

The invention relates to a guarantee closure for containers, such as bottles and the like, having a closure cap of plastic which is designed as a screw cap and the shell of which is joined in the region of the shell inner circumference by means of tear-off tabs to a guarantee strip, the outside of which has adjoining the tabs a wall section running outwards and downwards at an angle and which bears on its inside at least one retaining member, which extends into the inner space bounded by the guarantee strip and, with closure cap screwed onto the container mouth, engages under an annular catching projection of the container, arranged underneath the container screw thread, the guarantee strip having on its inner side in the region of the retaining member an essentially axially running circumferential recess, which is open towards the lower end of the guarantee strip and from the upper wall section of which the retaining member extends away.

Guarantee strips which can be anchored mechanically on containers have, compared to guarantee strips which can be shrunk-on, the advantage that, when the screw cap is screwed for the first time onto the container mouth designed according to the MCA standard, it is sufficient for the strips to be pushed over the catching projection since, on account of their elasticity, they can snap-in under the catching projection, and the retaining member optionally bends upwards and remains in this position. After the snapping-in of the retaining member of the guarantee strip, the closure cap can be unscrewed only by destroying the guarantee strip, by which means the first-time opening of the container is indicated.

A closure cap which can be produced in an injection moulding process with a guarantee strip which can be anchored mechanically on the container is already known from GB-A-2,022,063, in which the retaining member is a bead running on the inner side of the guarantee strip.

A closure cap of the type mentioned in the

introduction is also known from EP-A-0,166,572, in which the guarantee strip engages under the annular catching projection with retaining fingers, which are designed widening downwards.

5 FR-A-2,499,519 discloses a closure cap whose guarantee strip bears on the inner side retaining fingers which are arranged with a mutual circumferential spacing and which project from the inner circumference of the guarantee strip and have uniform thickness with parallel
10 running inner and outer surfaces. The retaining fingers engage under a container bead.

US-A-4,469,234 discloses a screw cap whose guarantee strip is designed in cross-section in the form of an inverted U with legs of unequal length, retaining
15 fingers projecting downwards from the shorter inner leg and having end sections which are curved upwards in hook formation and engage under a container bead. For opening the screw cap, the retaining fingers can move outwards into the inside of the inverted U.

20 The essential disadvantage of the known guarantee strips described above lies in the fact that the injection moulds used for producing the closure caps and opening in axial direction are of relatively complicated design. For demoulding the guarantee strip, the moulds
25 must in fact consist at least of three parts, i.e. viewed in axial section they must have a horizontal mould parting line at the level of the lower edge of the closure cap, a mould parting line extending from the inner edge of the guarantee strip and running outwards
30 and downwards at an angle, and a vertical mould parting line extending from the lower section of the guarantee strip in the region of the projection or projections. In the demoulding process, first the mould part having the angled mould parting line is moved downwards, in order to
35 free the lower section of the guarantee strip in the region of the catching projection, then the core is moved downwards in order to expose the inner side of the closure cap and of the guarantee strip. In this way the guarantee cap still held by the outer mould part can be

ejected from the latter axially upwards without damaging the guarantee strip. Such moulding tools are expensive to produce and moreover limit the rate of production on account of the three-stage demoulding process.

5 The aim of the present invention is to provide a guarantee closure of the type mentioned in the introduction, whose closure cap, while maintaining the advantageous axial demouldability, can be produced with the aid of an injection mould managing without any mould part
10 movable downwards in vertical direction relative to the core. This is achieved according to the invention in that the retaining member in axial section, as known per se, has parallel running inner and outer surfaces, or in that the retaining member has in axial section inner and outer
15 surfaces converging downwards from the upper wall section and is preferably a triangular design, and in that the radial depth of the circumferential recess is at least equal to the greatest width of the retaining member in axial section.

20 This design makes it possible to make the shaping section of the injection mould for the guarantee strip in only two parts, namely an outer mould part and a core adjacent to the latter via the mould parting line extending outwards at an angle from the lower side of the
25 guarantee strip. Upon demoulding, the mentioned circumferential recess of the guarantee strip is in fact gradually freed from the core, so that the retaining finger or the retaining fingers can swing outwards elastically without risk of damage. Thus, according to
30 the invention, after the removal of the mould core, an immediate demoulding of the closure cap is possible. The invention permits the use of simpler and less expensive injection moulds which have longer service lives and allow a higher production rate.

35 The invention also relates to an injection mould used for producing the described guarantee closure, having a cavity plate and a mould core, which together bound a mould cavity for the closure cap and are moveable relative to each other in the axial direction, and having

an axially moveable stripper plate, which together with the mould core bounds a mould cavity for the guarantee strip, as well as having an ejection mechanism for the closure cap, the mould parting line between cavity plate and stripper plate extending from the lower edge of the closure cap; according to the invention, this mould is characterised in that the stripper plate and the mould core are adjacent to each other along a common mould parting line which runs from the lower inner edge of the guarantee strip outwards and downwards at an angle, and in that the mould core has at least one recess for forming the retaining member, which recess is in connection with the mould cavity above the angled mould parting line, extends from a shoulder of the core and has in axial section parallel or downwardly converging sides.

Preferably, as known per se, a plurality of recesses, arranged with a mutual circumferential spacing, are provided for the forming of finger-shaped retaining members.

Thus, according to the invention, the stripper plate and the mould core constitute the two parts of the shaping section for the guarantee strip. Upon demoulding, the mentioned circumferential recess of the guarantee strip is freed gradually from the mould core, into which recess the retaining member or the retaining fingers can swing in elastically without risk of damage, so that, after removal of the mould core, an immediate axial demoulding of the closure cap is possible. The injection mould according to the invention is simple and inexpensive and guarantees a longer service life and a higher production rate than the conventional moulds.

Further features of the invention will be described in greater detail below on the basis of exemplary embodiments and with reference to the drawings, in which:

Fig. 1 shows an axial section of the guarantee closure according to the invention,

Fig. 2 shows a section along the line II-II in Fig. 1,

Fig. 3 shows, in an enlarged axial section, a

part of the closure cap and the guarantee strip of the closure according to Fig. 1,

Fig. 4 shows, in an enlarged axial section, a modified embodiment of the invention,

5 Fig. 5 shows an axial section through an injection mould according to the invention, and

Fig. 6 shows an axial section through the opened injection mould prior to ejection of the closure cap.

10 The guarantee closure according to Figs. 1 and 2 has a cylindrical closure cap made of plastic, in particular polypropylene or polyethylene, which is designed as a screw cap 1 and which is provided on the inner side of its shell 2 with a screw thread 3. The closure cap 1 is screwed onto a container mouth 4 which is designed in particular according to the MCA standard and which bears on its outer side a screw thread 5 and is equipped below the latter with an annular catching projection 6 designed as a bead.

20 A guarantee strip 8, which is made integral with the closure cap, is secured at the lower end of the shell 2 of the closure cap 1 via a number of vertical, tear-off tabs 7. The tabs 7 and the upper section of the guarantee strip have essentially the same internal diameter as the shell 2 or a slightly greater internal diameter.

25 The guarantee strip 8 has on its outer side an outer wall section 9 widening conically downwards from the tabs 7 and, connected to this, a cylindrical outer wall section 10. On its inner side the guarantee strip 8 is provided with a circumferential recess 11 which is bounded by an upper wall section 12, which widens conically downwards and outwards from the inner wall of the guarantee strip, and a lower cylindrical wall section 13 adjacent to the latter section. The circumferential recess 11 is therefore open towards the lower end of the guarantee strip. A plurality of retaining fingers 14 distributed around the strip circumference project inwards from the upper inner wall section 12 of the guarantee strip and engage under the catching projection 6 of the container when the closure cap is screwed on

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(Fig. 1). The guarantee strip can additionally have at least one vertical predetermined break point 15, which is shown in the right-hand half of Fig. 1 and in Fig. 2.

5 As emerges from Fig. 3, each retaining finger 14 extends from the upper wall section 12 of the circumferential recess 11 towards the inside of the guarantee strip. The retaining finger 14 has in axial section parallel running outer and inner surfaces or a body with the thickness "y". The base 14' of the retaining finger 10 14 extends from the inner wall of the guarantee strip to a point P on the upper wall section 12 whose radial distance "x" from the inner wall is at least equal to the retaining finger thickness "y". As Fig. 3 also shows, the radial depth "z" of the circumferential recess is greater 15 than the radial distance "x". The design described above makes it possible to carry out an axial demoulding of the closure cap and guarantee strip from an injection mould, which in axial section manages with only two mould parting lines, namely the horizontal mould parting line 20 A at the lower end of the cap shell and the mould parting line B which extends outwards and downwards at an angle and extends away from the lower inner edge of the guarantee strip 8.

25 Within the scope of the invention, a plurality of retaining fingers can be arranged with a mutual spacing around the circumference of the guarantee strip, as shown in Fig. 2. For a satisfactory function, at least three retaining fingers should be provided. Instead of individual fingers, sectors or, if appropriate, a single 30 retaining ring can be formed. The essential point is that the depth "z" of the circumferential recess is at least equal to the greatest width of the retaining member in axial section, in order to permit a perfect demoulding.

35 In the exemplary embodiment shown in Fig. 4, the retaining finger 14 is designed in axial section as a triangle, one triangle side coinciding with the upper wall section 12 of the circumferential recess 11.

Within the scope of the invention, the upper inner wall section 12 of the circumferential recess 11

can be, instead of conical, designed in a concave arch towards the inner side of the guarantee strip. Moreover, the cross-sectional form of the retaining fingers can differ from that shown. For example, the retaining fingers can be of curved design.

Fig. 5 shows the injection mould according to the invention in axial section. The mould has a cavity plate 20 and a mould core 21, which together bound a mould cavity 22 for the actual closure cap. Below the cavity plate 20 and between this and the mould core 21, a stripper plate 23 is arranged which, together with the mould core 21, bounds a mould cavity 22' for the guarantee strip. The mould core 21, the stripper plate 23 and the cavity plate 20 are passed through by axial guide pins 24.

Connected to the mould core 21 in axial direction downwards are a mould part 25 and a base plate 26, which are connected to the mould core 21 via securing pins 27. The mould parts 21, 25, 26 are passed through by a stripper bar 28 screwed into the stripper plate 23. An ejection pin 29 is displaceable in the inside of the mould core 21 and in the mould parts 25, 26, for which pin a return spring 30 is provided in the mould part 25.

The injection mould thus has in axial section only two mould parting lines, namely the horizontal mould parting line A at the lower end of the cap shell between cavity plate 20, mould core 21 and stripper plate 23, and the mould parting line B running outwards and downwards at an angle between mould core 21 and stripper plate 23, this parting line extending away from the lower inner edge of the guarantee strip 8.

The mould core 21 has a plurality of recesses 31 for forming the retaining fingers 14, which recesses are in connection with the mould cavity 22' above the mould parting line B, extend from a shoulder of the mould core and have in axial section parallel or downwardly converging sides.

Upon demoulding, first the cavity plate 20 is moved upwards and then the stripper plate 23 is moved

upwards too by means of bars 28, as shown in Fig. 6, in such a way that the cap with guarantee strip moves upwards relative to the mould core 21 and the retaining fingers 14 swing outwards elastically from the recesses 31 into the circumferential recess 11 freed gradually from the mould core, as a result of which the risk of shearing-off of the retaining fingers is avoided.

The exemplary embodiment described can be modified within the scope of the invention defined in the claims. If, instead of being conical, the upper wall section 12 of the circumferential recess 11 of the guarantee strip is designed, for example, as a concave arch towards the inner side of the guarantee strip, the corresponding mould part is also arched. In addition, as mentioned, the retaining fingers and the recesses 31 could also be of curved design.

Patent Claims:

1. Guarantee closure for containers, such as bottles and the like, having a closure cap of plastic which is designed as a screw cap (1) and the shell (2) of which is joined in the region of the shell inner circumference by means of tear-off tabs (7) to a guarantee strip (8), the outside of which has adjoining the tabs a wall section (9) running outwards and downwards at an angle and which bears on its inside at least one retaining member (14), which extends into the inner space bounded by the guarantee strip and, with closure cap screwed onto the container mouth, engages under an annular catching projection (6) of the container, arranged underneath the container screw thread, the guarantee strip having on its inner side in the region of the retaining member an essentially axially running circumferential recess (11), which is open towards the lower end of the guarantee strip and from the upper wall section of which the retaining member extends away, characterised in that the retaining member (14) has a uniform thickness in axial section, with parallel running inner and outer surfaces, or in that the retaining member (14) has in axial section inner and outer surfaces converging downwards from the upper wall section (12) and is preferably a triangular design, and in that the radial depth (z) of the circumferential recess is at least equal to the greatest width (y) of the retaining member in axial section.

2. Guarantee closure according to Claim 1, characterised in that, as known per se, three or more retaining fingers (14) are provided, which have a mutual circumferential spacing.

3. Injection mould for producing a guarantee closure according to Claim 1 or 2, having a cavity plate (20) and a mould core (21), which together bound a mould cavity (22) for the closure cap and are moveable relative to each other in the axial direction, and having an axially moveable stripper plate (23), which together with the mould core (21) bounds a mould cavity (22') for the



guarantee strip, as well as having an ejection mechanism for the closure cap, the mould parting line between cavity plate (20) and stripper plate (23) extending from the lower edge of the closure cap, characterised in that the stripper plate (23) and the mould core (21) are adjacent to each other along a common mould parting line (B), which runs from the lower inner edge of the mould cavity (22') for the guarantee strip outwards and downwards at an angle, and in that the mould core (21) has at least one recess (31) for forming the retaining member, which recess is in connection with the mould cavity (22') for the guarantee strip above the angled mould parting line (B), extends from a shoulder of the mould core and has in axial section parallel or downwardly converging sides.

4. Injection mould according to Claim 3, characterised in that, as known per se, a plurality of recesses (31), arranged with a mutual circumferential spacing, are provided for the forming of finger-shaped retaining members.

