Jan. 21, 1969 J. A. FOSTER 3,422,984

CONTAINER WITH LIFT TAB COVER RELEASE

Filed Jan. 16, 1968 Sheet 1 of 5

Fig. 1

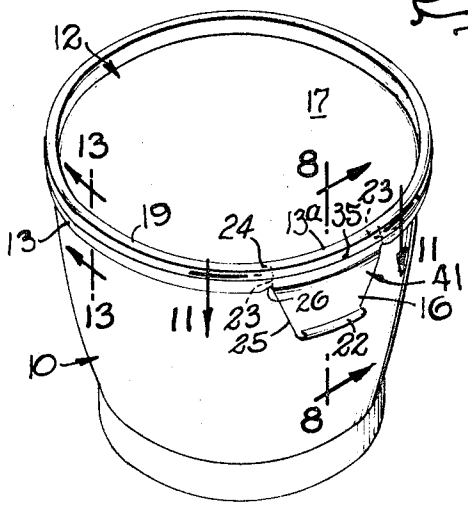


Fig. 2

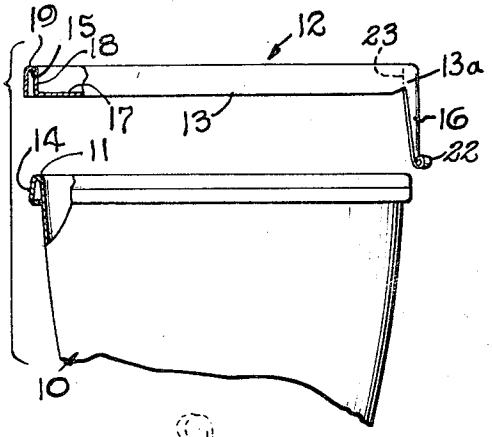
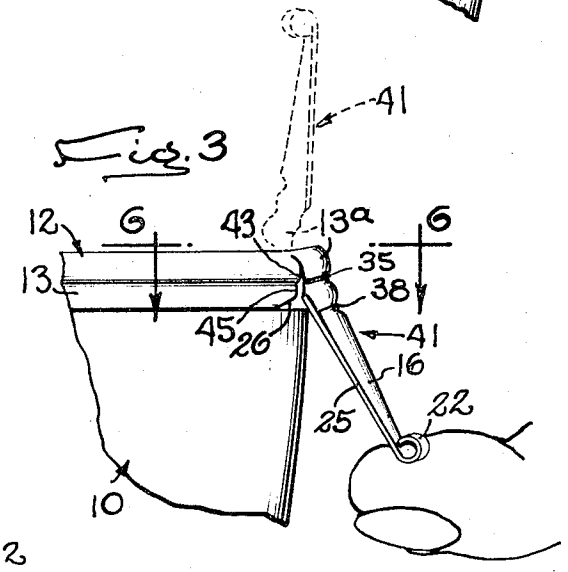


Fig. 3



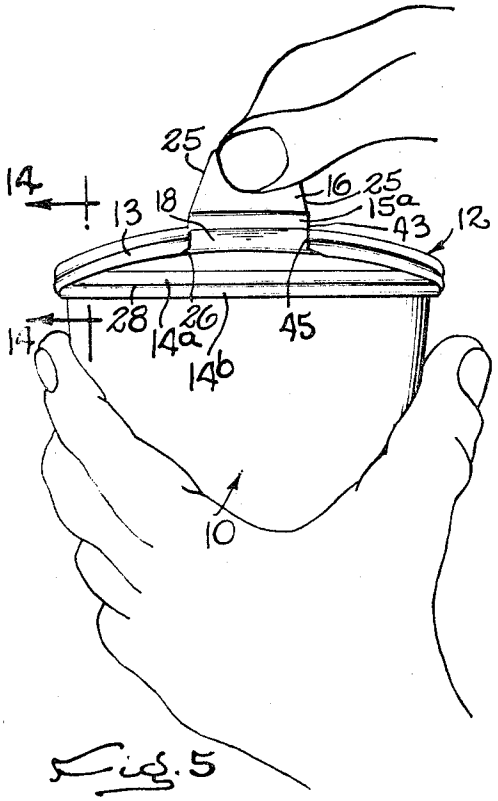


Fig. 4

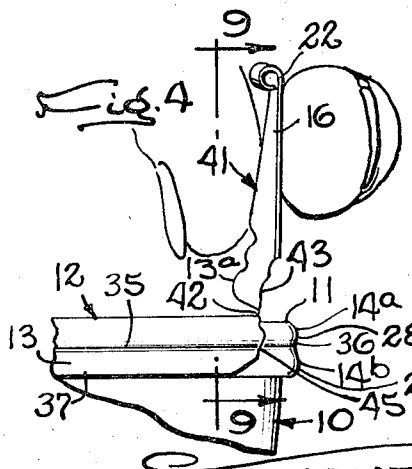


Fig. 5

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CONTAINER WITH LIFT TAB COVER RELEASE

Filed Jan. 16, 1968

Fig. 6

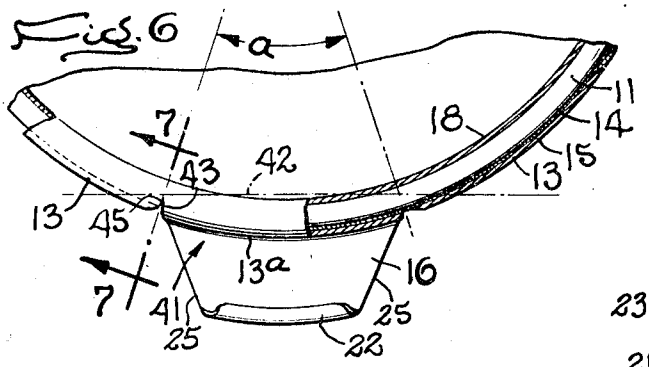


Fig. 7

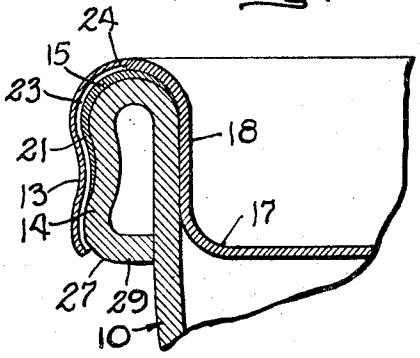


Fig. 8

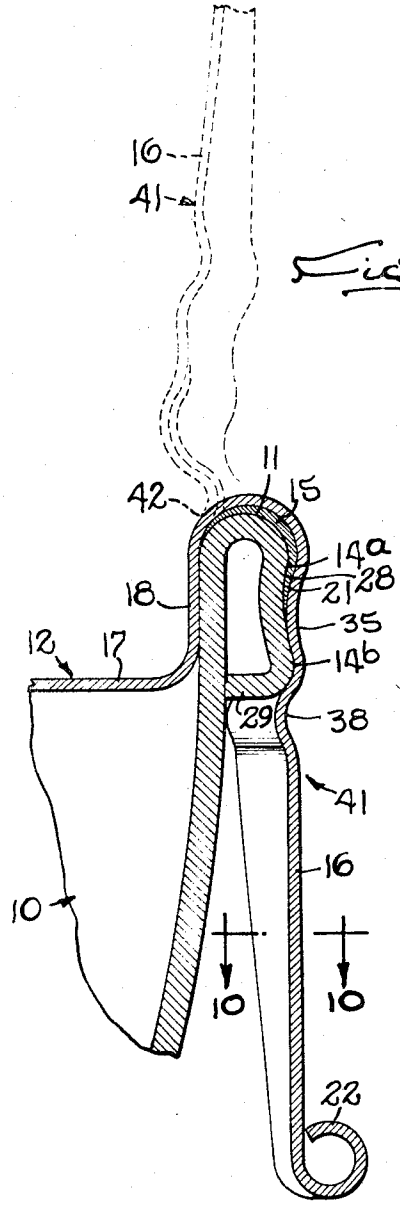


Fig. 9

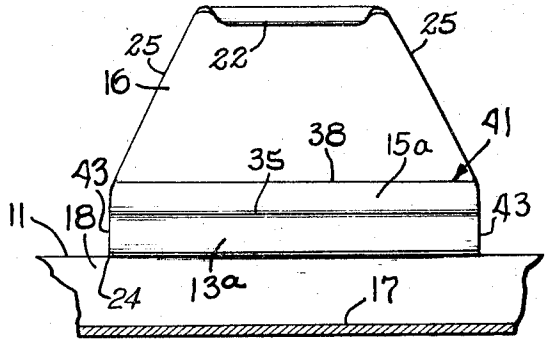


Fig. 10

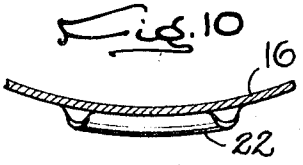
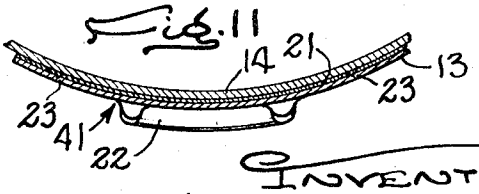


Fig. 11



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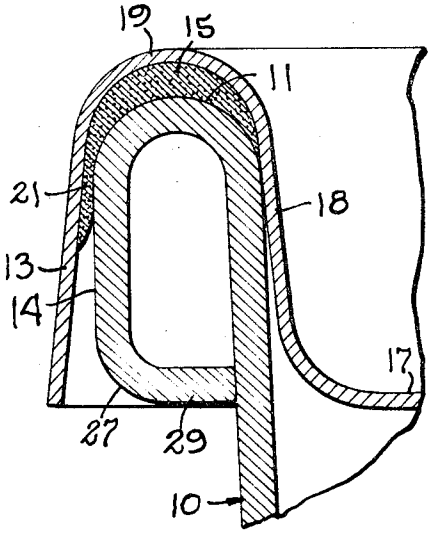


Fig. 12

Fig. 13

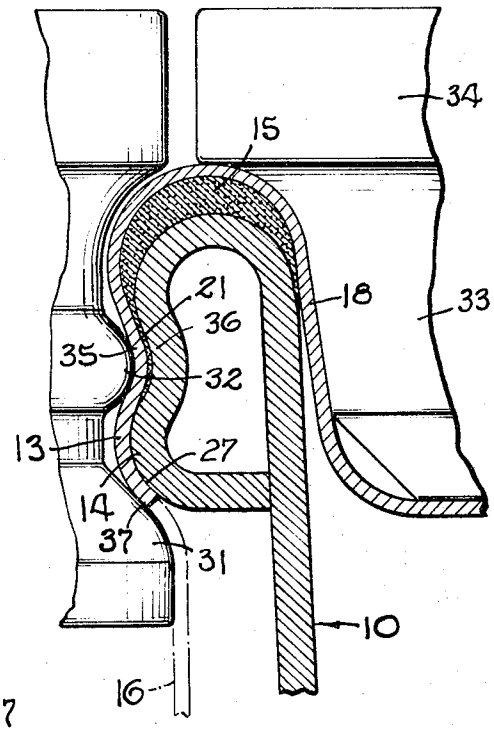
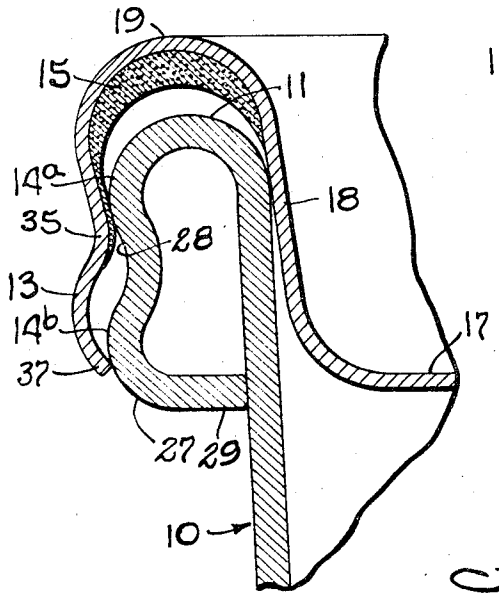


Fig. 14



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Jan. 21, 1969 J. A. FOSTER 3,422,984

CONTAINER WITH LIFT TAB COVER RELEASE

Filed Jan. 16, 1968 Sheet 4 of 5

Fig. 15

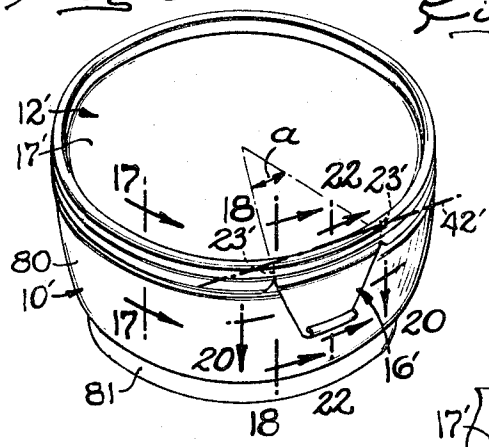


Fig. 16

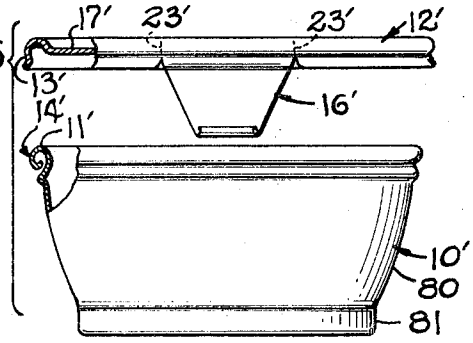
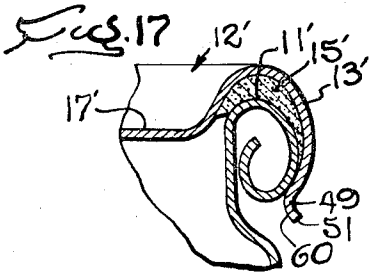


Fig. 17



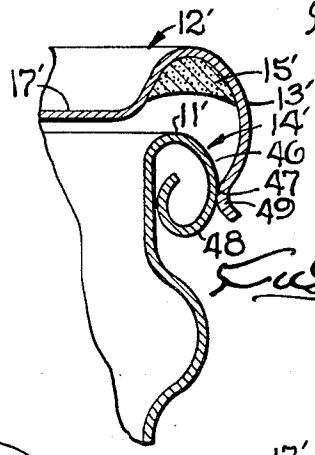
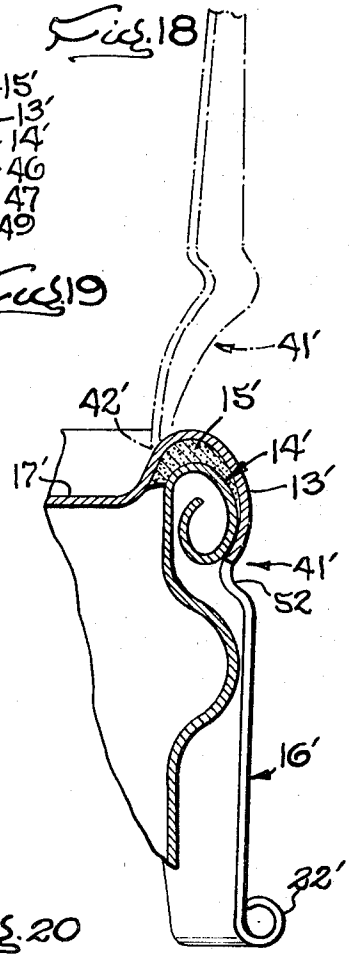


Fig. 19

Fig. 18



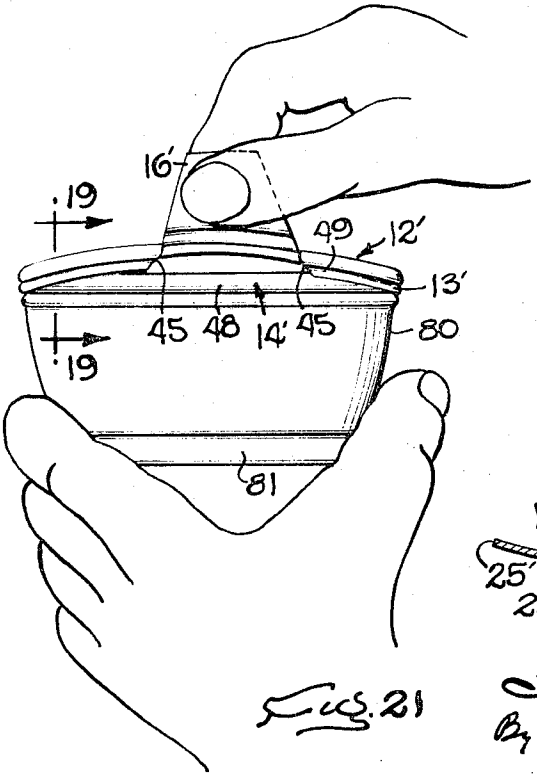


Fig. 21

Fig. 20

INVENTOR
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CONTAINER WITH LIFT TAB COVER RELEASE

Filed Jan. 16, 1968 Sheet 5 of 5

Fig. 22

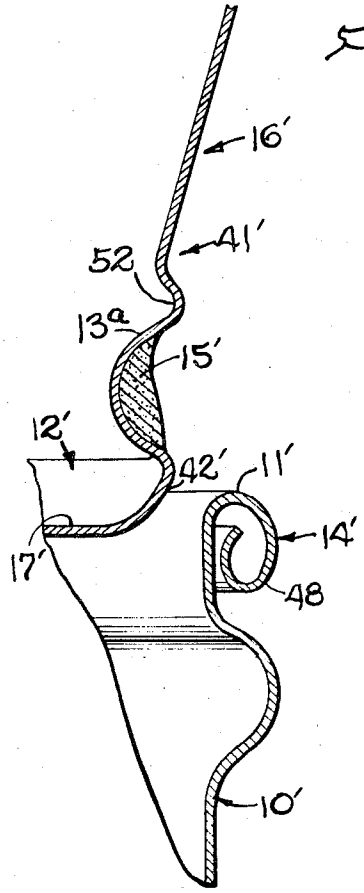


Fig. 23

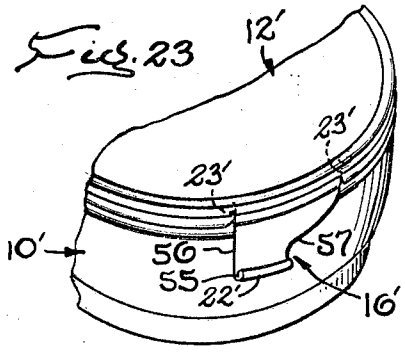
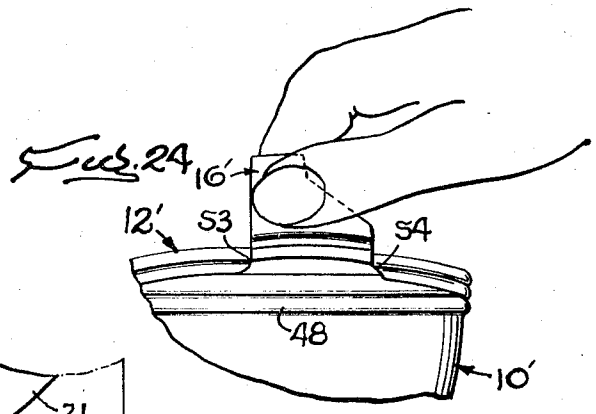


Fig. 24



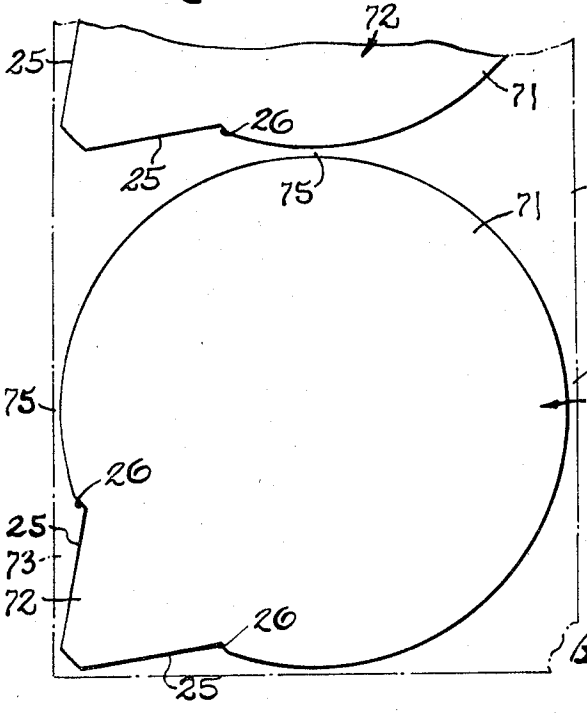


Fig. 25

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United States Patent Office 3,422,984 Patented Jan. 21, 1969

3,422,984

CONTAINER WITH LIFT TAB COVER RELEASE

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Continuation-in-part of applications Ser. No. 570,217, Aug. 4, 1966, and Ser. No. 613,778, Feb. 3, 1967. This application Jan. 16, 1968, Ser. No. 703,835
U.S. Cl. 220—59 32 Claims
Int. Cl. B65d 17/20

ABSTRACT OF THE DISCLOSURE

A sealed container comprising a cup-like body closed by a sheet metal cover having a depending skirt hooked around and beneath a lip bead or curl on the body and releasable from the bead by outward and upward swinging of a tab integral with and depending from the skirt between spaced upright score lines. A novel construction of the tab insures upward tearing of the skirt and provides for easy release and removal of the cover by continued upward lifting of the tab.

Cross-references to related applications

This application is a continuation-in-part of my copending applications Ser. Nos. 570,217, filed Aug. 4, 1966, and 613,778, filed Feb. 3, 1967, both applications now abandoned.

Background of the invention

This invention relates to a container having a tubular body with an outturned lip bead or curl and a sheet metal cover with a depending skirt hooked around and beneath the bead to hold a sealing gasket compressed between the cover and the body lip from which the cover is released by manual pulling of a tab depending from the skirt.

Summary of the invention

The main object of the invention is to provide a container of the above character in which the continuity of the skirt and the compression of the seal are maintained around the full circumference of the container while permitting the cover to be released more easily than has been possible heretofore by a lifting force manually exerted on the tab initially depending from the skirt. For this purpose, the tab and a part of the skirt between upright lines of tearing adjacent the side edges of the tab are constructed to form a rigid cantilever having greater resistance to bending than the metal of the skirt has to tearing along such lines. Full tearing of the skirt is thus insured simply by swinging of the lever outwardly and upwardly toward an upright position from which an upward lifting force applied to the tab will cause the torn skirt ends to be cammed outwardly by the bead thus releasing the skirt to permit easy removal of the cover and without deforming the latter. The resiliency of the skirt, the extent of its hooking beneath the shoulder defined by the bead, and the inclination of this shoulder are correlated with each other so that the outward camming action will be initiated and will progress outwardly from the torn ends of the skirt under a lifting force which is capable of being exerted manually and which is substantially less than that which would cause tearing of the cover inwardly beyond the top of the skirt.

Brief description of the drawings

FIGURE 1 is a perspective view of a closed container embodying the novel features of the present invention.

FIG. 2 is an exploded elevational view of the parts of the container before assembly.

FIGS. 3 and 4 are fragmentary elevational views illustrating successive steps of releasing the container cover.

FIG. 5 is a perspective view illustrating the manner of effecting final release of the container cover.

FIG. 6 is a fragmentary section taken along the line 6—6 of FIG. 3.

FIG. 7 is a fragmentary section taken along the line 7—7 of FIG. 6.

FIG. 8 is a fragmentary section taken along the line 8—8 of FIG. 1.

FIG. 9 is a fragmentary section taken along the line 9—9 of FIG. 4.

FIG. 10 is a fragmentary section taken along the line 10—10 of FIG. 8.

FIG. 11 is a fragmentary section taken along the line 11—11 of FIG. 1.

FIG. 12 is a fragmentary cross-section of the cover and cup assembly before seaming.

FIG. 13 is a fragmentary section taken along the line 13—13 of FIG. 1 during the seaming operation.

FIG. 14 is a fragmentary section taken along the line 14—14 of FIG. 5.

FIGS. 15 and 16 are views similar to FIGS. 1 and 2 showing a modified construction.

FIGS. 17 and 18 are fragmentary sections taken respectively along the lines 17—17 and 18—18 of FIG. 15.

FIG. 19 is a fragmentary cross-section taken along the line 19—19 of FIG. 21.

FIG. 20 is a cross-section taken along the line 20—20 of FIG. 15.

FIG. 21 is a perspective view illustrating the manner of releasing the container cover.

FIG. 22 is a fragmentary section taken along the line 22—22 of FIG. 15 with the tab torn upwardly.

FIGS. 23 and 24 are views similar to FIGS. 15 and 21 but showing a modified form of lift tab.

FIG. 25 is a plan view of the blank from which the cover is formed, the metal square from which the blank is stamped being shown in phantom.

Description of the preferred embodiments

Referring first to the form shown in FIGS. 1 to 14, the invention is incorporated in a container comprising generally a cup-like body **10** externally curled or beaded around and below the body lip **11** which defines a top opening closed by a generally flat, and in this instance, circular cover **12** having a depending peripheral skirt **13** hooked around and beneath one or more downwardly facing shoulders on a peripheral lip bead **14** on the body. The cover thus held compresses a gasket **15** against the lip to provide the desired tight seal. A tab **16** formed integral with and depending from a short arc of the skirt **13** is adapted to be swung outwardly (FIG. 3) and then lifted upwardly (FIG. 4) first to interrupt the circumferential continuity of the skirt and then, by continued manual upright lifting of the tab and the torn part of the skirt (FIG. 5), to release the cover for easy removal from the cup.

The body and the lip bead may be formed in various ways and composed of various materials such as molded semi-rigid plastic (FIGS. 1 to 14) or metal such as steel or aluminum (FIGS. 15 to 24). Suitable plastic materials include the acrylic-butadiene-styrene compounds sold by Monsanto and Dow Chemical companies. One suitable metal is an adequately hard and resilient aluminum such as is sold by Alcoa under the trade designation of 3003.H14 and having a thickness of .008 of an inch. In both of the forms disclosed, the cover is also composed of such aluminum which is strong enough to maintain the desired tight seal but will tear easily under the forces manually applied in accordance with the present invention.

In the form in FIGS. 1 to 14, a flat central portion **17** of the cover is depressed within a cylindrical wall **18**

radially spaced from the skirt 13 which, as initially formed, is cylindrical and joined by an arc 19 of about the same cross-sectional curvature as the cup lip 11. To provide a tight and hermetic seal as an incident to seaming or beading of the cover onto the cup, the gasket 15 comprises a relatively thin layer (FIG. 12) of a compressible compound cast into the groove defined by the arc 19 and composed of a material which is compatible with and adheres to whatever coating is used to cover the underside of the cover. A suitable gasket may be formed of a thixotropic polyvinyl chloride material sold by Ball Brothers under the trade designation of 1281. Preferably, the gasket layer is formed not only around the groove but also around the major depth and on the interior of the skirt 13 so as to form a lining layer 21 adapted to telescope down over the bead 14 as shown in FIG. 12 as a preliminary to the seaming or beading operation following filling of the cup.

The cover 12 including the tab 16 is formed in a conventional drawing operation from a blank (FIG. 25) preferably but not necessarily stamped out of a square sheet 70 of metal and comprising a disk 71 which is circular in the present instance and just slightly less in diameter (e.g., .050 to .060 of an inch) than the width of the square. The tab is formed from an integral projection 72 stamped out of one right angular corner 73 of the scrap which remains after blanking out the disk 71. The projection is centered within the corner 73 and formed with side edges 25 which converge outwardly and, at their inner ends, include an arc which, for a purpose to appear later, is less than the right angle of the corner.

In a drawing operation, the outer periphery of the disk 71 is formed into the cylindrical skirt 13, the projection 72 becoming an integral extension of an arc 13^a (FIGS. 1 and 22) of the skirt and having the same thickness and transverse arcuate curvature (FIG. 10) as the skirt cylinder. At the lower or free end, the metal projection thus formed into the tab 16 is preferably curled outwardly, upwardly and then inwardly to form a closed curl 22 of circular cross-section and the same longitudinal curvature as the tab cross-section. The curl thus provides a rigid and transversely extending finger grip that facilitates firm gripping of the tab between the user's thumb and forefinger as illustrated in FIGS. 4 and 5.

In response to outward and upward swinging of the tab after hooking of the skirt around the shoulder defined by the lower edge portion of the bead 14, the skirt is torn along well defined lines adjacent the sides of the tab at the intersection thereof with the skirt. While such tearing of the skirt, when composed of the material above described, will occur naturally when the present tab is swung outwardly, it is preferred to facilitate starting of the tearing and to define the lines quite accurately while at the same time preserving the continuity of the skirt around the full circumference and over substantially the full depth thereof prior to the tearing. Such tearing may best be accomplished by weakening the skirt somewhat along the desired lines as by wrinkling the metal of the skirt or by scoring the same along lines 23 (FIGS. 1, 7 and 11) which preferably but not necessarily are parallel and extend from the lower edge of the skirt upwardly across the part 21 of the gasket and to points 24 close to the upper edge of the skirt and the lip 11 of the cup. Herein, the scoring is effected by forming grooves extending along the lines 23 on the inside of the skirt and having a depth about half the thickness of the skirt in the present instance. Such grooving may, if desired, be effected during the drawing of the disk and projection to form the skirt and tab.

Starting of the tearing may also be facilitated by notching the skirt at the intersections of the lower edge with the sides of the tab 16. Herein, the skirt adjacent opposite sides of the tab, is cut away along diagonal lines in the blanking operation to form shallow, inverted V-shaped notches 26 (FIGS. 1, 5 and 25) into which metal may flow during formation of the score lines 23 in the drawing operation. The notches also prevent the leaving of objectionable sharp projections along the tab or the edges of the skirt after the tearing.

In the form shown in FIGS. 1 to 14, the cover is secured to the cup after filling thereof by hooking the skirt around two vertically spaced and relatively shallow beads 14^a and 14^b whose lower edge portions 27 and 28 provide downwardly facing shoulders of low inclines which act at substantial mechanical advantage in camming the torn end portions of the skirt outwardly in response to the lifting force applied to the tab (see FIG. 4) after upward tearing of the skirt along the score lines 23 as illustrated in FIGS. 3 and 4. To these ends, the lip bead 14 as initially formed (FIGS. 2 and 12) is relatively flat and hollow and of a depth corresponding to the desired final spacing and location of the shoulders 27 and 28, the latter shoulder being formed in the final operation of seaming the cover skirt onto the cup. To form the lower shoulder 27, the lower edge portion of the bead as molded is curled inwardly as indicated at 29 and terminates at the wall of the cup. To impart the desired strength to the bead 14, the plastic thereof is relatively thick, being in this instance about .024 of an inch.

To form the two beads 14^a and 14^b and interlock the skirt 13 therewith as shown in FIGS. 7 and 8, the cup and the cover as initially formed and shown in FIG. 2 are first telescoped together as shown in FIG. 12. Then, in a conventional seaming operation, rolls 31 and 32 of the proper contour (FIG. 13) are pressed inwardly against the cover and cup assembly while the cover wall 18 is backed by a mandrel 33. The upper part of the gasket 15 is held compressed against the cup lip 11 by a part 34 of the mandrel.

During the seaming, the roll 32 engages a central band of the skirt 13 and depresses the metal inwardly a distance about half the radial thickness of the bead 14 as shown in FIG. 14, thus collapsing the medial part of the skirt to form a rather shallow external groove 35 around the skirt. The force thus applied to deform the skirt is advantageously transmitted through the lower part 21 of the gasket and to the outer bead wall which thus becomes similarly bent inwardly as indicated at 36. The gasket compound is sufficiently rigid to transmit the force necessary for collapsing the bead and remains compressed between the skirt and the resulting bead groove 36. A tight and substantially hermetic seal is thus produced within the seam and around the entire circumference of the skirt. By bulging the part 21 of the gasket 15 inwardly and employing a somewhat harder gasket material, it is possible to effect the desired collapse of the bead 14 during the seaming while leaving the external surface of the skirt more nearly cylindrical.

The strength of the seam and the effectiveness of the seal are increased substantially during the seaming by hooking the lower edge portion 37 of the skirt 13 around the lower edge of the bead 14^b. This is effected by the seaming roll 31 which curls the lower edge of the skirt inwardly from the position shown in FIG. 12 to the final position (FIG. 13) in which the skirt edge is inclined downwardly and only partially across and beneath the shoulder 27 of the bead.

To enable the cover skirt to slide edgewise and easily past the shoulders 27 and 28 after cross-tearing of the skirt and in response to lifting of the cover after the tearing, the inward bending and shaping of the skirt and the two beads 14^a and 14^b during the seaming is controlled by shaping the seaming rolls so that the axially spaced and downwardly facing shoulders on the two resulting beads are disposed at relatively small angles relative to the vertical. Also, the radial depth of these shoulders is correlated with the thickness and resiliency of the metal of the skirt so that the shoulder surfaces act effectually against the opposed surfaces on the gasket lining and on the skirt to cam the skirt outwardly in response to the lift-

ing force applied through the tab from the position shown in FIGS. 4 and 5 and in phantom in FIG. 8.

In the present instance, the notches **26** extend upward across the lowermost part of the bead shoulder **27** thus interrupting the hooked around edge of the skirt at opposite sides of the tab. These interruptions are very short and do not detract from the effectiveness of the skirt in holding the gasket compressed against the cup lip. Also, the thinning of the metal of the skirt to form the score lines does not detract appreciably from the force holding the gasket compressed against the lip **11** because the skirt remains as a continuous and solid ring of metal hooked beneath the bead around the full circumference of the cover.

In the seaming operation, the deformation of the skirt to achieve the desired hooking around the beads extends circumferentially across the score lines **23** but the depth of the grooves forming the score lines is not changed appreciably. Thus, the seaming does not change the effectiveness of the score lines in facilitating upward tearing of the skirt. As a result of the deformation in the seaming, the shallow acruate groove **35** (FIG. 3) remains in the part **13a** of the skirt between the score lines and a similar arcuate groove **38** is left across the tab at the junction thereof with the skirt between the score lines. The skirt part **13a** is thus weakened somewhat along these grooves which provide natural transverse lines conducive to bending of the tab and the connected part of the skirt as the tab is swung outwardly and upwardly. Such bending, if allowed to occur, would prevent or make difficult the further and complete upwardly tearing of the skirt over its full depth thus preventing the final lifting force applied on the tab from being exerted along the proper lines for easy camming of the torn skirt ends off from the beads **14a** and **14b**.

In accordance with an important aspect of the present invention, such transverse bending of the tab **16** across the tab and skirt junction groove **38** or below the shoulder **28** is prevented by converting the tab and the connected part **13a** of the skirt between the score lines **23** into a rigid cantilever **41** (FIGS. 3, 4 and 5) adapted to always fulcrum about a well defined axis **42** (FIG. 6) preferably near the upper edge of the skirt and constructed to possess a resistance to bending intermediate its ends that is somewhat greater than the resistance offered by the metal of the skirt to upward tearing along the score lines. To accomplish this, advantage is first taken of the curved cross-section (see FIG. 10) of the tab **16** and the inherent rigidity resulting therefrom. Then, in order to strengthen the cantilever against bending intermediate its ends, the width of the curved tab cross-section at the junction groove **38** and also across the groove **35** is increased enough to impart to the cantilever the rigidity required to overcome the resistance of the skirt to tearing along the score lines and thus force such tearing to occur over the full depth of the skirt without bending of the tab at the groove **38** as the tab is swung outwardly and upwardly about the fulcrum **42** to the position shown in FIG. 4 and in phantom in FIG. 8.

With material of the thickness and the scores of the depth above described, it has been found that the desired resistance to bending is achieved when the width of the tab at the junction **38** with the lower edge of the skirt includes an angle *a* (FIG. 6) which is substantially less than the right angle included in the corner **73** (FIG. 25) of the scrap metal from which the tab **16** is formed. For a cover of about four inches in diameter, it has been found that when the angle *a* is about 40 degrees as shown in FIG. 6, the tab will possess the desired rigidity and resistance to bending for easy and certain upward tearing of the skirt along the score lines **23**. For containers of smaller diameters, the angle *a* should be somewhat greater, for example, 60 degrees for containers as small as two inches in diameter. For larger containers, for example, six inches in diameter, the angle *a* may be as small as 30 degrees. For all containers ordinarily used in packaging foods, a tab of satisfactory length and width may be formed out of the corner scrap **73** (FIG. 25) when the blank **72** is stamped from a square **70** only slightly larger than the diameter of the disk **71** plus the usual allowance of metal **75** at the sides and ends of the square to maintain the scrap in the form of a continuous strip.

With the score lines **23** paralleling each other and extending upwardly to the top of the gasket **15** from the points of intersection of the skirt edge and the sides **25** of the tab and with a tab of the proper width as determined by the angle *a* of the magnitude above described, the cantilever **41** will remain rigid and be used to best mechanical advantage as it is swung outwardly and upwardly and the tearing of the skirt will start immediately adjacent the sides of the tab projection and then proceed precisely along the score lines **23** by virtue of a true shearing of the metal of the skirt. Substantial widening of the tab would reduce the effectiveness of this shearing action and make the upward tearing of the skirt more difficult or uncertain. Therefore, for best releasing action, it is desirable to balance properly the width of the tab with the size of the cover.

The curl **22** not only provides for firm finger gripping of the tab but also, by virtue of its own rigidity and extension crosswise of the tab, contributes to the maintenance of the arcuate cross-section of the tab and the overall rigidity of the cantilever **41**. Below the junction **38**, the side edges **25** of the tab preferably converge downwardly to the finger grip or curl **22** which is substantially narrower than the upper end of the tab so as to locate the natural line of upward lifting of the tab after the cantilever has been bent upwardly. Where the lifting force is to be divided substantially equally between the torn ends **45** of the skirt, the finger grip is located at the longitudinal center of the free end of the tab as shown in FIGS. 1 and 2.

The cantilever **41**, reinforced against bending as above described, acts at a substantial mechanical advantage in swinging about the axis **42** to overcome the load or resistance offered by the metal to tearing starting at the lower ends of the score lines. As the tab is pulled outwardly by only a small amount of forefinger pressure, the metal breaks substantially immediately all the way along the score lines in the present instance as shown in FIG. 3 so that the cantilever swings easily to the upright position shown in FIG. 4 and in phantom in FIG. 8 as the finger movement is continued. Once the tearing has started along the score lines, it will continue all the way to the upper edge of the skirt even though the scoring may terminate below this edge. Thus, the circumferential continuity of the metal of the skirt is easily interrupted along the lines **23** and across the full depth of the skirt leaving torn ends **45** on the skirt and opposed edges **43** at the sides of the skirt part **13a** of the tab.

The upper ends **24** of the score lines **23** establish approximately the line **42** about which the cantilever **41** fulcrums in being swung upwardly to tear the skirt. This line is a chord of the cover which, because the tear lines are spaced a substantial distance apart, extends across the gasket **15** and a segment of the cup opening. Thus, as an incident to full upward tearing of the skirt and swinging of the lever up to the fulcrum line **42** and to the upright position shown in FIG. 4, the segment of the skirt confining the gasket will be swung away from the bead **14** and the gasket will be broken along or stretched across the tear lines **23** and pulled away from the lip of the container between the tear lines to quickly relieve any vacuum that may be present within the container as sealed. The part **15a** of the gasket underlying the cantilever swings upwardly with the cantilever as shown in FIG. 5.

With the skirt broken and the cantilever in upright position, the tab is grasped between the thumb and forefinger as shown in FIG. 4 and pulled upwardly while the cup is held by the user's other hand. The lifting force is thus

applied to the skirt at the torn ends **45** and substantially in vertical alinement with these ends. It is thus utilized most effectually in causing the inclined shoulders **27** and **28** on the bead **14** to cam the broken skirt ends outwardly and release the same from the lip beads. Under the continued pull, the camming progresses in both directions around the lip as illustrated in FIG. 5 until the cover is fully released and may be lifted off from the body. By proper correlating of the inclination of the bead shoulders **27, 28** and the extent of hooking of the skirt around these shoulders with the resiliency of the skirt, the end portions of the skirt after the tearing by the tab may be adapted for outwardly camming by and release from the bead under a lifting force on the tab which is well below the force that would be required to cause continued tearing of the metal beyond the upper ends of the score lines **23** and inwardly across the cover. As a result, the skirt is released from the bead without deformation of the cover which may be replaced on the cup and effectually resealed against the lip thereof. To effect such reclosure, the cover is replaced by first hooking the medial unbroken part of the skirt over the bead **14** and shifting the cover edgewise back to the position shown in FIG. 5, and then pressing downwardly on the cover at the broken skirt ends. If desired, the tab may be swung downwardly against the side of the cup thus again utilizing the resistance of the cantilever to bending to bring the part **15a** of the gasket back against the lip of the cup when the latter is reclosed.

The novel tab construction above described may be utilized to advantage in containers in which the skirt is initially formed with a hooked cross-section so that the cover may be snapped onto a bead preformed on the cup. A container of this construction is shown in FIGS. 15 to 22 in which the parts corresponding to those above described are indicated by the same but primed numbers.

A body or cup **10'** made of the sheet aluminum above described, is curled by conventional flanging and bending operations to form a bead **14'** of rounded cross-section below the lip **11'**. From the lip, the bead flares downward gradually at **46** to a maximum diameter at **47** and then curls inwardly and upwardly to provide a downwardly facing shoulder **48** which is inclined inwardly and downwardly to provide for outward camming of the torn skirt ends **45** during lifting of the upright tab **16'** as shown in FIG. 21.

The cover **12'** is composed of the same aluminum and comprises a flat top **17'** depressed within a peripheral depending skirt **13'** to provide a downwardly opening groove in which is cast a gasket ring **15'** adapted to be compressed against the lip **11'** in the snapped-on position (FIGS. 17 and 18) of the cover and provide an airtight seal. A polyvinyl chloride so-called puff compound may be used in forming the gasket.

Below the gasket, the skirt converges gradually to an inwardly projecting and relatively shallow bead **49** which is somewhat smaller than the diameter **47** of the body bead **14**. It is spaced below the cover top so as to hook around and in beneath the shoulder **48** as the cover is pressed onto the cup far enough to compress the gasket to the desired degree. Below the bead **49**, the skirt preferably flares outwardly to form a flange **51** whose internal frustoconical inner surface **60** coacts with the bead surface **46** to expand the resilient skirt enough (FIG. 19) to allow the bead **49** to pass the bead **14'** and then spring inwardly beneath the shoulder **48** as shown in FIGS. 17 and 18 and hold the gasket **15'** under the desired compression.

The invention also contemplates a novel construction of the cup so as to facilitate the firm gripping required for easy release of the cover by the lift tab when the cover is applied to a relatively shallow cup having an external surface **80** which tapers downwardly quite sharply as shown in FIGS. 15 and 16 and cannot be gripped with the security required for easy release of the cover by lifting the upright tab. To this end, the taper is terminated short of the cup bottom and the bottom portion constitutes a pedestal formed with a substantially vertical outer surface **81** which is preferably cylindrical and permits of firm gripping and holding between the user's thumb and forefinger of one hand while the cover is being lifted off from the bead **14'** with the other hand as illustrated in FIG. 21. It has been found that such gripping may be achieved by making the surface **81** about ⅜ of an inch deep and cylindrical as shown so that inward grooving of the pedestal to achieve better gripping is unnecessary. Such a surface may be formed easily and by a simple die set-up for drawing the cup.

As before, the cover is released from the cup by the camming action of the shoulder **48** in response to lifting of a tab **16'** (FIG. 20) after upward tearing and breaking of the skirt **13'** and the gasket **15** along score lines **23'** by outward and upward swinging of the cantilever **41'** to the position shown in FIG. 22. The tab is an integral extension of the flange **51** which, after hooking inwardly beneath the bead shoulder **48**, is left with an outwardly opening groove **52** that extends crosswise of the tab and thus constitutes a line of weakening which is conducive to bending of the skirt without proper tearing as the tab is swung upwardly.

To reinforce the cantilever **41'** and insure upward tearing of the skirt across its full depth without bending of the cantilever at the groove **52**, the tear lines **23'** are spaced far enough apart and the resistance of the cantilever to bending is increased beyond the resistance of the metal of the skirt to tearing along these lines. The desired resistance is achieved in the present instance by spacing the score lines **23'** to include an angle *a* within the range of magnitudes above described for covers of different diameters. As a result, the skirt will always be torn across its full width by swinging the tab outwardly and upwardly about the fulcrum **42'** to the upright position shown in FIG. 21 and in phantom in FIG. 18. From this position, the bead **49** of the skirt adjacent the torn ends **45** of the skirt will, as before, be cammed outwardly by the bead shoulder **48** and released from the cup in response to upward lifting of the tab in the manner illustrated in FIG. 21.

The snap-on type of cover shown in FIGS. 14 to 22 facilitates assembly onto the cup and is usually preferred where the body may be formed with close tolerances. For wider tolerances, a tighter seal usually can be obtained by seaming the skirt around the cup shoulder. The latter preferably is a bead of the approximate cross-section shown in FIG. 19. To provide for such seaming, the cover is formed initially to the cross-section shown in FIG. 12, telescoped onto the cup bead, and then interlocked with the bead by conventional seaming rolls such as those shown in FIG. 13.

If desired, the camming action above described may be utilized more effectually and the lifting force required for releasing the cover may be reduced substantially by first exerting the major part of such force on the cover at or near one of the torn skirt ends, in this instance, the end **53** of the cover shown in FIGS. 23 and 24. Under such force, the outward bending of the skirt starts at the end **53** as illustrated in FIG. 24 and progresses around the cover before the camming action becomes effective to expand the skirt at the other torn end **54**. By first releasing some of the skirt at one end, the cover may be removed more easily and with a lifting force of lesser magnitude.

To accomplish the foregoing, the invention, in another aspect, provides the tab **16'** and its finger grip **22'** that are so constructed as to induce each user to naturally apply the cover releasing force in a direction to concentrate the initial force on one of the two torn ends, the left end **53** in this instance. For this purpose, the finger grip formed by the curl **22'** is offset laterally from the longitudinal center line of the tab with one end **55** extending to the tab edge **56** which herein is alined vertically with the left score line **23'**. The curl extends less than half way across the tab to the lower end of the opposite

tab edge 57 which is inclined diagonally and upwardly to the lower end of the other score line.

With such a short curl 22' disposed at one side of the tab, it is natural for the user to grip the tab at the curl and proceed to apply the lifting force to the cover along a line offset to the left of the tab center as illustrated in FIG. 24. The major portion of the force is thus applied so as to concentrate the initial camming action by the bead surface 48 adjacent the left torn edge 53. The latter is thus expanded and lifted across and above the maximum diameter 47 of the bead so as to become released as illustrated in FIG. 24 before substantial expansion of the other broken end 54 of the skirt and release thereof from the bead 14'. After a substantial arc of the skirt end has been thus released, the other torn skirt end 54 becomes released easily thus enabling the cover to be lifted off from the cup with little further effort.

I claim as my invention:

1. A closed container comprising a cup-like body having a lip defined by a peripheral bead having a downwardly facing shoulder, a sheet metal cover for said body having a depending peripheral skirt closely telescoped downwardly around said bead and presenting a circumferentially continuous external surface, the lower edge portion of the skirt being hooked around and beneath said shoulder, and a tab of arcuate cross-section integral with and depending from the lower edge of said skirt over a substantial arc thereof, the upper end of said tab and the adjacent part of said skirt being hooked beneath said bead, and said tab, at the junction with said skirt, being of sufficient arcuate width to impart to the tab and the connected part of said skirt a resistance to bending which is greater than the resistance of the metal of said skirt to tearing along upright lines constituting extensions of the side edges of the tab whereby to force upward tearing of the skirt along such lines as the tab is swung outwardly and upwardly.

2. A container as defined in claim 1 in which the metal at the free end of said tab is curled outwardly, reversely and upwardly to form a rigid and longitudinally curved finger grip preserving the transverse curvation of said tab during upward swinging thereof.

3. A container as defined in claim 1 in which the metal of said skirt is scored and weakened along said tear lines upwardly from the lower edge of the skirt while preserving the circumferential continuity of the metal of the skirt prior to upward swinging of the tab.

4. A closed container comprising a cup-like body having a lip defined by a peripheral bead having a downwardly facing shoulder, a sheet metal cover for said body having a depending peripheral skirt closely telescoped downwardly around said bead with its lower edge hooked inwardly around and beneath said shoulder, said skirt having a circumferentially continuous external surface, and a pull tab depending from the lower edge of the skirt over a substantial arc thereof and constituting an integral extension of the hooked around edge portion of the skirt, said tab and the connected part of said skirt forming a cantilever which is swingable outwardly and upwardly about an axis lying on a chord of said cover adjacent the upper edge of the skirt, said cantilever being wide and rigid enough to possess greater resistance to bending below said axis than the metal of said skirt is to resist upward tearing along upright lines at opposite sides of the tab when the cantilever is swung upwardly to a position extending upwardly from said lip.

5. A container as defined in claim 4 in which opposite side edges of said tab converge downwardly to a finger grip at the free end of the tab.

6. A container as defined in claim 4 in which the metal along said tear lines is deformed and weakened so as to facilitate starting of the tearing in the upward swinging of said cantilever.

7. A container as defined in claim 4 in which said tear lines are defined by upright grooves formed in the metal of said skirt and extending substantially across the skirt.

8. A container as defined in claim 7 in which the depth of said grooves is approximately half the thickness of the skirt.

9. A container as defined in claim 4 in which said tab across the free end thereof is deformed to provide a rigid transversely extending finger grip.

10. A cover as defined in claim 4 including downwardly opening notches formed in the free edge of said skirt at opposite sides of said tab and having outer edges inclined upwardly toward and to said score lines.

11. A container as defined in claim 4 in which the chord defined by the upper terminal ends of said tear lines overlies and intersects the opening in said body whereby the upward bending of said tab to an upright position about the chord breaks any vacuum existing within the sealed container.

12. A container as defined in claim 4 including a continuous ring-like gasket of yieldable material disposed within said skirt and between said lip and cover and held under compression against the lip by virtue of the hooking of the skirt beneath said bead.

13. A container as defined in claim 12 in which said gasket is disposed in a downwardly opening groove defined by said skirt and an inner wall defining a downward depression in the top of said cover.

14. A container as defined in claim 12 in which a portion of said gasket is disposed below said axis and is torn along said upright lines along with said skirt as the cantilever is swung toward an upright position.

15. A container as defined in claim 4 in which said arc including said tab is within a range of from 30 to 60 degrees.

16. A container as defined in claim 15 in which said arc is approximately 40 degrees for a container of about four inches in diameter.

17. A container as defined in claim 4 in which said bead shoulder is inclined downwardly and inwardly and acts during lifting of said tab from said upright position to cam the torn end portions of the skirt outwardly and thereby release the same from said bead.

18. A container as defined in claim 17 in which the camming action of said shoulder on said skirt during lifting of the tab progresses circumferentially in opposite directions around said bead until said cover is released from the bead.

19. A container as defined in claim 17 in which the resistance of the metal of said cover to tearing inwardly beyond said chord is substantially greater than the resistance of the torn ends of the skirt to outward camming and release from the bead under a vertical lifting force exerted on the tab from said upright position.

20. A container as defined in claim 9 in which said finger grip is offset laterally from the longitudinal center line of said tab whereby a vertical upward pull applied to said finger grip after said cantilever has been swung to upright position will be exerted on said cover and concentrated primarily adjacent one torn end of the skirt so as to cause such skirt end to be cammed outwardly and off from said bead before the other torn end of the skirt is released from the bead.

21. A container as defined in claim 20 in which one side edge of said tab is approximately parallel to the adjacent tear line while the other side edge of the tabe makes an obtuse included angle of substantial magnitude with the other tear line.

22. A closed container comprising a cup having a bead defining an external peripheral shoulder around the lip of the cup, said shoulder facing downwardly and being inclined downwardly and inwardly below the lip, a sheet metal cover for said body having a depending peripheral skirt closely telescoped downwardly around said bead, a gasket ring on said cover engaging said lip around the full circumference thereof, the lower edge of said skirt being deformed and hooked around and beneath said shoulder to hold said ring under compression against said lip, a tab

of arcuate horizontal cross-section constituting an integral extension of said skirt and depending from the lower edge of the skirt, the upper end of said tab and the adjacent part of said skirt defining a shallow outwardly opening groove, and means defining upright tear lines on said skirt adjacent opposite side edges of said tab, said tab and the part of said skirt between said tear lines forming a rigid cantilever which is swingable outwardly and upwardly about an axis lying on a chord of said cover above the lower edge of said gasket ring, said cantilever being of sufficient arcuate width and rigidity to possess greater resistance to bending across said groove than the metal of said skirt does to upward tearing along said lines when the cantilever is swung outwardly and upwardly toward an upright position above said lip.

23. A container comprising a cup having a lip defined by an outturned peripheral bead having a downwardly facing shoulder, the wall of said cup converging downwardly from said lip and terminating in a bottom pedestal having an upright peripheral surface providing for substantially firmer manual gripping than the converging part of said wall, a sheet metal cover for said cup having a depending peripheral skirt closely telescoped downwardly around said bead and deformed and hooked around and beneath said shoulder, and a tab depending from the lower edge of the skirt over a substantial arc thereof and constituting an integral extension of the hooked around edge portion of the skirt, said tab and the connected part of said skirt forming a cantilever which is swingable outwardly and upwardly about an axis lying on a chord of said cover adjacent the upper edge of the skirt and wide and rigid enough to possess greater resistance to bending below said axis than the metal of said skirt is to resist upwardly tearing along upright lines at opposite sides of the tab when the cantilever is swung upwardly to an upright position above said lip, said shoulder being inclined downwardly and inwardly and acting under a lifting force manually to the upright tab to cam the torn ends of said skirt outwardly and release the same from said bead.

24. A container as defined in claim 23 in which the upright surface of said pedestal is disposed vertically.

25. A container having, in combination, a relatively rigid tubular body having around the open end portion thereof upper and lower axially spaced peripheral beads of rounded cross-section defining between them in a shallow outwardly opening groove of arcuate cross-section, the upper edge of said upper bead merging with the upper end of said body to form a lip of rounded cross-section, a cover of thin and deformable sheet metal having a depending peripheral skirt telescoped over and around both of said beads and curving around said lip, a yieldable sealing compound lining the interior of said skirt to form a gasket, a band of said skirt intermediate the edges thereof being depressed into said groove to compress said gasket and hook the skirt around the lower edge of said upper bead, the lower edge of said skirt being hooked around the lower edge of said lower bead thereby to form a double interlocked seam with said gasket compressed therein, upright score lines formed in said skirt and extending upwardly from the free edge of the skirt along generally parallel and circumferentially spaced lines which terminate at points adjacent said container lip, and a lift tab integral with and projecting downwardly from said skirt between said score lines, the metal of said cover along said score lines being thin enough to be torn in response to an outward and upward pull applied manually to said tab, and said tab and the arc of said skirt between said score lines being sufficiently rigid to insure tearing of said skirt all the way up to said points under such outward and upward pull.

26. A container as defined in claim 25 in which the lower edge portions of said upper and lower beads constitute upwardly and outwardly inclined peripheral cam surfaces causing expansion of the split skirt and upward and edgewise separation of the skirt from said beads starting at the torn ends of the skirt and progressing in opposite directions around the skirt in response to continued upward pulling of the tab after tearing of the skirt up to said terminal points.

27. A container as defined in claim 25 in which said upper and lower beads are hollow and said gasket is compressed between a portion of said skirt depressed inwardly between the beads.

28. A cover as defined in claim 25 in which said body is composed of plastic and the lower edge of said lower bead is curled inwardly and lies substantially in a transaxial plane with its edge abutting the wall of said body.

29. A container having, in combination, a relatively rigid tubular body having an outwardly projecting peripheral bead around a lip which defines the top opening of the container, said bead being collapsible radially under an inwardly applied seaming pressure, a cover of thin and deformable sheet metal having a depending skirt deeper than said bead and telescoped over and around the bead, a band of yieldable sealing compound lining the interior of the skirt intermediate the ends thereof, the telescoped assembly of the skirt, the band and the bead being collapsed inwardly to divide the bead into upper and lower beads, and seam the skirt and container together with the skirt hooked around the lower edges of said upper and lower beads, upright score lines formed in said skirt at the ends of an arc thereof and extending upwardly from the free edge of the skirt along generally parallel and circumferentially spaced lines which terminate adjacent said container lip, and a pull tab integral with and projecting downwardly from said skirt between said score lines, the metal of said cover along said score lines being thin enough to be torn in response to an outward and upward pull applied manually to said tab, and said tab and the tearable part of said skirt between said score lines being arcuate in cross-section and sufficiently rigid to insure tearing of the skirt all the way up to said points.

30. A container cover composed of relatively thin sheet metal and having, in combination, a generally flat top, a skirt integral with and depending from the periphery of said top, score lines at opposite ends of a short arc of said skirt extending from the free edge thereof upwardly and terminating at points at the upper edge of said skirt, and a pull tab integral with and projecting downwardly from the lower edge of said skirt between said lines, the metal of said cover along said score lines being thin enough to be torn in response to an outward and upward pull applied manually to said tab, and said tab and the tearable part of said skirt between said score lines being arcuate in cross-section and sufficiently rigid to insure tearing of the skirt all the way up to said points but not beyond said points.

31. A cover for use in closing and reclosing a cup having a lip formed by an external bead defining a downwardly facing and inwardly and downwardly inclined shoulder, said cover being formed of relatively thin and flexible sheet material and having, in combination, a generally circular top plate, a skirt integral with and depending from said top plate and sized to telescope downwardly over the lip bead, said skirt having a circumferentially continuous external surface and being deformed inwardly around its circumference and intermediate its upper and lower edges to define on the outer side of the skirt a shallow outwardly opening circumferential groove and to define on the inner side of the skirt an upwardly facing circumferential shoulder adapted for interlocking beneath the downwardly facing shoulder on the lip bead to hold the cover on the container, a tab of arcuate cross-section constituting an integral extension of an arc of said skirt and depending from the lower edge of the skirt with said groove extending crosswise of the tab adjacent the upper edge thereof, said tab and the connected part of the skirt forming a rigid cantilever which is swingable toward a substantially upright position in response to an outwardly and upwardly applied force exerted manually on the free

end of the tab with the material of said skirt being thin enough to tear along upright lines adjacent the sides of said tab as an incident to such swinging of the cantilever, and said cantilever being of sufficient arcuate width and rigidity to have greater resistance to bending upwardly along said groove than the material of the skirt has to tearing along said upright lines when said cantilever is swung upwardly whereby such upward swinging is effective to tear said skirt to points above said groove without causing bending of the cantilever along the groove.

32. A closed container comprising a cup-like body having a lip defined by a peripheral bead having a downwardly facing shoulder, a sheet metal cover for said body having a depending peripheral skirt closely telescoped downwardly around said bead with its lower edge hooked inwardly around and beneath said shoulder, said skirt having a circumferentially continuous external surface, and a pull tab depending from the lower edge of the skirt over a substantial arc thereof and constituting an integral extension of the hooked around edge portion of the skirt, said tab and the connected part of said skirt forming a cantilever which is swingable outwardly and upwardly about an axis extending transversely across the upper end

of said cantilever, the cantilever being wide and rigid enough to possess greater resistance to bending below said axis than the metal of said skirt is to resist upward tearing along at least one line extending upwardly through the skirt from the corresponding side of the tab when the cantilever is swung upwardly toward a position extending upwardly from said lip.

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