

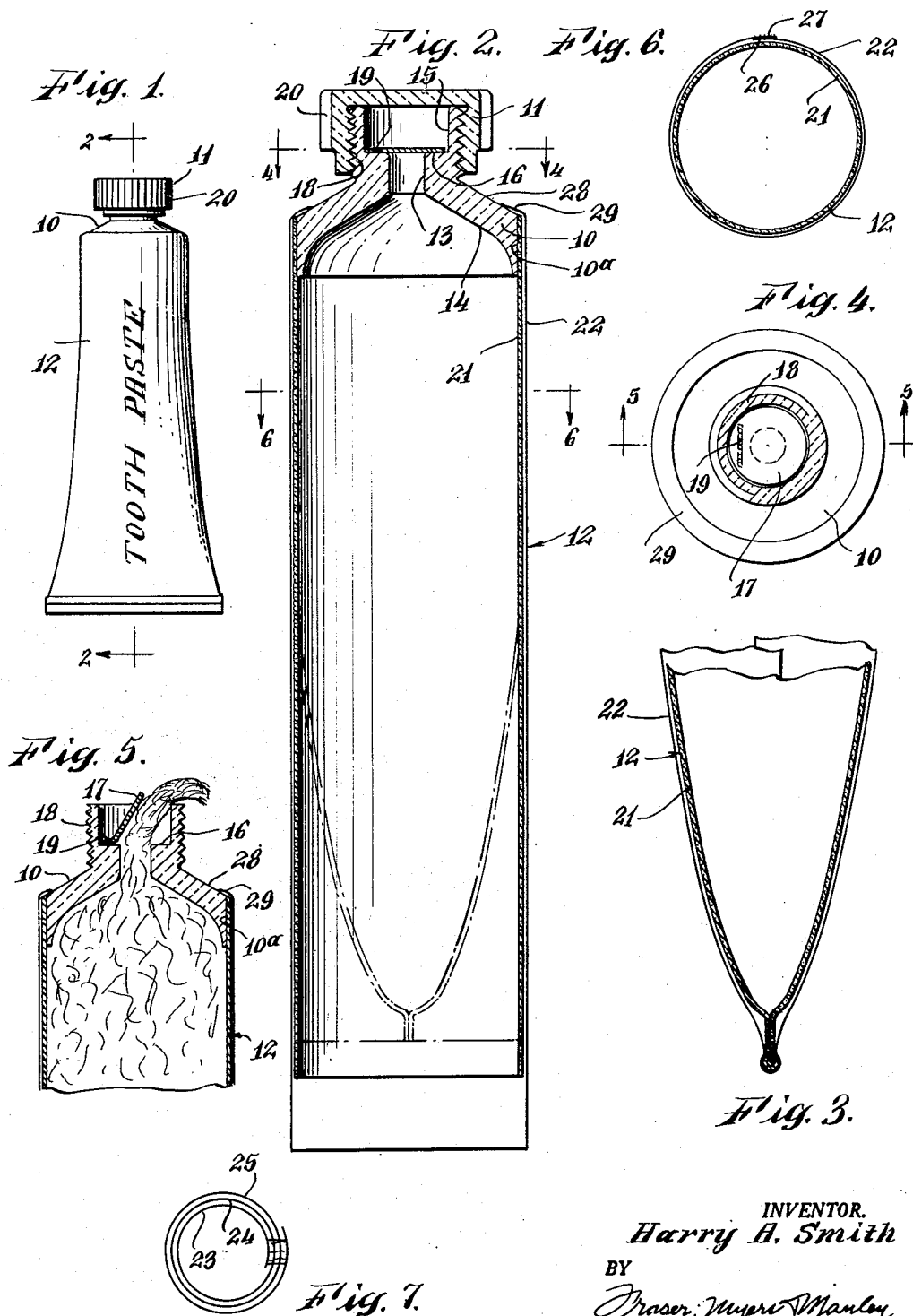
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PLASTIC TUBE FOR PASTES AND OTHER VISCOUS MATERIALS

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PLASTIC TUBE FOR PASTES AND OTHER
VISCIOUS MATERIALS

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My present invention relates to plastic collapsible tubes, containers and the like, and aims to provide certain improvements therein.

Collapsible tubes for packaging and dispensing tooth paste, medicated ointments, paints, and other viscous materials are currently made of tin, lead, aluminum and the like. Aside from being costly to produce because of the methods of manufacturing the tubes and ornamenting them prior to filling, the metals used for said purpose are now being stock-piled for defense purposes, and in the event of a war they may be so restricted as to preclude their use for making collapsible tubes. Moreover, many manufacturers of tooth paste and medicated ointments have long sought for a collapsible tube made of plastic which may be transparent or translucent, which will be impervious to the essential oils and flavorings used in compounding such products, and which will be flexible to the degree that the tube may be squeezed in the palm of the hand to dispense the contents without recourse to rolling up the tube as the contents thereof are discharged.

It is accordingly the objects of my present invention to provide a collapsible tube from plastic material which will be relatively cheap; which will be transparent or translucent as desired; which will be impermeable to moisture, oils and flavorings used in pharmaceutical preparations, cosmetics and perfumes; which will be pleasing to the feel of the hands, and which will enable advertising or decorative matter to be applied to the material from which the tube is made, prior to fabricating the tube. My invention also contemplates a novel valve disposed within the head of the tube which valve will normally seat to prevent drying or evaporation of the tube contents in the event that the cap is inadvertently not replaced on the tube.

The foregoing and other objects of my invention not specifically enumerated I accomplish by forming the collapsible tube entirely of plastic material and preferably of thermoplastic material. However, since many of said materials are permeable to certain oils and flavorings or are attacked by others, and in view of my desire to form at least the outer surface material of the tube from stock which can be pre-ornamented and imprinted, the body of the collapsible tube is preferably formed of a plurality of laminations of the same or different thermoplastic material depending upon the characteristics desired for the finished tube, which laminations may be either of preformed tubular shape or of sheet material which may be wound or rolled into tubular form and assembled so as to provide the outermost lamination with the pre-imprinted matter. The invention in its various aspects will be better understood from the detailed description which follows when considered in connection with the accompanying drawings showing two embodiments, and wherein:

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Figure 1 is an elevation of a collapsible tube embodying my invention.

Fig. 2 is a section taken substantially along the plane of the line 2-2 of Fig. 1 showing the bottom end of the tube prior to being sealed.

Fig. 3 is a fractional section corresponding to Fig. 2 of the lower end after being sealed.

Fig. 4 is a section taken along the plane of the line 4-4 of Fig. 1.

Fig. 5 is a section taken along the plane of the line 5-5 showing the valve in open position during dispensing contents from the tube.

Fig. 6 is a section taken substantially along the plane of the line 6-6 of Fig. 2.

Fig. 7 is a section corresponding to Fig. 6 and showing another embodiment of the body construction of the tube.

Referring to the drawings, the collapsible tube embodying my invention may be said to consist of a head 10, a closure cap 11 and a body portion 12, all made of plastic material.

The head 10 is preferably formed of a suitable thermoplastic material of sufficient thickness to be rigid and dimensionally stable, and has an axial passage of various diameters extending therethrough; the passage 13 of smallest diameter being intermediate the passages 14 and 15; the latter passage forming with the passage 13 a shoulder or valve seat 16 upon which a flap valve 17 is mounted. The flap valve 17 is of smaller area than the passage 15, but of sufficient size to provide a closure for the passage 13. As is conventional, the outer end of the head may be externally screw-threaded, as indicated at 18, to accommodate the closure cap 11. The head 10 may be formed of any suitable thermoplastic material which can be molded or extruded, and I prefer to use polyethylene for said purpose. The flap valve 17 is also preferably formed of polyethylene which, in sheet form, is resilient and has the inherent property of returning to its initial shape after being deformed by a force less than its elastic limit. As herein shown, the flap valve 17 is in the form of a disc of polyethylene which is heat-bonded to the shoulder 16 along a limited area of engagement, indicated at 19, to provide a hinge joint for the valve.

The closure cap 11 may be formed in any well known manner from plastic material and is internally screw-threaded for engagement with the screw-threads on the head and is preferably externally knurled or fluted, as indicated at 20.

The body portion 12 of the tube is preferably formed of a plurality of laminations of flexible thermoplastic material, two laminations 21 and 22 being shown in the embodiment disclosed in Figs. 1 to 5, and three laminations 23, 24 and 25 spirally wound upon one another, being shown in the embodiment of Fig. 7. The laminations 21 and 22 may be of the same or different thermoplastic material depending upon the characteristics desired for the finished tube. These lami-

nations may be either of preformed tubular shape or of sheet material which may be wound or rolled into tubular form and seamed in situ. It is desirable that the outermost lamination be of a character of material which can be ornamented and imprinted prior to forming the tube so that the high cost of ornamenting and/or printing the tube during the manufacture thereof may be avoided. The number and character of the laminations forming the body of the tube will also depend upon the permeability of the laminating material to the substances to be packaged in such tubes and, of course, it is preferable that at least one of the laminations will be impermeable to moisture, essential oils and flavorings used in pharmaceutical preparations, cosmetics and perfumes, while one or more of the remaining laminations may be permeable to a limited extent to such substances. I have found that by making the inner lamination 21 of polyethylene and the outer lamination 22 from a polymer of vinylidene chloride such as "Saran" or "Geon," the tube will have the necessary properties for packaging tooth pastes, pharmaceutical preparations and cosmetics. By forming the inner lamination 21 of polyethylene it may be given a thickness sufficient to afford ample "body" and strength to the tube, in which case the outer lamination which may be formed of "Saran" or "Geon" may be relatively thin, e. g., about 0.002 of an inch thick. If desired, the tube portion may be formed from a continuous sheet of suitable thermoplastic material spirally wound upon itself to provide a plurality of laminations, as shown in Fig. 7, in which case the portion of the sheet which will form the outermost convolution will be pre-ornamented or imprinted so that the body portion of the tube, when formed, will be ornamented without further recourse to a separate ornamenting or imprinting operation.

Although the body portion 12 may be made in various ways I prefer to form the inner lamination 21 of tubular stock either separately from the head 10 or integrally therewith by an extruding operation. Where the lamination 21 is formed separately from the head it may be heat-sealed around the cylindrical portion 10a of the head in any preferred manner. The lamination 21 after being secured to the head, while preferably on a mandrel, may have the lamination 22 wound therearound and the overlapping longitudinal edges 26 and 27 thereof sealed in situ. Where said outer lamination is formed of "Saran" it is preferable to heat-seal the longitudinal overlapping edges by high frequency induction current which will cause shrinkage of the head-engaging end of the lamination around the head and over the shoulder 28 thereon, as indicated at 29, to provide a secure grip onto said head. In making the tube body portion from a lamination 21 of polyethylene and a lamination 22 of "Saran," it is preferable to form the "Saran" lamination of a length to extend a substantial distance beyond the ends of the polyethylene lamination, as shown for example, prior to sealing at the bottom of Fig. 2, for the reason that "Saran" has a high shrinkage factor upon sealing.

When a tube such as shown in Fig. 2 has been formed, the head is capped by the closure cap 11 and the tube is filled through its open bottom end in a conventional manner. The open end of the polyethylene inner lamination is then heat-sealed by the hot plate method through the "Saran" lamination by a sealing temperature

sufficient to heat-seal the polyethylene but insufficient to heat-seal the "Saran." The open end of the "Saran" tube may then be sealed by applying a proper heat-sealing means thereto or by subjecting said open end to high frequency induction current to accomplish said sealing. In this connection it may be stated that in view of the extremely low dielectric loss of polyethylene, it is practically unaffected by the induction sealing of the "Saran."

The filled tube is now ready for use and in dispensing contents from said tube the cap 11 is withdrawn and pressure is applied to the walls of the tube either in the conventional manner or by grasping the same in the hand and squeezing it between the palm and fingers. Under the application of such pressure, the flap valve 11 will open, as shown in Fig. 5, to permit the contents to flow from the head. After the desired amount of substance has been dispensed, the release of pressure on the tube wall will, because of its inherent resiliency, tend to return to its original form and in the course of such action any of the substance contained in the passage 15 below the open flap valve 17 will ooze back into the tube owing to the atmospheric pressure thereon and the inherent tendency of the valve 17 to seat upon the shoulder 16. The cap 11 may then be applied to the tube to seal the same. Should the user inadvertently forget to re-apply the cap, the closing of the valve 17 will operate as a closure for the passage 12 and thus prevent, to a substantial degree, the drying of the tube contents.

While I have shown and described certain preferred embodiments of my invention it is to be understood that changes in constructional details, materials used and the methods employed in forming the tube may be varied within the range of engineering skill without departing from the spirit of the invention as defined in the appended claims.

What I claim is:

1. A collapsible tube having a body portion wholly formed of a plurality of laminations of flexible thermoplastic material, at least one of said laminations being relatively thick and formed of polyethylene and at least one of said laminations comprising a polymer of vinylidene chloride and being relatively thin compared to the polyethylene lamination.

2. A collapsible tube having a body portion formed of a relatively thick inner lamination of polyethylene and an outer lamination comprising a polymer of vinylidene chloride, said outer lamination being relatively thin compared to the inner laminations.

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