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(54) **FLEXIBLE TUBE DISPENSER FOR VISCOUS MATERIALS WITH MOVABLE INSERT AND METHOD OF ASSEMBLY**

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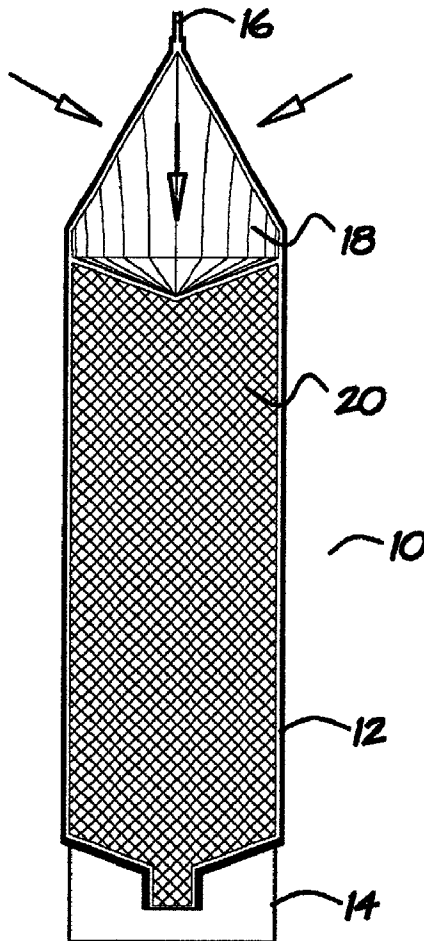
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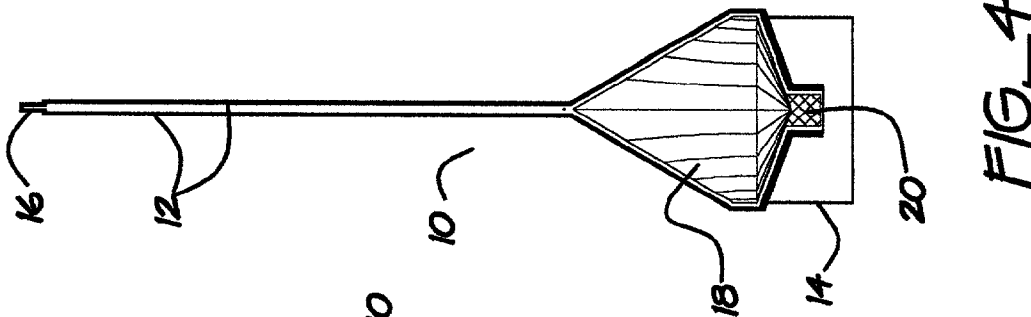
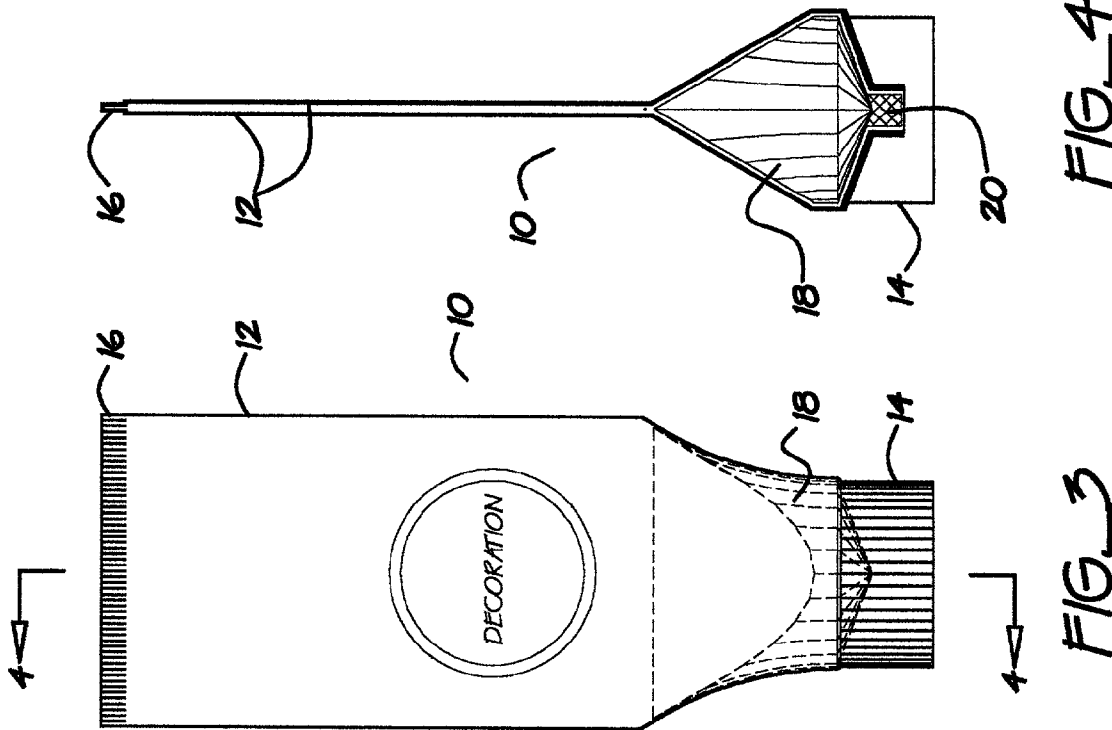
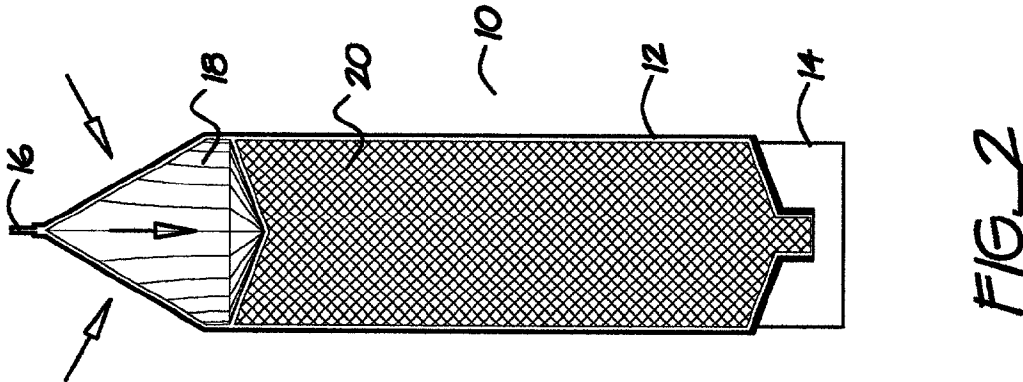
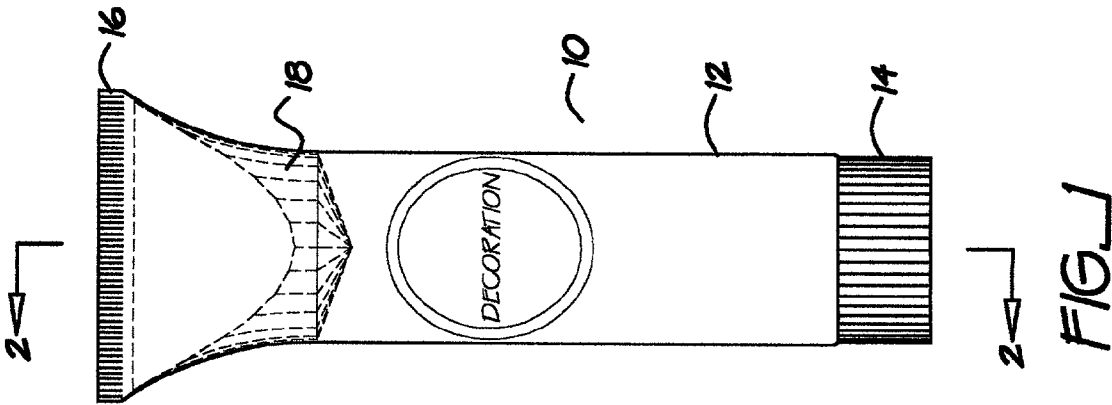
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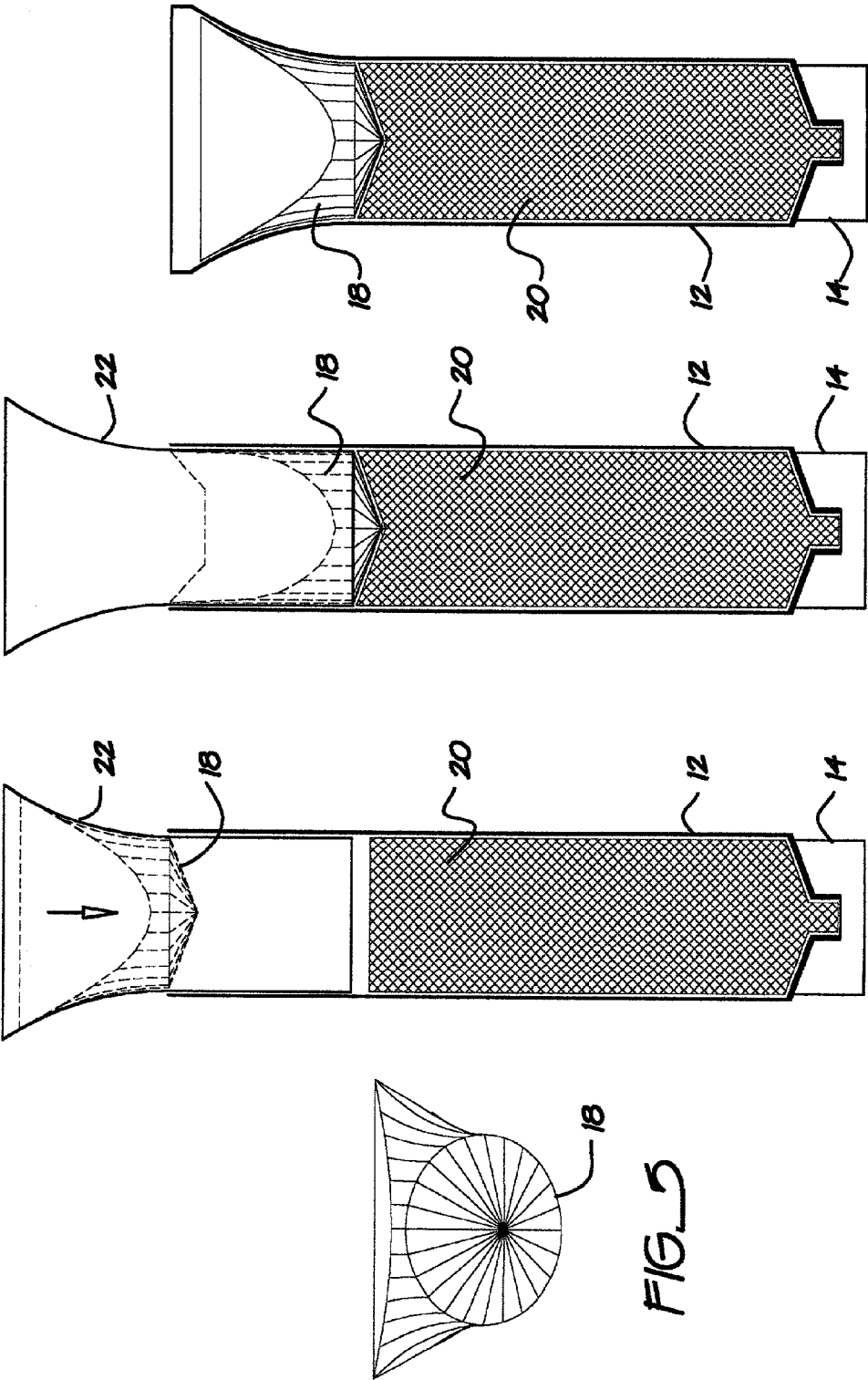
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(57) **ABSTRACT**

A cylindrical tube enclosure with flexible walls having at one end a semi-rigid dome-shaped closure with an operable opening and a flattened sealed finish on the other, and containing a movable insert initially positioned at the sealed end of the tube. By squeezing the tube dispenser the insert is moved forward toward the operable end of the tube dispensing its content of viscous material completely.







**FLEXIBLE TUBE DISPENSER FOR VISCOUS
MATERIALS WITH MOVABLE INSERT AND
METHOD OF ASSEMBLY**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

[0001] Not Applicable

**STATEMENT REGARDING FEDERALLY
SPONSORED RESEARCH OR DEVELOPMENT**

[0002] Not Applicable

REFERENCE TO A MICROFICHE APPENDIX

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] 1. Field of the invention

[0005] This invention relates generally to tube containers and more specifically to an improved tube dispenser for viscous materials, most often cream or paste.

[0006] 2. Description of the Prior Art

[0007] Flexible tube dispensers for viscous materials are widely used. They are made of various materials; e.g. flexible metal, laminated film, or injection molded plastic. The intermediate product usually is a decorated cylindrical container with flexible walls having on its one end a semi-rigid, dome shaped closure with an operable opening and is completely open at the other. In the process of preparing the final product, the container is filled through the open end and then the tube is sealed flat in a linear or curved configuration. Generally, the final product resembles an elongated wedge, circular or elliptical at the operable end and flat at the other. The user is required to open the device and squeeze the tube by hand to dispense its content. It requires variable efforts, depending on the material, construction, content and fullness of the dispenser to discharge the desired quantity of material. Fullness is the key factor in the operation of the dispensers. Depending on the material and construction, and the nature and consistency of its content, the tube usually is not filled full, the balance of the space is occupied by air. As more and more of the content are used up, the tube takes in more air or collapses and requires greater effort to operate. At some point no more of the content can be extracted, although a significant proportion of it is still in the tube. This is a considerable waste in both effort and material.

[0008] The general problem with the tube dispenser can be summarized as the lack of efficient control over the operation of the container. Often, in response to squeezing the content moves the opposite direction from the discharge opening. About halfway through its life, a tube dispenser appears mangled, disdented and may not be fully functional.

SUMMARY OF THE INVENTION

[0009] The tube dispenser of this invention is a cylindrical tube container with flexible walls having at one end a semi-rigid dome-shaped closure with an operable opening and sealed flat on the other and contains a movable insert (the advancer) initially positioned at the sealed end of the tube. The advancer maximizes the capacity of the container by defining and maintaining its shape, and allowing the user

convenient control, including dispensing of its content fully. The advancer is shaped to match both ends of the tube. It resembles a wedge or a fishtail, in fact it is a piston with wings. In other words, it derives its shape from the transition between the fully filled front compartment and the flattened empty rear compartment of the tube. Its length is determined by the optimum pitch (approximately 2:1) that is needed to move it forward by the squeezing action of the user.

[0010] As the advancer moves forward and pushes the content in front of it toward the operable opening, it keeps the front compartment full, while at the same time flattens the empty rear compartment of the tube in an orderly fashion and without any special effort on the part of the user. The relatively tight fit and the natural resistance of the side walls to deformation ensures that the advancer remains in place after it has been moved, at the same time it also allows it to return to an equilibrium position if too much pressure is built up in the front compartment for any reason.

[0011] The advancer can be of molded solid foam or injection molded hollow plastic compatible with the material and construction of the tube dispenser. In case injection molded technology is used to produce the tube dispenser, the end portion usually discarded after decoration may be designed and fashioned into the advancer. Its core may be filled with air, liquids or other compatible substance.

[0012] As the advancer is to form a tight seal with the walls of the flexible tube dispenser, it requires an appropriate method of assembly. In the preferred method of assembly, the advancer is fed through a round funnel with an outside diameter slightly less than the inside diameter of the tube dispenser and deposited on top of the viscous content as a last step before sealing the tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] **FIG. 1** is a front view (assuming a vertical position for illustration and assembly purposes) of the tube dispenser of this invention illustrating the flexible cylindrical container filled to full capacity having at one end a removable cap and a sealed closure at the other and containing a movable insert (the advancer) initially positioned at the sealed end defining its unique shape;

[0014] **FIG. 2** is a side view/longitudinal section of the tube dispenser taken along line 2—2 of **FIG. 1** illustrating the flexible enclosure filled to full capacity having an operable end and a flattened sealed closure at the other, with the advancer positioned at the sealed end on top of the content;

[0015] **FIG. 3** is a view identical to **FIG. 1** illustrating the empty tube dispenser with the advancer positioned at the operable end;

[0016] **FIG. 4** is a view identical to **FIG. 2** taken along line 4—4 of **FIG. 3** illustrating the empty tube dispenser with the advancer positioned at the operable end;

[0017] **FIG. 5** is a perspective view of the advancer;

[0018] **FIG. 6** is a front view/longitudinal section of the tube dispenser filled to capacity with the advancer feeding funnel inserted into the open end illustrating the first step of the preferred method of assembly;

[0019] **FIG. 7** is a view identical to **FIG. 6** illustrating the second step of the preferred method of assembly, the advancer is compressed and pushed into its initial position;

[0020] FIG. 8 is a view identical to FIGS. 6 & 7 illustrating the final step of the preferred method of assembly, the advancer is released in its initial position and the tube dispenser is ready to be sealed.

DETAILED DESCRIPTION OF THE INVENTION

[0021] FIG. 1 is a front view (assuming a vertical position for illustration and assembly purposes) of the tube dispenser 10 of this invention illustrating the flexible cylindrical container 12 filled to maximum capacity having at one end a removable cap 14 and a sealed closure 16 at the other and containing a movable insert 18 (the advancer), initially positioned at the sealed end defining its unique shape. The cross section of the tube dispenser illustrated here is circular but any elliptical shapes would work just the same.

[0022] FIG. 2 is a side view/longitudinal section of the tube dispenser 10 taken along line 2—2 of FIG. 1 illustrating the flexible enclosure 12 filled to full capacity with a viscous content 20 having an operable end cap 14 and a flattened sealed closure 16, with the advancer 18 positioned at the sealed end on top of the viscous content 20. This view clearly illustrates how advancer 18 defines the shape of container 12 and maximizes its capacity. The volume of advancer 18 approximately equals the unused space in similar state of the art dispenser tubes. To activate the advancer 18 requires no special effort other than squeezing the flexible enclosure 12 between the thumb and index fingers.

[0023] FIG. 3 is a view identical to FIG. 1 illustrating tube dispenser 10 empty with advancer 18 at the operable end 14. By comparing FIG. 3 with FIG. 1 it is easy to see how the movement of advancer 18 pushes the content 20 toward operable end 14, keeps the forward compartment full and flattens the empty portion of the tube dispenser behind. This dynamic process of flattening the cylindrical enclosure 12 requires no special effort on the part of the user, still, the advancer 18, due to its relatively tight fit and special configuration, encounters enough resistance to make the process orderly and to keep its place or seek a position of equilibrium.

[0024] FIG. 4 is a view identical to FIG. 2 taken along line 4—4 of FIG. 3 illustrating the flexible enclosure 12 empty of its content 20 and completely flattened. Advancer 18 is at operable end 14 of the tube dispenser; the content is fully discharged except for a very small amount in the orifice. The greatest advantage of the advancer 18 is demonstrated here, its ability to clean sweep container 12 and empty it completely through the operable end 14.

[0025] FIG. 5 is a perspective view of the movable insert 18 (the advancer). This is the heart of this invention. Its basic geometry is derived from the transition of a circular cylinder

tube into a flattened tube. The length of advancer 18 is determined by the optimum slope (approximately 2:1) needed to move it forward by squeezing the dispenser tube. Advancer 18 can be of molded solid foam or injection molded hollow plastic, compatible with the material and construction of the flexible enclosure 12. In case injection molded technology is used to produce the tube dispenser 10 the end portion, usually discarded after decoration, may be designed and fashioned into the movable insert 18. The core of the insert may be solid or hollow filled with air, liquids or other compatible substances. In order to achieve a proper fit the advancer 18 should be appropriately sized and shaped. The circular end may be fashioned into an integral packing washer. Generally, the more resilient are the walls of enclosure 12 the more firm the advancer 18 should be and vice versa.

[0026] FIG. 6 is a front view/longitudinal section of the tube dispenser 10 filled to capacity with the advancer feeding tube 22 inserted into the open end illustrating the first step of the preferred method of assembly. The advancer 18 is positioned in the feeding funnel 22 for insertion on top of content 20. The funnel 22 is sized to fit into the open end of the tube dispenser container 12.

[0027] FIG. 7 is a view identical to FIG. 6 illustrating the second step of the preferred method of insertion of advancer 18. The advancer 18 is compressed and pushed into its initial position on top of viscous content 20.

[0028] FIG. 8 is a view identical to FIGS. 6 & 7 illustrating the final step of the preferred method of assembly. The advancer 18 is released in its initial position with the feeding tube withdrawn and the tube dispenser is ready to be sealed.

[0029] While specific embodiments of the invention have been shown and described in detail to illustrate the concepts of the invention, it is understood that it may be embodied otherwise without departing from the spirit and scope of the invention. Accordingly, the scope of this invention is to be limited only by the appended claims.

What I claim as my invention is:

1. A tube dispenser for dispensing a quantity of viscous material, said tube dispenser comprising:

- a flexible enclosure having at one end an operable opening with a removable cap, a sealed closure at the other; and
- a movable insert initially positioned at the sealed end of said tube dispenser defining its shape and facilitating the complete removal of its content through the operable end.

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