Dec. 5, 1961 L. RADO 3,011,293

COLLAPSIBLE CONTAINER

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FIG. 1.

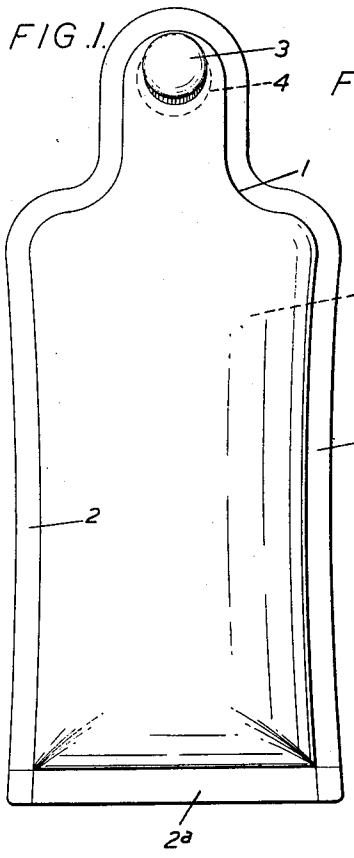


FIG. 2.

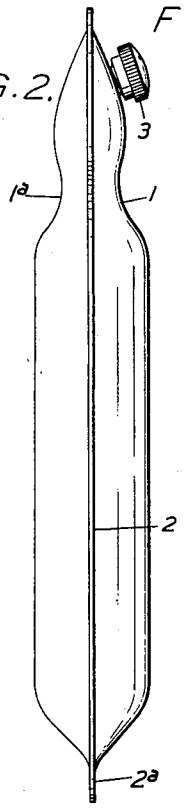


FIG. 2a.

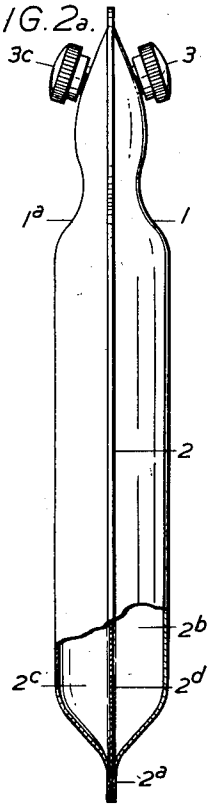
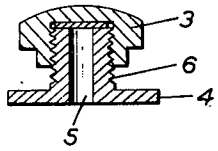


FIG. 3.



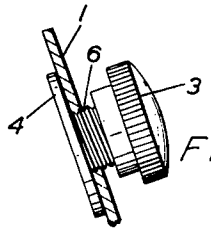
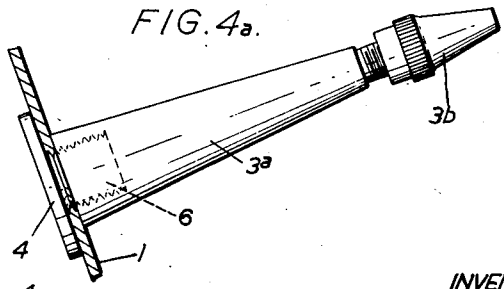


FIG. 4.

FIG. 4a.



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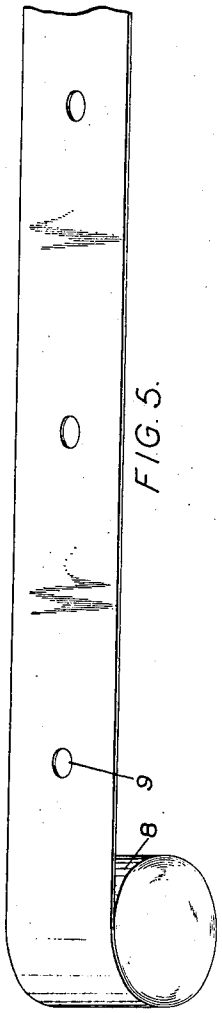


FIG. 5.

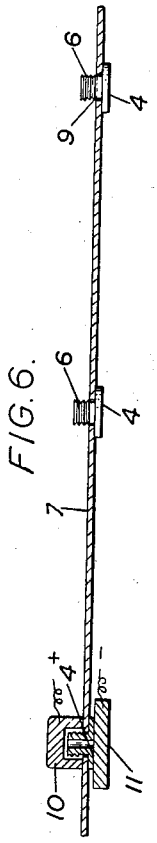


FIG. 6.

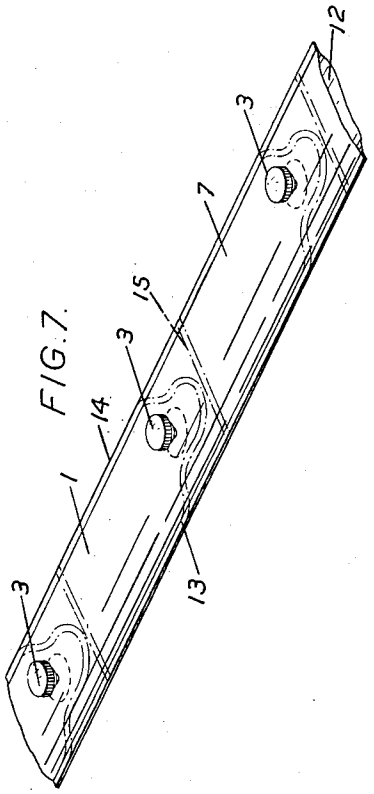


FIG. 7.

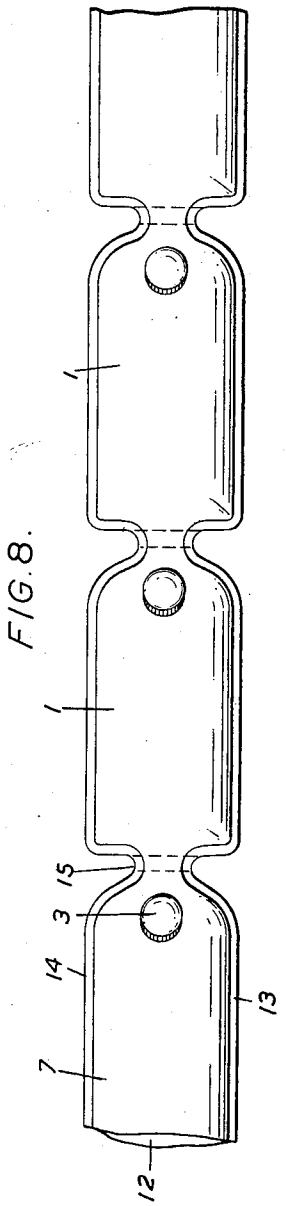
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COLLAPSIBLE CONTAINER

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FIG. 8.



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COLLAPSIBLE CONTAINER

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FIG. 9.

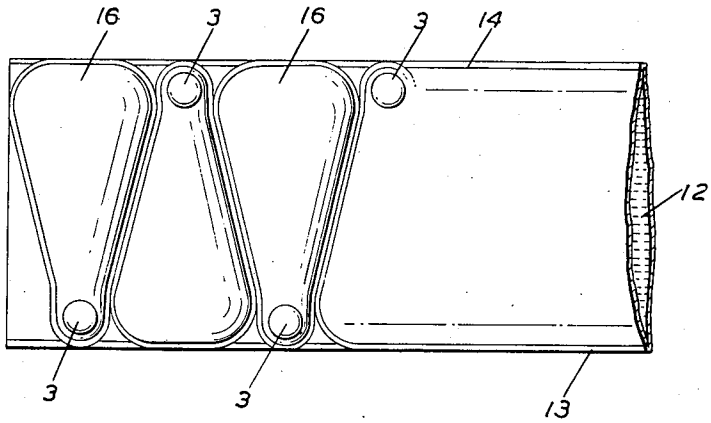


FIG. 10.

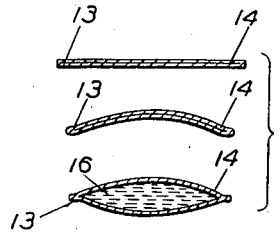
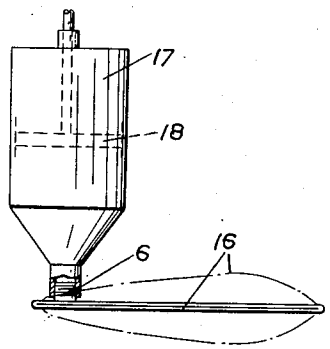


FIG. 11.



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United States Patent Office 3,011,293 Patented Dec. 5, 1961

3,011,293
COLLAPSIBLE CONTAINER

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Filed Jan. 13, 1954, Ser. No. 403,872
Claims priority, application Great Britain Mar. 24, 1953
13 Claims. (Cl. 53—14)

The present invention relates to a collapsible container for liquids or pastes and a method for the production of the same.

The new collapsible container is provided in general for the same purpose as that served by the conventional collapsible tube, but it is distinguished therefrom by its shape and the process for the manufacture thereof.

The collapsible container of the present invention is produced from a thermoplastic material, such as for example vinyl resin, chlorinated rubber, polyethylene, and similar thermoplastic materials or combinations of such materials, but also from non-thermoplastic materials coated, laminated, or impregnated with thermoplastic substances, such non-thermoplastic materials being for example, films of fiber-free cellulose, metal foils, paper, woven fabric, or the like and is mainly characterized in that the nozzle of the container through which the contents are expelled, is situated and fixed in a side wall of the container substantially near to one narrowed end thereof, and is provided with a closure cap.

Although the collapsible container of the present invention can be produced also from extruded tubing, it is, however, more advantageous to produce it from heat-sealable sheets or strips, preferably from two superposed sheets or strips of the same width, but it is within the scope of this invention to produce the container from a lengthwise folded strip. The nozzle through which the container content is expelled, is made also of thermoplastic material and is welded to a side wall of the container. The said nozzle is separately produced from a thermoplastic material which is less plasticized than the material used for the body of the container.

One execution of the collapsible container has a middle wall dividing the container into two compartments, each compartment holding a different substance therein, and each side wall of the container being provided with a nozzle for the expulsion therethrough of the contents of that compartment.

The process for the production of a collapsible container in accordance with the present invention, is that whereby the sheet material which is to form a wall of the container, is provided with a perforation through which a nozzle of approximately the same diameter as that of the perforation, and separately produced from a less plasticized thermoplastic material than that used for the container body, and having a bottom flange, is so inserted through said perforation that it protrudes from that side of the material which will be outermost when the container is formed, and thereafter the bottom flange of the nozzle is by welding united around said perforation to the inner side of the material which will form a wall of the container, and lastly the said wall material is united by heat action to another sheet material which will form the opposite wall of the container, so that a hollow body is thereby produced.

The materials used for one or both walls of the body of the collapsible container are elastic, if so required. To allow, if required, inspection of the contents of the filled container, one or both walls of the container are produced from transparent heat-sealable material.

To produce the collapsible container seriatim, the process is carried out as follows:

A strip of thermoplastic material firstly is provided at required distances with perforations. Secondly, through

each said perforation, a nozzle, separately produced from thermoplastic material and having a bottom flange thereto, is inserted, and thereafter by heat action said flanges are united with the strip around the perforations, to provide the strip with a row of protruding nozzles, and thirdly the said strip is superposed over a second strip of thermoplastic material of the same width with the nozzles outermost, and the lengthwise edges of the two superposed strips are united by heat action so that a tubing is formed from which the collapsible containers are so produced, that at a distance from a nozzle a bottom transverse seal of the container is made, and another seal above the nozzle provides the top seal of the container. It is within the scope of this invention to produce the said container from one strip by folding the strip and so to create the second strip.

In a modification of the production of fluid-filled containers, the process is as follows:

A tubing is formed as previously described, the protruding nozzles are closed each by a screw cap, and thereafter the tubing is filled with fluid substance at least in excess of that required for a single container, and from said filled tubing the collapsible containers are produced by a tool or a pair of tools which at required distances apply pressure to the tubing walls to cause them to contact each other and to displace the contents from the pressure places, and thereafter the same tool or pair of tools while maintaining pressure, generate the heat to weld the walls together thereat, the containers being thereafter separated by cutting.

To produce the containers an advantageous method is to provide a strip as previously described with nozzles, and to superpose said strip over a second strip of the same width and said strips are welded together by a pair of tools having the shape of the collapsible container to be produced so that a hollow body is formed having a nozzle at one end, the bottom sealed end of the so-produced container being adjacent to the following container.

The process for the production of a collapsible container provided to hold two different substances, is as follows:

Two strips of similar shape are provided with nozzles and are superposed over a middle strip with the nozzles protruding outermost and preferably opposite to each other, and from said three strips collapsible hollow bodies are produced, each having two compartments, and each compartment a nozzle with a closure cap.

In accordance with the present invention the walls of the container can be pre-molded if it is required that the container holds a content quantity larger than can be packed in a container produced from flat sheets.

The filling of the container of the present invention as previously described, can be done during the production of the container itself, but in most cases the filling of the container with a fluid substance will be carried out after the container is produced, through the nozzle of the container. To carry out the filling, the walls of the container are brought together to expel the air entirely from the container, and thereafter by a filling device the container is filled through the nozzle by pressing the fluid substance into the container, and lastly the container is sealed by the closure cap. The so-filled container will be free of entrapped air.

For better understanding the accompanying drawing illustrates the collapsible container, the production method therefor, and the filling thereof.

In FIGURE 1 is shown the collapsible container in plan view, in FIGURE 2 the container in side view, and in FIGURE 2*a* a collapsible container having two compartments. FIGURE 3 illustrates the separately produced closure nozzle and cap thereto. FIGURE 4 shows how

the closure device of FIGURE 3 is united to the side wall of the container. FIGURE 4*a* shows a funnel-like nozzle which can replace the screw cap of FIGURE 4. FIGURE 5 shows a strip of thermoplastic material provided with perforations. FIGURE 6 shows in sectional view, how the nozzles of FIGURE 3 are inserted through the perforations of the strip shown in FIGURE 5 and are united by welding. FIGURE 7 shows a tubing produced from two superposed strips, one of which is the strip provided with nozzles as illustrated in FIGURES 5 and 6 said nozzles being provided each with a closure cap. FIGURE 8 shows a tubing as shown in FIGURE 7, but already shaped as a collapsible container, leaving only inter-communicating channels for filling the row of containers. FIGURE 9 shows an arrangement whereby the collapsible containers can be economically produced from two superposed sheets. FIGURE 10 shows in sectional view and in three stages, how the tubing walls can be molded, and FIGURE 11 shows the filling device and method of filling collapsible containers through their nozzles.

In FIGURES 1 and 2 the filled collapsible container illustrated is produced from thermoplastic sheets, one wall, marked **1**, being that to which the nozzle closed with the screw cap **3** is fixed at the upper narrowed end; **1***a* marks the opposite wall of the container, **2** marks the welded side walls, and **2***a* the sealed bottom.

In FIGURE 2*a* one side wall of the container is marked **1**, and the oposite side wall **1***a*. The container is divided by a lengthwise middle wall **2***d*, so that two compartments have been created, **1** marked **2***c* and the other **2***b*. The welding of the side walls is marked **2** and the bottom seal of the container **2***a*. Each compartment is provided with an outlet nozzle with screw closure cap thereto, one of which is marked **3** and the other **3***c*.

FIGURE 3 shows a container nozzle **6**, with a bore **5**, and a flange **4**, and closed by a screw cap **3**.

FIGURE 4 shows how the nozzle **6** of FIGURE 3 is fixed to the side walls of the containers shown in FIGURES 1, 2 and 2*a*. The side wall **1** has a perforation through which the nozzle **6** is inserted, and the flange **4** is united with the side wall **1**. The nozzle is provided with a screw cap **3**.

FIGURE 4*a* shows an execution in which the nozzle is provided with a funnel-like extension, marked **3***a*, which in turn is provided with a closure cap **3***b*, the construction otherwise being the same as shown in FIGURE 4.

FIGURE 5 shows a strip of thermoplastic material **7** which runs off a reel **8**, and is provided at distances with perforations **9**.

FIGURE 6 shows in sectional view how the nozzles of the containers shown in FIGURES 1, 2 and 2*a* are fixed to the strip shown in FIGURE 5. The nozzles **6** of FIGURE 3 without their closure caps, are inserted through the perforations **9** of the strip shown in FIGURE 5, and the flanges **4** are united to the strip **7** by, in the present case, radio frequency heating. The top part of the welding tool is hollowed to receive the protruding nozzles and is marked **10**, and the bottom part of the tool is marked **11** and is flat, and on applying pressure by the tools to the material surrounding the perforations and to the flange of the nozzle and generating heat, flange and material will become welded together. A strip provided in such way with nozzles will be used for the production of the collapsible containers.

FIGURE 7 shows the strip **7** provided with nozzles and screw closure caps produced in accordance with FIGURES 5 and 6, superposed over a strip **12** and the lengthwise edges **13** and **14** of the two strips are welded together so that a tubing is produced. Said tubing is filled with a fluid substance and the collapside containers shown in FIGURES 1 and 2 are produced from the said tubing by a pair of tools which apply pressure on the tubing walls to displace the contents from the pressure place, and thereafter heat is generated thereto to carry out the welding of the contacting walls of the tubing. One weld

marked **15** will be bottom weld of the collapsible container, and the top part marked **15***a* of the collapsible container will be welded in a similar way, but in a desired shape. The so-produced filled collapsible containers are separated from each other by cutting along approximately the middle of the welded place.

FIGURE 8 show a tubing as shown in FIGURE 7 produced from strips **7** and **12**, welded together at their lengthwise edges, one side seam being marked **13** and the other **14**. The nozzles protruding from the so-produced tubing are closed by the screw caps **3**. The tubing is so welded that it has a non-uniform cross-section. The tubing is filled with a fluid substance and the narrow parts **15***b* of the tubing walls are welded together and thereafter separated by cutting along the middle of the width of the welded place to produce the individual containers.

FIGURE 9 shows a method for the production of single containers from two superposed strips. The upper strip **7** which is provided with nozzles and screw caps thereto, is superposed over the strip **12** and the lengthwise edges of said strips are welded together, one weld being marked **13**, and the other **14**. The tubing so produced is filled with fluid substance, and pressure is applied thereto with a pair of tools having the shape of a collapsible container **16**, so that the walls at the pressure places contact each other and thereafter the tools generate the necessary heat to carry out the welding. It is also within the scope of the present invention to superpose and weld the strips **7** and **12** and without filling the tubing so produced, to produce therefrom the containers **16** by a pair of welding tools having the contour required for the collapsible containers. The so-produced containers are separated by cutting or stamping. The containers produced in accordance with this latter method will be filled through the nozzle.

FIGURE 10 shows, in sectional view, the collapsible containers which are produced from sheets and welded at the edges **13** and **14**.

In the same figure are also shown superposed sheets molded to produce depressions therein. The figure also shows two walls of the collapsible container brought close together so that no air is in the container prior to filling. The figure further shows that the contents of the filled container **16** fill the container entirely as no air has been entrapped therein.

FIGURE 11 shows how to fill a collapsible container which during the production thereof has remained empty. The collapsible container flattened to leave no air therein, is connected by the nozzle **6** to a filling device **17** from which, by a pressing device **18**, the fluid contents will be pressed into the container, which content fills out the container as shown by the numeral **16**.

The container in accordance with the present invention has the advantage that the walls of the container are flat, the empty collapsible containers can be easily transported, saving considerable space, and being flexible cannot be damaged during transport as are the conventional collapsible containers. The sheet materials can be more easily printed or embossed, or both, than the conventional containers. Further, the containers can be produced and filled at one and the same time, and can be produced from thermoplastic materials which have not the disadvantages of certain metals; they can be entirely emptied and, if required, refilled, and are more easily stored and transported than tubular collapsible tubes.

Although I have disclosed herein the best form of the invention known to me at this time, I reserve the right to all such modifications and changes as may come within the scope of the following claims.

What I claim is:

1. Process for the production of collapsible containers made from flexible sheet material wherein a first portion of the sheet material which is to form one wall of the container is provided with a perforation and a nozzle of approximately the same diameter as that of the perfo-

ration, said nozzle, being separately produced from a less flexible material than that used for the container body, and having a bottom flange thereto, is so inserted through said perforation as to protrude the outer face of said wall, and thereafter the bottom flange of the nozzle is united around said perforation to the inner side of face of said one wall, and lastly said first portion of the said material is united to a second portion of the material along the opposite side edges thereof to form the opposite wall of the container, so that a hollow body is thereby produced.

2. Process for the production of collapsible containers in accordance with claim 1, wherein a strip of thermoplastic material firstly is provided at required distances with perforations, secondly through each said perforation a nozzle separately produced from thermoplastic material and having a bottom flange thereto, is inserted, and thereafter by heat action said flanges are united with the strip around the perforation to provide a strip with a row of protruding nozzles, and thirdly said strip is superposed over a second strip of thermoplastic material of the same width with the nozzles outermost and the lengthwise edges of the two superposed strips are united or welded so that a tubing is formed from which the collapsible containers are so produced that at a distance from a nozzle a bottom transverse seal of a container is made, and another seal above the nozzle provides the top seal of the containers.

3. Process for the production of a collapsible container in accordance with claim 2, wherein the nozzles of the tubing are closed by screw caps and thereafter the tubing is filled with a fluid substance, and from said filled tubing the collapsible containers are produced by a tool or a pair of tools which at required places by pressure cause the tubing walls to contact each other and the tubing contents to be displaced from the pressure places, and thereafter while maintaining pressure, the same tool or pair of tools generate the heat to weld the walls together at the places pressed, and thereafter the containers are separated by cutting.

4. Process for the production of collapsible containers in accordance with claim 1, wherein a strip provided with nozzles is superposed over a second strip and by a pair of tools having the shape of the collapsible container to be produced said strips are welded together so that hollow bodies are formed each having a nozzle at one end, the bottom sealed wall of one produced container being adjacent to the neighboring container.

5. Process for the production of a collapsible container in accordance with claim 1, wherein two strips of similar shape each provided with nozzles protruding outermost are superposed over a middle strip edge to edge, and from three said strips collapsible hollow bodies are produced each having two compartments, and each compartment a nozzle with a closure cap thereto.

6. Process for the production of collapsible containers in accordance with claim 1, wherein sheet material from which the walls of the container are to be formed is provided with depressions to create depth therein.

7. Process for filling collapsible containers in accordance with claim 1, wherein the container walls are brought close together to expel the air entirely from said container, and thereafter by a device the container is filled through the nozzle by pressing in the fluid substance.

8. The herein described process for the production of collapsible containers from thermoplastic material, which consists in perforating a sheet of thermoplastic material which is to form a wall of the container, separately producing from a less plasticized thermoplastic material than that used for the container body a nozzle of an external diameter adapted to fit snugly through the perforation having a bottom flange wider than the external diameter of the nozzle, inserting the nozzle through the perforation from the inside of the thermoplastic sheet to the outside thereof until the bottom flange engages the inner surface of the thermoplastic sheet surrounding the perforation and the outer portion of the nozzle protrudes from that side of the sheet which will be outermost when the container is formed, sealing the bottom flange of the nozzle around the perforation to the inner side of the inside of the sheet which will form the wall of the container, and subsequently uniting by heat action the said thermoplastic sheet with a nozzle in place to another thermoplastic sheet which will form the opposite wall of the container so that a hollow body is thereby produced.

9. The herein described method for making collapsible containers from thermoplastic material, which consists in perforating a thermoplastic sheet while it is in single form at requisite distances apart dependent on the length of container desired, inserting hollow nozzles through all of the perforations as the sheet is being perforated, subsequently placing the sheet containing such nozzles upon another sheet of thermoplastic material of equivalent size, uniting both sheets along both longitudinal edges to form a continuous tube, placing removable caps on the external ends of the nozzles to seal the same, thereafter introducing into the tube a plastic material to be vended in the containers, thereafter sealing the two sheets along spaced transverse lines at distances apart equivalent to the lengths of the containers and severing the sheets transversely along approximately the middle of said sealing lines to produce the individual containers.

10. Process for the production of collapsible containers from flexible sheets made at least in part of thermoplastic material, wherein the sheet material which is to form a wall of the container is provided with a perforation and a nozzle of approximately the same diameter as that of the perforation, said nozzle being separately produced and having a base flange thereto and being less flexible than the said sheets used for the container body, said nozzle being inserted through said perforation so as to protrude from that side of the material which will be outermost when the container is formed, and thereafter the base flange of the nozzle is welded to the periphery of the said perforation, and lastly the said sheet or strip of material is welded to a strip or sheet of at least-in-part-thermoplastic material which will form the opposite wall of the container, so that a flat hollow body is thereby produced.

11. The herein described process for the production of collapsible containers made from thermoplastic material which consists in perforating the thermoplastic sheet material which is to form a wall of the container, separately producing from a less plasticized material than that used for the container body a flanged nozzle, inserting the nozzle through the perforation until the flange engages one surface of the sheet and the nozzle protrudes from that side of the material which will be outermost when the container is formed, thereafter welding the flange around the perforation to the inner side of the material of the sheet and subsequently uniting the sheet to another thermoplastic sheet which will form the opposite wall of the container so that a hollow body is thereby produced.

12. The herein described process for making collapsible containers from sheets of at least in part thermoplastic material which consists in perforating a sheet at requisite distances apart dependent upon the length or width of the containers desired, inserting screw-threaded "blind end" or "pressover" closure nozzles separately produced and having a base flange thereto and being less flexible than said sheets used for the container body through such perforations following the perforating operation, subsequently uniting said sheet to another sheet or to a folded-over portion of the said sheet along both sides or one side to form a continuous tube, thereafter introducing into the tube a fluid substance to be packaged, thereafter sealing the tube at intervals along transverse lines at distances

apart determining the length or width of containers to be produced and severing along said sealing lines intermediate the width of the seals, to divide the string of collapsible containers so produced into individual units.

13. The herein described method for making collapsible containers from sheets of at least in part thermoplastic materials, which consist of perforating the thermoplastic sheet at distances apart dependent upon the length or width of the containers desired, inserting screw-threaded or press-over closure nozzles separately produced and having a base flange thereto and being less flexible than said sheets used for the container body through such perforations following the perforating operation, subsequently uniting said sheet to another sheet along both sides or to a folded-over portion of the same sheet along one side and transversely sealing to divide the tube so produced to yield bodies of the desired shapes, while simultaneously preforming each shape in a curvilinear section, so that all air is excluded and so that the said bodies may thereafter be filled through the nozzle without introduction of air, the filling material distending the lower portion of the container progressively as the filling operation proceeds.

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