

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

#### Improvements in or relating to Closures for Bottles or 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 closures for bottles or the like and in particular to screw-on closures made from synthetic plastics material and comprising a crown and an internally screw-threaded skirt.

15 It has long been an objective of manufacturers and designers of closures of the kind mentioned to produce a wadless closure which can be manufactured in large numbers, which is economical to produce, and 20 which will provide, when applied to a bottle or the like, a seal comparable with that obtainable when a closure is used with a wad.

25 Heretofore, it has been usual to produce closures of the kind mentioned by compression moulding thermo-setting materials because the kind of strength obtainable by the use of such materials has been considered to be necessary.

30 It has now been found that the above stated objective can be achieved by injection moulding polypropylene, or plastics materials having qualities of toughness and resilience similar to those of polypropylene, 35 if the closure, and particularly the screw-threads, are suitable proportioned.

40 According to the invention there is provided a screw-on closure of bottles and the like, which closure is made from moulded synthetic plastics material and comprises a crown and an internally screw-threaded skirt, wherein the screw threads are so proportioned that the ratio of the radial depth

to the width at the root thereof is at least 1.8 to 1. The thickness of the crown is 45 desirably not greater than the width of the root of the thread and preferably is substantially equal to the width of the root of the thread.

In one embodiment of the invention the 50 sides of the screw-threads which face the open end of the closure are flat and substantially radial to the axis of the closure.

In order that the invention may be clearly understood some embodiments thereof will 55 now be described, by way of example, with reference to the accompanying drawings in which:—

Fig. 1 is a top plan of a closure according 60 to the invention,

Fig. 2 is a section showing the cap applied to the neck of a bottle,

Fig. 3 illustrates to an enlarged scale the form of the screw-thread of the cap and compares it with the conventional form 65 of thread, and

Fig. 4 is a section similar to that of Fig. 2 but of a modified form of closure.

Referring to Figs. 1 and 2, the closure is injection moulded from polypropylene, 70 or from other plastics material having qualities of toughness and resilience similar to those of polypropylene, and comprises a crown 1 and an internally screw-threaded skirt 2. The screw-threads 3 are so proportioned that the ratio of the radial depth 75 RD to the width RW at the root of the thread is at least 1.8 to 1. For example, if the radial depth RD is 0.042 inch the width RW is not greater than 0.023 inch. This produces threads which are of relatively rigid fin-like form capable of retaining a constant tension with the threads 4 of a bottle neck 5, to which the closure is applied, while providing a degree of 85 flexibility giving a torque-tension which

[Price 4s. 6d.]



resists creep. As shown in Fig. 2 the sides 6 of the screw threads 3 which face the open end of the closure are flat and substantially radial to the axis of the closure.

5 This is shown more clearly in Fig. 3 which compares the thread with that of a conventional thread CT as used with a conventionally threaded bottle neck as shown in Fig. 2.

10 The exterior of the skirt 2 may be fluted lengthwise thereof and as shown in Fig. 1 the fluting consists of teeth each having a face 7 radial with the axis of the closure and facing the direction of rotation of the closure during application thereof to a bottle or the like. The fluting provides a means of obtaining a firm grip on the closure during removal thereof from a bottle or the like.

20 When moulding the closure a minimum of material is used so as to keep the crown, the skirt, and the threads relatively thin. Desirably, the thickness of the crown is not greater than the width RW and preferably it is substantially equal to the width RW. The thickness of the skirt is desirably comparable with that of the crown. By making the closure thin, as just described, it is found that virtually no marks known in the art as "sinkmarks" appear on the outer surface of the closure. Further, the provision of the thin crown permits the material to follow and seal irregularities in the rim of the bottle or the like to which the closure is applied thus usually removing the necessity for a wad to be incorporated in the closure. It will, however, be understood that, if desired, a wad may be used with the closure.

40 Fig. 4 illustrates a modified form of the closure in which the screw-threads 3 are more conventional in form but are proportioned as described above with reference to Figs. 2 and 3.

45 If desired the closure may be provided with an annular resiliently flexible sealing element 8, Fig. 2, which extends from the interior of the crown 1 and has a side face 9 while lies at an angle to the axis of the closure for engagement with the rim 10 of a bottle or the like on application of the closure thereto whereby during continued application of the closure to the bottle or the like the sealing element 8 flexes and forms a seal with the rim 10. Further description of the form and mode of operation of the sealing element 8 is considered unnecessary because it is fully described in British Patent Specification 60 No. 788,148. The sealing element may have any of the forms thereof described in Specification No. 788,148.

If desired, instead of a sealing element

8 the crown 1 may be provided with a sealing ledge, not shown, which effects a 65 seal with the rim of a bottle or the like. Alternatively, the crown 1 may be recessed as at 11, Fig. 4, to receive a compressible wad 12 or the like.

#### WHAT WE CLAIM IS:—

70 1. A screw-on closure for bottles and the like, which closure is made from moulded synthetic plastics material and comprises a crown and an internally screw-threaded skirt, wherein the screw threads 75 are so proportioned that the ratio of the radial depth to the width at the root thereof is at least 1.8 to 1.

2. A closure according to Claim 1, wherein the thickness of the crown is not 80 greater than the width of the root of the thread.

3. A closure according to Claim 2, wherein the thickness of the crown is substantially equal to the width of the root 85 of the thread.

4. A closure according to any one of Claims 1 to 3, wherein the sides of the screw-threads which face the open end of the closure are flat and substantially radial 90 to the axis of the closure.

5. A closure according to any one of Claims 1 to 4, wherein the closure is moulded from synthetic thermoplastic material having qualities of toughness and 95 resilience similar to those of polypropylene.

6. A closure according to any one of Claims 1 to 5, wherein an annular resiliently flexible sealing element extends from the interior of the crown and has a side face 100 which lies at an angle to the axis of the closure for engagement with the rim of a bottle or the like on application of the closure thereto whereby during continued application of the closure to the bottle or 105 the like the sealing element flexes and forms a seal with the rim.

7. A closure according to any one of Claims 1 to 6, wherein the exterior of the skirt is fluted lengthwise thereof. 110

8. A closure according to Claim 7, wherein the fluting consists of teeth each having a face radial with the axis of the closure and facing the direction of rotation of the closure during application 115 thereof to a bottle or the like.

9. A screw-on closure for bottles or the like, substantially as herein described with reference to Figs. 1 to 3, or Fig. 4 of the accompanying drawings. 120

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20 When moulding the closure a minimum of material is used so as to keep the crown, the skirt, and the threads relatively thin. Desirably, the thickness of the crown is not greater than the width RW and preferably it is substantially equal to the width RW. The thickness of the skirt is desirably comparable with that of the crown. By making the closure thin, as just described, it is found that virtually no marks 30 known in the art as "sinkmarks" appear on the outer surface of the closure. Further, the provision of the thin crown permits the material to follow and seal irregularities in the rim of the bottle or the like to 35 which the closure is applied thus usually removing the necessity for a wad to be incorporated in the closure. It will, however, be understood that, if desired, a wad may be used with the closure.

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2. A closure according to Claim 1, wherein the thickness of the crown is not 80 greater than the width of the root of the thread.

3. A closure according to Claim 2, wherein the thickness of the crown is substantially equal to the width of the root 85 of the thread.

4. A closure according to any one of Claims 1 to 3, wherein the sides of the screw-threads which face the open end of the closure are flat and substantially radial 90 to the axis of the closure.

5. A closure according to any one of Claims 1 to 4, wherein the closure is moulded from synthetic thermoplastic material having qualities of toughness and resilience similar to those of polypropylene. 95

6. A closure according to any one of Claims 1 to 5, wherein an annular resiliently flexible sealing element extends from the interior of the crown and has a side face 100 which lies at an angle to the axis of the closure for engagement with the rim of a bottle or the like on application of the closure thereto whereby during continued application of the closure to the bottle or 105 the like the sealing element flexes and forms a seal with the rim.

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