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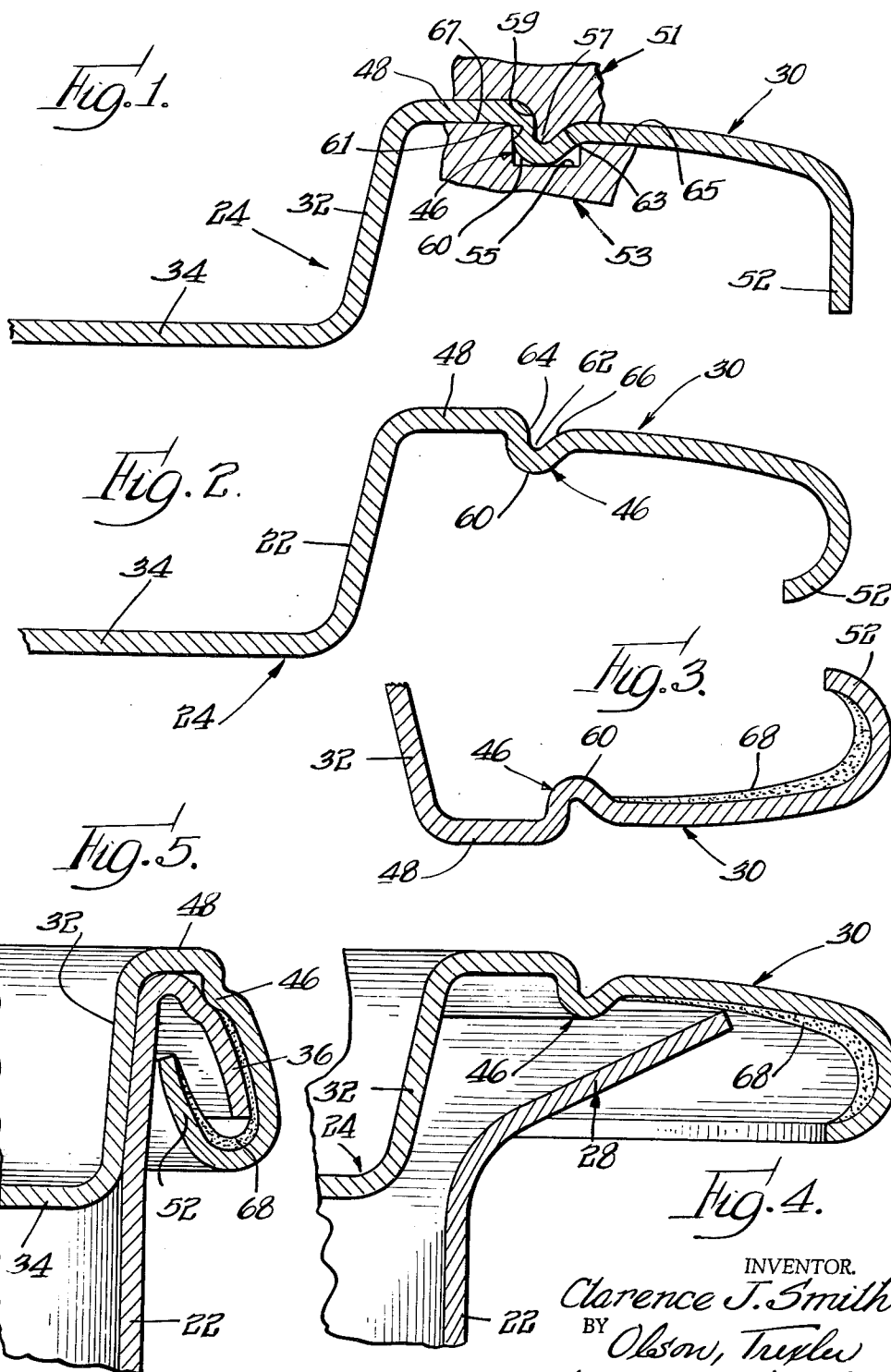
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3,221,922

CONTAINER END SEAM

Filed Sept. 11, 1961

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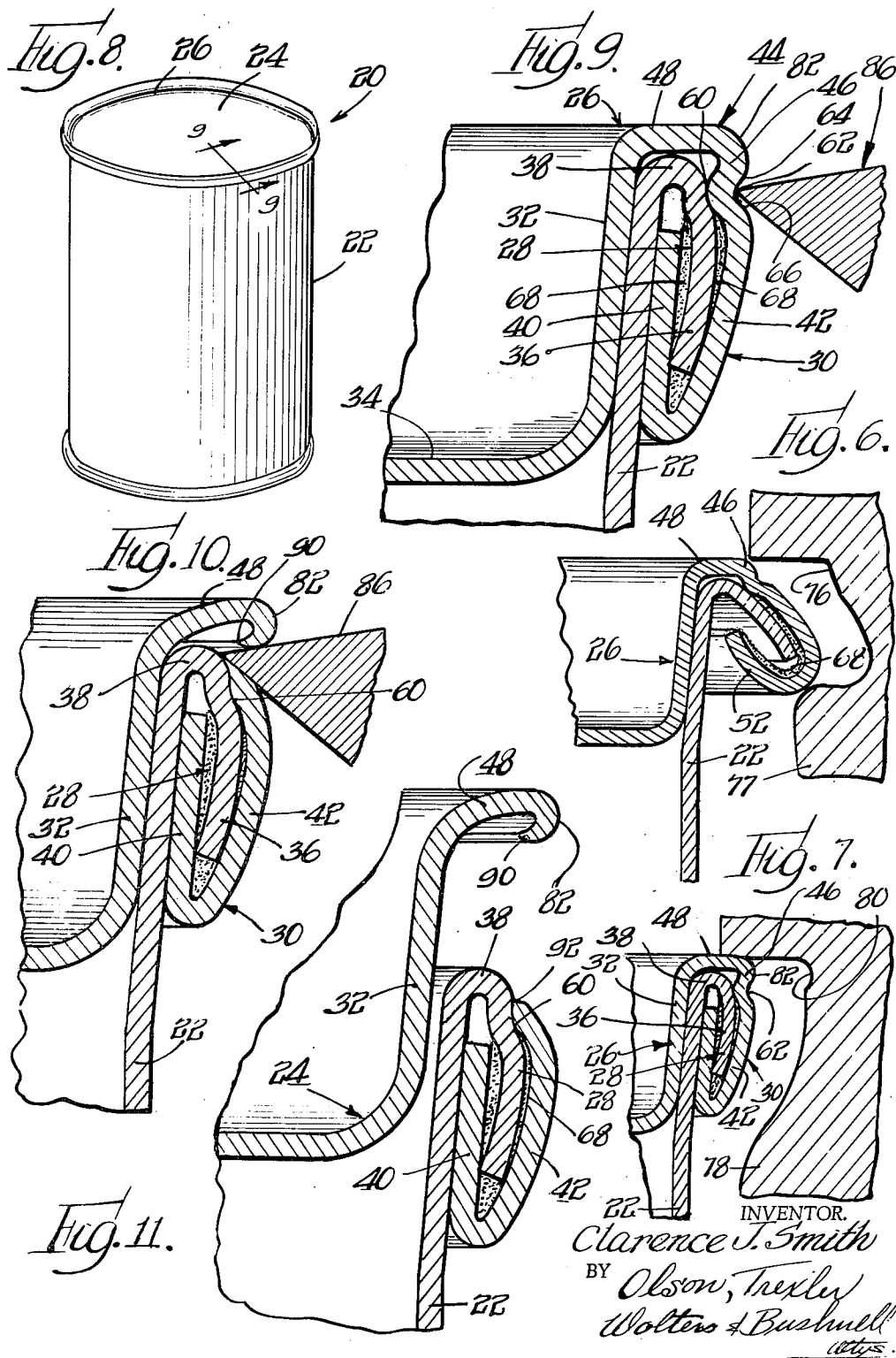
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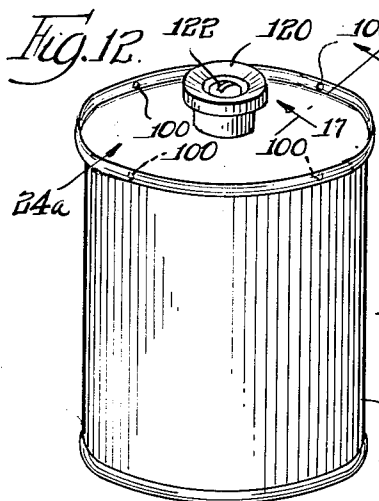
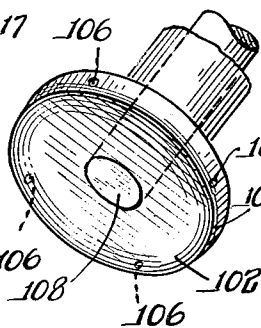
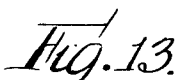
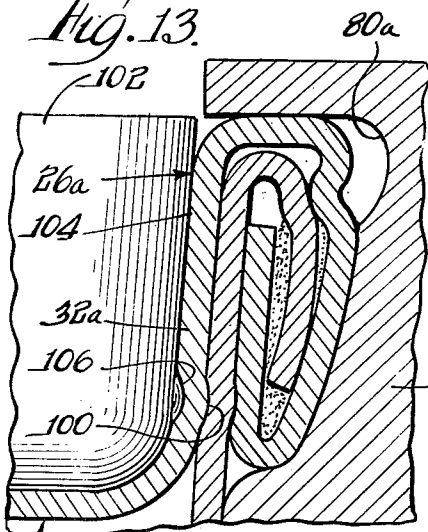
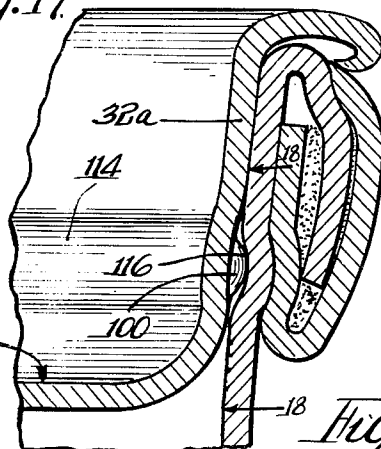
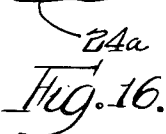
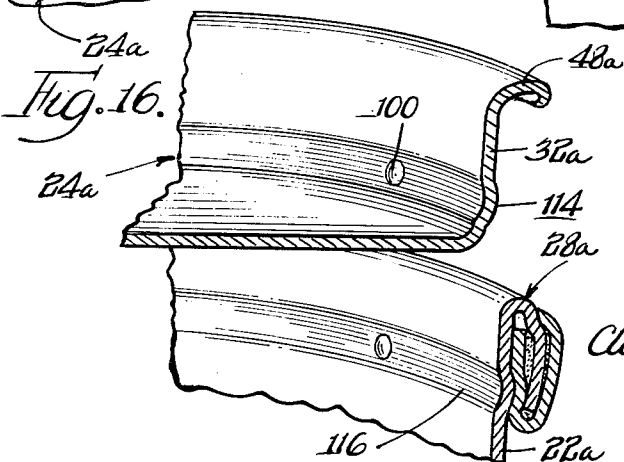
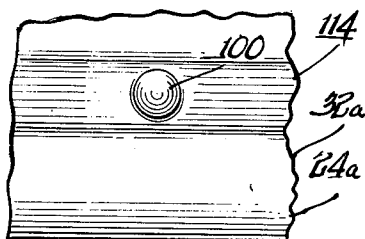
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CONTAINER END SEAM

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3 Sheets-Sheet 3



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3,221,922

CONTAINER END SEAM

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7 Claims. (Cl. 220-48)

The present invention relates to containers commonly known as "tin cans." In general, a container of this character comprises a container body closed at each end by a cover secured to the container body by an end seam in which a peripheral hook on the cover is folded around a hook on the body.

One object is to provide an improved container of the above character, designed to be opened by cutting through a circumferential portion of a cover hook which overlies a coating body hook on the container and having an improved construction which affords significant advantages in the manufacture of the container and significant advantages in the way of functional capabilities and features of the container provided.

Another object is to provide a container capable of being easily opened by cutting through a cover hook of the container over the coating body hook and having an improved construction which provides a superior sealing of each container cover to the container body through mechanical engagement of the cover with the body.

Another object is to provide an improved container of the character recited in the above objects having an improved construction which utilizes an annular portion of a typical container cover to produce a tight, highly effective mechanical seal with the container body and to effect a highly efficient and effective guiding of a cutter to open the container by cutting through an annular portion of the cover hook which overlies a coating body hook.

Another object is to provide a container of the character recited in the preceding objects in which a sealing compound is disposed in an optimum sealing space within an end seam of the container and positively confined against escape from the optimum sealing space by means of an improved construction which also forms a highly effective mechanical seal between the associated container cover and body and which serves to avoid exposure of the sealing compound upon opening of the container by fully enclosing the compound within structure of the end seam which remains attached to the container body after severing of the cover hook to open the container.

Another object is to provide a container of the character recited in the previous objects having an improved construction which facilitates efficient, economical manufacture of the containers on a rapid mass production basis, while at the same time effectively avoiding over-stressing or abrasion of the container structure including that which is shaped to form the end seam.

Another object is to provide a container of the character recited in the preceding objects having an improved construction which affords decided advantages in manufacturing the container, particularly with reference to the incorporation of sealing compound into each end seam of the container in a manner which assures a highly effective seal between the container body and each cover of the container, while at the same time providing for efficient advantageous opening of the container by cutting through a cover hook and over the adjacent body hook on the container.

Another object is to provide an improved container as recited in the preceding objects which is capable, after being opened, of affording special advantages as a reclosable container by virtue of an improved construction of the container that facilitates easy replacement of the severed cover and serves advantageously to forcefully,

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yet yieldably, retain the replaced cover on the container body.

Another object is to achieve the previously recited objects by means of improved container structure well adapted for economical manufacture.

Another object is to provide a new and improved method of manufacturing the improved container recited in the preceding objects.

Other objects and advantages will become apparent from the following description taken in relation to the drawings which illustrate a container constructed in accordance with the invention.

In the drawings:

FIGURE 1 is a fragmentary transverse sectional view of a partially formed container cover illustrating one step in the manufacture of the container and showing a fragmentary section of coating dies used in forming the container cover;

FIG. 2 is a transverse sectional view of a container cover similar to FIG. 1 but showing a curl formed on the periphery of the cover as another step in the production of the container;

FIG. 3 is a transverse fragmentary sectional view of a container cover showing the cover inverted with reference to the position of the cover in FIG. 2 and illustrating the manner in which the shaping of the cover serves most advantageously in effecting location of a sealing compound in a desired optimum position on the cover;

FIG. 4 is a transverse fragmentary sectional view illustrating initial placement of a cover in covering relation to one end of a previously formed container body;

FIG. 5 is a fragmentary transverse sectional view showing an end seam of the improved container after completion of the first of two rolling operations in the formation of a typical end seam;

FIG. 6 is a view similar to FIG. 5 in which the die used in the first rolling operation is shown spaced outwardly from the end seam structure;

FIG. 7 is a view similar to FIG. 6 but showing the die used in the second rolling operation and showing the end seam as completed by the second rolling operation;

FIG. 8 is a perspective view of an improved container constructed in accordance with the invention;

FIG. 9 is a transverse sectional view taken with reference to the line 9-9 of FIG. 8 and illustrating the positional relationship to the end seam of a cutter used to open the container;

FIG. 10 is a sectional view similar to FIG. 9 but illustrating the action of the cutter in cutting through the cover hook over the body hook to open the container;

FIG. 11 is a transverse sectional view generally similar to FIG. 10 but illustrating the cover displaced axially from its normal position on the container after severing of the cover hook, as illustrated in FIG. 10;

FIG. 12 is a perspective view showing a container incorporating an additional feature of the invention which enhances the utility of the container as a reclosable canister after it has been opened;

FIG. 13 is a fragmentary sectional view illustrating the second rolling operation in the formation of an end seam of the container of FIG. 12;

FIG. 14 is a perspective view of a chuck used in the seaming operation of FIG. 13;

FIG. 15 is a fragmentary sectional view illustrating the opening of the container of FIG. 12 with a can opener;

FIG. 16 is a fragmentary perspective view showing a severed cover shifted upwardly from its normal position in relation to a container body;

FIG. 17 is a fragmentary sectional view taken with reference to the line 17-17 of FIG. 12 and showing the severed cover replaced on the container body; and

FIG. 18 is a fragmentary sectional view taken with reference to the line 18—18 of FIG. 17.

The container 20 constructed in accordance with the invention and illustrated in FIG. 8 comprises a cylindrical body 22 closed at each end by a cover 24 secured to the body by an end seam 26.

As shown in FIGS. 7 and 9, each end seam 26 comprises a body hook 28 formed on the adjacent end of the body 22, and a cover hook 30 interfolded with the body hook and joined to an outwardly extending, annular chuck wall 32 fitted into the adjacent end of the body 22 and adjoining the central portion 34 of the cover. In this description, the body hook 28 will be regarded as including an annular flange portion 36 connected through a curved connecting portion 38 of the body hook with the main portion of the body 22. The flange portion 36 of the body hook encircles the main portion of the body and has substantial axial length, as shown.

The cover hook 30 will be regarded in this description as including all the structure of the cover which extends beyond the chuck wall 32. The cover hook 30 includes an inner fold 40 extending between the body hook flange 36 and the main portion of the body 22, an outer fold 42 encircling the body hook flange 36, and an annular connecting segment 44 of the cover hook which joins with the chuck wall 32.

As will presently appear, the connecting segment 44 of the cover hook has a special shaping which affords very material advantages in the manufacture of the container while at the same time affording significant advantages in the use of the container.

For convenience in description, the connecting segment 44 of the cover hook can be regarded as including an annular cutter guiding portion or segment 46 joined to the outer cover hook fold 42 and being connected to the chuck wall 32 by an annular abutment portion or segment 48 of the connecting segment. The connecting segment 44, including the cutter guiding portion 46 and the abutment portion 48, is shaped in a manner to be described, which effects, as an incident to rolling of the end seam, of which the cover hook is a part, a tight, mechanical seal between the cover hook and the coating body hook 28.

The advantageous shaping of the connecting segment 44 of the cover hook can be most easily described and visualized with reference to the method of making the container which is illustrated in FIGS. 1 to 8.

The body 22 of the container 20 is fashioned in accordance with conventional practice and is shaped as illustrated in the fragmentary, transverse sectional view of FIG. 4 to have an outwardly flared incipient body hook on each end, which for convenience in description is identified by the number 28 applied to the completely formed body hook in the finished container.

A typical cover 24 is stamped from sheet metal by special stamping dies 51, 53, to have the shape illustrated in the fragmentary, transverse sectional view of FIG. 1. Except for the use of the special dies 51, 53, this stamping operation is performed in a conventional manner.

The special dies 51, 53, differ from conventional dies used for the same purpose in the shaping of the portions of the dies 51, 53 illustrated in FIG. 1. The stamping operation forms the chuck wall 32 and forms the incipient cover hook 30 to have the shape illustrated in FIG. 1. For the purpose of description and identification the incipient cover hook 30 can be regarded as being a "seaming panel." The specially shaped portions of the dies 51, 53 illustrated in FIG. 1 effect the desired shaping of an annular portion of the incipient cover hook 30 which becomes the previously mentioned cutter guiding segment 46 of the finished cover hook. For convenience this swaged annular portion of the incipient cover hook is identified by the number 46 in FIGS. 1 to 5. The side or face of each cover 24 which ultimately confronts the interior of the container to be formed will be referred to as the inner face or side of the cover, which appears on

the underside of the incipient cover as illustrated in FIGS. 1 and 2.

As shown, the portion of the inner die 53 which co-operates with the outer die 51 to swage the cutter guiding segment 46 defines a rectilinear groove 55 which opens in an axially outward direction. The outer die 51 defines an annular protuberance 57 which registers radially with the inner die groove 55, as shown in FIG. 1. Preferably, the outer die protuberance 57 defines a sharp annular ledge 59 extending to the radially inner edge of the protuberance. This ledge 59 is spaced radially outward of the radially inward wall 61 of the inner die groove 55. The side 63 of the protuberance 57 opposite from the sharp ledge 59 slopes radially outward from the inner die groove 55, as shown.

Preferably, the surface 65 on the inner die 53 encircling the groove 55 is offset axially somewhat inward of the inner die surface 67 on the radially inward side of the groove 55, as shown. Corresponding surfaces of the outer die 51 are similarly shaped.

Swaging of the annular cover hook segment 46 by the dies 51, 53, as an incident to stamping of the incipient cover forms at once an annular protuberance 60, FIG. 2, on the inner face of the incipient cover hook 30 and an annular groove 62 which opens axially outward. Upon formation of an end seam 26, the swaged annular portion 46 of the cover hook is turned so that the groove 62 which initially opens axially outward ultimately opens in a radially outward direction.

Preferably, the swaged segment 46 is shaped by the dies 51, 53 so that the radially inward side surface 64 of the groove 62 has a relatively steep slope in relation to the medial plane of the cover, and the radially outward side surface 66 of the groove 62 has a less steep slope relative to the medial plane of the cover.

The swaged annular cover segment 46, FIG. 2, has a carefully determined radial spacing from the chuck wall 32 which provides advantageous positional relationships of the components of the end seam to be formed, as will be presently described. A flat portion 48 of the incipient body hook 30 intervening between the chuck wall 32 and the swaged segment 46 subsequently becomes the abutment segment 48 of the completed cover hook, FIGS. 7 and 9, and has a radial width somewhat less than the radial thickness of the end seam to be formed.

As stamped by the dies 51, 53, the incipient cover 24 defines on its outer periphery a partially formed curl 52, as shown in FIG. 1. In a second operation, the incipient curl 52 is turned further inward radially in a conventional manner to have the form illustrated in FIG. 2.

The next operation is the placement of a sealing compound on the inner face of each cover 24 to subsequently form a seal within the end seam to be produced. For depositing of the sealing compound, a cover is inverted from the position shown in FIG. 2 to occupy the position illustrated in FIG. 3. A suitable sealing compound 68 is deposited on the inner face of the incipient cover hook 30 between the protuberance 60 and the curl 52. This is readily accomplished with the aid of gravity which causes the sealing compound in its initially liquid form to distribute itself along the cover hook 30 between the protuberance 60 and the curl 52. Most significantly, the annular protuberance 60 forms a dam which prevents the sealing compound from spilling over onto the inner face of the cover radially inward of the protuberance 60. As will presently appear, this assures confinement of the sealing compound to a position on the cover which effects a most advantageous location of the compound within the container end seam 26 of which the cover subsequently becomes a part.

Attachment of a cover 24 to a body 22 begins by placement of the cover in covering relation to one end of the body, as illustrated in FIG. 4.

The cover and body are then seamed together in two rolling operations. The outer swaging roller 77 used in

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the first seaming operation is illustrated in FIG. 6. The contour of the roller 77 is identical to that of a conventional end seaming roller, except for formation in the roller 77 of a recess 76 which avoids direct engagement of the roller with the juncture of the cutter guiding segment 46 with the flat portion 48 of the cover hook during the first seam rolling operation, which is carried out in a conventional manner. As illustrated in FIGS. 5 and 6, the first seam rolling operation swings the body hook flange 36 toward its final position and turns the curl 52 under the flange 36. At the same time, the swaged segment 46 is turned downwardly at its circumferential juncture with the segment 48 of the cover hook taking shape.

The second beam rolling operation is carried out in a conventional manner, using the special seam roller 78, FIG. 7, which differs from a conventional roller only by the formation in the roller 78 of a recess 80 which avoids application of roller pressure to the junctures of the segments 46, 48 of the cover hook.

The radially inward force applied by the roller 58 to the outer fold 42 of the cover hook forces the inwardly projecting annular protuberance 60 of the cover hook into tight circumferential engagement with the curved connecting portion 38 of the body hook 28 as the body hook and cover hook are pressed into tight interfolded relation to each other, FIGS. 7 and 9.

The rolling of an end seam 26 sharply increases the curvature of the juncture of the swaged segment 46 of the cover hook with the abutment segment 48 of the cover hook to leave the abutment segment 48 in a substantially flat condition and to produce on the cover hook an annular protuberance 82 that projects radially outward beyond the groove 62, which is turned to open radially outward.

The radial width of the flat abutment segment 48, previously determined by the radial spacing of the swaged segment 46 from the chuck wall 32, is such that the maximum radius of the protuberance 82 with respect to the central axis of the container is limited so as not to exceed the corresponding maximum radius of that portion of the cover hook located axially inward of the groove 62 and constituting the outer fold 42 of the cover hook. Preferably, the just mentioned maximum radius of the protuberance 82, FIGS. 7 and 9, is slightly less than the corresponding maximum radius of the cover hook outer fold 42.

Hence, the swaged cutter guiding segment 46 of the cover hook is protected effectively from axial blows by the flat abutment segment 48 of the cover hook and is protected from radial blows by the relatively large outer fold 42 of the cover hook, which has a diameter at least equal to and preferably exceeding that of the protuberance 82.

As previously mentioned, the fact that the protuberance 60, formed by the swaged segment 46, initially extends inwardly from the portion of the cover hook, that ultimately becomes the outer cover hook fold 42, causes the protuberance 60 to bear tightly against the body hook as the cover hook fold 42 is rolled toward the container body in the end seaming operation. The tight mechanical seal thus formed between the cover hook protuberance 60 and the body hook 28 not only serves to contribute directly to the production of a tight seal between the cover and body, but also serves to great advantage in assuring confinement of the sealing compound 68 to the optimum desired sealing space within the seam 26 formed. As previously described in relation to FIG. 3, the protuberance 60 initially serves to advantage in preventing the sealing compound 68 in its liquid state from spilling over onto portions of the cover radially inward of the protuberance 60. Similarly, when the end seam 26 is rolled, engagement of the protuberance 60 with the body hook, as described, precludes squeezing of the sealing compound past the protuberance 60 so that it does not intrude into

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interstices between portions of the cover hook and body hook which are subsequently separated from each other upon opening of the container.

Moreover, as will presently appear, a portion of the cover hook which defines the protuberance 60 remains in tight engagement with the body hook 28 after the container is opened to continue to confine the sealing compound 68 and advantageously prevent its exposure when the container is opened.

As illustrated in FIGS. 9 and 10, the reversely curved cutter guiding segment 46 of the cover hook 30 serves to advantage in guiding the cutting edge of a circular cutter 86 to effect advantageous opening of the container. The circular cutter 86 is moved radially inward and rotated by an opener structure (not shown) which does not form a part of this invention. The reversely curved cutter guiding segment 46 guides the edge of the cutter 86 into the groove 62 where it is restrained by the protuberance 82 against axially outward displacement past the protuberance, thereby guiding the center to cut through the cutter guiding segment 46 of the cover hook over the curved connecting portion 38 of the body hook, as illustrated in FIG. 10. The groove 62 is located axially closely adjacent the abutment segment 48 of the cover hook so that the cutter 86 engages and glides over the rounded surface of the curved connecting portion 38 of the body hook, as shown.

The cutter 86 progresses around the end seam 26 to sever the cover hook between the protuberance 82 and the outer fold 42 of the cover hook. The cover is then lifted from the container, as shown in FIG. 11, and can be subsequently replaced to reclose the container, if desired.

As shown in FIG. 11, a portion of the cover hook defining the protuberance 60 remains attached to the severed cover hook fold 42 to preclude exposure of the sealing compound 68 located in an optimum position within the end seam, as described. This is of decided advantage in containers used to contain food, in that the sealing compound, which tends to have an unappetizing appearance, is not exposed to view. The containment of sealing compound against exposure to view is of special advantage in food containers which are when opened used as drinking cups or dishes from which the contents of the containers are consumed.

As previously intimated, the fact that the opened container can be conveniently reclosed by replacement of the severed cover is quite advantageous. Upon replacement of the cover, the chuck wall 32 fits within the opened end of the container body 22 and the abutment segment 48 and projection 82 fit down over the body hook segment 38. In this connection, it will be noted, with reference to FIGS. 10 and 11, that the severed edge 90 of the projection 82 is turned back under the abutment segment 48 so that it is not exposed to contact the hand of the user. The user's hand engages only the rounded projection 82 on the removed cover. Similarly, the severed edge 92, FIG. 11, of the severed portion of the cover hook which remains attached to the container body fits close against the body hook 28 where it can cause no harm. This safety feature, together with the confinement of the sealing compound, as described, affords special advantages in the use of an opened container as a drinking cup, for example.

FIGURES 12 to 18 illustrate additional features of the invention which provide for a more positive retention of a replaced cover on a container body after the container has been opened. In FIGS. 12 to 18 container components corresponding to container components previously described in relation to FIGS. 1 to 11 are identified with the same reference numbers with the addition of the suffix "a."

The container 20a of FIGS. 12 to 18 is manufactured in the same manner as the previously described container 20, except for a modification in the formation of the end seam 26a which forms in the chuck wall 32a a plurality

of circumferentially spaced outwardly protruding pimples or swaged protuberances **100** located near the lower portion of the chuck wall, as shown in FIG. 13.

The end seam **26a** is rolled in the same manner as the end seam **26**, previously described. The protuberances **100** are formed in the chuck wall **32a** by the use of a special chuck **102** defining on its periphery **104**, FIGS. 13 and 14, which fits within the chuck wall **32a**, a number of circumferentially spaced protuberances or pimples **106** equal to the number of pimples **100** to be formed in the chuck wall **32a**. Preferably, four protuberances **106** are formed on the chuck **102** to produce four pimples **100** in the chuck wall **32a**.

The chuck **102** is inserted into the upwardly open cover **24a** in a conventional manner, as shown in FIG. 13. Upon rolling of the end seam, the roller **78a** used in the second rolling operation forces the chuck wall **32a** hard against the periphery **104** of the chuck **102**, causing the chuck protuberances **106** to swage adjacent portions of the chuck wall **32a** outwardly to form the protuberances **100**.

After the last seam rolling operation, the chuck **102** is extracted from the cover **24a**. Any tendency the chuck protuberances **106** may have to hold the cover on the chuck is overcome by operation of a central plunger **108** in the chuck, FIG. 14, to force the cover from the chuck.

The container **20a** is opened in exactly the same manner as the container **20**. As illustrated in FIG. 15, the end seam **26a** is engaged on opposite sides by a rotary cutter **86a** and a platen roller **110** of a can opener forming no part of the present invention. The lower end of the platen roller **100** is somewhat enlarged radially, as shown in FIG. 15, to form an annular swaging protuberance **112**. This swaging protuberance engages the chuck wall **32a** adjacent but somewhat above the juncture of the chuck wall with the central panel **34a** of the cover. As the roller **110** progresses around the end seam **26a**, it swages the adjacent portions of the chuck wall **32a** and container body **22a** radially outward to form a broad annular land or ridge **114** on the chuck wall and an annular indentation **116** in the container body.

This outward swaging of the chuck wall **32a** and container body **22a** is superimposed on the outward swaging of these parts by the previously mentioned chuck protuberances **106**.

Upon replacement of the severed cover **24a**, as shown in FIG. 17, the swaged annular protuberance or ridge **114** in the cover **24a**, FIGS. 16 and 17, tends to protrude outwardly into the annular indentation **116** in the container body **22a**. The effect of this is to yieldably hold the cover **24a** in its replaced position.

This yieldable retention of the replaced cover on the container body is powerfully augmented by the action of the circumferentially spaced protruding pimples **100** formed by the seaming chuck **102**. These pimples or protuberances **100** register along the axis of the cover with the annular swaged protuberance **114** and, upon replacement of the cover, project outwardly into engagement with the annular indentation **116** in the container wall, as shown in FIG. 17. The result is to more firmly hold the replaced cover in place.

As shown in FIG. 12, a knob **120** is attached to the the container cover **24a** by a self-tapping screw **122**. This knob may be applied either before or after the cover **24a** is severed from the container body. The knob provides a convenient means of replacing and removing the cover whereby the opened container serves most conveniently as a reclosable cannister.

The invention is claimed as follows:

1. In a container the combination of a container body, an annular body hook formed on one end of said body, a cover disposed in closing relation to said one end of the body and including an outwardly turned chuck wall fitted into said one end of said body, the periphery of said

cover defining a cover hook interfolded with said body hook to form an end seam, said cover hook including an outer fold encircling said body hook and being connected to said chuck wall by an intervening connecting segment of the cover hook which includes a cutter guiding segment of the cover hook joined to said outer fold of the cover hook, and said cutter guiding segment of the cover hook being reversely curved in transverse section to define an outwardly open annular groove and to form an inwardly projecting annular protuberance projecting sharply radially inward from said outer fold of the cover hook to tightly engage said body hook along a narrow band of mutual engagement of the protuberance and the body hook, the engaged portion of the body hook being complementarily displaced inwardly in lesser degree to conform to the shaping of said inward protuberance and said protuberance being in localized pressure contact therewith.

2. A container as defined in claim 1 wherein said inwardly projecting annular protuberance comprises an upper portion having a smaller angle of inclination relative to a plane perpendicular to the axis of the container, and a lower portion having a larger angle of inclination in respect thereto.

3. A container as defined in claim 1 wherein said intervening connecting segment of the cover hook includes a radially extending substantially flat portion interconnecting said chuck wall and the upper portion of the cover hook outer fold.

4. A container as defined in claim 1 wherein the chuck wall of the cover and the end of the body engaged thereby are provided with cooperative projection and recess means for releasably holding the cover within the body end.

5. In a container the combination of a container body, an annular body hook formed on one end of said body, a cover disposed in closing relation to said one end of the body and including an outwardly turned chuck wall fitted into said one end of said body, the periphery of said cover defining a cover hook interfolded with said body hook to form an end seam, said cover hook including an outer fold encircling said body hook and being connected to said chuck wall by an intervening connecting segment of the cover hook which includes a cutter guiding segment of the cover hook joined to said outer fold of the cover hook, and said cutter guiding segment of the cover hook being reversely curved in transverse section to define an outwardly open annular groove and to form an inwardly projecting annular protuberance projecting sharply radially inward from said outer fold of the cover hook to tightly engage said body hook along a narrow band of mutual engagement of the protuberance and the body hook, the engaged portion of the body hook being complementarily displaced inwardly in lesser degree to conform to the shaping of said inward protuberance and said protuberance being in localized pressure contact therewith, and an annular body of sealing compound disposed between the outer fold of the cover hook and the encircled portion of the body hook, said inward protuberance providing a dam excluding the sealing compound from the interstices of the end seam therebeyond.

6. A cover member for double seaming connection with container bodies, said cover member being shaped peripherally to conform to the shaping of a cooperative container body, said cover member having a countersunk central portion projected axially of the cover member to form a chuck wall with the end of the container body, and a peripheral portion formed on said cover member extending radially outwardly from said countersunk portion, said peripheral portion having a circumferentially extending rib formed therein, said rib being in spaced relation from the countersunk portion and projected axially of the cover member in the direction of the countersunk central portion, the peripheral portion terminating in an outer flange bent axially of the cover in the direc-

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tion of said countersunk portion and adapted in the double seaming operation to be brought into pressure engagement with the body to provide a pressure seal therewith, and a body of sealing compound on the cover member between said rib and said outer flange.

7. A cover member for double seaming connection with container bodies as defined in claim 6, wherein said rib is provided with an inner wall sloped at a greater angle in respect to the adjacent peripheral portion and an outer wall sloped at a lesser angle in respect thereto.

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THERON E. CONDON, *Primary Examiner.*