

Dec. 27, 1938.

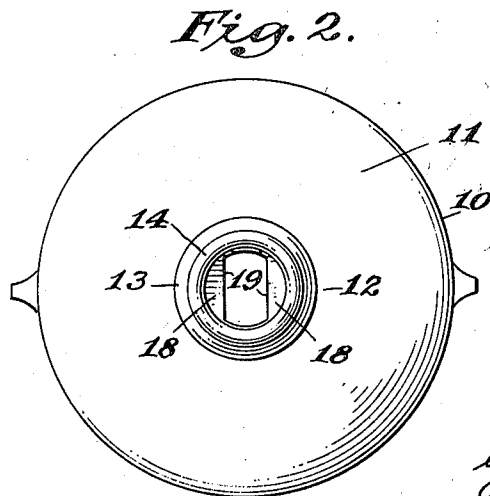
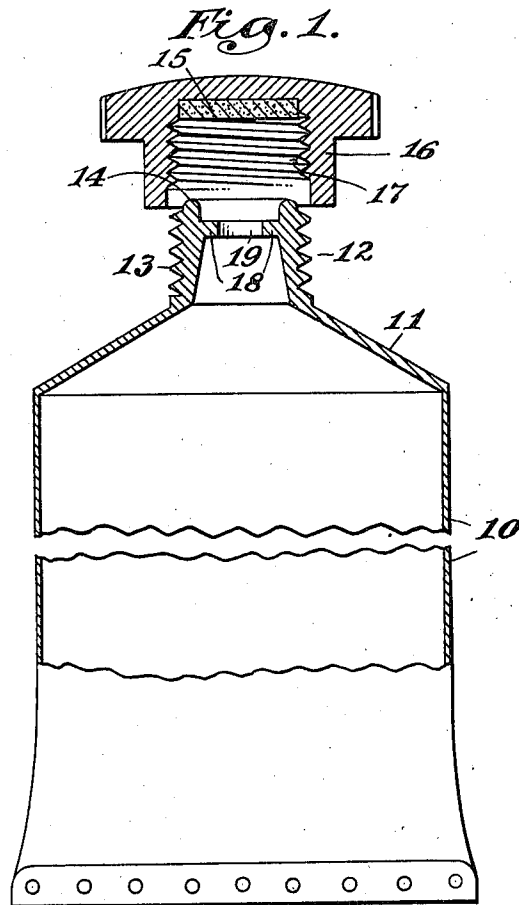
J. H. FRIDÉN

2,141,602

METHOD OF MAKING COLLAPSIBLE TUBES

Original Filed Jan. 19, 1934

2 Sheets-Sheet 1



Inventor

John H. Fridén
by *H. C. Miesing*
Attorney

Dec. 27, 1938.

J. H. FRIDÉN

2,141,602

METHOD OF MAKING COLLAPSIBLE TUBES

Original Filed Jan. 19, 1934 2 Sheets-Sheet 2

Fig. 3.

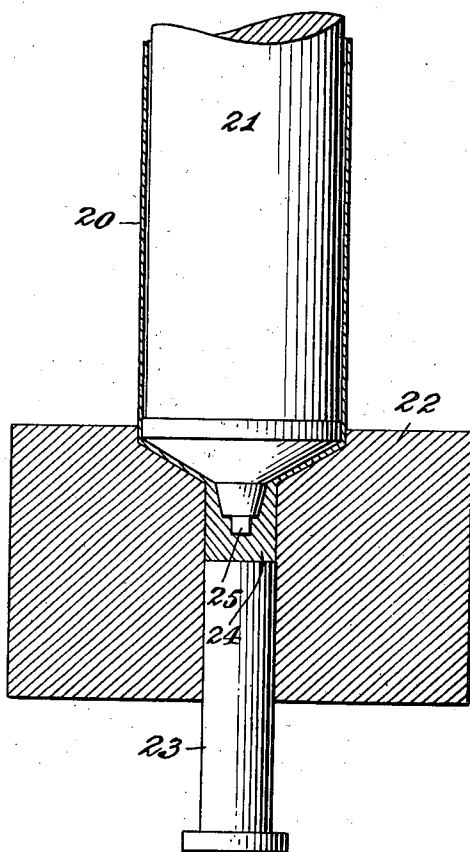


Fig. 4.

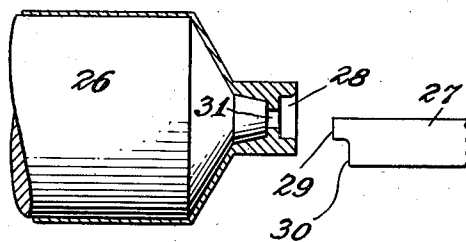


Fig. 5.

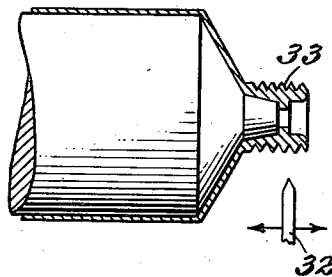
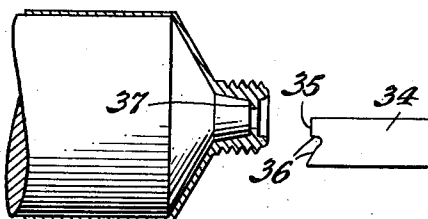


Fig. 6.



Inventor

John H. Fridén
H. C. Miesing
Attorney

UNITED STATES PATENT OFFICE

2,141,602

METHOD OF MAKING COLLAPSIBLE TUBES

John H. Fridén, Maplewood, N. J., assignor to
The Sun Tube Corporation, Hillside, N. J., a
corporation of New Jersey

Original application January 19, 1934, Serial No.
707,233, now Patent No. 2,042,836, dated June
2, 1936. Divided and this application April 30,
1936, Serial No. 77,135

10 Claims. (Cl. 29—148.2)

This invention relates to a method of producing a form of collapsible tube adapted for the packaging of tooth pastes, shaving creams, cold creams, adhesives, shoe polishes, edible pastes, and a variety of similar, pasty or semi-fluid commodities. The present application is a division of my application Ser. No. 707,233, filed January 19, 1934, issued June 2, 1936, as Patent No. 2,042,836, in which an improved tube, to the production of which this method is particularly applicable, is claimed.

A primary purpose of the invention has been to devise a simple and effective method of producing a tube of the character mentioned in which a smooth or rounded sealing ring is formed at the end of the neck and a partition is provided a slight distance in from the end of the tube to partially close the passage through the neck. The method is particularly useful in the production of tubes in which the set-in partition is formed with a non-circular opening, such as a ribbon slot, although it is also applicable to the production of tubes of other forms.

In general the improved method involves the extrusion of a tube, from a slug of tin or the like, with a relatively thick wall closing the end of the neck. This wall, preferably, is partially penetrated by the end of the punch in the course of extrusion but is not completely pierced. The contour of the depression so provided is that of the desired opening through the partition of the finished product. By removing from the outer end a portion adjacent the center of the neck closure, through an appropriate cutting operation, the set-in and apertured partition is formed. Suitable finishing and threading operations then complete the tube.

Other features and advantages of the invention will appear from a detailed description of the same which will now be given in conjunction with the accompanying drawings, in which:

Figure 1 is a side view of a tube formed in accordance with the invention, a portion being shown in section along a central plane.

Figure 2 is an end view of the tube with the cap removed, and

Figures 3 to 6, inclusive, are schematic views illustrating various stages in the preferred method of making the tube.

Referring now to Figure 1, the tube is shown as provided with a main body portion 10 having a suitable wall thickness to withstand the strains due to filling, handling and using the tube. It may be formed of any suitable material, depending upon the intended use. If it is to be used

for the packaging of tooth paste or an edible paste or the like, it is preferably formed of substantially pure tin. For other purposes it may suitably be formed of lead or aluminum or other readily extrudable materials. Adjacent the top a conical portion 11 joins the body with a neck designated generally at 12. The neck is preferably of somewhat greater wall thickness than the body of the tube and is provided over a suitable portion of its length with external threads 13. These may, if desired, extend throughout the length of the neck, although preferably they begin a short distance in from the outer end of the neck and terminate at, or slightly in from, the lower end of the neck.

The outer end 14 of the neck is preferably well rounded, smooth and regular or even. This is to permit it to cooperate readily and effectively with a sealing disk 15 within a cap 16. Threads 17 formed over a suitable portion of the inner wall of the cap are adapted to cooperate with the threads 13 on the tube to secure the cap in place. A suitable distance in from the end 14 of the neck there is formed a partition or partial closure 18 provided with a discharge opening 19 of suitable form and dimension. The opening is illustrated as being of rectangular form so as to produce a flat ribbon of paste. It might be made elliptical or round or star-shaped or of any other suitable form, depending upon the form of the ribbon of paste desired.

When the tube is to be used, it will be understood, the cap is tightly screwed upon the neck and the paste is forced into the tube through the bottom under pressure. Subsequently the bottom of the tube is closed by appropriately folding it or applying a clip. If a tight seal is not provided between the end of the neck and the disk 15, the paste under pressure will ooze out between the cap and neck. Furthermore, it is important not only to prevent this leakage of paste but it is also desirable to make the tube completely air-tight. The filled tubes are sometimes kept on the shelf in a store or home for a number of months before they are used. If the tubes are not air-tight, the contents will have a tendency to dry out and cake adjacent the point of air leakage. For this same reason it is important to make the tube air-tight not only when first filled but also after each use. This can only be effectively accomplished by providing a regular, smooth surface 14 at the end of the neck, particularly if a relatively hard type of sealing disk is used. In re-applying the cap it will never be returned quite to its former posi-

tion and therefore any irregularity in the edge of the sealing ring is apt to produce air leakage.

The depth of the sealing ring from the outer edge 14 to the outer surface of the partition 18 may vary according to circumstances. It should be great enough to insure an effective seal and proper cooperation with the sealing disk. If the partition 18 were made flush with the end 14, it would be difficult to insure a perfect, air-tight seal at all times. Furthermore, with such a construction the sealing disk would be partly squeezed into the opening 19 as the cap is applied and when the cap is later removed the projection from the disk would remain engaged with the opening and due to the wrench action the disk would be withdrawn from the cap. It is important to have the partition 18 set-in a distance sufficient to prevent squeezing of any part of the sealing disk into the opening 19. If a soft cork disk is used, the distance should be relatively great, say between $\frac{1}{8}$ " and $\frac{1}{4}$ " or even more while if a harder, less compressible disk is employed, the distance may be made even less than $\frac{1}{8}$ ". On the other hand, when a harder type of sealing element, such as paper or metal foil or the like, is employed, the accuracy and regularity of the outer edge 14 becomes of increasingly greater importance. The purpose of terminating the threads 13 some distance in from the end of the neck is to prevent the outermost turn from biting into the sealing disk and removing it from the cap in the same manner as explained with relation to the opening 19.

A preferred way of producing the foregoing type of tube will now be explained in conjunction with Figures 3 to 6, inclusive. A tube 20 is first produced by the action of a punch 21 upon a slug deposited in the cavity of a die 22. In the course of extruding the tube a knockout pin 23 will recede to an appropriate extent to produce a neck 24 on the tube of suitable length and with a relatively large amount of metal at the end. An extension 25 is preferably provided on the punch to form a recess or indentation in the end of the neck having the shape of the opening desired in the finished tube.

The extruded tube is now subjected to a series of finishing operations upon a single machine or a series of machines, as desired. For all of these operations the tube is preferably mounted upon a rotatable mandrel 26 adapted to grip the interior wall of the neck and rotated in any convenient manner during the operations to be explained. In the first operation a roughing tool 27 is brought into and against the end of the tube to form a recess 28. This tool is provided with cutting edges 29 and 30 for this purpose. The depth of the cut is sufficient to remove the metal which closes the end of the tube and thus produces an opening 31 out of the recess formed by the extension 25. In the next operation a thread cutter 32 forms threads 33 in the exterior surface of the neck. Finally a tool 34 is brought into cooperation with the end of the tube to finish the various surfaces. This tool is provided with cutting edges 35 and 36 which not only finish the outer surface of the partition 37 but also the inner, outer and end surfaces of the annular sealing ring. The outermost portions of the thread 33 are removed in this way and the end of the neck is given a smooth, even, regular surface, preferably rounded. Any suitable devices, known in the art, may be employed for producing the desired, relative movements between the various cutting tools and the tube.

While a particular form of tube and a preferred method of making it have been explained in considerable detail, it will be understood that various changes may be made in the article and in the steps by which it is produced without departing from the general spirit and scope of the invention.

What I claim is:

1. In a method of making a collapsible tube, the steps which comprise extruding a tube having a body portion and a neck with a recess formed in the end wall of the neck but not completely through the same, and cutting away a portion of the metal of the end in line with said recess and over a greater cross-sectional area than said recess to form said recess into an open passage and to leave an annular rim beyond said passage and surrounding the same.

2. In a method of making a collapsible tube, the steps which comprise extruding a tube having a body portion and a neck with a recess formed in the end wall of the neck but not completely through the same, and boring the end wall of said neck in line with said recess but over a greater area than the cross section of said recess to a depth sufficient to form said recess into an open passage.

3. In a method of making a collapsible tube, the steps which comprise extruding a tube having a body portion and a neck with a recess formed in the end wall of the neck but not completely through the same, boring the end wall of said neck in line with said recess but over a greater area to a depth sufficient to form said recess into an open passage and to leave an annular rim beyond said passage, and rounding the end of the rim so formed.

4. A method of making a collapsible tube which comprises extruding a tube having a body portion and a neck with a recess formed in the end wall of the neck but not completely through the same, boring the end wall of said neck in line with said recess but over a greater area to a depth sufficient to form said recess into an open passage, forming threads in the outer surface of said neck, and finishing the end of said neck to provide a rounded rim.

5. In a method of making a collapsible tube, the steps which comprise extruding a tube having a main body portion and a neck closed by a thick end wall, boring the central portion of said end wall to provide an inset partition with an opening therethrough and surrounded by an annular rim, and threading the outer surface of said neck.

6. In a method of making a collapsible tube, the steps which comprise extruding a tube with a neck having a passage partially but not completely through the same, and boring the outer end of said neck to provide a recess therein of greater area than the end of said passage and to a depth sufficient to provide open communication between said passage and recess.

7. In a method of making a collapsible tube, the steps which comprise extruding a tube having a main body portion and a neck closed by a thick end wall, boring the central portion of said end wall to provide an inset partition with an opening therethrough and surrounded by an annular rim, finishing simultaneously the surfaces of said inset partition and annular rim, and threading the outer surface of said neck.

8. In a method of making a collapsible tube, the steps which comprise extruding a tube with a neck having a passage partially but not completely through the same, and boring the outer

end of said neck to provide a recess therein of greater area than the end of said passage and to a depth sufficient to provide open communication between said passage and recess, said boring step being performed in such a manner as to simultaneously finish a plurality of surfaces of said neck.

9. In a method of making a collapsible tube, the steps which comprise extruding a tube having a body portion and a neck with a non-circular recess formed in the end wall of the neck but not completely through the same, and cutting away a portion of the metal of the end in line with said recess and over a greater cross-sectional area than said recess to form said recess into an open pas-

sage and to leave an annular rim beyond said passage and surrounding the same.

10. In a method of making a collapsible tube, the steps which comprise extruding a tube having a body portion and a neck with a recess having side walls which deviate from a circle concentric with said neck formed in the end wall of the neck but not completely through the same, boring the end wall of the neck concentrically with said neck to a depth sufficient to form said recess into an open passage and to leave an annular rim beyond said passage, and rounding the end of the rim so formed.

JOHN H. FRIDÉN.