Feb. 28, 1967 J. H. LEMELSON 3,306,488

CONTAINER AND LINER THEREFOR

Filed Dec. 27, 1965

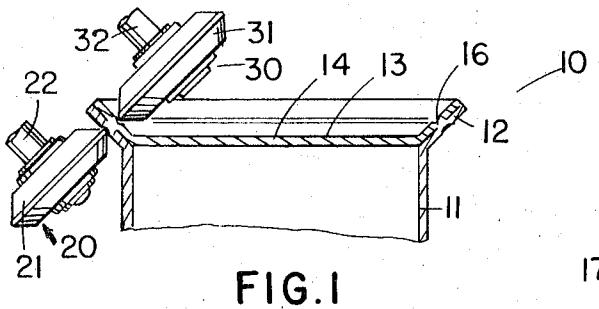


FIG. 1

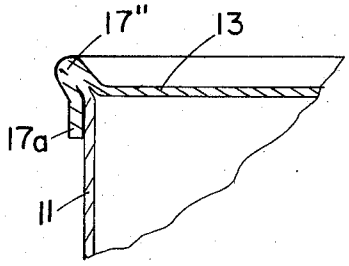


FIG. 3

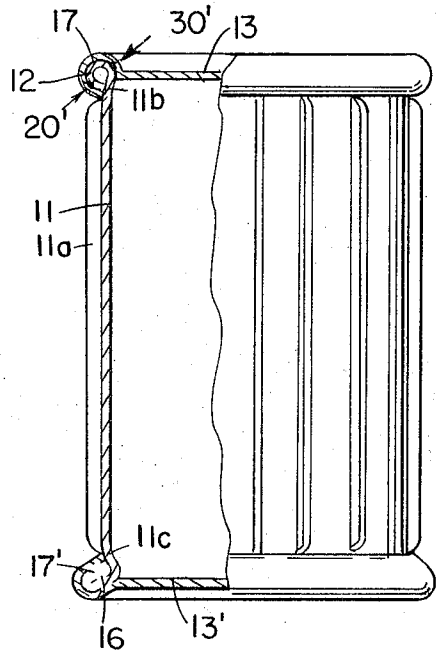


FIG. 2

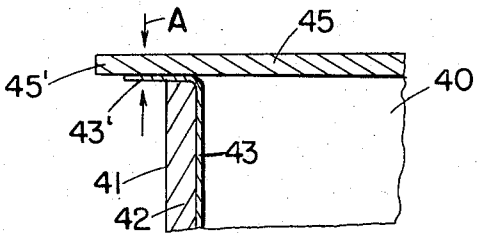


FIG. 4

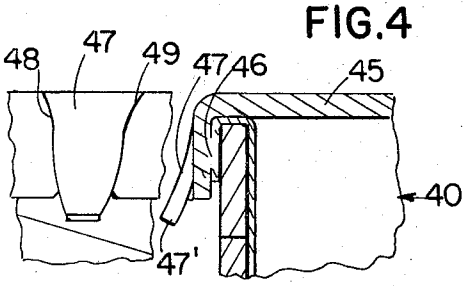


FIG. 6 FIG. 5

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CONTAINER AND LINER THEREFOR

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10 Claims. (Cl. 220—63)

This invention relates to improvements in the structure and manufacture of containers and is a continuation-in-part of copending application Serial Number 142,333 filed October 2, 1961, for Container and Method of Manufacture having as a parent application Ser. No. 691,622 filed Oct. 22, 1957.

It is a primary object of this invention to provide new and improved structures in containers of the canister variety and improved methods of manufacturing same.

Another object is to provide improved structures in containers made of metal and wall reinforcing means therefor.

Another object is to provide an improved method of fabricating and assembling containers.

Another object is to provide an improved method of securing and sealing an end wall to a container such as a metal can.

Another object is to provide improved techniques for fabricating containers of non-ferrous, pressure-weldable, metal, such as aluminum.

With the above and such other objects in view as may hereinafter more fully appear, the invention consists of the novel construction, combination and arrangement of parts which will be hereinafter more fully described and illustrated in the accompanying drawings wherein are shown embodiments of this invention and it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

FIG. 1 is a partial view taken in cross section of a container made in accordance with the teachings of this invention and also illustrates means for sealingly closing the container;

FIG. 2 is a cross sectional view of a portion of a modified form of the container illustrated in FIG. 1 with parts broken away for clarity;

FIG. 3 is a view taken in cross section of a portion of a container of the type illustrated in FIG. 1 having a bead formed in the rim of the container which is different from that of FIG. 2;

FIG. 4 is a view taken in cross section of a portion of a container having components similar to FIG. 1 but modified as hereinafter described;

FIG. 5 is a view of the fragment of the container of FIG. 4 showing the closure therefor welded and deformed over the rim of the side wall; and

FIG. 6 is a side view of FIG. 5.

In FIG. 1 is shown a portion of a container made of metal or plastic and defining a so-called can or canister. The container **10** comprises a side wall **11** of substantially cylindrical shape, the upper end of which is illustrated as having a flange **12** formed therein, which flange is shown in abutment with the peripheral portion **15** of a disc-shaped end wall **13** having a central portion **14** defining the end wall of the container assembly. The peripheral portion **15** is shown welded to the flange **12** and, thereafter may be rolled or bent to define a beaded formation such as illustrated in FIGS. 2 and 3 which beaded formation serves to reinforce the side and end walls of the container and also as a means for facilitating opening of the container.

If the side wall and end wall of container **10** are made of a weldable material such as steel or aluminum or a conventional thermoplastic polymer, the abutted flange

and peripheral portions **12**, **15** may be easily welded together by means of rolling dies such as those of the illustrated die assemblies **20** and **30**. Said die assemblies each include respective welding wheels **21** and **31** mounted on shafts **21** and **32** which extend outwardly from a drive means for simultaneously rotating the dies so as to ascribe a circular path around the periphery of the abutted portions **12** and **15** to provide a circular weld line **16** therein.

Simultaneously with or subsequent to such welding action, the die assembly illustrated or other suitable means may be opeartive to bend or roll a bead of the welded portions **12** and **15**. Welding may also be effected after the abutted portions **12** and **15** are rolled or bent into a beaded formation as described hereafter.

A similar operation to that illustrated in FIG. 1 for welding and beading the upper end of a can may also be provided at the lower end of the can between a closure similar to **13** and a flanged portion of the side wall. Depending on the material or materials utilized for wall members **11** and **13**, the welding dies **20** and **30** may be operative in a number of different modes. For example, if the materials of which members **11** and **13** are made, comprise ferrous metal such as steel or coated steel, the die wheels **21** and **31** may comprise electrodes of a resistance welding fixture and are operative to effect a circular resistance weld between flange **12** and rim portion **15** prior to the beading operation. If the material comprising members **11** and **13** is a non-ferrous metal such as aluminum, die wheels **21** and **31** may be urged towards each other with sufficient force to effect a cold pressure molecular bond or weld **16** extending in a circular path between the peripheral portions of side wall **11** and end wall **13**. In a third technique, wheels **21** and **31** may be ultrasonic transducers or may be ultrasonically vibrated while compressed against portions **12** and **15** of members **11** and **13** so as to effect a circular line or band ultrasonic weld at the interface of the members. In a fourth technique, if members **11** and **13** are made of a thermoplastic polymer or are coated along those areas of portions **12** and **15** which abut each other with a thermoplastic material, then die wheels **21** and **31** may be resistance or inductively heated a sufficient degree to permit the interfacial welding along weld line **16** of the members **11** and **13** together. If members **11** and **13** are made of a polymer such as rigid polyvinylchloride or are respectively coated with such a polymer, then the die members **21** and **31** may be electrodes of an apparatus applying radio frequency energy thereto for interfacially welding the two together along circular weld line **16**.

In FIG. 2 a container of the type illustrated in FIG. 1 is shown wherein the cylindrical side wall **11** has end walls **13** and **13'** secured thereto by the technique illustrated in FIG. 1 but embodying the further procedure of beading the protruding welded flange portions described. The end wall **13** is shown having its border or peripheral rim welded to the flange **12** of cylindrical member **11** with the two welded portions which ordinarily protrude laterally outward from the side wall, being rolled to define a circular beaded formation at the rim of the can. The beaded formation serves not only to secure the welded portions together by mechanical means but also defines a reinforcement for the rim of the can and means for engaging said can with a conventional can opener. The beaded formation **17** is shown as substantially circular in shape although it may have any suitable shape in accordance with conventional can beading techniques.

Another feature of the can assembly illustrated in FIG. 2 is the provision of a plurality of reinforcing rib formations **11***a* formed integral with the side wall **11** and extending outwardly therefrom laterally around the cylin-

drical side wall and preferably in a direction parallel to the longitudinal axis of the cylinder defining said side wall. The reinforcing rib-formations 11*a*, in a preferred form of the invention, are provided by extruding same during an operation in which the entire side wall 11 of the container is extruded as a cylindrical tube or as a flat member which is later rolled into the shape of a cylindrical tube.

In order to provide the end flanges at both ends of the cylindrical side wall 11 of the container, the ribs 11*a* are either extruded in situ on the cylindrical side wall only along the central portion thereof or, in a second technique, said ribs are machined at their ends so as to provide rib-free cylindrical portions 11*b* and 11*c* at both ends of the member 11 from which the flange formations 12 may be bent or spun. A so-called stop-extrusion technique as described in my U.S. Patent Re. 25,570, may be employed to provide a cylindrical or otherwise shaped tubular member or sheet having a flat portion such as the base of sheet 11 and a plurality of rib-like formations such as 11*a* which do not extend the length of the tubular or sheet formation but only across the central portion thereof and may be utilized for the side wall of the container of FIG. 2 by performing operations to provide flanges at either or both ends of the formation for the purpose described. Notation 17 refers to the bead, 17′ to the bead. While in FIG. 3, a bead formation 17 is provided in the welded peripheral portions of the flange of the side wall and the end wall of a container by spinning or folding the welding portions back on themselves and then deforming the end portion 17*a* thereof against the side wall 11 of the container. The end portion 17*a* of the welded formation 17″ may be frictionally engaged against the outer surface of the side wall 11 or may be heat sealed or welded thereto during the beading operation.

In FIG. 4, the side wall 41 of a container 40 is made of a laminate of thin plastic or metal such as aluminum or steel forming a liner 43 for an outer wall 42 of metal, cardboard or plastic and the flange portion 44 of liner 43 is shown welded in a circular weld line 46 to the peripheral portion 45′ of a disc-shaped end wall 45 for the container. Liner 43 and outer wall 42 may be bonded or welded together and the container may be further fabricated by deflecting or rolling flange 44 and portion 45′ against the outer surface of 42 or beading same prior to deforming same against said outer surface. Welding or bonding along line 46 between flange 44 and portion 45′ of end wall 45 may be effected by one or more of the techniques hereinabove described.

FIGS. 5 and 6 show further details of the container 40 of FIG. 4 after the rim of the end closure 45 and the flange portion of the liner 43 have been spun or otherwise deflected over and around the rim of the supporting portion 42 of the side wall 41 of the container. Notation 46 refers to a circumscribing weld line provided between the flange 43′ of the liner 43 which weld line is formed by the application of suitable dies in the direction of the arrows A illustrated in FIG. 4 before the peripheral portions 43′ and 45′ of the liner 43 and closure 45 are beaded as hereinbefore described and shown in FIGS. 1–3 or deformed downwardly and against the side wall of the container, as in FIG. 5. Also shown in FIGS. 5 and 6 is a tear opening tab 47 which is an extension of the peripheral portion 45′ of the closure 45 and is defined by an end portion 47′ of said tab which extends outwardly beyond the periphery of the rim of the closure 45. Notations 48 and 49 refer to score or separation lines along the border of the tab 47 which preferably also extend partially or completely through a portion of the end closure 45 in a manner such that when the tab 47 is grasped between the thumb and forefinger of the hand and is pulled upwardly, an opening will be made in the end wall 45 of the container through which liquid or particulate material within the container may be poured or otherwise dispensed. If lines 48 and 49 define a complete severance between the material of the tab and the remainder of the end wall 45, the border portions of the tab may overlap the edge portions of the opening in the end wall 45 which the tab closes and conventional plastic bonding, cold welding or other suitable bonding means may be provided which will tear open by application of a light shearing force thereto when the tab is lifted.

In another form of the invention, the peripheral portion 45′ of the end wall 45 may be rolled or bent per se or in conjunction with the flange portion 43′ of the line of 43 to define a thickened rim or bead similar to that hereinbefore described. Such circular bead may be deformed over and around the end of the outer wall portion 42 of the side wall 41 of the container and compressed against the outer surface thereof to form a closure assembly which is not only securely held in place but is hermetically sealed and may be subject to vacuum packaging of the contents of the container. Conventional aluminum foil lined paperboard containers which have metal closures at the end thereof are not hermetically sealed and may not be so vacuum packaged. Accordingly, the structures illustrated in FIGS. 4 and 5 may be utilized to vacuum or pressure pack the contents of the container at a substantially lower cost than a conventional container using a rigid side wall made entirely of metal.

If the liner 43 is made of aluminum foil it may be pressure welded along the circumscribing circular weld line 46 illustrated. The liner 43 may also be made of tin-plated or aluminum-coated steel foil having a thickness in the range of .002″ or less whereupon the circumscribing circular weld line 46 may be effected by pressure welding the aluminum coating to the aluminum end wall 45 or by resistance welding the steel to a tin-coated steel end wall 45.

It is noted that the structure illustrated in FIG. 4 may be used per se for a container where the liner 43 holds the lid or end wall 45 of the container in place against side wall 41 since the liner is secured to and forms part of said wall. The contents of container 40 are thus hermetically sealed and the container may be opened by lifting upwardly on lid 45 to tear 43 or rupture the weld line between peripheral portions 43′ and 45′ of members 43 and 45.

Further modifications to the structures illustrated in FIGS. 4 to 6 include the following:

(a) The liner 43 may be either inwardly flared or closed at either or both ends thereof and joined by welding or bonding to the abutting surface of the end wall 45 so as to provide a hermetically sealed enclosure for the contents of the container which may be opened by a tearing action during removal of the entire end wall 45 from the side wall assembly 41 when lifted thereoff. Said liner may be in the form of a bag, coating, molding or extrusion of suitable plastic disposed within the cylindrical outer wall portion 42 after the latter has been formed to shape, or during the formation of said outer wall member.

(b) Another embodiment of the invention, the tear strip 47 may be pressure welded or otherwise bonded to the liner so as to create a tear or severance therein when the tear strip is lifted off the end wall of the container thereby exposing the contents of the container permitting them to be dispensed through the opening provided when the tear strip is lifted or removed.

I claim:

1. A container assembly comprising:

a tubular member comprising the side wall of said container,

an end wall joined to said side wall at one end thereof,

said side wall being made of a plurality of sheet materials,

a first of said side wall sheet materials defining a wall portion of tubular shape and providing the major support for said side wall,

a second of said side wall materials provided as a thin sheet liner disposed against and supported by said first sheet wall,

said sheet materials being bonded together to form a unitary lamination defining said side wall,

said thin sheet liner extending beyond said first sheet wall portion at an end thereof, and

a circumscribing seal line between said thin sheet liner and said end wall.

2. A container assembly in accordance with claim 1, said liner defining the inside wall of said tubular member and being outwardly flared and containing said circumscribing seal line with said end wall.

3. A container assembly in accordance with claim 1, said liner and said end wall being deformed over and around the end of said first sheet wall portion of said side wall.

4. A container assembly in accordance with claim 3, wherein said end wall has a pull strip portion operative to sever a portion of the end wall from the remaining portion thereof to define an opening in said end wall to the contents of said container.

5. A container assembly in accordance with claim 2, said liner and said end wall being deformed over and around the rim of said first sheet material of said side wall.

6. A container assembly in accordance with claim 5, including a tear strip assembled with said end wall over an opening therein and bonded along its edges to the material of said end wall adjacent said opening so as to define a closure for said end wall, one end of said tear strip extending beyond the edge periphery of said end wall and terminating at a pull tab portion thereof, said tear strip being welded to said liner and operative when pulled upwardly to sever both said end wall and said liner to expose the contents of said container.

7. A container assembly comprising:

(a) a first wall member,

(b) a second wall member,

(c) said wall members having peripheral portions of each abutting each other,

(d) and a beaded formation formed of said abutting peripheral portions of said wall members for reinforcing said wall members,

(e) the portions of said wall members at the interface of said beaded formation thereof being bonded together in a circumscribing weld to define a unitary gas tight bead structure at the end of said container.

8. A container assembly in accordance with claim 7 having a side wall made from an extrusion of irregular cross section of substantially rigid material, said side wall shaped with a cylindrical base portion, a plurality of annular rib formations protruding outwardly from said cylindrical base portion and each extending parallel to the longitudinal axis of said base portion for reinforcing said side wall, the end portions of said side wall of said container being void of said rib formations, the cross section of said side wall from a point adjacent the upper end to the lower end of said rib formations being substantially constant in area and an end wall joined to one end of said side wall to form a closure for said container.

9. A container assembly in accordance with claim 7 said beaded formation comprising a fold in said abutted peripheral portions of said wall members inward of the periphery thereof, the peripheral portion of said abutted peripheral portions defining a flange extending parallel to and abutting one of said wall members of said container.

10. A container assembly in accordance with claim 7 in which said wall members are made of pressure weldable metal, one of said wall members is substantially cylindrical in shape and defines the side wall of a canister, said beaded formation being at one end of said canister joining the end wall to said cylindrical side wall, and said beaded formation being compressed together in a circumscribing pressure weld.

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