

1,084,564



PATENT SPECIFICATION

1,084,564



Inventor: HERBERT ARMSTRONG, DONALD HODGSON and FRANK GEORGE COLLIER RUTTER.

Date of filing Complete Specification: November 17, 1965.

Application Date: February 17, 1965.

No. 6896/65

Complete Specification Published: September 27, 1967.

© Crown Copyright 1967.

Index at Acceptance:—B8 T (7F1, 20B, 20C, 20D).

Int. Cl.:—B 65 d 53/06.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in or relating to Sealing Containers



We, THE METAL BOX COMPANY LIMITED, a Company Incorporated under the laws of Great Britain, of 37, Baker Street, London, W.1., England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sealing containers, for example bottles, and in particular to a gasket for incorporation in a cap or like closure for application to a container for a liquid which generates gas in the container.

During storage some kinds of products generate gas which produces an undesirable pressure within the container therefor. For example, liquid products such as solutions of sodium hypochloride slowly release oxygen. Many attempts have been made to produce a closure for a container, which closure will permit leakage or venting of gas while preventing leakage of liquid from the container. One closure so proposed is made of synthetic plastics material and has an aperture through the crown thereof, such aperture, in conjunction with a rubber wad, permits venting of the container but also permits leakage of the liquid contents of the container. Another proposal consists of a cap fitted with a soft gasket, the cap being applied to the container with a relatively low closing torque. This kind of cap is not wholly satisfactory because irregularities in the neck of the container give rise to the risk of leakage, while at closing torque levels low enough to permit venting of gas, liquid also may seep from the container or the cap may become loosened during transport.

It is an object of the present invention to provide a gasket for incorporation in a cap or like closure which will avoid the

disadvantages of closures of the kind above mentioned.

According to the invention there is provided a gasket formed from a plastisol sealing compound having a gas permeable intercellular structure created by the incorporation in the compound of a blowing agent and the decomposition of said agent by heating the compound for a time and at a temperature such that the gasket has a specific gravity less than 1. The compound preferably has a specific gravity between 0.4 and 0.7. In one embodiment of the invention the compound is heated for one minute at a temperature in the range of 425° to 465°F.

The invention also comprehends a screw-on cap or like closure for a container for a product which generates gas in the container, including a gasket as set forth in the preceding paragraph. The gasket may be formed by flowing the sealing compound into the cap and thereafter effecting the heating of the compound. If desired the crown of the cap may be provided with at least one inwardly directed indentation adapted to prevent over compression of the gasket on application of the cap to a container.

In another embodiment the crown of the cap may include raised panels or blisters between which are lands arranged to compress sections of the gasket against the rim of the container.

In order that the invention may be clearly understood embodiments thereof will now be described, by way of example, with reference to the drawing accompanying the Provisional Specification, in which:

Fig. 1 is an elevation, partly in section, of a screw-on cap according to the invention.

Fig. 2 is an underneath plan of Fig. 1, and

Fig. 3 is a pictorial view, partly in section,

[Price 4s. 6d.]

of a modified form of the cap applied to a bottle, and with reference to the accompanying drawings, in which:—

- 5 Figs. 4 and 5 are pictorial views, partly in section, of two other forms of the cap applied to bottles.

Referring to the drawings, the cap may be made of tinplate or aluminium and consists of a crown 1 and a screw-threaded skirt 2. The gasket 3 is located against the inner side of the crown 1 and may be arranged to provide with the rim 4 of a bottle 5. Fig. 3, a corner seal a top seal or, as shown in Fig. 3, both a corner seal and a top seal. As shown in the drawings the gasket covers the whole of the interior of the crown 1 but if desired the gasket may be an annulus.

The gasket 3 is gas permeable and is formed from a sealing compound and has an intercellular structure created by the incorporation in the compound of a blowing agent, such as a hydrazine derivative which upon heating gives off nitrogen, and the decomposition of the said agent by heating the compound for about one minute at a temperature of 425° to 465°F. It is to be understood, however, ~~the~~ the result of the chemical reaction is related to both time and temperature; thus the time may be varied somewhat either side of one minute with an appropriate adjustment to temperature. The compound is a paste comprising a dispersion of a synthetic thermoplastic resin, preferably polyvinyl chloride, in a plasticiser and may include fillers or other agent materials. The compound does not contain volatile solvents and has a viscosity such that it may be squirted out of a nozzle. On heating, the plasticiser diffuses throughout the resin particles so as to transform the compound, usually referred to as transform the compound, usually referred to as a plastisol, from a pasty mixture to a permanent rubber-like material. The compound may be flowed to form a sheet which is then heated for the period and at the temperature stated above and the gaskets stamped or cut from the sheet, but preferably the compound is flowed into the cap and is then heated for the period and at the temperature stated.

The heating of the compound in the manner stated causes the decomposition of the blowing agent thus liberating gas, usually air or nitrogen, which causes the formation of discrete cells in the compound. By heating to the temperature stated, the gas in the cells expands and tends to rupture the cells so that the compound has a partially intercommunicating cell structure which renders it gas permeable. When the compound is heated to the temperature stated for about one minute the compound has a specific gravity less than 1 and according to

the extent to which it is rendered intercellular, it may have a specific gravity between 0.4 and 0.7.

By providing a cap with a gasket as herein described it has been found possible to apply the cap to a bottle with sufficient closing torque to ensure retention of the cap and prevention of liquid leakage during transport, and it has also been found that the cap will vent gas at pressures down to about two pounds per square inch, which pressure is well below the maximum desirable pressure for bottles made from synthetic thermoplastic materials and intended to contain liquid such as bleach.

If the cap is provided interiorly with an anti-corrosive coating the sealing compound will adhere to the coating and in such instances it is preferred to effect the heating to obtain the lower specific gravity so that a more complete intercellular condition compensates for venting area which may be lost by adhesion.

If desired, the crown 1 of the cap may be provided with one or more indentations 6, Fig. 3, which act as a safety feature to prevent application of the cap so tightly to the bottle that the rim 4 compresses the gasket 3 enough to impede venting. Such indentations are, however, not essential if the torque used in applying the cap can be closely controlled.

In the embodiment of the cap shown in Fig. 4 the crown 1 of the cap is provided with one or more raised panels or blisters 7 which provide lands 8 to compress sections of the gasket 3 against the rim 4. This kind of cap is found to permit a relatively free flow of the gasket-forming compound and to provide adequate venting of the bottle. A further alternative form of cap is shown in Fig. 5 and this cap has depressed panels 9 provided in the crown 1.

WHAT WE CLAIM IS:—

1. A gasket formed from a plastisol sealing compound having a gas permeable intercellular structure created by the incorporation in the compound of a blowing agent and the decomposition of said agent by heating the compound for a time and at a temperature such that the gasket has a specified gravity less than 1.

2. A gasket according to Claim 1, wherein the specific gravity is between 0.4 and 0.7.

3. A gasket according to Claim 1 or Claim 2, wherein the compound is heated for one minute at a temperature in the range of 425° to 465°F.

4. A screw-on cap or like closure for a container for a product which generates gas in the container, including a gasket according to any one of Claims 1 to 3.

5. A cap according to Claim 4, wherein the gasket is formed by flowing the sealing



that

of a modified form of the cap applied to a bottle, and with reference to the accompanying drawings, in which:—

5 Figs. 4 and 5 are pictorial views, partly in section, of two other forms of the cap applied to bottles.

Referring to the drawings, the cap may be made of tinplate or aluminium and consists of a crown 1 and a screw-threaded skirt 2. The gasket 3 is located against the inner side of the crown 1 and may be arranged to provide with the rim 4 of a bottle 5. Fig. 3, a corner seal a top seal or, as shown in Fig. 3, both a corner seal and a top seal. As shown in the drawings the gasket covers the whole of the interior of the crown 1 but if desired the gasket may be an annulus.

The gasket 3 is gas permeable and is formed from a sealing compound and has an intercellular structure created by the incorporation in the compound of a blowing agent, such as a hydrazine derivative which upon heating gives off nitrogen, and the decomposition of the said agent by heating the compound for about one minute at a temperature of 425° to 465°F. It is to be understood, however, that the result of the chemical reaction is related to both time and temperature: thus the time may be varied somewhat either side of one minute with an appropriate adjustment to temperature. The compound is a paste comprising a dispersion of a synthetic thermoplastic resin, preferably polyvinyl chloride, in a plasticiser and may include fillers or other agent materials. The compound does not contain volatile solvents and has a viscosity such that it may be squirted out of a nozzle. On heating, the plasticiser diffuses throughout the resin particles so as to transform the compound, usually referred to as a plastisol, from a pasty mixture to a permanent rubber-like material. The compound may be flowed to form a sheet which is then heated for the period and at the temperature stated above and the gaskets stamped or cut from the sheet, but preferably the compound is flowed into the cap and is then heated for the period and at the temperature stated.

The heating of the compound in the manner stated causes the decomposition of the blowing agent thus liberating gas, usually air or nitrogen, which causes the formation of discrete cells in the compound. By heating to the temperature stated, the gas in the cells expands and tends to rupture the cells so that the compound has a partially inter-communicating cell structure which renders it gas permeable. When the compound is heated to the temperature stated for about one minute the compound has a specific gravity less than 1 and according to

the extent to which it is rendered intercellular, it may have a specific gravity between 0.4 and 0.7.

By providing a cap with a gasket as herein described it has been found possible to apply the cap to a bottle with sufficient closing torque to ensure retention of the cap and prevention of liquid leakage during transport, and it has also been found that the cap will vent gas at pressures down to about two pounds per square inch, which pressure is well below the maximum desirable pressure for bottles made from synthetic thermoplastic materials and intended to contain liquid such as bleach.

If the cap is provided interiorly with an anti-corrosive coating the sealing compound will adhere to the coating and in such instances it is preferred to effect the heating to obtain the lower specific gravity so that a more complete intercellular condition compensates for venting area which may be lost by adhesion.

If desired, the crown 1 of the cap may be provided with one or more indentations 6, Fig. 3, which act as a safety feature to prevent application of the cap so tightly to the bottle that the rim 4 compresses the gasket 3 enough to impede venting. Such indentations are, however, not essential if the torque used in applying the cap can be closely controlled.

In the embodiment of the cap shown in Fig. 4 the crown 1 of the cap is provided with one or more raised panels or blisters 7 which provide lands 8 to compress sections of the gasket 3 against the rim 4. This kind of cap is found to permit a relatively free flow of the gasket-forming compound and to provide adequate venting of the bottle. A further alternative form of cap is shown in Fig. 5 and this cap has depressed panels 9 provided in the crown 1.

WHAT WE CLAIM IS:—

1. A gasket formed from a plastisol sealing compound having a gas permeable intercellular structure created by the incorporation in the compound of a blowing agent and the decomposition of said agent by heating the compound for a time and at a temperature such that the gasket has a specified gravity less than 1.

2. A gasket according to Claim 1, wherein the specific gravity is between 0.4 and 0.7.

3. A gasket according to Claim 1 or Claim 2, wherein the compound is heated for one minute at a temperature in the range of 425° to 465°F.

4. A screw-on cap or like closure for a container for a product which generates gas in the container, including a gasket according to any one of Claims 1 to 3.

5. A cap according to Claim 4, wherein the gasket is formed by flowing the sealing



that



* C L M S *

compound into the cap and thereafter effecting the heating of the compound.

6. A cap according to Claim 4 or Claim 5, wherein the crown of the cap is provided with at least one inwardly directed indentation adapted to prevent over compression of the gasket on application of the cap to a container.

7. A cap according to Claim 4 or Claim 5, wherein the crown of the cap includes raised panels or blisters between which are lands arranged to compress sections of the gasket against the rim of the container.

8. A cap according to Claim 4 or Claim 5, wherein the crown of the cap includes depressed panels.

9. A gas permeable gasket substantially as herein described.

10. A screw-on cap or like closure for a container for a product which generates gas in the container, substantially as herein described with reference to Figs. 1 and 2 or to Fig. 3 of the drawing accompanying the Provisional Specification, or substantially as herein described with reference to Fig. 4 or to Fig. 5 of the accompanying drawing.

PAGE, WHITE & FARRER,
Chartered Patent Agents,
27, Chancery Lane,
London, W.C.2.
Agents for the Applicants.

Berwick-upon-Tweed: Printed for Her Majesty's Stationary Office by The Tweeddale Press Ltd.—1967
Published at the Patent Office, 25 Southampton Buildings, London, W.C.2 from which copies may be obtained.



* C L M S *