Dec. 8, 1964 L. R. WEISBERG 3,160,323

CONTAINERS WITH INTERNAL, INTERLOCKING PROTRUSIONS

Filed April 5, 1963

Fig. 1.

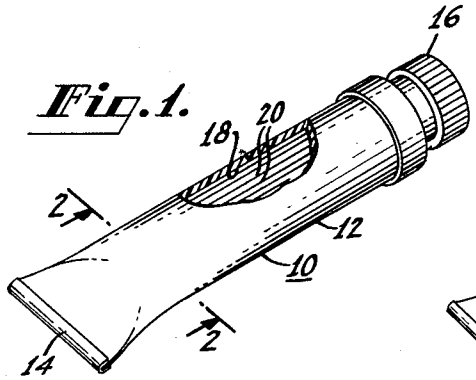


Fig. 4.

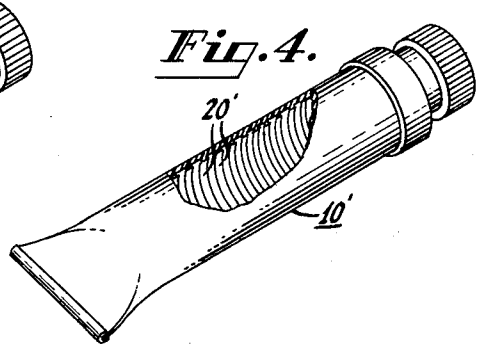


Fig. 2.

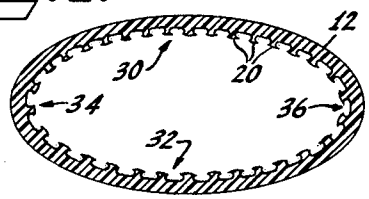
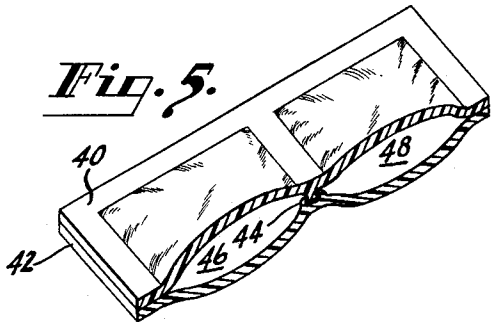


Fig. 5.



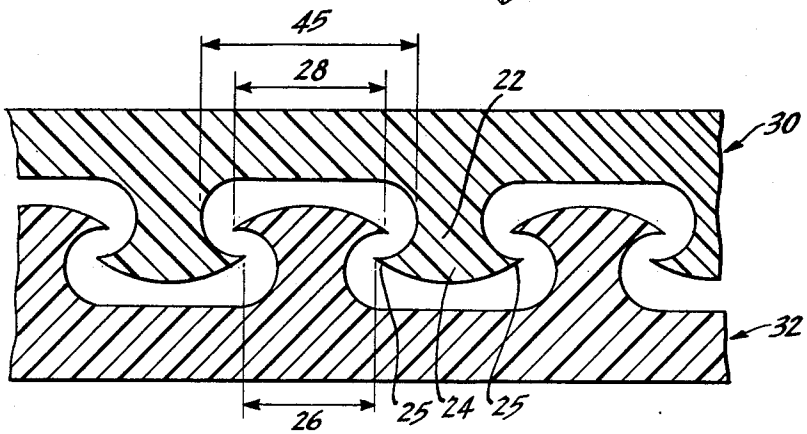


Fig. 3.

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CONTAINERS WITH INTERNAL, INTERLOCKING PROTRUSIONS

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This invention relates to containers, and particularly to dispensing containers having flexible walls adapted to be squeezed together to expel the contents of the container.

Metallic collapsible tube containers, such as those used for tooth paste, have the desirable property of remaining collapsed to the extent that the contents have been squeezed out. On the other hand, a metal tube is not suitable for containing many types of liquid, cream, and paste materials because the materials react chemically with the metal of the tube. For this reason, dispensing tubes made of chemically inert organic materials, such as flexible plastics, are preferred. Plastic dispensing tubes are also preferred because they can be made particularly attractive and appealing in appearance.

A plastic tube, however, suffers from the disadvantage that, after some of the contents has been expelled by squeezing, the tube tends to spring back to the full extended cylindrical shape it had when completely filled with its contents. In the process, air is sucked into the tube container. Air in the container has a drying or other undesirable deteriorating effect on the contents. Also, when the tube is again squeezed to expel more of its contents, a mixture of air and contents spatter out of the tube opening. Additionally, the presence of air in the tube makes it difficult to judge how much of the original contents of the tube remain in the tube.

It is an object of the invention to provide an improved container which remains collapsed to the extent that contents have been squeezed out of the container.

It is another object to provide an improved tube container made of an organic or plastic material and having integral means for overcoming the inherent tendency to spring back and suck in air after having been squeezed to expel some of the contents.

It is a further object to provide an improved container having flexible organic walls and having pressure-actuated means on the inner surfaces of the walls to hold them together.

It is yet another object to provide an improved container having means for forming or removing a partition separating the contents of the container.

According to an example of the invention, a dispensing tube includes a tubular body of flexible plastic material, a pinched permanently-closed end, and a removable closure cap at the other end. The inner walls of tubular body are provided with integral parallel-extending protrusions or ribs. The ribs are shaped so that when the tube is squeezed to expel the contents, the ribs on opposite walls are pressed together into interlocked engagement with each other. The tube is thus prevented from springing back to its former shape, and the tube remains collapsed to the extent that contents have been expelled. The interlockable protrusions or ribs may be arranged to extend in the direction in which the contents of the tube is expelled, in a transverse direction, or in a diagonal direction. The container may have a shape other than tubular. A container may include a few ribs for the purpose of partitioning the container.

These and other objects and aspects of the invention will be apparent to those skilled in the art from the following more detailed description taken in conjunction with the appended drawing wherein:

FIG. 1 is a perspective view of a dispensing tube having a portion of the tubular body cut away to reveal longitudinally-extending protrusions or ribs on the inner walls;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1 and showing the integral ribs on the inner wall of the tube in cross section;

FIG. 3 is an enlarged fragmentary sectional view showing the integral ribs on opposite side walls of the tube of FIG. 1 in interlocked relationship;

FIG. 4 is a perspective view of a dispensing tube cut away to reveal transversely-extending ribs on the inner walls; and

FIG. 5 is a perspective cut-away view of a generally flat or "pillow-shaped" container having means for forming a removable partition dividing the interior of the container into two cavities.

Referring now in greater detail to FIGS. 1, 2 and 3 of the drawing, a dispensing tube container **10** includes a tubular body **12**, a pinched permanent closure **14** at one end and a removable closure or cap **16** at the other end. The body **12** is preferably made of an organic material such as a plastic, and may be formed by extrusion, or other suitable method. The material selected should be one which is not affected or dissolved by the contents of the tube. Suitable and economical plastic materials are characterized in having an inherent flexibility and resilience, so that the tubular body naturally assumes a full cylindrical shape regardless of the presence or absence of contents in the tube. This quality of the material, together with its texture and surface finish, adds to the sales appeal of the container.

The inner wall **18** of the cylindrical or tubular body **12** is provided with parallel longitudinally-extending protrusions or ribs **20** which are preferably integral with the body and formed therewith by an extrusion process. Each rib, when viewed in cross section as shown in FIG. 3, is mushroom shaped and includes a supporting neck portion **22** and an enlarged end portion **24**. Adjacent ribs **20** are spaced apart an amount providing a clearance **26** therebetween which is slightly less than the maximum width **28** of the ends of the ribs. The ends **24** of the ribs **20** are provided with sharp corners **25** adapted to yield sufficiently to permit the rib to enter between two adjacent ribs on the opposite side of the inner wall, and to permit the ribs to be separated again if sufficient pressure is applied.

The ribs **20** as shown in FIG. 2 may be all alike and distributed uniformly around the inner wall of the tubular body **12**. The ribs on opposite facing sides **30** and **32** of the inner wall are clamped in staggered alignment at the end closure clamp **14**. According to an alternative arrangement, the ribs may be omitted from the facing sides **34** and **36** of the inner wall. Also, fewer ribs may be located on the facing sides **30** and **32**, if desired, but the arrangement shown is preferred because it minimizes the problem of registering the ribs on opposite walls in staggered alignment.

In the use of the dispensing tube of FIGS. 1 and 2, the cap **16** is removed and the tube is squeezed near its clamped end **14** to expel a portion of its contents. When the tube is squeezed flat, the ribs **20** on the opposite surfaces **30** and **32** of the inner wall are pressed into interlocked relationship as shown in FIG. 3. The walls remain collapsed when the pressure is removed to the extent that the contents of the tube have been expelled. By remaining collapsed, the tube is prevented from springing back to its full position and drawing air into the tube. In repeated dispensing of the contents of the tube, the tube is progressively collapsed from the clamped end **14** toward the capped end **16** until all the contents have been expelled. At all stages, the tube remains collapsed to the extent that the contents have been expelled. The collapsed state of the tube provides a visual indication of the amount of contents remaining in the tube.

FIG. 4 illustrates an embodiment of the invention which differs from that of FIG. 1 in that the ribs 20' are arranged transversely of the axial direction of the tube 10' in which the contents are expelled. Transversely arranged ribs may be somewhat better adapted for tubes on containers constructed by a wrapping and joining method. Alternatively, the ribs may be arranged at an intermediate or diagonal angle to the direction in which the contents are expelled.

In all cases the opposite sides of the wall are maintained collapsed by the interlocked ribs. However, it is possible to separate the interlocked ribs if desired. For example, the tube may be squeezed and collapsed at its center so that some of the contents is trapped at the permanently closed end 14. In this case, the squeezing of the tube near its end 14 causes enough expansive pressure on the interlocked ribs at the center of the tube to cause them to disengage and permit the expulsion of contents. At a later stage in the dispensing of the contents, the ribs at the center can again be squeezed into interlocking relationship.

While the invention thus far has been illustrated and described as applied to cylindrical dispensing tubes, the invention is also applicable to other shapes of containers, such as generally flat or "pillow-shaped" containers. FIG. 5 is a perspective view of a sectioned portion of a generally flat container made of two plastic sheets 40 and 42 sealed along the edges thereof. The inner walls of the sheets are provided with protruding interlocked ribs 44 extending in a direction to partition the container and form two cavities 46 and 48 for the same or different types of contents. The ribs may be few or several in number and may have a cross sectional shape as illustrated in FIG. 3.

The ribs provide partitioning of the contents of a container in such a manner that the ribs can be disengaged by pressing the outside of the container, as has been described in connection wtih a tube that has been collapsed at the center. The use of ribs as partitions in a container permits different, partitioned contents to remain separated until prior to use, at which time the partitioned materials may be intermixed by squeezing the container to disengage the ribs forming the partition. Then the container can be kneaded to intermix the contents before it is expelled for use. Partitioning ribs may also be employed for determining measured quantities of contents to be expelled from the container.

When it is desired that the partitioning ribs make a liquid-tight seal, the dimensions of the ribs may, of course, be modified to provide a tighter engagement than illustrated in FIG. 3. This may be accomplished, for example, by making the dimension 45 between the roots of adjacent ribs more nearly equal to the dimension 28 at the end of the interlocking rib.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that variations may be made therein without departing from the spirit of the invention.

What is claimed is:

1. A container having flexible walls adapted to be squeezed together to expel the contents from the container

and having a plurality of identical interlockable protrusions on each of two opposite inner sides of said walls to maintain said walls collapsed together after having been squeezed together, said interlockable protrusions being transversely-extending integral parallel spaced ribs, each having, in cross section, a supporting neck and an enlarged end having corners adapted to deformation, said enlarged end having a maximum width from corner to corner which is slightly greater than the space between the enlarged end corners of two adjacent ribs.

2. A container having two opposite flexible resilient walls which are normally maintained apart to accommodate contents of the container, and means to maintain said two opposite walls in contact with each other to the extent that the contents has been removed, said means comprising a plurality of parallel spaced ribs extending transversely from the facing inner surface of one of said two walls, and a plurality of identical parallel spaced ribs extending from the facing inner surface of the other of said two walls, said ribs in cross section each including a supporting neck and an enlarged end dimensioned to be forced between adjacent ribs on the opposite wall.

3. A dispensing tube, comprising a tubular body of flexible material, the entire inner wall of said body having integral uniformly-spaced transversely-extending ribs each of which in cross section includes a supporting neck and an enlarged end dimensioned to be forced between other adjacent ribs, and a pinched permanent closure at one end of said body to insure the interlocked alignment of ribs at said end.

4. A dispensing tube, comprising a tubular body of flexible material, the entire inner wall of said body having integral uniformly-spaced transversely-extending identical ribs each of which in cross section is mushroom shaped and includes a supporting neck and an enlarged end dimensioned to be forced between other adjacent ribs, a pinched permanent closure at one end of said body to insure the interlocked alignment of ribs at said end, and a removable closure at the other end of said body, whereby the progressive squeezing of the contents from said tube results in a progressive collapsing the tube.

5. A dispensing tube, comprising a uniformly-extruded tubular body of flexible resilient plastic material, the inner wall of said body having integral uniformly-spaced transversely-extending ribs each of which in cross section includes a supporting neck and an enlarged end dimensioned to have a maximum width which is slightly greater than the space between the enlarged ends of two adjacent ribs, a pinched permanent closure at one end of said body to insure the interlocked alignment of ribs at said end, and a removable closure at the other end of said body, whereby the progressive squeezing of the contents from said tube results in a progressive collapsing the tube.

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