Aug. 23, 1927. 1,639,699

N. M. HOPKINS

ARTICLE OF MANUFACTURE COMPRISING CONTAINER AND CONTENTS THEREFOR

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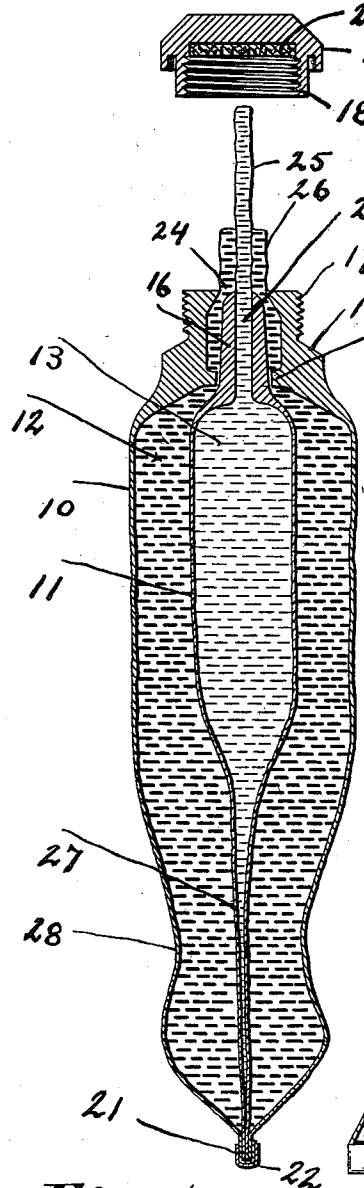

Fig. 1

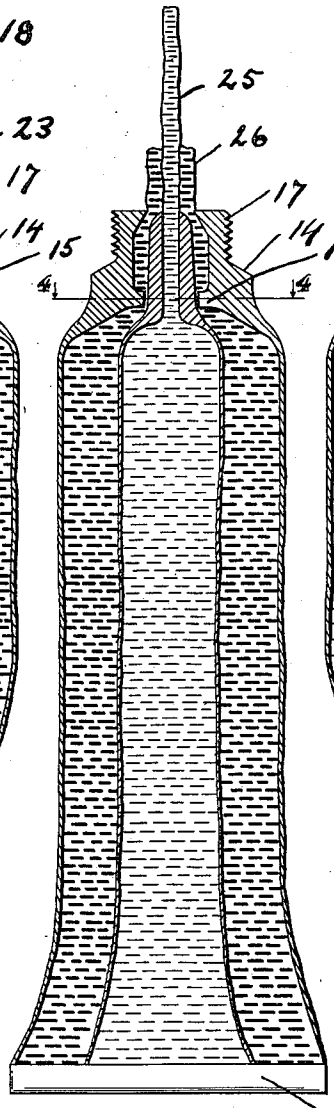

Fig. 3

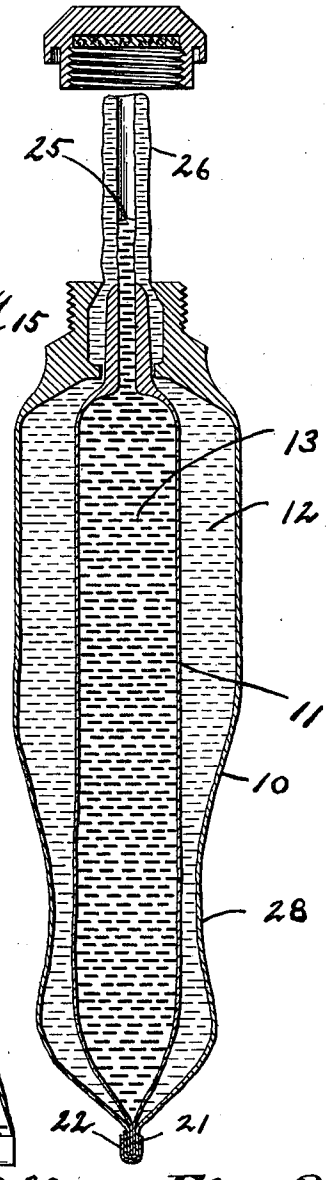

Fig. 2

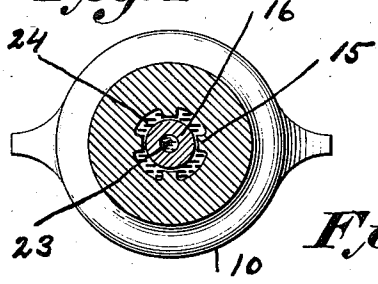

Fig. 4

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UNITED STATES PATENT OFFICE.

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ARTICLE OF MANUFACTURE COMPRISING CONTAINER AND CONTENTS THEREFOR.

Application filed August 29, 1923. Serial No. 660,029.

The object of my present invention is to provide a novel article of manufacture, comprising a multiple compartment collapsible tube of pliable metal or alloy, or such structurally associated tubes, each compartment of said collapsible tube containing a different substance, a paste or colloidal body, for example. Each paste in this colloidal body serves as a vehicle and contains a different chemical substance, the pastes being of equal or substantially equal fluidity, or degree of mobility, and pre-designed physically and chemically, to maintain, or to substantially maintain, these pre-designed respective fluidities, or degrees of mobility, regardless of time or aging, of temperature changes, vibrations, etc.

I have found in practice, that for equal extrusion volumes, or rates of flow of substance from a multiple compartment collapsible tube, as herein illustrated and descripesd, that substances of equal or substantially equal fluidities, or degrees of mobility, must be produced and be maintained, in order to provide and insure satisfactory behavior or operation in use. By satisfactory behavior is meant equal, or substantially equal, volumes, or rates of flow of material or substance from both of the two structurally associated tubes, when they are compressed at any point, not only immediately after manufacture, but after months of storage in various climates.

With reference to the accompanying drawings, Figure #1 represents a section through a multiple compartment collapsible tube, with each compartment filled with a substance, showing, upon the application of external pressure, an inordinate extrusion of substances from the inner tube. Figure #2 again illustrates a section through such a bicompartment collapsible tube system, but showing, upon the application of external pressure, an inordinate extrusion of substance from the outer tube. Figure #3 shows such an article of manufacture comprising the double tube and separated contents, turned through an angle of ninety degrees, and Figure #4 shows a section through the neck piece of Figure #3 along the broken line 4—4. With further reference to Figure #1, 10 represents the outer collapsible tube and #11 represents the inner collapsible tube. #12 represents the substance, or mixture of substances, in the outer collapsible tube and #13 represents the substance, or mixture of substances, in the inner collapsible tube. The neck piece #14 of the outer collapsible tube, carries inwardly projecting members #15 integral therewith, receiving and centering the neck piece #16 of the inner tube. The screw threads #17 are adapted to receive the screw threads #18 in the cap or cover #19, provided with the cork disk #20. Both the outer tube #10 and the inner tube #11 are sealed by the common closure #21, produced by flattening together, and folding the metal ends of the two tubes, and in clamping with the clip #22. On the other end, or upper end, egress of material may take place from the inner tube through the central orifice #23 and material may have egress from the outer tube through the surrounding orifices #24. With such a system of soft, or pliable metal collapsible tubes, thus structurally associated, containing separate pastes or colloidal substances, the inner paste, or colloidal paste, #13, is extruded more rapidly, or in larger volume, as indicated by the long core of substance #25, than the paste in the outer tube, as shown by the shorter shell of substance #26, unless the pastes are of substantially equal fluidities, or degrees of mobility. For best results, with equal areas, or substantially equal areas, of paste outlet, that is to say, the area of the outlet #23 of the inner tube, and the area of the outlets #24 of the outer tube, I prefer to make the inner paste #13 a little stiffer, or less fluid, than the outer paste #12, otherwise an undue collapse of the inner tube #11 is liable to take place, as shown at #27, when pressure at a point #28, is brought to bear on the outer tube. This phenomenon of inner tube collapse with inordinate extrusion of the inner paste or colloid is liable to take place nevertheless upon pressure exerted at any point of the surface of the outer tube #10, unless the inner paste is slightly stiffer, or less fluid, than the outer paste. Although the relative extrusion rates of the pastes in the inner and outer tubes may vary somewhat dependent upon the

relative sizes of the extrusion passageways and orifices, and upon other characteristics, I have found for collapsible tubes of commercial weights and commercial proportioning of the passageways and orifices and other characteristics, that a ten percent increase in paste stiffness in the inner tube is about right.

With further reference to Figure #2, the reverse of the behavior shown in Figure #1 is depicted, due to the fact that the outer paste #12 is more fluid than it should be over the paste #13 of the inner tube, and with the pressure exerted at the point #28 on the outer tube #10 without the collapse of the inner tube #11, thereby forcing an inordinate length or volume of the shell of paste, as shown at #26, over the length or volume of the core of paste, as shown at #25.

With particular reference to the substances which I may employ to fill the respective compartments of such a bi-compartment collapsible tube for an article of manufacture, I am selecting here, as an example, substances for a dentifrice in the form of pastes or colloids.

It is evident that pastes, or colloidal substances, may be made from gums, water and glycerine, for example, to serve as vehicles for other substances, such vehicles possessing equal degrees of fluidity, or mobility, or substantially equal degrees of fluidity or mobility, at the time of mixing or of manufacture, and because of the different chemical natures and characteristics of the different substances, a chemical or physical change, or both, may take place in one of the vehicles or in certain of the substances, incorporated in the vehicles, altering the fluidity, or mobility.

The present description relates in some detail to the operation of a system of collapsible tubes and fluids, and also to the chemical substance and physical characteristics of a re-acting type of dentifrice; it will be understood, however, that the invention is equally applicable to facial creams, shaving creams and other cosmetics dependent upon constant colloidal binders, as well as to certain compound substances employed in the arts and sciences, adapted for use in a multi-compartment collapsible tube. The following formulæ are given here, therefore, for a reacting type of dentifrice as an example of the principles involved, applicable, not only to a dentifrice, but to cosmetics in general and to other substances in the arts and sciences. The component parts of each article of manufacture under my invention are adapted for isolation in the respective compartments of a collapsible envelope, until the moment of use, and are contained in the separate compartments of a bi-compartment collapsible tube as herein illustrated and described, and furthermore, as disclosed, illustrated and described in my several previous patent applications. The following are the component parts of the compound formulæ for a reacting dentifrice.

Contents of outer tube (white carbonate paste).

32 oz. calcium carbonate; 44 oz. gum tragacanth colloid, made by adding 30 oz. water to 1 oz. gum tragacanth, allowing the same to stand for 24 hrs. and then adding 20 oz. of glycerine and 10 oz. of nulomoline, (nulomoline is the trade name for glucose or inverted sugar);

7 oz. sodium bicarbonate; ½ oz. potassium chlorate or other oxygen yielding compound; 1½ oz. corn starch powder; ¼ oz. sodium benzoate; 160 drops tincture myrrh; and 20 drops oil of eucalyptus.

Contents of inner tube (pink acid paste).

44 oz. calcium phosphate precipitated, ¼ oz. sodium benzoate; 48 oz. gum tragacanth colloid, made by adding 30 oz. water to 1 oz. gum tragacanth, allowing the same to stand for 24 hrs. and then adding 20 oz. glycerine and 10 oz. nulomoline, (nulomoline is the trade name for glucose or inverted sugar);

16 oz. powdered sugar; 6 grammes phenol; 4½ oz. tartaric acid; ½ oz. citric acid;

100 drops oil wintergreen; and powdered litmus worked into paste and added to provide the orange vegetable color, or other suitable food color, such as amaranth and naphetal, as certified by the U. S. Department of Agriculture.

In manufacturing these pastes, I use an electric motor driven stirring or mixing machine, and by inserting a wattmeter in the motor circuit I am enabled scientifically to make the two pastes of the some consistency, or fluidity, or mobility, or to make the pink acid paste say 10% stiffer than the white carbonate paste.

It has been found in practice, that the gum tragacanth employed as a colloidal binder here, will in time, at elevated temperature, such as encountered in hot summer weather in certain climates, or when stored in certain localities, adjacent to steam pipes, etc., be hydrolyzed by the action of the sodium bicarbonate, for example, and will increase in fluidity, or mobility.

In order to maintain this gum tragacanth paste or colloidal substances at the same degree of fluidity, or mobility, or substantially the same degree of fluidity or mobility, after the wattmeter control of motor manufacture, in the presence of the basic sodium bicarbonate after a lapse of time, or subjection to heat, or both, it is necessary to provide chemically, against these changes in fluidity. The addition of the corn starch powder, insoluble at ordinary temperature, in the white carbonate paste, prevents an

increase in fluidity or degree of mobility, of the paste or colloid, as a result of hydrolysis, because the powdered corn starch itself, normally insoluble, goes into solution, at the temperature of hydrolysis, and forms a starch colloid which automatically take the place of the tragacanth colloid, which has been hydrolyzed.

On the other hand, with the pink calcium phosphate paste I may do likewise, but I find in practice that it is not necessary, with the above formulæ, or formulæ upon substantially the same lines, to provide for the hydrolysis of the tragacanth, since it does not appear to break down so freely in the presence of the dilute fruit acids used. With the above compound formulæ, or with compound formulæ on substantially the same lines, I am enabled to subject my article of manufacture, comprising the double collapsible tubes, and the chemical substances contained therein, to a temperature of 50° C. or over, for a long period of time, or to a temperature of 100° for a reasonably short intensive test period, without materially changing the respective fluidity, or mobility, of either of the two pastes. By applying these principles of manufacture and chemical colloidal control to my double tube and contents, or novel article of manufacture, I secure and maintain equal, or substantially equal extrusion rates, or volumes of flow of substances from my tube, regardless of the point of external pressure application. In the same general way I am enabled to produce other satisfactory reacting toilet articles, together with other substances adapted for use in the arts and sciences, of equal, or substantially equal, fluidities, at the time of manufacture and to provide for hydrolysis of the colloidal binder, for example, and for other chemical actions which would interfere with the maintenance of previously adjusted equal, or substantially equal, fluidities or mobilities.

In some cases it is desirable to adjust this fluidity or mobility of the paste or colloids so one would be more fluid, or mobile, than the other on account of tube thickness, compartment volumes, or areas of orifice, but in such a case, as in the previous cases, it is also of great importance to predesign chemically to maintain these respective physical fluidities, or mobilities, in spite of temperature or aging.

Furthermore, I have found for multiple compartment collapsible tubes of pliable material, that pastes or colloids, even if prepared of substantially equal degrees of fluidity or mobility, must have a certain definite relative value of fluidity or mobility with relation to the thickness and stiffness of the walls of the two tubes in order to extrude simultaneously in a satisfactory manner; otherwise the smooth equal extrusion of the two colloids or pastes, is not easily promoted or maintained. I find, as a result of my researches, that pastes substantially stiffer than pastes or colloids produced by the above described formulæ, made at 80° C. do not flow as well in harmony in structurally associated tubes of commercial thickness when made of pure tin, the preferred metal.

What I claim is:

1. The herein described new article of manufacture comprising a pair of concentrically disposed collapsible tubes containing a plurality of viscous bodies the mobility of the inner body being sufficiently less than the mobility of the outer body as to cause both bodies when pressure is applied to be extruded from said tubes at the same speed.

2. The herein described new article of manufacture comprising a pair of concentrically disposed collapsible tubes containing a plurality of viscous bodies the mobility of the inner body being sufficiently less than the mobility of the outer body as to cause both bodies when pressure is applied to be extruded from said tubes at the same speed, one of said bodies containing a substance adapted to maintain its mobility constant.

3. The herein described new article of manufacture comprising a pair of concentrically disposed collapsible tubes containing viscous bodies and provided with a common outlet, the viscosity of the inner body being substantially 10% greater than the viscosity of the outer body.

Signed at New York city, in the county of New York and State of New York this 27th day of August A. D. 1923.

NEVIL MONROE HOPKINS.