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Screw cap with sealing disc

The invention relates to a cap with sealing disc for a container closure, for use on a container with an opening bounded by a peripheral edge, wherein the sealing disc consists of a plurality of layers, the bottom-most layers of which seal tightly the opening of the container prior to the initial opening of the container and are connected in a releasable manner to the upper-most layers of the sealing disc, wherein said upper-most layers are able to form a renewed temporary closure of the opening of the container.

- 10 On the closure of a container it is frequently desirable, or even necessary, to provide the container mouth with a disc-shaped sealing which seals off the contents, for example liquids or else substances such as foodstuffs.

There are several reasons why said sealing off is required. On the one hand, the contents are to be protected against outside influences, for example against water vapour or oxygen, on the other they are also to remain aroma-tight. There is a further reason in the case of aggressive contents, for which as optimum a leakage protection as possible must be provided. Finally, an originality protection for the trade may also be provided by such a sealing off, since a user is able to recognise immediately whether someone has already handled the container contents beforehand.

In addition, the container closure is then also sealed with a screw cap or a similar element, which ensures a mechanical and stable sealing outside the film. On initial use the user destroys the film in order to gain access to contents of the container and closes the container afterwards (unless he has already removed the entire contents) with the screw closure, which may provide a temporary seal for the opened contents for a suitably short period of time.

If the tightness requirements are only slight, a cardboard disc may, as proposed in DE 94 10 934 U1, be placed on the container mouth as a sealing element or in some cases be clamped in the screw cap. The sealing disc may then be ejected by means of a small flap



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in the screw cap, in order to allow the contents to flow out of said flap again after renewed screwing on. However, any sealing after the initial opening is therefore forfeited, and furthermore the possible uses are also limited to undemanding and insensitive contents.

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The film that seals the container contents is frequently applied by means of induction sealing, as inter alia in EP 0 717 710 B1 and DE 39 20 324 A1. A complete sealing disc is put on for this purpose, whose bottom-most layer forms the sealing layer. Above it lies a second layer consisting as a rule of aluminium, which serves for the generation and transmission of heat during the induction process and optionally forms an additional mechanical protection. The second layer is connected to the first one firmly and in particular favourably for the transmission of heat. Above said aluminium layer are then provided also further components of the sealing disc, which remain in the cap after the opening of the screw or other rotating closure.

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Said further or upper components of the sealing disc are clamped together in the screw cap. If said screw cap is rotated at the initial opening, the torque is automatically also transferred onto said upper parts of the sealing disc. Said upper parts of the sealing disc therefore rotate relative to the opening of the container. The lower parts of the sealing disc, on the other hand, are sealed firmly onto the container mouth and do not rotate. In this way the upper part of the sealing disc is sheared off from the lower part precisely in the separation area provided. The upper part remains in the screw cap, the lower part remains on the container and may now be suitably handled by the user and destroyed.

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Problems arise at this point, however. In order that the user may remove said lower part with the sealing layer, certain sensitive measures have been taken in said area. For example, it is provided according to EP 0 395 660 B1 or EP 0 534 949 B1 to make the upper-most layer capable of being turned up, by it being in part not bonded to the induction layer. Said non-bonded area in particular is therefore naturally very sensitive to applied stresses, above all in the rotation direction, where no resistance of any kind may be offered to them because of the lack of bonding. A point may therefore be reached

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where destruction or damage occurs here, which gives the inexperienced user in particular the impression that the container closure was defective or possibly not tight or else was not sealed in the proper manner. In extreme cases said process may actually lead to partial destruction of the sealing layer.

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The object of the invention is conversely to propose a cap with a sealing disc with which a more gentle separation of the sealing disc components takes place.

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This object is achieved by the fact that the cap comprises devices for limiting the spacing of the upper-most layers of the sealing disc from the underside of the cap in the event of an opening of the cap and the upper-most layers of the sealing disc are adhesion-free relative to the underside of the cap and rotatable with respect thereto.

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The problem is surprisingly solved with such an idea, which is a complete departure from the prior art. To date, in fact, it had always been assumed that the rotational movement of the cap must be exploited in order to separate the two relevant components of the sealing disc from one another. Now, however, the sealing disc is quite deliberately no longer bonded in the cap, but lies loose in the latter. The result of this is that on rotation of the cap, as a result of the still present bonding of the upper parts of the sealing disc to the lower parts of the sealing disc the whole of the sealing disc remains stationary and does not share the rotational movement of the cap. The result of this in turn, however, is that no destruction of any kind is able to occur because of the relative rotational movements of the various layers to one another. The tabs, folds or other ingenious arrangements on the top-most layer of the lower layers of the sealing disc remain completely unaffected.

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The upper-most part of the sealing disc, which later forms the reseal part, is simply lifted vertically upward. Vertically upward is in this case parallel with or exactly in axial direction of the opening of the container. Said lifting takes place by on the one hand the elastic pressure originally exerted by the cap being removed and on the other due to suitable mechanical measures, by a light force being exerted exactly vertically upward by the cap, which moves reliably upward not only in a rotating manner.

To ensure said movement, however, a controlled, light connection is in fact easily settable by means, for example, of a polymer separation layer between the reseal part and the lower layers of the sealing disc. The latter may be provided precisely in such a way that, although it is stronger than any rotational forces and torques nevertheless transmitted, it still then yields to said vertical force effect. However, said vertical lifting of the upper layers from the lower ones leaves the top side of the lower layers unaffected. They are not displaced relatively into one another or buckled relative to one another, but remain lying uninfluenced.

The user may now carry out the respective manipulations offered, for example lifting partially bonded areas, vertically raising folds and similar. After this he may remove said lower area fully from the container. The screw cap then possesses again, precisely as in the prior art, a reseal part, which is exceptionally suitable for the renewed sealing of the container. It is also now immaterial whether and how said reseal part moves, it is simply screwed on again together with the screw cap. Despite the absence of adhesion, it does not drop out of the screw cap, as it is retained in the cap by the mechanical engagement means, in particular grooves and beads.

It is particularly preferable if the sealing disc exhibits a constant outer diameter across all the layers. In this way a single punching tool may be employed and in addition only one punching operation is required. In the prior art it was nevertheless sometimes preferred, because of the sensitivity of the upper layers, to provide individual layers with outwardly projecting tabs as in EP 0 697 345 A2, in order to counteract this.

An embodiment of the invention will be explained in detail below with reference to the drawing, in which:

Figure 1 shows a diagrammatic cross-section, not to scale, through a screw cap with sealing disc during the opening.

Figure 1 shows the area of the opening 11 of a container 10. This may be a bottle, a container for agrochemicals, or a container to be sealed aroma-tight, for example for coffee powder or similar. The opening is surrounded by a peripheral edge 12. The edge 12 is in general circular.

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On said opening is located after the filling of the container and prior to the initial opening a sealing disc 20 consisting of several layers, which is sealed upward and laterally by a screw cap base element 40.

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Viewed from the container side, the disc 20 begins first of all with a sealing layer 21. There follows on said sealing layer 21 an induction layer 22, conventionally of aluminium. Said induction layer ensures that heat produced in the layer 22 by means of induction is transferred to the sealing layer 21 and the latter is sealed firmly onto the edge 12 of the opening 11 of the container 10 during the production or packaging process.

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The induction layer 22 is followed next by a layer 23. By means of said layer 23 the user is able to remove the sealing layer 21 together with the induction layer 22 if he wishes to gain access to the contents of the container 10. Said layer 23 comprises for said purpose for example outwardly projecting tabs or else inherently a corresponding fold for gripping. In the representation in Figure 1 this is indicated by such a projecting fold. In the completely sealed state said fold lies flat naturally and takes up practically no additional space. There then exists in practice no gap between the layer 23 and the next layer 24 lying on top of it, the so-called reseal part. The reseal part 24 therefore lies directly on the layer 23, optionally on the flat lying fold of the layer 23.

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All the layers are bonded to one another, the layers 21, 22 and 23 very firmly by adhesive layers, as they are no longer to be, and must not be, separated from one another. The layers 23 and 24 are conversely connected to one another by a relatively easily releasable connection which is at any rate easily controllable in terms of its adhesive power. Care should be taken in selecting the bonding and separating material between the layer 23

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and the layer 24 that in the event of a separation said material remains in the main on the layer 23.

5 The total thickness of the layers 21, 22 and 23 is very small in relation to the rest of the container and also opening dimensions. Their presence or non-presence plays practically no part in the procedure for screwing down or attaching the cap 40 onto the container 10. It should be pointed once again that Figure 1 is in no way to scale here.

10 There is provided on the screw cap 40 on the one hand a fixing device 43, for example an internal thread, which engages with matching counter-fixing elements (not shown) of the container 10. The cap 40 may therefore be screwed on here.

15 Noticeably, and other than in the prior art, there is not only provided between the uppermost cover plane of the cap 40 and the fixing device 43 a space for a sealing disc 20, but said space in addition comprises an inwardly projecting groove 41 or alternatively, co-ordinated with the latter, a bead 42 projecting slightly outwards in relation to said groove 41. The size ratios are also exaggerated slightly here.

20 Likewise other than in the prior art, no adhesive connection is provided between the sealing disc 20 or the reseal part 24 of the sealing disc 20 on the one hand and the underside of the cover of the cap 40 on the other. The sealing disc 20 is therefore rotatable in its entirety relative to the cap 40.

25 The groove 41 is arranged exactly so that the reseal part 24 fits into the bead 42. During the screwing of the cap 40 onto the container 10 said reseal part 42 passes into said area without difficulty, due to light mechanical tension or suitable thermal measures, across the slight resistance of the groove 41. Prior to the initial opening of the container also, therefore, a separation of the reseal part 24 from the lower layers 21, 22 and 23 of the sealing disc 20 is not carried out. The latter still remain together.

30 Not until the initial opening of the container, during the unscrewing of the screw cap 40, is said connection loosened. Other than in the case of screw caps from the prior art,

however, this does not take place, for instance, by the torque of the screw cap 40 being transferred onto the reseal part 24 during the opening, and the connection of the reseal part 24 thereby being "deflected" to the lower layers of the sealing disc. The reseal part 24 simply remains stationary and only the then absent compressive force from above, 5 combined with the mechanical engagement of the groove 41 with the reseal part 24, leads to the reseal part being lifted vertically upward without any rotation. The reseal part therefore remains in the cap, whereas the lower layers remain on the container 10.

10 In the Figure there is indicated diagrammatically a phase in which the separation between the layers 23 and 24 from one another has just taken place. Both layers are not rotated against one another, however, they move away from one another along the axis of the container mouth. The indicated fold is starting to form; in practice, however, it will as a rule intentionally require manual assistance for this.

15 The user is consequently presented, after the initial opening of the screw cap 40, with free access to the layer 23 with the handling means provided there, for example the tab or the projecting fold.

20 If he has now loosened said lower layers and partially removed the contents of the container 10, he may seal the container once again with the screw cap 40 and the reseal part 24 contained therein. Although the container then no longer has its original seal, a closure is nevertheless possible in this way for a temporary period. Opening may then naturally take place again, in order to gradually consume the container contents.

List of reference symbols

	10	container
	11	opening of the container
5	12	edge of the opening
	20	sealing disc
	21	sealing layer
	22	induction layer
10	23	layer for opening
	24	reseal part
	40	cap
	41	groove
15	42	bead
	43	fixing device

Claims

1. Screw cap with sealing disc for a container closure, for use on a container (10) with an opening (11) bounded by a peripheral edge (12), wherein

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- the sealing disc (20) consists of a plurality of layers, the bottom-most layers (21, 22, 23) of which seal tightly the opening (11) of the container (10) prior to the initial opening of the container,

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- the bottom-most layers (21, 22, 23) are connected in a releasable manner to the upper-most layers (24) of the sealing disc (20),

- said upper-most layers (24) are able to form a renewed temporary sealing of the opening (11) of the container (10),

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- the cap (40) comprises devices (41, 42) for limiting the spacing of the upper-most layers (24) of the sealing disc from the underside of the cap (40) in the case of an opening of the cap (40) and

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- the upper-most layers (24) of the sealing disc (20) are adhesion-free relative to the underside of the cap (40) and rotatable with respect thereto.

2. Cap with sealing disc according to claim 1,

characterised in that

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the outer diameter of the sealing disc (20) is constant and without projections over all the layers (21, 22, 23, 24).

3. Cap with sealing disc according to claim 1 or 2,
characterised in that
the devices (41, 42) for limiting the spacing of the upper-most layers (24) of the
sealing disc (20) contain an inwardly projecting groove (41) and/or an outwardly
projecting bead (42).
4. Cap with sealing disc according to one of the preceding claims,
characterised in that
between the lower layers (21, 22, 23) and the upper layers (24) of the sealing disc
(20) a defined separation layer is provided, which permits, without relative
rotation of the layers to one another, a separation by vertical lifting of the layer
groups from one another.
5. Cap with sealing disc according to claim 4,
characterised in that
the separation layer creates a stronger connection than the releasing force
resulting from the torque transferred by means of the mechanical contacting of the
upper layer (24).
6. Cap with sealing disc according to one of the preceding claims,
characterised in that
the lower layers (21, 22, 23) comprise on their top side a releasing device not
projecting beyond the outer periphery of the sealing disc (20), in particular an
interposed fold.