May 1, 1945. W. E. AMBERG 2,374,796

COLLAPSIBLE CONTAINER

Original Filed May 18, 1942

Fig. 1

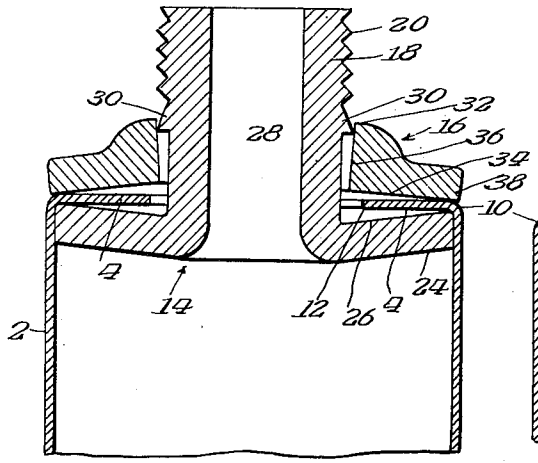


Fig. 2

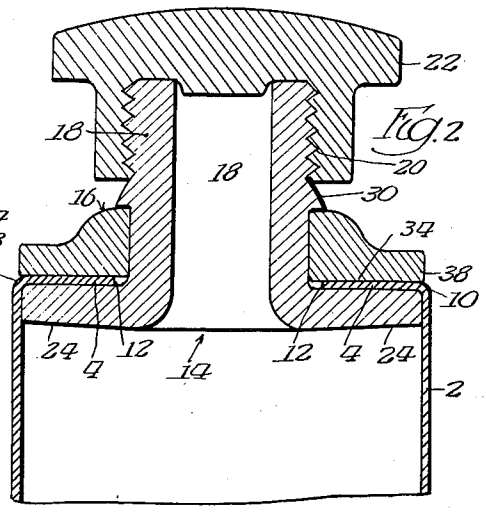


Fig. 4

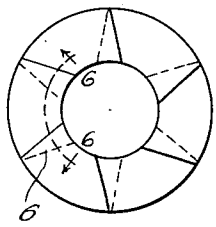


Fig. 5

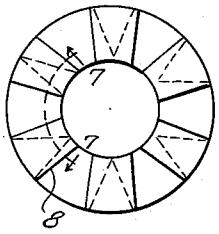


Fig. 3

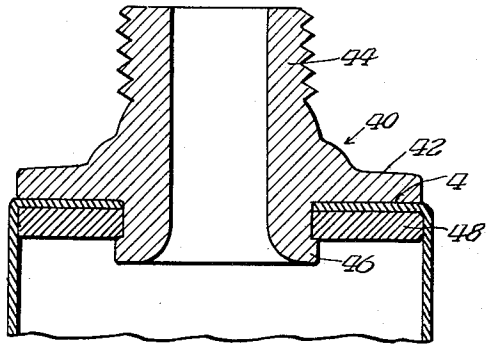


Fig. 6

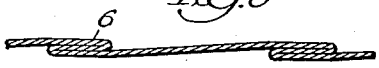


Fig. 7

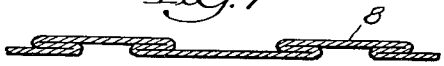


Fig. 8

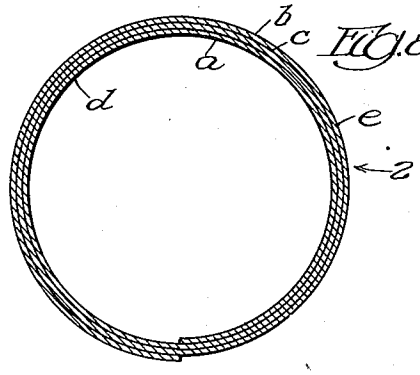
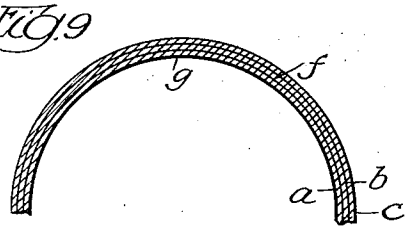


Fig. 9



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UNITED STATES PATENT OFFICE

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COLLAPSIBLE CONTAINER

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Original application May 18, 1942, Serial No. 443,436. Divided and this application June 14, 1943, Serial No. 490,722

2 Claims. (Cl. 222—107)

This invention relates to containers, and more particularly to containers of the collapsible tube type, such as are used for toothpaste, shaving cream, vaseline, ointments and a wide variety of other products.

This application is a division of my co-pending application Serial No. 443,436, filed May 18, 1942, issued as U. S. Patent No. 2,322,213, and is directed more particularly toward certain embodiments described but not claimed therein, including, for example, the species of invention described and illustrated with respect to Figure 10 of the drawing of said patent.

These containers are normally made of metal and are usually formed in a single piece by extruding a small metal billet. The metal used for this purpose is usually tin.

Containers of this type must be compressible at the lower end so that they can be squeezed or rolled up in order to discharge their contents. The discharge end is usually more rigid and is supplied with a screw cap or other type of top.

The use of metals has a number of disadvantages, because metals are often scarce, relatively expensive, sometimes tend to discolor the contents of the tube, and do not readily lend themselves to the necessary printing which is usually applied to toothpaste tubes and the like.

The use of various types of tubes in which paper or other flexible materials besides metals have formed the body of the tube has been suggested, but tubes of this type have not been commercially successful. One of the principal problems in using a paper tube is the difficulty of securing a proper juncture between the tube and the head of the container which must be of a more rigid material.

One of the objects of this invention is to provide a new and improved type of collapsible tube container in which the body of the container is made from paper or other similar flexible material.

Another object of the invention is to provide a new and improved type of collapsible tube container in which all parts thereof are non-metallic.

Still another object of the invention is to provide a new and improved type of collapsible tube container characterized by a novel type of construction for joining the body of the container to the head portion.

An additional object of the invention is to provide a new and improved type of collapsible tube container which will meet all of the requirements of commercial usage and at the same time can be prepared simply and economically in relatively large quantities without utilizing metals in the structure of the container.

Another object of the invention is to provide a new and improved method for assembling a container of the collapsible tube type.

Other objects and advantages of the invention will be apparent by reference to the following description in conjunction with the accompanying drawing, in which:

Figure 1 represents a collapsible tube container of the type covered by this invention, showing in section the position of the head elements and of the tubular body partially assembled;

Figure 2 shows the container as it appears after the component parts have been assembled;

Figure 3 illustrates a sectional view of a modification of the container shown in Figure 2;

Figures 4 and 5 illustrate two different methods of forming the plaits on the annular flange of the tubular body;

Figure 6 is a sectional view taken through the line 6—6 of Figure 4;

Figure 7 is a sectional view taken through the line 7—7 of Figure 5;

Figure 8 is a cross-sectional view of the tubular paper or paper-like body portion, showing a preferred structure in which a convolute tube, or a tube having a plurality of laminations, is employed;

Figure 9 illustrates a variation of Figure 8 in which continuous layers of waterproofing, vaporproofing and/or greaseproofing materials are disposed between the laminations or convolutions of the plies of the paper which form the body of the tube.

Referring to Figure 1, as shown, the body 2 is substantially tubular and is formed of paper or other flexible sheet material. For convenience, this has been shown as a single thickness of material but it will be understood that this tubular body portion may have a plurality of thicknesses of material, for example, as illustrated in Figures 8 and 9. The tubular body 2 has an inwardly directed annular flange 4. This flange is formed by folding the material into flat folds or plaits. These plaits may be of different types, for example, such as the knife plaits 6, shown in Figures 4 and 6, or the box plaits 8, shown in Figures 5 and 7. It will be understood that other types of plaits can be used to take up the excess of paper which is necessarily present when the flange is formed.

The flange 4 is characterized generally by a substantial uniformity of paper near the peripheral edge 10 (Figure 1) and an increasing bulk

or irregularity as the flange continues in an inward direction toward its inner edge 12.

As shown in Figure 1, according to one form of the invention, the flange is placed between a plurality of head elements generally indicated by the numerals 14 and 16. In this particular embodiment the head element 14 comprises a neck portion 18 provided with screw threads 20 and a cap or top 22, such as shown in Figure 2. The lower part of the head element 14 has an annular flange 24 with a concave or dished face 26. The opening 28 is provided to permit the contents of the tube to be dispensed. Between the flange 24 and the threaded cap portion 20 a single locking element 30 is provided which is adapted to engage with top 32 of the head member 16. The head member 16, as shown in Figure 1, also has a dished face 34, which opposes the dished face 26 of the flange 24.

It will be understood that the edge 36 of member 16 is forced over the locking element 30 of the head member 14.

The head members 14 and 16 are preferably constructed of a molded resinous material of which many different types are available and which should preferably have a slight resiliency for reasons which will be hereinafter explained. Among the materials which may be used for this purpose are the phenolic condensation products, such as "Bakelite," and many other types of thermosetting resins, and other types of resinous condensation products of the thermoplastic type, such as, for example, "Saran" (a vinylidene chloride condensation product of the Dow Chemical Company). Many other specific types of such materials are known and can be used for forming the head members. These materials have special advantages over metals, because of the scarcity of the latter and because metals in certain instances tend to contaminate, discolor or otherwise affect the contents of the tube.

The tube is formed by pressing the annular element 16 downwardly while holding the flange 24 of the element 14 against movement until the edge 36 is beyond element 30 whereby the top 32 of element 16 engages beneath locking element 30. This tends to cause the face 12 of the flange 24 and the face 34 of the flanged element 16 to seek a mean plane, or to approach planes which are generally parallel to each other, as illustrated by Figure 2. Actually, the planes of the two faces cannot be parallel unless the bulk of the paper which forms the plaits of the flange 4 is greatly compressed. The invention contemplates that planes through the faces 26 and 34 of the elements 14 and 16, respectively, will still be slightly dished with respect to each other, but in any event, a major part of the force or pressure which clamps the flange 4 between the head members 14 and 16 is concentrated near the outer edge 10 of the flange 4. This is a desirable and important feature of the invention because at this point the paper has a maximum uniformity and a minimum thickness, whereas, as the flange continues inwardly, the thickness and irregularity both increase.

In the forms of the invention shown in Figures 1 and 2, the locking of the head members 14 and 16 in place is due to the resiliency or springiness of these elements, plus the fact that they are sprung from their initial dished formation while at the same time the inner diameter of the annular element 16 is decreased. Thus, if the point 38 may be regarded as a fulcrum, the maximum leverage is exerted against the locking element 30, or alternatively, if the locking element 30 is regarded as the fulcrum, the maximum leverage is exerted against the paper flange 4 adjacent its outer periphery 10. Thus, the pressure caused by pressing together the two head elements 14 and 16 is concentrated in the two areas where it is needed most, (1) adjacent the peripheral edge 10 of the flange 4, and (2) at the juncture of 30 and 32.

In Figure 3 the structure shown is somewhat different from that shown in Figures 1 and 2 in that the head element generally indicated at 40 and which corresponds generally to the head element 14 of Figures 1 and 2, is provided with an annular flange 42 extending horizontally intermediate of the neck 44. The locking element 46 which corresponds to the element 30 of Figure 1 is locked in a similar manner with the head element, 48 except that head element 48, which corresponds generally to the element 16 of Figure 1, is disposed inside instead of outside of the paper flange 4. It will be understood that the flanged elements 42 and 48 are both dished in a manner similar to the elements 24 and 16 of Figure 1, and that the method of construction is similar except for the reversed arrangement of parts.

As shown in Figure 8, the tubular body 2 is preferably formed from more than one lamination or ply of paper, or other sheet-like material. Thus, in Figure 8, there are three plies of paper indicated by the letters *a*, *b* and *c*. These plies are held together by an adhesive, or in any other suitable manner. The surface of the innermost ply is preferably coated with a moistureproofing, greaseproofing and/or vaporproofing film such as a resin or other suitable material generally indicated at *d*. The outermost surface of the tube may also be coated with any suitable type of coating composition, as generally indicated at *e*. Likewise, it will be understood that a coating or layer of a moistureproofing, greaseproofing and/or vaporproofing material may be applied between the convolution or laminations, as indicated by the layers or coatings *f* and *g* in Figure 9. These layers may be in the form of a continuous film, such as a wax or resin film. The coatings on the inside and outside of the tubular body, as well as the intermediate coatings, or both, may be applied before, during or after the winding or rolling of the tube. The tube may also be molded into the desired shape.

From the foregoing description it will be recognized that the invention involves a number of features. By forming the tubular body member of paper or other similar flexible sheet material and by making the head closure from a molded non-metallic substance of substantial rigidity, such as a resin, new and improved containers are provided in which none of the component parts is formed of a metal. Thus, the necessity for using metals, which are scarce, expensive and have other disadvantages, is avoided.

The structures of the containers provided in accordance with the invention and the method of assembly are such that there is a minimum amount of twisting or distortion of the paper at the juncture of the paper tube and the head closure. In other words, the inturned flange of the tubular body is clamped with clamping means which are not rotated or are non-rotatable during the clamping operation and the means for locking the clamped elements together do not require a rotation of any parts which are in contact with the inturned flange of the tubular body; hence, to this extent, the locking means may be

described as non-rotatable. Furthermore, the clamping forces exerted by the head members against the annular flange of the tubular body of the tube are directed largely in a longitudinal direction, as distinguished, for example, from that type of structure in which the top of the tube is held by forces mainly directed in a transverse or sidewise direction. The type of structure herein described has a greater tendency to resist the stresses normally present when the flexible body of the tube is rolled up during usage and there is less tendency for the body of the tube to separate from the head.

The term "resilient" is employed throughout the specification and claims to describe a body or material which tends to return to or resume its original position or shape after being deformed. The term "bored" is used herein in its generic sense as meaning provided with a hole or opening regardless of how it is formed.

As will be understood from the disclosure herein where certain elements are described as having opposed surfaces "at least one of which is dished with respect to the other," this expression is employed to described the angularity between two surfaces whereby the space between them increases from the outside toward the center as shown, for example, in Figure 1.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a collapsible container, a collapsible substantially tubular body, an inturned flange upon one end of said body and a head therefor comprising an outlet member provided with a neck portion and bored to provide an outlet from said body, another member surrounding a portion of said neck portion, locking means to lock said members together, and clamping portions upon the respective members having opposing surfaces, at least one of said surfaces being initially dished and resilient with respect to the other, said surfaces constituting a spring clamp bearing longitudinally of the tubular body on opposite sides of the inturned body flange adjacent the periphery thereof, and said locking means comprising a single annular projecting portion on the exterior of the neck portion of said outlet member bearing against the upper surface of said member surrounding said outlet member.

2. In a collapsible container, a collapsible substantially tubular body, an inturned flange upon one end of said body and a head therefor comprising an outlet member provided with a neck portion and bored to provide an outlet from said body, another member surrounding a portion of said neck portion, locking means to lock said members together, and clamping portions upon the respective members having opposing surfaces, both of said surfaces being initially dished and resilient with respect to the other, said surfaces constituting a spring clamp bearing longitudinally of the tubular body on opposite sides of the inturned body flange adjacent the periphery thereof, and said locking means comprising a single annular projecting portion on the exterior of the neck portion of said outlet member bearing against the upper surface of said member surrounding said outlet member.

WALTER E. AMBERG.