

Jan. 6, 1970

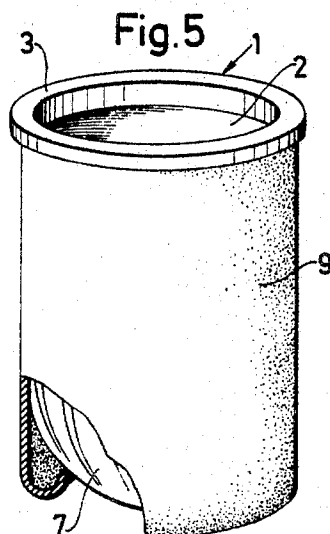
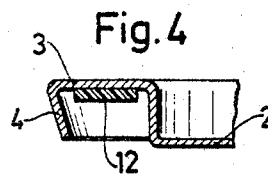
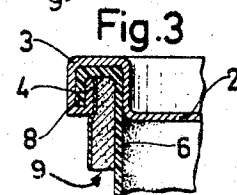
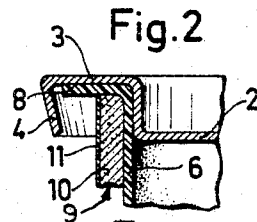
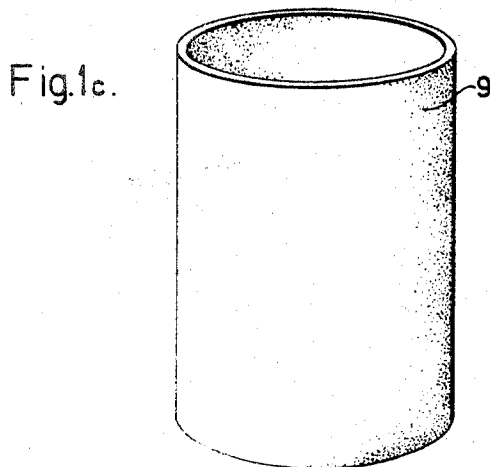
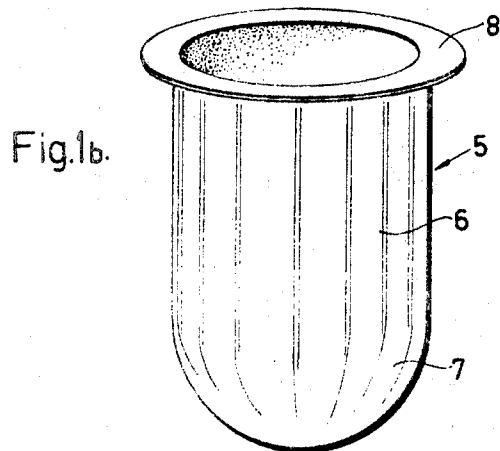
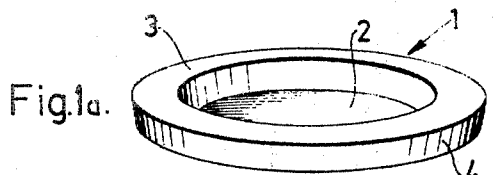
A. R. RAUSING ET AL

3,487,989

CONTAINER

Filed Jan. 8, 1968

3 Sheets-Sheet 1



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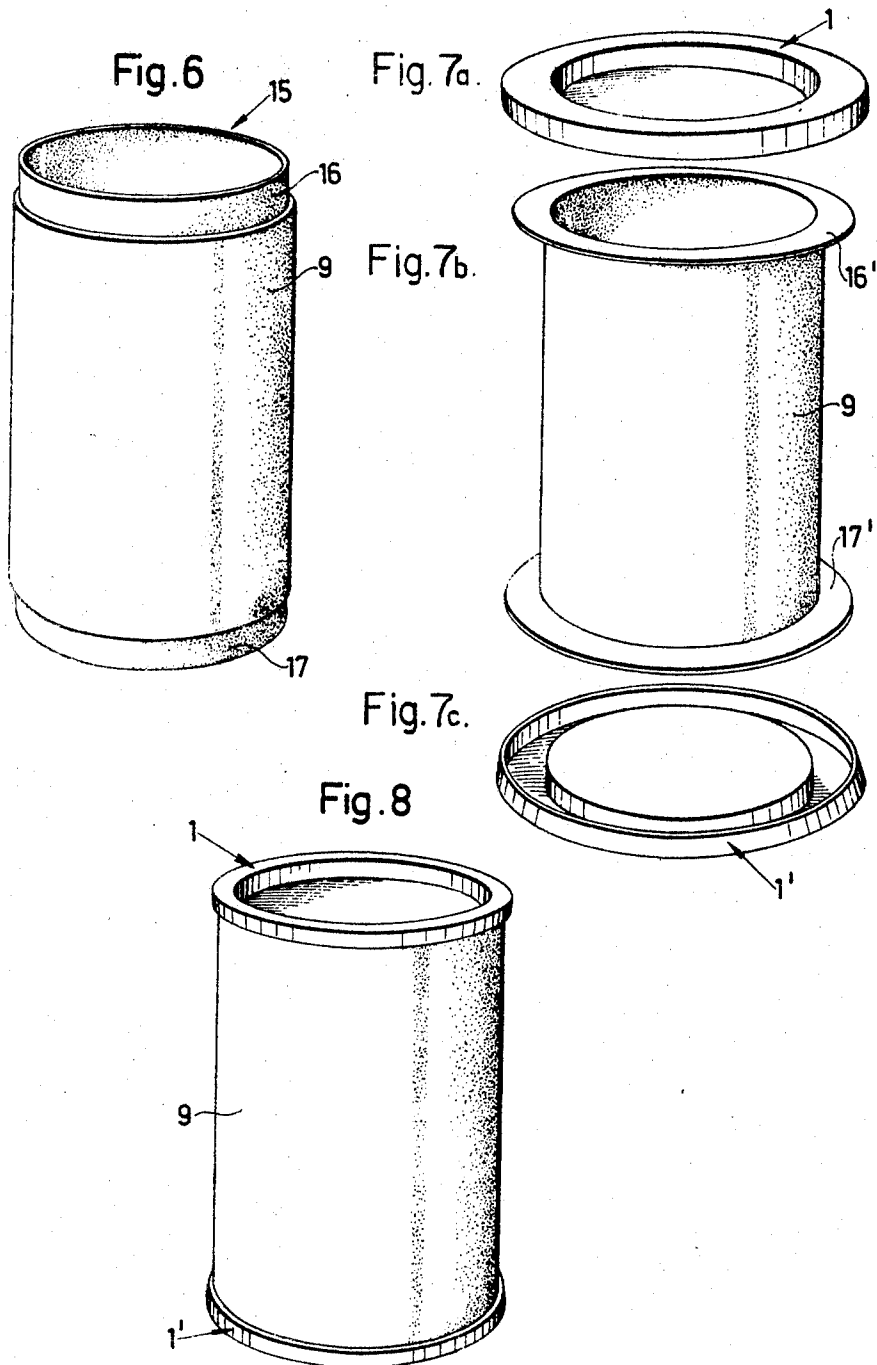
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CONTAINER

Filed Jan. 8, 1968

3 Sheets-Sheet 2



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CONTAINER

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3 Sheets-Sheet 3

Fig. 9

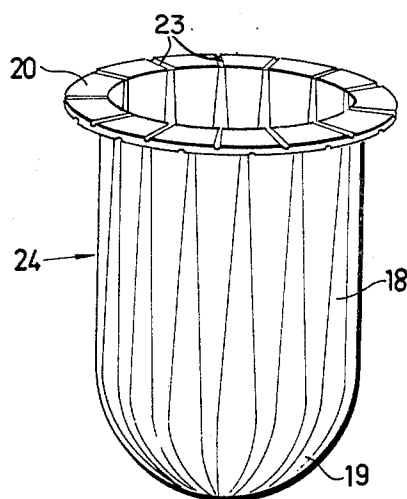
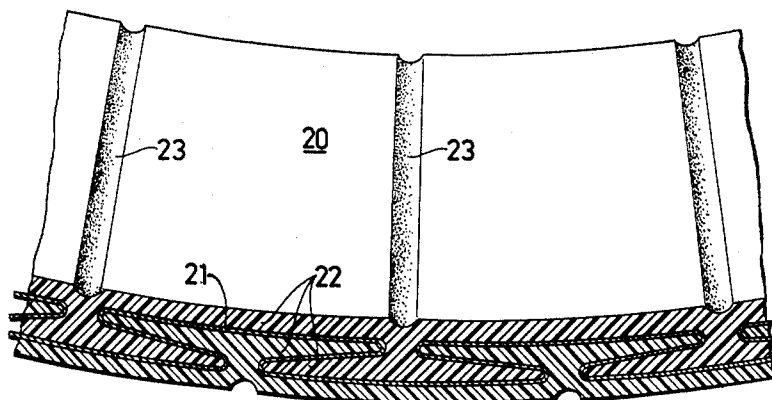


Fig. 10



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CONTAINER

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U.S. Cl. 229—14

8 Claims

ABSTRACT OF THE DISCLOSURE

A container structure for liquid contents comprises a liner of PVC, a comparatively stiff outer sleeve of cardboard or polystyrene and an end wall of seamable material such as sheet metal seamed to an end of the liner which projects beyond the end of the outer sleeve and terminates in a seaming flange.

Containers of glass and/or sheet metal have so far mainly been used within the brewery and canning industries for the packaging of their products. Glass bottles or sheet metal cans have thus been used for beer and other aerated drinks. Although it is possible to produce a glass bottle more cheaply than a can of sheet metal, the latter has been widely used as a result of a number of factors. For example, a metal can is unbreakable, it has a more compact shape and is absolutely leakproof (a certain amount of gas escaping through the cap of a glass bottle must always be allowed for). There has thus been established a big demand for such robust containers, and it appears that the greatest obstacle to a wider use of these metallic containers is their comparatively high cost. Attempts have therefore been made to produce containers of the can type more cheaply by complete or partial use of materials other than sheet metal.

According to an earlier proposed solution, the wall of the cylindrical portion of the container consists of a sleeve of strong cardboard coated on the inside with a thin aluminium film, while the top and bottom of the container are of sheet metal as before. During production of these containers, which are referred to as composite cans in the industry, the sleeve is first inserted into a flanging machine where the edges of the sleeve are folded outwards to as large an extent as is possible without the material of the sleeve bursting. After the sleeve and the lid (or bottom) have been seamed together and the lid folded down along the outside of the sleeve, the sleeve and the lid will be partially seamed together. It has however been found that these composite cans are only suitable for very limited excess pressure in the container. When the pressure in the container exceeds the normal value by only a comparatively small amount, the lid or bottom respectively will be blown off owing to the incomplete folding around the edge of the sleeve.

One of the objects of the present invention is to offer a feasible solution to the problem of making beer containers of the can type cheaper. In the same way as in the case of the above described composite cans, a combination of a sleeve of some cheap material, for instance cardboard, a lid and/or a bottom of sheet metal or some comparable material that is capable of being seamed, and a liner which is leakproof and resistant to the proposed contents, are utilized. The characteristic features of the invention are that the lining extends past the edge(s) of the sleeve and that the projecting portions of the lining are in a leakproof and durable manner seamed together with the lid and/or bottom. The sleeve will in this way be relieved of axial tensile stresses set up by the pressure in

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the container, these tensile stresses being on the whole completely transferred to the lining. Since it is easy to make the lining of such material that can easily be seamed on to the ends and which in addition satisfies requirements as regards tensile strength, leakproofness and resistance to the contents, there arises in this way a possibility of producing a packaging container which, apart from being cheap to produce, also has all the advantages of the can type container.

The lining is preferably made of a plastic material, a combination of several plastic materials, or of a combination of plastic and for instance aluminium. It has been proposed before that beer containers should be produced from polyvinylchloride (PVC) in the shape of two hollow bodies welded to one another. It has further been proposed before that beer containers should be produced that the side of the plastic material which is to form the inside of the container should be varnished with polyvinylidene chloride. Since, however, it is not possible to seal polyvinylidene chloride by conventional welding methods, it has not been possible to apply these principles in practice unless spaces are left in the material for the weld. By the present invention, however, which is not based on welding as the method of closure, it will be possible to make use of the material composition desired, which is one of the advantages of the invention.

In accordance with one preferred constructional form of the invention, the lining consists of a hollow body having a jacket of circular cross section, a hemispherical bottom portion and an opening, the hollow body having been produced by means of deep-drawing flat PVC (which may be covered by polyvinylidene chloride varnish). During the process of deep-drawing, the material is forced into the forming tool, which results in the formation of an outward-turned flange around the opening of the hollow body. This flange, in accordance with the present invention, is used to seam the lining on to the lid. Owing to the fact that the flange is formed right at the beginning, it is possible to save a stage in working operations which otherwise would be difficult to eliminate, and since in addition only one sheet metal end wall is required as against two in the case of the composite cans previously proposed, the use of the prefabricated deep-drawn lining can further reduce the cost of the end product.

In the canning industry also, the predominant packaging materials have so far been glass and sheet metal. This is particularly so in the case of processed foods for several reasons, some of which are the requirement that the packaging material should be absolutely leakproof, the requirement that the material should be capable of withstanding long-term heating in an autoclave, and the requirement that the material should be capable of closure (capable of being welded, usually). A container produced in accordance with one of the constructional forms of the invention satisfies all these requirements. In accordance with this constructional form, the lining consists of a laminate containing, in addition to at least one plastic layer, also a layer, preferably aluminium, that has satisfactory barrier characteristics towards the contents. This composition is capable of withstanding long-term heating without being deformed or damaged in some other way and is also suitable for seaming on to the lid. The lining is preferably produced by folding flat material so as to obtain a hollow shape having a cylindrical portion, a flat or curved bottom and an outward-turned flange around the opening of the body.

The invention will now be more closely explained by reference to the enclosed drawings, of which

FIGURES 1a to c show exploded perspective views of the various components making up the container in ac-

cordance with a first constructional form of the invention, these being

FIG. 1a shows a sheet metal lid,

FIG. 1b shows a lining in the shape of a prefabricated hollow body having a curved bottom, a cylindrical wall and a flange, and

FIG. 1c illustrates a cardboard sleeve.

FIG. 2 shows diagrammatically the starting point of the operation of seaming the sheet metal lid on to the flange of the lining,

FIG. 3 shows the finished connection,

FIG. 4 illustrates how the connection can be supplemented by the use of additional sealing material,

FIG. 5 shows (partially exposed) the finished container in accordance with the first constructional form,

FIGS. 6 and 7a to 7c illustrate the production of a container in accordance with a second preferred constructional form of the invention, in which the material for the lining is initially a tube protruding out of both ends of the sleeve,

FIG. 7a shows a sheet metal lid for this,

FIG. 7b a sleeve with the lining, which has been folded out at both ends, in position, and

FIG. 7c a sheet metal bottom,

FIG. 8 shows the finished container produced in accordance with the second constructional form of the invention,

FIG. 9 shows a lining produced by folding a flat material, and

FIG. 10 shows an enlarged view of the structure of the flange of this lining.

The sheet metal lid 1 shown in FIG. 1a has a flat, somewhat depressed, central portion 2. The depth of this depression has been exaggerated in the figure in order that the nature of the construction may be more easily seen. The lid also has a flange with a back 3 and a shoulder 4 which projects downwards and inwards. The material which is capable of being seamed may also be polystyrene as an alternative to sheet metal, the polystyrene being impact-resistant.

The lining 5 in FIG. 1b consists of a deep-drawn hollow body of PVC which may, on the inside, be varnished with polyvinylidene chloride. The lining has a cylindrical body 6 and a curved, preferably hemispherical bottom 7. The cylindrical portion becomes an outward-turned flange 8 around the edge of the opening.

The outer sleeve 9, FIG. 1a, consists mainly of cardboard 10 but is in addition preferably provided with a label 11, FIG. 2, which extends right up to the upper edge of the sleeve. It is best if the label contains a plastic layer or an aluminium film, or is coated with a plastic varnish, so that sleeve 9 will not become saturated during the filling operation. The sleeve may as an alternative to cardboard consist of extruded polystyrene, which is particularly suitable when the contents of the container are to be pasteurised.

The principles of the seaming together of the lid and the lining should be apparent from FIGS. 2 and 3. The operation will however be further clarified in the following description.

The main body 2 of the lid 1 is situated below the upper edge of sleeve 9. From this lower level (the depth of which, as referred to earlier, has in the figure been exaggerated) the edge zone portion of the lid, together with the uppermost portion of the lining, at first extends upwards to the level of the upper edge of sleeve 9. From this point back 3 runs along the flange 8 of the lining. The shoulder 4 projects past the outer edge of flange 8.

The seaming operation may be carried out by means of conventional seaming machines. In this operation, rollers of the appropriate section are rotated at speed round the edge of the lid, at the same time as they move in towards the center of the can, subjecting it to a spinning action. Since the cold-worked sheet metal can only spring back to an insignificant extent, there is set up a very high pres-

sure between the materials which have been seamed together. It is in this connection of advantage if, in some conventional way, the sheet metal lid is coated with some kind of sealing agent 12, FIG. 4, for instance a compound such as strong plastic PVC, which after seaming will effectively fill all the pores.

As a result of the seaming operation, shoulder 4 of the lid will be folded in underneath the outward-turned flange 8 of the lining, and the back 3 of the lid, together with the said flange 8 and shoulder 4, will be folded down along the outside of sleeve 9 and will also be pressed into the material of the sleeve so that this will be compressed. When the contents of the container exert excess pressure, which may be considerable when the contents are an aerated liquid, all the walls will thus be subjected to an outward force. The outward force acting on the body 6 of the lining will be resisted by the strong outer sleeve 9. As a result of the pressure on the end walls, namely the curved bottom 7 and the lid 1, axial tensile stresses will be set up partly in the cylindrical wall 6 of the lining and partly in the connection between the cylindrical wall and the lid. The former can be countered by means of suitably dimensioning the wall thickness, while the latter is countered by the shape of the connection between the lid and the remainder of the container, which is a characteristic of the invention. As will be appreciated from a study of FIG. 3, sleeve 9 is on the whole completely relieved of axial tensile stresses, which will instead be taken up by the lining which is joined to the lid by means of a very durable connection that may almost be described as a hook-joint.

The appearance of the finished container should be quite clearly apparent from FIG. 5. The lower end of the sleeve is turned inwardly and up and forms the base of the container.

In the constructional form shown in FIG. 8, the material for the lining is initially a tube 15 of the same material in the case of the previous constructional form. The sleeve 9 is the same as before. Portions 16 and 17 of tube 15 project past both ends of sleeve 9. In order that the jointing to the lid and bottom respectively may be facilitated, it is best if portions 16 and 17 are folded outwards to form flanges 16' and 17', FIG. 7b, corresponding to flange 8 in the previous constructional form, which in the case of suitable material will occur spontaneously when heat is applied. A sheet metal lid 1 and a sheet metal bottom 1' of the same kind as the sheet metal lid in the previous constructional form (or alternatively impact-resistant polystyrene or some other material capable of being seamed) is used for the closure of the container.

Since seaming together of the tubular lining 15 and sheet metal end walls 1 and 1' may be carried out in a way analogous to that described earlier, there should be no need for any further description of this process.

A lining 24 for containers which are designed to be used for the packaging of preserved foods is shown in FIG. 9. Owing to the fact that PVC shrinks when heated, this material is not suitable for this purpose. The lining is instead produced from a laminate containing an aluminium layer which possess the required barrier characteristics, and a polyethylene layer on each side of the aluminium layer, the plastic being mainly the reason for the material having a certain mechanical strength. The material is initially flat and is then folded to attain the shape shown in the figure. The surface of the body, namely its curved (or in some cases flat) base 19, cylindrical wall 18 and outward-turned flange 20 will thus exhibit alternating valleys and ridges. In certain cases, viscose cellulose (cellophane) may also be considered as an alternative to aluminium. The pleated liner structure is also disclosed and claimed in a co-pending application Ser. No. 675,549, filed Oct. 16, 1967, now U.S. Patent No. 3,436,007.

An enlargement of portion of flange 20 is shown in

FIG. 10. The aluminium layer, whose fold pattern should with the desired degree of clarity be apparent from the figure, has here been denoted 21. The fold pattern has been fixed by means of melting together the plastic material 22. Owing to the fact that heat and pressure are simultaneously applied over the flange 20, a substantial evening-out of the fold pattern is attained here, but it is difficult to even out completely the material in this way. The remaining depressions in the material have been denoted 23 in FIG. 10. It should be appreciated that these valleys constitute a danger to the leakproofness of the container if the conventional welding is applied, insofar as they may form direct channels between the inside of the container and the surroundings. If however the container is closed by means of a sheet metal lid (or in some corresponding manner) in the way described in the foregoing, namely by the use of appreciable compressive forces, all irregularities will be eliminated and a very leakproof package will be obtained. A tube of extruded polystyrene or comparable water-resistant material is in this case used as outer sleeve.

What we claim is:

1. In a container structure for liquid contents the combination comprising an inner liner constituted by a three layer laminate comprising two outer layers and an inner layer having a barrier characteristic with respect to the contents, an outer sleeve of comparatively stiff and essentially non-metallic material surrounding and in contact with said inner liner, at least one end portion of said liner projecting beyond the corresponding end of said sleeve, and a lid of seamable material seamed to said projecting end portion of said liner and which establishes an end wall of the container.

2. A container structure as defined in claim 1 wherein said outer layers of said liner are made from polyethylene and said inner layer is made from aluminum and wherein said outer sleeve is made from cardboard and said lid is made from sheet metal.

3. A container structure as defined in claim 1 wherein said outer layers of said liner are made from polyethylene

and said inner layer is made from aluminum and wherein said outer sleeve is made from polystyrene and said lid is made from sheet metal.

4. A container structure as defined in claim 1 wherein the projecting end portion of said liner terminates in an outwardly turned flange which is seamed together with a flange portion of said lid.

5. A container structure as defined in claim 1 wherein the top end of said liner is closed by said seamed-on end wall and the bottom end thereof is integral with the side walls which has a cylindrical configuration.

6. A container structure as defined in claim 1 wherein said inner liner is constituted by a tube projecting from both ends of said outer sleeve, and each end of said tube is closed by a seamed-on end wall.

7. A container structure as defined in claim 1 wherein the seamed together parts of said end wall and liner are folded down over the outside of said sleeve.

8. A container structure as defined in claim 1 wherein the seamed together parts of said end wall and liner have the shape of a hook-joint.

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U.S. Cl. X.R.

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