This invention relates to a dispensing cap which is particularly designed to be used in conjunction or integral with a collapsible toothpaste or shaving cream tube or with tubes holding any fluid or semifluid material.

Heretofore collapsible soft metal tubes, such as toothpaste tubes, utilized threaded caps which were removed when usage of the contents of the tubes was required. Due to the customarily repeated usage of the tubes, the threads became worn allowing air passageways into the tube and the hardening of the tube contents. Moreover, the caps, as utilized in the prior art, provide a greater supply of material than is required, or can be used, since the flow of the tube contents cannot be controlled or rapidly shut off. Conventional caps are also frequently lost or misplaced, allowing the tube contents to harden.

The present invention overcomes these difficulties and accomplishes the following objects by providing, in the specific embodiments incorporated herein, for a cap that may be integral with or threaded upon the neck of a collapsible tube. The cap is resiliently movable when pressure is exerted upon the sides of the collapsible tube to present an aperture through the cap to the interior of the tube. Removing the pressure from the sides of the tube allows the resilient member to restore the positioning of the cap and shut off the aperture.

It is therefore an object of the present invention to provide for a novel collapsible tube having a self-sealing cap integrally therewith.

Another object of the present invention is the provision of a novel, sturdy and durable collapsible container and cap which is relatively simple and inexpensive to manufacture, assemble and utilize.

Still another object of the present invention is the provision of a novel collapsible container having a dispensing aperture which is automatically covered when the container is not in use.

Still another object of the present invention is the provision of a novel cap for collapsible containers which does not have to be removed to extract the tube contents.

Still another object of the present invention is to provide in a collapsible tube, a self-sealing dispensing cap having an outer tubular member closed at the top and open at the bottom adapted to movably receive the neck of the tube, an inner tubular member slidably movable within said outer member, resilient means normally urging said inner member towards the body of said tube, and a dispensing aperture in the inner member which is registrable with the neck opening of the tube when pressure is applied to the sides of the tube.

Still another object of the present invention is the provision of a self-sealing collapsible tube operable by squeezing the sides of the tube in the conventional manner.

Still another object of the present invention is to provide in a collapsible tube, a self-sealing dispensing cap closed at the top and open at the bottom adapted to be movably received in the neck of the tube and having a dispensing aperture and a resiliently positioned blocking member normally urged to its blocking position adjacent the aperture, and resilient means normally urging the cap towards the body of the tube.

Still another object of the present invention is the provision of a novel collapsible tube having a dispensing cap which is movable in the neck of the tube and normally urged by the sloped sides of the neck of the tube towards the body of the tube. The cap has a normally sealed dispensing aperture and a valve controlled by the pressure on the sides of the tube.

Still another object of the present invention is the provision of a novel collapsible tube having a rotatable cap normally covering a dispensing aperture in the neck of the tube, and resilient means urging the cap to cover the aperture.

Further objects and advantages will become apparent to those skilled in the art upon consideration of the following description taken in conjunction with the drawings wherein:

Fig. 1 is the top view of the novel collapsible container of the present invention;

Fig. 2 is a side view of the novel collapsible container of the present invention;

Fig. 3 is a partial sectional view taken along line 3—3 in Fig. 2;

Fig. 4 is the top view of a modification of the novel collapsible container of the present invention;

Fig. 5 is a side view of the modification of the novel collapsible container of the present invention;

Fig. 6 is a partial sectional view taken along line 6—6 in Fig. 5;

Fig. 7 is the top view of a second modification of the novel collapsible container of the present invention;

Fig. 8 is a side view of the second modification of the novel collapsible container of the present invention;

Fig. 9 is a partial sectional view taken along line 9—9 in Fig. 8;

Fig. 10 is the top view of a third modification of the novel collapsible container of the present invention;

Fig. 11 is a side view of the third modification of the novel collapsible container of the present invention;

Fig. 12 is a partial sectional view taken along line 12—12 in Fig. 11;

Fig. 13 is a top view of a fourth modification of the novel collapsible container of the present invention;

Fig. 14 is a side view of the fourth modification of the novel collapsible container of the present invention;

Fig. 15 is a partial sectional view taken along line 15—15 in Fig. 13; and

Fig. 16 is a partial sectional view taken along line 16—16 in Fig. 15.

Referring to Figs. 1 through 3, wherein is shown the first exemplary embodiment of the novel collapsible or flexible walled tube of the present invention, the tube is indicated generally at 20. The tube 20 is a thin walled flexible container for retaining such fluids as tooth paste, shaving cream, salve and the like. The tube 20 has a neck 21 which is threaded at 22 near the junction of the neck 21 and the remainder of the tube 20. The neck 21 supports a cap 23 which, in the closed position shown in Fig. 3, rests against either the top 24 of the neck 21, or against the threaded portion 22, or against both. The cap 23 is axially movable, or sidable, upon the neck 21 when pressure is applied to the walls of the tube 20. The cap 23 has a dispensing aperture 28 which is shut off from the contents in tube 20 by the neck 21 when pressure is not applied to the tube 20. The cap 23 is retained in its closed or sealing position, in the absence of applied pressure, by the resilient member, or coiled spring 26. A gasket seal 27 separates the
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When pressure is applied to the thin walls of tube 26 the contents thereof exert pressure against the top of the cap 23. When the exerted pressure is greater than the restoring force of spring 26 the cap 23 is forced up compressing the spring 26. As long as the dispensing aperture 28 is blocked by the neck 21 of tube 20, the tube contents cannot exit therethrough. When, however, the aperture 28 clears the top of the neck 21 of the cylindrical, or the base of the cap 23 and the spring 26 so that the tube contents do not squeeze past the base of the cap 23. The spring 26 and seal 27 are restrained in position by the retainer 25 which is threaded upon the threaded portion 22 described above.

When pressure is applied to the thin walls of tube 26 the contents thereof exert pressure against the top of the cap 23. When the exerted pressure is greater than the restoring force of spring 26 the cap 23 is forced up compressing the spring 26. As long as the dispensing aperture 28 is blocked by the neck 21 of tube 20, the tube contents cannot exit therethrough. When, however, the aperture 28 clears the top of the neck 21 of the cylindrical, or the base of the cap 23 and the spring 26 so that the tube contents do not squeeze past the base of the cap 23. The spring 26 and seal 27 are restrained in position by the retainer 25 which is threaded upon the threaded portion 22 described above.

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In the exemplary embodiment of the present invention, shown in Figs. 7 through 9, the tube 59 includes the neck or head 51 which is integral therewith. The head 51 supports the single valve or cap 52. There are no other components utilized in the specific embodiment shown in Figs. 7 through 9. The valve 52 is a formed or molded resilient rubber composition or similar material and comprises the restraining tip or rounded retainer top or ring 83, When the tube 59 is assembled, the valve 52 is inserted from below before the bottom of tube 59 is filled and sealed. The ring 53 is depressed into the depression 54 when it is pressed against the retaining ledge 55. The ring 53 snaps into place or to its original shape when the assembly is upon the shape of aperture 28, of the tube contents, is emitted. Reloading the pressure exerted upon the walls of tube 20 allows the restoring spring 26 to return the cap 23 to its lower or sealing position, shutting off the dispenser aperture 28. The arrow 29 on the top of the cap 23 as shown in Fig. 1 is molded, stamped, printed or otherwise impressed, to indicate the position of the dispensing aperture 28.

The length of the neck 21 and cap 23 may be decreased or the aperture 28 located closer to the top of cap 23 to decrease the time, after pressure is applied, before the contents can be forced out. Locating the aperture 28 adjacent the top 24 of the neck 21 allows the contents to be squeezed out almost immediately upon applying pressure to the walls of tube 20. The aperture 28 is located as shown in Fig. 3 to permit easy access thereto with a toothbrush and to maintain the aperture 28 clean. The cap assembly can be readily modified to be removable and threads provided to take the place of conventional caps on conventional tubes.

Referring now to Figs. 4 through 6, the tube 30 is shown, which is designed to minimize the accumulation of paste on the outside thereof. The main part of tube 30 is integral with the head or neck 31. The top of neck 31 has a retaining lip 39 which mates with the top of the slidable cap 33. The cap 33 includes the abutment 34 which has an outer circumference which slidably mates with the inner circumference of the head 31. The cap 33 supports a coiled spring 38 and slidable aperture block 37 which are retained in position by the retreating bulge 36. The cap 33 also supports the coiled spring 38 and gasket seal 40 upon the abutment 34. In its normal condition an aperture 34 in cap 33 is blocked by the internal aperture block 37. The block 37 may be constructed of metal, plastic, rubber or the like. When pressure is applied to the thin walls of tube 30 the pressure is transmitted to the abutment 34 of cap 33 and to the aperture block 37. The restoring force of spring 38 is slightly greater than that of spring 32 so that the applied pressure first causes the compression of spring 32. The cap 33 is in this manner moved up until the aperture 43 clears the top of the head 31 of tube 30. Further pressure compresses spring 38 and moves the slidable block 37 to clear the aperture 43 and allow the tube contents to be squeezed out. The aperture 43 can be larger and can be located in a position closer to the lip 39 of head 31 to decrease the time before the ejection of the tube contents. The aperture 43 is located as shown in Fig. 6 for easy access thereto with a toothbrush and maintain it covered when the tube 30 is not in use.

When the applied pressure relaxes or is removed, the block 37 is restored to its normal or blocking position and the cap 33 is returned into head 31. The bulge 36 restrains the block 37 in normal position. The gasket seal 40 prevents the tube contents from squeezing between the cap 33 and head 31 to the spring 32. Paste accumulation is minimized on the top of cap 33 and on retaining lip 39. The arrow 42 on top of the cap 33 indicates the aperture position. The embodiments shown in Figs. 4 through 6 may be provided as a separate unit and attached to the conventional threaded collapsible tubes.

In the exemplary embodiment of the present invention, shown in Figs. 7 through 9, the tube 59 includes the neck or head 51 which is integral therewith. The head 51 supports the single valve or cap 52. There are no other components utilized in the specific embodiment shown in Figs. 7 through 9. The valve 52 is a formed or molded resilient rubber composition or similar material and comprises the restraining tip or rounded retainer top or ring 83, When the tube 59 is assembled, the valve 52 is inserted from below before the bottom of tube 59 is filled and sealed. The ring 53 is depressed into the depression 54 when it is pressed against the retaining ledge 55. The ring 53 snaps into place or to its original shape when the assembly is upon the shape of aperture 28, of the tube contents, is emitted. Reloading the pressure exerted upon the walls of tube 20 allows the restoring spring 26 to return the cap 23 to its lower or sealing position, shutting off the dispenser aperture 28. The arrow 29 on the top of the cap 23 as shown in Fig. 1 is molded, stamped, printed or otherwise impressed, to indicate the position of the dispensing aperture 28.

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is inserted in neck 91 the spring 93 snaps into position as shown in Figs. 13 through 15. When pressure is applied to the sides of tube 90 it is transmitted by the tube contents against the rubber, or similar material, seal 97. The seal 97 is affixed to the cap 92 as shown in Fig. 16. The application of pressure against seal 97 deforms the spring 93 near its junction with cap 92 and causes the cap 92 to rotate in a counter-clockwise manner. The rotation of cap 92 opens the aperture 98 so that when the bottom of seal 97 passes alignment therewith the tube contents are emitted. The counter-clockwise rotation of cap 92 is limited by a stop 96 which is integral with the neck 91. The cap assembly may be provided with threads as well as the lower part of neck 91 so that the cap assembly can be substituted for the conventional cap on the conventional tube.

Various other modifications may be provided without departing from the spirit of the invention. The above-described arrangements are therefore only illustrative of the application of the principles of the invention.

What is claimed is:

1. A self-sealing collapsible tube comprising flexible walls; a neck integral with said walls; a cap slidably supported within said neck having a dispensing aperture, a dispensing block normally sealing said dispensing aperture and resilient means urging said dispensing block to its sealing position; and resilient means supported between said cap and said neck for urging said cap toward said flexible walls, said first-mentioned resilient means having a spring constant which is greater than the spring constant of said second-mentioned resilient means.

2. A self-sealing collapsible tube in accordance with claim 1 wherein said cap has retaining bulges for supporting said block and said neck has retaining bulges for supporting said cap.

3. A self-sealing collapsible tube in accordance with claim 2 wherein the top of said cap is flush with the top of said neck and said first and second-mentioned resilient means are coil springs.

4. A self-sealing collapsible tube consisting of the tube proper and a one-piece resilient valve member supported in said tube proper, said valve member comprising a retaining tip engaging the top of said tube proper, a dispensing aperture, a blocking member normally sealing said aperture, a base at the lower end of said valve member engaging said tube proper, and a thin wall section connecting said blocking member and said base, said thin wall section being resiliently deformed upon the application of pressure to said tube proper before said blocking member is deformed to unseal said aperture.

5. A self-sealing collapsible tube in accordance with claim 4 wherein said valve member comprises in addition a stop for limiting the upward movement of said aperture and said blocking member upon the application of pressure to said tube proper.

6. A self-sealing collapsible tube comprising a sloped wall neck; a cap supported by said neck having resilient legs engaging said neck, and a dispensing aperture normally blocked on one side by said neck; and a washer valve supported in said cap normally blocking the other side of said aperture, the application of pressure to said tube raising said cap due to the action of said neck on said legs to unseal one side of said aperture before said washer valve unseals the other side of said aperture.

7. A self-sealing valve comprising a movable member having a closed and an open position and comprising an aperture having an inner and an outer end; a first means normally blocking said inside end of said aperture; resilient means urging said first means to block said inside end; resilient means urging said movable member towards said closed position whereby said outer end of said aperture is covered; and means whereby said movable member is operable to uncover said outer end of said aperture before said first means is operable to unblock said inner end of said aperture.

8. A one-piece self-sealing valve comprising a movable member having a closed and an open position and comprising an aperture having an inner and an outer end; a first means contiguous with said movable member normally blocking said inside end of said aperture; resilient means contiguous with said first means urging said first means to block said inside end; resilient means contiguous with said movable member urging said movable member towards said closed position whereby said outer end of said aperture is covered; and means whereby said movable member is operable to uncover said outer end of said aperture before said first means is operable to unblock said inner end of said aperture.

9. A self-sealing valve comprising a movable member having a closed and an open position and comprising an aperture having an inner and an outer end; a first means normally blocking said inside end of said aperture; resilient means urging said first means to block said inside end; resilient means contiguous with said movable member urging said movable member towards said closed position whereby said outer end of said aperture is covered; and means whereby said movable member is operable to uncover said outer end of said aperture before said first means is operable to unblock said inner end of said aperture.

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