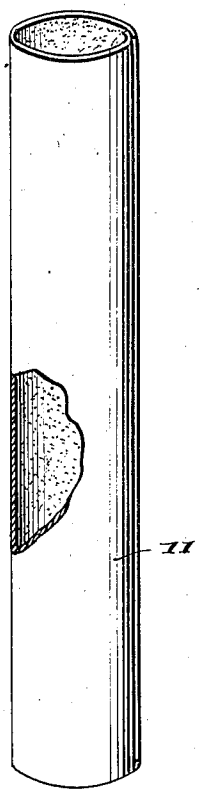
Dec. 21, 1943. J. P. NISSEN, JR 2,337,264

COLLAPSIBLE TUBE

Filed Nov. 13, 1941

Fig. 1.

Fig. 3.



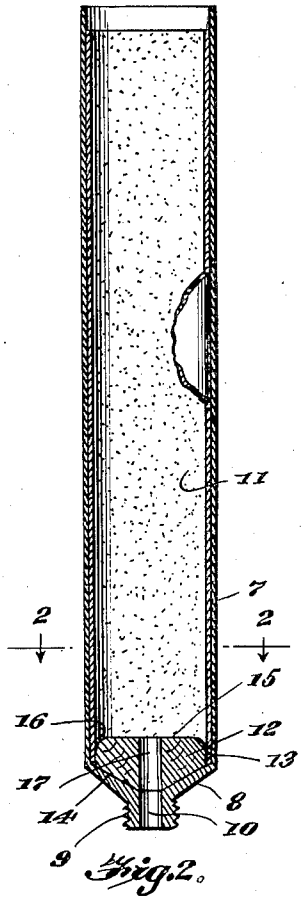


Fig. 2.

Fig. 5.

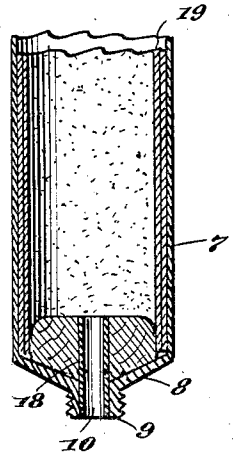
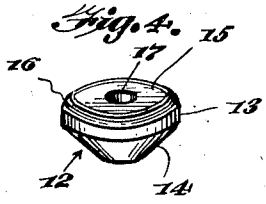


Fig. 4.



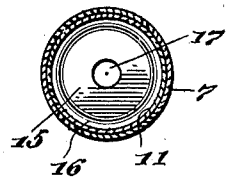
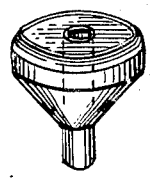


Fig. 6.



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2,337,264

COLLAPSIBLE TUBE

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Application November 13, 1941, Serial No. 418,971

1 Claim. (Cl. 221—60)

This invention relates to collapsible metal tubes for dispensing, particularly to those tubes that are provided with impervious liners.

While collapsible tubes comprising tubular side walls of single thicknesses of metal are in common use, and for containing some products are more or less satisfactory, there are weaknesses in such tubes that render them wholly unsuitable for containing many kinds of product. For example, certain products are of such nature as to be contaminated by metal of any sort usable in tubes, and similarly certain cheap metals, as lead, are unsuitable as they contaminate a wide variety of products that might otherwise be packed in them. Additionally, it has been found impractical to produce tubes that are entirely free from pin holes and minor imperfections, which, although they may be so small as to be invisible, permit escape of the contents of the tube or admission of air, particularly after the tube has been used and the walls flexed during such use. Similarly, the walls of such tubes, regardless of the metal of which they are made, are subject to crystallization and cracking after being subjected to a few flexing operations in normal use. These weaknesses render such tubes unsuitable for packaging many commodities that could otherwise be marketed in them, and detract considerably from the degree of their usefulness in the fiields in which they are to be used.

It has been proposed to use various sorts of liners inside of collapsible metal tubes in order to overcome these difficulties, but such liners have not been entirely satisfactory, due principally to the lack of provision for satisfactorily securing the liners in proper position within the tubes, and sealing the liner to the tube at the discharge end of the tubes.

The principal object of the present invention is the provision of novel means for securing an impervious flexible liner within a flexible metal collapsible tube and sealing such a liner to the tube at the discharge end thereof, whereby the liner is permanently fixed in proper position within the tube, this being accomplished without weakening the tube structure or the liner, and without rendering either liable to injury during the normal use of the tube.

In the accompanying drawing:

Figure 1 is a longitudinal median sectional view of lined collapsible metal tube assembly wherein the invention is embodied.

Figure 2 is a sectional view on line 2—2 of Figure 1.

Figure 3 is a perspective view of a liner for use in a collapsible tube.

Figure 4 is a perspective view of a device for securing a tubular liner within a collapsible tube.

Figure 5 is a fragmentary sectional view of a lined tube wherein is mounted a modified form of securing device.

Figure 6 is a perspective view of the securing device of Figure 5.

Describing the drawing in detail, and referring to Figure 1, an unfilled collapsible tube is illustrated as including a tubular side wall 7 and an end wall 8 that terminates in a threaded nipple 9, provided with an outlet passage 10. This tube structure is arranged in accordance with standard prior practice.

Within the tubular side wall 7 is mounted a liner 11, which, as shown in Figure 3, may be a simple tubular structure, open at both ends, and which is so arranged within the tubular wall of the tube as to be parallel to the latter and have its outer surface in engagement with the inner surface thereof. The forward end of the liner abuts the inner surface of the end wall 8. In order to adequately secure the liner in position in relation to the tubular wall 7, and to seal the forward end thereof to the said wall, a securing member, designated generally as 12, is arranged within the liner in such fashion as to press it securely against the surrounding surface of the tubular side wall 7.

The member 12 preferably comprises a generally cylindrical body of limited axial extent having a peripheral surface 13 that is shaped to conform to the configuration of the inner surface of the tubular wall 7 adjacent the end wall 8, a forward surface 14 that is shaped to conform to the configuration of the inner surface of the end wall 8 against which it is engaged, a flat rear surface 15, and rounded rear edges 16 connecting the peripheral and rear surfaces. The member is also provided with a central bore 17 for registration with the outlet passage 10 of the collapsible tube.

In assembling the structure the liner 11 is inserted into the tube blank, the securing member 12 is inserted through the open rear end of the blank inside of the liner and is pressed home to engagement with the end wall 8 of the tube. Tube blanks produced by present manufacturing methods have a very slight inward taper from the rear end toward the discharge end, such taper being sufficient to permit ready insertion of the securing devices 12, and to insure proper outward pressure being by them exerted

upon liners with which they are assembled in tubes in the manner illustrated.

When so positioned in a lined tube, a securing device of the kind in question presses the liner securely against the surrounding side wall in an area of the said side wall that is held against outward distortion by the adjacent end wall 8, so that a permanent and secure assembly is made, there being sufficient taper of the tube wall 7 to afford a slight wedging effect that is sufficient to render the assembly secure against accidental displacement of the liner during use, and to seal the liner to the tube wall. The peripheral surface 13 of the member 12 also supports the side wall 7 against accidental inward distortion, and the forward surface 14 affords support to the end wall 8, so that the member 12 exerts a considerable strengthening effect upon the tube structure at its discharge end. The rounded rear edge of the member 12 avoids cutting of the metal wall 7 by inward flexing of the wall during service.

In the modified form of securing device illustrated in Figures 5 and 6, the body of the securing device is identical with that previously described and similar numerals are applied to it. It differs from the previously described member in being provided with a pipette, or tubular element 18, which is mounted in the bore 17 and which is extended forwardly of the forward surface 14 of the member a sufficient distance to penetrate the bore 10 of the nipple 9 when the device is mounted in a collapsible tube. The structure is particularly valuable when the material of which the structure of the collapsible tube is made is of a kind that may contaminate the product to be packaged therein, since the liner, the securing member 12, and the pipette 18, serve to prevent contact between the contents of the tube and any part of the tube structure.

The liner used may be of any suitable material and of any desirable structure. Paper of suitable weight and characteristics to resist repeated flexing without rupturing is suitable for many products, but other impervious flexible material may be used with equal advantage. The material of the liner may be coated or impregnated with suitable material to prevent seepage or other penetration by the material with which it is used. The liners may also vary in structure, for example, the liner of Figures 1 and 2 is shown as a single thickness, spirally overlapped, and the liner 19 of Figure 5 is shown as a multiple layer spiral. Other forms may obviously be substituted, and the thickness of the liners may be regulated in accordance with the severity of conditions to which they are subjected during ejection of the contents of the tubes.

Similarly, considerable selection may be exercised in the choice of materials of which the securing members 12 are made. Suitable materials are cork, rubber, paper, plastics, but I regard wood as preferable, particularly because of its quality of absorbing fluid from the contents of the tube, and in consequence of such absorption swelling and slightly expanding, whereby the assembly of securing member, liner, and tube is made more secure after filling of the tube. Additionally, selection between different kinds of wood, made with relation to the nature of the fluid constituents of the packaged product, permits a certain degree of control of the amount of expansion of the wooden members when used with different packaged materials, as different woods will have different capacities for absorbing different liquids.

After the tube has been filled, the closing by crimping the rear end seals the liner, the liners preferably being made long enough to be engaged and folded in the crimped structure, but shorter than the tubes, so as not to project from the closed tubes.

One peculiar advantage of securing devices constructed and arranged as herein disclosed is that during use of the tubes in which they are mounted, the working of the metal walls, which are somewhat ductile, tends to form the walls about the members, particularly about the peripheral surfaces and over the rear edges, thereby increasing the security of the assembly as use of the tube progresses. This forming of the metal tube walls about the members progresses until the members are securely locked to the liners and tubes. As heretofore mentioned, the rounded rear edges of the members avoid cutting of the tube walls during this working and forming of the walls.

Apart from the just described peculiar advantage of the members in question, this invention provides a simple means of adequately securing a flexible liner within a metal collapsible tube, and sealing the liner to the tube, without materially increasing the cost of the tube either by material or labor expenses, the liners and securing members being of inexpensive material and capable of manufacture by quantity production methods, and the assemblies are readily and quickly made.

From the foregoing the construction, operation, and advantages of the herein-described invention will be readily apparent, and it is to be understood that changes in the size, shape, proportions, and minor details may be resorted to without departing from the scope of the invention as set forth in the appended claim.

I claim:

A collapsible tube structure of the character described, including a collapsible tubular body having a forwardly extending internally tapered end wall formed with an axially extending bore, a tubular liner frictionally engaged within said body and having its forward end abutting the tapered end wall at substantially the inner end of the latter, an expansible cylindrical plug of moisture-absorbing material frictionally engaged within the liner and of a size to force the latter into engagement with said body, said plug having an axial bore alined with the first named bore and a forwardly tapered end to conformedly engage the inner surface of the end wall of the body, and a tubular conduit carried within the bore of the plug and having a free end engageable within the bore of the end wall of the body, whereby said plug will expand outwardly against the liner under the influence of absorbed moisture so as to bind the liner within said body.

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