July 9, 1940. H. P. DUEY 2,206,993

CAP FOR COLLAPSIBLE TUBES

Filed July 3, 1939

FIG. 1.

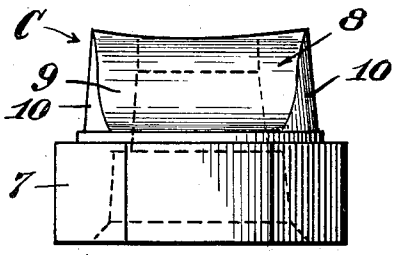


FIG. 2.

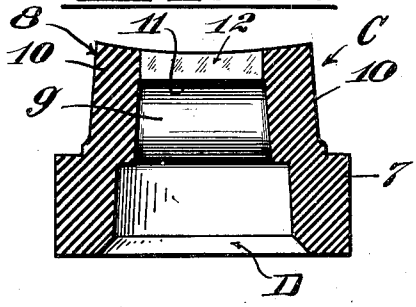


FIG. 3.

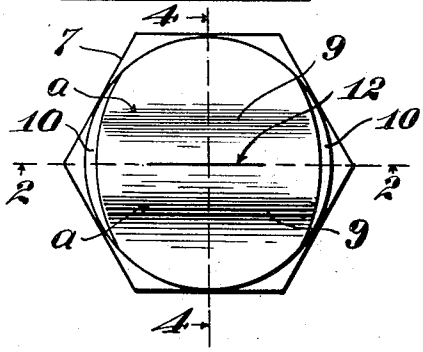


FIG. 4.

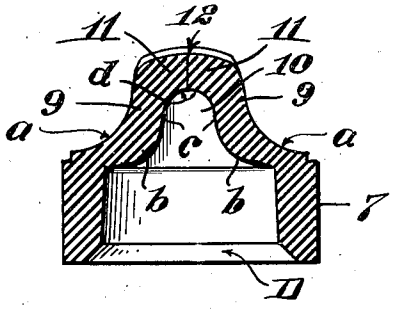


FIG. 5.

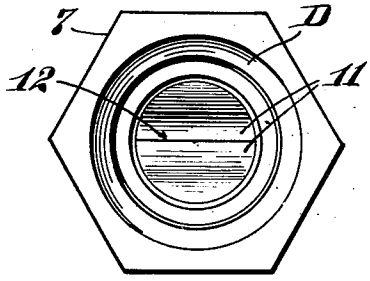
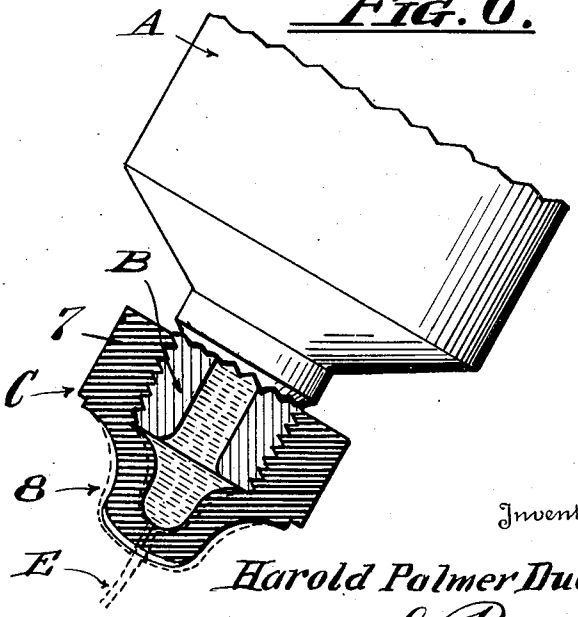


FIG. 6.



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CAP FOR COLLAPSIBLE TUBES

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Application July 3, 1939, Serial No. 282,604

4 Claims. (Cl. 221—60)

This invention relates to a cap for collapsible tubes and more particularly pertains to the type of such caps embodying a slit resilient tip portion constituting a nozzle adapted to form a thin ribbon of paste on squeezing the tube to which the cap is applied and which will operate to automatically cut off the continued flow of paste from the tube on terminating squeezing action on the latter.

Caps of this character are designed as replacements for the conventional metal caps with which collapsible tubes are ordinarily equipped, and for such purpose are adapted to be engaged with the externally threaded nipple constituting the discharge end of the tube. Heretofore the nozzle or tip portion of such caps has been formed with relatively thick end walls in which the discharge slit is formed, or is formed with converging walls leading to the slit, and each being of a character such that, in the first instance, excessive pressures are required to effect opening of the slit in discharging the paste therethrough and such as to be liable to force the cap from the tube nipple, and, in the second instance, the walls of the tip have insufficient tension to effectively cut off the ribbon of paste and seal the tip on cessation of squeezing action of the tube.

The primary object of the invention is to provide a construction and formation in the cap whereby the resilient tip will readily open under internal pressure directed thereto on squeezing the paste content of the tube into the tip and yet effect automatic closure of the discharge slit on cessation of the squeezing action.

A further object is to provide a construction in the nozzle tip that will insure the delivery of paste in a thin ribbon through a normally closed discharge outlet, and in which opening of the outlet is effected by outward movement of resilient side walls of the nozzle under internal pressure developed interiorly of the nozzle by forcing the contents of the tube into the nozzle under pressure by squeezing the tube, whereby the ready discharge of the paste from the tube will be facilitated and will be effected with less resistance than where the outlet is opened by forcing the paste directly through a slit as heretofore contemplated in devices of this character.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention is carried into effect as illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a view of the cap as seen in side elevation;

Fig. 2 is a sectional view of the cap as seen on the lines 2—2 of Fig. 3;

Fig. 3 is a plan view of the cap;

Fig. 4 is a sectional view of the cap as seen on the line 4—4 of Fig. 3;

Fig. 5 is an inverted plan view of the cap.

Fig. 6 is a view in section and elevation illustrating the invention as applied and depicting the mode of operation thereof.

Referring to the drawing more specifically, A indicates generally a conventional collapsible tube which is fitted with an externally threaded discharge nipple B in the usual manner, and C designates generally a cap embodying the invention and which includes a collar 7 engageable with the nipple B and which collar is fitted with a discharge nozzle 8. The cap C may be formed of any suitable material having requisite resilience but rubber or rubber composition is preferably employed. The collar 7 and nozzle B are formed as a unit being molded or pressed in a single piece.

The collar 7 may be formed in any suitable fashion for engagement with the nipple B but is here shown as provided with a hexagonal outer periphery and with a smooth substantially cylindrical inner periphery having a diameter slightly less than the external diameter of the nipple B at the base of its threads whereby expansion of the collar 7 will be effected on positioning it around the nipple so as to place the collar under tension and thereby effect a gripping action on the nipple in such manner as to securely fasten the cap in place on the tube. As a means for facilitating insertion of the tip of the nipple B into the collar 7 the internal margin of the inner end of the latter is formed with a bevel 9.

The essence of the invention resides in the construction of the nozzle 8 which, as here shown, embodies transversely elongated spaced apart side walls 9 connected together at their ends by walls 10; the side walls 9 being formed with inturned end walls 11 connecting the walls 10 and abutting each other along a slit 12 constituting the discharge outlet of the nozzle. The walls 9, 10, and 11 of the nozzle 8 are formed as a unit and accordingly the inturned end walls 11 are integral with the spaced side walls 9. The side walls 9 have a concavo-convex contour in the direction of their length, from their intersection with the collar 7 to their intersection with the inturned end walls 11—11 thereon; the outer faces *a* of the walls 9 being concave while the inner faces of the side walls are formed with convex portions *b* extending along the base portions of the side walls

and merging into slightly converging faces *c* terminating in short concave faces *d* constituting the inner faces of the inturned end walls 11; the inner faces of the side walls 9 thus being formed with substantially an ogee or S-curvature and being disposed close to each other and extending inwardly from the inner margin of the collar 7 with the converging intermediate faces *c* thereof extending in near parallel relation to each other whereby on imparting outward pressure against the inner faces of the side walls 9 the latter will move outwardly at least throughout the intermediate portions of the length thereof in such fashion as to effect separation of the inturned walls 11 and thereby effect opening of the slit 12. The slit 12 is formed to extend throughout the length of the interior faces of the inturned walls so that paste discharged therethrough will take the form of a thin narrow ribbon.

When the cap C is applied to the nipple B of the collapsible tube A, the inner convex portions *b* of the nozzle side walls will be disposed in close proximity to the tip on the nipple in overlying relation thereto and will accordingly present convex contours to the discharge outlet of the nipple so that the body of paste initially emitted from the latter under pressure will first spread the portions *b* relative to each other. At the same time the body of paste lying between the nearly parallel and slightly converging faces *c* of the side walls of the nozzle will be shoved forward and will act on said faces to spread apart the nozzle side walls and the inturned ends thereof and thereby open the slit 12.

The operation of the invention is apparent from the foregoing, it being manifest that on applying the cap C to the nipple B on the collapsible tube A and squeezing the latter to effect discharge of the paste content thereof through the nipple B, the pressure imparted to the paste entering the nozzle 8 will distend the side walls 9 of the latter in opposition to the tension thereof so as to open the slit 12 as above stated and as indicated in dotted lines in Fig. 6 and thereby permit discharge of paste therethrough in ribbon form.

By the construction and arrangement of the parts of the nozzle 8 as herein set forth, advance movement of the column or body of paste through the nozzle 8 will direct opposed lateral forces on the side walls of the nozzle and will thereby act to spread the latter apart in effecting opening of the discharge slit 12 with a minimum of outwarfd end thrust on the nozzle tip tending to excessively distort the latter and also tending to force the cap off of the nipple.

On cessation of the squeezing action on the collapsible tube A such as to relieve the side walls 9 of the nozzle of internal pressure, such side walls by virtue of having been distended and placed under tension will automatically retract to normal, thereby closing the slit 12 and cutting off the discharge of paste from the tube.

I claim:

1. In a cap for collapsible tubes, a nozzle having spaced laterally elongated resilient side walls connected by flexible end walls and formed with integral inturned walls on their outer margins abutting each other; each of said side walls being concave on its outer face in a direction of the length of the nozzle and having a convex inner face whereby outward pressure imparted to the inner faces of said side walls will effect spreading apart of the inturned walls relative to each other.

2. In a cap for collapsible tubes, a nozzle having spaced laterally elongated resilient side walls connected by flexible end walls and formed with integral inturned walls on their outer margins abutting each other; each of said side walls having a concave outer face extending longitudinally thereof and having a convex inner face at the base portion thereof, whereby said side walls are adapted to be flexed outwardly relative to each other on application of pressure to the interior faces thereof to effect spreading apart of said inturned walls relative to each other.

3. In a cap for collapsible tubes, a collar adapted to be engaged with a tube nipple, a nozzle formed integral with said collar having spaced laterally elongated resilient side walls connected by flexible end walls and formed with integral inturned walls on their outer margins abutting each other; said side walls being concavo-convex in the directions of their length with the convex portions thereof innermost.

4. A cap for collapsible tubes having a discharge nipple, comprising an annular collar for encircling engagement with the nipple, unitary nozzle on one end of said collar having opposed side walls the inner end portions of which extend inwardly from the inner margin of said collar to overlie the end of the nipple, the inner faces of the inner end portions of said side walls curved convexly toward the nozzle tip, the inner faces of said side walls leading from said curved inner end portions in near parallel spaced relation to each other, and abutting inturned end walls on said side walls integral therewith having short concave inner faces with which the inner faces of said side walls merge.

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