

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 86115745.1

51 Int. Cl.4: **B65D 41/24**

22 Date of filing: 12.11.86

30 Priority: 18.11.85 US 799342

43 Date of publication of application:
27.05.87 Bulletin 87/22

84 Designated Contracting States:
DE FR GB IT NL

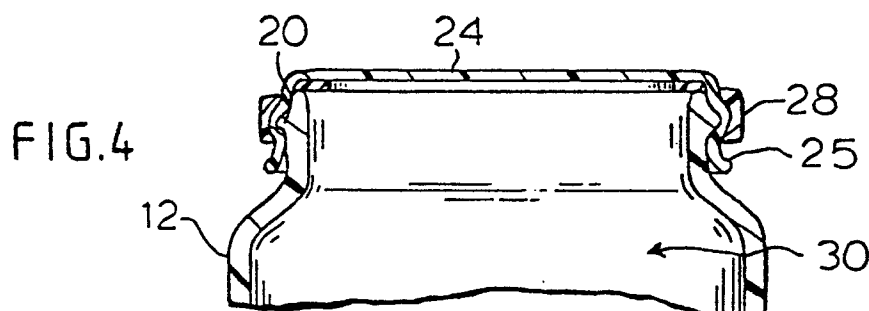
71 Applicant: **GENERAL ELECTRIC COMPANY**
1 River Road
Schenectady New York 12305(US)

72 Inventor: **Teutsch, Erich Otto**
2542 Chimney Springs Drive
Marietta Georgia 30062(US)

74 Representative: **Catherine, Alain et al**
General Electric - Deutschland Munich
Patent Operation Frauenstrasse 32
D-8000 München 5(DE)

54 **Method of sealing containers.**

57 Disclosure is made of a method for sealing the juncture between an openable, closed container and a removable closure member for said container. The method comprises employing a heat-shrinkable, synthetic polymeric resin sealing strip to shrink over and close the juncture between the closure member and the container. In a preferred embodiment of the invention, both cap and heat-shrinkable strip are integrated in a unitary closure member.



METHOD OF SEALING CONTAINERS

BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to methods of sealing closed containers including those fabricated from synthetic polymeric resins.

Brief Description of the Prior Art

Containers, be they of glass, metal or plastic construction, are frequently sealed with closures which may be reusable such as screw-on caps or a single use type such as the conventional can. All of these closures require mechanical action beyond simply placing the closure onto the container to seal it. Some may simply require a combination of pressure and heat while others require the cap to be spun onto or pressed onto the container. These steps of sealing the closure require valuable time, often limiting production rates.

The method of the present invention requires less labor and requires no mechanical action beyond placing the closure on the container, to seal the container with a closure mechanism.

SUMMARY OF THE INVENTION

The invention comprises a method of sealing the juncture between a container opening and removable closure member for said container, which comprises;
providing a sealing strip of a heat-shrinkable, synthetic polymeric resin, adapted by size and configuration to cover said juncture;
positioning the strip over the juncture so as to cover said juncture; and
causing the positioned strip to shrink sufficiently to seal the underlying juncture closed.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a view-in-perspective of a conventional container and a conventional closure (an interference fitting cap).

Figure 2 is a view-in-perspective of a strip employed in the method of the invention to seal closed the container and cap shown in Figure 1.

Figure 3 is a cross-sectional side elevation of the container and cap of Figure 1 combined with the strip of Figure 2, prior to sealing.

Figure 4 is a view as in Figure 3, after sealing.

Figure 5 is a view as in Figure 3, of another container and cap to be sealed by the method of the invention.

Figure 6 is a view as in Figure 5, after sealing.

Figure 7 is a cross-sectional side elevation of a combined sealing strip and cap used to close a conventional container according to the method of the invention.

Figure 8 is a cross-sectional side elevation of the combined strip/cap seen in Figure 7, employed for sealing a conventional container.

Figure 9 is a view as in Figure 8, but after sealing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Those skilled in the art will readily gain an appreciation of the invention from a reading of the following description when read in conjunction with a viewing of the accompanying drawings of Figures 1-9, inclusive.

Referring first to Figure 1, there is seen a view-in-perspective of a conventional, prior art container and a conventional, prior art closure for the container. The assembly 10 comprises the container 12 and a closure member 24. The container 12 is a generally tubular shape having a first closed end 14 and a second open end 16. The ends 14,16 are joined together by an intervening body 18. The container 12 may be fashioned of any conventional material such as glass, metal or a synthetic polymeric resin such as polyethylene, polycarbonate, polyurethane, polytetrafluoroethylene or like material. The method of the invention is particularly useful for sealing containers fabricated from multi-layer, synthetic polymeric resins or other relatively low modulus materials.

Disposed radially about the periphery of open end 16 and adjacent thereto is a friction lug 20 for engaging the cap 24 in frictional fit. The cap 24 is forced over the lug 20 to secure the cap 24 to the container 12 and thereby close the open end 16.

Figure 2 is a view-in-perspective of a sealing strip 28 employed in the method of the invention to seal closed the container 12 and cap 24 shown in Figure 1. The strip 28 is fabricated from a monolayered film of a non-adhesive, heat-shrinkable, synthetic, polymeric resin. Films of such polymeric resins are well-known in the art as is the method of their fabrication and forming into strip materials.

Representative of such polymeric resins are polyolefins, such as polyethylene, polypropylene and the like; polyamides; polyurethanes, polyvinylchlorides; and like resins which have been processed to impart to them so-called "elastic-memories"; see for example U.S. Patent 3,297,819. Preferred, are biaxially-oriented, heat-shrinkable polyethylene terephthalate film such as is disclosed in U.S. Patent 3,631,899. These heat-shrinkable polymeric resin films generally shrink when exposed to temperatures of circa 135°C. to 200°C. The sealing strip 28 is provided in a size and configuration appropriate to cover the juncture between cap 24 and container 12 after the cap 24 is emplaced on the open end 16 of the container 12, over lug 20.

As shown in Figure 3, a cross-sectional side elevation of the container 12 and cap 24 combined with the strip 28, the downward projecting flange 25 of cap 24 need not fit tightly with lug 20. An elastomeric sealing gasket is interposed between the end 16 of container 12 and the underside of cap 24. The strip 28 is disposed over and about the flange 25 and over the cap 24 and the underlying juncture with container 12. The strip 28 is then caused to shrink by exposure to sufficient heat to cause the shrinkage of the synthetic polymeric resin strip 28. As shown in Figure 4, a view as in Figure 3 but after sealing, it may be seen that the strip 28 has shrunk and tightened to squeeze and deform the downward projecting flange 25 of cap 24 so that it conforms to, and mates with the outer surface of container 12 and hermetically seals closed the juncture between cap 24 and container 12 over lug 20.

The cap 24 may be readily be removed from its secure engagement with the container 12 by removal of the band 28 (by cutting, etc.).

Figure 5 is a view as in Figure 3, but of another container 12 and cap 24 sealed by the method of the invention. The embodiment container 12 shown in Figure 5 differs only in the positioning of lug 20 in respect to the open end 16 of the container 12 and to the use of cap 24 having a reduced thickness portion or zone 34 which can function as a tamper or spoilage indicating panel.

Figure 6 is a view as in Figure 5 but after sealing has occurred by carrying out the method of the invention as described above, i.e., by causing the strip 28 to shrink and conform the downward projecting flange 25 of cap 24 to the sidewalls 18 of the container 12. The reduced in thickness zone 34 of the cap 24 is shown slightly indented as an indication of a vacuum within the chamber 30 of the container 23. If this vacuum is lost, the indentation of the zone 34 will disappear, as an indicator of the condition of the contents within the container 12.

Figure 7 is a cross-sectional side elevation of a combined sealing strip and cap used to close a conventional container according to the method of the invention. The cap 40 has an inverted "U" shape formed by downward projecting, radially disposed flange 42 about the periphery of a generally planar surface. The cap 40 may be thermo formed of multilayer sheet of synthetic, polymeric resins to provide special barriers for moisture, oxygen or carbon dioxide. The thermo formed or an injection molded cap 40 may also incorporate any special features such as tamper evident panels or pressure compensating devices or removal features and may be pre-decorated or printed. The entire material of cap 40 is fabricated from a heat-shrinkable, synthetic, polymeric resin as described above. To employ the cap 40 in the method of the invention, it is provided in an appropriate size and configuration to close the end of the container 12 as shown in Figure 8, a cross-sectional side elevation of the combined strip/cap 40 seen in Figure 7, employed for sealing the conventional container 12. In the next step in the method of the invention the combined assembly as seen in Figure 8 is caused to mutually seal by exposure of the heat-shrinkable cap 40 to heat. The cap 40, after heating either from a residual heat from the filled container 12, post processing (autoclaving) or from in-line heaters will shrink and conform tightly and uniformly to the container 12 including such features as threads, lugs or raised rings. Control over the degree of stretching of the pre-formed cap 40 results in controlled shrinkage and resulting pressures. Thickness variations in the cap 40 may also be employed to control pressures on specific areas.

Figure 9 is a view as in Figure 8 but after sealing and shows the shrinkage of the cap 40 after exposure to heat, so effect sealing of the container 12.

Claims

1. A method of sealing the juncture between an openable, closed container and a removable closure member for said container, which comprises; providing a sealing strip of a heat-shrinkable, synthetic polymeric resin, adapted by size and configuration to cover said juncture; positioning the strip over the the juncture so as to cover said juncture; and causing the positioned strip to shrink sufficiently to seal the underlying juncture closed.

2. The method of claim 1 wherein the strip also functions as the removable closure member.

3. The method of claim 1 wherein said causing is carried out by exposing the strip to heat of a temperature sufficient to shrink the strip.

4. A method of closing a container having an access opening, which comprises;
covering the opening with a closure member which is made of a heat-shrinkable, synthetic polymeric

resin; and
causing the closure member to shrink;
whereby the container is closed by the shrunken member.

5

10

15

20

25

30

35

40

45

50

55

4

