapted to be sealed to the body of said container by interlockingly joining wall portions of said body and lid thereby forming an endless seam, said lid comprising a thread-like member wound around an outside peripheral surface of said lid in such a manner that it remains attached to it until the said lid is assembled to the said container body.

19. For the combination of a non-metallic opening means with a metallic container, an end closure or lid, adapted to be sealed to the body of said container by interlockingly joining wall portions of said body and lid thereby forming an endless seam, said lid comprising a thread-like member, one portion of the length of which is wound around an outside peripheral surface of said lid in a parallel relationship to its edge, and another transitional portion is leading over and to the opposite side of said edge in a direction substantially transverse to the said edge line, so that only part of the said transitional portion will be confined within an endless seam of the aforementioned type, said thread-like member remaining attached to said lid until it is assembled to the said container body.

20. For the combination of a non-metallic opening means with a metallic container, an end closure or lid, adapted to be sealed to the body of said container by folding an outwardly positioned wall portion of said body over an inwardly and contiguously positioned wall portion comprising the peripheral edge of said lid to form an endless seam, said lid comprising a thread-like member, one portion of the length of which is wound around an outside peripheral surface of said lid in a parallel relationship to its edge, and another transitional portion is leading over and to the opposite side of said edge in a direction substantally transverse to the said edge line, so that only part of the said transitional portion will be confined within an endless seam of the aforementioned type, said thread-like member remaining attached to said lid until it is assembled to the said container body.

21. An end closure or lid as described in claim 20, where the said outside peripheral lid surface comprises shoulder means to laterally position the portion of the said thread-like member which is wound around said lid surface.

22. An end closure or lid as described in claim 20, where the said outside peripheral lid surface carries a coating of at least initially adhesive material, causing the said thread-like member to adhere to said lid surface after being wound around it, said adhesive material being capable of serving as a sealing element after the assembly of the said lid to the said container body.

23. An end closure or lid as described in claim 20, where the said thread-like member is impregnated with an adhesive compound before being wound around the said peripheral lid surface, causing the said thread-like member to adhere to said lid surface, said adhesive material being capable of serving as a sealing element after the assembly of the said lid to the said container body.

24. An end closure or lid as described in claim 20, where the process of forming an endless seam by folding of an outwardly positioned body wall portion over an inwardly and contiguously positioned lid wall portion does not entail any deformation of the said lid.

25. An end closure or lid as described in claim 20, where the process of forming an endles seam by folding of an outwardly positioned body wall portion over an inwardly and contiguously positioned lid wall portion does not entail any deformation of the said lid, and where the said lid is suitable for being used more than once for assembly to a container body by virtue of it being neither deformed nor cut during the seaming and opening operations, said opening operation causing the severance of the said body wall only.

References Cited by the Examiner

UNITED STATES PATENTS

1,810,925	6/1931	Oftedahl	220—49
2,086,586	7/1937	Taylor	220—49

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