The invention relates to a closure structure for a pliable container such as a squeezeable tube containing a substance of liquid or pasty consistency, for instance, toothpaste, cosmetics, food, such as mustard, cleaning substances, etc.

More particularly, the invention relates to a self-closing closure structure of the kind in which a closure cap normally closes the container by engagement with a closure member disposed coaxially with the cap and the cap is slidable into a dispensing position in reference to the closure member by pressure exerted upon the container.

Self-closing closure structures of the general kind above referred to as heretofore known, have been found not to be satisfactory. The substance within the tube tends to ooze out of the closure structure not only at the dispensing opening thereof but also between component parts of the closure structure.

It is the broad object of the present invention to provide a novel and improved closure structure of the kind above referred to which effectively prevents such oozing out of the closure structure.

The aforementioned object, features and advantage of the invention and other objects, features and advantages which will be pointed out hereinafter are attained by providing a closure structure comprising a closure cap having an inner conically formed surface which is in sealing engagement with a closure member in any position of the cap and the closure member relative to each other, that is, in both the closure position and the open position of the cap and also in any intermediate position.

It has been found advantageous to form the closure member coacting with the cap with a terminal sealing portion of frusto-conical configuration. This terminal portion has a certain inherent flexibility due to its slim cross section and as a result it will a but against a conical surface portion of the closure cap with a certain pressure resulting in a reliable seal between the cap and the closure member in any position of the two members relative to each other.

The closure member is preferably enlarged at its end opposite to that terminating in the sealing portion so that the container body proper may be tightly secured to the enlarged part of the closure member.

To strengthen further the a foregoing described sealing action, the inner conical surface of the closure cap and the sealing portion of the closure member meet each other preferably at an acute angle.

In the accompanying drawing, a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a sectional view of a self-closing structure according to the invention in the closed position thereof.

FIG. 2 is a sectional view similar to FIG. 1, but showing the closure structure in its open position, and

FIG. 3 is a sectional view of a closure member of the closure structure.

Referring now to the figures in detail, the exemplified closure structure comprises a generally tubular outer closure member generally designated by 1. The closure member is made of an inherently slightly elastic material, preferably a plastic such as polyethylene. As can best be seen in FIG. 3, closure member comprises an enlarged cylindrical socket or base portion 2 in an cylindrical portion 4 of reduced diameter. Portion 4 terminates in a slender frusto-conical part 10 which constitutes part of sealing means as will be more fully described hereinafter. A central inner closure member 8 is fixedly mounted within the interior of member 1. The closure member 8 is coaxial with closure member 1 and has a slanted flat rim 9. The angles defined by rim 9 and sealing portion 10 are indicated in FIG. 3.

Closure member 1 is fixedly secured with its enlarged portion 2 in an opening of a container 3 which may be visualized as a tube. The tube and closure member may be secured to each other by any suitable means such as a tapered surface. The container is continued beyond part 2 and terminates in an inwardly turned flange 3.

The closure structure further comprises a closure cap 5 having in its base a discharge opening 59. The cap is also preferably made of a plastic such as polystyrene. It is slidably received on portion 4 of closure member 1 and terminates in outwardly turned flange. A loaded spring 11 is fitted between the flanges of cap 5 and tube 3 respectively, to urge the cap into the position of FIG. 1, that is, the closed position of the closure structure.

The inner wall portion of cap 5 adjacent to closure member 8 is conically formed at 6 and coacts with closure member 8 and more specifically with the slanted rim 9 thereof, either to close the discharge opening 59 by abutting against rim 9 or to uncover an annular passage 7 for dispensing a desired quantity of the content 17 in tube 3 through closure member 1 and the cap opening 59.

To effect a tight seal between closure member 1 and cap 5 in any position of the latter, the frusto-conical sealing portion 10 abuts against the conical inner surface 6 of cap 5 with sliding pressure engagement. Due to the aforementioned inherent elasticity of portion 10 combined with the action of spring 11 the rim 16 of sealing portion 10 constituting an elastically flexible tongue and will be continuously pressed against the cap surface.

Spring 11 also serves to return cap 5 into the closure position after the cap has been forced into open position by the pressure exerted upon the cap by the hand in response to pressure exerted upon the container.

The closure structure as heretofore described, functions as follows:

In order to open the closure structure, tube 3 is squeezed and as a result cap 5 will be forced away from its engagement with closure member 8. The content of the tube is now dispensed through the annular passage 7 and opening 59. After the desired quantity has oozed out from the cap and the pressure upon the tube is relaxed, spring 11 will return the cap from the position of FIG. 2 into the position of FIG. 1. During the cap movement into either direction, edge 16 of portion 10 remains in engagement with the wall of cap 5 as previously explained. As a result, the tube content cannot penetrate into gap 13 and from that gap into space 14 and out of the tube at a point other than the desired discharge opening.

The effective sealing action obtained by the closure structure of the invention does not increase in any way the force necessary to open the closure structure for dispensing part of the tube content. On the contrary, the pressure of sealing edge 16 against the cap surface 6 assists the opening of the cap and thus reduces the required opening force.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is
intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A closure structure for dispensing the content of a pliable container, comprising an outer tubular closure member, said closure member being adapted to be tightly secured at one end in an opening of the container for dispensing the container content through said closure member, a central inner closure member secured within the outer closure member coaxially therewith and protruding from the other end thereof to define an annular discharge passage between the inner and the outer closure member, a closure cap slidably fitted over said outer closure member and said central inner closure member coaxially therewith, said closure cap being axially displaceable in reference to the outer and inner closure members between a closed position closing said passage and an open position uncovering said passage, the other end of the outer closure member terminating in an elastically flexible tongue slidably engaging an inner wall portion of said closure cap, said tongue being biased into continuous sealing engagement with said wall portion in any position of axial displacement of the closure cap in reference to said inner and outer closure members, and spring means coacting with said closure cap to bias the same into the said passage closing position.

2. A closure structure according to claim 1 wherein said inner wall portion of the cap has a conical cross sectional configuration, said tongue being biased against said conical wall portion.

3. A closure structure according to claim 1 wherein said inner wall portion of the cap and the outer wall of said tongue of the outer closure member define different angles in reference to the common center axis of the cap and the closure members.

4. A closure structure according to claim 1 wherein the outer wall of said outer closure member is generally cylindrical, part of the cylindrical wall being reduced in diameter, the wide cylindrical part being adapted to be secured to said container and the narrow cylindrical part receiving said cap upon its outside wall and terminating in said tongue.

References Cited in the file of this patent

UNITED STATES PATENTS

1,877,882 Jones --------------- Sept. 21, 1932
1,911,616 Gruber ----------------- May 30, 1933
1,928,895 Jensen ----------------- Oct. 3, 1933
1,971,371 Donnelly-------------- Aug. 28, 1934
1,975,878 Thompson------------- Oct. 9, 1934

FOREIGN PATENTS

461,833 Italy ----------------- Feb. 15, 1951