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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Bottles

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 bottles made of synthetic thermoplastic material such as polyethylene or polypropylene.

As is well understood it has long been the custom to package a large variety of commodities in tins, particularly when the commodity is such that the package therefor must be tamperproof and hermetically sealed. The construction of tins is such that they can be adapted in a number of ways to fulfil these requirements but they are relatively expensive to produce.

Bottles made of synthetic thermoplastic materials have also been known and used for some considerable time for the packaging of many commodities and it is known that by controlling the quantity of material used in the formation of these bottles, they can be produced, in various shapes, more cheaply than can tins. It has also been known that bottles made from synthetic thermoplastic materials are suitable for the packaging of a number of commodities currently packaged in tins but these commodities have not been packaged in synthetic thermoplastic bottles because such bottles have not hitherto been tamperproof, or properly protected against the ingress of moisture through the mouths thereof, as is an essential requirement when packaging these kinds of commodities. As an example of a commodity which must be packaged in a tamperproof bottle there may be instanced motor oil, and a commodity to be packaged in a bottle the mouth of which is protected against the ingress of moisture is health salts.

[*Price 4s. 6d.*]

The invention is particularly intended for use with thin-walled bottles and where herein reference is made to a "thin wall" this term is intended to mean a wall thickness normally not greater than 0.030 inch, although it could be used on larger bottles having thicker walls.

When the mouth of a thin-walled bottle is sealed by a sealing or closure element which is heat-sealed to a flange defining the mouth opening of the bottle it is sometimes found difficult to effect a complete seal because of slight undulations which may occur in the flange, or because of minute lines of material which may be formed by the moulding process and extend across and stand slightly proud of the flange. It is one object of the present invention to provide a bottle with a smooth flat surface against which sealing of the bottle mouth may be effected and thereby to reduce to a minimum the number of bottles the mouths of which are inadequately sealed during the sealing operation.

In some instances the mouth of a bottle is closed and sealed by a cap interlocked with the neck of the bottle, as by screw-threads, and in such instances it has been usual to fit a wad in the crown of the cap to make sealing engagement with the rim defining the mouth of the bottle. Such wads increase the cost of production and sometimes have a tendency, when the cap is not applied to the bottle, to become dislodged and fall out of the cap. It is a further object of the invention to provide a bottle for use with a closure cap and which is capable of making an effective seal with the cap while avoiding the use of a wad in the cap.

According to the invention a bottle made of synthetic thermoplastic material has the mouth thereof defined by a rim integral with and upstanding from a flexible flange integral with and extending laterally from the neck towards the longitudinal axis of the bottle, said rim having a smooth outer edge substan-

tially at right angles to the axis of the bottle to make sealing engagement with a closure element for the mouth of the bottle.

In one embodiment of the invention the flange may slope upwards from the neck towards the rim, and the neck may include a side portion substantially parallel with the axis of the bottle and the flange may form an angle of about 20° with a plane at right angles to the longitudinal axis of the bottle.

The flange may be substantially at right angles with the axis of the bottle.

The invention further contemplates a bottle the mouth of which is sealed by a closure element made from synthetic thermoplastic material or from a laminate of two or more different thermoplastic films or coated paper, or from a coated metal foil, for example aluminium foil coated with a film or layer of synthetic thermoplastic material such as polyethylene, and the closure element is heat-sealed to the smooth outer edge of the rim.

The closure element may comprise a disc a centre portion of which is heat-sealed to the rim and the edge portions of which are freely downturned about the neck thereby to provide a portion which can be gripped in order to effect stripping of the closure element from the bottle when it is desired to obtain access to the contents thereof.

In an alternative embodiment of the invention the bottle neck is provided with screw threads or the like adapted for interengagement with a cap to retain the cap in position about the neck, and the mouth is sealed by engagement between the crown of the cap and the smooth outer edge of the rim.

With thin walled bottles it is sometimes found that the sides thereof, following filling and sealing, are subject to the condition known as "panelling" this being a condition in which portions of the sides collapse or distort inwards usually due to a slight vacuum which is created in the bottle. This condition spoils the appearance of the bottle and it is a further object of the invention so to construct the bottle that it is possible to effect manipulation during filling and sealing in a manner such that a slight positive pressure is created in the bottle and which acts to retain the normal shape of the sides thereof.

According to this aspect of the invention a part of the bottom of the bottle extends into the bottle and is capable of being drawn outwards from the bottle by a vacuum applied thereto prior to the sealing of the bottle whereby following sealing of the mouth and release of the vacuum said part may be returned to or substantially to the normal position thereof thereby to create pressure in the bottle to constrain the sides of the bottle against panelling thereof. The said part of the bottom may be so connected to the sides of the bottle as to be restored to the normal position thereof by the resiliency of the bottle-forming material.

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

Figure 1 is a broken view of a bottle, partly in section, according to the invention,

Figure 2 is a section of the mouth end of the bottle of Figure 1 with a closure element heat-sealed across the mouth thereof.

Figure 3 is a top plan of Figure 2, and

Figure 4 is a view, partly in section, of a modified form of bottle according to the invention.

Referring to Figures 1 to 3, the bottle is made of synthetic thermoplastic material, for example polyethylene, and is a thin-walled bottle comprising a cylindrical body having a smooth portion 1 to receive a printed decoration, not shown, thereon and two ribbed portions 2, 3 at the opposite ends of the portion 1 to impart strength to the body. The top of the bottle has a neck 4 provided with a mouth defined by a rim 5 integral with and upstanding from a flexible flange 6 integral with and extending laterally from the neck towards the longitudinal axis of the bottle. The rim 5 has a smooth outer edge 7 substantially at right angles to the longitudinal axis of the bottle to make sealing engagement, as described below, with a closure element for the mouth of the bottle. The rim 5 is moulded during the moulding of the bottle when "flash" or waste material is formed in extension of the rim and the smooth outer edge 7 is obtained as the result of a machining operation during which the flash is severed from the bottle. As the result of the machining operation the edge 7 presents a smooth non-undulating surface which is free from mould marks, is substantially at right-angles to the axis of the bottle, and to which a closure element can be heat sealed using automatic machinery. The height 8, Figure 1, of the rim is small being of the order of 0.060 inch.

In the preferred embodiment of the invention the flange 6 slopes upwards from the neck towards the rim, as shown in Figures 1 and 2, and the neck includes a side portion 9 substantially parallel with the longitudinal axis of the bottle. The flange 6 forms with a plane at right angles to the longitudinal axis of the bottle an angle 10 of about 20°.

Figure 2 illustrates the sealing of the mouth of the bottle by a closure element 11 which is heat-sealed to the outer edge 7 of the rim. The closure element 11 is made from synthetic thermoplastic material or from a coated metal foil, for example aluminium foil coated with a film or layer of synthetic thermoplastic material such as polyethylene. As illustrated in the drawings the closure element 11 is

assumed to be a coated metal foil. A suitable thickness for the sealing element is within the range of from 0.001 inch to 0.006 inch.

The closure element 11 is applied to the rim by the simultaneous application thereto of heat and pressure and is caused to adhere only to the smooth edge 7 so that the edge portions 12, Figure 2, of the closure element extend freely outwards from the rim 5 and can be downturned about the neck as shown in Figure 2. When it is desired to obtain access to the contents of the bottle a portion of the downturned edge portion 12 is raised and gripped and the closure element 11 is torn from the rim 5. The closure element is conveniently formed from a disc and, as shown in Figure 2, a centre portion of the disc is heat-sealed to the edge 7. It will be understood that by leaving the edge portion 12 of the disc free it is not necessary to provide the disc with a tag or tongue for gripping when removing the disc from the edge 7. It will also be understood that when sealed by the disc the bottle is rendered tamperproof because once the disc has been removed it is difficult or impossible to replace it without it being readily apparent that tampering has been effected.

The sloping form of the flange 6 ensures that the disc is adhered only to the edge 7 of the rim 5 and the flexibility of the flange permits movement of the rim towards the bottom of the bottle on the application of the sealing pressure thus allowing for slight irregularities in the height of the rim and ensuring that sealing pressure is fully and evenly applied over the whole of the edge 7.

The above-mentioned condition of panelling occurs in the body portion 1 and to overcome this tendency a part 13, Figure 1, of the bottom of the bottle extends into the bottle and is capable, due to the flexibility of the material, of being drawn outwards from the bottle by a vacuum applied thereto prior to the sealing of the bottle thus by drawing the part 13 outwards from the body and increasing the capacity of the bottle. The bottle is not filled to the brim of the mouth and when filled has an ullage or headspace. This is so selected that when, following sealing of the bottle, the bottom part 13 is returned to or substantially to the normal position thereof, Figure 1, a positive pressure is created in the bottle and this pressure acts to constrain the body side portion 1 against panelling thereof.

Following the release of the vacuum from the bottom part 13 this part may be pushed positively, as by a plunger or the like, back to the normal position or alternatively and preferably, the part 13 is connected with the sides of the bottle by a portion 14 the configuration of which is so selected as to cause the part 13 to be self-returning when the vacuum is released.

Figure 4 illustrates a modified form of the bottle described above with reference to Figures 1 to 3 and which is arranged to be sealed by engagement of the inner surface 15 of the crown 16 of a cap 17 with the edge 7 of rim 5. In this embodiment of the invention the neck 4 is provided with screw-threads or the like 18 adapted for interengagement with the cap 17 so that when the cap is fully interengaged with the neck the surface 15 is pressed against the edge 7 and makes sealing engagement therewith. In this embodiment of the invention the flange 6 may, as shown in Figure 4, be substantially at right angles to the axis of the bottle.

WHAT WE CLAIM IS:—

1. A bottle made of synthetic thermoplastic material and having the mouth thereof defined by a rim integral with and upstanding from a flexible flange integral with and extending laterally from the neck towards the longitudinal axis of the bottle, said rim having a smooth outer edge substantially at right angles to the axis of the bottle to make sealing engagement with a closure element for the mouth of the bottle.

2. A bottle according to Claim 1, wherein the flange slopes upwards from the neck towards the rim.

3. A bottle according to Claim 2, wherein the neck includes a side portion substantially parallel with the axis of the bottle and the flange forms an angle of about 20° with a plane at right angles to the longitudinal axis of the bottle.

4. A bottle according to Claim 1, wherein the flange is substantially at right-angles with the axis of the bottle.

5. A bottle according to any one of Claims 1 to 3, wherein the mouth is sealed by a closure element made from synthetic thermoplastic material or from a coated metal foil, for example aluminium foil coated with a film or layer of synthetic thermoplastic material such as polyethylene, and the closure element is heat-sealed to the smooth outer edge of the rim.

6. A bottle according to Claim 5, wherein the closure element comprises a disc a centre portion of which is heat-sealed to the rim and the edge portions of which are freely downturned about the neck thereby to provide a portion which can be gripped in order to effect stripping of the closure element from the bottle when it is desired to obtain access to the contents thereof.

7. A bottle according to Claim 4, wherein the neck is provided with screw threads or the like adapted for interengagement with a cap to retain the cap in position about the neck, and the mouth is sealed by engagement between the crown of the cap and the smooth outer edge of the rim.

8. A bottle according to any one of Claims 1 to 6, wherein a part of the bottom of the bottle extends into the bottle and is capable

assumed to be a coated metal foil. A suitable thickness for the sealing element is within the range of from 0.001 inch to 0.006 inch.

The closure element 11 is applied to the rim by the simultaneous application thereto of heat and pressure and is caused to adhere only to the smooth edge 7 so that the edge portions 12, Figure 2, of the closure element extend freely outwards from the rim 5 and can be downturned about the neck as shown in Figure 2. When it is desired to obtain access to the contents of the bottle a portion of the downturned edge portion 12 is raised and gripped and the closure element 11 is torn from the rim 5. The closure element is conveniently formed from a disc and, as shown in Figure 2, a centre portion of the disc is heat-sealed to the edge 7. It will be understood that by leaving the edge portion 12 of the disc free it is not necessary to provide the disc with a tag or tongue for gripping when removing the disc from the edge 7. It will also be understood that when sealed by the disc the bottle is rendered tamperproof because once the disc has been removed it is difficult or impossible to replace it without it being readily apparent that tampering has been effected.

The sloping form of the flange 6 ensures that the disc is adhered only to the edge 7 of the rim 5 and the flexibility of the flange permits movement of the rim towards the bottom of the bottle on the application of the sealing pressure thus allowing for slight irregularities in the height of the rim and ensuring that sealing pressure is fully and evenly applied over the whole of the edge 7.

The above-mentioned condition of panelling occurs in the body portion 1 and to overcome this tendency a part 13, Figure 1, of the bottom of the bottle extends into the bottle and is capable, due to the flexibility of the material, of being drawn outwards from the bottle by a vacuum applied thereto prior to the sealing of the bottle thus by drawing the part 13 outwards from the body and increasing the capacity of the bottle. The bottle is not filled to the brim of the mouth and when filled has an ullage or headspace. This is so selected that when, following sealing of the bottle, the bottom part 13 is returned to or substantially to the normal position thereof, Figure 1, a positive pressure is created in the bottle and this pressure acts to constrain the body side portion 1 against panelling thereof.

Following the release of the vacuum from the bottom part 13 this part may be pushed positively, as by a plunger or the like, back to the normal position or alternatively and preferably, the part 13 is connected with the sides of the bottle by a portion 14 the configuration of which is so selected as to cause the part 13 to be self-returning when the vacuum is released.

Figure 4 illustrates a modified form of the bottle described above with reference to Figures 1 to 3 and which is arranged to be sealed by engagement of the inner surface 15 of the crown 16 of a cap 17 with the edge 7 of rim 5. In this embodiment of the invention the neck 4 is provided with screw-threads or the like 18 adapted for interengagement with the cap 17 so that when the cap is fully interengaged with the neck the surface 15 is pressed against the edge 7 and makes sealing engagement therewith. In this embodiment of the invention the flange 6 may, as shown in Figure 4, be substantially at right angles to the axis of the bottle.

WHAT WE CLAIM IS:—

1. A bottle made of synthetic thermoplastic material and having the mouth thereof defined by a rim integral with and upstanding from a flexible flange integral with and extending laterally from the neck towards the longitudinal axis of the bottle, said rim having a smooth outer edge substantially at right angles to the axis of the bottle to make sealing engagement with a closure element for the mouth of the bottle.

2. A bottle according to Claim 1, wherein the flange slopes upwards from the neck towards the rim.

3. A bottle according to Claim 2, wherein the neck includes a side portion substantially parallel with the axis of the bottle and the flange forms an angle of about 20° with a plane at right angles to the longitudinal axis of the bottle.

4. A bottle according to Claim 1, wherein the flange is substantially at right-angles with the axis of the bottle.

5. A bottle according to any one of Claims 1 to 3, wherein the mouth is sealed by a closure element made from synthetic thermoplastic material or from a coated metal foil, for example aluminium foil coated with a film or layer of synthetic thermoplastic material such as polyethylene, and the closure element is heat-sealed to the smooth outer edge of the rim.

6. A bottle according to Claim 5, wherein the closure element comprises a disc a centre portion of which is heat-sealed to the rim and the edge portions of which are freely downturned about the neck thereby to provide a portion which can be gripped in order to effect stripping of the closure element from the bottle when it is desired to obtain access to the contents thereof.

7. A bottle according to Claim 4, wherein the neck is provided with screw threads or the like adapted for interengagement with a cap to retain the cap in position about the neck, and the mouth is sealed by engagement between the crown of the cap and the smooth outer edge of the rim.

8. A bottle according to any one of Claims 1 to 6, wherein a part of the bottom of the bottle extends into the bottle and is capable

of being drawn outwards from the bottle by a vacuum applied thereto prior to the sealing of the bottle whereby following the sealing of the mouth and release of the vacuum said part may be returned to or substantially to the normal position thereof thereby to create pressure in the bottle to constrain the sides of the bottle against panelling thereof.

9. A bottle according to Claim 8, wherein said part of the bottom is so connected to the sides of the bottle as to be restored to the normal position thereof by the resiliency of the bottle-forming material.

10. A bottle made of synthetic thermoplastic material substantially as herein described with reference to and as illustrated in Figures 1 to 3, or substantially as described with reference to and as illustrated in Figure 4 of the drawings accompanying the Provisional Specification.

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