

[54] **LOCK-DOWN FOR A PULL TAB ON A CONTAINER WALL**

[75] Inventors: **George L. Smith, Jr., Vandergrift; Hans H. Diekhoff, Greensburg, both of Pa.**

[73] Assignee: **Aluminum Company of America, Pittsburgh, Pa.**

[22] Filed: **Apr. 5, 1973**

[21] Appl. No.: **348,155**

Related U.S. Application Data

[62] Division of Ser. No. 212,562, Dec. 27, 1971, abandoned.

[52] U.S. Cl. **113/121 C**

[51] Int. Cl. **B21d 51/26**

[58] Field of Search **113/121 C, 15 R, 15 A; 220/54, 48**

[56] References Cited

UNITED STATES PATENTS

3,381,848	5/1968	Brown.....	220/54
3,494,500	2/1970	Foster.....	220/54
3,618,815	11/1971	Heffner et al.....	220/48

3,744,666	7/1973	Heffner.....	220/54
3,749,275	7/1973	Smith et al.....	220/54
3,750,606	8/1973	Schultz.....	113/121 C
3,780,902	12/1973	Holz.....	220/54

Primary Examiner—C. W. Lanham

Assistant Examiner—M. J. Keenan

Attorney, Agent, or Firm—David W. Brownlee

[57] ABSTRACT

An easy opening device is provided which includes a score line in the container wall defining an opening flap adjacent an edge of the container wall and a tab having a nose end overlying the opening flap and affixed thereto and a handle end toward the opposite edge of the container wall with a line of weakening in the tab between its nose and handle ends for depressing the handle end of the tab to a nonobstructing position on the container wall, and which further includes an upwardly embossed hook in the container wall for engagement over an edge portion of the handle end of the tab to restrain it in a non-obstructing position on the container wall. A method of forming an embossed hook for engaging a tab is also provided.

2 Claims, 14 Drawing Figures

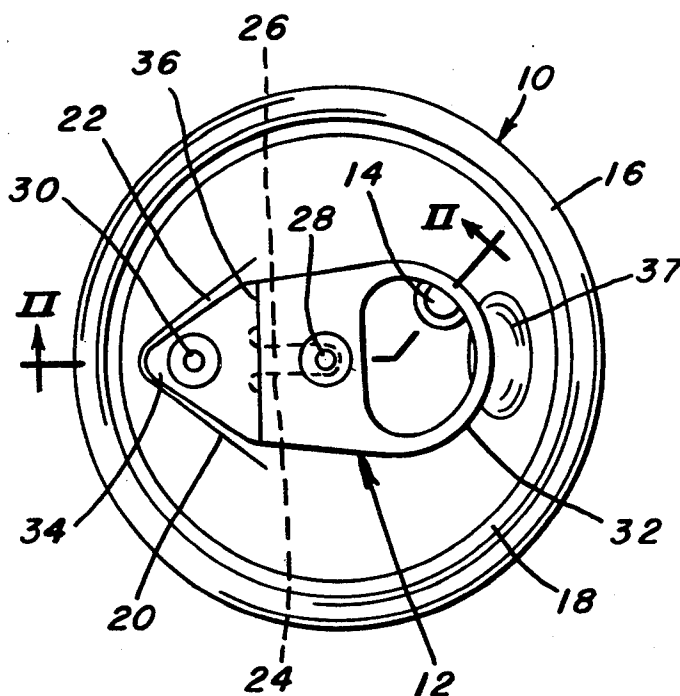


FIG. 1.

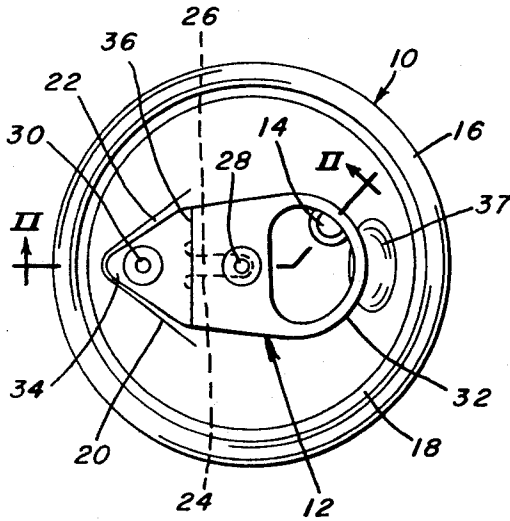


FIG. 3.

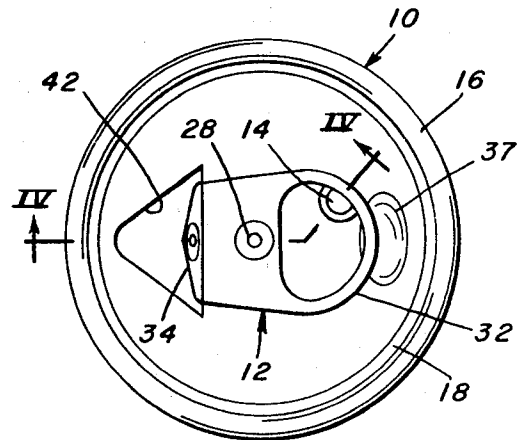


FIG. 2.

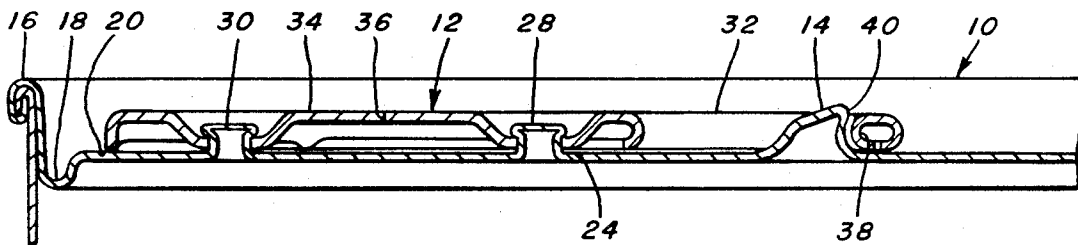


FIG. 4.

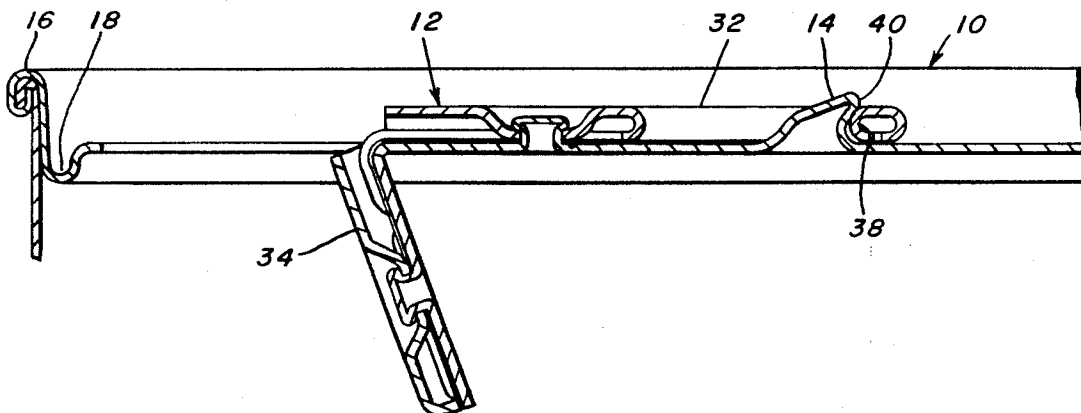


FIG. 5.

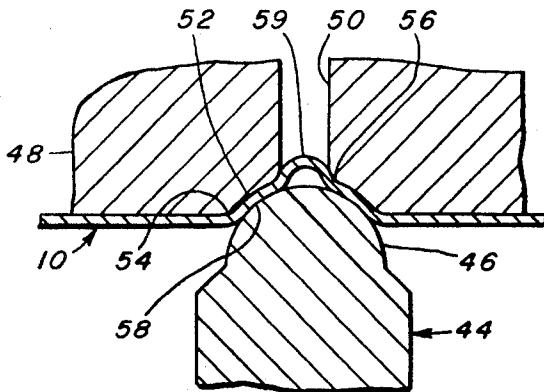


FIG. 6.

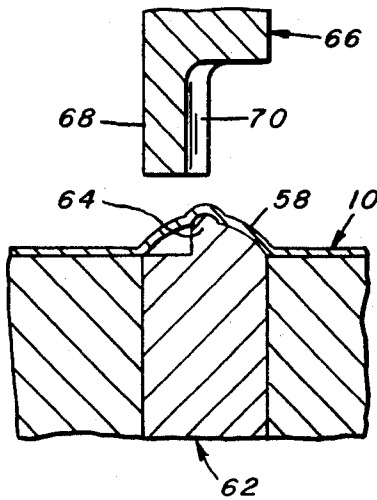


FIG. 10.

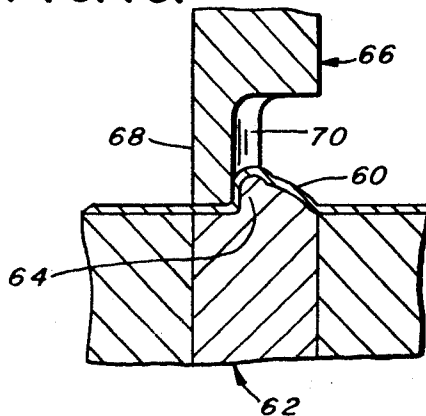


FIG. 7.

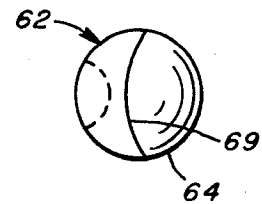


FIG. 8.

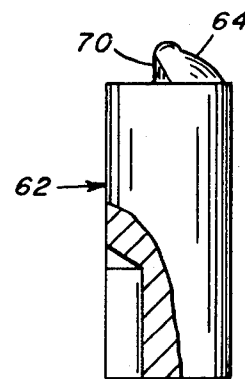


FIG. 9.

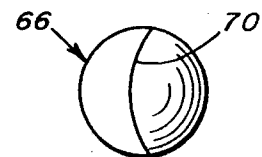


FIG. 11.

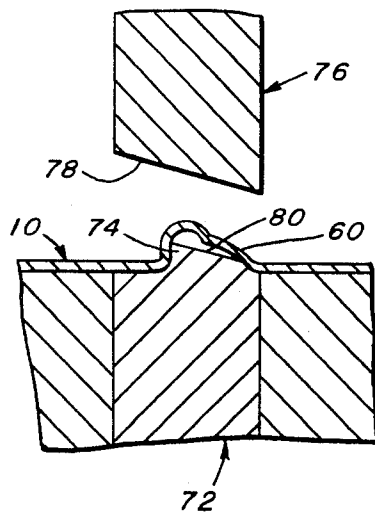


FIG. 14.

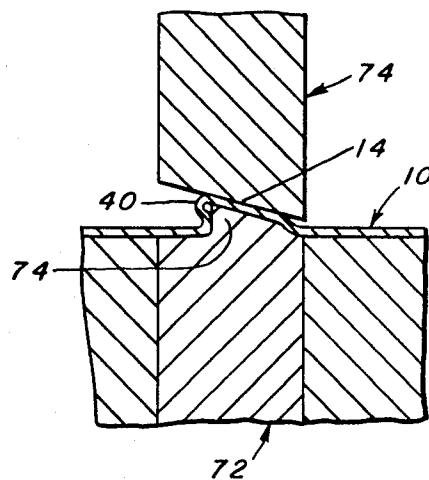


FIG. 12.

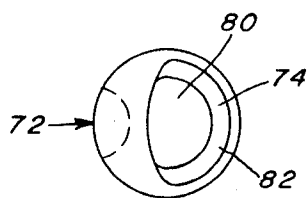
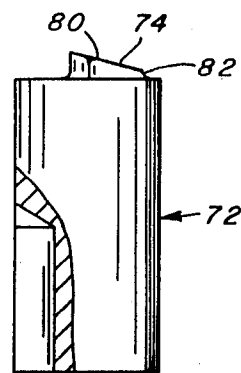


FIG. 13.



LOCK-DOWN FOR A PULL TAB ON A CONTAINER WALL

This is a division of application Ser. No. 212,562, filed Dec. 27, 1971, now abandoned.

BACKGROUND OF THE INVENTION

It is known to provide easy opening devices with pull tabs thereon which remain attached to a container wall after opening in order to reduce litter problems which may be caused by small tabs which are sometimes carelessly discarded. For example, U.S. Pat. No. 3,618,815 illustrates and describes an easy opening device comprising a V-shaped opening flap in a container wall and a tab attached to the opening flap for depressing the flap into a container on which the easy opening device is attached. The tab on this easy opening device has a nose end and a handle end with a weakening line therebetween so that, after opening, the handle end of the tab can be depressed to a non-obstructing position on a container wall without closing the pouring orifice which has been formed. U.S. Pat. No. 3,618,815 discloses no means for retaining the handle end of the tab in a non-obstructing position on a container end after opening. Means for retaining a non-severable tab in a non-obstructing position on a container are disclosed in a number of U.S. patents including Pat. Nos. 3,269,586; 3,386,613; 3,420,398 and 3,442,416.

SUMMARY OF THE INVENTION

This invention provides an improvement upon an easy opening device with a non-removable tab such as that which is illustrated and described in U.S. Pat. No. 3,618,815, which improvement comprises means on the container end wall for engaging the handle end of a tab and restraining it in a non-obstructing position on a container wall. In a preferred embodiment of the invention, such means comprises an embossed hook configuration which is engageable over an edge of the handle end of a tab. A method of forming such an embossed hook is also provided.

Accordingly, an object of the invention is to provide an easy opening device having a tab which remains on a container end wall after opening and means on the container wall for restraining the handle end of the tab in a non-obstructing position.

Another object of the invention is to provide a non-removable easy opening device which includes an embossed hook means in a container wall for engaging over an edge portion of the handle end of a tab to hold such handle end in a non-obstructing position on the container wall.

Another object of the invention is to provide a method of forming an embossed hook means in a container wall for engaging over an edge portion of a tab to hold the tab in non-obstructing position on the container wall.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be more fully understood and appreciated with reference to the following description and the drawings appended hereto wherein:

FIG. 1 is a top plan view of a container wall of the invention with an embossed hook means thereon for engaging the handle end of a tab on the container wall;

FIG. 2 is a cross-sectional view taken along line II—II of FIG. 1;

FIG. 3 is a top plan view of the container wall of FIGS. 1 and 2 after opening;

FIG. 4 is a cross-sectional view taken along lines IV—IV of FIG. 3;

FIG. 5 is a fragmentary cross-sectional view illustrating a first step in forming an embossed hook means;

FIG. 6 is a fragmentary cross-sectional view illustrating tools and a container wall preparatory to a second step in forming an embossed hook means;

FIG. 7 is a plan view of the punch of FIG. 6;

FIG. 8 is a side view of the punch of FIG. 6;

FIG. 9 is an end view of the die of FIG. 6;

FIG. 10 is a fragmentary cross-section similar to FIG. 6 subsequent to the second forming step;

FIG. 11 is a fragmentary cross-sectional view illustrating tools and a container preparatory to a third step in forming an embossed hook means;

FIG. 12 is an end view of the punch of FIG. 11;

FIG. 13 is a side view of the punch of FIG. 11; and

FIG. 14 is a fragmentary cross-sectional view similar to FIG. 11 subsequent to the third forming step.

DESCRIPTION OF A PREFERRED EMBODIMENT AND MODE OF MAKING

A preferred embodiment of a container end wall 10 with a non-removable pull tab 12 affixed thereto and a lock-down hook 14 for restraining the tab in a non-obstructing position on the container wall after opening is illustrated in FIGS. 1 and 2. Container wall 10 is preferably made of aluminum or an alloy thereof and has a peripheral seam 16 therearound which may be joined to a container body by conventional methods. A peripheral groove 18 may also be provided adjacent to and inwardly of seam 16 to strengthen end wall 10 against reversal or outward doming.

To provide a pouring orifice in a container wall 10, a V-shaped score line 20 may be formed in the container wall to define a flap 22 which can be depressed into a can on which the container wall is affixed. Opening flap 22 is preferably located near the periphery of container wall 10 with the apex of score 20 toward the edge of the wall and with the ends of the score diverging approximately 60° from such apex. An anti-fracture score, not shown, may also be provided in opening flap 22 adjacent and parallel to score 20 to relieve the stresses in the residual metal in the score and thereby substantially eliminate any stress cracks from forming in the score.

Container wall 10 may further include a U-shaped score 24 defining a tear strip 26 which has a starting end in a central portion of the container wall and a terminal unscored end toward flap 22. Tab 12 is affixed to tear strip 26 and to opening flap 22 by means of rivet attachments 28 and 30 respectively. Scores and tabs exemplary of those which can be used are more fully illustrated and described in application Ser. No. 212,561, filed concurrently herewith on Dec. 27, 1971, and now abandoned. As described in that application, tab 12 may include a handle end 32 and a nose end 34 and may have a weakening line 36 in its upper wall between its nose and handle ends to facilitate depressing the handle end to a non-obstructing position on the container wall after opening. End wall 10 may also have a finger well 37 formed therein for facilitating initial lifting of a tab from the end wall as is well known in the art.

To form a pouring orifice in a container wall 10, tab 12 is first lifted to rupture score line 24 around tear strip 26 and initiate rupture of score 20 around flap 22. Continued lifting of tab 12 plunges opening flap 22 downwardly into a container on which container wall 10 is affixed. Handle end 32 of tab 12 is preferably pushed against seam 16 on end wall 10 at the end of the lifting step to insure that flap 22 is fully opened and to facilitate lockdown of the handle end after opening as will be explained later. During such lifting, tab 12 remains substantially rigid since weakening line 36 is in the upper wall of the tab and does not effect the strength of the tab. After tab 12 has been manipulated to form a pouring orifice 42 in wall 10, the last step is to depress handle end 32 of the tab downwardly into a non-obstructing position against the upper surface of container wall 10. Weakening line 36 in the upper surface of tab 12 permits bending of the tab between its handle end 32 and nose end 34 in this direction so that when the handle end is depressed against the container wall, the nose end remains in the container. This leaves a substantially open pouring orifice through which the contents of the container can be emptied. Such a pouring orifice 42 is illustrated in FIG. 3.

It is a feature of the invention that means is provided for retaining handle end 32 of tab 12 in a depressed non-obstructing position on container wall 10 after opening has been effected. The container end illustrated in U.S. Pat. No. 3,618,815 included no such retaining means, and the handle end of the tab in that structure could become raised above the surface of the container wall and could interfere with drinking or pouring from the container. When such a raised handle portion of a tab interferes with drinking from the container, the consumer may break the tab at the weakening line between its nose end and handle end and discard the handle end of the tab to cause a litter problem. The purpose of a non-removable tab could therefore be defeated by a tab which has a handle portion which can spring back to an obstructing position on a container wall. This invention substantially eliminates any problems with such a raised handle end of a tab after opening.

In its preferred form, means for locking down handle end 32 of tab 12 after opening is provided in the form of an upwardly embossed hook 14 formed in end wall 10 within the large finger aperture in the tab so that the hook is engageable over an edge portion of the tab around the finger aperture. Lock-down hook 14 is preferably engageable with the edge of tab 12 around the aperture in handle end 32 thereof offset from the longitudinal axis of the tab. In the embodiment selected for illustration, hook 14 is located on a radial line extending from approximately the center of the finger aperture at approximately a 45° angle to the longitudinal axis of tab 12 toward the outer end of the tab. This location may be on either side of the longitudinal axis of tab 12, although in the container end 10 selected for illustration it is located between 10 and 11 o'clock on the periphery of the finger aperture when the tab oriented as illustrated with its nose down or toward the bottom of FIG. 3. As will be explained, location of a lock-down hook 14 offset from the longitudinal axis of tab 12 facilitates engagement of the hook with the edge of the tab even if there are small variations in the dimensions of an end, and also avoids possible interfer-

ence of the lock-down with a tab 12 which could make it difficult to affix the tab on end wall 10.

Referring to FIGS. 2 and 4, it is seen that the edge of tab 12 around the finger aperture in its handle end 32 is curled in the form of a bead 38. It is also seen that lock-down hook 14 has an outwardly projecting rounded nose 40 on or near its top. As illustrated in FIG. 2, nose 40 and curled bead 38 are preferably not to be in contact prior to opening of a pouring orifice in container end 10 and do not contact during opening. If nose 40 engaged bead 38 during opening, hook 14 could interfere with lifting of handle end 32 of tab 12 which could make opening difficult.

After a pouring orifice is formed in container end 10 and handle end 32 of the tab 12 is depressed to a non-obstructing position as illustrated in FIGS. 3 and 4. When handle end 32 of tab 12 is so depressed, the handle end will be disposed a short distance further toward the pouring orifice than it was before opening. This means that nose 40 on lock-down hook 14 will engage curled bead 38 on tab 12 when the handle end is depressed against the container end to hold the handle end against the container end as illustrated in these Figs. Handle end 32 of tab 12 has been moved axially toward pouring orifice 42 because the handle end is attached to nose end 34 which is plunged into a container. As nose end 34 of a tab 12 is plunged into a container, the tab is rotated about a fulcrum located approximately in the plane of the container end, and this pulls the tab forward on the end. When handle end 32 is then depressed to a nonobstructing position on the end, its attachment to nose end 34 of the tab, which remains in the can, holds the handle end of the tab in a slightly forward position with respect to its original position on the ends. Accordingly, curled edge 38 around the finger aperture in tab 12 will now contact nose 40 on lock-down hook 14. Since both nose 40 and bead 38 are rounded, depression of handle end 32 against the lock-down will cause the rounded edge of the bead to slide over the rounded edge of the nose and catch under the nose as illustrated in FIG. 4.

Pushing handle end 32 of tab 12 against seam 16 during opening, as described above, helps to insure that lockdown hook 14 will hold the handle end of the tab against container wall 10 after opening. This pushes flap 22 further into a container and pulls tab 12 further forward on container wall 10 to provide positive engagement between the hook and curled bead 38 when the tab is depressed against the container wall. Such positive engagement prevents spring back in tab 12 from lifting its handle end 32 off end wall 10 and interfering with emptying of a container.

As discussed above, the location of lock-down hook 14 so as to engage edge 38 slightly offset from the longitudinal axis of tab 12 toward the outer end of the tab also facilitates locking engagement of the hook on the tab. If there is substantial interference between nose 40 and curled bead 38 when handle end 32 is depressed against container end 10, the handle end of the tab can twist slightly in its plane so that its longitudinal axis is rotated toward lock-down hook 14. This moves the finger aperture in tab 12 so that it extends further outwardly with respect to hook 14 to reduce the interference between head 38 and nose 40 and permit the bead to slide over the nose and engage thereunder. If lock-down hook 14 were located on the longitudinal axis of tab 24, the hook would engage the edge of the finger

aperture at its farthest extent, and rotation of the tab would not facilitate the sliding of bead 38 over nose 40. Instead, in instances of substantial interference between the hook and the curled edge around the finger aperture, it might be necessary to pull the tab rearward so that the bead could slide over the lock down. Location of lock-down hook 14 offset from the longitudinal axis of tab 12 also facilitates location of finger well 37 under the end of the tab.

From the above, it is also seen that it is preferable to locate hook 14 so that it is engageable with curled bead 38 on the one-half of the periphery of the finger aperture toward the outer end of the tab. Since tab 12 is moved toward the pouring orifice by the opening mechanics, hook 14 would either interfere with affixation of the tab to end 10 or would not engage the edge of the finger aperture upon opening if the hook were located adjacent bead 38 toward the nose end of the tab.

Turning to FIGS. 5 through 14, a method and tools for forming a lock-down hook of the invention are illustrated. FIG. 5 illustrates a punch 44 with a hemispherical working end 46 which is advanced against a container end 10 and against a die 48 with an aperture 50 therein and an annular shoulder 52 around the aperture. Shoulder 52 preferably has a radius of curvature approximately corresponding to that of the hemispherical end 46 of punch 44 and may have small radii 54 and 56 between the shoulder and the upper surface of the die and the inner surface of the aperture 50 in the die. Advancing punch 44 against die 48 draws metal from container end 10 into aperture 50 and extrudes metal from between hemispherical end 46 on the punch and shoulder 52 to form a bubble 58 in the container end. Extrusion of metal from between punch 44 and die 48 may also form a small protrusion 59 on the end bubble 58 as illustrated in this Fig. Although other tools and methods can be employed for a forming bubble to be reformed into a lockdown hook, the tools and method illustrated in FIG. 5 are preferred since they facilitate the formation of a relatively high bubble which facilitates the forming of such a hook.

FIGS. 6 through 10 illustrate tools and a method for reforming bubble 58 into a boss 60. These tools include a punch 62 with an upwardly extending projection 64 thereon over which a bubble 58 in the end wall 10 is positioned and reformed by means of a die 66 with a nose 68 thereon for co-acting with the projection on the punch. Projection 64 and nose 68 may have parallel curved surfaces 69 and 70 thereon for reforming bubble 58 therebetween. As illustrated in FIG. 10, advancing punch 62 against die 66 reforms bubble 58 over projection 64 on the punch to form a boss 60 having a shape substantially corresponding to the shape of projection 64.

FIGS. 11 through 14 illustrate tools and a method of

reforming boss 60 into a lock-down hook 14. These tools include a punch 72 with an upwardly projecting button 74 thereon over which boss 60 is reformed by means of a die 76 with a substantially flat forming surface 78 thereon. Forming surface 78 and the upper surface 80 of button 74 are substantially parallel and are inclined at an angle of approximately 15° to horizontal. Button 74 on punch 72 has a substantially oval-horizontal configuration so that boss 60 will fit thereover, and has an inwardly and upwardly sloping outer surface 82 around approximately two-thirds of its upper surface 80 (FIGS. 12 and 13). Boss 60 on end wall 10 is higher than is button 74 on punch 72 so that excess metal is provided to be buckled outwardly to form nose 40 on lockdown hook 14 as illustrated in FIG. 14. Nose 40 provides a hook for engaging an edge of a tab for locking the handle end of the tab in a non-obstructing position on a container end as discussed above.

It is therefore seen that an improved easy opening device is provided which has a non-serverable tab thereon and which includes a lock-down hook formed in the container wall for engaging an edge of the tab to hold it in a non-obstructing position on the container end. Although a preferred embodiment and method of making the same are illustrated and described, it will be apparent to those skilled in the art that numerous variations can be made in the details of the preferred embodiment and mode of making the same without departing from the scope of the appended claims.

What is claimed is:

1. A method for forming an embossed hook in a container wall for retaining a tab thereon comprising the steps of

forming a hemispherically-shaped bubble with a hollow protrusion on the projecting end thereof in a sheet metal container wall,

reforming the bubble into a boss having a substantially vertical side wall around approximately one-half of its perimeter, an end wall sloping toward the container wall from the top of said side wall, and an upwardly projecting hollow protrusion near the top of the end wall adjacent the side wall of the boss; and

reforming the boss into a hook for engagement over an edge of a tab by partially collapsing the boss and reforming the top of the side wall and the protrusion outward to form a rounded nose on the hook.

2. A method as set forth in claim 1 in which the bubble is formed by drawing metal between a punch with a hemispherical end thereon and an apertured die with an annular shoulder around the aperture, and further extruding metal inwardly into the die aperture from between the end of the punch and the die shoulder.

* * * * *