United States Patent

Goglio

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[54] **SEMIRIGID CONTAINER**

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[30] **Foreign Application Priority Data**

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March 23, 1970 Italy 22316 A/70

[52] **U.S. Cl.** .....**150/.5**, 229/1.5 R, 229/5.5
[51] **Int. Cl.** **A45c**
[58] **Field of Search** .....150/.5; 229/5.5, 1.5 R

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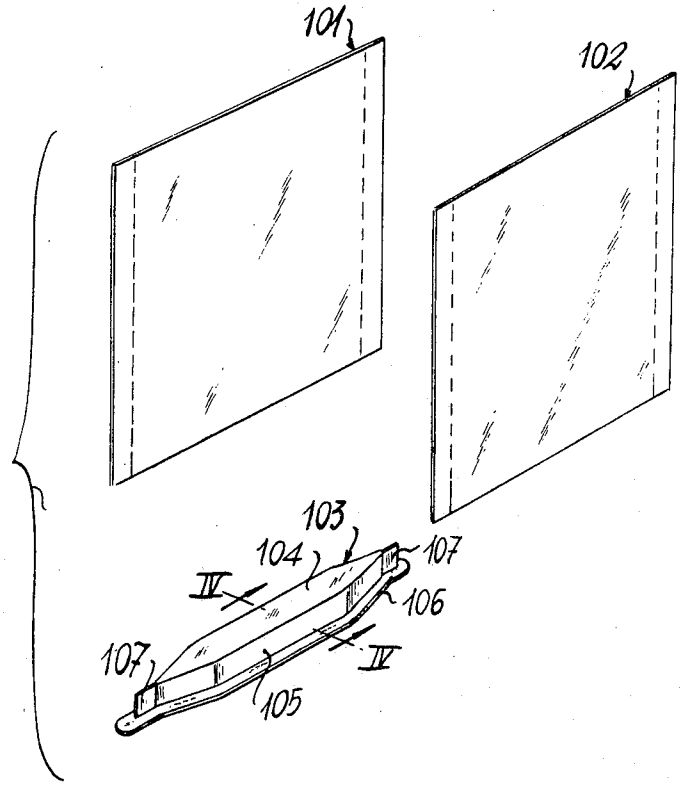
Assistant Examiner—Thomas C. Culp, Jr.
Attorney—Richard P. Alberi

[57] **ABSTRACT**

Completely heat-welded, semirigid tight container for foodstuff. The container comprises a pre-shaped bottom of thermoplastic material which can be heat-welded, as well as a top containing portion, at least partly formed of heat weldable material consistent with that the bottom, formed of a preferably tubular element which at one of its ends is heat-welded to the bottom and provided with a top opening suitable to be closed by transverse heat-welding upon completion of product stuffing.

11 Claims, 15 Drawing Figures



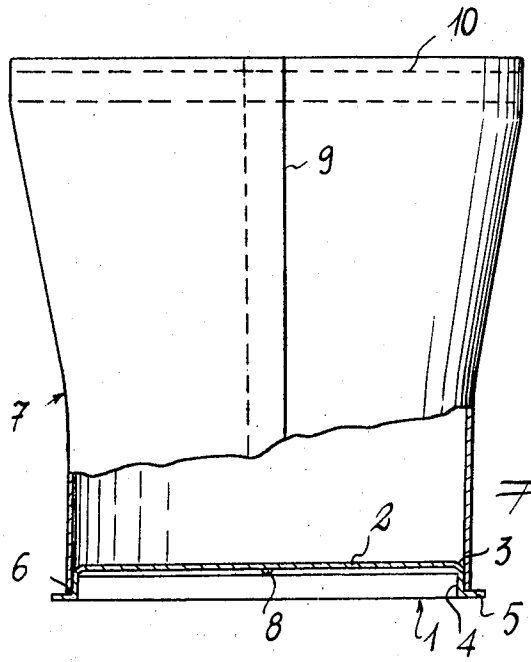


Fig. 1

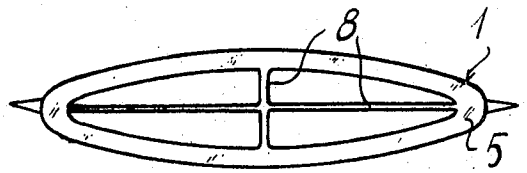


Fig. 2

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BY Richard P. Albert

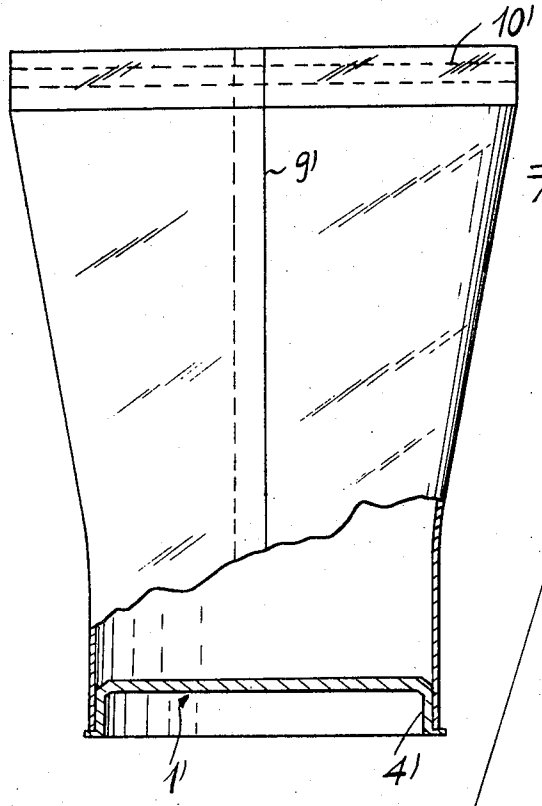

Fig. 3

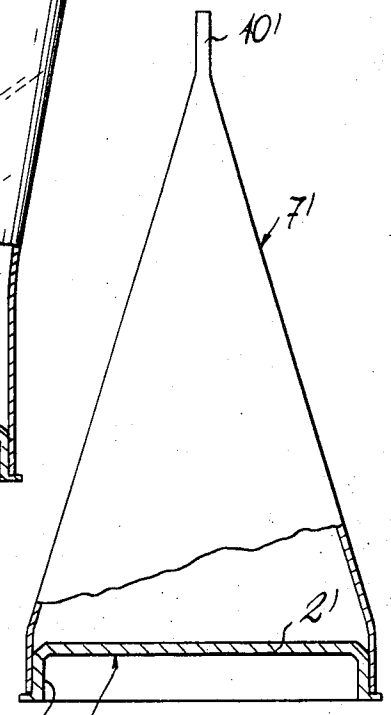

Fig. 4

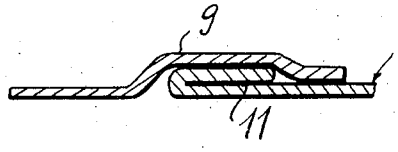

Fig. 5

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BY Richard P. Fisher

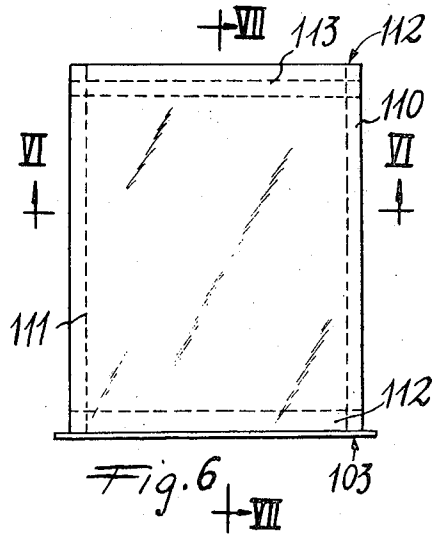

Fig. 6

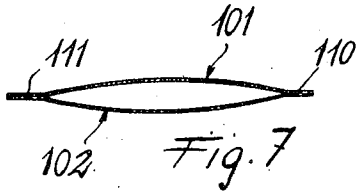

Fig. 7

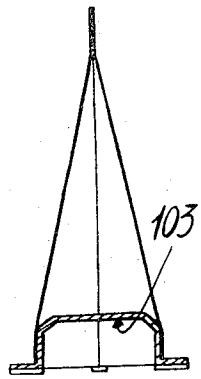

Fig. 7a

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BY Richard P. Klein

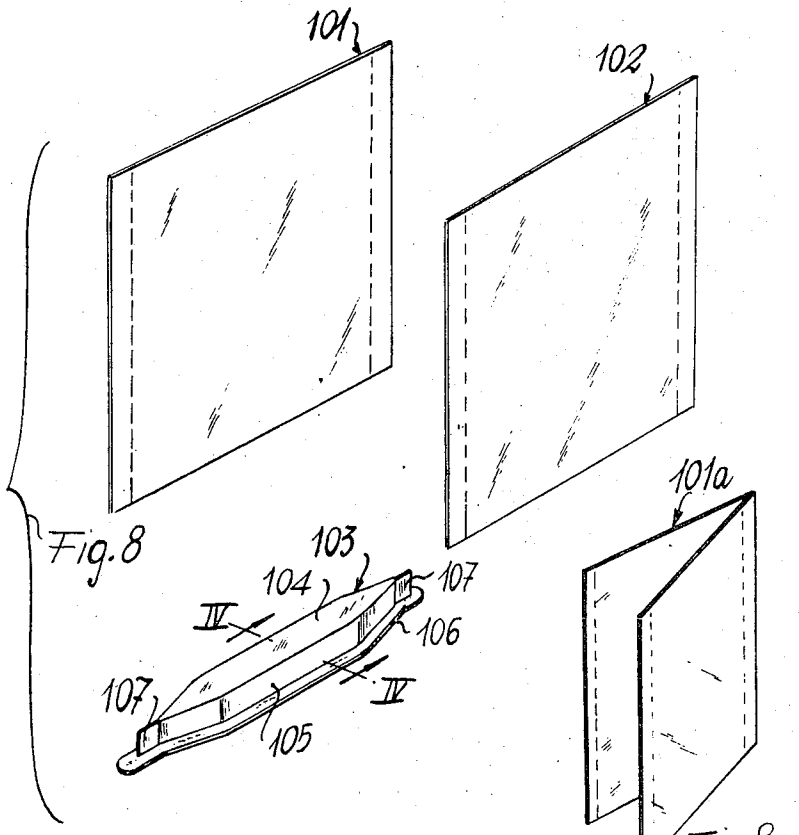

Fig. 8

Fig. 8a

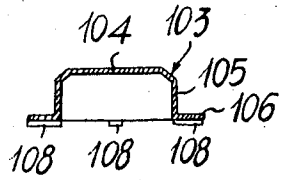

Fig. 9

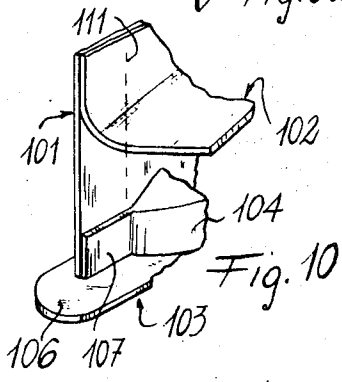

Fig. 10

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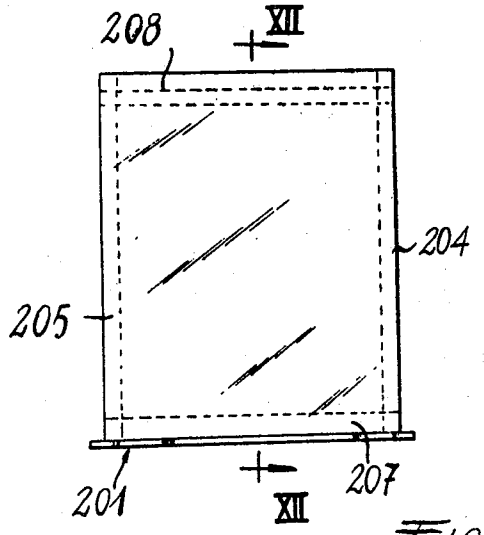

Fig. 11

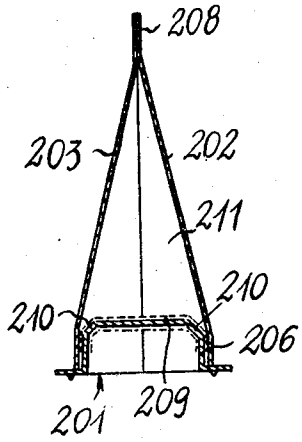

Fig. 12

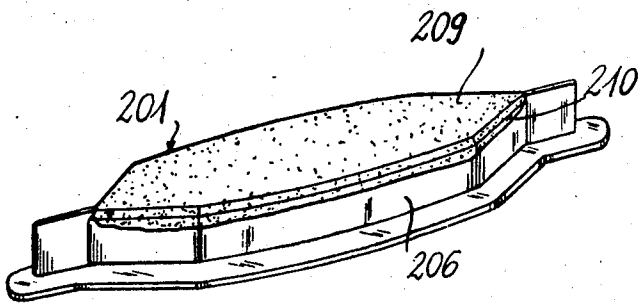

Fig. 13

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BY

SEMIRIGID CONTAINER

This invention relates to a completely heat-welded, hermetically sealable semirigid container.

It is the object of this invention to provide a container prevailingly comprising flexible materials and rigid plastic materials, suitable:

a. to contain liquid, semidense and dense, powdered and granule products;
b. to retain a vacuum condition; and
c. depending on the materials comprising it, to stand also the high temperatures required for the content sterilization.

More particularly, it is the object of the invention to provide a completely heat-welded, semirigid hermetic container for containing foodstuffs.

Completely heat-welded hermetic containers are known and wholly formed of multi-layered flexible materials for containing foodstuffs and which are in the form of envelopes. Such known envelope containers suffer from the disadvantage of possibly having microholes which might jeopardize the preservability of the product. These possible microholes are due to localized overstresses arising from stuffing as a result of a change in the envelope shape which from flat becomes tridimensional.

The container according to the present invention overcomes the disadvantages of the conventional solutions in that the shape being taken after stuffing is consistent, that is a shape taken without causing detrimental local stresses to the material comprising it.

According to the invention the container is essentially characterized by comprising a pre-shaped bottom of heat-weldable thermoplastic material, as well as a top container portion, at least partly formed of heat-weldable material consistent with that of the bottom, formed of a preferably tubular element which at one of its ends is heat-welded to the bottom and provided with a top opening suitable to be closed by transverse heat-welding upon completion of product stuffing.

Thus, a container is provided wherein the bottom and top portion constitute a single unit without any solution of continuity, which gives the desired tightness feature.

The bottom can be made of mouldable thermoplastic material, such as polyethylene, and the tubular element can be made of any among a wide range of conventional layered materials, wherein the inner layer will comprise polyester (polyethylene terephtalate) polypropilene, polyamides and similar thermoplastic material consistent with that of the bottom, where by consistency it is meant the possibility that such material adheres under thermal action (with or without simultaneous pressing action) to the bottom material. For example, where the bottom comprises polyethylene, the inner layer of the layered material will comprise polyethylene, while where the bottom is of polypropilene, the inner layer will also be of polypropilene. The layers in the layered material may be combined as follows: cellophane (cellulose leaf) polyethylene, cellophane (cellulose leaf) aluminum-polyethylene, polyester-polyethylene, polypropilene-polyethylene, paper-polyethylene-thin board-polyethylene, thin board-aluminum-polyethylene, polypropilene-aluminum-polyester-polyethylene (or polypropilene)-polyester (or polypropilene)-aluminum-polyester (or polypropilene)polypropilene-polyester-aluminum-polyester, polyester-aluminum-polyester (or polypropilene)-aluminum, polypropilene, and so on.

These layered materials are commercially known and described in many patent publications, whereby it is deemed unnecessary to describe them in more detail.

According to a preferred embodiment of the invention, the container portion comprises two flat sheets (or a single folded sheet) heat-welded to each other along the longitudinal sides thereof. This container portion is heat-welded along the lower contour to the bottom which, in order to ensure a thorough tightness at the longitudinal edges, has extensions interposed between the two sheets (or between the folding and the opposing free ends in the case of a folded sheet) at the area of the longitudinal edges, so that by heat-welding said edges the material of these extensions will at least partially be melted filling up the voids between the edges of the sheet(s) and bottom, thus ensuring a perfect tightness.

It has been found that, in case of low thicknesses or in case of unaccuracies which may occur in mass-productions, the bottom wall or the wall defining the container bottom may have some gas permeability capable of damaging the product confined in the container.

According to the invention, such a disadvantage is avoided by providing that at least one of the surfaces of the wall defining the container bottom is covered with a sheet of impervious material attached to said one surface. The imperviousness material may be of a composite nature, that is a layered material comprising at least two layers, one of which is an aluminum foil (for example, 5–50 micron thick) and the other of which is a thermoplastic material consistent with that of the bottom. Also in this case, by consistency it is meant that the bottom material might remain adhesively attached to the imperviousness material under thermal action with or without a pressing action. Thus, for example, where the bottom is made of polypropilene, the layer contacting the impervious material bottom will also be made of polypropilene, while where the bottom is made of polyethylene the adhesive layer associated with aluminum will be also made of polyethylene.

The adhesive layer thicknesses are not critical and can be those commonly used in the art of composite laminated materials for making heat-weldable flexible containers. By way of example, the thickness may range between 5 and 1,000 micron, while the annealed aluminum thickness may range between 5 and 50 micron.

The application of the impermeabilizing sheet to the bottom can be accomplished in several manners not forming part of the invention as within the scope of conventional techniques. Thus, for example, the impermeabilizing sheet, so shaped as to correspond to the area to be impermeabilized, can be applied on the formed bottom to remain adhering thereto, exerting a simultaneous heating and pressure effect on the sheet. Another approach consists of introducing the shaped element of impermeabilizing sheet into the bottom moulding die, then injecting the bottom material into the die. Due to heat and pressure, the sheet element adhesively joins the bottom being moulded.

The invention will be better understood from the following detailed description given by mere way of example, reference being had to the accompanying drawings in which:

FIG. 1 is a partly sectional, side elevation view showing a first embodiment of the semirigid container which is elliptic in cross-section;

FIG. 2 is a bottom view of the container shown in FIG. 1;

FIG. 3 is a partly sectional, side elevation view showing a different (circular) embodiment of the container;

FIG. 4 is a view similar to that of FIG. 3, but rotated by 90°;

FIG. 5 is an enlarged view the detail for the longitudinal weld of the layered material forming the top or containing portion of the container, as required for converting the web-like material into a tube;

FIG. 6 is a diagrammatic side view of the container according to the invention;

FIG. 7 is a sectional view taken on line VI—VI of FIG. 6, wherein the walls are slightly spread apart;

FIG. 7*a* is a sectional view taken on line VII—VII;

FIG. 8 is an exploded view of a container, wherein the containing portion is provided from two sheets which, however, can be substituted for by a single sheet folded as shown in FIG. 8*a*;

FIG. 9 is a cross-section of the bottom alone;

FIG. 10 is a perspective view showing the corner detail of the container, assumed that one of the sheets of the containing portion has been raised;

FIG. 11 is a side view showing another embodiment of the container;

FIG. 12 is a sectional view taken on line XII—XII in FIG. 11; and

FIG. 13 is a perspective view showing the bottom following application of the impermeabilizing sheet thereon.

As shown in FIGS. 1 and 2, the container comprises a bottom 1 provided by moulding thermoplastic material, such as polyethylene, polypropilene or the like. This bottom comprises a substantially flat raised central portion 2 connecting by a perimetral chamfer 3 with an edge 4 which is suitably slightly flared so as to facilitate the piling of said bottoms.

The contour of edge 4 is characterized by an outward facing perimetral flange 5, against which there abuts the lower end of a tubular element 7 constituting the upper or containing portion of the container.

As shown in FIG. 2, the bottom is of a substantially elliptic shape, or however formed of curved sections which are interconnected. Stiffening ribs 8 may be provided along the major diameters of the bottom below the wall 2.

The tubular element 7 is formed of a sheet of composite material comprising, for example, double, triple, quadruple or quintuplicate layers: cellophane-polyethylene, cellophane-aluminum-polyethylene, polyester-polyethylene, polypropilene-polyethylene, paper-polyethylene, thin board-polyethylene, thin board-aluminum-polyethylene, etc., as provided by composing the individual base films and the like. The composite materials of the above list providing an inner layer comprising polyethylene are for use with a bottom 1 also made of polyethylene.

Generally, to accomplish heat-welding between the bottom 1 and tubular element 7, it is required that the contacting materials thereof are consistent and preferably the same. Where the bottom comprises polypropilene, the layered material making up said tubular element 7 will preferably have an inner layer of polypropilene and may be formed of polypropilene and polyester-aluminum-polypropilene, or polyester-aluminum-polyester-polypropilene.

The lower end of the tubular element is heat-welded (that is attached by exerting a pressure with a contribution of heat) to the perimetral edge 4 of bottom 1. Heat-welding is accomplished by exerting a pressing effect through heating jaws against the lower end of the tubular element at the area of edge 4, this effect being resisted by a resisting body inserted in the bore of the bottom and mating therewith.

The tubular element 7 has a longitudinal weld 9 as formed from a layered material sheet or web, the longitudinal edges of which are superimposed to one another as shown in FIG. 5. This figure shows how one of the longitudinal flat sheet edges is turned over at 11, so that faces of the same material and thus heat-weldable to one another are facing one another.

After introducing the product, the tubular element 7 is closed by top transverse heat weld shown at 10.

A different preferred embodiment of the container is shown in FIGS. 3, 4 and 5. Similar or corresponding elements to those of the embodiment in FIGS. 1 and 2 have been designated by using the same reference numerals followed by a prime.

The bottom may have other forms than those shown and described, such as a conical form or however identified by arcuate surfaces, having a constant or varying radius of bending, such surfaces being interconnected.

Referring to FIGS. 6–10, the container substantially comprises the following elements: two flexible sheets 101 and 102 (or a folded sheet 101*a*) and a bottom designated as a whole at 103.

The sheets 101, 102 or 101*a* can be made of the above mentioned heat-weldable materials. The bottom, also made of one of the above mentioned materials, is provided by moulding and includes a flat raised portion 104 connecting through a possible chamfer to an edge 105 which can suitably be also slightly flared so as to facilitate the piling of said bottoms.

The lower contour of edge 105 is characterized by an outward facing continuous perimetral flange 106, the lower edge of the containing portion comprising the sheets 101, 102 or the single sheet 101*a* abutting there against.

The bottom shape substantially resembles a deformed ellipse at the opposite ends where flat extensions 107 are provided.

At suitable locations on said flange 106, ribs 108 can be provided for maintaining the container lifted from a rest plane to allow the inner cavity of the bottom to be reached by the hot fluid as required, for example for cooking and sterilizing the product within the container.

The extensions 107 are interposed between the two sheets (as shown in FIG. 10, particularly at the edges of the latter). The sheets are moved near each other and then by welding bars (known and not shown) two weld

lines **110** and **111** are accomplished along the edges, these weld lines also involving said extensions **107**, which due to heat partially melt and fill the voids at the junction of the two sheets, ensuring a perfect tightness. By a second heat-welding operation, accomplished by welding jaws mating the contour of edge **4**, the lower end **112** of the sheets (already attached to the bottom through the extensions **107**) is welded to the edge **105** of said bottom.

After having thus made the container, the latter is filled with product and then its open inlet is closed by heat-welding along the transverse area **113** defined by broken lines.

Thus, a container is provided and has shielded corners (because of the two longitudinal welds **110** and **111**), capable of self-supporting. This feature has the advantage that in a sterilizing chamber a larger amount of containers can be arranged, since the containers need not to be laid down. The advantage is also achieved for a more effective sterilization as all of the container faces are completely free and, therefore, can be attacked by the sterilizing fluid. The container may not require the use of outer packings and is perfectly tight. Moreover, with respect to the flexible envelope containers and under the same conditions as to volume and containable material, it requires a less amount of flexible material, which results in a lower cost of the material. Finally, due to the consistency of the deformations and thus because of absence of local overstresses no microholes will occur in the flexible material making up the containing portion.

The container shown in FIG. **11**, **12** and **13** is substantially the same as that above described.

The container comprises a bottom, designated as a whole at **201**, in connection with which the expedients according to the present invention have been devised. The container also comprises two composite sheets, that is multi-layers which are heat welded to one another along two longitudinal edges **204** and **205** so as to maintain them joined to one another. The two sheets are also joined by heat-welding to the contour edge **206** of the bottom **201** along the zone indicated at **207**. After filling up, the container is closed by heat-welding transversely of the inlet area **208** identified by the broken lines.

A possible disadvantage of this embodiment resides in that the top surface or bottom **209** of the bottom may for any reason be pervious to gasses, which could adversely affect the product within the container, particularly where the contents are foodstuffs.

It is the object of the embodiment to impermeabilize this specific surface **209** and according to the invention this is achieved by applying thereon, or on the inner or outer side thereof, a shaped impermeabilizing sheet to cover or to involve said surface **209** and the next adjacent areas, so that gas is prevented from moving to or away from the contents. In other terms, with its wall **209** and next adjacent sections **210**, the bottom **201** defines the inner space **211** containing the product. Thus, where the impermeabilizing sheet is applied on the side facing the container space **211**, this sheet, as shown by broken lines in FIG. **12**, shall involve not only the side of zone **209** and the sections **210** next adjacent thereto, but also, although to a limited extent such as a few millimeters (1–3 mm.), the contour side **206** of the bottom. The impermeabilizing sheet can arranged on the outer bottom side as well, as shown by dash and dot lines, and its shape and extension should be such as to block up the less long permeability paths for the gas. It is apparent that the approach as shown by dash and dot lines is unfavorable, since the gasses could move along the height of sides **6**, even if this is practically to be excluded due to the substantial length of this path.

The impermeabilizing sheet is preferably formed of a two layer material, one layer of which is aluminum having the task of impermeabilization, and the other of which is thermoplastic material consistent with that of the bottom and serving to provide adhesion between aluminum and bottom. Consistency is to be intended in that, under heat and possible pressure effect, the bottom material and that of the adhesive layer would interpenetrate so as to ensure a thorough connection for the impermeabilizing sheet to the bottom.

By way of example, the bottom can be made of polypropilene or polyethylene. In the former case, the adhesive layer will be made of polypropilene, while in the latter case it will be made of polyethylene.

Although only one embodiment of the invention has been described, it will now be easy for those skilled in the art to devise many changes and modifications, which however are all to be intended as within the scope of the invention.

What is claimed is:

1. A semirigid container comprising:

a premolded bottom of plastic material having a contoured side circumscribing a transverse wall, said side having at least one flat outward extension, and a stop shoulder transverse to said contoured side; and

a containing element of flexible material having at least one surface of thermoplastic material and at least one longitudinal weld joining together juxtaposed portions of said surface of thermoplastic material, said containing element being welded to said contoured side of said bottom with said extension being interposed between said portions of said surface of thermoplastic material and adjacent said longitudinal weld, whereby said premolded bottom closes an end of said containing element.

2. The container as claimed in claim **1**, wherein said containing element comprises a single folded sheet of said flexible material, and said longitudinal weld joins together the free ends of said folded sheet.

3. The container as claimed in claim **1**, wherein: said at least one outward extension comprises a pair of outward extensions; said containing element comprises a pair of sheets of said flexible material; and said at least one longitudinal weld comprises a pair of longitudinal welds joining together two opposing sides of said pair of sheets.

4. The container as claimed in claim **1**, wherein said contoured side has a circular configuration.

5. The container as claimed in claim **1**, wherein said contoured side has an elliptical configuration.

6. The container as claimed in claim **1**, wherein said contoured side has a configuration formed of interconnected arcuate lines.

7. The container as claimed in claim **1**, wherein said premolded bottom includes bearing projections, whereby it is maintained at a raised position from a supporting surface.

8. The container as claimed in claim 1, wherein at least one surface of said transverse wall is covered with a sheet of material making the transverse wall impermeable.

9. The container as claimed in claim 8, wherein said impermeable sheet comprises at least one aluminum sheet adhesively joined to at least one surface of said transverse wall.

10. The container as claimed in claim 8, wherein said at least one surface of said transverse wall is an inner surface.

11. The container as claimed in claim 8, wherein said transverse wall, said contoured side, and said stop shoulder are integrally formed portions of said premolded bottom.

* * * * *