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(54) **Stopper for vials.**

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DE - B - 1 946 566
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Stopper for vials

This invention relates to a stopper for vials, and more particularly to a stopper for sealing off a vial by a simplified procedure without necessitating the step of crimping an aluminum cap.

US—A—3 587 897 discloses a container closure comprising a cap of a cuplike form adapted to hold a stopper or liner in place in a container, said cap having a top including inner and outer portions. While the outer portion, i.e. a cover member may be made of a pliable material, such as plastic, the inner portion, i.e. the closure for holding the stopper in place has a generally cuplike form and is made out of sheet material such as aluminum.

DE—A—2 405 169 describes a dropping dispenser to be fixed to a bottle by the user of the bottle. This dropping dispenser comprises two elements, i.e. an inner dropping insert to be introduced into the bottle opening and an outer cup for sealing the opening of the dropping insert.

From DE—B—2 361 350 a stopper for vials is known as well, which comprises an aluminum outer cap for holding the stopper in place.

Such so-called "flip-off caps" of aluminum are widely used for vials containing pharmaceutical preparations, especially powders or the like for preparing injection solutions. Such caps are costly since they are made of aluminum and, moreover, have the drawback of requiring a cumbersome vial closing process because the aluminum cap must be fitted to the vial by crimping after the vial has been sealed with a rubber plug pressed against the flange of the vial.

According to the present invention these drawbacks are overcome by providing a stopper for sealing off vials without using any aluminum material and also without resorting to the cumbersome crimping step needed for aluminum caps.

Subject matter of this invention therefore is a stopper for a vial having a flange at its opening portion comprising a rubber plug having a top plate fittable to the flange in pressing contact therewith, an inner cap for receiving the rubber plug and having an upper wall formed with a hole in its center and an outer cap made of a flexible plastic fittable over the inner caps (as known from US—A—3587897), which is characterized in that the side wall of the inner cap comprises at least one projection on the inner peripheral surface thereof, the projection being fittable to the lower face of the flange with the top plate of the rubber plug held between the upper wall of the inner cap and the flange and at least one projection engageable with the top plate of the rubber plug on the inner surface of the inner cap side wall at its upper end; in that the outer cap has a side wall provided on its inner peripheral surface with a projection engageable with the outer peripheral

surface of the inner cap side wall; and in that the inner cap is made of a flexible plastic.

The subclaim covers a preferred embodiment of the stopper of the invention as defined above and in claim 1.

A vial stopper embodying this invention will be described below with reference to be accompanying drawings, in which:

Fig. 1 is a view in vertical section of an outer cap 1;

Fig. 2 is a bottom view of the same;

Fig. 3 is a view in vertical section of an inner cap 2;

Fig. 4 is a bottom view of the same;

Fig. 5 is a view in vertical section of a rubber plug 3;

Fig. 6 is a bottom view of the same;

Fig. 7 is a view in vertical section showing the stopper placed on the vial before the sealing step; and

Fig. 8 is a view in vertical section showing the stopper after the sealing step.

The stopper of this invention comprises an outer cap 1, an inner cap 2 and a rubber plug 3.

The outer cap 1 includes an upper wall 1a and a side wall 1b integral therewith and formed with a projection 4 on its inner peripheral surface. The projection 4 is engageable with the outer periphery of the side wall 2b of the inner cap 2 to hold the outer cap 1 thereon.

The inner cap 2 includes an upper wall 2a integral with the above-mentioned side wall 2b. The upper wall 2a is formed in its center with a hole 5 for permitting an injection needle to penetrate the rubber plug 3. Formed on the inner peripheral surface of the side wall 2b are two projections 6 which are fittable to the lower face of the flange 11a of a vial 11 with the top plate 3a of the rubber plug 3 positioned between the upper wall 2a and the flange 11a. Four projections 7 are provided on the inner surface of the side wall 2b at its upper end for engaging the top plate 3a of the rubber plug 3 to retain the plug 3 in the inner cap 2.

The rubber plug 3, which is a rubber stopper heretofore used for vials, comprises the above-mentioned top plate 3a serving as a packing, and two legs 3b. Each of the legs has on its outer surface a projection 8 engageable with the opening portion of the vial 11.

The outer cap 1 and the inner cap 2 are made of a flexible plastic, which is preferably polypropylene, polyethylene, polycarbonate or the like.

The projection 4 on the outer cap 1 and the projections 6 and 7 on the inner cap 2 are not limitative in their arrangement but can be provided as desired insofar as they are serviceable as contemplated.

For example, the projections 6 on the inner cap 2 may be in the form of a continuous pro-

jection extending over the entire inner periphery of the inner cap side wall 2b like the projection 4 on the outer cap 1, or may be in the form of dots resembling the projections 7 on the inner cap 2.

The stopper of this invention will be used in the following manner, for example, for a vial 11 for containing a freeze-dried preparation for injection.

The inner cap 2 is fitted in the outer cap 1 in engagement with the projection 4, with the rubber plug 3 engaged with the projections 7 on the inner cap 2. The stopper is then placed on the vial 11 containing an aqueous solution S of the preparation so that the projections 8 on the rubber plug 3 bear on the opening portion of the vial 11 as seen in Fig. 7. When the stopper is pressed against the vial after the solution S has been freeze-dried to powder P, the projections 6 on the inner cap 2 strike the upper edge of the flange 11a on the vial 11, thereby forcing the side wall 2b of the inner cap 2 radially outward at its lower portion, and thereafter come into fitting engagement with the lower face of the flange 11a, whereupon the inner cap side wall 2b restores itself. Thus the vial 11 containing the powder P is completely sealed off as shown in Fig. 8.

The vial stopper of this invention, for which no aluminum material is used, can be manufactured at a low cost. The stopper is easy to use since it seals off the vial completely when simply pressed on. Because the sealing step can be performed subsequent to freeze-drying within a freeze-drying chamber in a continuous operation, the stopper is very useful for providing pharmaceutical products free from foreign matter and having an extremely low water content and a high quality.

Claims

1. A stopper for a vial (11) having a flange (11a) at its opening portion comprising a rubber plug (3) having a top plate (3a) fittable to the flange (11a) in pressing contact therewith, an inner cap (2) for receiving the rubber plug (3) and having an upper wall (2a) formed with a hole (5) in its center and an outer cap (1) made of a flexible plastic fittable over the inner cap, characterized in that the side wall (2b) of the inner cap (2) comprises at least one projection (6) on the inner peripheral surface thereof, the projection (6) being fittable to the lower face of the flange (11a) with the top plate (3a) of the rubber plug (3) held between the upper wall (2a) of the inner cap (2) and the flange (11a) and at least one projection (7) engageable with the top plate (3a) of the rubber plug on the inner surface of the inner cap side wall (2b) at its upper end; in that the outer cap (1) has a side wall (1b) provided on its inner peripheral surface with a projection (4) engageable with the outer peripheral surface of the inner cap side wall (2b); and in that the inner cap (2) is made

of a flexible plastic.

2. The stopper as defined in claim 1, characterized in that the outer cap (1) and the inner cap (2) are made of polypropylene, polyethylene or polycarbonate.

Revendications

1. Bouchon pour un flacon (11) ayant un rebord (11a) à son orifice, comprenant un bouchon en caoutchouc (3) ayant une plaque supérieure (3a) s'ajustant au rebord (11a) en contact serré avec lui, un capuchon intérieur (2) destiné à recevoir ce bouchon en caoutchouc (3) et ayant une paroi supérieure (2a) pourvue d'un trou (5) au centre, et un capuchon extérieur (1) en matière plastique souple s'ajustant sur le capuchon intérieur, caractérisé en ce que la paroi latérale (2b) du capuchon intérieur (2) présente au moins une saillie (6) sur sa surface périphérique intérieure, cette saillie (6) s'ajustant à la face inférieure du rebord (11a), la plaque supérieure (3a) du bouchon en caoutchouc (3) étant retenue entre la paroi supérieure (2a) du capuchon intérieur (2) et le rebord (11a), et présente en outre sur sa surface intérieure, à son extrémité supérieure, au moins une saillie (7) pouvant venir en prise avec la plaque supérieure (3a) du bouchon en caoutchouc, en ce que le capuchon extérieur (1) a une paroi latérale (1b) pourvue sur sa surface périphérique intérieure d'une saillie (4) pouvant venir en prise la surface périphérique extérieure de la paroi latérale (2b) du capuchon intérieur, et en ce que le capuchon intérieur (2) est en matière plastique souple.

2. Bouchon selon la revendication 1, caractérisé en ce que le capuchon extérieur (1) et le capuchon intérieur (2) sont en polypropylène, polyéthylène ou polycarbonate.

Patentansprüche

1. Verschluß für eine Ampulle (11), die einen Flansch (11a) in ihrem Öffnungsbereich aufweist, mit einem Gummistopfen (3), der eine Kopfplatte (3a) besitzt, die in Druckkontakt an dem Flansch (11a) befestigt werden kann, einer inneren Kappe (2) zur Aufnahme des Gummistopfens (3), die eine obere Wand (2a) mit einem Loch (5) in der Mitte aufweist, und einer über die innere Kappe passenden äußeren Kappe (1) aus einem flexiblen Kunststoff, dadurch gekennzeichnet, daß die Seitenwand (2b) der inneren Kappe (2) auf ihrer inneren Umfangsoberfläche mindestens einen Vorsprung (6), welcher Vorsprung (6) an der Unterseite des Flansches (11a) befestigt werden kann, wobei die Kopfplatte (3a) des Gummistopfens (3) zwischen der oberen Wand (2a) der inneren Kappe (2) und dem Flansch (11a) festgehalten wird, und am oberen Ende der inneren Oberfläche der Seitenwand (2b) der inneren Kappe mindestens einen Vorsprung (7) aufweist, welcher in die Kopfplatte (3a) des

Gummistopfens eingreift; daß die äußere Kappe (1) eine Seitenwand (1b) aufweist, die an ihrer inneren Umfangsoberfläche mit einem Vorsprung (4) versehen ist, welcher in die äußere Umfangsoberfläche der Seitenwand (2b) der inneren Kappe eingreift; und daß die innere Kappe

(2) aus einem flexiblen Kunststoff besteht.

2. Verschuß nach Anspruch 1, dadurch gekennzeichnet, daß die äußere Kappe (1) und die innere Kappe (2) aus Polypropylen, Polyethylen oder Polycarbonat bestehen.

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FIG. 1

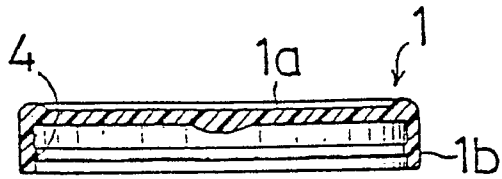


FIG. 2

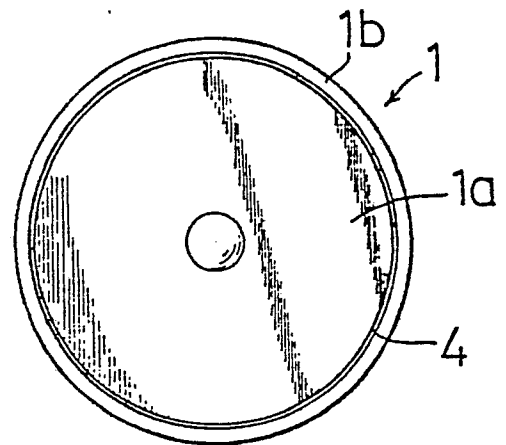


FIG. 3

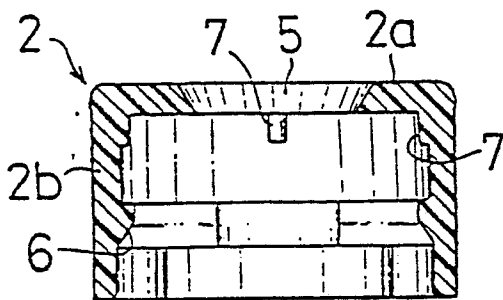


FIG. 4

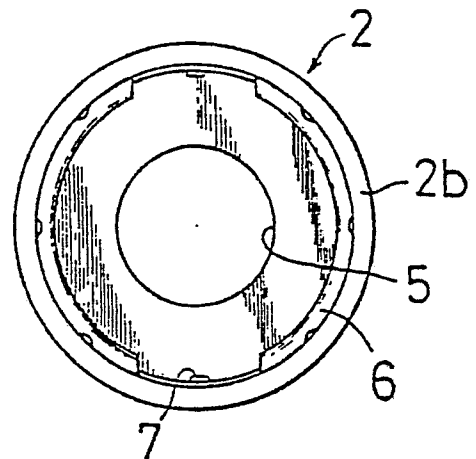


FIG. 5

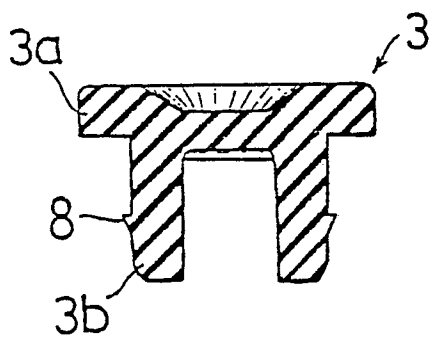


FIG. 6

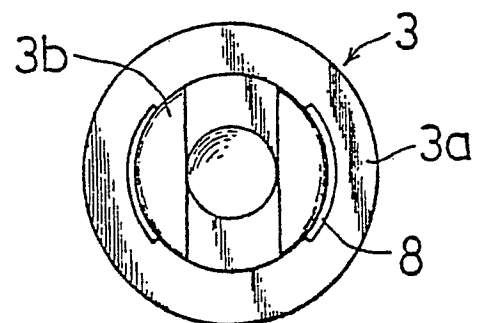


FIG. 7

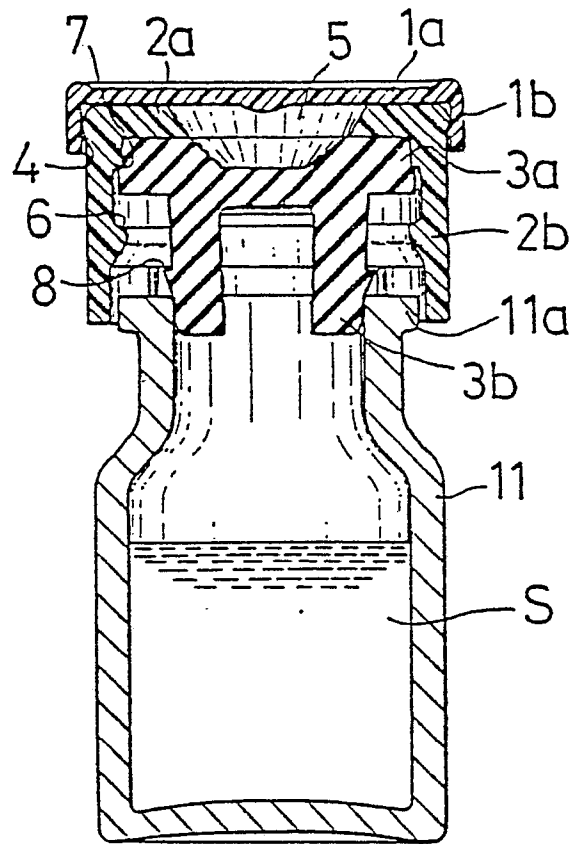


FIG. 8

