CLOSURE FOR COLLAPSIBLE TUBES

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My invention relates to collapsible tubes, such as the tubes used to contain and dispense toothpaste, shaving cream, and various plastic and semi-liquid substances, and to means for closing or sealing such tubes. An object of my invention is to provide a collapsible tube with closure or cap which, when it is attached to the tube, can be readily manipulated so as to permit egress of the tube contents and also readily manipulated further to seal the tube and prevent egress of such contents when no longer desired, such manipulation being done without the necessity of removing the cap from the tube, and thus avoiding the annoyance occasioned by the dropping or losing of the cap.

Another and very important object of my invention is to provide a dispensing and sealing cap for collapsible tubes which may be so constructed as to permit every particle of the material delivered from the tube to be easily removed from all exposed surfaces of the cap, thereby providing a cap which is highly sanitary, and a cap on which dried particles of the material delivered from the tube will be prevented from collecting, and in which there will be no clogging of the cap outlet by such collection of dried material.

Another object of my invention is to provide such a closure or cap which, in one form, can be readily attached to any standard collapsible tube container, and, when desired, removed from one tube to another.

A further object is to provide a cap on a collapsible tube which will enable the tube user always to be assured of the complete opening or closing of the cap, even when the tube is used in the dark.

A still further object of my invention is to provide a cap meeting the requirements above set forth which will be simple of construction and inexpensive in manufacture. The manner in which the above and incidental objects are attained will be apparent from the following description in reference to the attached drawing, in which:

Fig. 1 is an elevation showing my invention applied to collapsible tube of standard make;

Fig. 2 is a top plan view of the cap of Fig. 1 illustrating the cap in a half open position;

Fig. 3 is a vertical medial sectional view of the cap and upper portion of the tube taken on the line 3-3 of Fig. 4 and drawn on a larger scale than Figs. 1 and 2;

Fig. 4 is a top plan view of the cap and tube drawn on the same scale as Fig. 3 showing the cap completely closed; Fig. 5 is a top plan view of the inner of the two members of which the cap in Figs. 1 to 4 is comprised, drawn on the same scale as Figs. 3 and 4;

Fig. 6 is a corresponding side elevation of the member shown in Fig. 5;

Fig. 7 is a view in perspective of my cap illustrating an optional manner in which the outer 10 perimeter may be formed.

Referring first to Fig. 3, my cap, in one embodiment of my invention, comprises two cylindrical members, one within the other, namely the inner member 7 and outer member 15. The inner member 7, which is shown also in Figs. 5 and 6, is a hollow cylinder with the lower portion of the inside surface of the cylindrical wall 10 threaded as at 10a (Fig. 3), the interior diameter of the cylindrical wall 10 and the threads 10a being of proper size to enable the inner member 7 to be screwed onto the ordinary neck of a collapsible tube 20 of standard make. The inner member 7 is made with a flat top outer surface 9 and smooth annular outer side surface 8. The top and side surfaces serve as bearing surfaces for the outer member 15. The screw threads 10a terminate in an annular shoulder 11 which bears against the top of the threaded neck of the collapsible tube 20 when my cap is in position on the tube. An aperture 12 is made in the top of the inner member 7, this aperture being preferably segmental in shape, as shown in Fig. 5, and the aperture is placed entirely to one side of the center of the circular top surface 9. A groove 13 is provided in the outer cylindrical wall surface 8 of the inner member 7 and extends around such outer wall surface parallel to the top and slightly below the top, the said groove 13 extending slightly more than half the distance around the cylindrical outside wall.

The interior surfaces of the outer member 15 are made so as to permit the said outer member to fit closely over the inner member 7 but to be freely rotatable on the inner member. The top of the outer member 15 is provided with an aperture 17 conforming exactly in size and location with the aperture 12 of the inner member 7, so that when the outer member 15 is rotated with respect to inner member 7, the two apertures 17 and 12 can be brought into exact registration. Since both the apertures are located entirely on one side of the common center or axis of said outer and inner members, it is possible also, by rotating the outer member with respect to the inner mem-
ber, to have the apertures brought to exactly opposite positions on either side of the center axis so that these two apertures do not overlap each other in any part. Such position is illustrated by Fig. 4 and represents the cap when closed. Fig. 2 shows the cap in half opened position.

The two apertures 11 and 12 may be of any shape, but I have found the segmental shape, as illustrated in the drawing, to be preferable inasmuch as it affords a maximum sized outlet opening.

The entire periphery of the aperture 11 of the outer member is beveled outwardly as shown in Figs. 3 and 4, forming the sloping edges 18 and 19.

The beveling of these edges is an important feature, for while my cap will work satisfactorily if the edges of the aperture 17 are not beveled, the beveling aids in the removal of any residue of the material from within the tube which may cling to the top of the aperture 17 when the cap is closed. It will be apparent that, with the cap in the closed position shown in Fig. 4, the edges of the aperture 17 and the exposed portion of the top surface of inner member 7 within the aperture 17 can be readily cleaned by wiping the top of the cap with a brush or by bringing the top of the cap into contact with running water from a faucet.

When the outer member 15 is put in place over the inner member 7, in the assemble of my cap, a detent or restraining element such as a pin 14 is inserted tightly in a hole provided thru the cylindrical wall of the outer member (see Fig. 3), in registration with the groove 13 on the outer surface of the inner member 7. The pin 14 is set so that its inner end projects into and fits loosely in the groove 13, the diameter of the inner end of pin 14 being slightly less than the width of the groove 13. The co-acting pin 14 and groove 13 thus prevent separation of the inner and outer members 7 and 15 of the cap, but permit the outer member to be rotated thru an arc of 180° with respect to the inner member, the groove 13 extending slightly more than half way around the outside of the cylindrical wall of the inner member 7, as already explained. Further rotation of the outer member beyond the 180° turn permitted by the pin 14 and groove 13 will, by causing the rotation of the inner member, serve either to screw the cap onto the threaded neck of the collapsible tube or unscrew the cap from said neck, depending upon the direction of rotation. When the cap is screwed onto the neck of the tube, the top edge of the tube neck is forced firmly against the shoulder 11 at the top of the threads 10a, thus causing the inner member 7 to sit firmly on the tube neck and to offer a slight resistance to any unscrewing therefrom.

Attaching this cap to a collapsible tube of standard size is a very simple operation, and when the contents of the tube have been used up, the cap is easily removed and attached to a fresh tube. It is my intention to make the cap in stock sizes to fit on tubes of various standardized makes and sizes. The cap may be made of any suitable metal or of cheaper material such as bakelite, etc. When my cap has been attached to a tube and the substance in the tube is to be dispensed thru the cap, the outer member 15 is turned until aperture 17 moves into registration with aperture 12. Then when it is desired to close the tube, the outer member 15 is given a half turn in the reverse direction, the edges 18 and 19 of the apertures 17 cut off the passage of the substance from the tube. The aperture 17 is then completely closed, and any surplus deposit of the substance which may cling to the sides of the aperture is easily removed, as already explained, thus providing a complete and absolutely clean closure for the tube.

The rotation of the outer member on the inner member in the opening and closing of the cap has no effect on the position of the inner member because the pin 14 travels freely on the groove 13 and because the inner member is firmly screwed onto the neck of the tube as previously mentioned. The user of the tube with this cap as described can tell, merely by attempting to turn the cap, when it is completely open and when it is completely closed, and thus could use the tube conveniently even in the dark. A countersunk screw may be substituted for the pin 14.

For convenience in facilitating the turning of outer member 15, the perimeter 21 of said outer member may be made in the shape of a polygon with flat sides, such as the hexagonal shape in Figs. 1, 2, 3 and 4, or the perimeter may be knurled or grooved in any way to provide a suitable finger grip, a modified form being illustrated at 22 in Fig. 7. It is not my intention to limit the external shape and design of my cap to any particular form, since obviously many variations in form and design may be made without departing from the principle of my invention.

I claim:

A cap for collapsible tubes and the like having an externally threaded discharge neck, said cap comprising a cup-shaped inner member having an internally threaded cylindrical wall, whereby said inner member may be screwed on said neck, an aperture in the top of said inner member lying entirely to one side of the axis of said wall, a groove on the outer surface of said cylindrical wall perpendicular to its axis and extending part way around said surface, an outer cup-shaped member fitting over said inner member and rotatable thereon, an aperture in the top of said outer member lying entirely to one side of the axis of rotation of said outer member corresponding in size to the aperture in said inner member and adapted to be registrable therewith, a pin extending thru said outer member and engaging said groove of said inner member, whereby to hold said outer member on said inner member and permit limited rotation thereon, said openings in said outer and inner member being so arranged with respect to said pin and said groove that rotation of the outer member to its limit in one direction on said inner member will cause said openings to be in registration with each other while rotation to the limit in the opposite direction will cause said openings to be entirely out of registration with each other.

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