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SUPPOSITORY AND METHOD OF MAKING THE SAME.

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To all whom it may concern:

Be it known that we, FREDERICK D. CRANE, a citizen of the United States, and a resident of Montclair, county of Essex, and State of New Jersey, and WILLIAM JAY SCHIEFFELIN, a citizen of the United States, and a resident of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Suppositories and Methods of Making the Same, of which the following is a specification.

Our invention relates to suppositories designed to be introduced into a passage of the body and there permitted to dissolve; and particularly to rectal or anal suppositories designed to be introduced into and for the treatment of disorders of the lower portion of the intestine by appropriate medicaments incorporated in them, or as aids to defecation because of the lubricating and stimulating qualities of the liquid which results from the dissolution of the suppository. Suppositories in accordance with our invention, however, are not limited to anal suppositories, but may be used wherever it is desired to apply a medicament in temporarily solid form to an internal surface to be treated.

The object of our invention is to provide for the use of oily bodies in general, and particularly for the use of "Russian," "Californian," and the like heavy paraffin or mineral oils such as are at present extensively used as remedies for constipation and analogous ailments as a material in making suppositories; the oil being solidified and made available in a solid form by subjecting it to the process hereinafter disclosed and the resulting mass or product then moulded or otherwise shaped into proper form; thereby providing a suppository made up almost entirely of paraffin or other oil whereby the oil may be applied locally, and the beneficial effects thereof secured without necessitating that the same traverse the entire digestive tract, as when it is taken through the mouth.

Our invention includes the method or process of making suppositories hereinafter described and explained as well also as a suppository, as a new article of manufacture, made in accordance with such method or process, and from the substances or materials enumerated or their equivalents, all as will hereinafter and at length appear.

In making suppositories in accordance with our invention we first take a quantity of paraffin or other oil which is to form the basis and indeed substantially the entire mass of the article produced, to which oil a quantity of stearic or equivalent fatty acid, preferably a fatty acid of the type generally found in nature in combination with glycerine, or a mixture of such fatty acids is added, whereupon the acid or mixture of acids is dissolved in the oil. Such fatty acids are referred to in our claims as higher fatty acids, and this term is used to include soap forming fatty acids, such as stearic, palmitic, oleic and the like acids and mixtures thereof. The step of dissolving the acid in the oil may obviously be performed in any suitable receptacle, and by the use of any suitable apparatus for securing a proper mixture of the ingredients referred to and the solution of the acid in the oil, and may be facilitated or expedited by the use of heat if deemed necessary or desirable.

The quantity of stearic or similar fatty acid which the oil may be made to dissolve varies within quite wide limits; and is dependent upon the characteristics of the particular oil or oils employed, upon the manner in which the oil is manipulated or the steps followed in securing the solution of the acid in the oil, upon the degree of heat employed in case heat is employed as is ordinarily the case, and upon other circumstances unnecessary to enumerate. Generally speaking, a quantity of from about 3% to 6% (three to six per cent) by weight of acid will result in a satisfactory suppository; and it may be here remarked that the hardness of the article produced will depend largely upon the quantity of acid employed, the same being the harder and firmer the greater the quantity of fatty acid dissolved in the oil and employed in forming the suppository,

Although we have referred to the oil employed in making suppositories in accordance with our invention as a paraffin or mineral oil, any oil or liquid in which a fatty acid is soluble may be employed, or a mixture made up of two or more of such substances; and in this connection we would

particularly mention castor oil as a substance made available by our invention for use as a basis for suppositories, and which may be used either alone or mixed with paraffin or similar oil. Also, although stearic acid has been referred to as the fatty acid to be dissolved in the oil base, other fatty acids soluble in the base employed may be used; among which we mention palmitic acid or the fatty acids obtained from cocoanut oil, as acids which we have used, both alone and mixed with stearic acid, with good results. Of course more of some acids has to be used than of others, as their solubility in a given oil base varies; although in all cases the amount used will be small as compared with the quantity or mass of oil in which they are dissolved.

Having thus prepared a solution of stearic or similar acid in the oil base from which the suppositories are to be formed we add to the said mixture or solution an alcoholate, in solution, preferably, in the alcohol from which it is formed; which reagents, upon being properly mixed together and stirred to produce a uniform distribution thereof throughout the mass thus formed, react chemically, or, as otherwise stated, the acid and the alcoholate combine to form a salt of the fatty acid and an alcohol corresponding with that from which the alcoholate was formed.

The resulting mass or mixture will presently, and upon cooling if heat is used in the working of the process as is ordinarily the case, harden and produce a solid and more or less resistant product, the ultimate hardness being dependent upon the characteristics of the materials employed and upon the circumstances above enumerated; and suppositories in a form suitable for sale and use are made from the mixture above referred to by placing proper portions thereof in suitably shaped moulds and permitting the same to harden therein.

The quantity of alcoholate used should be such that there will be no excess of it or of the acid after the reaction above referred to has taken place, and the total amount of the acid and of the alcoholate necessary to be used is small as compared with the oil, being ordinarily not in excess of 5% (five per cent) thereof; so that the suppositories produced will be composed almost entirely of the oil base from which they are made, distributed throughout a hard or jelly-like mass and thus rendered available for use in a solid form.

Although our process may be performed and suppositories made by using various alcoholates, we prefer to use sodium ethylate for accomplishing the solidification of the oil material used as a base. This ingredient is preferably made at the place where the articles are produced by adding metallic sodium, or sodium hydroxide to ethyl alcohol; the alcohol being commonly in excess of the amount required to form the alcoholate, so that the same as actually used is commonly in the liquid form, and comprises sodium ethylate held partly in suspension and partly in solution in an excess of the ethyl alcohol used in producing it.

If the alcohol used is anhydrous, and if metallic sodium is used, then an anhydrous solution of sodium ethylate in ethyl alcohol is secured, and the jelly-like mass which results from the addition of the ethylate to the oil in which the acid is dissolved and the suppositories made therefrom contain no water. If on the other hand sodium hydroxide is used in the preparation of the alcoholate, then a small quantity of water is produced by the reaction whereby the ethylate is produced; and if the alcohol is not anhydrous, more water is of course present in the resulting jelly-like mass. Inasmuch, however, as the total quantity of ingredients added to the oil to effect its solidification need not ordinarily be in excess of 5% (five per cent) of the oil, the finished product contains very little water in any case, and may be properly referred to as free or substantially free from water.

The chemical reaction following the addition of the sodium ethylate to the oil and stearic acid solution results in sodium stearate and ethyl alcohol. The sodium stearate is insoluble in the oil base employed, and forms the jelly-like mass above referred to; throughout which the oil and the ethyl alcohol produced in the reaction, as well also as any excess thereof, are distributed and held in suspension. In their final form the suppositories are exceedingly stable, retain their shape permanently, and will not spontaneously return to a liquid or non-resistant form, although they liquefy readily and quickly upon being introduced into the body and produce the characteristic effects of the oil base from which they are made.

It will be appreciated that any suitable medicaments may be mixed with or dissolved in or otherwise introduced into the oil base, or into the mass before forming the suppositories therefrom, should it be deemed desirable to do so; which substances, being obviously present in the suppositories produced, will produce their characteristic effects when the suppositories are used.

It necessarily follows that if an alcoholate other than sodium ethylate is used, a different stearate, and, incidentally, a different alcohol, will result from the chemical action which follows the addition of the alcoholate to the oil in which the acid (assumed to be stearic acid) is dissolved. Thus if metallic potassium, or potassium hydroxide, be

added to methyl alcohol, potassium methylate will be produced; and the products resulting from the addition of the alcoholate to the oil and acid solution will be potassium stearate, and methyl alcohol; the potassium stearate being a jelly-like mass which hardens, and which is for all practical purposes the equivalent of the sodium stearate first above referred to. Likewise the process may be worked by using an alcoholate produced from amyl alcohol, as by the addition of say sodium hydroxide to amyl alcohol, thus producing sodium amylate; the jelly-like product then being as before sodium stearate, and the alcohol produced being amyl alcohol; and it is here pointed out that dihydroxy or trihydroxy alcohols may be used in lieu of the monohydroxy alcohols hereinbefore cited as examples. Finally, if a fatty acid other than stearic acid is dissolved in the oil base, then salts of the particular acid used will be produced and will constitute the jelly-like mass in each of the examples above cited; that is, if say palmitic acid is used, palmites of the metals (sodium, potassium, etc.), as distinguished from stearates, will be produced, which will likewise serve to solidify the oil base employed and enable suppositories sufficiently resistant for use to be made therefrom with their assistance.

As an obvious modification of the procedure above outlined and one within the scope of our invention the proper quantity of stearic or similar fatty acid may be dissolved in one portion of an oil base to be solidified, and the proper quantity of sodium ethylate or other alcoholate added to and mixed with another portion, and the two portions then mixed together to produce the same ultimate result and product.

Having thus described and explained our invention, we claim and desire to secure by Letters Patent—

1. The process of making suppositories which consists in dissolving a higher fatty acid in an oil base adding an alcoholate of an alkali metal to the solution thus formed, and forming the resulting product into suppository form.

2. The process of making suppositories which consists in dissolving a higher fatty acid in an oil base, adding an alcohol solution of sodium ethylate to the solution thus formed, and forming the resulting product into suppository form.

3. The process of making suppositories which consists in dissolving a higher fatty acid in a paraffin oil base and adding to the solution a substantially anhydrous combination of an element of the alkali group and an alcohol in substantially stoichiometric proportion, and forming the resulting substantially andydrous product into suppository form.

4. The process of making suppositories which consists in dissolving a higher fatty acid in a base of paraffin oil and adding to the solution so obtained a substantially anhydrous combination of sodium and an alcohol in substantially stoichiometric proportion, and forming the resulting product into suppository form.

5. A suppository consisting of an oil base solidified by an alkali metal salt of a higher fatty acid in the presence of an alcohol.

6. A suppository consisting of a paraffin oil base solidified by an alkali metal salt of a higher fatty acid in the presence of an alcohol.

7. A suppository consisting of a paraffin oil base solidified by a sodium salt of a higher fatty acid in the presence of ethyl alcohol.

In testimony whereof we have signed our names to this specification at New York, New York, this 30th day of August 1918.

FREDERICK D. CRANE.
WILLIAM JAY SCHIEFFELIN.