

Jan. 15, 1963

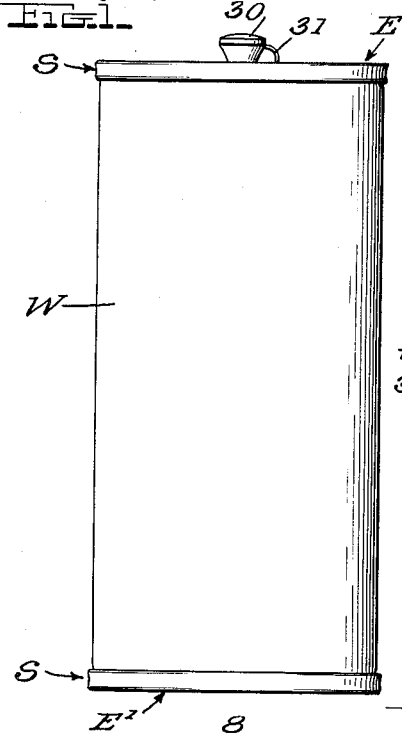
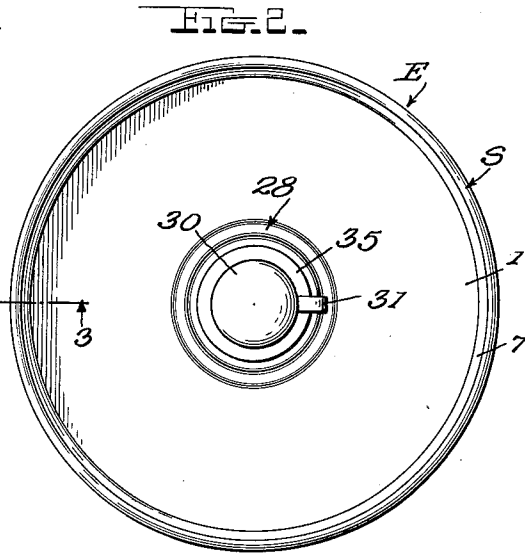
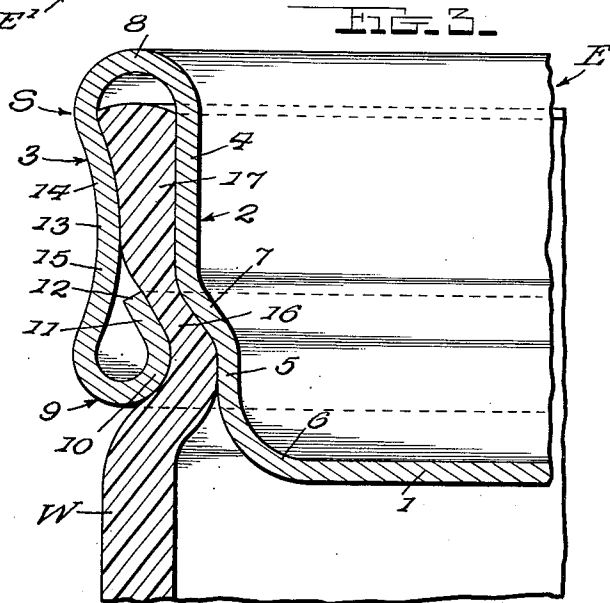
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3,073,478

CONTAINER AND METHOD OF MANUFACTURE

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5 Sheets-Sheet 1



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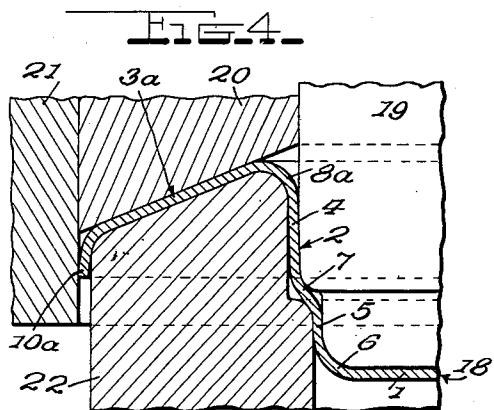
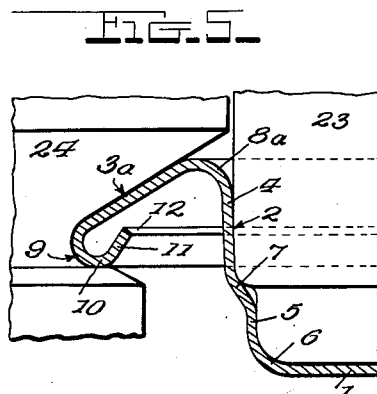
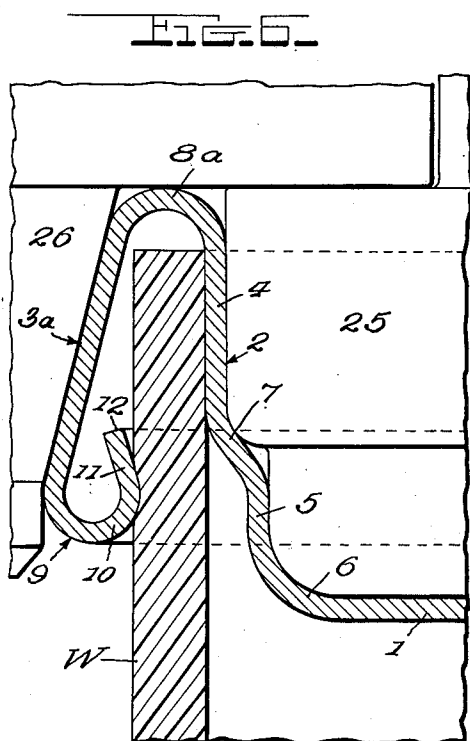
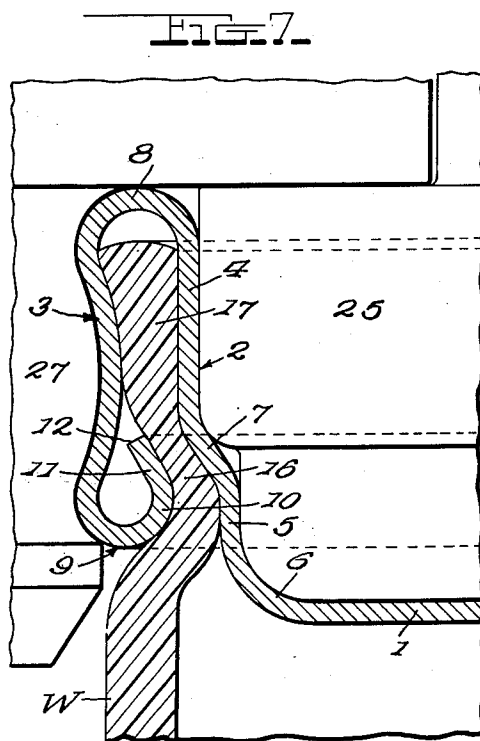
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CONTAINER AND METHOD OF MANUFACTURE

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5 Sheets-Sheet 2



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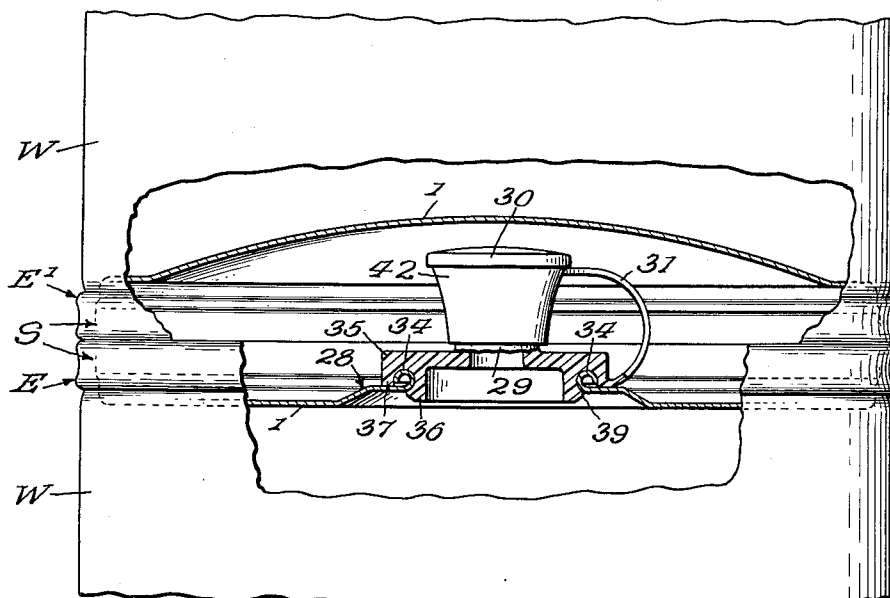
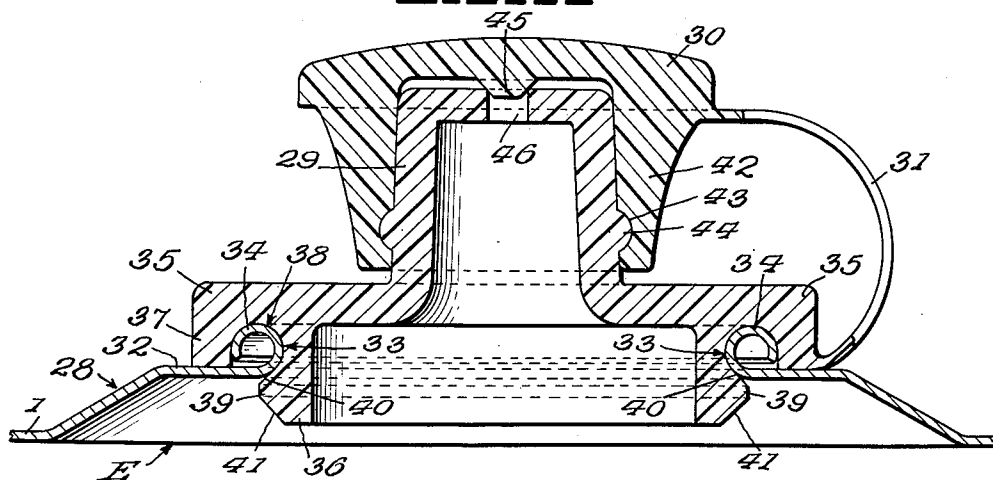
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CONTAINER AND METHOD OF MANUFACTURE

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5 Sheets-Sheet 3



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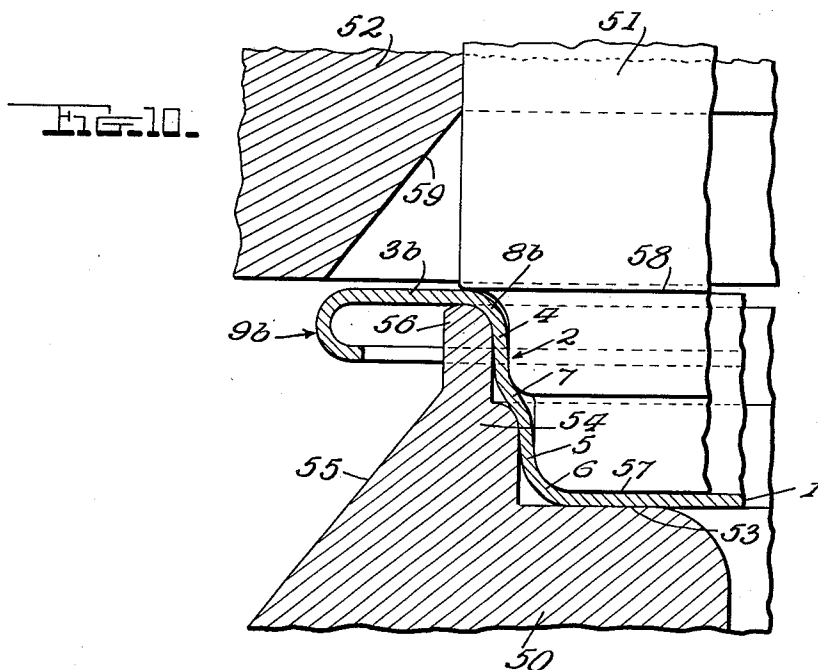
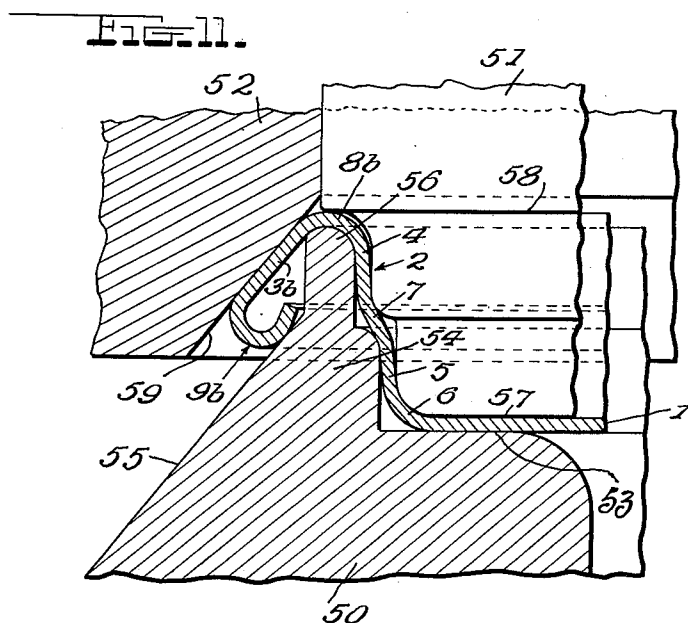
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CONTAINER AND METHOD OF MANUFACTURE

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5 Sheets-Sheet 4



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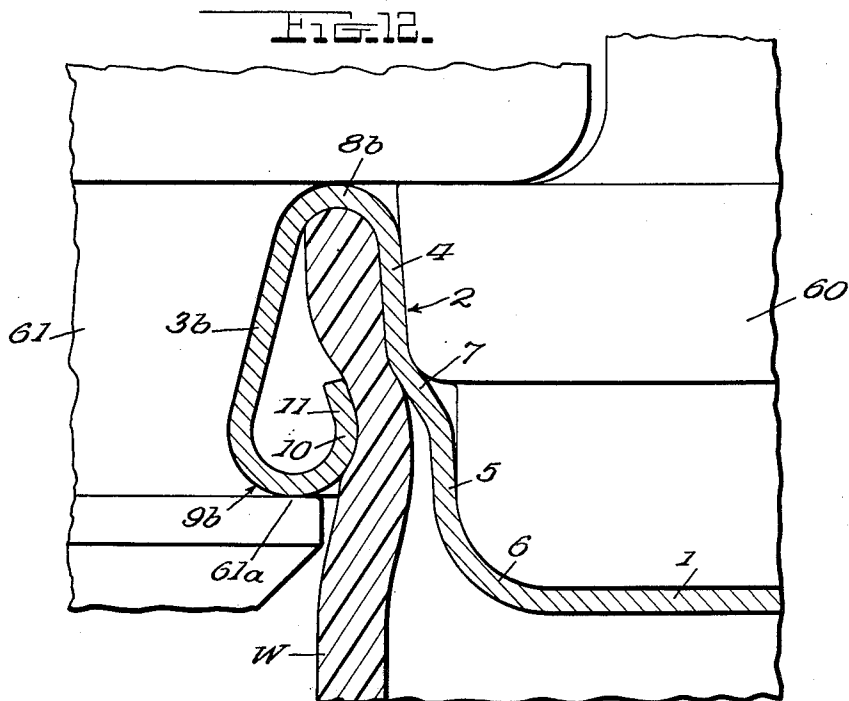
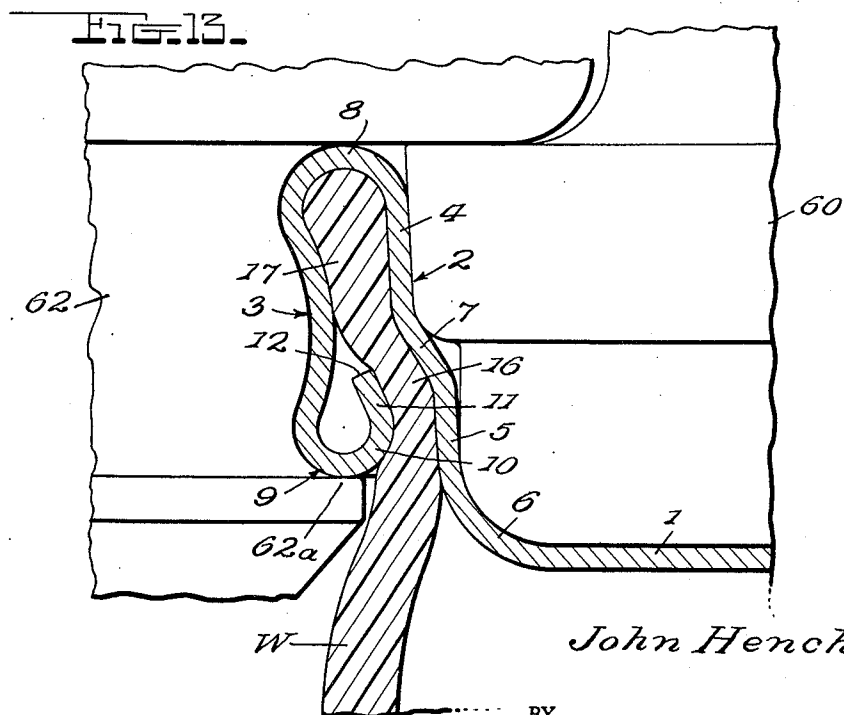
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CONTAINER AND METHOD OF MANUFACTURE

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5 Sheets-Sheet 5



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3,073,478

CONTAINER AND METHOD OF MANUFACTURE
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3 Claims. (Cl. 220-67)

This invention relates to a new and improved container of the general type having a yieldable side wall and sheet metal end closures. Primarily, the invention relates to containers of this general type known as squeeze cans, in which a plastic container side wall of polyethylene or the like is inwardly deformed by hand pressure to discharge container contents through a nozzle and returns to normal shape when relieved from pressure. However, drums and the like having side walls of fiber board or other yieldable material seamed to sheet metal end closures, may also be constructed in accordance with the invention.

The principal object of the invention has been to provide a new and improved seam structure for tenaciously and fluidly tightly connecting the sheet metal end members with the yieldable container wall without danger of injuring said wall.

Each end closure is of cupped form and includes a closure disk, a side wall (known as a chuck wall) and a peripheral skirt, an end of the yieldable container wall being tightly held between said chuck wall and said skirt.

In attaining an effective assembly of this character, another object has been to provide the chuck wall with a reduced inner end merging smoothly into the closure disk and with a shoulder at the juncture of said reduced end with the outer portion of said chuck wall, and to provide the free end of the skirt with an inwardly curled open bead, said bead cooperating jointly with said reduced chuck wall end and said shoulder in holding the material of the container side wall under intensive compression.

Another object has been to flare the aforesaid shoulder from the reduced chuck wall end to the outer portion of the chuck wall and to provide the skirt bead of ovate form and with its inner wall substantially unidirectional with the flare of said shoulder, providing two widened surfaces between which to clamp the yieldable container wall without injury.

A further object has been to leave the aforesaid inner wall of the ovate bead free from contact with the adjacent portion of the skirt, to yield during seaming of the end closure onto the container wall and prevent the bead from injuring this wall.

The skirt is joined by a bight to the outer end of the chuck wall: and a further object has been to gradually reduce the skirt diameter from said bight to the mid-length of the skirt and to similarly reduce the skirt diameter from the bead to said mid-length, thus providing for further compressing the container side wall and increasing the efficiency of the seam.

Still further objects have been to provide a novel method for constructing the end closure in readiness for seaming onto the container wall, and a novel method for accomplishing the seaming.

Additional objects have been to provide a novel discharge nozzle, to mount this nozzle in an improved manner on the upper end closure, and to shape the lower end closure in a manner preventing the nozzle from interfering with stacking of one container on another.

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.

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In the drawings:

FIGURE 1 is a side elevation of a container constructed in accordance with the invention.

FIGURE 2 is an upper end view.

FIGURE 3 is an enlarged detail vertical section on line 3-3 of FIGURE 2, showing the seam.

FIGURES 4 and 5 are enlarged sectional views showing steps employed in manufacturing the end closures.

FIGURES 6 and 7 are enlarged sectional views showing steps employed in seaming the end closures onto the container side wall.

FIGURE 8 is a fragmentary side elevation, partly broken away and in section, showing two of the containers stacked without interference from the discharge nozzle.

FIGURE 9 is an enlarged vertical sectional view showing the nozzle and the portion of the upper end closure to which it is connected.

FIGURES 10 and 11 are enlarged sectional views showing other method steps which may be employed in manufacturing the end closures.

FIGURES 12 and 13 are views similar to FIGURES 6 and 7, showing the method of seaming the end closure of FIGURE 11 onto the container side wall.

In FIGURE 1, two sheet metal end closures E and E' are connected by novel seams S to the ends of a cylindrical container side wall W formed from polyethylene or other appropriate material. The peripheral portions of both end closures E and E' may be considered as of identical construction and therefore illustration and description directed to the peripheral portion of the closure E will serve for both.

The closure E (see FIGURE 3) is of cupped form and embodies a disk 1, a side wall 2 (known as a chuck wall), and a peripheral skirt 3. The chuck wall 2 has an outer portion 4, a reduced inner end portion 5 merging at 6 into the disk 1, and a flared shoulder 7 at the juncture of said reduced end 5 with said major portion 4.

The skirt 3 surrounds and is spaced from the chuck wall 2 and one end of said skirt 3 is integrally connected by a bight 8 with the outer end of said chuck wall 2. The free end of the skirt 3 is curled inwardly at 9 to provide a hollow bead 10 which is opposed to the reduced end 5 and shoulder 7 of the chuck wall 2. The bead 10 is of ovate form in radial section and the inner wall 11 of this bead is substantially unidirectional with the flare of the shoulder 7. The free edge 12 of the bead wall 11 is inwardly spaced from the adjacent portion of the skirt 3.

From the bight 8 substantially to the mid-length 13 of the skirt 3, this skirt is gradually reduced in diameter as shown at 14. The skirt is also gradually reduced at 15 from the bead 10 to its mid-length 13. The skirt portion 14 diverges from the outer chuck wall portion 4 toward the bight 8. Both diameter reductions 14 and 15 are preferably effected on a curvature, as shown.

One end of the yieldable container wall W is received between the chuck wall 2 and the skirt 3. The ovate bead 10 holds the wall portion 16 intensively compressed against the reduced end 5 and the shoulder 7 of the chuck wall 2. The skirt 3 holds the wall portion 17 tightly compressed against the major portion 4 of said chuck wall 2, said wall portion 17 having a wedge formation conforming to the space between the skirt portion 14 and said major portion of said chuck wall 2. An effective leak-proof seam is thus provided between the end closure and the yieldable container wall W. In this seam, the inner wall 11 of the ovate bead 10 has rather extensive contact with the material of said wall W and yieldably engages it to preclude possibility of injuring the material and causing possible leakage.

In constructing the end closure, method steps, which

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may be employed, are illustrated in FIGURES 4 and 5. As shown in FIGURE 4, a sheet metal blank 18 is shaped into cupped form in a die press, elements of the press being shown at 19, 20, 21 and 22. The disk 1 and the chuck wall formations 4, 5, 6 and 7, above described, are shaped by the press and the beaded skirt formation is started by providing the chuck wall 2 with an outwardly projecting flange 3a having a downwardly turned edge 10a. The flange 3a is joined to the chuck wall 2 by a bight 8a and is disposed at a widely acute angle to said chuck wall.

The partially formed end closure of FIGURE 4 is transferred to a curling unit (FIGURE 5) and the edge portion of the flange 3a is curled by said unit to shape the ovate bead 10, the free edge 12 of the inner bead wall 11, however, being left in excessively spaced relation with the flange 3a.

The curling unit may be of any conventional type and is shown as including a chuck 23 and a curling roll 24. This curling unit, in addition to beading the edge of the flange 3a, bends this flange into less acute angular relation with the chuck wall, as shown.

Operation of the curling unit completes the peripheral portion of the end closure in readiness for seaming onto an end of the yieldable container wall W, the seaming steps being illustrated in FIGURES 6 and 7. For illustrative purposes, the seaming means is shown as including a chuck 25, a first-operation seaming roll 26 (FIGURE 6), and a second-operation seaming roll 27 (FIGURE 7).

The first-operation roll 26 simply clinches the flange 3a sufficiently to slightly embed the bead 10 in the yieldable container wall W, as seen in FIGURE 6. The second operation roll 27, then converts the flange 3a into the beaded skirt 3 above described, and so deforms the container wall as to provide it with the compressed portions 16 and 17, also described above. During the operation of the roll 27, the pressure exerted, somewhat closes the bead 10 but the inner wall 11 of said bead yields under the pressure to prevent it from injuring the container wall.

The central zone of the disk 1 of the upper end closure E is formed with an upwardly offset portion 28 (FIGURES 2, 8 and 9) upon which a discharge nozzle 29 is mounted; and a captive cap 30 is provided for said nozzle, said cap being connected with said nozzle by a strap 31. The disk 1 of the lower end closure E', however, is domed as seen in FIGURE 8, to accommodate the nozzle and cap of a subjacent container, when one container is stacked upon another. The offset portion 28 and the domed formation may be shaped at any time prior to seaming the end closures onto the container wall, and any adequate means may be employed in such shaping.

The offset disk portion 28 has a flat top 32 formed with a central opening 33 and the metal at the edge of this opening is curled upwardly, outwardly and downwardly to provide said flat top with an upstanding bead 34 around said opening, as best seen in FIGURE 9, said bead being cooperable with the base 35 of the nozzle 29 in fluid tightly mounting said nozzle on the end closure E.

The nozzle 29 is formed from a suitable plastic and has such resiliency as to permit some distortion when applying it to the end closure and to then cause return to normal shape. The lower side of the nozzle base 35 is provided with an inner downwardly projecting wall 36 and with an outer downwardly projecting wall 37. These walls are continuous and concentric and are spaced apart to form a channel 38 between them, said channel being shaped and dimensioned to snugly receive the bead 34. The inner wall 36 projects downwardly a greater distance than the outer wall 37 and is provided on its outer periphery with an integral continuous rib 39, said rib having a downwardly flared upper side 40 for contact with the inner lower portion of the bead 34. The rib 39 also has a downwardly tapered lower side 41, the lowermost diameter of which is no greater than that of the opening 33.

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In applying the nozzle to the end closure, the lower end of the inner wall 36 is placed for passage through the opening 33, the lower side 41 of the rib 39 being then in contact with the upper inner portion of the bead 34. Then downward pressure is exerted on the nozzle base 35 while the container is held against descent. The result is that the lower rib side 41 cams the inner wall 36 to such reduced diameter that the entire rib 39 may pass through the opening 33, whereupon the resiliency of said inner wall restores it to normal diameter. As this restoration occurs, the lower end of the outer wall 37 comes solidly to rest upon the top 32 of the offset 28. The upper rib side 40 then coacts with the lower inner portion of the bead 34 to exert a downward camming action on the nozzle base 35, thereby maintaining tight contact between the outer wall 37 and the offset top 32 and also holding the bead 34 tightly seated in the conforming channel 38.

The cap 30 is formed from the same material as the nozzle 29 and is integrally connected by the strap 31 with the base 35. The cap skirt 42 is provided with a groove 43 and the nozzle 29 with a rib 44 receivable in said groove to normally hold the cap tightly closed. The resiliency of the cap, however, allows the skirt to expand and clear the rib 44 when the cap is pulled upwardly. When re-closing the cap, the rib 44 cams the skirt 42 outwardly and it then returns to normal diameter with a snap action and holds the cap tightly closed. The skirt 42 and the nozzle 29 are slightly tapered for tight contact. Also, the cap has an integral conical boss 45 to tightly close the nozzle discharge opening 46. Thus, there is no danger of leakage.

Due to the mounting of the nozzle on the upwardly offset disk portion 28 of the end closure E, no appreciable amount of liquid need remain in the container, as said offset portion forms a sump or well when the container is inverted, the last of the liquid will run into this sump or well, and almost all of this liquid can be discharged through the nozzle.

Instead of following the method steps above described, somewhat different procedure may be employed, as follows.

The blank 1 is cupped and provided with the formations 2, 4, 5, 6 and 7 and with an outwardly projecting flange having a downturned outer edge. However, instead of disposing this flange at a widely acute angle to the chuck wall 2 as in FIGURE 4, it is disposed at a right angle to said chuck wall. The downturned edge of the flange is then curled downwardly and inwardly into substantially semi-circular form in radial section instead of into the ovate form shown in FIGURE 5. The shaped unit then has the formation shown in FIGURE 10, in which the flange is denoted at 3b and its curled edge at 9b. The procedure employed in producing this flange 3b and its curled edge 9b may be substantially the same as that employed in providing a corresponding formation on a conventional can end closure. However, a conventional closure unit with this formation is in readiness for seaming onto a can wall, whereas further shaping steps are performed to prepare the closure unit of the present invention for seaming onto the can wall. These additional steps consist of downwardly bending the flange 3b into acute angular relation with the chuck wall 2 and bending the curl 9b into somewhat ovate form, as seen in FIGURE 11, a die press being employed to perform these operations.

The press comprises a lower die 50, a plunger die 51, and a third die 52 slidably surrounding said plunger die, as seen in FIGURES 10 and 11. The lower die 50 has a horizontal surface 52 to support the peripheral portion of the disk 1 and an upstanding wall 54 surrounding said surface 53, said wall 54 having a conical outer peripheral surface 55 and a radially narrow portion 56 projecting upwardly beyond said conical surface to engage the bend 8b which joins the flange 3b to the chuck

wall 2. Internally, the wall 54 is shaped in approximate conformity with the chuck wall 2. The plunger die 51 is similarly shaped externally and has a lower end surface 57 to clamp the disk 1 against the surface 53. This die 51 also has a downwardly facing shoulder 58 to clamp the bend 8b against the curved upper edge of the wall portion 56. The third die 52 has a downwardly flared inner surface 59 to bend the flange 3b downwardly and to coact with the conical surface 55 in bending the curl 9b into ovate form as seen in FIGURE 11. Both surfaces 55 and 59 are preferably at about 40° to the common axis of the dies.

The same press is employed for both the top and bottom end closures, and it will be, of course, understood that the nozzle mounting portions of the upper closures and the domed portions of the lower closures may be formed at any time prior to operation of said press upon said closures.

The completed closure unit is seamed onto the can wall W by means of a seaming machine which embodies a chuck 60, a first operation seaming roll 61 (FIGURE 12) and a second operation seaming roll 62 (FIGURE 13). These rolls have peripheral ledges 61a and 62a, respectively, to underlie and contact with the curl 9a, thereby relieving the flexible wall W of the downward thrust of the chuck 60 during the seaming operations and also giving better control of the curl by preventing it from creeping downwardly out of proper relation with the shoulder 7 during said operations.

The first operation roll 61 clinches the flange 3b sufficiently to slightly embed the bead 10 in the yieldable container wall and inwardly deform this wall somewhat, as seen in FIGURE 12. The second operation roll 62 then converts the flange 3b into the beaded skirt 3 above described. During the operation of this roll, the pressure exerted, further closes the curl 9b and embeds the bead 10 in the wall W but the inner bead wall 11 yields under the pressure to prevent it from injuring said side wall. The complete assembly has the compressed portions 16 and 17 previously described: and the same tenacious and leak-proof union between side wall and end closure exists.

The provision of the sump or well in the container top closure and defined by the offset disk portions 28 and 32 provides a marked advantage in permitting a discharging of all of the liquid from the container in the manner previously described. If desired the top portion 32 herein shown flat may even be shaped at an upwardly and inwardly sloping angle, say of fifteen degrees, thereby to additionally assure the discharging of virtually all of the liquid collecting in the sump or well when the container is inverted.

From the foregoing, it will be seen that novel provision has been made for attaining the desired ends.

I claim:

1. In a container, an end closure having a closure disk and a chuck wall connected therewith; said chuck wall having an outer portion of substantially uniform diameter, an inner end portion of reduced diameter and merging inwardly to said disk, and a shoulder at the juncture of said outer portion with said reduced inner end portion; said end closure also having a peripheral skirt and a bight connecting one end of said skirt to said outer portion of said chuck wall, the free end of said skirt being curled inwardly and forming a hollow bead opposed to said reduced inner end and said shoulder of said chuck wall, the diameter of said skirt being gradually decreased from said bight and said bead to

the mid-length of said skirt and providing this skirt with a portion which diverges from said outer portion of said chuck wall toward said bight; and a yieldable container wall having one end confined between said chuck wall and said skirt, the outer surface of the outer portion of said chuck wall being aligned with the inner surface of the main portion of said container wall and the upper part of said container wall engaged with said chuck wall outer portion being aligned with the part of said container wall disposed below said end closure, said container wall having an intensively compressed portion held by said bead against said shoulder and said reduced end of said chuck wall, the curled end of said skirt after forming said hollow bead terminating in spaced relation with the adjacent portion of said skirt for yieldable contact of said bead with the container wall, said container wall having a second compressed portion resiliently held between the diverging portions of said chuck wall and skirt and conforming thereto with the upper portion of said container wall being of a wedge shaped cross section.

2. A structure as specified in claim 1; the bead being of ovate form in radial section; said shoulder being flared from said reduced end of said chuck wall to said outer portion of said chuck wall, the flare of said shoulder being substantially unidirectional with the inner side of said ovate bead.

3. A container end closure for seaming to one end of a yieldable container wall, said closure having a closure disk and a chuck wall connected therewith; said chuck wall having an outer portion of substantially uniform diameter, an inner end portion of reduced diameter and merging inwardly to said disk, and a shoulder at the juncture of said outer portion with said reduced inner end portion; said end closure also having a peripheral skirt and a bight connecting one end of said skirt to said outer portion of said chuck wall, the free end of said skirt being curled inwardly and forming a hollow bead, said skirt being in diverging relation with said chuck wall to permit easy reception of an end of the container wall between said skirt and said chuck wall, said skirt being of such length that said bead will compress the container wall against said reduced end and shoulder of said chuck wall when said skirt is inwardly clinched, the curled end of said skirt after forming said hollow bead terminating in spaced relation with the adjacent portion of said skirt for yieldable contact with the container wall, and said bead being of ovate form in radial section.

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