Dec. 1, 1970 J. HENCHERT 3,543,391

METHOD OF PRE-FORMING AND ATTACHING METAL PULL TAB METAL CAN END RIVET FORMATION

Original Filed Nov. 1, 1963

FIG. 1

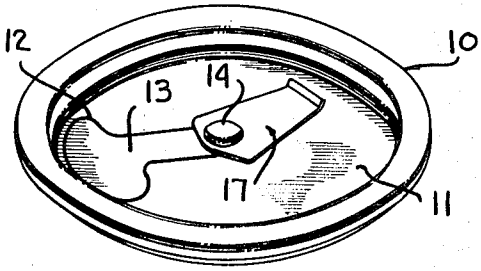


FIG. 2

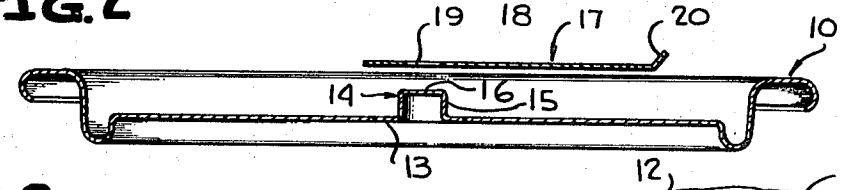


FIG. 3

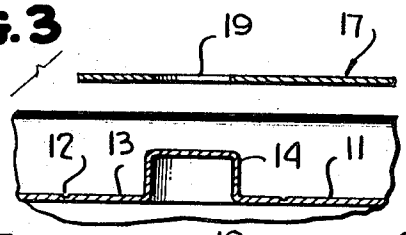


FIG. 4

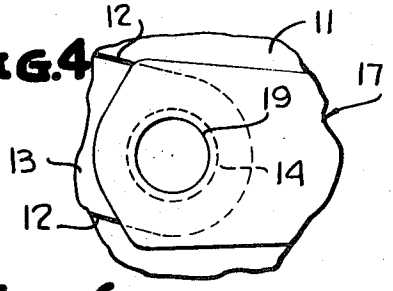


FIG. 5

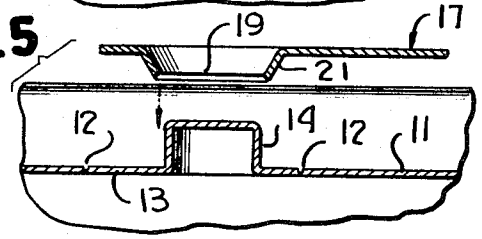


FIG. 6

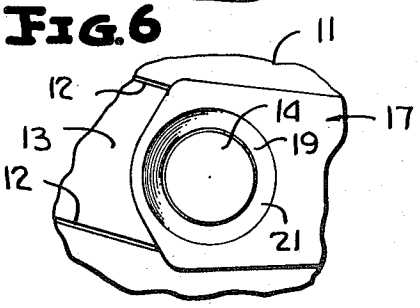


FIG. 7

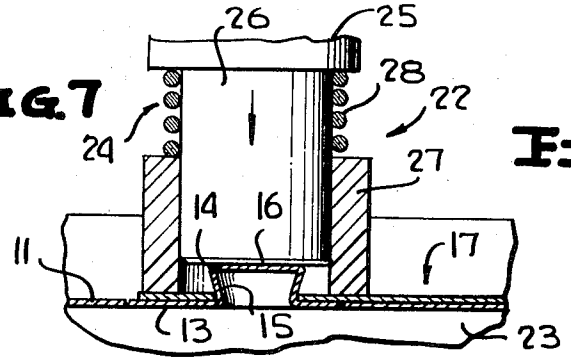


FIG. 9

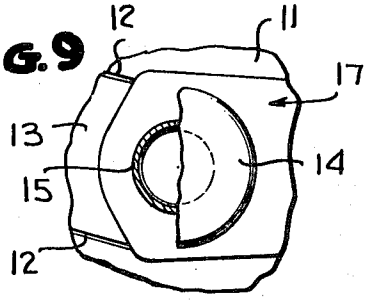
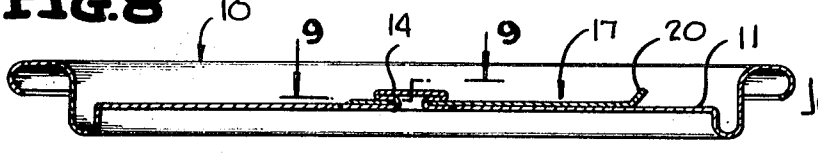


FIG. 8



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METHOD OF PRE-FORMING AND ATTACHING METAL PULL TAB METAL CAN END RIVET FORMATION

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Original application Nov. 1, 1963, Ser. No. 320,763, now Patent No. 3,416,221, dated Dec. 17, 1968. Divided and this application Aug. 21, 1968, Ser. No. 754,215

Int. Cl. B21d 39/00

U.S. Cl. 29—509 3 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a method of securing a pull tab to a removable panel portion of a container wherein the removable panel portion is provided with the integral rivet. The pull tab is provided with an aperture therein of a diameter less than the diameter of the base of the rivet, after which the pull tab is flared about the opening therein so that the metal is stressed and the opening is increased to a diameter to receive the rivet. The pull tab is then seated down on the container panel and the flared portion thereof is flattened with the opening therein again reducing in diameter and the pull tab tightly squeezing the base of the rivet so as to inwardly stake the rivet, thus facilitating the final staking or crimping of the rivet to secure the pull tab in place.

This application is a division of my application Ser. No. 320,763, filed Nov. 1, 1963, now Pat. No. 3,416,221.

This invention relates in general to new and useful improvements in methods of making easy opening containers, and more particularly relates to a novel method of making a connection between a metal pull tab and a tear strip portion of a can end.

At the present time containers are being provided with easy opening ends which have portions thereof defined by tear strips which are removable. In order to facilitate the attachment of pull tabs to the tear strips without perforating the can ends, the tear strips are provided with integral rivets which are utilized to secure the pull tabs to the tear strips. However, difficulties have been encountered in the utilization of such rivets in that there is not available sufficient metal for the rivets to sufficiently hold the pull tabs against any accidental removal from the tear strips during the opening of the cans. This invention relates to a novel manner of securing a pull tab to a tear strip utilizing an integral rivet wherein the pull tab is securely attached to the tear strip by means of the rivet.

At the present time a tubular rivet is formed and the pull tab is provided with a sufficiently large opening to be easily positioned over the rivet, after which the rivet is upset or deformed so as to flow outwardly over the pull tab around the opening therein. There is no gripping action of the pull tab on the rivet and the rivet functions solely to clamp the pull tab in place.

In accordance with this invention, it is proposed to provide a novel method of attaching a pull tab to a tear strip utilizing an integral rivet on the tear strip wherein prior to the crimping of the tubular rivet over the pull tab, the pull tab is caused to tightly grip the base of the rivet, thereby greatly enhancing the connection between the pull tab and the tear strip.

Another object of this invention is to provide a novel connection between a pull tab and a tear strip wherein the rivet receiving opening in the pull tab is temporarily enlarged by means of a flanging operation, after which

the pull tab is telescoped over the rivet and then is reformed to its flat state so as to reduce the size of the opening therein with the result that the metal of the pull tab defining the opening therein will close around the rivet and effect a tight gripping thereof.

Another object of this invention is to provide a novel method of assembling a pull tab on a can end wherein an integral rivet is utilized to secure the pull tab in place, the method including the initial forming of the pull tab with an opening of a size too small to receive the rivet, and wherein in subsequent operations, the opening is temporarily enlarged to receive the rivet and is later reduced so that the pull tab firmly grips the rivet at the base thereof and effects a prestaking operation on the rivet whereby a final staking of the rivet is facilitated and the pull tab is secured to the can end both by the clamping action of the rivet and by the gripping of the rivet by the pull tab.

A still further object of this invention is to provide a novel method of securely achoring a pull tab on a can end by means of an integral rivet, the method including the forming of a pull tab having an opening therein of a size insufficient to receive the rivet, flanging the pull tab around the opening to temporarily increase the diameter of the opening in the pull tab to a dimension wherein the rivet is receivable therethrough and after the pull tab has been positioned on the rivet, flattening out the flange on the pull tab wherein the diameter of the opening in the pull tab is reduced back to its previous size and the metal of the pull tab surrounding the opening firmly grips the base of the rivet and effects a necking down thereof wherein the rivet assumes an upwardly flared cross section which facilitates the final staking of the rivet over the pull tab.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings:

In the drawings:

FIG. 1 is a top perspective view of a can end formed in accordance with this invention.

FIG. 2 is a vertical sectional view on a large scale through the can end of FIG. 1 prior to the attachment of the pull tab thereto.

FIG. 3 is an enlarged fragmentary sectional view showing the relative sizes of the rivet and the opening in the pull tab.

FIG. 4 is an enlarged fragmentary plan view wherein the relative dimensions of the opening and the rivet are clearly shown.

FIG. 5 is an enlarged fragmentary sectional view similar to FIG. 3 and shows the pull tab after the flanging thereof surrounding the opening to effect an increase in diameter in the opening.

FIG. 6 is a plan view of the pull tab and rivet arrangement of FIG. 5 and shows the relative dimensions of the opening and the rivet.

FIG. 7 is a schematic view with parts in section of an apparatus which first re-forms the pull tab and then stakes the rivet.

FIG. 8 is a vertical sectional view similar to FIG. 2 and shows the assembled pull tab and can end.

FIG. 9 is an enlarged fragmentary plan view with parts broken away and shown in section of the assembled can end and pull tab.

Referring now to the drawing in detail, it will be seen that there is illustrated in FIGS. 1 and 2 a can end which, with the exception of being particularly formed to be of the easy opening type, is a conventional type of can end. This can end is generally referred to by the

numeral **10** and as far as this invention is concerned, the can end **10** includes an end panel **11** which has been formed with a score line **12** defining a tear strip **13** which is particularly shaped for the dispensing of liquids therefrom. The tear strip **13** is provided adjacent one end thereof, the starting end of the tear strip, with a tubular rivet **14**, as is best shown in FIG. 2. The tubular rivet **14** includes an upstanding cylindrical wall **15** and an end wall **16**.

In accordance with this invention, it is proposed to utilize the tubular rivet **14** in the securement of a pull tab, generally referred to by the numeral **17**, to the tear strip **13** to facilitate the removal of the tear strip **13**. The pull tab **17** is illustrated as including a flat body portion **18** having a rivet receiving opening **19** therethrough adjacent one end thereof, and the opposite end of the body **18** terminates in an upstanding flange **20** which defines a grip element to facilitate the lifting of the pull tab. It is to be understood that in accordance with this invention, the structural details of the pull tab **17** may be varied.

It will be apparent from FIGS. 3 and 4 that the diameter of the rivet receiving opening **19** is such that when the pull tab **17** is initially formed, it is not receivable over the rivet **14**. It has been found that when the rivet receiving opening of a pull tab is formed of sufficient size to readily receive a rivet, a relatively loose fit results between the rivet and the pull tab. After the rivet is crimped or headed to secure the pull tab to the tear strip, the pull tab is secured in place solely by the head of the rivet. A relatively large force is required to initiate tearing the tear strip **13** from the end panel **11** and when this force is applied by lifting the free end of the pull tab, considerable pressure is concentrated against the head of the rivet. Should the head on the rivet be improperly formed or weakened during formation, the pull tab may be torn from the rivet prior to the actual opening of the can of which the can end **10** is a part, thereby defeating its purpose.

In accordance with this invention it is proposed to obtain a mechanical interlock between the pull tab **17** and the rivet **14** independent of and in addition to the crimping or heading of the rivet **14**. In order to accomplish this, the rivet receiving opening, as mentioned above, is initially sized so that it will not receive the rivet **14**. In order to assemble the pull tab **17** on the rivet **14**, the portion of the pull tab **17** surrounding the opening **19** is flared downwardly in the manner shown in FIG. 5. This downward flaring of the pull tab **17** results in the formation of a downwardly flaring flange **21** and an increase in the diameter of the rivet receiving opening **19**. It will be apparent from FIGS. 5 and 6 that the diameter of the rivet receiving opening **19** is thus increased in size to readily receive the rivet **14**.

The pull tab **17**, being temporarily deformed in the manner shown in FIGS. 5 and 6, then may be loosely assembled over the rivet **14**. Reforming or flattening the pull tab **17** back to its original shape shown in FIGS. 2 and 3 results in straightening or removing the flange **20** and decreasing the diameter of or resizing the opening **19** to approximately that shown in FIG. 3. Since the diameter of the opening **19** is less than that of the rivet **14**, it will be readily apparent that flattening the pull tab **17** will compress and construct or neck in the cylindrical wall **15** of the rivet formation at the base thereof in the manner clearly shown in FIG. 7. This necking in or reforming of the rivet **14** at the base thereof by the reformation of the pull tab causes the previous cylindrical wall **15** to have an upwardly flared configuration, such as would result from a prestaking operation on the rivet. The rivet **14** is then finally crimped over or headed to firmly clamp the pull tab **17** against the end panel **11**, as is clearly shown in FIGS. 8 and 9.

It will be readily apparent from the foregoing description that flattening or reforming the pull tab **17** to the position shown in FIG. 7, forms a strong positive mechanical connection between the pull tab and the side wall of the rivet **14**. In certain instances this connection may be sufficient for removing the tear strip **13** by the pull tab **17** without any further deforming operation on the rivet **14** to provide it with a head. However, the primary purpose of this invention is to provide a dual connection for attaching the pull tab to the rivet. It will be apparent that by providing a mechanical connection between the pull tab and the rivet independent of and supplemental to the clamping action of the rivet on the pull tab, the possibility of pulling the pull tab off the rivet during the opening operation on the can end will be greatly decreased or eliminated.

Reference is once again made to FIG. 7 wherein there is shown apparatus for effecting both the re-forming of the pull tab and the crimping or heading of the rivet. This apparatus, which is generally referred to by the numeral **22**, includes a back-up member **23** on which the end panel **11** is seated with the rivet **14** overlying the back-up member **23**. It is unnecessary for the back-up member **23** to have a portion projecting into the rivet **14** because when the pull tab **17** is re-formed, it will firmly grip the base end of the rivet **14** and serve to support the rivet during the crimping or final staking of the rivet. However, if desired, the back-up member **23** could be provided with a short projection which would be received within the rivet **14**.

The apparatus **22** includes a punch unit which is generally referred to by the numeral **24**. The punch unit **24** includes a reciprocating head **25** which may be a part of a conventional punch press. The head **25** carries an inner punch member **26** on which there is mounted for relative sliding movement an outer punch member **27**. The outer punch member **27** is tubular and is of a diameter to clear the rivet **14** when it is in its finally crimped or staked position of FIG. 8. The outer punch member **27** is secured on the inner punch member **26** for limited travel in a conventional manner not shown. The outer punch member **27** is resiliently retained in an outer position with respect to the inner punch member **26** by means of a coil spring **28** which encircles the inner punch member **26** and bears against the head **25** and the outer punch member **27**.

In the operation of the punch unit **24**, the head **25** is brought down in a normal punching movement with the outer punch member **27** engaging the pull tab **17** around the rivet **14**. The pressure exerted by the outer punch member on the pull tab **17** is sufficient to re-form the pull tab **17** by the flattening of the flange **21**. As has been stated above, the flattening of the flange **21** results in the reduction of the diameter of the rivet receiving opening **19** so that the metal of the pull tab **17** surrounding the opening **19** will tightly grip the rivet **14** at the base thereof and form a mechanical connection therewith. It will be readily apparent that the relative diameters of the rivet **14** and the rivet receiving opening **19** is such that a definite constriction of the rivet **14** at the base thereof results and the rivet assumes a prestaked configuration. Further downward movement of the head **25** results in the compressing of the spring **28** while the punch member **26** continues to move downwardly. Since the rivet **14** is already initially staked by the necking in operation, and the body **15** of the rivet is upwardly and outwardly flared, a downward force on the end wall **16** of the rivet by the inner punch member **26** results in the crimping or staking of the rivet **14** in the manner clearly shown in FIG. 8. The mechanical interlock between the rivet **14** and the pull tab **17** is now complete.

From the foregoing description it will be evident that the invention provides for a better distribution of the force applied to the rivet formation by the pull tab when lifted so that the entire force is not concentrated on the head of the rivet.

Dividing the force between the constriction and head formations of the rivet provides a dual connection that reduces the force applied to the head portion of the rivet. This contributes to avoiding separation of the pull tab

from the rivet during the lifting operation that might otherwise occur.

It is to be understood that the relative proportions of the can end, the rivet and the pull tab have been exaggerated so as to clearly illustrate the invention and the manner in which the pull tab and rivet are deformed.

Although only a preferred embodiment of the invention has been specifically illustrated and described herein, it is to be understood that minor variations may be made in the method of this invention without departing from the spirit and scope thereof.

I claim:

1. A method of securing a pull tab to a tear strip of a container member, said method comprising the steps of shaping the container member to have an integral tubular rivet having a free end and a base end connected to the container member, forming an opening in the pull tab of a diameter less than the diameter of the rivet base end, deforming the pull tab around the opening therein to define a flared flange surrounding the opening with the opening being offset from the original position thereof and the diameter of the opening increased to receive the rivet free end, positioning the pull tab on the rivet, flattening the flange of the pull tab to reduce the diameter of the pull tab opening with the pull tab gripping the rivet base end and effecting a necking in of the rivet at

the base end thereof, and then crimping the rivet free end over the pull tab around the pull tab opening to further and securely attach the pull tab to the container member.

2. The method of claim 1 wherein said tubular rivet is cylindrical and the diameter of the increased opening is sufficient to permit the complete passage of the rivet through the enlarged opening in the pull tab.

3. The method of claim 1 wherein the necking of the rivet at the base thereof is such whereby the rivet assumes a partially staked configuration prior to the crimping of the rivet free end of the pull tab.

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CHARLIE T. MOON, Primary Examiner

U.S. Cl. X.R.

29—520, 522; 113—121; 220—54