

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in or relating to the Closing and Sealing of Bottles and the Like

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:—

10 This invention relates to the closing and sealing of bottles and the like having a neck provided with screw threads or a bead at a position spaced from the mouth end of the neck.

15 It is known to close bottles of the kind mentioned above by applying to the mouth end of the neck a permanently deformable closure cap having a crown and an annular skirt having a diameter greater than that of the maximum permissible diameter of the threaded portion of the neck and to deform the skirt to effect interengagement thereof with the threaded or beaded portion of the neck.

25 It has also been proposed to effect top and side sealing of a bottle of the kind described by inserting in the closure cap a sealing disc made of compressible material such as cork, soft rubber, paper, pulpboard, or the like, the disc having a diameter greater than that of the mouth rim of the bottle so that a marginal portion of the disc overhangs the mouth rim when the cap and disc are applied to the bottle. In this proposal the cap, after being loosely applied to the bottle, is deformed by a sealing head so that a portion of the crown of the cap is pressed towards the exterior sides of the mouth portion of the bottle thereby to turn inwards the overhanging portions of the seal-

ing disc to form a side seal.

It is a main object of the present invention to provide a closure cap for closing and sealing bottles of the kind mentioned which avoids the use of a sealing disc but ensures an efficient top and side seal with the mouth end of the bottle, combined with ease of opening and a firm reseal even if the mouth ends of the bottles are of slightly irregular, for example oval, shape, and which can be performed by relatively simple machinery.

A further object of the invention is to provide a method of applying the closure cap to a bottle.

According to the invention there is provided a closure cap of the kind comprising a crown and an annular skirt made of deformable material and in which the skirt includes a portion thereof which following application of the cap to the mouth end of a bottle neck provided with screw threads or with a bead at a position spaced from the mouth end of the neck is adapted to be deformed to effect interengagement thereof with the threaded or beaded portion of the neck, wherein the skirt prior to application of the cap to the bottle neck includes an annular portion which extends from the crown and has a diameter less than that of the portion which is to be interengaged with the threaded or beaded portion of the neck and which has an internal diameter corresponding substantially with the external diameter of the neck in the region of the mouth end thereof, and wherein a plastisol sealing compound lines the interior of the cap and extends at least partly down the sides of the skirt, the sealing compound being of greatest thickness in the area bounded by said portion of lesser diameter to provide a cushion

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of compound into and against which the mouth end of the neck can be seated and sealed.

In one embodiment of the invention the portion of greatest diameter of the skirt may be provided with an irregular exterior adjacent to the junction thereof with said portion of lesser diameter to strengthen the skirt and provide a gripping surface.

In another embodiment of the invention the skirt portions of greater and lesser diameter are joined by a frusto-conical portion.

There is also contemplated a method of closing and sealing the mouth of a bottle or the like by the use of a closure cap according to the invention.

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

Figure 1 illustrates, partly in section, one form of closure cap according to the invention.

Figure 2 illustrates, partly in section, a second form of closure cap.

Figures 3 and 4 illustrate the manner of carrying the method into effect using a closure cap as shown in Figure 2.

Figure 5 illustrates, to an enlarged scale, a part of Figure 4.

Figure 6 illustrates the form of the cap shown in Fig. 2 after it has been applied to a bottle by the method of Figures 3 and 4, and

Figure 7 illustrates the method of closing and sealing a bottle using a closure cap as shown in Figure 1.

Referring to the drawings, Figure 1 illustrates one form of closure cap according to the invention, the cap being made of permanently deformable material such as tinplate or aluminium and comprising a crown 1 and an annular skirt of which a first portion 2 extends from the open end of the cap and has a diameter greater than that of the maximum permissible diameter of the threaded portion 3 of the neck 4, Figures 3 and 4, of a bottle the mouth of which is to be closed and sealed by the closure cap. The skirt also includes a second portion 5 which extends from the crown 1 and the diameter of which is less than that of the first portion 2 and internally corresponds substantially with the minimum permissible diameter for the mouth end of the neck 4. The first portion 2 of the cap includes a frusto-conical portion 6 by which the first portion 2 is joined to the second portion 5. The interior of the cap in the region thereof which overlies the mouth end of the neck 4 is provided with a lining 7 consisting of any suitable form of plastisol sealing compound. The lining 7 is of non-uniform thickness and extends across the

crown 1 and partly down the sides of skirt and has the part 8 thereof which is of greatest thickness disposed in the region of the junction of the crown with the skirt. In the cap shown in Figure 1 the part 8 is applied to the area of the cap which is bounded by the second skirt portion 5.

The cap shown in Figure 2 is similar to that of Figure 1 but the first portion 2 of the skirt is provided at 9 with an irregular exterior adjacent to the junction of the first portion with the second portion 5. The irregular part 9 may be formed in any desired manner, as by profiling or knurling, and is arranged to strengthen the skirt and to provide a gripping surface by which the cap can be gripped when being turned to remove it from a neck to which it has been applied.

Figures 3 to 5 illustrate the method of closing and sealing a bottle when using the cap shown in Figure 2. Figure 3 illustrates the position of the parts preparatory to the closing and sealing of the mouth of the neck 4, the bottle being stood on a support, not shown, and the neck aligned with a closing and sealing head 10 which, in known manner, is arranged to be reciprocated into and out of engagement with the closure cap which has been loosely applied to the neck 4.

The bottle neck ring 11 has a maximum and a minimum manufacturing tolerance of the order of 0.03 inch and the diameter of the second portion 5 of the skirt corresponds substantially with the minimum permissible diameter of the neck ring 11. For purposes of illustration, however, the portion 5 in Fig. 3 has been shown as of slightly greater diameter than that of neck ring 11. Thus when pressure is applied to the crown of the cap, as described below, the diameter of portion 5 and the thickness of the lining compound being the same for all caps, the lining compound ensures a light fit on a neck ring 11 with minimum diameter and a tighter fit on a neck ring 11 with maximum diameter.

The tapered root 12, Figure 2, of the flute or knurling 9 acts as a lead in for the neck ring 11.

The head 10 is provided with an arched opening so shaped that when the head is moved towards the cap the portions 13 of the arch engage the outer peripheral portion of the crown and, during continued downward movement of the head, deforms the second portion 5 of the skirt to effect tailoring of the second portion 5 about the mouth end of the neck so causing the sides and top of the mouth end of the neck to be sealed into and against the sealing compound as shown in Figures 4 and 5. During the deformation of the second portion 5, the part 8 of the sealing compound is caused

to spread to form side seals 14, 15 with the outer and inner sides of the mouth end of the neck 4. The deformation of the second portion 5 increases the diameter thereof by a minimum amount equal to the thickness of the sealing compound forming the exterior side seal 14 round the mouth end of the neck. With this embodiment of the invention the tailoring of the second portion 5 and the forming of the side seals 14 and 15 is effected solely by the application of top pressure to the outer peripheral portion of the crown 1.

When the cap has been applied, and the seals formed, as described above the first portion of the skirt is deformed to effect interengagement thereof with the threaded portion 3 of the neck 4. This step is performed in known manner by the use of a spinning roller or rollers 16, Figure 4, the construction and operation of which, being well-known in the art, are not described herein. Figure 6 illustrates the exterior form of the cap following the complete application thereof to the neck 4.

Figure 7 illustrates the method of application of the cap shown in Figure 1 to a neck 4, the closing and sealing head 10, and the mode of operation thereof, being similar to that described above with reference to Figures 3 to 5 and the tapered portion 6 of the cap acting as a lead-in for the neck ring 11.

Following the formation of the threads in the first portion 2 of the skirt the curl 17, Figures 1 and 2, provided at the mouth end of the cap is turned under the threads in the usual manner using known means for this purpose.

It is to be understood that, if desired, instead of mechanical engagement between the first skirt portion 2 of a cap and the neck of a bottle being effected by screw threads as described above the mechanical engagement may be effected in known manner, by rolling the mouth end of the cap under a circular bead formed around the neck of the bottle.

As mentioned above, caps as described herein are of particular use with bottles the neck rings of which are slightly irregular, for example oval, in shape. This is because during the application of the cap to the bottle neck capping pressure is applied only to the top of the cap and the cap is deformed by the mouth ring of the bottle to the shape thereof, and not by the capping or closing head.

WHAT WE CLAIM IS:—

1. A closure cap of the kind comprising a crown and an annular skirt made of deformable material and in which the skirt includes a portion thereof which following application of the cap to the mouth end of a bottle neck provided with screw threads

or with a bead at a position spaced from the mouth end of the neck is adapted to be deformed to effect interengagement thereof with the threaded or beaded portion of the neck, wherein the skirt prior to application of the cap to the bottle neck includes an annular portion which extends from the crown and has a diameter less than that of the portion which is to be interengaged with the threaded or beaded portion of the neck and which has an internal diameter corresponding substantially with the external diameter of the neck in the region of the mouth end thereof, and wherein a plastisol sealing compound lines the interior of the cap and extends at least partly down the sides of the skirt, the sealing compound being of greatest thickness in the area bounded by said portion of lesser diameter to provide a cushion of compound into and against which the mouth end of the neck can be seated and sealed.

2. A cap according to Claim 1, wherein the portion of greatest diameter of the skirt is provided with an irregular exterior adjacent to the junction thereof with said portion of lesser diameter to strengthen the skirt and provide a gripping surface.

3. A cap according to Claim 2, wherein the skirt portions of greater and lesser diameter are joined by a frusto-conical portion.

4. A method of closing and sealing the mouth of a bottle or the like having a neck provided with screw threads or with a bead at a position spaced from the mouth end of the neck, by loosely applying to the mouth end of the neck a closure cap made of deformable material and having a crown and an annular skirt including a first portion having a diameter greater than that of the threaded or beaded portion of the neck, a second portion which extends from the crown and has a diameter less than that of the first portion and which has an internal diameter corresponding substantially with the external diameter of the neck in the region of the mouth thereof, and a plastisol sealing compound which lines the interior of the cap, extends at least partly down the sides of the skirt, and is of greatest thickness in the area bounded by said second skirt portion, applying pressure to the outer peripheral portion of the crown of the cap to deform said second skirt portion about the mouth end of the neck thereby to tailor said second portion about the mouth end of the neck and cause the sides and top of the mouth end to be sealed into and against the sealing compound, and thereafter deforming said first portion of the skirt to effect interengagement thereof with the threaded or beaded portion of the neck.

5. A bottle or the like closed and sealed by the method according to Claim 4.

6. A closure cap for a bottle or the like

to spread to form side seals 14, 15 with the outer and inner sides of the mouth end of the neck 4. The deformation of the second portion 5 increases the diameter thereof by a minimum amount equal to the thickness of the sealing compound forming the exterior side seal 14 round the mouth end of the neck. With this embodiment of the invention the tailoring of the second portion 5 and the forming of the side seals 14 and 15 is effected solely by the application of top pressure to the outer peripheral portion of the crown 1.

When the cap has been applied, and the seals formed, as described above the first portion of the skirt is deformed to effect interengagement thereof with the threaded portion 3 of the neck 4. This step is performed in known manner by the use of a spinning roller or rollers 16, Figure 4, the construction and operation of which, being well-known in the art, are not described herein. Figure 6 illustrates the exterior form of the cap following the complete application thereof to the neck 4.

Figure 7 illustrates the method of application of the cap shown in Figure 1 to a neck 4, the closing and sealing head 10, and the mode of operation thereof, being similar to that described above with reference to Figures 3 to 5 and the tapered portion 6 of the cap acting as a lead-in for the neck ring 11.

Following the formation of the threads in the first portion 2 of the skirt the curl 17, Figures 1 and 2, provided at the mouth end of the cap is turned under the threads in the usual manner using known means for this purpose.

It is to be understood that, if desired, instead of mechanical engagement between the first skirt portion 2 of a cap and the neck of a bottle being effected by screw threads as described above the mechanical engagement may be effected in known manner, by rolling the mouth end of the cap under a circular bead formed around the neck of the bottle.

As mentioned above, caps as described herein are of particular use with bottles the neck rings of which are slightly irregular, for example oval, in shape. This is because during the application of the cap to the bottle neck capping pressure is applied only to the top of the cap and the cap is deformed by the mouth ring of the bottle to the shape thereof, and not by the capping or closing head.

WHAT WE CLAIM IS:—

1. A closure cap of the kind comprising a crown and an annular skirt made of deformable material and in which the skirt includes a portion thereof which following application of the cap to the mouth end of a bottle neck provided with screw threads

or with a bead at a position spaced from the mouth end of the neck is adapted to be deformed to effect interengagement thereof with the threaded or beaded portion of the neck, wherein the skirt prior to application of the cap to the bottle neck includes an annular portion which extends from the crown and has a diameter less than that of the portion which is to be interengaged with the threaded or beaded portion of the neck and which has an internal diameter corresponding substantially with the external diameter of the neck in the region of the mouth end thereof, and wherein a plastisol sealing compound lines the interior of the cap and extends at least partly down the sides of the skirt, the sealing compound being of greatest thickness in the area bounded by said portion of lesser diameter to provide a cushion of compound into and against which the mouth end of the neck can be seated and sealed.

2. A cap according to Claim 1, wherein the portion of greatest diameter of the skirt is provided with an irregular exterior adjacent to the junction thereof with said portion of lesser diameter to strengthen the skirt and provide a gripping surface.

3. A cap according to Claim 2, wherein the skirt portions of greater and lesser diameter are joined by a frusto-conical portion.

4. A method of closing and sealing the mouth of a bottle or the like having a neck provided with screw threads or with a bead at a position spaced from the mouth end of the neck, by loosely applying to the mouth end of the neck a closure cap made of deformable material and having a crown and an annular skirt including a first portion having a diameter greater than that of the threaded or beaded portion of the neck, a second portion which extends from the crown and has a diameter less than that of the first portion and which has an internal diameter corresponding substantially with the external diameter of the neck in the region of the mouth thereof, and a plastisol sealing compound which lines the interior of the cap, extends at least partly down the sides of the skirt, and is of greatest thickness in the area bounded by said second skirt portion, applying pressure to the outer peripheral portion of the crown of the cap to deform said second skirt portion about the mouth end of the neck thereby to tailor said second portion about the mouth end of the neck and cause the sides and top of the mouth end to be sealed into and against the sealing compound, and thereafter deforming said first portion of the skirt to effect interengagement thereof with the threaded or beaded portion of the neck.

5. A bottle or the like closed and sealed by the method according to Claim 4.

6. A closure cap for a bottle or the like



substantially as herein described with reference to and as illustrated in Fig. 1 or Fig. 2 of the drawings accompanying the Provisional Specification.

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