

The invention concerns a bottle closure cap according to the introductory part of claim 1 known from DE-V 85 02 008.7.

Depending on the type of coupling engagement, the component kept ready as a concentrate in the cup of small volume is released during screw fitting or not until the closure cap is unscrewed for mixing with the second component contained in the bottle.

It is the object of the invention to develop a bottle closure cap of the kind mentioned which is optimal with respect to use and filling.

This object is achieved by the invention specified in claim 1.

The subsidiary claims are advantageous developments of the subject of the invention.

As a result of such a design, a bottle closure cap of the kind mentioned with increased serviceability is obtained: the latter is proven above all in the high sealing tightness of the cup which is obtained. Entry of the skirt end of the closure cap into an annular groove of the cup practically leads to a double seal. The inner and outer walls of the end skirt fit tightly against the corresponding annular surfaces of the annular groove. Since furthermore the seal is located in the region of the bottom of the cup, the whole length of the cup can be used to the maximum as a filling space. The excess length of the cup (cup wall) which is necessary anyway for sealing disappears in the annular groove. In order to prevent the concentrate from passing into the region of the seal during closure, by turning the closure cap upside down and hence with the skirt oriented upwards, the latter can be filled like a cup. The pot-shaped closure cap has in any case a larger diameter and consequently proves to be more stable for example during automatic filling in case of belt transport. After filling, the cup is then simply fitted with its opening now pointing downwards like a cap, i.e. screwed on. The corresponding rotary movement of the two

parts to be joined together promotes sealing tightness on the bottom side in addition; the end of the skirt turns into the annular groove. It further proves advantageous that the annular groove at the bottom of the cup is adjacent to the peripheral wall of the cup in such a way that this wall together with an annular step of the cup bottom, as seen in cross-section, forms a U-profile. This leads to an increase in flexibility of adaptation of the groove flanks forming the sealing surfaces. Deviations caused by tolerances at the end of the skirt are tolerated better. Also, the skirt end which enters sealingly has good adaptability in so far as the end of the skirt entering the annular groove is reduced in its wall thickness. This results in increased flexibility. Furthermore, it is an advantage that the projections for coupling engagement are formed by radially projecting, axially extending ribs, of which the end region on the bottom side extends to below the annular bottom zone of the annular groove. Apart from the driving function of such coupling projections, they also fulfil that of a stabilising framework. A very thin cup wall can therefore be selected. The continuation of the coupling projections to below the annular bottom zone of the annular groove thus also reinforces the U-profile in the bottom region. Also, anchoring of the projections on the cup side is better. Furthermore, it is proposed that the axial dimension of the ribs extends over the whole axial length of the peripheral wall of the cup. As a result the load on the ribs, whether by the claws of a screw-on tool or in connection with coupling engagement, is distributed over a larger area of the peripheral wall of the cup. Moreover the measure whereby the inner wall of the skirt carries reinforcing ribs has a stabilising effect on the skirt. The sealing zone is of course excluded from this. Finally, an advantageous characteristic lies in that adjacent to the bottle neck is a second bottle neck with a thread of the same form, on which is fitted a second closure cap, wherein

the edge of the pot-shaped closure cap fits sealingly on a shoulder of the bottle neck, for which the length of the bottle neck is shorter than the axial length of the peripheral wall of the pot-shaped closure cap. The mixing process is brought about by simply exchanging the closure caps. Thus a container which leaves the moment of mixing to the consumer without placing excessive demands on him with respect to handling, is obtained. He need only change the closure caps.

The subject of the invention is explained in more detail below with the aid of a practical example illustrated by drawings. They show:

Fig. 1, a vertical section through the bottle closure cap constructed according to the invention, at the fitting stage, with the bottle neck shown only partially;

Fig. 2, this bottle closure cap after the end of the screw-on movement and after the cup has been unscrewed;

Fig. 3, the cup shown on its own in half-section;

Fig. 4, a side view thereof;

Fig. 5, a plan view of a complete bottle;

Fig. 6, this bottle in a side view with the closure cap arranged over the respective bottle neck, and

Fig. 7, a side view thereof.

The pot-shaped bottle closure cap 1 shown carries on its pot inner wall 2 a bottle screw-on thread 3. The latter extends, starting from the cap edge 4, approximately halfway up the pot inner wall 2. It may be a single-start or multiple-start thread.

The bottle neck I, which is formed integrally with a bottle 5 in the form of a cylindrical neck, carries the corresponding counterthread 6 for the bottle screw-on thread 3.

The lower flank of this counterthread 6 is steeper than the upper flank. There is a sawtooth structure.

The bottle closure cap 1 is designed to receive a first component A. The second component B is received by the space of larger volume in the bottle 5.

The space for receiving the first component A, for example in the form of a concentrate such as crop protection agent, beverage syrup or the like, is formed by a skirt 7 formed integrally with the closure cap 1 in combination with a cup 8 screwed thereon. The skirt 7 starts from the flat bottom or the top of the pot-shaped closure cap 1. It (7) extends concentrically to the cylindrical pot wall W, and enters the bottle neck opening 9 when the closure cap 1 is screwed tight.

The thread formed integrally with the peripheral wall of the collar 7 is marked 10 and cooperates with a corresponding counterthread 11 on the inner wall of the cup 8. Here the counterthread 11 is constructed as a two-start thread. It is a left-handed thread, while the thread between the closure cap 1 and the counterthread 6 of the bottle neck I is designed as a right-handed thread.

The corresponding opposite directions are used to achieve unscrewing of the cup 8 from the skirt 7 when the closure cap 1 is screwed on. For this, between the bottle neck I and cup 8 are inserted rotation-locking means. On the cup side these are axially oriented projections 12, and on the bottle neck side they are ridges 13 extending into the bottle neck opening 9. The coupling engagement which holds the cup 8 fast does not occur until after a screw-on movement of about 360° , in any case at a stage at which there is thread engagement between 3 and 6.

As can be seen from Fig. 1, the ridges 13 which are also oriented axially start only halfway up the bottle neck I. The region in front of them on the mouth side consequently does not have a rotation-locking effect; it therefore allows unhindered rotational entrainment of the cup 8 screwed onto the skirt 7. After passing the ends of the projections 12 and ridges 13 which are directed towards each other, due to the threads there is coupling engagement.

To obtain highly efficient sealing of the first component A, the end 7' or the free edge of the skirt 7

engages in form-locking relationship in an annular groove 14 of the cup 8. This annular groove 14 is formed simply by central inversion of the cup bottom 15. This leads to a U-profile in the edge region of the cup bottom 15 and two sealing points D1 and D2 at the rotationally symmetrically cylindrically extending flanks of the annular groove 14 and the correspondingly peripheral mating countersurfaces of the end 7'. Inversion leads to an annular step St which extends at an axial distance from the free edge of the skirt.

As can be seen clearly from Figs. 1 and 2, the end 7' is reduced in thickness at least by the amount of the depth of the groove, by removal of the skirt 7 on the peripheral wall side. The transitional step between the two different thickness zones is marked 16. This is a diagonal step which has an obtuse angle of more than 120° , so that any notch effect is avoided.

The inner and outer edges of the skirt end 7' are chamfered. This and a funnel-like slant of the entrance to the annular groove 14 leads to an advantageous centring effect which promotes screw fitting of the cup 8 or screwing the skirt 7 into the latter. The sealing points D1 and D2 arranged in pairs may be under additional sealing tension on account of a slight pretension of the U-profile due to a return force to be obtained therefrom.

On account of the cross-sectional reduction of the end 7', there is greater flexibility or elasticity and hence also good adaptability, so that there is optimum sealing tightness. On entry of the end 7' into the annular groove 14, on account of the form-locking engagement the residual air is displaced, i.e. it can escape from the U-shaped gap due to the flexibility of the groove-forming sections of the U-profile. As sealing occurs only at the last moment due to the arrangement of the annular groove 14 on the bottom side, no internal pressures arise.

As can be seen, the projections 12 are formed by radially projecting, axially extending ribs. The height

Filling takes place. By means of a feed mechanism the cup 8 is screwed on in cap fashion from above. In the process the edge 7' enters the annular groove 14 sealingly while turning.

If such a minicapsule is now fitted on a bottle neck I of the kind described, the projections 12 arranged on the peripheral wall of the cup finally come into non-rotatable but axially slidable coupling engagement with the bottle neck I, i.e. in coupling engagement with the ridges 13. In the process, due to the opposite directions of the threads the cup 8 is unscrewed and drops into the interior of the bottle. Mixing of the two components A and B takes place. When the bottle closure cap 1 is fully screwed on, it has then itself become flush with the bottle neck 1 in a sealing relationship, by the fact that a sealing skirt 22 formed integrally with the bottom or top of the closure cap 1 enters the mouth of the bottle neck 9 and presses itself against the resilient inner edge there (cf. Fig. 2).

The sealing skirt 22 extends concentrically to the skirt 7, but has considerably less height, so that it is only at the last moment of screw-on movement that the corresponding sealing effect occurs.

The bottle 5 constructed as a flat container has, apart from the bottle neck I described in detail, an additional bottle neck II as well. The latter has the same thread as the bottle neck I, on account of which the bottle closure cap fits both screw necks. The reference numbers are used analogously.

The bottle neck II however, as a comparison in Fig. 6 reveals, has a distinctly lower height or axial length. In the screw-on position, the edge 23 of the second pot-shaped closure cap 1' fits sealingly on a shoulder 24 of the bottle neck II. The pot edge 23 can be lip-shaped.

As moreover shown by the plan view according to Fig. 5, this bottle neck II is not fitted with countercoupling means in the form of ridges 13.

If a method of use to the effect that mixing of the

components A and B takes place at a time determined by the user is sought, then it is simply necessary to exchange the two bottle closure caps 1 and 1'. The bottle closure cap 1 fitted with the cup 8 up till then was connected in sealing relationship to the bottle neck II. Due to the absence of ridges 13, the minicapsule remains closed there. A closure cap 1 not fitted with a cup is fitted on the bottle neck I up till then. Here, sealing is achieved by the sealing skirt 22 described above, so that component B cannot escape.

The simple instruction to change the caps in order to bring about mixing is therefore sufficient for the user.

As can be seen, the bottle necks I, II are arranged in different planes. For this, the bottle 5 forms, laterally of a neck section tapering towards the free end, a recess 26 in the lower horizontal step of which the bottle neck I originates.

The useful height range of the bottle is, as can be seen from Fig. 7, provided with a scale and indications of filling quantity.

Patent claims

1. Bottle closure cap (1) for two-component packages, with a skirt (7) which extends from the bottle of the pot-shaped cap comprising a bottle screw-on thread (3) on the pot inner wall (2), which skirt (7) carries, by means of a thread (10) running in the opposite direction to the bottle screw-on thread, a cup (8) which can be brought into non-rotatable but axially slidable coupling engagement with the inner wall of the bottle neck by projections (12) mounted on the outside of the peripheral wall of the cup, characterised in that the end (7') of the skirt (7) passes in form-locking relationship into an annular groove (14) at the bottom (15) of the cup (8).

2. Bottle closure cap according to claim 1, characterised in that the annular groove (14) at the bottom (15) of the cup (8) is adjacent to the peripheral wall of the cup



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2. Bottle closure cap according to claim 1, characterised in that the annular groove (14) at the bottom (15) of the cup (8) is adjacent to the peripheral wall of the cup



in such a way that this wall together with an annular step (St) of the cup bottom (15) forms a U-profile.

3. Bottle closure cap according to one or more of the preceding claims, characterised in that the end (7') of the skirt entering the annular groove (14) is reduced in wall thickness.

4. Bottle closure cap according to one or more of the preceding claims, characterised in that the projections (12) for coupling engagement are formed by radially projecting, axially extending ribs, of which the end region on the bottom side extends to below the annular bottom zone (17) of the annular groove (14).

5. Bottle closure cap according to one or more of the preceding claims, characterised in that the axial dimension of the ribs (projections 12) extends over the whole axial length of the peripheral wall of the cup.

6. Bottle closure cap according to one or more of the preceding claims, characterised in that the inner wall of the skirt (7) carries reinforcing ribs (7").

7. Bottle closure cap according to one or more of the preceding claims, characterised in that adjacent to the bottle neck (I) is a second bottle neck (II) with a thread (6) of the same form on which fits a second closure cap (1'), wherein the edge (23) of the pot-shaped closure cap (II) fits sealingly on a shoulder (24) of the bottle neck (II), for which the length of the bottle neck (II) is shorter than the axial length of the pot wall (W) of the closure cap.