United States Patent

[11] 3,581,926

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[33] **Germany**
[31] **P 17 57 325.0**

[54] **CLOSURE CAP FOR CONTAINERS**
6 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **215/41,** 215/44
[51] **Int. Cl.** **B65d 1/02,** B65d 41/04
[50] **Field of Search** 215/41, 43, 43.1, 44; 220/39, 40

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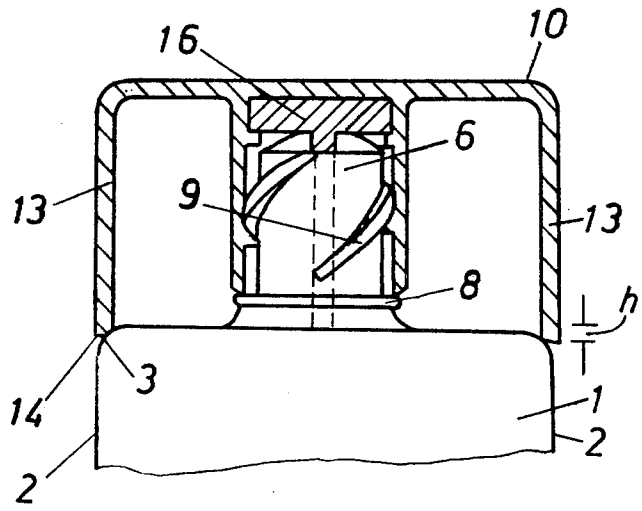
ABSTRACT: A closure cap of resilient material having a circumferential shape corresponding to that of the upper portion of a container, such as a bottle having a neck portion projecting from a shoulder surface of the container and defining the container opening which is sealed by the closure cap when it is brought into releasable closing position by snap action in which the side surfaces of the container and of the closure cap are aligned, wherein the neck portion of the container is provided with outer courses of thread while the closure cap includes an inner tubular socket provided with corresponding inner courses of thread, the pitch and the position of the courses of thread being such that the side surfaces of the courses of thread being such that the side surfaces of the closure cap occupy an angular position relative to the side surfaces of the container, when the closure cap has been rotated until its lower edges contact the shoulder of the container whereupon continued rotation out of said angular position causes a deformation of and a storage of force in the sidewalls and/or the top wall of the closure cap which force is released when the lower edges of the closure cap snap over the rounded or beveled shoulder edges of the container into a closing position beveled shoulder of the closure cap in which the sidewalls of the closure cap and the sidewalls of the container are positively aligned.



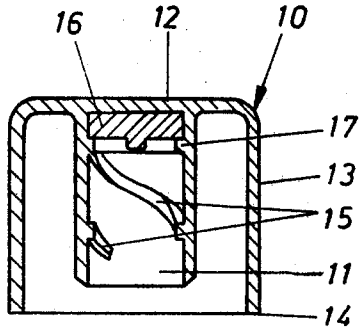


Fig. 2

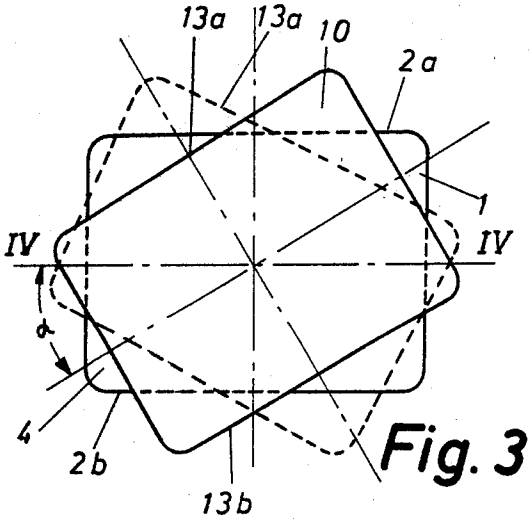


Fig. 3

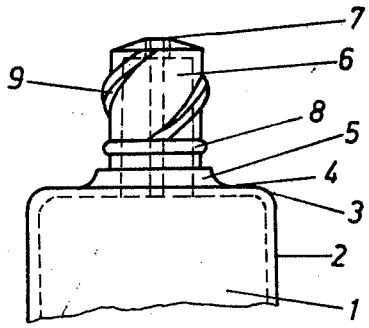


Fig. 1

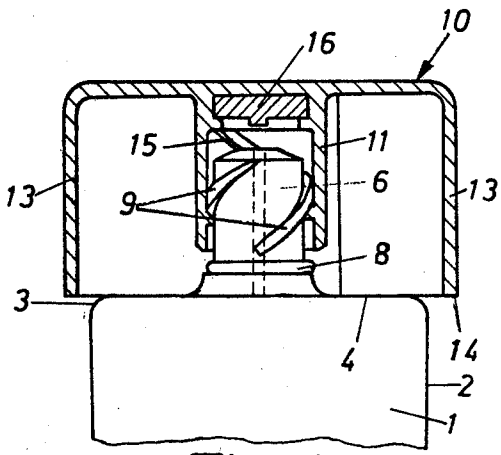


Fig. 4

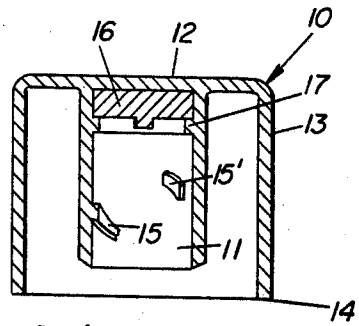


Fig. 10

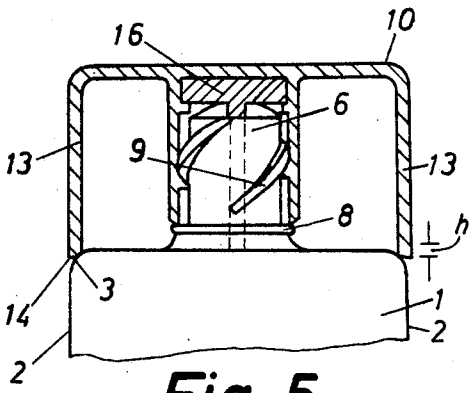


Fig. 5

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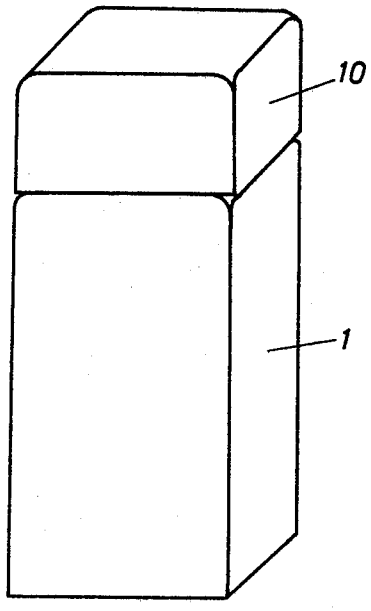

Fig. 6

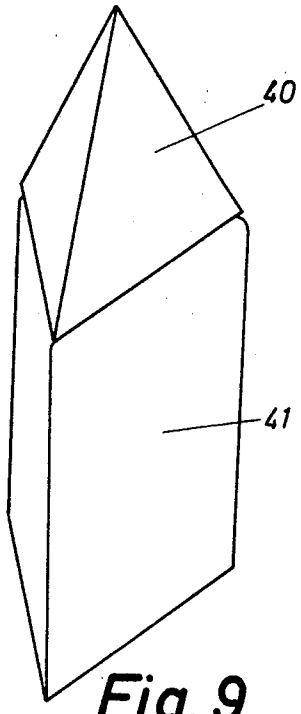

Fig. 9

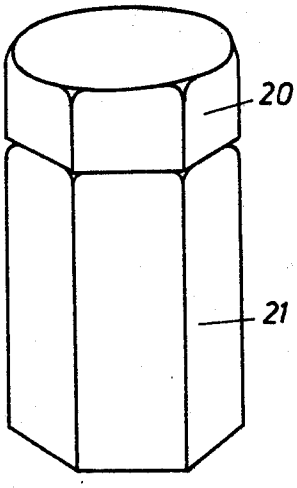

Fig. 7

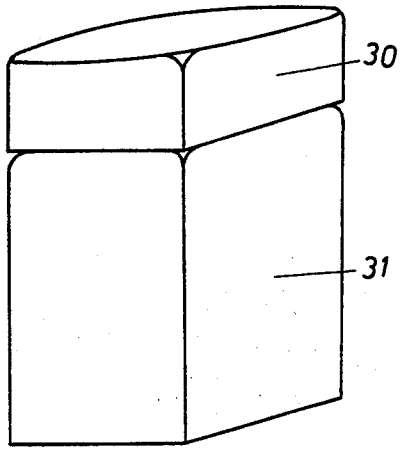

Fig. 8

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CLOSURE CAP FOR CONTAINERS

BACKGROUND OF THE INVENTION

1. Field of the Application

The closure cap according to the invention may be used for containers having a relatively large opening as well as for bottles and containers having a relatively small opening as they are used for cosmetic products.

2. Description of the Prior Art

A bottle closure cap having vertical outer surfaces which are aligned with the walls of the bottle when the closure cap occupies its closed position is known in form of a plug closure from the U.S. Pat. No. 2,476,155. The exact position of this closure relative to the bottle is determined by a prism-shaped top side of the bottle and a corresponding recess in the lower side of the closure. Since this plug closure must snugly engage the prism-shaped top side of the bottle there is the danger that the bottle opening is insufficiently sealed by the sealing member arranged within the closure. Besides this when the bottle is to be closed again it is irksome for the consumer to urge such plug-type closures in place back again in such a way that a satisfying seal is obtained.

Swiss Pat. No. 356,639, issued to Nellie Fried-Stein on Aug. 31st, 1961 and published on Oct. 13th, 1961 and based on an application filed on Mar. 23rd, 1957, discloses a connection between two elements, for example between a closure cap, and a bottle, wherein a bottle neck, which has an upwardly diverging wedgelike cross section flattened laterally, is urged laterally into a widening groove of the closure cap. The two elements are twisted about 90°, whereby the surfaces of revolutions of the bottle neck and the closure cap engage each other with a self-locking sliding fit, in which position the side surfaces of the closure cap and the bottle are supposed to be aligned. It appears questionable whether a sufficient seal and an exact alignment of contours can be attained by this type of closure means. Besides this, this type of closure is only adapted for very narrow bottles, in which the width is not greater than the smallest width of the wedge-shaped groove.

It is an object of the invention to provide a closure cap of flexible material for containers having at least an upper portion of noncircular or cornered cross-sectional shape, which closure cap, in any case, provides an unobjectionable seal of the container opening after placing it thereon, wherein the outer surfaces of the cap, or the lines of contour respectively, are aligned with the outer container, and the cap is releasably locked in this position.

SUMMARY OF THE INVENTION

A closure cap for the opening of the neck of containers having at least an upper portion of noncircular or cornered cross-sectional shape, which closure cap includes sidewalls the circumferential shape of the lower edges of which corresponding to the cross-sectional shape of the upper container portion, wherein the sidewalls of the closure cap are aligned with the sidewalls of the container when the closure cap occupies its closing position. A closure cap of this type is improved according to the invention in that the neck of said container extends upwardly from a shoulder defined by the sidewalls of said container and forming rounded or beveled edges therewith said neck being provided with outer courses of thread, and that said closure cap includes a central downwardly extending bottom open tubular socket terminating with its opening above the plane of said lower edges and being provided with inner courses of thread adapted to engage said outer courses of thread of the container neck the pitch and the position of said courses of thread being such that the circumferential contour of said closure cap, when screwed onto the neck until its lower edges contact said shoulder of the container, will occupy an angular position relative to the cross-sectional contour of said container, and that continued rotation of said closure cap will cause a cam action between the lower edges of said closure cap and the rounded or beveled shoulder edges of said container and a deformation of the closure cap thereby storing a force which is utilized to snap and axially draw said closure cap into its closing position in which the outer contours of both said closure cap and said container are positively aligned and said container opening is firmly sealed.

By means of this construction the lower edge of the cap snaps, in dependence on the pitch angle of the thread courses and the aforementioned angle, axially downwardly directed over the correspondingly rounded or beveled shoulder edges of the container into the position in which the side surfaces of the cap, or lines of contour of the cap respectively, and the side surfaces of the container are aligned relative to each other, wherein simultaneously an unobjectionable seal of the container opening is obtained either by the end wall of the inner tubular socket, or an inserted seal, due to the axially downwardly directed snapping movement of the cap.

A further feature of the invention resides in that the number of the interengaging separate courses of thread of said closure cap and of said bottle neck is smaller than or equal to the number of the possible aligned positions of the outer contour of said closure cap relative to the outer upper cross-sectional contour of said container.

According to the invention it is also possible to replace one of a plurality of thread courses by a nodular-shaped cam projection.

Still another feature of the invention resides in that the courses of thread are formed by approximately half-pitch coarse thread courses.

In order to prevent overturning of the cap and stripping of the courses of thread the invention provides a circumferentially extending bead at the bottle neck below its courses of thread forming a stop limiting the position of said closure cap in cooperation with either the lower extremities of said inner courses of thread of the socket of said closure cap, or the lower edge of said socket respectively, in which position said lower edges of said closure cap snap over the shoulder edges of said container.

Following several exemplified embodiments of the subject matter of the invention shall be described in detail in connection with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the upper portion of a container, according to the invention, for example of a bottle, having a rectangular cross-sectional shape,

FIG. 2 is an axial cross-sectional view of a closure cap according to the invention having a rectangular configuration viewed from the top corresponding to the cross-sectional shape of the bottle,

FIG. 3 is a top view of the closure cap and the bottle in a twisted position relative to each other in which the lower edge of the cap contacts the upper shoulder surface of the bottle,

FIG. 4 is a side view of the bottle and a cross-sectional view of the cap in the plane of line IV–IV in FIG. 3,

FIG. 5 is a side view of the bottle and a cross-sectional view of the cap in its closed position,

FIGS. 6 to 9 are perspective side views of containers and closure caps in closed positions of various cross-sectional configurations,

FIG. 10 is a view similar to that of FIG. 2 showing another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1 there is shown a container in form of a bottle 1 having at least an upper body portion of rectangular cross-sectional shape. The sidewalls of the bottle are denoted with 2 while the upper, for example planar, shoulder surface 4 is defined by the rounded or beveled shoulder edges 3. In the middle of the shoulder surface 4 a lug 5 and, projecting upwardly therefrom, a cylindrical bottle neck 6 defining the bottle opening 7 are provided. Upwardly of an annular outer bead 8 the bottle neck 6 is provided with a pair of oppositely ar-

ranged thread courses 9 which, according to the exemplified embodiment are thread courses of substantially one half of the full length.

The closure cap 10 shown in FIG. 2 is made, for example, of plastic material, and comprises an inner cylindrical tubular socket 11, a top wall 12, and projecting therefrom downwardly sidewalls 13 terminating with a lower edge 14. The interior wall of the cylindrical socket 11, which is closed at the upper end by the top wall 12, is provided with thread courses 15 corresponding to thread courses 9 of the bottle neck 6. An elastic sealing member 16 is arranged within the socket 11 and held in place by an inner annular bead 17. However, this sealing member 16 may also be held in place by the ends of the thread courses 15 by screwing it into the socket. In case the closure cap 10 is made of soft elastic material the sealing member 16 may be omitted. The cross-sectional rectangular contour of the closure cap 10 corresponds to that of the upper bottom portion 1. When in closed position the outer surfaces of the sidewalls 13 of the closure cap are to be aligned with the sidewalls 2 of the bottle.

The thread courses 9 and 15, of which one may also be formed as a simple cam projection 15' as shown in FIG. 10, are preferably forming a coarse thread with a relatively large pitch angle. The number of the thread courses is less or equal to the number of possible positions of the closure cap relative to the bottle. In case of a bottle having a rectangular cross-sectional shape two positions of the closure cap 10 relative to the bottle 1 are possible, in which the side surfaces 2*a* and 2*b* of the bottle may be aligned with the side surfaces 13*a* and 13*b* of the closure cap 10, and therefore only two separate thread courses as a maximum are required for the bottle neck 6 and the socket 11.

The thread courses interengaging each other are each formed by a convex thread course 9 projecting outwardly from the outer surface of the bottle neck 6 and by a convex thread course 15 projecting inwardly from the inner surface of the socket 11. The outside diameter of the bottle neck 6 is substantially equal to the core diameter of the thread, while the inner diameter of the socket is substantially equal to the outside diameter of the thread. The profile of the thread courses 9 and 15 may be pointed, rounded, or also trapezoidal. However, it is of advantage if the width of each of the pair of thread courses 9 and 15 is a multiple less than it would be in correspondence with the pitch of the thread. Due to this broad cylindrical surfaces having the diameter of the core of the thread, and the outside diameter of the thread respectively, remain free between the courses of the thread as well on the bottle neck 6 as also on the inner wall of the socket 11. By means of this it is possible to push the closure cap 10 so far over the bottle neck 6 until the lower flanks of the thread courses 15 engage the upper flanks of the thread courses 9. Due to the coarse pitch thread the axially directed slip on movement is readily transformed into a rotating movement, whereby the closure cap rapidly seats itself with its lower edge 14 on the shoulder surface 4 of the bottle 1. Upon continued twisting of the cap the upper flanks of the thread courses 15 threadedly engage the lower flanks of the thread courses 9, thereby elastically deforming the sidewalls 13 and/or the top wall 12 of the closure cap 10 until the lower edges 14 of the cap snap over the shoulder edges 3 of the bottle 1, whereby an undesired reverse rotation of the thread, or the closure cap respectively is prevented. After the closure cap of the rectangular bottle shown in FIGS. 1 to 6 has been slipped on the neck of the bottle only a rotating movement of approximately 45° up to a maximum of 180° is required in order to snap and lock the closure cap on the bottle. In order to prevent stripping of the thread by rotating the cap beyond its closed position the annular bead 8 of the bottle neck 6 is provided which is engaged as a lower limit stop by the lower ends of the inner thread courses 15 of the closure cap, or, if desired, also by the lower edge of the tubular socket 11. In FIGS. 3 and 4 the closure cap 10 is shown in that position in which the lower edge 14 of the cap is seated on the shoulder surface 4 of the bottle 1, and in which the thread courses 9 and 15 are interengaged. The two possible positions of the closure cap 10 are shown in FIG. 3 in full lines, and dotted lines respectively. The angle α represents the remaining angle about which the closure cap 10 must be rotated in threaded engagement in order to move its lower edge into the final snapped-on locking position. In FIG. 5 the distance h represents the amount about which the lower edge 14 of the closure cap 10 snaps over the shoulder edge 3 of the bottle. The pitch of the thread and the arrangement of the thread courses 9 and 15 in circumferential direction and height is determined by the aforementioned remaining angle α of rotation and the distance h. If, for example, the angle α amounts to 20° (equal to one-eighteenth of 360° and the distance h to 2 mm., then the pitch of the thread must be selected at least in the lower portion with 36 mm. In case of this example the shoulder edge 3 of the bottle 1 may be rounded with a radius of 4 to 5 mm. The edge 14 of the flexible closure cap 10 has in this case a thickness of 1 mm. The lower edge 14 of the closure cap 10 indeed surrounds the shoulder edge 3 of the bottle 1 completely but does not support the closure cap due to a little play between the lower edge 14 and the shoulder edge 3, or due to the elasticity of the cap walls respectively, so that the sealing member 16 is tightly urged against the opening 7 of the bottle 1 by the interengaging action of the threads 9 and 15.

invention is not restricted to bottles and closure caps of rectangular cross-sectional configuration. In the same manner also containers of oval, triangular, or polygonal cross-sectional shape may be provided with corresponding closure caps. The containers may be small bottles, as they are used for cosmetic products, but also containers with a relatively large opening.

Exemplified embodiments of such containers and closure caps have been shown in the FIGS. 6, 7 and 8. FIG. 6 shows a perspective view of a glass bottle 1 with a rectangular cross-sectional configuration and a closure cap 10 of plastic material which may, for example, be colored. FIG. 7 shows a perspective view of a hexagonal container 21 and a corresponding hexagonal closure cap. The container shown in FIG. 8 has a rhombic cross-sectional configuration with rounded corners and includes a corresponding closure cap 10.

Within the scope of the invention it is not required that, for example, the vertical sidewalls of the container are disposed in a common plane with the sidewalls of the closure cap. Thus, for example according to FIG. 9, the sidewalls of the closure cap 40 may also form a trilateral pyramid, or the like, while the container 41 includes three vertical sidewalls.

The shape of the closure cap according to the invention may be varied in many respects, it has a pleasant look, and is easy to handle and yet closes tightly.

What I claim:

1. In combination with a container, a closure cap for the opening of the neck of said container, said container having at least an upper portion of noncircular cross-sectional shape, said closure cap including sidewalls the circumferential shape of the lower edges of which corresponding to the cross-sectional shape of the upper container portion wherein the sidewalls of the container cap are aligned with the sidewalls of the container when the closure cap occupies its closing position, wherein the neck (6) of said container (1) extends upwardly from a shoulder (4) defined by the sidewalls (2) of said container and forming nonsquare edges (3) therewith said neck being provided with outer courses of thread (9), and that said closure cap (10) includes a central downwardly extending bottom open tubular socket (11) terminating with its opening above the plane of said lower edges (14) and being provided with inner courses of thread (15) adapted to engage said outer courses of thread of the container neck the pitch and the position of said courses of thread being such that the circumferential contour of said closure cap, when screwed onto the neck until its lower edges contact said shoulder of the container, will occupy an angular position relative to the cross-sectional contour of said container and that continued rota-

tion of said closure cap will cause a cam action between the lower edges of said closure cap and the rounded or beveled shoulder edges of said container and a deformation of the closure cap thereby storing a force which is utilized to snap and axially draw said closure cap into its closing position in which the outer contours of both said closure cap and said container are positively aligned and said container opening is firmly sealed.

2. A closure cap according to claim 1, wherein the number of the interengaging separate courses of thread of said closure cap and of said container neck is no greater than the number of the possibly aligned positions of the outer contour of said closure cap relative to the outer upper cross-sectional contour of said container.

3. A closure cap according to claim 1, wherein one of a plurality of thread courses is replaced by a nodular-shaped cam projection.

4. A closure cap according to claim 1, wherein the courses of thread are formed by coarse thread courses each extending around approximately one-half the circumference of the member on which it is disposed.

5. A closure cap according to claim 1, wherein a circumferentially extending bead is provided at the container neck below its courses of thread forming a stop limiting the position of said closure cap in cooperation with the lower extremities of said inner courses of thread of the socket of said closure cap, in which position said lower edges of said closure cap snap over the shoulder edges of said container.

6. A closure cap according to claim 1, wherein a circumferentially extending bead is provided at the container neck below its courses of thread forming a stop limiting the position of said closure cap in cooperation with the lower edge of said socket, in which position said lower edges of said closure cap snap over the shoulder edges of said container.