

Aug. 13, 1957

P. KALMBACH, JR., ET AL

2,802,607

DISPENSING CAP FOR COLLAPSIBLE TUBES

Filed May 11, 1953

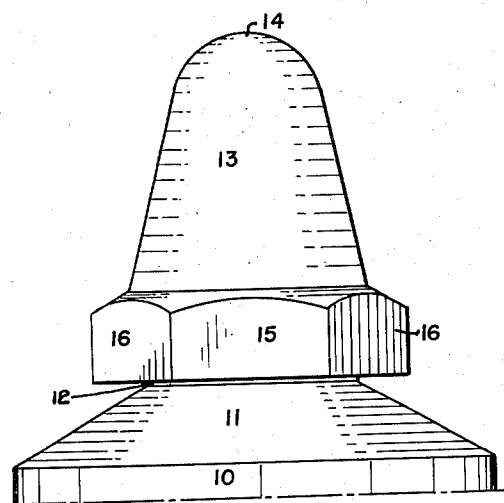


Fig. 1

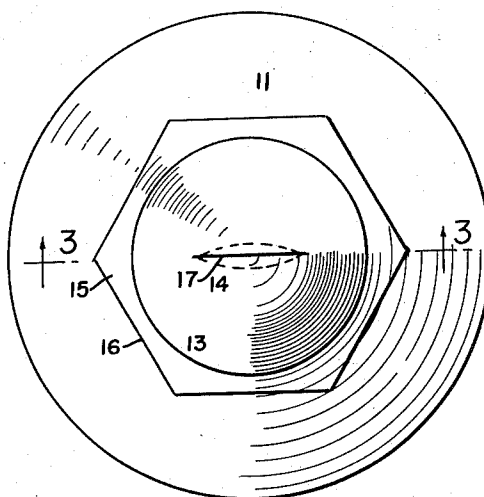


Fig. 2

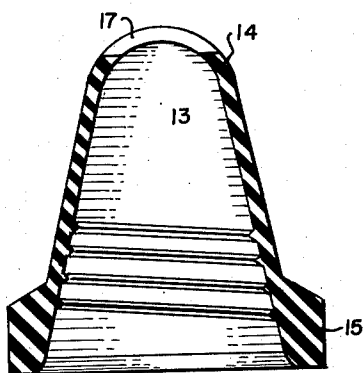


Fig. 3

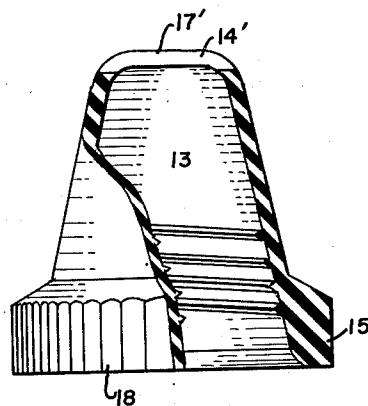


Fig. 4

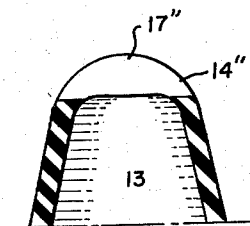


Fig. 5

INVENTORS:
PHILLIP KALMBACH JR
THOMAS F. NIEMAN
BY *James C. Sweet*
ATTORNEY

1

2,802,607

DISPENSING CAP FOR COLLAPSIBLE TUBES

Phillip Kalmbach, Jr., Wheat Ridge, and Thomas F. Nieman, Denver, Colo.

Application May 11, 1953, Serial No. 353,948

1 Claim. (Cl. 222—490)

This invention relates to dispensing caps for collapsible tubes of common type extensively utilized for the packaging of various paste-like and semi-liquid materials, and has as an object to provide an improved such cap adapted for use in substitution for the cap closures customarily characterizing such tubes.

A further object of the invention is to provide a cap operable in association with a collapsible tube to pass the tube contents in reaction to pressure applied to the tube and to close for preservation and protection of the tube contents when such pressure is relieved.

A further object of the invention is to provide a novel and improved dispensing cap adapted for operative association with various sized and particularly-worked tube delivery necks in substitution for the conventional closures furnished with the tubes.

A further object of the invention is to provide a novel and improved dispensing cap for collapsible tubes that is susceptible of production in a variation of detail whereby to adapt the cap for effective use in the dispensing of various particular materials.

A further object of the invention is to provide a novel and improved dispensing cap for collapsible tubes that is simple and inexpensive of production, convenient of use, efficient in attainment of the ends for which designed, and eliminative of the disadvantages characterizing conventional tube closures.

With the foregoing and other objects in view, our invention consists in the construction, arrangement, and operative combination of elements as hereinafter set forth, pointed out in our claims, and illustrated by the accompanying drawing, in which—

Figure 1 is a side elevation of a typical embodiment of the invention as associated with a conventional collapsible tube in position for practical use, portions of the conventional tube not essential to an understanding of the invention being broken away to conserve space.

Figure 2 is a top plan view of the arrangement according to Figure 1, broken lines indicating the form and position assumed by the cap dispensing outlet in reaction to pressures developed interiorly of the cap.

Figure 3 is a cross section of the cap unit alone taken substantially on the indicated line 3—3 of Figure 2.

Figure 4 is an elevation, partly in section, of an alternative or modified form of the improved cap.

Figure 5 is a detail elevation, partly in section, of a yet further modified form and construction of the cap tip, or outlet.

Collapsible tubes are extensively in use for the packaging of a wide range of particular materials in a form convenient of use. Such tubes are particularly characterized by a flexible, cylindrical body closed at one end and furnished with a relatively-stiff, annular closure flange at the other end from which centrally outstands a tubular, exteriorly-threaded discharge neck cooperating with a removable and replaceable closure cap. The convenience and utility of conventional collapsible tubes is

2

somewhat impaired by the necessity for removing and replacing the thread-mounted closure, and the instant invention is hence directed to the provision of a cap employable in substitution for the conventional type closure for selective dispensing of the tube contents without occasion for cap removal and replacement after it has been once installed, and with full protection against wastage or spoilage of the tube contents.

Essentially, the improved cap is a conical nipple homogeneously molded of impervious, resilient material, such as rubber, with an open base end for mounting coaction with the discharge neck of a collapsible tube from which the conventional closure has been removed and with a dispensing aperture at its tip so constituted as to open in reaction to pressures applied interiorly of the nipple and to close when such pressures are relieved.

In the drawing, the numeral 10 represents an end portion of a conventional collapsible tube having the usual annular end closure flange 11 and exteriorly-threaded discharge neck 12 outstanding centrally from said flange. The typical embodiment of the improved dispensing cap represented by Figures 1-3, inclusive, is constituted as a generally-conical, hollow body 13 formed from rubber to provide relatively stiff side walls of uniform thickness and a rounded tip 14 at the merge of said walls. At and about the major open end of the body 13 the walls of said body merge with an integral, thickened base ring 15 defining an internally-threaded extension of the body interior adapted to receive and coact with the tube discharge neck 12; the exterior of said ring 15 being worked, as by means of angularly-related, flat faces 16, to facilitate manual grip and manipulation of the cap unit. Completing the cap for its intended use, the tip 14 is diametrically cut, as at 17, to provide a slit through said tip opening to the interior of the body 13 and intersecting the body side walls through only that minimum distance required to dispose the slit in traversing relation across the interior of said tip 14.

Homogeneously molded of rubber in an appropriate resilient stiffness with the tip 14 initially closed and its ring member 15 threaded, the cap unit is conditioned for association with tube discharge necks 12 of varying sizes and differing thread pitch and arrangement. The base ring 15 of the cap is susceptible of some radial expansion permitting the cap to be mounted on discharge necks 12 of varying diameters, and since the molded threads within said ring are resilient and yieldable, it is manifest that the ring may be readily engaged with and mounted in secure gripping relation about the various forms and types of exterior connecting elements, such as threads, conventionally characterizing the discharge necks 12; it being wholly immaterial whether or not the internal threads of the ring 15 are directly complementary to the means carried by a given discharge neck 12 for coaction with the usual tube closure. After the molding of the cap unit has been completed, the finished closed tips of the caps are incised to provide the cuts 17 above described, whereby to insure that the separated edges of said cuts normally and naturally close together without any gap or spacing therebetween; it being obvious that said cuts are accomplished by revolving knives, or the like, as distinguished from saws, to the end that no material shall be removed from between the opposing lips of the resulting cuts.

The modification according to Figure 4 is essentially the same as the construction shown in the preceding views and hereinabove described, the only differences presented by the modification being a flattening of the cap tip, as represented at 14', whereby to somewhat enlarge the tip diameter with a consequent increase in the length of the cut 17', as at 17', and a milling or knurling

of the ring 15 cylindrical periphery, as at 18, in substitution for the angularly-related faces 16. In the modified construction according to Figure 5, the only variation from the organization shown in Figures 1-3, inclusive, is a thickening of the cap tip 14, as at 14'', whereby to increase the stiffness of the unit adjacent the cut 17, which cut, as indicated at 17'', is deepened axially of the cap to intersect the inner surface of the thickened cap tip.

In any of its particular embodiments the cap unit is adapted for engagement with and secure mounting upon the discharge neck 12 of a collapsible tube in substitution for the customary cap closure thereof, as above explained. In such association with a collapsible tube, the cap unit is available for delivery of tube contents through the cut 17 in reaction to pressures applied to the tube and without occasion for removal of the cap. When pressure is applied to the tube, a portion of the tube contents is ejected through the neck 12 in a usual manner until the interior of the cap unit is filled, whereafter the pressure on the tube acts on and through the cap charge to spread the lips of the cut 17, 17' or 17'', sufficiently for escape of a strip or ribbon of the contents in a continuous length determined by the degree and persistence of the applied pressure. When the pressure on the tube is relieved, the inherent resilience of the cap material acts to close the lips of the cut 17 together and to cut off the extruded length of the tube contents; such closing of the cut 17 reestablishing a closed container assembly effective to retain and preserve the tube and cap contents. Through proper proportioning of the cap stiffness adjacent the cut 17 and through appropriate adjustment in the length of said cut, the cap unit may be readily conditioned for use with tubes of varying capacity and for the dispensing of materials of differing consistencies.

Since changes, variations, and modifications in the form, construction, and arrangement of the elements shown and described may be had without departing from the spirit of our invention, we wish to be understood as being limited solely by the scope of the appended claims, rather than by any details of the illustrative showing and foregoing description.

We claim as our invention:

In a cap of the character described having a hollow, generally-conical body of impermeable, resilient material, an integral tip closing the lesser end of said body, and means at the greater end of said body coactable with the discharge neck of a collapsible tube, a self-closing outlet passage through said tip adapted to open in reaction to pressures expansively effective within said body, said outlet passage comprising a normally-closed slit cut diametrically of and fully across said tip through the thickness thereof in such limited intersection with the body wall portions merging into the tip as serves to establish the slit cut fully across the inner face of the tip, whereby to constitute the so-separated tip portions as complementary lips resiliently and oppositely yieldable about a common axis diametrically of the body and substantially in the plane of junction between the inner face of the tip and the conical body walls, wherein said tip is thickened axially of the body, whereby to stiffen the lips defined by said cut.

References Cited in the file of this patent

UNITED STATES PATENTS

1,622,526	Lewis	Mar. 29, 1927
1,650,966	Smith	Nov. 29, 1927
2,135,237	Lewis et al.	Nov. 1, 1938
2,206,993	Duey	July 9, 1940
2,272,653	Andrews	Feb. 10, 1942
2,550,132	Woods	Apr. 24, 1951