Oct. 7, 1941. C. A. TOME 2,258,395

TUBE

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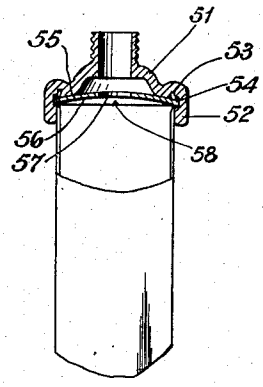

Fig. 2

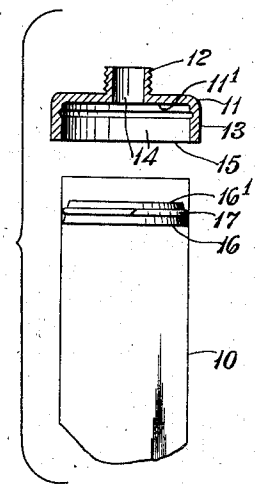

Fig. 1

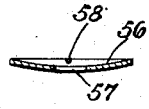

Fig. 3

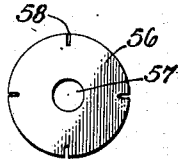

Fig. 4

INVENTOR
Charles A. Tome
BY
John L. Seymour
ATTORNEY

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TUBE

Charles A. Tome, Wilmington, Del.

Application October 27, 1939, Serial No. 301,517

6 Claims. (Cl. 221—60)

This invention relates to a collapsible container. The invention particularly relates to a fabricated dispensing container combining a dispensing head, a flexible tubular member, and an advantageous method and means for uniting them.

The field of collapsible dispensing tubes is at present dominated by metallic containers, which are usually made of tin, lead, or aluminum, or combinations of metals, and are substantially one piece, either being integral or so made by soldering or the like. Such containers are entirely satisfactory with non-corrosive substances, but are entirely unsuited to act as containers for other materials. It has been proposed to make such tubes out of materials, such as regenerated cellulose, for instance, by spirally winding strips of regenerated cellulose and gluing the overlapped portions. Such tubes have a disadvantage that they are not continuous, and tend to split at the seams. All such tubes have also been unsatisfactory because no wholly satisfactory method of joining the collapsible body to the rigid head has been invented. It has been proposed, in U. S. Patent No. 2,002,718, for example, to form a rigid head and to draw over that head a tube of smaller diameter locking the two in place with a metallic ring. There are several objections to this construction, among which is this that pressure applied to the contents tends to separate the tube and the head. Furthermore, such constructions are adapted only to the production of tubes having a circular head.

It is an object of this invention to produce a new and improved dispensing tube. It is a particular object of the invention to produce a dispensing tube no part of which need be made of metal except when such tubes are used for non-corrosive materials, and which can be used with materials corrosive to metallic containers. Another object is to produce a tube having a head of any desirable shape and a body portion conforming both to the size and shape thereof. Another object of the invention is to form a dispensing container having other than a circular shape out of a circular tube. Another object of the invention is to form a connection between the body portion of a flexible tube and the head which becomes more tightly sealed as pressure is applied.

The objects of the invention are accomplished by the invention which is herein described and which involves, generally speaking, a flexible tube, a perforated head having a flange or skirt, and a compression member to hold the tube against the skirt.

The invention will be illustrated in the accompanying drawing and the attached specification, but it is understood that this description does not limit the invention beyond the scope of the appended claims.

In the drawing Figure 1 is a dismantled view of an excellent form of the invention; Figure 2 is a preferred form of my invention, shown in section. Figures 3 and 4 are views in section and from above, respectively, of the locking disk used in the form of invention shown in Figure 2.

In Figure 1, 10 is a tube of material, such as regenerated cellulose, which can be extruded in a manner similar to the method which is used for the making of sausage casings. This tube can be made of cellulose acetate, of paper, or of any satisfactory flexible material; 11 is a head having a neck portion 12 and a flange or skirt 13; 14 is a bore extending completely through the head so that the contents of the tube can be forced out through the neck; 15 is a groove in the inner periphery of the skirt 13. The head is preferably made of some strong plastic material which is highly resistant to corrosive materials. 16 is a locking ring or head having a flat face 16', which will preferably contact with the flat face 11' of the head, and having a circumferential ring 17 for cooperation with the groove 15. In assembling this construction the tube 10 is properly seated within the skirt 13 and the ring 16 is forced into place, locking the tube between the ring 17 and the groove 15. The ring 17 may be integral with the member 16 or it may be a separate member seated in a groove therein. In ordinary cases it will be satisfactory if made integral with the member 16.

The tube can also be bonded to the head by a suitable cement if desired, in which case a locking member of less pressure can sometimes be used.

In a great many instances it is unnecessary to make the locking ring larger than the skirt in order to obtain proper sealing. Usually a sufficiently tight closure is effected by using a locking ring of the same size as the interior of the skirt, since the tube itself will furnish sufficient locking action. In some instances, where a tube of considerable thickness is employed, it is desirable to use a locking ring of less diameter than the inside of the skirt.

A preferred form of the invention is disclosed in Figures 2, 3, and 4. In these figures, 51 is a dispensing head made of appropriate material; 52 is a skirt on the head; 53 is a circular groove in the head alined with the inner side of the skirt 52; 54 is an annular groove in the skirt

just below the groove 53; 55 is a portion of the head acting as a shoulder; 56 is an annular disk having a convex form and made of some material such as compressed fiber having considerable strength and resilience; 57 is a hole in the center of the disk; 58 are slots in the edge of the disk.

Another method of describing the invention is to say that the head, 11 or 51, has a cavity formed by skirt, 13 or 52, which is enlarged by the groove.

In assembling this form of the invention a tube of appropriate material, having a circumference equal to that of the interior of the skirt 52, is inserted in the head and made to project into the groove 53. A spring disk, as shown in Figure 3, is then inserted in the tube and pushed into the head until it is emplaced in the groove 54. The disk is then sprung by pressing upon the center thereof so that its curvature is reversed, as shown in Figure 2. In this position it abuts against the supports 55 within the head forming a lock which cannot be broken by attempts to pull the tube from the head. The reason for this is probably that a pull on the tube 56 is transmitted around the shoulder formed by the lower angle of the groove so that the largest component thereof is transversely of the tube rather than longitudinally. This transverse pull tends, therefore, to increase the existing curvature of the disk rather than to decrease it. That tendency to increase the curvature is prevented by the support 55 so that the tube can be separated from the head only by actually crumpling the disk, which requires a far greater force than would ever be applied to the tube in normal operation.

When pressure is applied to the tubes of the dispensing containers of my invention the increase in pressure within the tube forces the locking member more tightly against the tube and the skirt of the head so that there is an increase of sealing rather than a tendency to separate. So strong is this sealing that the full weight of a man has proved insufficient to break the joint between a tube and its head. This is particularly advantageous in connection with substances which tend to dry out in the neck of the container on standing.

The dispensing heads can be made of artificial resins of phenol-formaldehyde type, vinyl resin type, cellulose plastic type, methyl methacrylate type, of hard rubber or of any other material of sufficient strength and sufficient resistance to the corrosive action of the particular material which is to be contained in the tube. The locking member can be made of the same or of different material. It is obvious that, although the invention is of particular value with the materials described, the invention is not to be limited to a particular material. In each instance the shapes of the conforming members will be so chosen that they make the best use of the materials selected.

An advantage of my invention is that non-circular tubes of substantially the same head and body size can be made. Another advantage of the invention is that a two-part tube is produced in which the application of pressure tends to seal rather than to separate the joint. Another advantage of the invention is that a tube of a non-circular container can be made from a circular tube. Other advantages of my invention will be in part apparent and in part elsewhere herein set forth.

This application is a continuation-in-part of application Serial No. 280,456, filed June 22, 1939.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof except as defined in the appended claims.

1. A non-metallic dispensing container having a comparatively rigid non-metallic dispensing head, a flexible non-metallic tube, and means to join the head piece and tube, said head being perforated to permit the extrusion of the material within the tube and having a skirt with a groove about its inner circumference, said means to join the head piece and tube comprising a locking member having a perforation in alinement with that of the head and having a protruding ring locking the tube within the head in cooperation with the said groove.

2. A dispensing container comprising a comparatively flexible tube and a comparatively rigid head having a depending skirt, a circumferential groove in the skirt, and means to force the tube into the groove comprising a reversible, convex locking piece.

3. A container comprising a comparatively flexible tube, a comparatively rigid head having a cavity to receive the tube with an interior circumferential shoulder formed by an enlargement of the cavity and means to join the tube to the head comprising a locking piece of limited flexibility and of normal size greater than the least circumference of the shoulder, whereby the seating of the locking piece will warp a portion of the tube about the shoulder.

4. In a container a relatively rigid head having a cavity, said cavity having a groove to receive the end of a flexible tube and a second groove to receive another part of the tube, a flexible tube having a portion within the said cavity and means to thrust a portion of the tube into said second groove comprising a spring disk.

5. A container comprising a comparatively flexible tube, a comparatively rigid head having a cavity to receive the flexible tube, said cavity being interiorly enlarged to form a circumferential shoulder, and means to join the tube to the head comprising a resilient disk for holding the tube in place by warping it around the shoulder whereby forces acting parallel to the axis of the tube are changed to a direction radial thereto.

6. A container comprising a flexible tube, a head having a cavity in which the tube is received, said cavity being the diameter of the tube near its mouth but of larger diameter thereabove, and means to force a portion of the tube into the enlarged portion of the cavity and to hold it there, whereby to lock tube and head together.

CHARLES A. TOME.