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(54) Threaded cap having a detachable safety strip and a seal ring.

(57) The hermetic closure comprises a cap assembly (10) provided with a cap (1) which, when unscrewed, cause a breakage of struts (5) and a detachment of a safety strip (4), and also comprises a seal which, when the cap assembly (10) is inserted on a container, guarantees a seal on a lateral wall of a dispenser (7), even when the cap (1) is subject to small axial displacements with respect to the container.

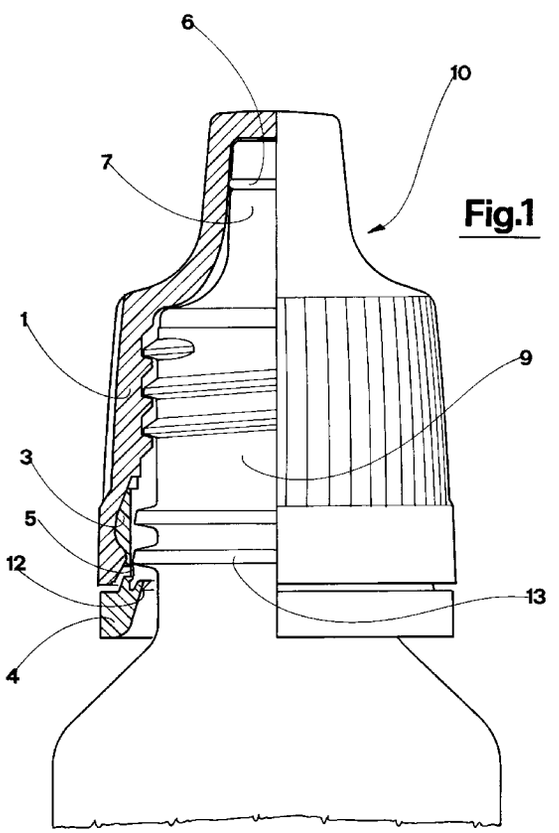

Fig.1

EP 0 636 552 A2

The invention relates to a hermetic closure in a cap assembly for containers equipped with dispensers devices.

In particular, reference is made to a hermetic closure for containers having a small opening provided on a dispenser, such as a spout, a spray, a drop-counter and the like, where factory sealing of the container is guaranteed by a safety device that is broken on first use of the container.

This safety device is usually a detachable safety strip connected to a a cap by easy-break struts, which are fractured by an axial movement of the cap in an upwards direction, that is to say in an opening direction of the container. This usually means an unscrewing movement.

Further, as the cap is generally made in fairly rigid plastic material, not normally able to ensure a good isolation of the contents inside the container, the hermetic efficiency of the closure is instead guaranteed by such systems as contact between the internal surface of the upper part of the cap and the upper surface of the dispenser and the container.

Some examples of such containers are tubes and flagons for pharmaceutical products such as eye-drops, ointments, solutions, and so on.

One of the drawbacks presented in known closures is that it is often possible slightly to unscrew the cap, enough to cause the seal to be broken while not sufficiently to make it obvious to a consumer that the seal has in fact been broken. In pharmaceutical products especially this can mean a crucial loss of sterility which may go unnoticed at first.

In bottles such seal breakage can be achieved by simply squeezing the bottle and releasing it, so that it functions as a suction pump. With rigid containers, it may be enough to immerse them fully in a bath containing sufficient fluid for them to lose their purity. In short, in the above case the mere presence of an unbroken safety strip is not a guarantee that the container has not been tampered with.

A principal aim of the present invention is to obviate the above drawback, by providing a hermetic closure with a plastic cap assembly, for containers having dispenser devices, in which the integrity of the safety guarantee device is a true guarantee that no violation has taken place, and also that none of the container contents have escaped nor extraneous contents been introduced.

One advantage of the invention is that it provides a constructionally simple closure while achieving its set aim, so that no utilization complications arise from it.

The above aims and more besides are fully attained by the closure of the invention, as it is characterized in the claims, in which, as in known closures, a cap assembly is provided, equipped with a cap which when unscrewed causes detachment of a safety strip, and which comprises a seal that, when the cap is inserted on the container, guarantees a seal on a lateral wall of the dispenser of the container, even when said cap is subject to small axial displacements with respect to the container.

Further characteristics and advantages of the present invention will better emerge from the detailed description that follows, of a preferred but non-exclusive embodiment here illustrated in the form of a non-limiting example in the accompanying drawings, in which:

figure 1 is a partially-sectioned schematic vertical elevation view of a first embodiment of the invention;

figure 2 is a partially-sectioned schematic vertical elevation view of a second embodiment of the invention.

In the figures and the following description reference is made to a particular type of closure assembly, by the novel concept expounded hereinbelow is intended to be applicable to all closure assembly types for containers equipped with dispensers which comprise plastic cap assemblies in which a detachment of a safety strip is provided as proof of the pristine conditions of the container contents, and where the separation of the safety strip is achieved by moving the cap axially upwards.

The closure assembly of figure 1 comprises a cap assembly 10 applied on a container having a neck 9 and a dispenser 7. The cap assembly 10 is composed of two plastic parts, which are assembled on insertion of the whole cap assembly 10 into the container neck 9. Figure 1 shows the cap assembly 10 mounted on the container before the container has been opened for a first time.

The cap assembly 10 comprises a first part constituted by a cap 1, which is generally used to reclose the container once it has been opened for the first time.

The cap 1 is generally manufactured by pressing of plastic material and is provided with an internal thread which couples with an external thread provided on a container neck 9.

The cap assembly 10 further comprises a second part, constituted by an annular element consisting of a ring 3 which when the cap assembly 10 is united joints into an annular seat fashioned in an internal wall of the cap 1. The annular element comprises a safety strip 4 coaxially connected with the ring 3 by means of easy-break struts 5, which when broken testify that the container has in fact been opened.

The safety strip 4 is provided with a lip 12 destined to interact, when the cap 1 is unscrewed, with an annular protruberance 13 provided on the container neck 9.

On first unscrewing, the cap 1 is raised and draws the ring 3 and the safety strip 4 with it for a certain distance, up until when the lip 12 of the safety strip 4 comes into contact with the protruberance 13 of the

neck 9. As the unscrewing procedure continues, the struts 5 are stretched by traction in the opening direction of the cap 1 up until they break and the safety strip 4 detaches from the rest of the cap assembly 10.

The above-described is a normal opening procedure utilized by many known closure assemblies.

On an external lateral surface of the dispenser 7, and at a certain distance from the container mouth, the first embodiment of the present closure assembly comprises a seal ring 6 fashioned from the plastic of the dispenser 7 neck and interacting with an internal lateral surface of the cap 1. The seal ring 6 provides a seal against the internal wall of the cap 1, at least when the cap 1 is moved axially upwards over distances which do not exceed a minimum displacement distance necessary for a detachment of the safety strip 4.

The seal ring 6 exhibits an external diameter which is not only greater than the internal diameter of the contact zone, that is the annular portion of cap internal wall with which the seal ring 6 contacts when the cap assembly 10 is mounted on the container, but also greater than the maximum internal diameter presented by the tract of wall exhibited by the cap 1 immediately underlying the annular contact portion, which has an axial length that is at least equal to the minimum distance necessary to cause the struts 5 to break.

The cap 1 comprises a seal zone on the internal lateral surface of the upper part of the cap 1 itself, (including the dispenser 7) which interacts with the seal ring 6 up to when the safety strip 4 breaks.

When the cap 1 is unscrewed by a short distance, the safety strip 4 connected to it lifts freely up to when the lip 12 contacts the protruberance 13 of the container neck 9.

During this operation, the seal zone of the cap 1 moves upwards, dragging on the seal ring 6 of the dispenser 7. The seal zone of the cap 1 loses contact with the seal ring 6 only when the cap 1 has been raised enough to break the struts 5.

In known type closures, very small cap upwards displacement is enough to break the seal between container and cap.

Reutilization of the cap 1 restores the seal, as in known cap assemblies.

Isolation of the container can be achieved by means of a seal ring made not on the container but on the internal lateral surface of the cap 1. In this case the seal ring will have a smaller internal diamter than the maximum diameter exhibited by a tract of external lateral wall on the dispenser 7. This tract, which will be axially longer than a minimum displacement necessary to break or distance the safety strip 4, will constitute a zone of the dispenser 7 on which the dragging of the safety strip 4 takes place.

Any deformable element can be used as a sealing means of the cap on the container, and will be interplaced between the external lateral surface of the dispenser 7 and the internal lateral surface of the upper part of the cap 1 covering said dispenser 7. The determining factor is that in each case the seal on the container should be maintained over axial displacements between the cap 1 and the container which must be at least as long as the minimum displacement of the cap 1 needed to break the safety strip 4.

Figure 2 shows a closure assembly of the same type as the above-described assembly, comprising a plastic cap assembly 10' in which the detachment of the safety strip 4 occurs by unscrewing or raising the cap of the cap assembly 10' itself.

The cap assembly 10', comprising a cap 1', is applied on a container neck 9' and a container dispenser 7', constituted in this case by a drop-counter solidly inserted into the neck 9' to enable drops of a liquid to be counted as they exit the container. In the figure the cap assembly 10' is shown mounted but as yet unopened.

The dispenser 7' is cup-shaped and has a slightly larger external diameter than the internal diameter of the container mouth, which is forced against the internal walls of the neck 9'. The cup is superiorly provided with a flat annular crown which strikes against the upper surface of the container. On its bottom surface the cup exhibits a small central hole for a passage of liquid drop by drop, and a small internal tube for air entrance.

The dispenser 7' further exhibits a coaxial cylindrical spout, arranged between the hole and the tube, fashioned on the bottom of the cup and facing externally of the container. A seal 8' on the lower face of the cap 1' seals against the flat annular crown and the spout of the dispenser 7'.

All of the aforegoing could be applicable to known-type cap assemblies.

The closure assembly of the present invention, shown in figure 2, comprises an annular element 6' fashioned in relief on the internal lateral surface of the cup of the dispenser 7', and projecting inwards.

The annular element 6' is arranged on the upper part of the cup and seals against the external lateral surface of a coaxial cylindrical element 11' fashioned on the seal 8'. The cylindrical element 11' faces inwardly of the cup and exhibits a greater external diameter than the internal diameter of the annular element 6'.

On the external lateral surface of the cylindrical element 11', the cap 10' also comprises a seal zone arranged immediately below the annular zone, which comes into contact with the annular element 6' when the cap assembly 10' is mounted on the container. The seal zone is longer than the minimum displacement required to break the safety strip of the cap assembly 10'.

This embodiment also offers the possibility of achieving perfect hermetic closure by means of a seal

ring fashioned on the cap instead of on the container. In this case the seal ring would be arranged on the external surface of the cylindrical element 11' of the seal 8'.

Independently of the realisation, the seal occurs between the external lateral surface of the cylindrical element 11' and the internal lateral surface of the dispenser 7', and is guaranteed for relative axial movement between the cap and the container over a distance that does not cause detachment of the safety strip.

Claims

1. A hermetic closure in a plastic cap assembly (10), (10') for containers provided with a dispenser (7), (7'), wherein the cap assembly (10) (10') comprises a cap (1), (1'), applied on a container neck (9), (9'), which when unscrewed and raised in an axial direction causes a detachment of a safety strip (4) from the cap assembly (10), (10'), characterised in that it comprises a seal ring interposed between an external lateral surface of the dispenser (7), (7') and an internal lateral surface of the cap (1), (1'), which seal ring remains fully effective both when the cap (1), (1') is applied on the neck (9) (9') and when the cap (1) is axially and upwardly displaced by distances not superior to an axial displacement necessary in order to cause a detachment of the safety strip (4) from the cap (1).

2. A closure as in claim 1, characterised in that the seal ring (6) is arranged on an external lateral surface of the dispenser (7) and, when the cap assembly (10) is mounted, seals against an annular contact zone of an internal lateral surface of the cap (1); said seal ring (6) having a greater external diameter than a maximum diameter of an internal surface of the cap (1) immediately underlying said annular contact zone and being at least as long, measuring in an axial direction, as an axial displacement necessary in order to detach the safety strip (4).

3. A closure as in claim 1, characterised in that the seal comprises an annular element (6') arranged on the internal lateral surface of the dispenser (7) which when the cap assembly (10) is mounted seals on an annular contact zone of an external lateral surface of a cylindrical element (11') solid to the cap (1'); said annular element (6') having a smaller internal diameter than a minimum diameter of the external surface of the cylindrical element (11') solid to the cap (1') and immediately underlying said annular contact zone, and being at least as long, in an axial direction, as an axial displacement necessary to detach the safety strip (4).

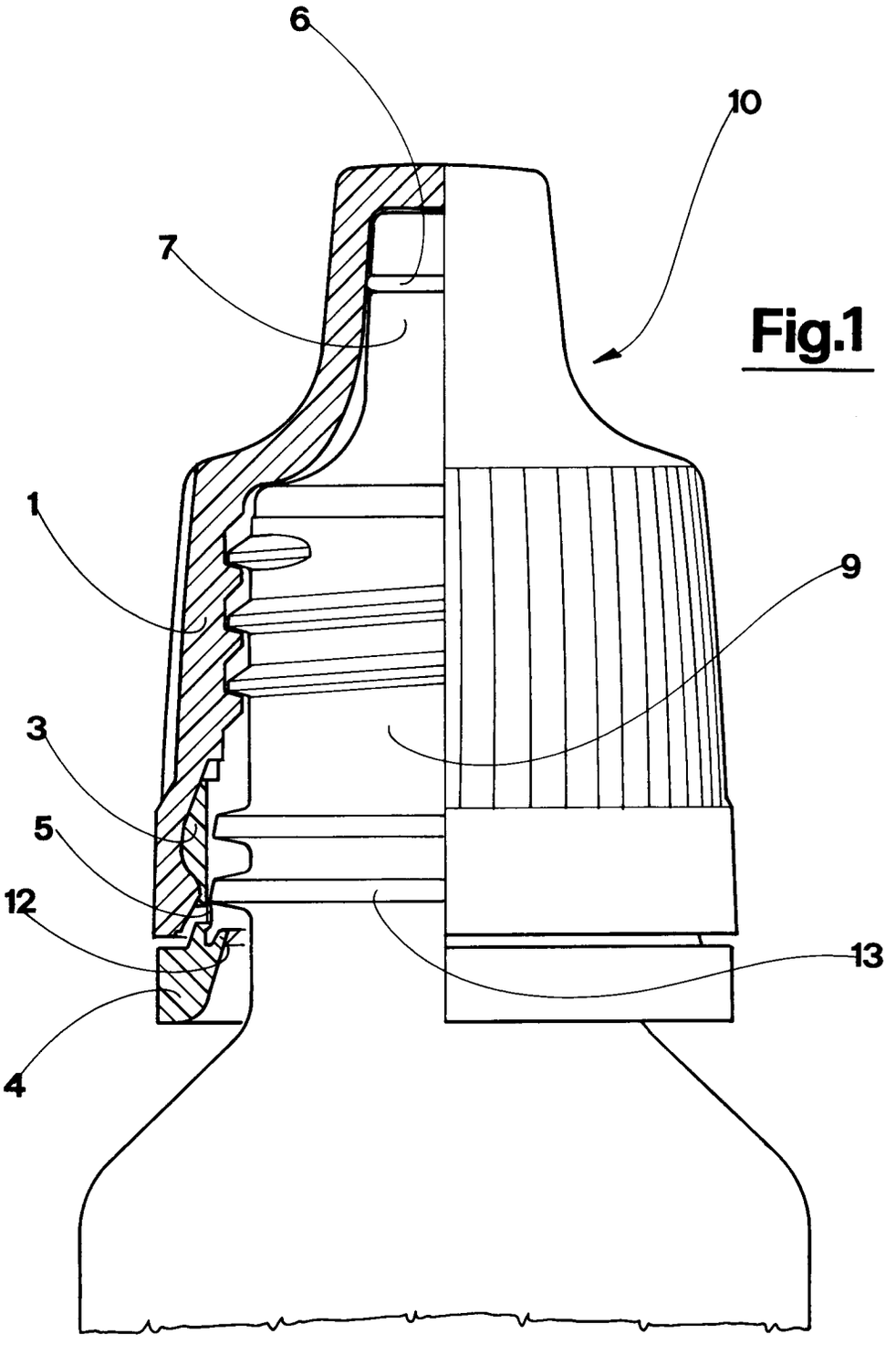

Fig.1

Fig.2