

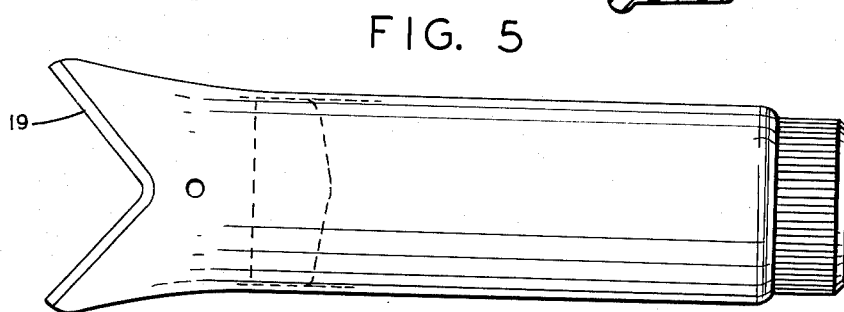
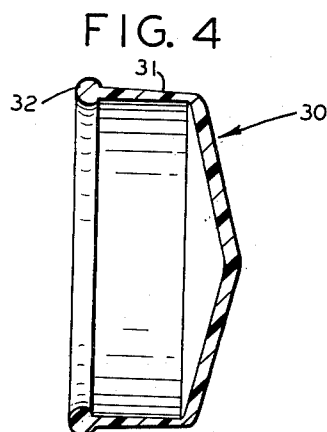
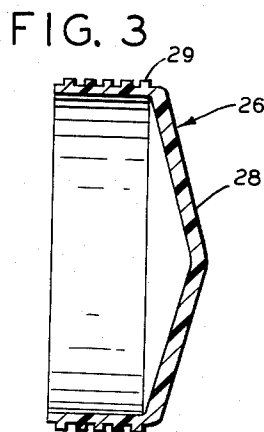
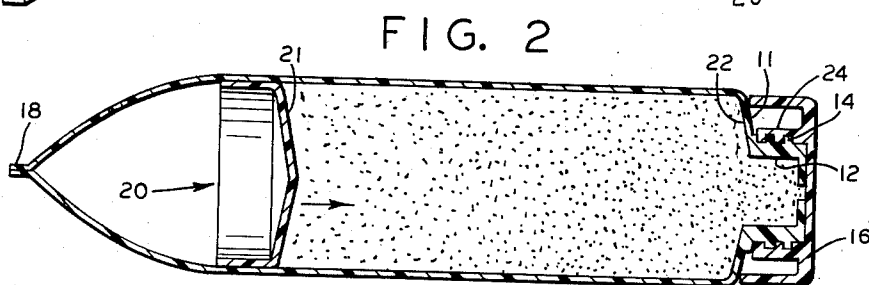
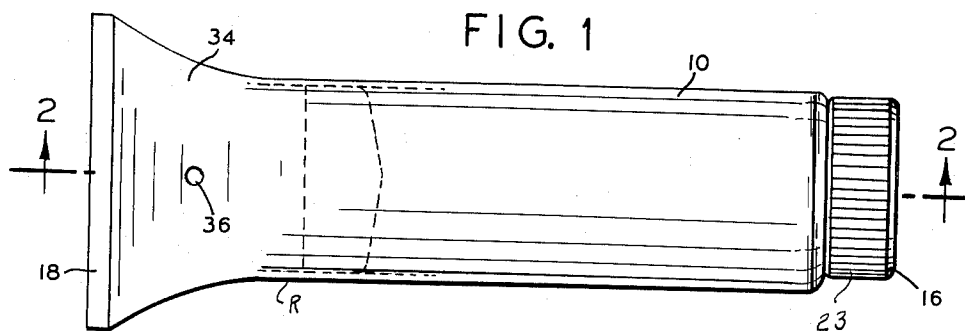
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3,201,003

DISPENSING CONTAINER

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DISPENSING CONTAINER

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This invention relates to dispensing containers for viscous fluids and relates more particularly to a flexible container having improved means for expelling from such container fluid materials such as creams, ointments, pastes and the like.

Flexible, collapsible containers for toothpaste, hair fluids, lotions and the like are formed from plastic materials and to expel the contents, the tubular container is simply squeezed at some point remote from its outer or discharge end. Unless the user is careful to discharge all the contents from this remote area, which is sealed, a considerable quantity of the contents remains after further efforts to remove them are ineffectual. Also, the tube presents an unsightly appearance long before the contents are expelled and the label frequently becomes illegible.

Possibly the greatest difficulty in this connection resides in the fact that such a tube is used by several members of a family and each one applies squeezing pressure at a different point.

An important object of the present invention is to provide a container with a snugly fitting piston which moves all of the contents ahead of it as it is driven in successive increments towards the dispensing or outer end of the tube.

A further object is to provide an inexpensive piston assembly which is driven forwardly by air pressure behind the piston and wherein the piston is so constructed as to tend to remain in a fixed position when the driving pressure is reduced to atmospheric pressure. Two factors contribute to this tendency to remain in a fixed position, one being that the annular side wall of the piston has sufficient length to provide a considerable area of contact with the inner wall of the tube. The other factor is that any such movement of the piston would induce a movement of the entire viscous mass ahead of the piston. This fact is better understood if the tube is squeezed in the area of the viscous mass and when the compressive action is released the tube springs back to its normal circular shape.

There is still another factor of lesser magnitude. The tube is generally sealed by a straight line seal which produces a tapered end section when viewed from the side. Should any pressure be exerted on the tube in front of the piston, rearward travel of such piston is restrained since such movement involves a round piston moving into an area with the contour of a flattened oval. By forming the tube from plastic material, the inner or sealed end always returns to its initial shape when the squeezing pressure is released. This would generally not be the case if the tube were made from thin soft metal alloys.

A further object of the invention is to provide a dispensable container wherein the contents are effectively sealed against the introduction of outside air which is very important in the case of foods since the air acts as a contaminant. Not only can air not move past the piston and into the top but there is no draw-back of air after the tube has been squeezed and before the cap is returned. This objection to conventional plastic tubes has largely eliminated their use for foods heretofore.

The presence of atmospheric air behind the piston, admitted through a vent hole which is closed when the tube is squeezed, may tend to dry out any small residue of the contents, but this is all located behind the piston and not in that portion of the container having the fluid. This vent hole is located close to the sealed end and under no

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condition will the piston move past the vent hole towards the sealed end.

Another object of the invention is to provide a dispensing tube where the quantity expelled is carefully controlled by the operation. Since the moment squeezing pressure is released, its flow ceases and no air is drawn back into the material carrying section of the tube.

In the drawings:

FIG. 1 shows a side elevation of a dispensing container of the present invention.

FIG. 2 is a central longitudinal section taken on line 2-2 of FIG. 1.

FIG. 3 is a section through a first modified piston.

FIG. 4 is a section through a second modified piston.

FIG. 5 is a view similar to FIG. 2 but showing a modification in the container.

The dispensing container of the present invention includes a tubular housing 10 having an open or outer end and a closed or inner end, the open end having a shoulder 11, a neck 12 of reduced diameter and having external threads 14 to receive a conventional closure cap 16. The housing may be made from some of the currently available transparent plastic materials which are flexible and may be attractively colored. The closed end has a straight transverse seal 18. It may have a generally V-shaped contour 19 when viewed from the front as in FIG. 5.

The novel structural addition to the tube is a piston 20 having a forward wall 21 shaped complementary to the inner face 22 of shoulder 11 formed at the discharge end leading to the neck. The actual diameter of the piston is of such size as to fit snugly within the bore in the tubular housing and as it advances, forcing the material out the discharge end, it wipes the inner walls clean and when its forward wall 21 contacts the inner face of the shoulder, all of the fluid has been discharged except the small amount remaining within the neck itself.

In actual practice, the piston may be identical with the cap so that a single die may be used for forming both. The cap, as shown in FIG. 1, has a knurled outer periphery, as shown at 23 and an internal collar 24 with an internal thread. It also has sufficient length, i.e., the distance from front to back, so that when the identical element is used as the piston it avoids cocking and consequent escape of the contents to an area behind the piston. If the piston is a replica of the cap, as suggested above, the internal collar is, of course, not used in the piston but it causes no harm and the presence of the useless internally threaded collar is hardly noticed.

A modified piston is shown in FIG. 3 wherein the molded element 24 has a front face 28 of the same contour on the inner face of the shoulder 22 and the outer periphery has some annular rings 29 resembling piston rings. The length of the side wall of the piston to avoid cocking has been mentioned. This length may be increased by having an annular section extending forwardly of the piston face.

In the second modification shown in FIG. 4, the piston 30 has a smooth annular wall 31 of reduced thickness and an annular head 32 at its trailing end. In this arrangement, while the annular wall is thin and therefore very flexible, the head acting independently exerts radial pressure outwardly. This type of cap is particularly useful if it is desired to have a tube which has a cross-sectional contour of oval shape or some other non-circular contour. The circular contour is most satisfactory from a functional point of view and the only probable reason for an oval shaped container and piston would be to give it a different appearance for promotional reasons.

The reason for the V-shaped seal 19, shown in FIG. 5, is to cause the tubular container to retain its tubular shape at all times in the area behind the piston. The straight

seal of FIGS. 1 and 2 sometimes causes recesses to form on each side at point R in FIG. 1 whereas with the V-shaped seal the tubular shape is maintained. This end section adjacent the seal has a vent hole 36 and when it is desired to expel some of the contents the cap is removed and the thumb or finger placed over the vent and the area squeezed from opposite sides. The liquid passes out of the neck until the pressure ceases at which time all flow ceases. This vent hole could have a closure in the form of a plug or an adhesive seal member which could be readily removed. This may increase the shelf life of the product.

While the dispensing container of the present invention is chiefly useful for cosmetic and pharmaceutical fluids and pastes, it may also have considerable usefulness for enclosing paste like foods or for fluids having a very low viscosity. It is effective in all instances wherein air is to be excluded from the mass after the closure cap has been initially removed and some of the contents dispensed.

The dispensing container of the present invention will also find particular usefulness in connection with space travel and under other conditions where there is a varified atmosphere. In cases wherein the atmospheric pressure decreases or the ambient temperature increases, there is an increase in the volume of the contents of the plastic container and under such conditions the piston moves towards the vented end, thus equalizing the pressure.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

What we claim is:

1. A dispensing container for viscous fluids comprising a flexible tubular container having a dispensing outlet at its forward end and a cap forming an airtight closure received in secured relation thereon, a flat seal extending across said container at its rear end, a generally round piston member within the container behind the contents

thereof and closely fitting the interior thereof to force said contents out of the dispensing outlet when said piston is driven forwardly, the area of the container from the piston rearwardly to the flat seal being tapered and providing an airspace, the cross section shape of the container in said tapered area progressively decreasing in roundness as the flat seal is approached, thereby offering increasing resistance to rearward travel of the generally round piston in the event that squeezing pressure is applied to the container adjacent its forward end, said tapered area of the container having a small opening which can be closed by a finger of the user when applying squeezing action to said area to develop pressure therein and drive the piston forward.

2. The structure recited in claim 1 wherein the flat seal at the rear end is generally straight.

3. The structure recited in claim 1 wherein the flat seal at the rear end has a generally V-shaped contour.

4. The structure recited in claim 1 wherein the annular side wall of the piston has a smooth outer surface.

5. The structure recited in claim 4 wherein the annular side wall of the piston is relatively thin to cause it to conform to the decreasing roundness of the containers as the flat seal is approached.

6. The structure recited in claim 1 wherein the annular side wall of the piston has a plurality of annular ribs.

7. The structure recited in claim 1 wherein the annular side wall of the piston is relatively thin and has an annular beading at its rear end.

8. The structure recited in claim 1 wherein the piston is a substantial duplicate of the closure cap.

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