March 25, 1969 W. COOKSON 3,434,623

CONTAINER WITH PULL-TAB OPENER

Filed Sept. 6, 1967 Sheet 1 of 7

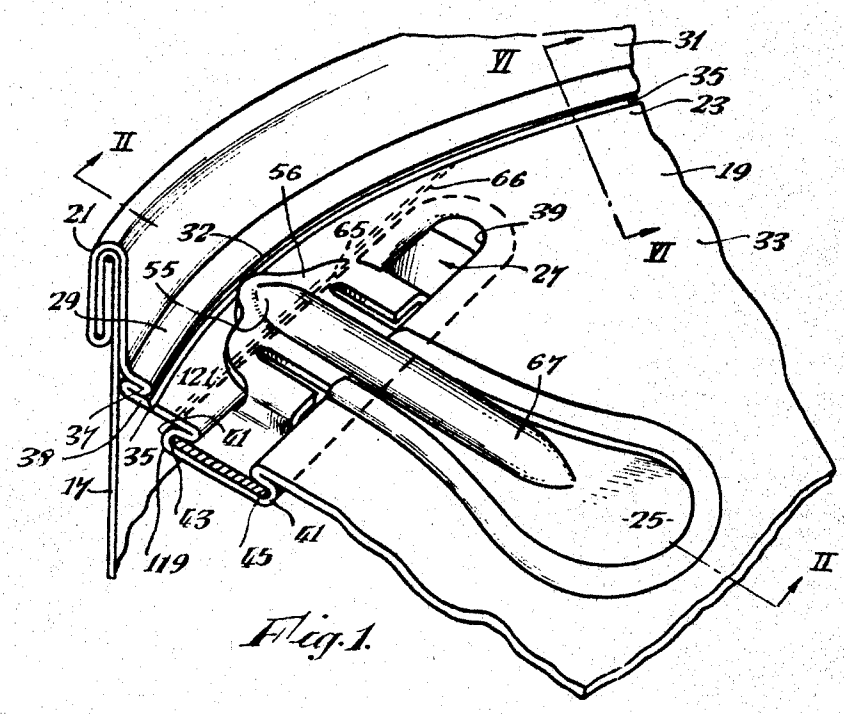

Fig. 1.

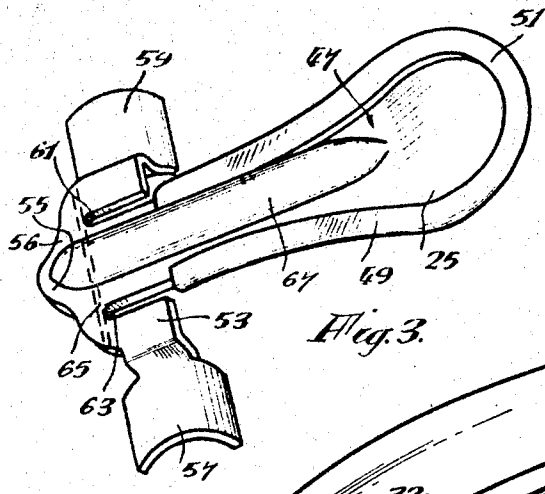

Fig. 3.

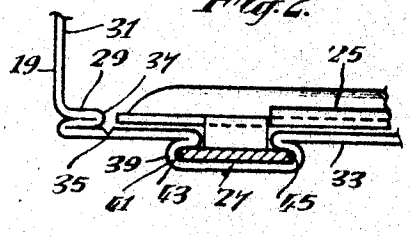

Fig. 2.

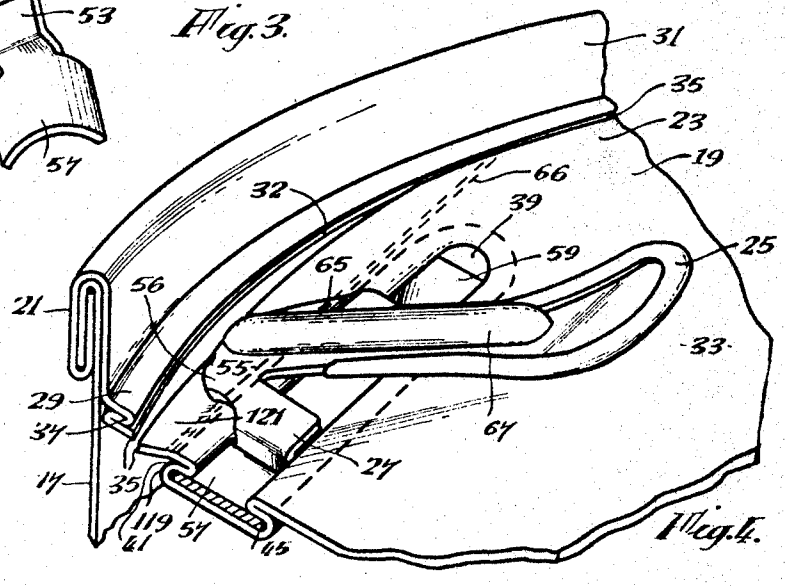

Fig. 4.

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CONTAINER WITH PULL-TAB OPENER

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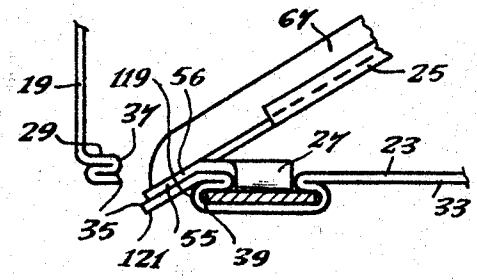

Fig. 5.

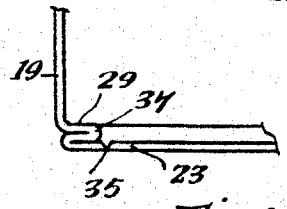

Fig. 6.

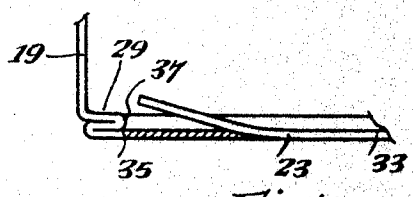

Fig. 7.

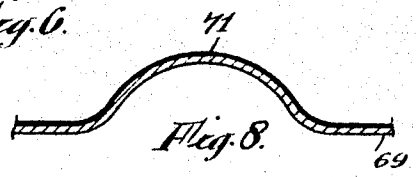

Fig. 8.

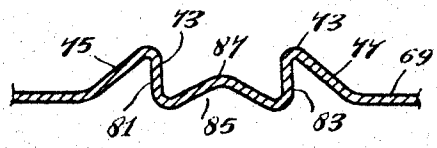

Fig. 9.

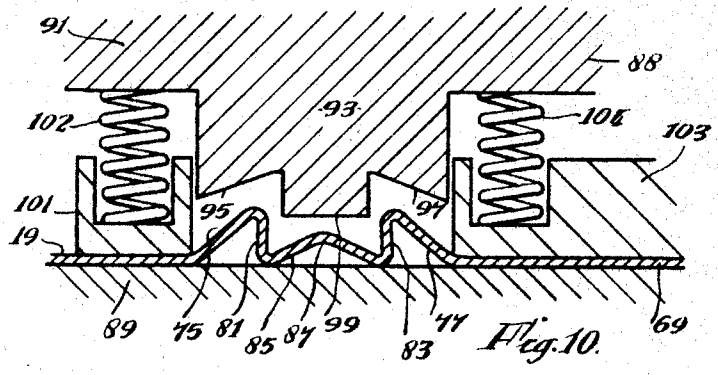

Fig. 10.

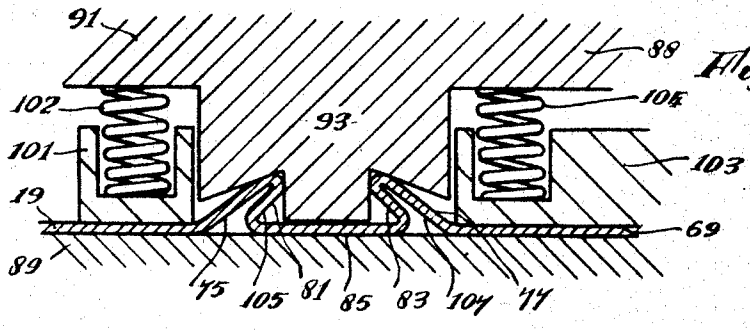

Fig. 11.

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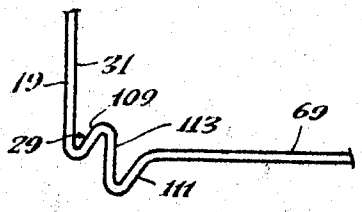

Fig. 12.

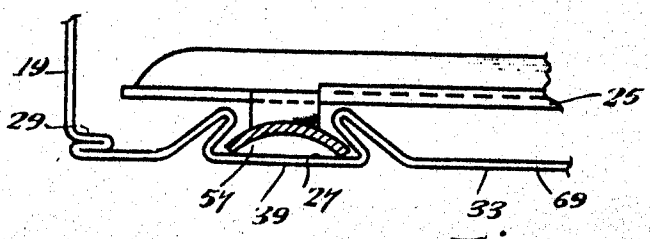

Fig. 13.

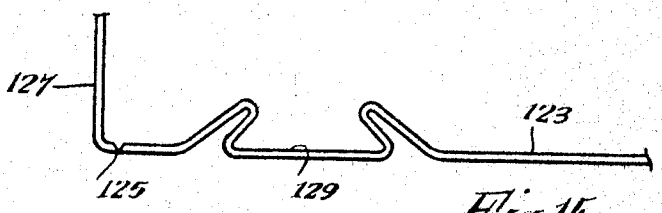

Fig. 14.

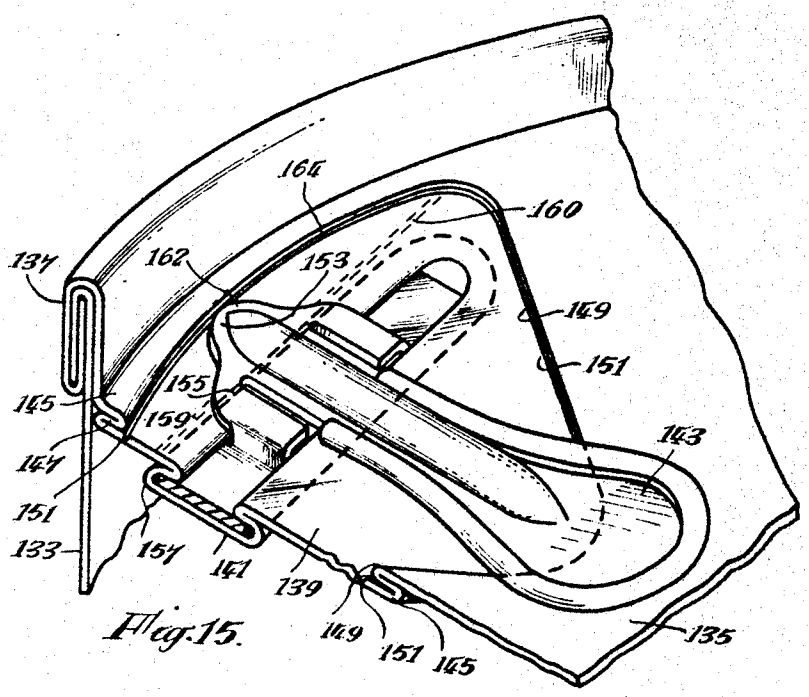

Fig. 15.

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CONTAINER WITH PULL-TAB OPENER

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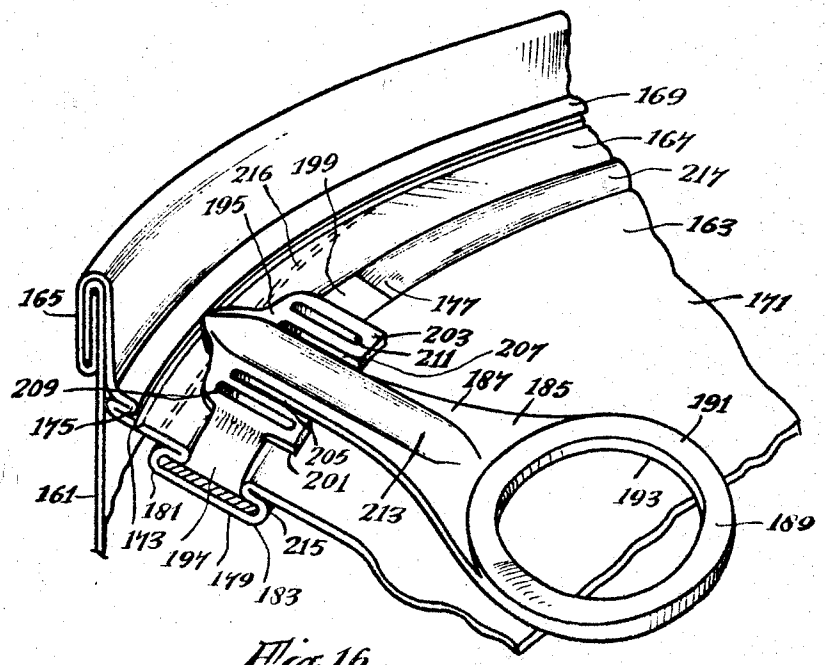

Fig. 16.

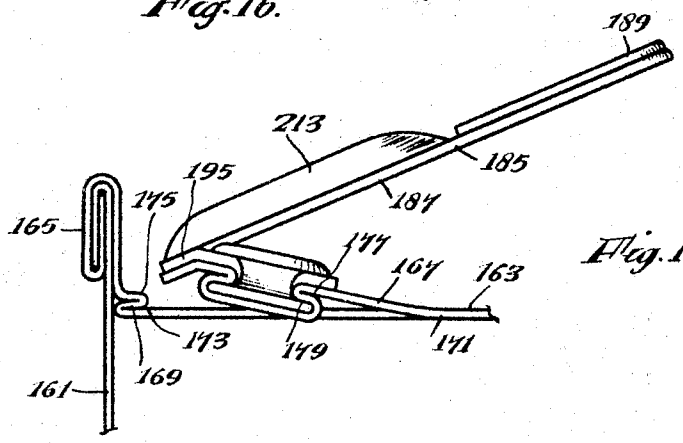

Fig. 17.

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CONTAINER WITH PULL-TAB OPENER

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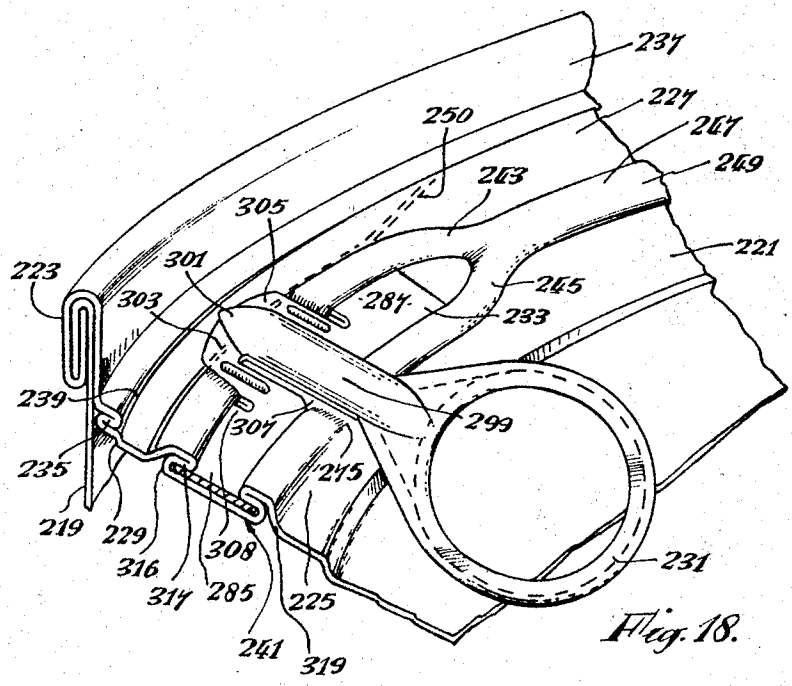

Fig. 18.

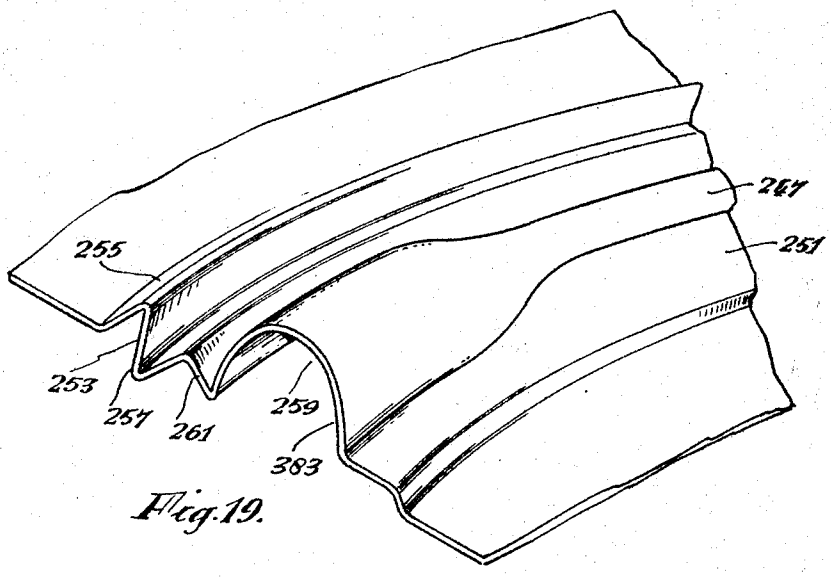

Fig. 19.

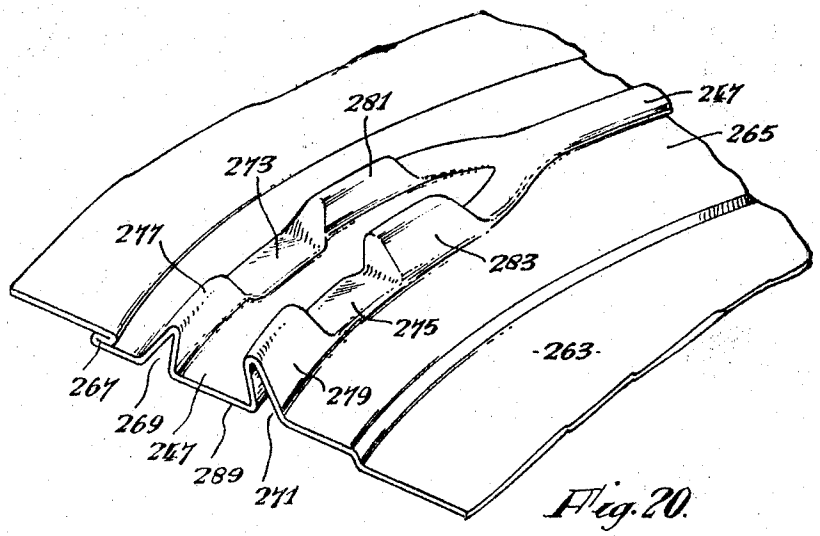

Fig. 20.

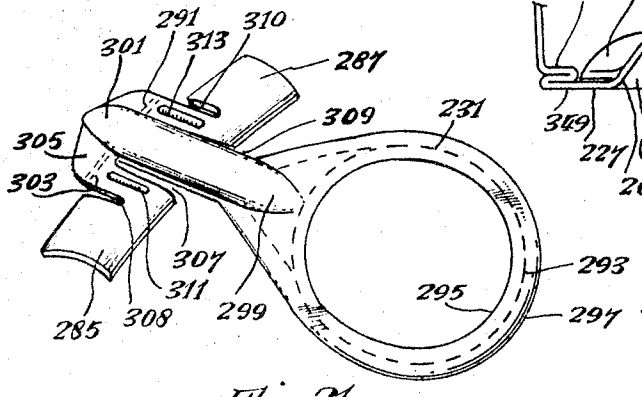

Fig. 21.

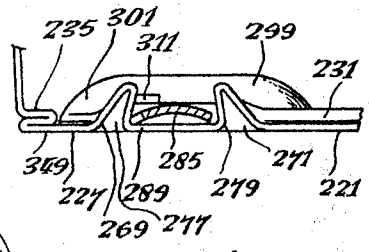

Fig. 22.

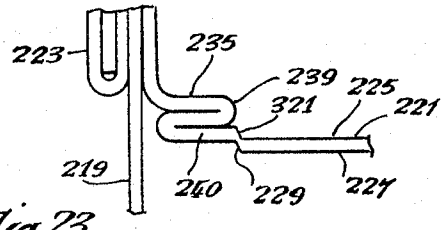

Fig. 23.

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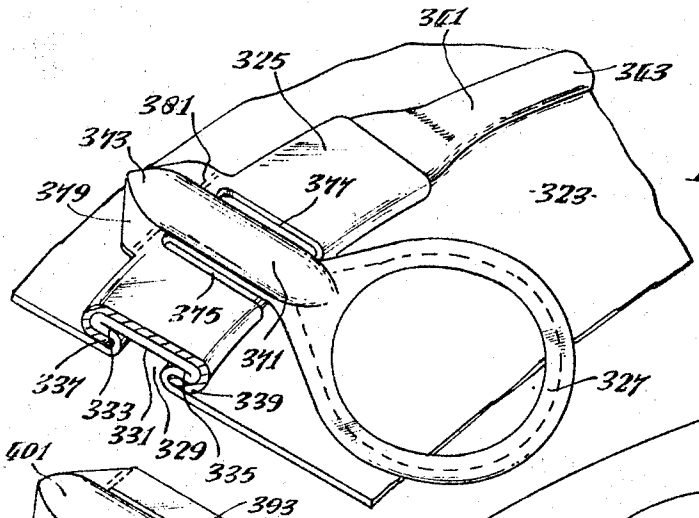

Fig. 24.

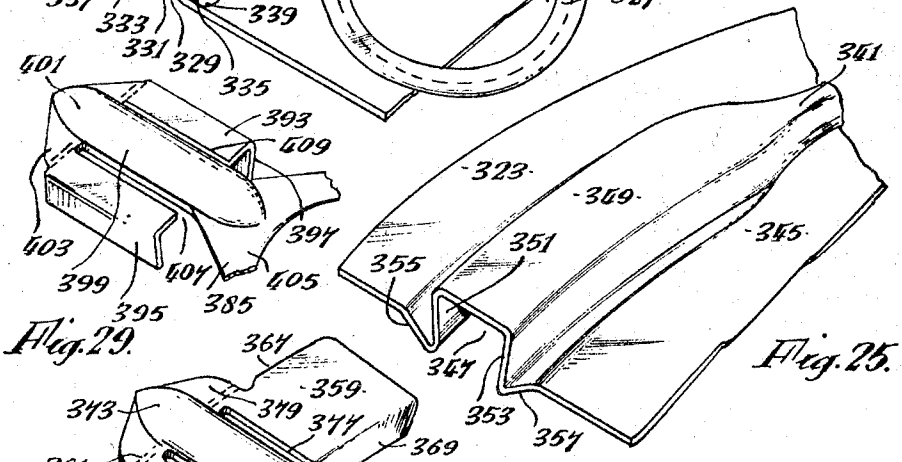

Fig. 29.

Fig. 25.

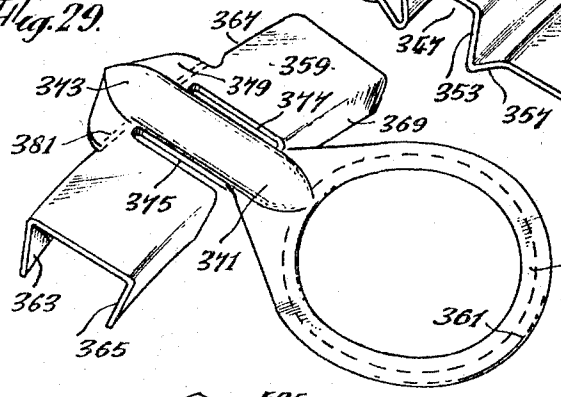

Fig. 26.

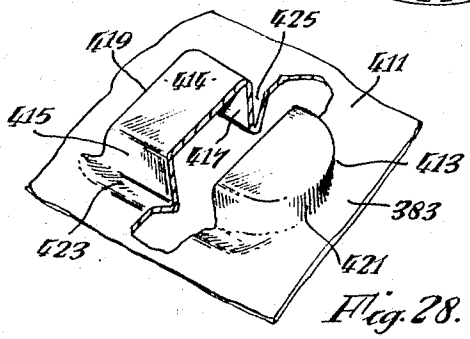

Fig. 28.

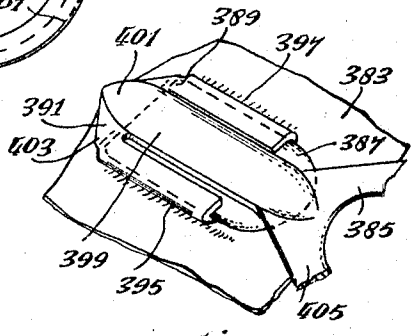

Fig. 27.

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Patented Mar. 25, 1969

3,434,623

CONTAINER WITH PULL-TAB OPENER

William Cookson, Fareham, England, assignor to Cookson Sheet Metal Developments Limited, Southampton, England, a company of Great Britain and Northern Ireland

Filed Sept. 6, 1967, Ser. No. 665,919
Claims priority, application Great Britain, Dec. 1, 1966, 53,907/66; Jan. 23, 1967, 3,298/67; June 6, 1967, 26,067/67; Aug. 9, 1967, 36,612/67
Int. Cl. B65d 17/20
U.S. Cl. 220—54
16 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed hand operable opening means for containers especially adaptable for use in a lid of a tinplate container. Substantially the whole, or a portion, of a lid may be removed by an upward pull on a handle. First, a portion of the handle hinges downwardly to start the opening along a weakened line and then continued upward force on the handle tears out a portion along the remainder of the weakened line. The problem of the handle separating from the lid is overcome by forming a channel with reverse folds, the folds overlying tabs on the handle. A method of forming such folds without tearing the metal is described.

This invention relates to opening means for containers and in particular to a wall for a container provided with opening means which may be operated without the use of tools. It is more particularly, though not exclusively, concerned with a container wall of thin sheet metal provided with opening means, especially a wall formed of tinplate. The invention also relates to a method for the formation of reversed folds in sheet metal, such method being useful in the manufacture of container walls according to the invention.

It has long been recognised as a problem in the manufacture of containers that there is no statisfactory means for providing a tinplate container with opening means which can be operated by hand without the use of tools such as domestic can-openers or keys adapted for engagement with a part of the container.

It has been proposed to use aluminium lids for containers and to form a rivet boss integrally with the lid for securing a tab handle to the lid. It has been found that the handle, which is intended to tear a portion surrounded by a weakened line out of the lid, because of the concentrated load on the head of the rivet boss, has often pulled off the rivet before the tear portion can be satisfactorily removed. A further disadvantage has been that it has been necessary to apply a wax or lacquer to the aluminium prior to the process of forming the rivet and this introduces another process operation.

It has not been possible to apply the method to tinplate lids because of the splitting of the tinplate which occurs when an attempt is made to draw the material into a shape suitable for providing a rivet boss.

A further cause of failure of a rivet boss connection between a tear-off lid and a tab handle arises when the rivet boss provides a pivot for the handle as the handle is lifted, a portion of the material of the lid being downwardly bent into the container. The additional strain on the head of the rivet causes this to collapse and pull through the rivet hole in the tab handle.

It is an object of this invention to provide improved forms of opening means for containers.

It is a further object to provide an improved means of securing a handle to a portion of a container wall to be removed from the container. Such a portion is subsequently referred to as a tearaway element.

It is a further object to provide a method for the formation of reversed folds in sheet metal suitable for the formation of a connection device for a handle used in opening means.

It is a still further object to provide a handle having a part to engage the material of the tearaway element as the handle is lifted to commence the opening of the container.

According to this invention there is provided in a container wall formed of relatively stiff thin sheet material, opening means for the container comprising a tearaway element in the material of the wall, a weakened line bordering the tearaway element, a handle having at least one fixing tab secured to the tearaway element by a connection device, the connection device being provided by a channelled section formed in the tearaway element having walls comprising reverse folds in the material, the folds overlying the fixing tab on the handle. The channelled section in the tearaway element may be downwardly or upwardly directed. The tab or tabs of the handle may be inside or outside the channelled section. The handle may have a part to engage a portion of the tearaway element adjacent the weakened line as the handle is lifted to cause the material to break at the weakened line and commence the opening of the container. The container may be further opened by use of the handle to cause the tearaway element to part from the remainder of the material along the weakened line. The invention is applicable to container walls formed either of tin-plate or aluminium and sheets of these materials may be of the thicknesses normally used in container manufacture.

The handle may be hinged so that when it is lifted, a front part rotates downwardly to cause an adjacent portion of the weakened line in the container wall to break through. This hinging may take place along an edge of the channelled section near to (and preferably parallel to or in chordal relationship to) the weakened line so that a portion of the tearaway element lying between the edge and the weakened line is bent down along the edge into the container. The said edge may be provided by a reversed fold in a side-wall of the channelled section underlying a portion of the tearaway element engaged by the front part of the handle. Especially in the case of a tinplate container wall the front part of the handle preferably has a generally spade-like shape comprising a nose portion flanked by wiper blade portions to cause the initial rupture of the weakened line and bend a portion of the tearaway element downwardly preferably about the edge of the channelled section to sever a further length of the weakened line. In this way a sufficient start is made in the opening to allow the remainder of the weakened line to be broken through by upward tearing achieved by an upward pull by hand on the handle.

There may conveniently be one fixing tab on each side of the handle for engagement by the connection device, and by means of the tabs a part of the handle may be secured to the container wall, the remainder of the handle being hingeable with respect to it.

The tearaway element may comprise a part, or substantially the whole of the wall e.g. the lid of the container. The tearaway element may be bordered by a weakened line in the form of a closed figure (i.e. a continuous weakened line) completely surrounding the tearaway element and may be wholly or only partly removed by the user. Alternatively the weakened line may be in the form of an open figure in which case the tearaway element would generally only be partially removable.

On the side opposite from the tearaway element, the weakened line may be bordered by a shoulder to assist

tearing action of the material of the wall along the weakened line as an upward pull is applied to the handle. Preferably the shoulder is adjacent the weakened line. The shoulder may be provided by a stepped edge or by an edge of a buttress comprising a reverse fold in the material. The shoulder may overlie the material so that after the initial opening of the container, upward pressure on the handle urges material in the region of the weakened line against the shoulder so that the material in this region is progressively broken through or parted. The buttress when used also serves to strengthen the container in the region of the weakened line to avoid undue weakening of the container as a result of the provision of the opening means.

The weakened line may be in the form of a portion of narrow width and reduced thickness. It may be formed e.g. by a scored line or semi-sheared line in the material.

The channelled section in the tearaway element providing the connection device for the handle preferably has a pair of opposite side-walls comprising reverse folds formed in the sheet material which overlie and secure the fixing tab or fixing tabs of the handle.

The channelled section may be in the form of a closed figure in which case it may comprise an upwardly or downwardly directed recess in the container wall and the recess may have a pair of opposite side-walls as above described.

Alternatively the channelled section may in continuous form in the container wall, only a part of it being used for engagement with the fixing tab or tabs of the handle, the remainder providing stiffening and strengthening for the wall. The said part may be in the form of an upwardly or downwardly directed recess and this may have a pair of opposite sidewalls as above described. The remainder of the channelled section may have walls which continue the walls of the recess round the container wall so that the whole of the channelled section is in the form of an upwardly or downwardly directed recess which may be of constant cross-sectional shape. Alternatively the remainder of the channelled section may be of a different form e.g. an upwardly or downwardly formed bead of which the open side may face in a different direction from that of the recess and the bead may be of narrower cross section than the recess.

A continuous channelled section is advantageously formed parallel to the edge of the wall. For example in a circular lid, the weakened line may be formed inwardly of and parallel to the edge of the lid and a continuous channelled section may be of annular shape concentric with the edge of the lid and with the weakened line which is formed inwardly of and parallel to the edge of the lid.

A channelled section in the form of a closed figure may have straight parallel walls joined by end walls conveniently half-rounded. At least a part of the weakened line bordering the tearaway element may have an arcuate shape and the channelled section may be chordal thereto. The channelled section may be chordal both to the edge of a circular end wall of a container and to the weakened line which is formed inwardly of the edge and parallel thereto.

Further according to the invention there is provided a container wall formed of relatively stiff thin sheet material having opening means comprising a tearaway element in the material bordered by a weakened line, a tab handle secured to the tearaway element by a connection device, the device comprising a channelled section formed in the tearaway element having walls formed by reverse folds in the material, the folds overlying at least one fixing tab provided on the tab handle, a part of the tab handle secured in fixed relation to the channelled section by the fixing tab, a front part and a finger grip on the tab handle hingeable with respect to the said fixed part of the handle, the front part being positioned to engage the material of the tearaway element adjacent the weakened line as the finger grip on the handle is lifted whereby as the finger grip is lifted the front part hinges downwardly and causes the weakened line to burst through locally and then bends down a portion of material between the weakened line and an edge of the channelled section into the container so as to further break through the material along the weakened line and thereafter as the handle is pulled the remainder of the weakened line is severed and so the tearaway element is removed from the container lid.

Further according to the invention there is provided a method for the formation of reversed folds in sheet metal comprising forming an upstanding elongated protuberance in the metal, and reshaping the protuberance to form two triangular shaped ears which are partially flattened inwardly to provide reversed folds. The material may be clamped outwardly of the ears, and the ears partially flattened so that the inward walls of the ears bend inwardly and the outward walls of the ears extend to provide the reversed folds. The protuberance may be dome-shaped in which case preferably a valley section is formed between two upstanding triangular shaped ears when the protuberance is reshaped, and the valley section is compressed as the ears are partially flattened. The folds may be further flattened to secure a fixing tab or fixing tabs of a handle placed beneath the folds, the handle being comprised in opening means for a container e.g. a container wall according to the invention.

Yet further there are provided dies suitable for carrying out the foregoing method which includes a die having a centre plug portion to flatten the inverted valley section in the sheet metal, the ecntre plug portion being bounded by slanting walls to flatten and reshape the upstanding triangular ears.

There is also provided a method for the formation of reversed folds in sheet metal preferably from strip material comprising forming an upstanding channel section or bead of substantially curved cross section with a portion of the channel being of deeper section in such manner that in forming dies the metal may be freely drawn inwardly into the curvature of the cross section from the periphery of the metal, and reshaping the said deeper portion to form two upstanding substantially triangular shaped ears which are partially flattened inwardly to provide reversed folds. Conveniently, the upstanding channel section or bead of substantially curved cross section may be circular and concentric with the edge of a circular sheet metal blank used e.g. in making a container lid. When the said deeper portion of the channel or bead is reshaped, the remainder of the channel provides a stiffening bead. The folds may be further flattened to secure a fixing tab or tabs of a tab handle placed beneath the folds, the handle being comprised in opening means for a container lid e.g. a container lid according to the invention.

Still further according to the invention there is provided a method for securing a tab handle to sheet metal in the construction of opening means comprising forming in the sheet metal an upstanding channel or elongated bead of substantially curved cross section which may be conveniently circular and concentric with the edge of a circular lid of a container with a portion of the channel being of deeper section in such manner that in forming dies the metal may be freely drawn inwardly into the curvature of the cross section from the edge of the metal, with the said deeper portion thereafter being reshaped to form two upstanding substantially triangular shaped ears and providing the tab handle e.g. a tab handle comprised in opening means according to the invention with at least one fixing tab suitably shaped to co-operate in the reshaped portion and inserting said tab into the reshaped portion and compressing the triangular shaped ears so that the inward walls of the ears bend inwardly and the outer walls of the ears extend to provide reversed folds with the tab of the tab handle being securely reshaped and locked beneath the folds.

Still further according to the invention there is provided a method for securing a part of thin material to part of thin sheet material, e.g. a handle to sheet metal in the construction of opening means for a container wall, comprising forming in the sheet material a channel or bead of preferably curved cross-section which may conveniently be circular or of other suitable configuration adjacent to the edge of the sheet with a portion of the channel being of larger section in such manner that in forming dies the material may be freely drawn inwardly into the channel from the periphery of the sheet, the said larger portion thereafter being reshaped to form two upstanding, preferably, triangular shaped ears with a base wall therebetween, the aforementioned part of thin material, e.g. a fixing tab of a handle comprised in opening means according to the invention, being suitably shaped to co-operate in the reshaped portion of the channel so that when compressed the inward walls of the ears bend inwardly and the outer walls of the ears extend to provide reversed folds above the base wall with the part of thin material being securely reshaped and clenched within the folds of the flattened channel.

Where a handle is being secured to a sheet metal blank e.g. a lid, the handle may be provided with two oppositely directed tabs and the middle portions of the ears may be first flattened before assembly of the tab handle to provide clearance for the centre portion of the handle so as to reduce the overall depth of the handle and connection device in the sheet metal and so allow the blanks to be pack assembled prior to their assembly e.g. on can bodies.

Still further according to the invention there is provided a method for securing a part of thin material to thin sheet material, e.g. securing a handle having fixing tabs to sheet metal in the construction of opening means for a container wall according to the invention comprising forming in the sheet an upstanding channel or bead of preferably curved cross-section which may conveniently be circular or of other suitable configuration adjacent to the edge of the sheet with a portion of the channel being of larger section in such manner that in forming dies the material may be freely drawn into the channel from the periphery of the sheet, the said larger portion thereafter being reshaped to form a channel having two downstanding preferably triangular shaped ears, the top of the portion being formed to a flat wall, forming in the aforementioned part of thin material fixing tabs suitably shaped to co-operate over the reshaped portion and compressing the reshaped portion of the channel so that the inward walls of the ears bend inwardly and the outer walls of the ears extend to provide reversed folds above the sheet material with the fixing tabs being securely reshaped and clenched beneath the folds of the flattened channel portion.

Also according to the invention there is provided a method for securing a handle to a circular sheet metal blank in the construction of opening means comprising forming in the blank an upstanding elongated dome-like bead of substantially curved cross-section adjacent to the edge of the blank and located in its radial direction, the said dome-like bead being reshaped to form a channel having two downstanding triangular shaped ears at the sides of the channel with the top of the portion being formed to a flat wall, providing a pair of fixing tabs on the handle suitably shaped to co-operate over the channel so that when the channel is compressed the inner side walls of the ears bend inwardly and the outer walls of the ears extend to provide reversed folds above the blank with the fixing tabs being securely reshaped and clenched beneath the folds of the flattened channel.

Various forms of the invention will be described by way of example only, with reference to the accompanying drawings wherein:

FIG. 1 is a part perspective view of a container lid with opening means including a tearaway element with its handle and connection device;

FIG. 2 is a part cross-section view of the container lid shown in FIG. 1 taken on the line II—II;

FIG. 3 is a perspective view of a preferred form of handle prior to assembly;

FIG. 4 is a part perspective view of the container lid shown in FIG. 1 with its handle in the operative position to open the lid;

FIG. 5 is a part cross-section view of the lid shown in FIG. 4;

FIG. 6 is a part cross-section view of a portion of the tearaway element shown in FIG. 1 taken on the line VI—VI;

FIG. 7 is a similar view of the tearaway element to that of FIG. 6 showing the tearaway element in the process of being torn out of the container;

FIG. 8 is a part cross-section view of the first formation stage of the handle engagement means in the lid;

FIG. 9 is a part cross-section view of the second formation stage of the handle engagement means;

FIG. 10 is a part cross-section view of the third formation stage in press tool dies of the handle engagement means prior to pressing;

FIG. 11 is a part cross-section view of the third formation stage shown in FIG. 10 after pressing;

FIG. 12 is a part cross-section view of triangular shaped ears before compressing in dies to form the buttress of the opening mean;

FIG. 13 is a part cross-section view of the lid with the handle shown being assembled in the lid engagement means;

FIG. 14 is a part cross-section view of a lid formed without a buttress;

FIG. 15 is a part perspective view of opening means for removing a portion of a lid including a tearaway element with its handle and connection device;

FIG. 16 is a part perspective view of a container lid with opening means including a tearaway element with its handle and another form of connection device;

FIG. 17 is a part cross-section view of the lid shown in FIG. 16 as it is being pulled out of a container;

FIG. 18 is a part perspective view of a further form of container lid with opening means including a tearaway element with its handle and connection device;

FIG. 19 is a part perspective view of the first stage of pressing the container lid shown in FIG. 18;

FIG. 20 is a perspective view of the second stage of pressing the container lid shown in FIG. 18;

FIG. 21 is a perspective view of the handle prior to assembly;

FIG. 22 is a part cross-section view of the handle partly assembled on the lid;

FIG. 23 is an enlarged part cross-section view of a tearaway element;

FIG. 24 is a part perspective view of alternative opening means for a lid with its handle and connection device;

FIG. 25 is a part perspective view of a pressing for the lid shown in FIG. 24;

FIG. 26 is a perspective view of the handle;

FIG. 27 is a part perspective view of another form of opening means for a lid with its handle and connection device;

FIG. 28 is a part perspective view of a pressing for the lid shown in FIG. 27; and

FIG. 29 is a perspective view of the handle.

In FIG. 1 there is shown a container body **17** and a lid or end cover **19** made of tinplate or other suitable material. Lid **19** is secured to container **17** by means of a conventional lock seam **21**. Opening means **23** including a tearaway element in the form of a removable disc **33** and a handle **25** secured to it by a connection device **27** is provided in lid **19**.

As shown in FIGS. 1 and 2 the opening means **23** further comprise a buttress **29** at the base of rim **31**

of lid 19 and a scored line 35 constituting a weakened line bounding disc 33 at the position of a shoulder 37 on the edge of the buttress 29. An annular strip 38 of the material of the lid adjacent the scored line on the outward side is closely overlain and reinforced by the buttress 29. Buttress 29 is formed in dies as will hereinafter be explained. Connection device 27 comprises a round-ended upwardly directed channel section or recess 39 in chordal relationship to rim arc 32, the channel section 39 having side walls 41 in the form of reverse folds providing recesses 43 which afford engagement means 45 for securing fixing tabs of the handle 25.

In FIG. 3 handle 25 made from tinplate, or other suitable material, comprises a wall 47, including a portion 49 which is suitably shaped with a hemmed edge 51 which can be easily gripped by the user's fingers and a front spade shaped part comprising a central nose portion 55 merging through curved walls with portions of a wiper blade 56 disposed on either side thereof, the front part being hingeably connected to a part 53 securable in fixed relation to the channel section 39 by two curved extension fixing tabs 57 and 59. Slits 61 and 63 are provided in wall 47 to allow the handle when lifted to bend on a hinge line 65 (shown double dotted). A stiffening bead 67 is provided in wall 47.

The lid and opening device is press formed in a sequence of suitable dies and the method of manufacturing the channel section 39 is shown in FIGS. 8, 9, 10 and 11. In FIG. 8 a lid blank 69 is formed in suitable dies with protuberance 71 of sufficient depth to provide the material for reshaping to desired ear formations 73 shown in FIG. 9 made in the next set of dies, and sufficiently elongated to provide a channelled section of the desired length. The ear formations 73 comprise two upstanding triangular shaped ears 75 and 77 having vertical inward walls 81 and 83. Between walls 81 and 83 is a base wall 85 provided with an inverted valley section 87. In FIGS. 10 and 11 are shown dies 88 and 89, the top die 88 having a top portion 91 and a center portion 93 provided at its base with two slanting walls 95 and 97 and a center plug portion 99. Center portion 93 slides between two pressure pads 101 and 103. Bottom die 89 is a flat platen on which is positioned the lid blank 69. Two springs 102 and 104 are provided between top die 88 and pressure pads 101 and 103.

In operation top die 88 approaches bottom die 89 compressing springs 102 and 104 so holding pressure pads 101 and 103 tightly onto the lid blank 69 on bottom die 89. The center portion 93 (see FIG. 11) then reshapes the ear formations 75 and 77 and flattens valley section 87. This process causes the ears 75 and 77 to slightly flatten collapsing walls 81 and 83 and lengthening base wall 85 to a flat condition thus providing semi-reversed folds 105 and 107 as shown.

In FIG. 12 is shown buttress 29 prior to being formed to the shape shown in FIGS. 1 and 2. The triangular ear shaped formations are made in suitable dies with ear 109 upstanding from the surface of lid 19 made at the base of rim 31 and ear 111 projecting below the surface of lid 19, the ears providing between them a vertical wall 113. Similar types of dies to those used for forming the recess 39 compress the ears 109 and 111 to collapse vertical wall 113.

Handle 25 is assembled in recess 39 as shown in FIG. 13. The curved extension tabs 57 and 59 are inserted in the recess and the assembly flattened in suitable dies with the tabs becoming securely interlocked in engagement means 45 (see FIGS. 1 and 2). In this manner the loading pressure on the connection when the handle is lifted is distributed over a considerable portion of the channelled section 39. Lid 19 is assembled on the container body 17 by means of lock seam 21.

To operate the opening device, handle 25 is lifted as shown in FIGS. 4 and 5, causing the nose portion 55 to swivel downwardly about hinge line 65 along the length of an underlying supporting shoulder 119 of connection device 27 thus exerting pressure along bend line 66 (shown by dotted lines) on the metal segment 121 which lies between shoulder 119 and buttress 29 to initially burst through scored lines 35. At the same time wiper blade 56 presses on segment 121 and bends along this shoulder 119 down into the container, to break through the scored line 35 along the length of rim arc 32. In this manner the material in the segment is easily broken through and its resistance to bending along bend line 66 considerably diminished by the support of the underlying shoulder 119. Apart from the broken scored line in rim arc 32, the remainder of the scored line round the buttress 29 remains undisturbed as shown in FIG. 6. Next, handle 25 is pulled upwardly so as to apply upward pressure to the disc 33 which causes scored lines 35 to be sheared through against shoulder 37 of buttress 29 simultaneously on each side of the connection device 27 (see FIG. 7) until tearaway element or disc 33 is fully torn out of container body 17. The shearing action is assisted by the reinforcement for the strip 38 provided by the buttress 29. By such means the disc 33 is easily and safely removed from the container.

For such easily rupturable material such as aluminium, buttress 29 may be omitted from the opening means. In FIG. 14 a lid 123 is provided with a scored line 125 adjacent to the rim 127. A connection device 129 is provided for attaching a handle (not shown) in the manner as previously described. Operating the opening means enables the disc to be removed from the container. This construction however, is more easily damaged than when a buttress is provided as the folds comprising the buttress strengthen and stiffen up the rim portion of the lid of the container.

In FIG. 15 a modified form of opening means is shown as applied to the removal of a portion only of the lid. A container body 133 and a lid 135 are secured together with a lock seam 137. The lid 135 is provided with opening means comprising a tearaway element 139 having a connection device 141 securing a handle 143. Tearaway element 139 is preferably made in an approximately triangular configuration and it is bounded by a buttress 145 comprising reversed folds 147 providing a shoulder 149. Adjacent shoulder 149 is provided a scored line 151 which is in arcuate form where parallel to the edge of the lid. The channelled section providing the connection device 141 is chordal to the arcuate portion of the scored line.

Handle 143 is secured in connection device 141 as previously explained. When handle 143 is lifted its nose portion 153 is bent downwardly about hinge line 155 and underlying shoulder 157 of connection device 141 to initially burst through scored line 151 and then with wiper blade 162 bend down segment 159 along bend lines 160 into the container by the pressure of wiper blade 162 on the segment so breaking through the portion of scored line in rim arc 164. Pulling the handle 143 upwardly shears off the remaining portions of scored line 151 against shoulder 149 so removing the tearaway element from the container. For easily rupturable material such as aluminium the buttress 145 may be omitted from the construction although, to some extent, this is thereby weakened.

In FIGS. 16 and 17 is shown a lid of a container made of tinplate or other suitable material having another form of connection device. Container body 161 is joined to a lid 163 by a lock seam 165. Lid 163 is provided with opening means 167 comprising a buttress 169 and a removable portion of the lid 171 forming a tearaway element bounded by a scored line 173 at the position of a shoulder 175 is provided by the buttress 169. Connection device 177 comprises a channel section 179 having two reversibly bent side walls 181 and 183, the channel section being formed concentrically with the edge of the removable portion 171 and the buttress 169 and near to the scored line 173.

Particularly for material of fairly hard temper it is preferable to provide a circular or other suitably shaped continuous channel section concentric or otherwise similarly disposed to the rim of the lid (as is provided in this embodiment) rather than one of shorter length. This facilitates the press forming operations as the lid blank material under pressure of the dies can flow evenly into the channel at a constant rate of movement in the direction of the centre of the blank from its periphery so avoiding the setting up of unbalanced stresses which can result in wrinkling, splitting and tearing of the sheet metal.

Location of the handle in the channel section is also facilitated in the manufacturing process as this can take place at any point of the circumference of the section, the channel section at this stage providing an upwardly directed recess of constant cross section right round the lid.

Handle **185** in FIGS. 16 and 17 is made from tinplate or other suitable material and it comprises a wall **187** of which one end may be suitably formed as a ring **189** to facilitate being gripped by the user's fingers. The ring **189** has suitable hemmed edges **191** and **193**. Wall **187** has a nose portion and wiper blade **195** and two extension tabs **197** and **199** shaped to fit in channel **179**. Two side portions **201** and **203**, are provided in wall **187** together with two slits **205** and **207**. Side portions **201** and **203** extend inwardly beyond tabs **197** and **199** and they are provided with stiffening beads **209** and **211**. A centre stiffening bead **213** may also be provided in wall **187**.

As previously explained handle **185** is secured to connection device **177** in press tools. In the pressing process the side walls **181** and **183** are collapsed to clamp tabs **197** and **199** in channel section **179** with side portions **201** and **203** above the inner edge **215** of the channel. At the same time a stiffening bead **217** is provided in channel section **179** on each side of tabs **197**, **199** as the section is flattened in the dies.

The opening of the container is illustrated in FIG. 17 and is similar to the opening operations previously described. Bend lines for the metal between the edge of channel section **179** and the scored line **173** are shown at **216**.

In FIG. 18 there is shown a container body **219** and a lid **221** made of tinplate or other suitable material. Lid **221** is secured to the container body **219** by means of lock seam **223**. Opening means **225** provided in lid **221** comprises a tearaway element in the form of a central portion or disc **227** with a weakened line in the form of a semi-sheared line **229** and a tab handle secured to it by a connection device **233**.

As shown in FIGS. 18 and 22 the opening means **225** further comprise a buttress **235** at the base of a rim **237** of lid **221** with the semi-sheared line **229** (see FIG. 23) constituting a weakened line bounding disc **227** at the position of a shoulder **239** on the edge of buttress **235**. Material **240** radially outwardly of the semi-sheared line and adjacent thereto is closely overlain and reinforced by buttress **235**. Connection device **233** comprises a wide upwardly directed channel section **241** with inwardly bent side walls **243** and **245** (see FIG. 18) for securing handle **231**. Walls **243** and **245** merge into a channel section **247** which provides a stiffening bead **249**. Bend line **250** for lid material bent downwardly in the initial opening movement later described for most of its length is supported by an edge **316** of a locking ledge **317** adjacent to the semi-sheared line **229**.

The first stage pressing **251** for lid **221** as shown in FIG. 19 is formed in suitable dies. It has an ear formation **253** comprising a slanting wall **255** and a vertical wall **257**. Raised channel section **247** has a more highly raised and widened portion **259** formed essentially parallel to ear formation **253**. Between channel section **247** and ear formation **253** is formed an inverted valley section **261**. The middle portion of pressing **251** has a shallow depression **263** for stiffening the centre of the lid.

In FIG. 20 the second stage pressing **265** formed in suitable dies has the ear formation **253** shown in FIG. 19 flattened to form buttress **267**. In the process valley section **261** shown in FIG. 19 is flattened to provide extra material under vertical wall **257** to facilitate this collapsing under the die pressures. At the same time portion **259** of channel section **247** is reshaped in the dies to provide ear formations **269** and **271** both of which are flattened down at their centre portions to provide clearances **273** and **275** and thus also providing two pairs of engagement means **277**, **279** and **281**, **283** for securing tabs **285** and **287** of handle **231** (see FIGS. 18 and 22). Between the ear formations **269** and **271** is provided a base wall **289**, the ear formations merging into channel **247** at each end of the base wall **289**.

In FIG. 21 tab handle **231** made from tinplate or other suitable material comprises a wall **291** of which one end may be suitably formed as a ring **293** with hemmed edges **295** and **297** providing a finger grip. Handle **231** is also provided with a stiffening bead **299** having a nose portion **301**, a hinged line **303** (shown double dotted) a wiper blade **305** and two oppositely disposed curved fixing tabs **285** and **287**. Slits **307** and **309** are provided each side of bead **299** to allow downward hinging of the nose portion and wiper blade. Slits **308** and **310** are provided to allow the front edges of the fixing tabs to be secured under the locking ledge **317** adjacent to the semi-sheared line **229** (see FIG. 18). Small stiffening beads **311** and **313** may be provided on wall **291**.

Handle **231** is first assembled on lid **221** as shown in FIG. 22 by placing its stiffening bead **299** in clearances **273** and **275** (see FIG. 20) with curved tabs **285** and **287** inserted between engagement means **277**, **279** and **281**, **283** respectively, the assembly being next folded together as shown in FIG. 18 in suitable dies. In the process the ear formations are reshaped to provide locking ledges **317** and **319** with the curved tabs **285** and **287** straightening out as the edges of curved tabs **285** and **287** become trapped under locking ledges **317** and **319**. In this manner the tab handle is positively secured to the lid, the tab connections ensuring that the load when lifting the handle is distributed over a much wider area of the lid than is possible with any form of rivetted or equivalent connection.

The opening device is operated as previously explained, the spade-like nose portion **301** and wiper blade **305** rotating downwardly ahead of the fixing tabs **385**, **387** as the finger grip is lifted causing initial rupture of the weakened line followed by folding down of the segment of the lid between bend line **250** and the arc of weakened line **229** which it intersects. This bending is facilitated by the underlying reverse folded edge **316** which acts as a folding bar and it further separates the material along the arc of the weakened line. Without the wiper blade **305**, that is using only centre bead **299** and nose portion **301**, only a local break through of the segment would be made in tinplate because of the resistance to bending of tinplate (unlike aluminium). It is most desirable in tinplate that the full arc of the weakened line bounding the segment should be broken through otherwise when the handle is pulled to complete the opening of the container by tearing out the tearaway element against the buttress **235**, the remaining portion of the weakened line would not start to tear. The wiper blade **305** having a greater width than the nose portion **301** ensures that a sufficient length of the weakened line is separated as it is rotated downwardly.

A small breakthrough of the weakened line in aluminium might be sufficient to enable subsequent upward tearing of the tearaway element but not in tinplate.

In FIG. 23 is shown the weakened line made by semi-shearing the material adjacent to shoulder **239** of buttress **235**. Semi-sheared line **229** is made in suitable shear tools which under controlled compression partly thins and partly shears through the lid material as shown, in the process forming step **321**. In this way, opening means **225** is pro-

vided with a weakened portion leaving a residual of material 0.004 in. which can be easily severed as the centre portion **227** is pulled out of the lid. A semi-sheared line similar to the line **229** may be used in place of a scored line in any of the embodiments of the invention previously described.

In FIG. 24 a lid made of thin sheet material **323** has a modified connection device **325** for a tab handle **327** comprising a downwardly directed (upwardly formed) channel section or recess **329** with a top wall **331** and the side walls inwardly shaped to provide tab fixing means, having locking ledges **333** and **335** and engagement recesses **337** and **339**. Channel section **329** merges at each end into a smaller channel section **341** which provides a stiffening bead **343**.

In FIG. 25 the lid pressing **345** is reshaped from a protuberance as previously explained to form a channelled recess **347** having a top wall **349** and two side walls **351** and **353**. At the base of the side walls **351** and **353** are provided two ear formations **355** and **357**. Tab handle **327** as shown in FIG. 26 is made of tinplate or other suitable material and has a base wall **359** and a ring handle **361** with hemmed edges. Side walls comprising fixing tabs **363, 365, 367** and **369** are provided on wall **359** and also a stiffening bead **371** with a nose portion **373**. Slits **375** and **377** are provided each side of bead **371**. The front portion of wall **359** provides a wiper blade **379** and a hinge line **381** (shown by dotted lines).

Handle **327** is assembled on the outside of channeled recess **347** with fixing tabs **363, 365, 367** and **369** engaging over channel walls **351** and **353** and the assembly is compressed in suitable dies. In the process ears **355** and **357** are flattened causing walls **351** and **353** to collapse inwardly in the process securely clenching over the handle fixing tabs as shown in FIG. 24.

The opening device is operated as previously explained.

In FIG. 27 an alternative form of connection device for a lid **383** and a handle **385** made of tinplate or other suitable material is shown. It comprises a downwardly directed channelled section or recess **387** having tab fixing means similar to those shown in FIG. 24. The channelled section is positioned in the radial direction on lid **383**. The portion of the channel adjacent to the weakened line (not shown) may have a substantially square end wall to provide a supporting shoulder **389** for the wiper blade **391** of handle **385**. In FIGS. 27 and 29 handle **385** is provided with a top wall **393** having side walls comprising fixing tabs **395** and **397**. A stiffening bead **399** on wall **393** has a nose portion **401** and a hinge line **403** (shown by dotted lines). There is also provided a ring handle **405** as shown. Two slits **407** and **409** are provided each side of the bead **399**.

In FIG. 28 the lid pressing **411** is reshaped from a dome-like protuberance. It comprises a channel section **413** having a top wall **414** side walls **415** and **417**, a front wall **419**, and a curved end wall **421**. At the base of side walls **415** and **417** are provided ear formations **423** and **425**. Handle **385** is assembled on channel section **413** with fixing tabs **395** and **397** engaging side walls **415** and **417** and the assembly is then compressed in suitable dies to provide the connection device as shown in FIG. 27, reverse folds formed by the walls **415, 417** overlying inturned lips formed by the reshaped fixing tabs **395, 397**.

The opening device is operated as previously explained.

It will be understood that the lever action of the tab handle in all the embodiments of the invention shown by the drawings has its fulcrum point beyond the tab fixing device which therefore is not subject to the strains caused by bending the tearaway element through and across fixing devices which hitherto have been used for securing tab handles to lids of containers. The underlying shoulder ensures controlled bending of the portion of the tearaway element between the channelled section and the weakened line as the handle is first lifted and initial separation along the weakened line takes place. The part of the handle engaging said portion of the tearaway element makes extended rather than point contact with the sheet material and so acts as a wiper blade acting on the material against the shoulder which acts as a folding bar.

The connection device can be made in tinplate without the use of any lubricants on the sheet material which is in clear distinction from the manufacture of rivet bosses in aluminium lids previously mentioned in which a wax or lacquer has to be applied to the aluminium prior to the process of forming the rivet.

The invention can be applied to manufacture of other walls of containers besides the lid, whether of circular, oval, rectangular or other shapes. The channel section may be made of a shape to correspond with the edge of the container wall and may thus be made in non-circular forms such as oval or rectangular with preferably rounded corners. The invention may be used with containers formed of materials e.g. glass or earthenware that are different from the materials of the lid.

What I claim and desire to secure by Letters Patent is:

1. In a container wall formed of relatively stiff thin sheet material, opening means for the container comprising a tearaway element in the material of the wall, a weakened line bordering the tearaway element and a handle having a pair of aligned fixing tabs extending transversely to the handle, one on each side thereof, the handle being secured to the tearaway element by a connection device, the connection device being provided by an elongate channeled section formed in the material of the tearaway element and extending adjacent the weakened line, the channeled section having opposed side walls comprising reverse folds in the material providing recesses, the folds overlying the channel and the lengths of the fixing tabs engaged within the recesses and securing the handle to the tearaway element.

2. A container wall according to claim **1** wherein clearances are provided in the opposed side walls of the channelled section to receive a central part of the handle, the reverse folds on each side of the said central part of the handle overlying the fixing tabs.

3. A container wall according to claim **1** wherein the handle on the opening means comprises on each side a part secured in fixed relation to the connection device by one of the fixing tabs and hingedly connected to the fixed part is a rotatable part comprising a finger grip and a front part, the front part rotating downwardly as the finger grip is lifted to cause a portion of the weakened line adjacent the end of the front part to break through.

4. A container wall according to claim **1** wherein the channelled section is in continuous form in the container wall having an inner wall enclosing a part of the tearaway element, part of the channelled section providing the opposed side walls and the remainder, merging with said side walls, comprising a bead, the bead providing strengthening and stiffening for the wall.

5. A container wall according to claim **4** in the form of a circular lid wherein the cannelled section is annular and concentric with both the edge of the lid and the weakened line which is formed inwardly of and parallel to the edge of the lid.

6. A container wall according to claim **1** wherein the elongate channelled section is in the form of a closed figure having substantially parallel side walls joined by curved end walls, the fixing tabs being located within the channelled section and the parts of the reverse folds in the side walls which overlie the fixing tabs being inwardly directed towards each other.

7. A container wall according to claim **6** wherein at least a part of the weakened line bordering the tearaway element has an arcuate shape and the channelled section is chordal thereto.

8. A container wall according to claim **6** wherein the

weakened line is bordered on the side opposite from the tearaway element by a buttress overlying and in contact with the material of the wall on said side, an edge of the buttress immediately adjacent the weakened line providing a shoulder to assist tearing action of the material along the weakened line as an upward pull is applied to the handle.

9. A container wall according to claim **6** made from tinplate.

10. A container wall according to claim **6** made from aluminum sheet.

11. A container wall according to claim **3** wherein the front part of the handle has a generally spade-like shape comprising a nose portion flanked by wiperblade portions to cause the initial rupture of the weakened line and to bend a portion of the tearaway element downwardly to sever a further length of the weakened line.

12. A container wall according to claim **11** wherein the hinging of the handle takes place along an edge of the channelled section near to the weakened line.

13. A container wall according to claim **12** wherein the said edge of the channelled section is provided by a part of one of the said reversed folds the part underlying the said portion of the tearaway element engaged by the front part of the handle.

14. In a container wall formed of relatively stiff thin sheet metal, opening means for the container comprising a tearaway element in the material of the wall, a weakened line bordering the tearaway element and a handle a pair of aligned fixing tabs extending transversely to the handle, one on each side thereof, the handle being secured to the tearaway element by a connection device, the connection device being provided by an elongate

channelled section extending adjacent the weakened line, the connection device being formed by steps including forming an upstanding elongate protuberance in the metal in the position desired for the channelled section, reshaping the protuberance to form two triangular shaped ears and flattening the ears inwardly to form opposed reverse folds comprising side walls of the elongate channelled section the reverse folds overlying the lengths of the fixing tabs of the handle and securing the handle to the tearaway element.

15. A container wall according to claim **14** wherein the upstanding elongate protuberance is of substantially curved cross-section and in continuous form round the perimeter of the wall, a portion of the protuberance being of deeper section, the protuberance being formed in such a manner that in forming dies the metal is freely drawn inwardly into the curvature of the cross-section from the periphery of the metal, said deeper section being reshaped to form the two triangular shaped ears.

16. A container wall according to claim **15** made from a circular sheet metal blank wherein the upstanding elongate protuberance is made circular and concentric with the edge of the blank, and when the portion of deeper section is reshaped, the remainder of the protuberance provides a stiffening bead.

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