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HERMETIC CLOSURE FOR COLLAPSIBLE TUBES

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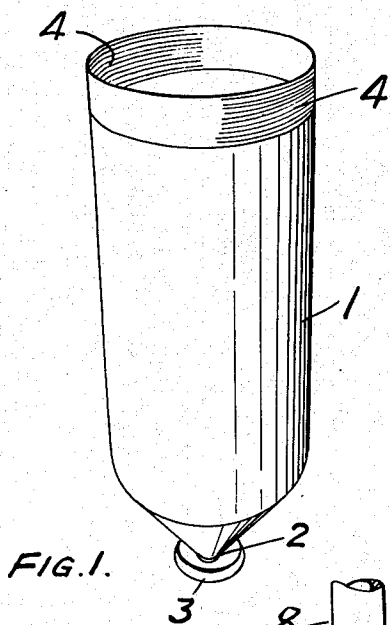


FIG. 1.

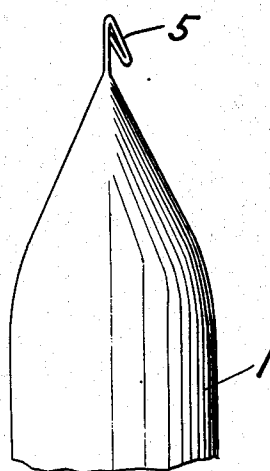


FIG. 2.

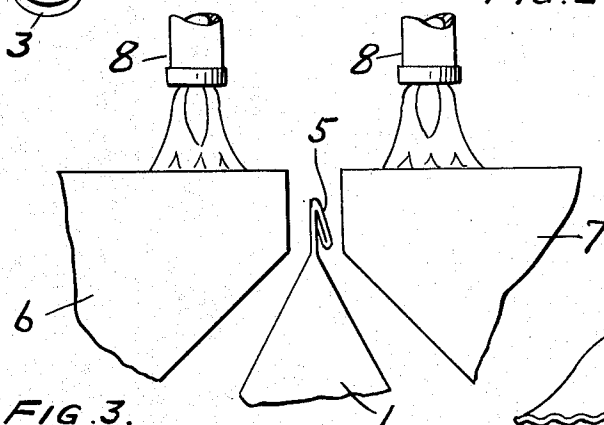


FIG. 3.

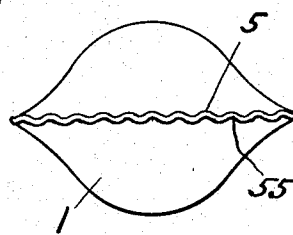


FIG. 5.

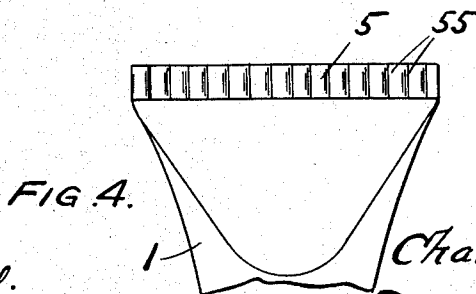


FIG. 4.

WITNESS:

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## UNITED STATES PATENT OFFICE

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HERMETIC CLOSURE FOR COLLAPSIBLE  
TUBES

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Application September 4, 1931, Serial No. 561,111

3 Claims. (Cl. 113—121)

My invention relates to collapsible or flexible tubes used as containers for pastes, creams, medicinal ointments, artists' colors, cement, etc., of a viscous or fluid nature. The tubes, which are made from soft metal or cellulose, usually have a neck at one end through which the material is squeezed out while the other end or bottom is left open to be closed after the tube has been filled by means of a number of folds made on the flattened out portion of this end. Heretofore, efforts have been made to produce a safe closure and prevent leaks or seepage of the material at this point by reinforcing the closed end with some form of clip made from stiffer material, or by using longer tubes and resorting to additional folds or extra reversed folds, but none of these methods produce a perfect seal or a hermetically closed tube. Attempts at the use of solder may have been made, but such method is impractical on account of the high temperature required as well as the cost and cannot, of course, be used with cellulose tubes.

Heretofore difficulty has been experienced by leaky tubes which permit the escape of material from the tubes or permit the entrance of air into the tubes which corrode the tubes and/or the clips forming the closures for the tubes.

The purpose of my invention is to produce a leak-proof closure which at the same time will be strong enough to resist accidental opening of the folds without having to use special reinforcing clips, longer tubes, etc., and which may be produced in a practical and economical way by automatic machinery. For this purpose I coat the open end of the tube for a predetermined distance either or both inside and/or outside with a cement, such as celluloid cement etc., which is of such nature that it will melt when touched by the last set of folding jaws or pressers, this last set of jaws being slightly heated, and instantly sets or hardens when the jaws or pressers are removed.

The tubes may be coated with the proper kind of cement by the tube manufactured at the same time they are lithographed or lacquered. There are a number of suitable cements in liquid form now manufactured which will dry when exposed to the air to a hard but flexible film. When this film is subsequently heated it melts or becomes sticky and will seal the closure forming a strong bond between the sides of the closure. The instant the heated jaws are removed the cement will set and harden.

For a further exposition of my invention reference may be had to the annexed drawing and

specification at the end whereof my invention will be specifically pointed out and claimed.

In the drawing,

Figure 1 is a view in projection of a tube before it is closed.

Figure 2 is a side view of a portion of a tube closed and partially folded.

Figure 3 is a side view of a portion of the tube and a portion of the folding jaws or pressers.

Figure 4 is a side view of a portion of a tube at right angles to Figures 2 and 3, and

Figure 5 is an end view of a portion of a tube.

In the embodiment of my invention chosen for illustration in the drawing, there is shown a tube generally indicated at 1 which may be of a non-rigid, collapsible, flexible material, such as soft metal, cellulose or the like. At one end the tube 1 has the customary neck 2 adapted to be closed by a cap 3. The material within the tube is expelled through an orifice in neck 2. The bottom or opposite end of the tube from neck 2 is left open to permit the tube to be filled through this end with the material it is to contain. At this end I coat either or both the inner and outer walls of tube 1 with a layer of a cement which will dry when exposed to the air to a hard but flexible film and which, when subsequently heated, will melt or become sticky and unite with the adjacent cement into a homogeneous mass forming, together with the folds in the material of tube 1, a hermetic seal for the lower end of the tube. A suitable cement for this purpose is a celluloid cement, such as that known to the trade by the trade-names "Williams No. 69" or "Farrels" cement.

As seen in Figure 2, a tube 1, which has been treated with such cement, is then pressed or folded to produce a fold, seam or closure 5 for the bottom end of the tube 1. This is done by a series of pressers or folding jaws similar to those illustrated in Figure 3 of which a portion is shown at 6 and 7. These folding jaws or pressers 6 and 7 are the last pair to operate on the fold 5. The jaws 6 and 7 may be heated in any convenient manner, such as by gas jets 8, electrical heaters, steam or any other convenient heating means. When the jaws 6 and 7 press on the seam 5 the layer 4 of cement melts or becomes sticky and unites into a homogeneous mass forming a hermetic seal for the lower end of the tube.

As seen in Figures 4 and 5 the seam 5 at the lower end of tube 1 may have corrugations, indentations, or wave forms 55 therein. These corrugations serve to reinforce or strengthen the seal 5.

By means of the folded seam 5 and the cement 4, which unites into a homogeneous mass, I am enabled to provide a hermetic seal for the lower end of the tube and to dispense with the clip or extra reverse folds now commonly used to close the lower ends of the tubes such as these.

I do not intend to be limited in the practice of my invention save as the scope of the prior art and of the attached claims may require.

10 I claim:

1. A process of hermetically sealing a tube of collapsible material, which process consists in, coating the entire circumferential surfaces on both sides of a tube adjacent one end thereof with cement before the tube is filled and restricting said cement to said surfaces, then closing the coated end of the tube by pressing the opposite inner walls of the tube into contact with each other without folds between them and by folding the coated end at the coated portion after the tube has been filled with the material it is to contain, and then causing the cement to unite into an impervious seal within the turns of the fold and surrounding the ends of the fold.

25 2. A process of hermetically sealing a tube of collapsible material, which process consists in,

coating the entire circumferential surfaces of both sides of a tube adjacent one end thereof with cement before the tube is filled and restricting said cement to said surfaces, then causing said cement to dry in the air, then closing the coated end of the tube by pressing the opposite inner walls of the tube into contact with each other without folds between them and by folding the coated end at the coated portion after the tube has been filled with the material it is to contain, and then applying heat to the coated portion thereby causing the cement to unite into an impervious seal within the turns of the fold and surrounding the ends of the fold.

3. A collapsible tube of bendable metal having one end hermetically sealed by a clipless closure strong enough to withstand considerable manual handling, said closure comprising, the opposite inner walls of one end of the tube compressed into alignment with each other without folds between them, a layer of cement interposed between said inner walls also bonded to the outer walls and covering said closure so as to form a coating about said closure, and a fold formed transversely of the tube at said end of the tube.

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