The present invention relates to apparatus for producing containers or cans having reclosure covers and has particular reference to forming locking lugs on an end seam of a can for holding the reclosure cover in place thereon.

An object of the invention is the provision of apparatus for forming cover locking lugs on the end seam of a can adapted to carry a reclosure cover wherein the end seam is formed with a laterally displaced portion projecting beyond the normal contour of the seam and providing a locking lug for engagement with the cover when the latter is rotated to hold it in place on the can as a reclosure.

Another object is the provision of such an apparatus wherein the locking lugs are formed in the end seam simultaneously with the forming of the seam so that extra steps with their attendant increase in the cost of production are eliminated.

Another object is the provision of such an apparatus wherein locking lugs of any desired shape may be readily and quickly formed on the end seam of a can for locking a reclosure cover or other can part or for drawing such a can part down tightly on a container during relative rotation of the parts, or for many other purposes wherein it is desired to temporarily hold two can parts together.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a perspective sectional view taken through the upper end of a sealed can and its reclosure cover, the can having locking lugs formed in accordance with the steps of the instant method invention;

Fig. 2 is a view similar to Fig. 1, with the reclosure cover removed from the can;

Fig. 3 is a fragmentary plan view of the top of the can and showing the end seam and one of the cover locking lugs;

Fig. 4 is a sectional detail showing a portion of the can and a portion of an end member in assembled position prior to being secured together;

Fig. 5 is a sectional view taken substantially along a plane indicated by the broken line 5—5 in Fig. 2 and showing the finished end seam which secures the end member to the can, with parts broken away;

Fig. 6 is a side view of an apparatus for forming the end seam and the locking lugs in accordance with the steps of the instant method invention, with parts broken away;

Fig. 7 is an enlarged fragmentary plan view taken substantially along a horizontal plane indicated by the line 7—7 in Fig. 6;

Figs. 8 and 9 are enlarged sectional details of portions of the can and the apparatus shown in Fig. 6, with parts broken away and parts in different positions incidental to producing the end seam and the locking lugs; and

Fig. 10 is a part side view and part sectional view of a modified form of the apparatus shown in Fig. 6, with parts broken away.

As a preferred and a modified embodiment of the instant invention the drawings illustrate an apparatus for securing a sheet metal end member A (Figs. 1, 2 and 3) to a sheet metal can body B by an interlocking of flange portions of these can parts in a multiple layer compound lined, double seam C while simultaneously forming circumferentially spaced inwardly projecting locking lugs D on the can for holding in place on the can a reclosure cover E having a corresponding number of outwardly projecting interrupted thread protruberances F.

The can body B preferably is a cylindrical tubular member formed at its upper end with a flange G (Fig. 4). The end member A is adapted to fit within the open end of the body member and for this purpose is formed with a countersunk panel wall or annulus H having a centrally located dispensing opening J. The outer edge of this annulus merges into an upright inner wall section K which engages against the inside surface of the body member when the end member is in place.

The upper edge of the inner wall section K merges into a horizontal flange L which extends outwardly over the flange G of the body member and terminates in a curled edge M. The flange L preferably carries a sealing gasket N of compound or the like material.

In accordance with the invention, the end member A is inserted within the end of the tubular body member B with its flange L overlying and engaging against the flange G of the body member, as shown in Fig. 4. While these flange parts are in this position they are interfolded to produce the multiple layer, compound lined, hermetic double seam C which permanently unites the end member A to the body member B as best shown in Fig. 5. During the formation of this seam, portions of its two inner layers, adjacent the countersink of the end member and at spaced intervals along the seam, are extruded or projected inwardly beyond the normal contour of the
seam and into the end member countersink in spaced relation to the annulus H, to set off a plurality of the locking lugs D as best shown in Figs. 2 and 3.

This inward projection of the inner seam layers in no way affects the outer surface of the seam, this outer surface remaining smooth and free of any indentations. The seam at the projections is merely made a little looser or less compact. As viewed in the drawings the can parts are greatly enlarged and thus appear exaggerated.

The locking lugs D project inwardly from the seam C a uniform distance to make them of even thickness, as shown in Figs. 2 and 3. The under portion of each lug is formed with a locking node O which merges into a tapered interrupted thread surface P, thus imparting to the lugs a wedge shape for cooperation with the interrupted thread sections or protuberances F on the cover E when the cover is applied to and partially rotated on the can.

The tapered section P terminates in a second locking node Q. These preferably are four of these locking lugs D spaced at equal intervals along the seam C and four protuberances F on the cover to correspond with these lugs, although any number of lugs and protuberances may be used as desired.

The reclosure cover E may be of any desired form having a countersunk panel R (Fig. 1) and an inner upright wall section S in which the outwardly extending protuberances F are disposed. Such a cover may be applied by insertion into the countersink of the end member A and is locked in place under the locking lugs D by a slight or partial rotation of the inserted cover. Preferably the cover is formed with an outer channel T containing a hermetic sealing gasket U for engagement against the top of the double seam C when the cover is in place to hermetically seal the can.

Forming of the double seam C and the locking lugs D during the securing of the end member A onto the can body member B is brought about preferably in a closing machine of suitable type. The drawings illustrate by way of a simple example, a type of machine disclosed in United States Patent 1,173,329, issued February 28, 1916, to L. N. Trudeau, on Can Crimping Machine, principal parts of which are shown in Fig. 6.

In such an apparatus the can body member B with its end member A superimposed thereon, as shown in Fig. 4, is supported on a rotatable lifter pad 21 (Fig. 6) mounted on the upper end of a vertical stem 22 carried in a bearing 23 formed on a frame 24 which may constitute the main frame of the machine. The stem 22 and the lifter pad 21 connected therewith may be raised and lowered by any suitable means.

When the can is in raised position its upper end engages against a rotatable chuck or chuck mold 27. This chuck is mounted on the lower end of a vertical shaft 28 which is journaled in a bearing 29 formed on the frame 24. The upper end of the shaft carries a driving gear 31 which may be rotated in any suitable manner. This gear rotates the chuck 27 and the can body and its superimposed end member through frictional engagement with the latter.

The chuck 27 fits down into the countersink of the end member A and engages the annulus H for holding the flange L of the end member tightly against the flange G of the body member for the sealing operation which follows. The outer peripheral edge of the chuck engages the upright inner wall section K, the outside diameter of the chuck being dimensioned to snugly fit into the end member. This backs up the wall section K of the end member and the side wall of the body during the sealing operation.

The interlocking of the flange parts G, L of the body and the end member respectively, the production of the lugs C is effected preferably by a conventional seaming roller 35 which is disposed adjacent the chuck 27. There may be one or more such rollers, such as first and second operation rollers and they may be incorporated in a rotating or stationary head as desired.

However, in order to simplify the description carried by one such roller is shown in the drawings and this is mounted on the inner end of a reciprocable slide 36 carried in the frame 24 as disclosed in the above mentioned Trudeau patent. The slide is actuated in any suitable manner to move in against the flange parts G, L of the rotating can body and end member and thus interlock these flange parts and press the interlocked parts inwardly against the chuck 27 to produce the double seam C as the can rotates.

The locking lugs D are formed or molded simultaneously with the formation of the double seam C as hereinbefore mentioned. Where the shape of the locking lugs permits, they are formed by mold recesses provided in the edge of the chuck 27 proper. However, the shape of the locking lugs sometimes do not lend themselves to this procedure and in that event the mold recesses may be formed in loose pieces carried in the chuck mold.

In the instant case, the locking lugs D are of the latter type in which they are best formed by mold recesses provided in the outer edge of the chuck. For this purpose the chuck 27 is provided with a plurality of forming dies or fingers 38 (Figs. 6 and 7) arranged at spaced intervals around the chuck in accordance with the desired position of the lugs on the double seam. Each die or finger is disposed in a horizontal channel or cavity 39 formed in the bottom of the chuck, the depth of the channel and the thickness of the finger being preferably the full thickness of the outer edge of the chuck.

The outer edge of each forming finger 38 is flush with the outer peripheral edge of the chuck to provide, with the chuck, a smooth backing up surface for the can parts. This outer edge of each finger 38 is formed with a mold recess 41 to correspond with the desired shape of the lug to be formed. In the instant case these recesses feature or include the locking nodes O and Q and the intervening tapered locking surface P of the locking lugs D.

The inner end of each forming finger is formed with a pivot pin or trunion 42 (Figs. 6 and 8) which is housed in a bearing 24 in the chuck so that the finger can pivot or rock downwardly. This downward position is shown in Fig. 9.

Hence, when the seaming roller 35 presses the interlocked flange parts of the body and the end member, inwardly against the chuck 27 to form the double seam, the chuck causes the lugs to be produced less at the mold recesses 41 than at the other portions of the chuck. These recesses permit the two inner layers of the seam to flow or be forced under pressure as in an extruding or a molding operation and thereby extend inwardly of or beyond the normal contour of the seam to produce the locking lugs D. The lugs take the form of
shape of the finger recesses $4f$ and therefore may be made of any desired shape or size by the proper dimensions of the recesses.

After such a seam and lug forming or molding operation, the seaming roller $35$ is retracted from its operating position and the chuck $27$ is withdrawn from the countersunk end member, this latter being effected by a lowering of the seamed can and the lifter plate $21$ to their original positions. During this lowering operation, the forming fingers $38$ hinge downwardly on their pivots $43$ with the can as best shown in Fig. 9. This hinging action of the fingers releases them from the newly formed locating lugs $D$ on the can and thus permits the can to be freely removed from the chuck $27$ without any interference from the formed or inwardly pressed lugs $D$.

A modified form of the seaming mechanism is illustrated in Fig. 10. In this modified form, the chuck $27$ is formed on the lower end of a vertical sleeve $51$ which is journaled in the bearing $29$ of the frame $26$. The driving gear $24$ is carried on the upper end of the sleeve and thus rotates the chuck through this sleeve connection.

Backings up of the end member inner wall section $K$ and the body $B$ during the seam and lug forming operation is effected by a plurality of horizontal or radially positioned die members or slides $52$. These slides are formed with side tongues $53$ which operate in horizontal slideways $54$ formed in the chuck $27$. The outer edges of the slides correspond with the described forming finger recesses $4f$ and are shaped in accordance with the desired configuration of lugs $D$ to be formed on the end member $A$.

The outer edges of the die elements or slides $52$ are flush with the outer peripheral edge of the chuck as in the preferred form. The inner ends of the slides are formed respectively with a tapered cam surface $55$ and with an adjacent upright lug $56$ which is engaged by a compression spring $57$ located in a bore $58$ in the chuck. These springs hold the cam surfaces $55$ of the slides $52$ in engagement with a conical cam $59$ located centrally of the chuck. The cam $59$ is formed on the lower end of a vertical actuating rod $6f$. The rod extends up through the chuck sleeve $51$ and is reciprocated vertically at the proper time in any suitable manner to radially retract and expand the slides $52$.

Hence when the chuck $27$ is to be withdrawn from the countersunk end member $A$ after a seaming and lug forming operation, the actuating rod $6f$ is first moved down a sufficient distance to permit the springs $57$ to shift the slides inwardly so that their outer ends are clear of the inwardly pressed lugs $D$ on the double seam $C$. With the slides in this position the chuck may be freely withdrawn from the end member, the lugs $D$ passing down through the space between the outer ends of slideways $54$ without interference with the chuck. When the chuck is completely removed from the can, the actuating rod $6f$ is shifted upwardly and this pushes the slides outwardly into their normal positions with their outer ends flush with the outer edge of the chuck for a subsequent seaming and lug forming operation.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts of the apparatus described herein, without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the apparatus hereinafter described being merely a preferred embodiment thereof.

I claim:

1. An apparatus for securing an annular end member having a peripheral flange thereon to an end of a container body while simultaneously forming inwardly projecting cover locking lugs on said end member, comprising a chuck for snugly engaging within said end member to hold the latter on said container body, said chuck having peripherally spaced cavities in its outer wall surface, a lug forming finger mounted for movement into operative and inoperative position in each chuck cavity and having a mold recess on its outer exposed surface and an adjacent outer peripheral wall portion disposed flush with the periphery of said chuck when the finger is in extended operative position, said fingers being moved into operative position by engagement with the annular end member, and a seaming roller engageable with the outer peripheral surface of the chuck held end member for bending its said flange inwardly into folded relation with the container body to form an end seam therebetween, said seaming roller forcing peripherally spaced portions of said seam during formation thereof into the finger mold recesses to form said inwardly projecting cover locking lugs of double thickness on the inner wall of said seam, each lug conforming in shape to the configuration of its adjacent finger mold recess, the subsequent separation of the container body from said chuck permitting said fingers to move inwardly to inoperative position to provide clearance between said fingers and said formed lugs.

2. An apparatus defined in claim 1, wherein the lug forming fingers are pivotally mounted on transverse axes in the chuck cavities and move by gravity to inoperative position when the seamed container body having the formed lugs thereon is separated from the chuck.

CARL W. HEINLE.

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