Dec. 17, 1968 J. R. HOENIG 3,416,702

REINFORCED METALLIC CONTAINER

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FIG. 1

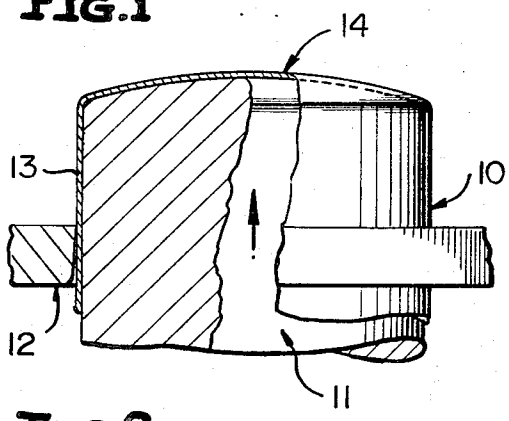

FIG. 2

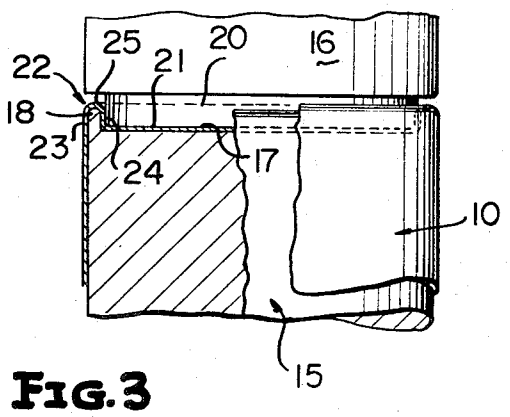

FIG. 3

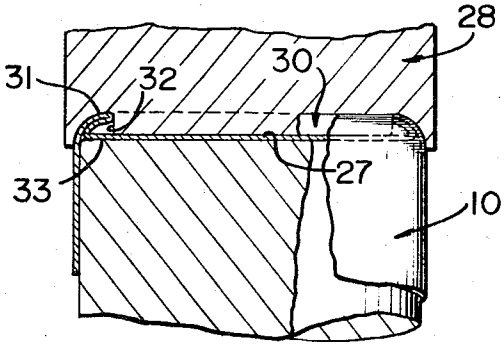

FIG. 4

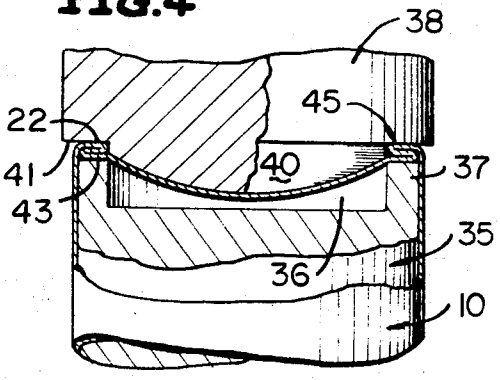

FIG. 5

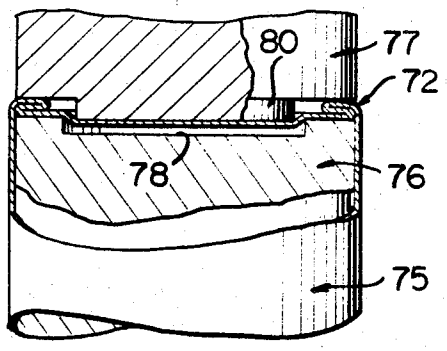

FIG. 6

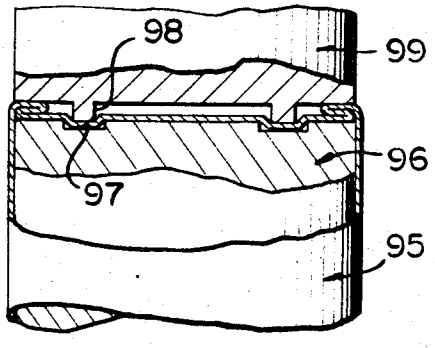

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FIG. 7

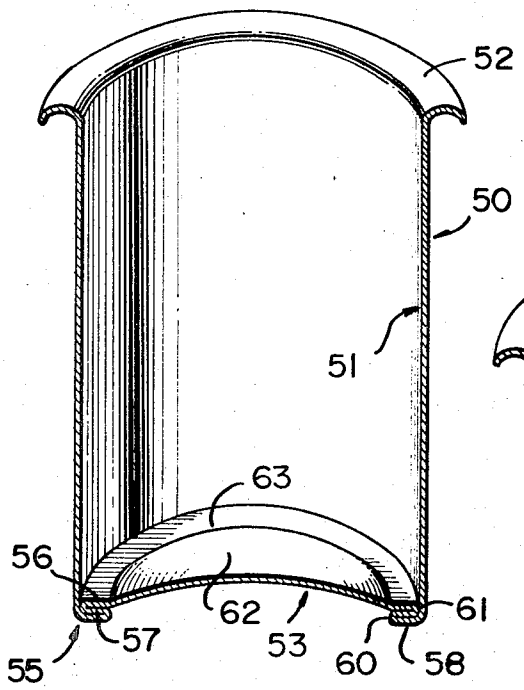
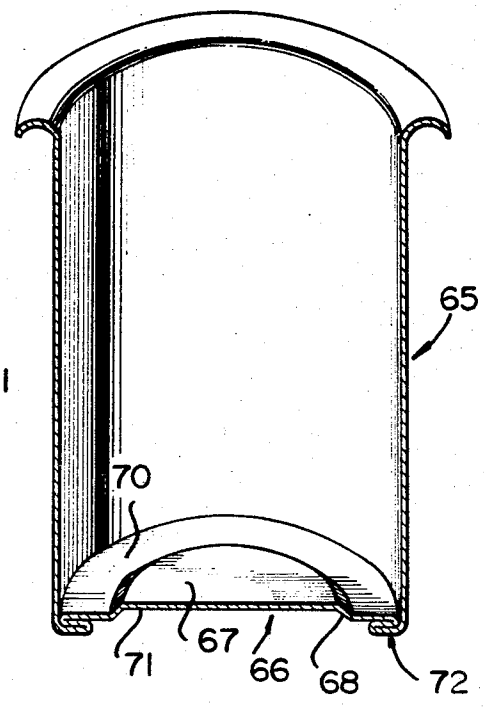


FIG. 8



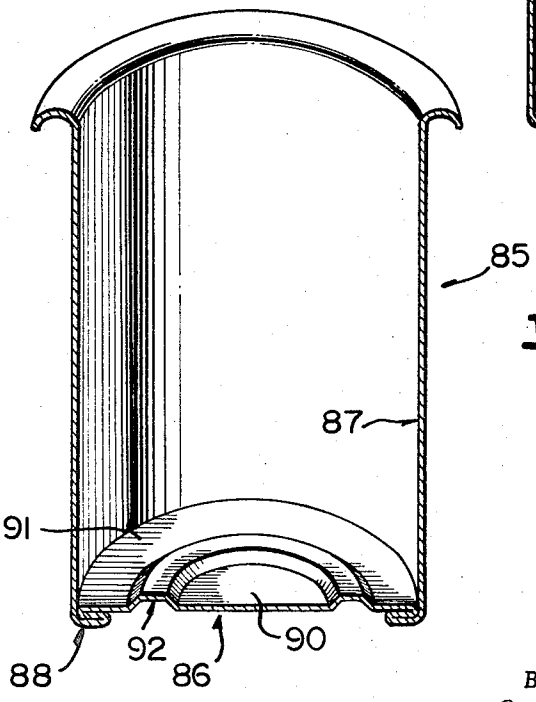


FIG. 9

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REINFORCED METALLIC CONTAINER

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Filed May 13, 1966, Ser. No. 549,907
2 Claims. (Cl. 220—70)

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a one-piece extruded metallic container having reinforcing means at a juncture of the container body and an integral end closure, the reinforcing means being defined by three annular layer portions disposed in generally parallel relationship to each other and housed completely radially inboard of the container body outer circumference.

Heretofore, most conventional metallic containers have been constructed from at least three pieces of metallic material, such as tinplate. These components include two suitably contoured closures or ends and a tubular container body provided with radially outwardly directed flanges at axially opposite open end portions thereof. One of the closures is secured to the container body by, for example, a conventional double seam after which a desirable product is packaged in the container and the second closure is thereafter secured to the remaining open end of the container.

Such conventional two-piece metallic containers, i.e., a separate container body and a separate closure secured thereto, are relatively inexpensive to manufacture but present numerous disadvantages which are overcome by the one-piece container of this invention. For example, the container body of conventional containers is generally constructed from a rectangular piece of sheet material which is formed to a tubular configuration and the longitudinal edges thereof are secured together as by, for example, a soldering or welding operation. In containers of this type, the blanks are suitably decorated, except for the longitudinal edges which must be maintained free of any type of decorating material to achieve an effective soldered or welded seam. The absence of decorative material along the seam, therefore, detracts from the overall esthetic appearance of the container body, as compared to seamless container bodies of the one-piece type to which this invention is directed.

Another disadvantage of such conventional two-piece containers is the necessity of flanging each end portion and securing a closure to each end, as opposed to performing but one flanging and seaming operation to secure but one closure to a one-piece container body.

While one-piece containers possess the heretofore noted and other advantages, one disadvantage stems from the fact that such one-piece containers are generally constructed from relatively ductile material, such as aluminum, which is relatively weak and readily deformable under the influence of impact shocks or under the influence of pressure-buildup, as in the case of containers packaged with beer or similar pressurized media. Pressure within such container bodies tends to cause the bottom end closures thereof to "pop" to an outwardly convex configuration making it virtually impossible to stand the containers in a normally upright position.

In keeping with the above, it is a primary object of this invention to provide a novel one-piece metallic container which overcomes the above and other disadvantages by means of peripheral reinforcing means at a juncture of a lower end portion of the container body and an integral lower closure which serves to reinforce the

container body and precludes the conventional popping of the lower closure of such conventional containers.

A further object of this invention is to provide a novel one-piece metallic container of the type heretofore described wherein the reinforcing means is defined by at least three annular portions which are disposed in generally parallel relationship to each other in planes normal to the container axis with the reinforcing means underlying a portion of the lower closure to prevent accidental deformation of the container under impact loads or popping of the lower closure under the influence of a pressurized product packaged in the container.

A further object of this invention is to provide a novel one-piece metallic container of the type heretofore described wherein the lower closure is additionally reinforced by a recessed central portion of the closure which augments the function of the reinforcing means in preventing the deformation of the container in the manner heretofore noted.

A further object of this invention is to provide a novel method of constructing a one-piece metallic container of the type heretofore described, the method including the steps of recessing a central portion of a cup-shaped container body blank to form an axially directed peripheral bead opening toward the interior of the blank, folding the peripheral bead radially inwardly into generally overlying relationship to the end wall, and forcing the bead axially into contact with the end wall whereby the bead underlies a portion of the end wall and prevents the latter from being deformed under the influence of internal or external forces applied to the container.

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 claimed subject matter, and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a fragmentary side elevational view with parts broken away for clarity of a male die, and diagrammatically illustrates an initial step in forming a reinforced one-piece container of this invention.

FIGURE 2 is a fragmentary side elevational view with parts broken away for clarity of a pair of cooperative dies, and illustrates the formation of an axially projecting bead at a juncture between an end panel and a body wall of the blank.

FIGURE 3 is a fragmentary side elevational view with part broken away for clarity of another pair of dies, and illustrates the bead turned radially inwardly toward a position overlying a portion of the end panel.

FIGURE 4 is a fragmentary side elevational view with parts broken away for clarity of another pair of dies, and illustrates the final step of flattening the bead and forming a recessed end panel.

FIGURE 5 is a fragmentary side elevational view with parts broken away for clarity, and illustrates another pair of dies for forming a modified end panel in another reinforced one-piece container.

FIGURE 6 is a fragmentary side elevational view with parts broken away for clarity of another pair of dies, FIGURES 1–4 of the drawings, and illustrates the final being formed in an end panel of the container.

FIGURE 7 is a longitudinal sectional view taken through a one-piece metallic container constructed in accordance with the steps diagrammatically illustrated in FIGURES 1–4 of the drawings, and illustrates the final configuration of the container.

FIGURE 8 is a longitudinal sectional view taken through the one-piece container of FIGURE 5, and illustrates the final configuration thereof.

FIGURE 9 is a longitudinal sectional view taken

through the container of FIGURE 6, and illustrates the final configuration thereof.

Referring to FIGURES 1–4 of the drawings, a one-piece metallic container body blank **10** of a generally cup-shaped configuration is illustrated being carried by a male die **11** in the direction of the unnumbered headed arrow through a cooperative female ironing die **12**. The blank **10** is preferably constructed from aluminum or similar relatively ductile material which is initially impact-extruded to the cup-shaped configuration thereof and is thereafter drawn through one or more drawing or ironing dies (not shown), corresponding to the die **12**. During the passage of the blank **10** through the one or more ironing dies **12**, a generally cylindrical body wall **13** of the blank **10** is "ironed" to the desired wall thickness of the final container. At this point of the process an integral closure **14** is outwardly convexly curved and is generally complementary to a similarly contoured axial end portion (unnumbered) of the male die or plunger **11**.

The body blank **10** is thereafter removed from the die **11** by a conventional stripping mechanism (not shown) and is transferred to another die **15** which is normally spaced from a cooperative die **16**. With the dies **15**, **16** in spaced relationship, the blank **10** is externally telescopically seated upon the die **15** in the manner readily apparent from FIGURE 2 of the drawings. The die **15** includes a generally circular recess **17** and an axially directed peripheral rib **18** which are contoured to receive a reduced circular boss portion **20** of the die **16**. The distance between the outer surface of the boss portion **20** and the inner surface of the axially projecting rib **18** is sufficient to receive the thickness of the end closure **14**, as is clearly illustrated in FIGURE 2.

As the dies **15**, **16** are moved relatively toward each other, the boss portion **20** contacts the end closure **14** of the blank **10** and progressively recesses a central portion **21** thereof to define an axially projecting bead, generally designated by the reference numeral **22**. The bead **22** includes an outermost peripheral wall portion **23** defined by a continuation of the body wall **13**, an innermost peripheral wall portion **4** and a radius portion **25** opening toward the interior of the blank **10**.

After the bead **22** has been formed from the material of the blank **10** generally at the juncture between the body wall **13** and the end closure **14**, the dies **15**, **16** are opened and the blank **10** is removed and repositioned in external telescopic relationship to anothr die **26** (FIGURE 3). The die **26** is similar to the die **11** but includes a relatively flat axial end face **27**. The die **26** is in axial alignment with another die **28** having an annular groove **30** which opens toward the die **26**. The groove **30** is defined by a gradually curved forming shoulder **31** and an annular wall **32**.

As the dies **26**, **28** are moved toward each other by means (not shown), the radius portion **25** of the bead **22** progressively contacts the forming shoulder **31** of the die **28** and is gradually directed radially inwardly into overlying relationship to an annular portion **33** of the end closure **14**. At the completion of this forming step, the wall portions **23**, **24** of the bead **22** are in generally contacting relationship, the bead **22** is closed and the radius portion **25** thereof is in contact with the annular wall **32** of the die **28** which serves as a stop to prevent further radial inward movement of the bead **22**.

The dies **26**, **28** are thereafter opened, the blank **10** is removed from the die **26** and is placed in external telescopic relationship to another die **35** (FIGURE 4) having a generally circular recess **36** and an axially projecting rib **37** terminating in an axial end face (unnumbered). The die **35** is normally spaced from a die **38** which includes a reduced concave boss portion **40** and an annular shoulder **41**. As the dies **35**, **38** are reciprocated toward one another by means (not shown), the central portion of the end closure **14** is contoured to a generally axially outwardly opening concave configuration while the bead **22** is flattened against a peripheral edge portion **43** of the closure **14** by the annular shoulder **41** and the axially end face (unnumbered) of the axially projecting rib **37**. The three wall portions **23**, **24** and **43** thus define reinforcing means, generally referred to by the reference numeral **45**, at the juncture of the body wall **13** and the end closure **14**.

The dies **35**, **38** are then moved away from each other, the blank **10** is removed and is subsequently trimmed and flanged by conventional means to conclude the formation of the now completed one-piece container of FIGURE 7, which is generally designated by the reference number **50**.

The container **50** is illustrated in the normal upright position in FIGURE 7 of the drawings, and includes a generally cylindrical container body **51** having a radially outwardly directed peripheral flange **52** at an upper end portion (unnumbered) and an integral end closure **53** remote from the flange **52**. Peripheral reinforcing means, generally designated by the reference numeral **55**, correspond to the reinforcing means **45** of the body blank **10** and are defined by a multi-layer structure formed by folding the material of the blank **10** in the manner heretofore described relative to FIGURES 1–4 of the drawings. The reinforcing means **55** includes three annular portions **56–58** disposed in generally parallel relationship to each other with each annular portion being disposed in a plane generally normal to the container body axis and housed completely radially inwardly of the container body **51**. The axially outermost annular portion **58** is joined by a peripheral radius portion **60** to the intermediate annular portion **57** while the axially innermost annular portion **56** is similarly joined by a peripheral radius portion **61** to the intermediate annular portion **57**. The annular portions **57**, **58** correspond to the annular portions **24**, **23** of the bead **22** (FIGURE 2) while the annular portion **56** correspods to the wall portion **43** of the blank **10** (FIGURE 4). The annular portion **56** is formed from a peripheral edge portion of the integral closure **53** and is joined to an axially outwardly concavely contoured central panel **62** by a peripheral juncture **63**.

While the material of the container **50** is relatively thin, the peripheral reinforcing means **55** provides ample reinforcement of the lower end portion (unnumbered) of the container body **51** both against externally and internally applied forces. Any tendency of the central panel **62** to pop to a convex position is resisted by the reinforcing means **55** which is readily immovable in a radially outward direction. That is, without the reinforcing means **55** internal pressure would tend to expand the lower portion of the container body **51** radially outwardly resulting in the popping of the central panel **62** which is, of course, precluded by the relatively rigid nature of the reinforcing means **55** and the location thereof wholly radially internally of the container body **51**.

Another one-piece metallic container constructed in accordance with this invention is fully illustrated in FIGURE 8 of the drawings, and is generally designated by the reference numeral **65**. The container **65** is substantially identical to the container **50** except for the particular construction of an integral bottom closure **66** thereof. The closure **66** includes a generally circular central panel **67** joined by an inclined annular wall **68** to an outermost peripheral end portion **70**. The end panel **67** and the frusto-conical wall **68** thereby define a generally frusto-conical recess **71** opening axially outwardly of the lower end portion (unnumbered) of the container **65**. The remaining unnumbered components of the container **65**, including a peripheral reinforcing means **72**, are identical to the corresponding components of the container **50**, and a further description thereof is deemed unnecessary for a complete understanding of the container **65**.

Referring now to FIGURE 5 of the drawings, the container **65** is constructed from a container body blank **75** which is initially identical to the blank **10** of FIGURE 1 of the drawings. The blank **75** is identically formed be-

tween the dies **11**, **12**, **15**, **16** and **26**, **28**. However, after being formed to the configuration of the blank **10** of FIGURE 3 between the dies **26**, **28**, the blank **75** is removed from the die **26** and is externally telescoped upon a die **76** which is normally axially spaced from a die **77**. The die **76** includes a generally circular shallow recess **78** in axial alignment with an axially projecting boss portion **80** of the die **77**. During the relative movement of the dies **76**, **77** toward each other, the boss **80** urges the material of the closure **66** partially into the recess **78** to form the reinforced central end panel **67** and the annular wall **68**. This same relative movement between the dies **76**, **77** flattens the free unnumbered peripheral wall portions to form the reinforcing means **72**. Thereafter, the body blank **75** is removed from the die **76**, is trimmed and the upper end portion is flanged to form the final container **65** of FIGURE 8.

A further one-piece metallic container constructed in accordance with this invention is illustrated in FIGURE 9 of the drawings, and is generally designated by the reference numeral **85**. The container **85** is identical to the containers **50**, **65** except for the particular configuration of an integral bottom closure **86** which is joined to a container body **87** by peripheral reinforcing means **88** corresponding in structure and function to the reinforcing means **55**, **72** of the respective containers **50**, **65**. As opposed to recessing the central panel of each of the containers **50**, **65**, a central panel **90** of the closure **86** is not recessed and is in a common plane with a peripheral end portion **91**. An annular axially outwardly opening bead **92** is, however, formed in the closure **86** to reinforce the same in the manner of the end panels **62**, **67**.

The container **85** is formed from a blank **95** which initially corresponds identically to the configuration of the blank **10** of FIGURE 1. The blank **95** is similarly formed by the dies **11**, **12**, **15**, **16** and **26**, **28**. However, after being formed between the dies **26**, **28**, the blank **95** is removed from the die **26** and is externally telescoped upon a die **96** (FIGURE 6). The die **96** includes an annular axially outwardly opening groove or channel **97** which is in axial alignment with an axially projecting annular rib **98** of a die **99**. The dies **95**, **99** are movable relative to each other in the same manner as the dies **76**, **77** and during the relative movement of the dies **96**, **99** toward each other, the axially projecting rib **98** urges the material of the integral closure **86** into the channel **97** to form the annular reinforcing bead **92**.

I claim:

1. A one-piece metallic container comprising a one-piece drawn metallic container body having axially opposite upper and lower end portions, one of said end portions being closed by an integral closure, and peripheral reinforcing means at a juncture of said one end portion and said integral closure, said reinforcing means being defined by a multi-layer structure formed by folding the material of said container upon itself, said reinforcing means including at least three annular portions disposed in generally parallel relationship to each other, an axially outermost one of said annular portions being integrally joined to said body lower end portion, an axially innermost one of said annular portions being integrally joined to a peripheral edge portion of said integral closure, radially opposed peripheral portions joining an intermediate one of said annular portions to said axially innermost and outermost annular portions, and said peripheral wall portions each being disposed normal to the container body axis and housed completely radially inwardly of the container body outer circumference.

2. The one-piece metallic container as defined in claim **1** wherein said integral closure includes an end panel, and said end panel includes a portion reinforced by outwardly opening recess means.

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U.S. Cl. X.R.

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