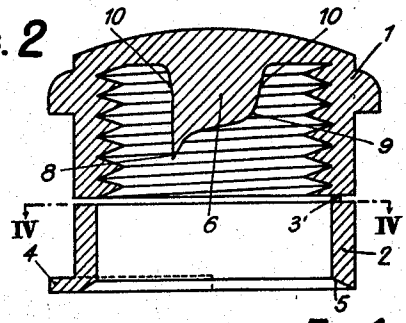
May 11, 1965 J. BEAUDOIN 3,182,858

PERFORATING STOPPER FOR COLLAPSIBLE TUBES

Filed July 30, 1963

FIG. 2



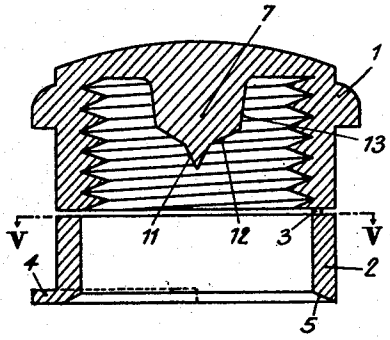


FIG. 3

FIG. 4

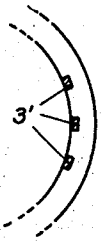


FIG. 1

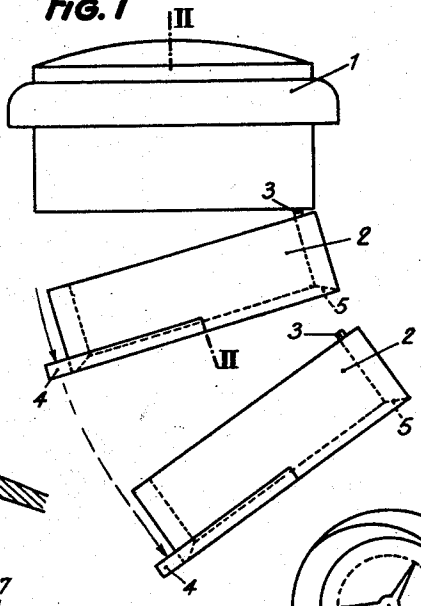


FIG. 5

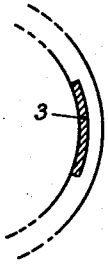


FIG. 6

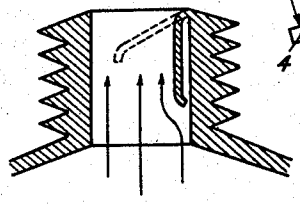


FIG. 8

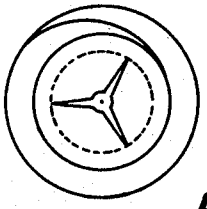


FIG. 7

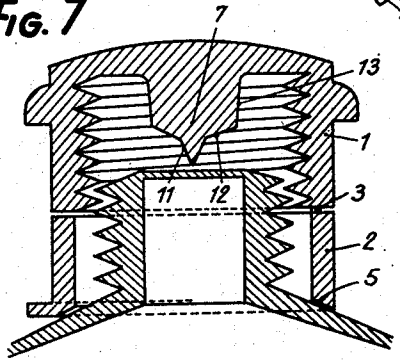
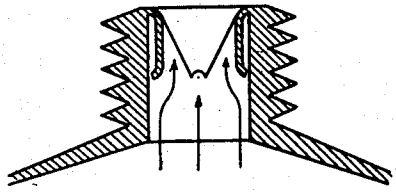


FIG. 9



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3,182,858

PERFORATING STOPPER FOR COLLAPSIBLE TUBES

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Claims priority, application France, July 30, 1962, 906,256, Patent 1,341,541
8 Claims. (Cl. 222—83)

Collapsible tubes made of tin, tin alloy or aluminum as they are commonly used for containing and delivering liquid, viscous or pasty products such as tooth pastes are generally fitted with a lid so as to be perfectly air tight while they are prepared for use, transported, stored in ware houses or sold in markets or shops. The lid is generally constituted by a thin metallic membrane which surrounds the threaded nozzle or neck of the tube, said membrane being obtained by an extrusion operation. Such a lid is perforated by the user of the tube shortly before he wants to use its contents.

Heretofore this type of collapsible tubes was fitted with a stopper made up of two separate elements, namely the perforating or punching cap and a spacer ring. This ring having a smooth inner surface had to be fitted first and then came into abutting contact with a shoulder provided on the tube body while leaving the root of the nozzle threaded portion uncovered, said portion being adapted to receive the cap by a screwing action. When the cap was being screwed, said cap came in turn into abutting relation with the upper portion of the spacer ring. Such a capping method, whether manually or mechanically performed, called for two operative steps which for mass production involved an unduly intricate method of manufacturing and a waste of time while increasing the cost.

It is the primary object of the invention to avoid these disadvantages by the provision on such collapsible tubes of a perforating or punching stopper of novel construction permitting them to be closed in one operative step.

Another object of the invention is to provide a new or improved perforating or punching stopper for the aforesaid type of collapsible tubes wherein the cap and the spacer ring to which it is blocked in position form a unitary part, interconnection of said elements being achieved by at least one connecting lug whereas separation of said elements, when the tube is about to be used, is effected by a mere outward rocking motion of the spacer ring, thereby liberating the cap for the perforating or punching operation.

A further object of the invention is to provide an improved stopper as aforesaid of more elaborate structure including several connecting lugs arranged as to form a short circumferential arc between the cap and spacer ring.

Yet another object of the invention is to provide an improved stopper as aforesaid wherein the connecting lug or lugs hold the cap and spacer ring at a small distance from each other and wherein, moreover, their lateral setting causes a rocking and wedging effect on the cap at the end of the tightening operation.

A further object of the invention is to provide an improved stopper as aforesaid in which the perforating or punching stopper can be shaped by a molding operation, for example by an injection molding process by the use of any suitable thermosetting or thermoplastic material advantageously by simultaneously molding by said process the cap and the spacer ring which is rigid with it.

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A still further object of the invention is to provide an improved stopper as aforesaid for collapsible tubes having such a structure as to be readily applicable to the tube, whereby during the handling step as the stopper is being initially fitted upon the lidded collapsible tube, said stopper only demands for proper fitting of its two constitutive elements one screwing on operation where it is applied by an automatic machine or one gesture of the operator if it is applied manually by him, thereby permitting a great saving in time and money.

Yet a further object of the invention is to provide an improved stopper for collapsible tubes as aforesaid having such a structure that when the user is desirous of unscrewing the punching stopper for perforating the tube lid, he only needs to perform one movement to move together its two constitutive elements.

With these and such other objects in view as will incidentally appear hereafter, the invention comprises the novel construction and combination of parts that will be now described with reference to the accompanying diagrammatic drawing exemplifying the same and forming a part of the present disclosure.

In the drawing:

FIGURE 1 is an elevational exploded view showing the several positions assumed by the spacer ring as it is taken off the tube cap.

FIGURE 2 is a sectional view on the line II—II of FIG. 1 showing the normal positions occupied by the cap and spacer ring.

FIGURE 3 is a sectional view also on the line II—II of FIG. 1 but with a constructional modification of the cap and the punching member therefor.

FIGURE 4 is a part sectional view on the line IV—IV in FIG. 2.

FIGURE 5 is a part sectional view on the line V—V of FIG. 3.

FIGURE 6 is a sectional view of the nozzle of a collapsible tube whose lid has been pierced by the punching member provided on the stopper shown in FIG. 2.

FIGURE 7 is a sectional view showing the punching stopper illustrated in FIG. 3 as it caps the collapsible tube.

FIGURE 8 is a top plan view of the nozzle of a collapsible tube whose lid has already been partly punched through starwise by the perforating stopper represented in FIG. 3.

FIGURE 9 is a sectional view of the tube nozzle illustrated in FIG. 8 but assuming its lid to be entirely punched by the perforating stopper visible in FIG. 3.

In the showing of FIGS. 1 to 3 inclusive, the punching stopper comprises a cap **1** and a spacer ring **2** extending from the base of said cap. These two elements are interconnected by lugs which may be constituted either by a single part **3** (FIGS. 3 and 5) or by several spaced parts **3'** (FIGS. 2 and 4). Such lugs are provided over a short circumferential arc.

Said elements are such that their sectional area (in the case of a single lug) or the total of their sectional areas (in the case of several lugs) permits the spacer ring **2** to be made from the mass of the cap **1**. Furthermore, the strength of the connection is such that it holds together these two elements **1**, **2** as they are stripped off the mold of an injection molding machine for plastics and during the manipulations and the screwing operation thereof upon nozzles of collapsible tubes. After the stopper has been unscrewed and removed, the punching cap and the spacer ring are easily separated from each other by a

mere exertion of finger pressure upon said ring (FIG. 1), producing a breakage of the connecting lugs 3 or 3'.

In order to facillitate separation of the spacer ring 2 from the cap 1, a flange 4 of semi-circular shape is provided at the base of the spacer ring 2 on that part which is diametrically opposed to the connecting lugs 3 and 3'. The height of the spacer ring 2 is such that when it rests by its lower surface upon the neck shoulder of the tube, it permits the screwthreaded portion of the cap to be engaged upon the tube nozzle.

The spacer ring 2 has a smooth inner surface and an inner diameter slightly larger than the diameter of the groove in the overlying screwthreaded portion of the cap 1. It has a guiding and centralizing action for ensuring proper engagement of the cap 1. To that effect, the spacer ring 2 has a chamfered portion 5 which matches the angle formed by the tube neck shoulder, thereby facilitating manual positioning of the entire punching stopper upon the tube while also avoiding, if an automatic setting machine is used, shortcomings due to such oblique settings as might involve an undue stoppage of the operation of the machine or alternatively destruction of the cap and spacer ring.

The lateral position of the connecting lugs 3 and 3' causes a rocking and wedging action of the cap 1 at the end of the screwing on operation, thereby preventing loosening during the handling and transport.

The punching element or perforator 6 which is integral with the cap 1 is so constructed that when the punching stopper is applied for the first time upon the tube, the sharp point of the perforator 6 only slightly touches the lid, thus providing a margin of safety since said lin cannot be accidentally punched out.

The cap 1 of the punching stopper as shown in FIG. 2 comprises a perforator 6 constituted by a knife 8 whose outer leading edge extends parallel to the rotational axis of the cap 1 while its inner cutting angle is hollowed in the shape of a circular arc which extends in tangency to the curvature of a heel portion 9 also in the shape of a circular arc having substantially the same geometrical radius. A sharp cone 10 whose generatrices respectively intersect the outer leading edge and extend tangentially to the curvature of the heel portion 9 constitutes the body of the perforator 6 which merges with the bottom of the cap 1 along a groove of small radius.

The punching stopper represented in FIG. 2 is utilized in the following manner: After the spacer ring 2 has been torn off as above stated and as shown in FIG. 1 and as soon as the cap 1 is screwed into position upon the tube neck, the knife 8 of the perforator 6 punches the lid owing to the pressure exerted upon it and as it is angularly moved, and imparts thereto a peripheral curvature as shown by dotted lines in FIG. 6.

The heel portion 9 of the perforator which is in the shape of a circular arc then progressively rocks down the lid as shown by full lines in FIG. 6 without producing any weakening angle or score i.e. without any risk of the lid being torn away or broken particularly if accidentally a cutting or stamping action takes place somehow. As screwing on of the punching cap 1 draws to its end, the generatrices which extend parallel to the rotational axis and then the slanting generatrices of the sharp cone 10 rock the line down and tightly apply it against the inner cylindrical surface of the tube nozzle right down to an intimate contact with its bent peripheral edge.

The product e.g. a cream or paste contained in the collapsible tube is then ejected as shown by the flow and compression depicting arrows visible in FIG. 6. It will be seen that there is no risk of the lid becoming partly bent outwardly or torn off, depending upon the degree of viscosity of the product contained in the tube, owing to the particular shape which has been imparted to the lid by the perforator 6.

A constructional modification of the perforator is shown in FIGS. 3 and 7. In this form the perforator is

designated by 7 and is made up of three cones, namely an acute angled cone 11, an obtuse angled cone 12 and a further acute angled cone 13. The cone 11 is centralized with respect to the rotational axis of the cap 1 and its slanting generatrices extending askew also impart to the lid a certain amount of curvature as soon as the latter has been punched for the first time (FIG. 8). Such a curvature is visible in the elements that are peened inwardly of the nozzle visible in FIG. 9.

As illustrated by the showing of FIG. 8, at the outset of the punching of the lid by the perforator 7, in proportion as the cap 1 rotates and is moved forward and as soon as the initial punching action has been centralized, the lid is progressively slitted to provide one, two and three vector radii responsive to the pushing stress and to the penertation of the generatrices of the obtuse angled cone 12 and is then folded down into three substantially similar circular sectors responsive to the action of the third acute angled cone 13 which constitutes the body of the perforator 7 and is connected to the bottom of the stopper by a groove of small radius.

The three sectors of the perforated and peened lid are forced due to the penetration of the acute angled cone 13 at the completion of the screwing on operaiton of the cap 1 into contact with the inner cylindrical part of the tube nozzle.

During use of the tube, the product contained in it (e.g. a paste or cream) is ejected as shown by the arrows (FIG. 9). It will be noticed that the lid elements run no risk of being outwardly peened or of being torn off no matter what viscosity said product has thanks to the curvature that has been imparted to the end of each element by the particular shape of the perforator 7.

The assembled parts have the relationship of FIG. 7. By examining said figure, it will be easily understood that the height of the ring 2 with respect to the entire punching stopper and particularly to the height of its perforator is the factor requiring proper calibration for each category of tube for which said cap is intended. Thus in particular the chamfered portion 5 provided at the root of the ring 2 for facilitating setting thereof upon the nozzle and providing a contact and adhesion surface with the tube body ensures on the one hand that the sharp point of the several constructions of perforators in FIGS. 2 and 3 will be flush with the lid at the time of the initial setting and on the other hand a proper grip of the punching cap with its ring upon the nozzle owing to proper clamping action resulting from the rocking and wedging action of the cap.

Minor constructional details may be varied without departing from the scope of the subjoined claims.

What is claimed is:

1. A stopper for containers, the stopper comprising an internally screw-threaded cap and a spacer ring, and connecting lug means integral with the cap and the ring on one side only of the cap and the ring and frangibly interconnecting the lug and the ring, the lug and the ring being normally spaced from each other on their side opposite said lug means, whereby the cap can be screwed down on said container until the spacer ring contacts a stationary portion of the container, whereupon said lug means will cant the cap relative to the spacer ring thereby to lock the cap on the container with a wedging action.

2. A stopper as claimed in claim 1, in which said lug means comprises at least two lugs spaced apart over a short circumferential arc between the cap and the spacer ring.

3. A stopper as claimed in claim 1, in which said lug means is a single element curved about a short circumferential arc.

4. A stopper as claimed in claim 1, and a punch within the cap for perforating a container lid upon separation of the cap and the spacer ring by breaking said lug means.

5. A punching stopper for containers having a perforatable lid, the stopper comprising an internally screw-

threaded cap and a central punch having a free end portion the side walls of which form a relatively small angle with the axis of the cap, an intermediate portion the side walls of which form relatively large angles with the axis of the cap, and a base portion the side walls of which form relatively small angles with the axis of the cap.

6. A punching stopper as claimed in claim 5, in which said end portion is laterally offset from the axis of the cap.

7. A punching stopper as claimed in claim 5, in which said end portion lies on the axis of the cap.

8. A punching stopper as claimed in claim 7, in which the surface of said punch is a figure of revolution about said axis.

References Cited by the Examiner

UNITED STATES PATENTS

2,771,218	11/56	Henderson	222—83
2,961,132	11/60	Ankney	222—541
3,081,002	3/63	Tauschinski et al.	222—541
3,109,562	11/63	Ferris	222—81

FOREIGN PATENTS

1,136,793	5/57	France.

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