

Description

The invention in question concerns a synthetic plastics closure for solid or deformable containers, which is an integral component of the container or is settable thereupon, having an under part and integrally connected with the under part through at least one tie strap.

A synthetic plastic closure of the above-mentioned kind is known from the CH-PS 619413. The function of the tie-strap(s) is described as giving support to hold the cap in the open position once it is opened. Such (preventive or precautionary) measures are well-known in the different forms of closure techniques for a long time. The tie-straps, according to the above-mentioned patent (specification), lie in the lock position of the closure on a plane outside the closure. As the tie straps are tensed when the closure is in the closed position, they have the tendency to open the closure and the closure should therefore always provide the corresponding bolt mechanism opposite the tie straps, to counteract this effect.

Another familiar solution, to counteract the undesirable opening effect of the tie-straps, is described in the patent specification. Herewith, is an integral film-hinge place in such a manner at the under part and the cap that the axis comes to be situated even further away from the centre of the closure and outside the closure.

This situation has many advantages:

- a) The opening and closing process results in very much strength, which brings about enormous stress upon the film-hinge. As a result, such closures can only be realised by using only high-value and expensive synthetic plastics, e.g. polypropylene.
- b) The placement of the film-hinge relatively far away outside the actual closure requires very much adaptation to the closure machine for the filling area. The catch must be shaped plainly but the inlet of the closure must be positioned according to exactness.
- c) The closure force of the tie straps is small which is also in relation to the distant placement of the film-hinge outside the closure.

d) The requisite to have a film-hinge results in a cogent movement mechanism which affects in an extremely limited manner the geometrical shape of the under part and the cap. Particular closures with an added part at the under part are hardly effective, eg. an elevated spout opening (outlet) or a plug (peg) which is provided for the purpose of gripping the opening of the cap. In any case, a considerable stress on the film-hinge is made by the closing or opening process which results in a constant slight deformity of the entire closure. The damaged edges of the plug (peg) and the spout lips also adversely affect the thickness effect as well as the spout qualities of the closure.

The aim of the invention is to create a closure of the type described at the beginning without the itemised disadvantages.

This aim works to an achievement of acquiring a closure in accordance with the overall concept for the application of patents, which distinguishes itself owing to the fact that in the closed condition of the closure, the tension tie strap or straps run(s) on a plane that intersects the synthetic plastic closure.

With this arrangement, the resultant force of the tie straps acts as a closing force on the closure even when the closure is in the closed condition.

In a favourable design of the closure, the plane of the tie strap run parallel to a vertical of the plane of separation between the under part and the cap. This causes the resultant force also to be fed into the closing position vertically on the plane of separation.

Other design forms and their advantages arise from the consideration and the description which follows. Several different design variations are presented in the descriptions and illustrated in the drawings.

Illustrations:

Figure 1 an overview of a cylindrical closure.

Figure 2 the side plane of the same closure.

Figure 3 presents the same closure attached on a case with prismatic form.

Figure 4 shows once more the closure as in diagram 3 on a side plane.

Figure 5 shows clearly the well-disposed area of the tie straps at a cylindrical closure.

Figure 6 is an overview of a can (tin) developed according to the invention and Figure 7 shows the intersection through the can like as in Figure 6 along the line A.A., while Figure 7a shows a detailed sector of Figure 7.

Figures 8a-d show the four opening positions of a jointless closure.

The closure according to the invention consists always of an under part (1) and a cap or a cover (2). Whether the under part (1) is placed on a solid or deformable container, which is not shown in the drawing, would depend on the under part of the container or the usage of the closure.

In Figures 1-5 and 8a-d, the closures to be placed on solid or deformable containers are shown. In the closed condition of the closure, the under part (1) and the cap (2) are situated in direct contact with one another. The contact area lies in the so-called plane of separation, which is indicated in the drawing with a (T). The under part (1) and the cap or cover (2) are joined integrally with one another over at least a tie strap (3). Over the gates (4) are the tie straps (3) from the under part (1) or from the cap (2) slightly separated. The tie straps (3) run in a plane (E). The plane (E) intersects the closure parallel to its rotation axis (a). In the variation according to Figures 1 and 2, the under part (1) and the cap (2) are joined to each other over a film-hinge (5).

The swing axis of the film-hinge (5) lies on one side in the plane (T) of separation and on the other side parallel to level (E) in which the tie straps are situated.

In the closed position of the closure, the tie straps (3) are tensed, whereby a resultant force is present, which lies within the horizontal section of the closure of plane (E) and support a closing pressure between the under part (1) and cap (2). If the closure were to be used on a container with gas content, then the closing pressure should be as much as possible.

This is adjusted accordingly through the dimensioning and positioning of the closure. Therefore, the material and physical properties like elasticity and solidity must be taken into consideration. An optimal solution is often only empirically possible. The variable sizes are the breadth and width of the tie straps in dimensioning as well as the distance of the plane (E) in which the tie straps (3) are situated, to the rotation axis (a) of the closure.

In this text, nothing about possible bolt mechanism, which are combined with the closure according to invention, is carried out.

Naturally, the closure according to the invention can be combined with all sorts of familiar bolt mechanisms, eg. also with a child-safe bolt mechanism.

The closure according to the invention has been installed on every form of under part and cap according to suitability. Figures 3 and 4 show an under part (1) and a similar covering cap (2) with 12-angles horizontal section.

The tie straps (3) which are fastened again over the gates (4) at the cap (2) or rather at the under part (1), lie again on a plane (E) which intersect the closure. The hinge (5) should extend to the nearest lying parallel side of the surface area (6) of the plane (E).

In Figures 1-4, the plane (E) in which the tie straps (3) lie, extends parallel to a perpendicular of the plane (T) of separation which in this case is identical to the rotation axis. This is however, by no means imperative as the specifications show according to Figure 6. The tie straps (3) also extend here on the plane (E) which again intersect the closure; nevertheless, the plane (E) is inclined perpendicularly to the plane (T) of separation. In the given example, as shown in Figure 5, are the gates (4) too, contrary to the earlier described example, which are asymmetrically arranged to the plane (T) of separation. The effect of the slanting tie straps (3) are of 2 different types. For the first, the resulting pressure between the under part (1) and cap (2) increase in direction to the centre of the closure. For the second, this arrangement influences a slight change in the closing movements, whereby an arranged plug in the cap gains an exact feeding into an outlet which is too thick, through the central plug.

This would especially happen if the closure is hingelessly formed, and this will be described later with the help of Figures 8a-d.

Through the asymmetrical arrangement of the gates (4) at the under part (1) and at the cap (2), the position of the maximum stretching of the tie straps (3) can be correspondingly shifted. From the position of the maximum stretch (3), the cap fits in the direction of the close and open positions.

The desired opening position of the cap (2), which is released by the tie strap (3), can be achieved depending on the type of closure, the form of the outlet or the type of containers to be closed.

Figure 6 shows, a can which is equipped with an invented closure. The can together with the under part (1) and the cap (2) produce a rectangular ground shape. The under part (1) and the cap (2) are connected with one another over 3 tie straps (3) arranged on the same side of the surface. Instead of the 3 tie straps represented here, the closure can obviously be constructed with an individual tie strap which should somewhat be thicker than this. Also, the tie straps (3) are again arranged inclined to the vertical (v) on the plane (T) of separation. Moreover, the tie straps (3) lie in the niches (7), which are inclined to the length (8) of the can.

In Figure 7, a cut along the line A-A according to Figure 6 is shown. From the Figure 7a, the relations in the range of the niches (7) are explained in detail. The arrangement of the tie straps (3) in niches (7) can obviously be realised even in other forms of closure as those described in the aforementioned Figures. The arrangement of the tie straps (3) in niches (7) has an advantage in that no parts of the closure project above the contour of the under part of the cap respectively. This is especially of advantage if the closure is mounted mechanically onto a container and if the closure is not to be straightened out on a handle any more than the projecting parts.

In Figures 8a-d, a hingeless closure in different openings are shown. Again, this is a closure with a cylindrical under part (1) and same covering cap (2). The gates (4) for the tie straps (3)

again lie asymmetrical to the plane (T) of separation. Obviously, the plane (E) (in which the tie straps (3) lie) here again intersects the closure.

The special feature of the closure in question lies in the fact that it does not show any hinges, so that the cap (2) and under part (1) are connected with one another entirely over the tie straps (3). In the closed condition as shown in Figure 8A, the closing strength which is exerted from the tie straps (3), behave similarly as in the aforementioned variation. The closing tension lies inside the plane (E) and is presented by an arrow (E).

Figure 8b shows the same closure in an easily opened half position. The tie strap (3) are now somewhat more stretched and cause a somewhat increased resultant tension (F2). The resultant tension (F2) now runs in the plane of the tie straps as before which is however inclined correspondingly to the degree of the opening of the cap (2). Consequently, the resultant tension (F2) can close the cap (2) in the force component FS which is exerted and resolved on the cap (2) to the centre towards the rotation axis (a) in the force component FZ which is inclined. In this position, one sees already that the under part (1) comprises an added part (9), which is situated somewhat around the wall-thickness of the cap (2) concentric to the rotational axis (a) against the inside. The added part (9) runs conically to a mid-opening-spout (10).

In the condition as shown in Figure 8b, the imaginary axis of rotation is parallel to the plane (E) and runs exactly through the contact point of the cap (2) and the under part (1).

With increasingly opening angle of the cap (2), the force component (FS) decreases and correspondingly the force component (FZ) increases. This happens until the force component FZ overcomes the adhering friction between the under part (1) and the cap (2), after which the cap (2) abruptly collides against the added part (9).

Nevertheless, the cap (2) will be completely opened as shown in Figure 8c, and the tie strap (3) releases itself extensively, however, not completely, so that a small resulting strength remains in the cap (2) in the opened condition as shown in Figure 8e. Should the added part (9) shows only a small elevation as shown in Figure 8c, then the tie straps (3) could raise the cap (2) onto the added part (9) and thereby, a re-closing of the cap (2) is considerably made difficult. In this case a catch (1) which is in the position between the 2 gates (4) of the under part (1) to optimise the motion-run off during the opening and especially during the closing of the closure, the passage (12) is rounded off from the under part (1) to the added part (9).

Should the added part (9) is relatively low, as shown in Figure 8c, then the rounded passage (12) can run directly from the plane (T) of separation to the catch (11).

In Figure 8d, the closure is shown in the final sprayed condition in accordance with the invention. The plane (T) of separation is simultaneously the plane of separation of the sprayed form. The tie straps (3) are sprayed convexly, so that they show a longer length than the distance between the 2 corresponding gates (4), to which the sprayed form corresponds.

The hingeless construction is obviously not only possible at the rounded closures, but also principally at every configuration form of the above. In the construction as shown in Figures 6 and 7, one must then speak of a contact line instead of a contact point. Should the closure have, as in Figure 6, an evidently odd number of tie straps, one must provide for an even number of catches (11) in case the added part (9) shows a too low elevation. With a can, the added part (9) would correspond completely to the edge transferred to the inside.