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Applicant: **SOUTH AFRICAN INVENTIONS  
DEVELOPMENT CORPORATION**  
Administration Building Council for Scientific and  
Industrial Research Scientia  
Pretoria, Transvaal(ZA)

Inventor: **Hall, Alethea Rosalind Melanie**  
40 Driefontein, Muldersdrift Krugersdorp  
Transvaal(ZA)

Representative: **Jennings, Roy Alfred et al,**  
**GILL JENNINGS & EVERY 53-64 Chancery Lane**  
London WC2A 1HN(GB)

**Thin walled containers.**

A thin walled plastic container (10) having an opening (14) therein includes a device (18) for increasing the rigidity of the container, the device comprising an expandable body (24) having an opening (28) therein, the body (24) being located in the container (10) with the opening (28) in the body in register with the opening (14) in the container so that the interior of the body is in communication with the outside of the container and not in communication with the interior of the container. The body (24) is adapted to be expanded, e.g. by means of a gas, to increase the pressure in the ullage space (34) of the container to increase the rigidity of the container (10) when the opening (28) in the body and the opening (14) in the container are closed by closure means (32) and (20). The increased rigidity of the container allows it to be transported and stored more easily.

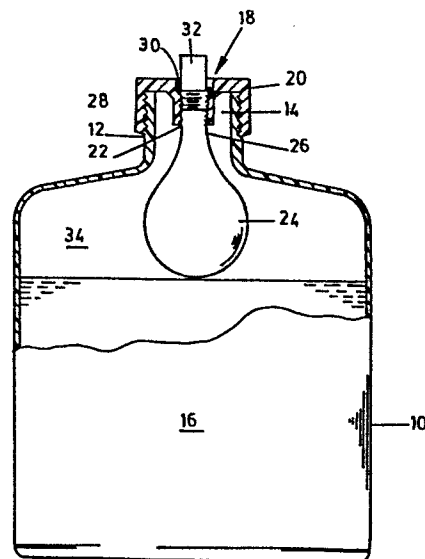


FIG. 1

South African Inventions  
Development Corporation

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"Thin Walled Containers"

BACKGROUND OF THE INVENTION

This invention relates to a thin walled container which includes a device for increasing the rigidity of the container, and to a method of increasing the rigidity of thin walled containers.

5 In the last few years plastic bottles and containers have become widely used. The plastics however are a relatively expensive raw material and recent developments have been aimed at producing thin walled containers. Of particular interest is the injection stretch blow moulding process, especially when applied to the material  
10 polyethylene terephthalate (PET). The injection stretch blow moulding process consists essentially of (a) injection blow moulding the container in miniature, (b) stretching the material to impart strength by alignment of the plastic molecular chains, and (c) blow moulding to achieve the final thin walled product. Containers  
15 produced by this method are exceptionally strong. They do, however, suffer from the fact that they lack rigidity which limits the potential market as the containers cannot be stacked. The main market for these containers has been for the packaging of carbonated beverages, as the pressurisation produced by the carbonation imparts a  
20 rigidity to the filled and sealed containers.

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Similarly, thin walled metal containers also lack rigidity which reduces their stackability.

#### SUMMARY OF THE INVENTION

According to the invention there is provided a thin walled container  
5 having an opening therein including a device for increasing the  
rigidity of the container, the device comprising an expandable body  
having an opening therein, the body being located in the container  
with the opening in the body in register with the opening in the  
container so that the body is in communication with the outside of the  
10 container and not in communication with the interior of the container,  
the body being adapted to be expanded to increase the pressure in the  
ullage space of the container, and closure means to close the opening  
in the body.

In one embodiment of the invention, the container may include a cap  
15 adapted to engage the container to close the opening, the cap having  
an aperture therethrough, the expandable body being attached to the  
cap with a gas-tight seal between the cap and the body, the opening in  
the body being in register with the aperture in the cap, and the  
closure means being adapted to close the aperture in the cap and the  
20 opening in the body. The cap is preferably screw-threaded and is  
adapted to engage with a complementary screw-thread on the container.  
In this case, the container will generally have only one opening,  
which is used for dispensing the contents of the container.

In another embodiment of the invention, the body may be attached to  
25 the container with the opening in the body being in register with the  
opening in the container, and the container including a second  
closeable opening. In this case, the second opening is used for  
dispensing the contents of the container.

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The expandable body may be, for example, balloon-shaped or rectangular in shape. Alternatively, the body may comprise a closed cylindrical tube, the side wall of the tube including one or more circumferential deformable ribs, so that the tube is adapted to collapse and expand.

- 5 The expandable body is preferably adapted to be expanded by a gas. The body is preferably expanded by introducing into the body a dose of a solid or liquid material which sublimates at ambient temperature to emit a gas, e.g. solid carbon dioxide, or by introducing a gas directly into the body.
- 10 The container may be a plastic container, preferably a plastic container made by the injection stretch blow moulding process, and more preferably a plastic container made of polyethylene terephthalate. The container may also be a metal container.

The closure means for closing the opening in the body may be a plug,  
15 or a non-return valve.

According to another aspect of the invention there is provided a method of increasing the rigidity of a thin walled container having an opening therein including the steps of locating an expandable body having an opening therein in the container, with the opening in the  
20 body in register with the opening in the container so that the body is in communication with the outside of the container and not in communication with the interior of the container, expanding the body to increase the pressure in the ullage space of the container, and closing the opening in the body.

- 25 According to a further aspect of the invention, there is provided a closure device for closing an opening in a thin walled container, comprising a cap adapted to engage the container to close the opening, the cap having an aperture therethrough, an expandable body attached

to the cap with a gas-tight seal between the cap and the body, the body including an opening in register with the aperture in the cap and the body being adapted to be located in the container when the cap is engaged with the container and to be expanded to increase the pressure 5 in the ullage space of the container, and closure means for closing the opening in the body and the aperture in the cap.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic side view of a first embodiment of a container and device according to the invention; and  
10 Figure 2 is a schematic side view of a second embodiment of a container and device according to the invention.

#### DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to Figure 1, there is shown a thin walled container 10 having an externally screw-threaded neck 12 surrounding an opening 14 15 and partially filled with a non-carbonated product 16, and a closure device indicated generally at 18. The thin walled container 10 may be, for example, a plastic container, e.g. a polyethylene terephthalate container made by the injection stretch blow moulding process, or a metal container.

20 The closure device 18 includes a cap 20 having an internal screw-thread which is complementary to the screw-thread on the neck 12 of the container 10 so that the cap 20 may be engaged on the neck 12 of the container 10, as shown, to close the opening 14, the cap 20 having an aperture 22 which is screw-threaded, therethrough. An expandable 25 body 24 which is balloon-shaped and has a neck 26 surrounding an opening 28 is attached by means of its neck 26 to the interior of the aperture 22 at 30 so that there is a gas-tight seal between the body 24 and the cap 20 and so that the opening 28 is in register with the

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aperture 22. A plug 32 which has a complementary screw thread to the thread of the aperture 22, is engaged in the aperture 22 of the cap 20 so that it closes the aperture 22 and the opening 28 in the body 24. The screw-thread on the plug 32 is broken in one or more places so that when the plug 32 is unscrewed from the aperture 22, gas contained in the body 24 may escape before the plug 32 is completely removed.

The cap 20 and the plug 32 may be made of a plastics material. The body 24 may be made of any material which will expand sufficiently.

The use of the container 10 will now be described. The container 10 is filled to the level shown with a non-carbonated product 16, leaving an ullage space 34 above the product 16. The flexible body 24 is located in the container 10 as shown in Figure 1, and the cap 20 is screwed on to the neck 12 of the container 10. The plug 32 is unscrewed from the aperture 22 and a dose of a solid or a liquid material which sublimates at ambient temperature to emit a gas, e.g. solid carbon dioxide, is placed in the body 24. The plug 32 is then replaced in the aperture 22 thus sealing the body 24. As the material sublimates and the gas is emitted, the body 24 expands until it partially or completely fills the ullage space 34 to increase the pressure in the ullage space 34, thus pressurising the container 10 to impart rigidity thereto. The container 10 may now be transported and stored without fear of damage thereto.

When it is desired to use the product 16 stored in the container 10, the plug 32 is unscrewed from the aperture 22 thus allowing the gas in the body 24 to escape and the body 24 to deflate. The cap 20 is then unscrewed from the neck 12 to give access to the product 16.

Referring to Figure 2, there is shown a thin walled container 50 having a first opening 52, and a second opening 54 closed by a cap 56, and a device for imparting rigidity to the container, indicated

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generally at 58. The container 50 is partially filled with a non-carbonated product 60. Again, the container 50 may be a plastic container or a metal container.

The device 58 comprises a flexible rectangular-shaped body 62 having an opening 64, the body 62 being attached to the interior wall of the container 50, with the opening 64 in the body 62 being in register with the opening 52 in the container 50. A non-return valve 66 closes the opening 64 in the body 62 and the opening 52 in the container 50. The dotted lines illustrate the body 62 before expansion, and the solid lines illustrate the body 62 after expansion.

The body 62 may be attached to the container 50, e.g. by heat or ultrasonic welding or glueing, with the non-return valve 66 then being inserted in the openings 52 and 64, e.g. by means of a snap-fit, or the body 62 may first be attached to the valve 66 by similar methods, and then the body 62 and valve 66 inserted in the container 50.

The use of the container 50 will now be described. The container 50 is filled to the level shown with a non-carbonated product 60, leaving an ullage space 68 above the product 60. The cap 56 is then screwed on to the opening 54 to close it. The body 62 which is already located in the container 50, is then filled with a gas through the non-return valve 66, until the bag 62 expands to increase the pressure in the ullage space 68, thus pressurising the container 50 to impart a rigidity thereto. The container 50 may now be transported and stored without fear of damage thereto.

When it is desired to use the product 60 stored in the container 50, the non-return valve 66 is opened to allow the body 62 to deflate, and then the cap 56 is removed from the opening 54, to give access to the product 60.

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The container of the invention has several advantages. Firstly, such containers have a high degree of rigidity. Therefore, they can be easily and safely stacked without damage to the containers. This results in the advantages that they can be transported more easily and economically, and that they can be stacked better on supermarket and shop shelves. Secondly, as the gas which is used to pressurise the containers, is confined in a closed body, there is no contamination of the product contained in the container by the gas. The container may therefore be used to contain a wide variety of products such as edible oils, food products such as mayonnaise, toiletries, pharmaceuticals, household chemicals and industrial chemicals.

CLAIMS

1.

A thin walled container (10, 50) having an opening (14, 52) therein is characterised in that it includes a device (18, 58) for increasing the rigidity of the container (10, 50), the device (18, 58) comprising an expandable body (24, 62) having an opening (28, 64) therein, the body (24, 62) being located in the container (10, 50) with the opening (28, 64) in the body (24, 62) in register with the opening (14, 52) in the container (10, 50) so that the body (24, 62) is in communication with the outside of the container (10, 50) and not in communication with the interior of the container (10, 50), the body (24, 62) being adapted to be expanded to increase the pressure in the ullage space (34, 68) of the container (10, 50), and closure means (32, 66) to close the opening (28, 64) in the body (24, 62).

15 2.

A container according to claim 1 characterised in that the container (10) includes a cap (20) adapted to engage the container (10) to close the opening (14), the cap (20) having an aperture (22) therethrough, the expandable body (24) being attached to the cap (20) with a gas tight seal between the cap (20) and the body (24), the opening (28) in the body (24) being in register with the aperture (22) in the cap (20), and the closure means (32) being adapted to close the aperture (22) in the cap (20) and the opening (28) in the body (24).

3.

25 A container according to claim 2 characterised in that the cap (20) is screw-threaded and is adapted to engage with a complementary screw-thread on the container (10).

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4.

A container according to claim 1 characterised in that the body (62) is attached to the container (50) with the opening (64) in the body (62) being in register with the opening (52) in the container (50), and the container (50) includes a second closable opening (54).

5.

A container according to any one of the preceding claims characterised in that the body (24, 62) is adapted to be expanded by a gas.

6.

10 A container according to claim 5 characterised in that the body (24, 62) is adapted to be expanded by introducing into the body (24, 62) a dose of a solid or liquid material which sublimes at ambient temperature to emit a gas.

7.

15 A container according to claim 6 characterised in that the material is solid carbon dioxide.

8.

A container according to any one of the preceding claims characterised in that the container is a plastic container.

20 9.

A container according to claim 8 characterised in that the plastic container is made by the injection stretch blow moulding process.

10.

25 A container according to claim 9 characterised in that the plastic container is made of polyethylene terephthalate.

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11.

A container according to any one of claims 1 to 7 characterised in that the container is a metal container.

12.

5 A container according to any one of the preceding claims characterised in that the closure means comprises a plug (32).

13.

A container according to any one of claims 1 to 11 characterised in that the closure means comprises a non-return valve (66).

10 14.

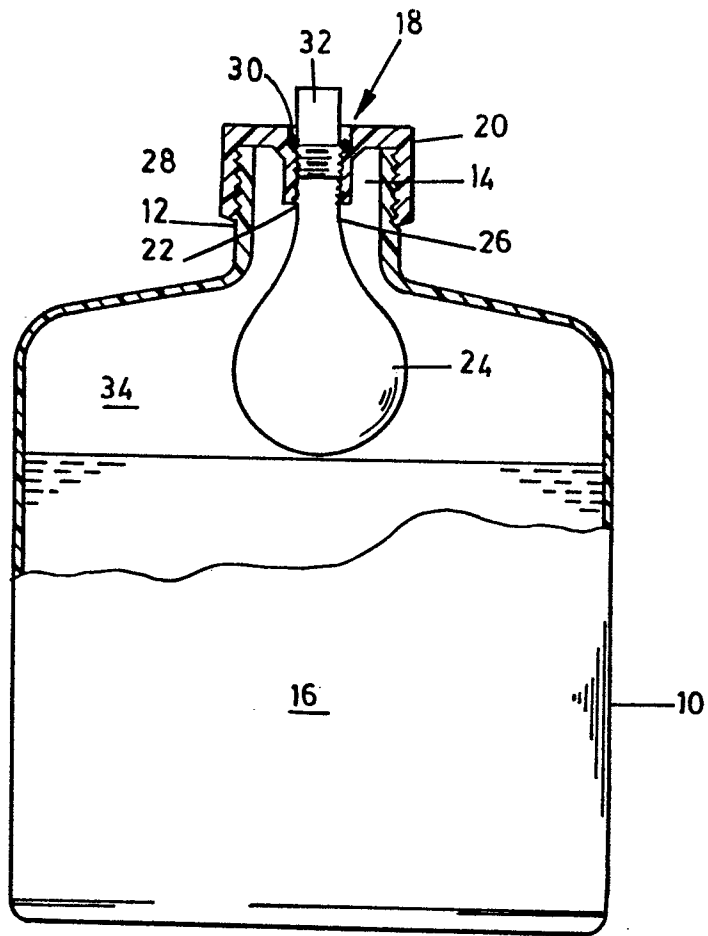
A method of increasing the rigidity of a thin walled container (10, 50) having an opening (14, 52) therein characterised in that it includes the steps of locating an expandable body (24, 62) having an opening (28, 64) therein in the container (10, 50), with the opening  
15 (28, 64) in the body (24, 62) in register with the opening (14, 52) in the container (10, 50), so that the body (24, 62) is in communication with the outside of the container (10, 50) and not in communication with the interior of the container (10, 50), expanding the body (24, 62) to increase the pressure in the ullage space (34, 68) of the  
20 container (10, 50), and closing the opening (28, 64) in the body (24, 62).

15.

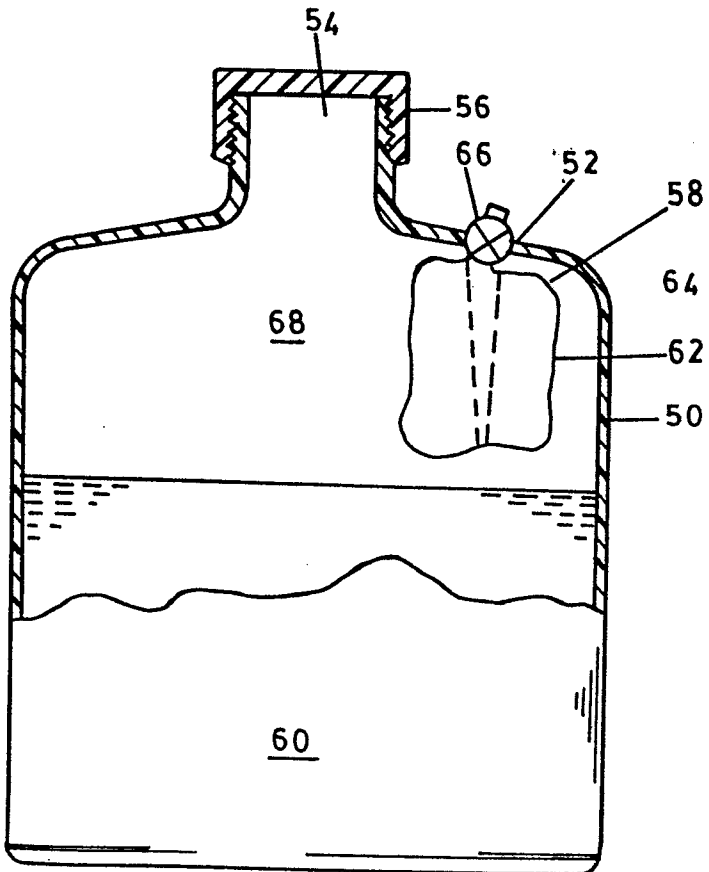
A closure device (18) for closing an opening (14) in a thin walled container (10) comprises a cap (20) adapted to engage the container  
25 (10) to close the opening (14), the cap (20) having an aperture (22) therethrough, an expandable body (24) attached to the cap (20) with a gas-tight seal between the cap (20) and the body (24), the body (24) including an opening (28) in register with the aperture (22) in the cap (20) and the body (24) being adapted to be located in the

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container (10) when the cap (20) is engaged with the container (10) and to be expanded to increase the pressure in the ullage space (34) of the container (10), and closure means (32) for closing the opening (28) in the body (24) and the aperture (22) in the cap (20).



FIG\_1



FIG\_2