July 14, 1936. R. H. FERGUSON 2,047,320

SOAP CREAM

Filed June 14, 1933

Fig. 1.

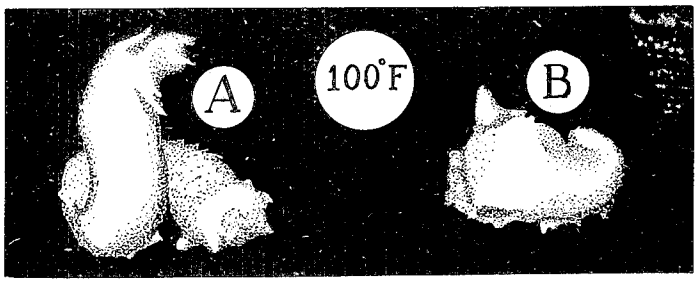


Fig. 2.

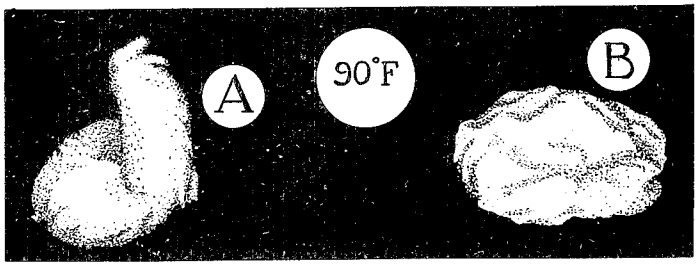


Fig. 3.

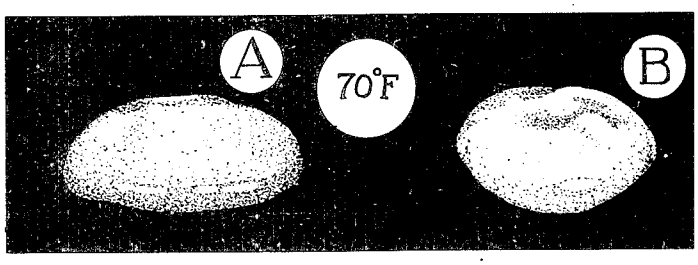


Fig. 4.



INVENTOR.
Ralph H. Ferguson

BY
Allen & Allen

ATTORNEYS

Patented July 14, 1936 2,047,320

UNITED STATES PATENT OFFICE

2,047,320

SOAP CREAM

Ralph H. Ferguson, Cincinnati, Ohio, assignor to The Procter & Gamble Company, Cincinnati, Ohio, a corporation of Ohio

Application June 14, 1933, Serial No. 675,790

8 Claims. (Cl. 87—16)

This invention relates to improvements in soap creams, suitable for use as shaving creams, or for other purposes.

Its object is to provide an improved soap cream which, besides yielding a copious and lasting lather, and having a good texture and other properties required in a good shaving cream, will retain its good creamy consistency over a wide range of temperatures, including high summer temperatures, without becoming stiff and gummy.

Pure soap creams suitable for use as shaving creams have always in the past had the objectionable feature of becoming thick and gummy at summer temperatures if they are made so as to have the desired creamy texture at ordinary temperatures of approximately 60–80° F. A good shaving cream should have the following characteristic. It must have a good creamy texture, without being so thin as to run out of the tube easily, nor so thick as to interfere with its use at ordinary temperatures; it must spread easily on the shaving brush or on the skin, must dissolve readily, form a copious lather of good lasting qualities, and contain no material harmful or irritating to the skin. In making a soap cream to meet these requirements, it has usually been found best to use mainly a solid fat or fats such as tallow or commercial stearic acid in order to obtain a soap which gives a lather with good lasting qualities, and with it a relatively small percentage of oil of the coconut type to improve the solubility and quick lathering property of the soap product. A mixture of potash and soda is commonly used to saponify the fatty ingredients because it has been found that such a mixture gives a cream of better solubility than soda alone, and a better texture than either alkali alone. It is found that creams having a real soap content of approximately 40–45%, with the balance consisting mainly of water, have a desirable texture at ordinary temperatures. Regardless, however, of the kind of fat heretofore used, or the kind or relative proportions of alkali, or the percentage of real soap in the finished neutral soap cream, it has invariably been found that if the texture is suitable for use at average temperatures, such as 70° F., for example, it will invariably be much too stiff at temperatures higher than approximately 90° F. The cream changes at these higher temperatures to a relatively stiff gummy mass which is difficult to squeeze out of the tube, tends to roll off the shaving brush, does not spread easily on the skin, and is slow in dissolving. Attempts have been made to overcome these defects in various ways, such as by adding electrolytes, or excess free fatty acid, or neutral fat, but results are only partially satisfactory, and in any event my procedure accomplishes the desired result in improving the texture, at warm temperatures, regardless of the addition of other ingredients.

My invention consists in the discovery that hydrogenated oils or fats (as described below) when used as the predominating fat constituent in soap creams, not only yield creams of good texture at ordinary temperatures, but impart to them the desirable and valuable property of retaining a creamy texture even at the highest summer temperatures without becoming stiff or gummy; that is, if made in accordance with ordinary practice, so as to have a desirable texture at temperatures of 60–80° for example, they will retain this texture even when used at temperatures of 100° F., or even higher in many cases. They will also retain a desirable creamy texture at temperatures as low at 40° F. Hence, they are always in a good creamy condition at any temperature at which they are likely to be used, either winter or summer.

Most of the common vegetable or animal oils or fats, except those of the coconut oil group, may be used after hydrogenating, such as, for example, cottonseed, peanut, soya bean, sesame, corn, sunflower, olive, linseed, rape, etc., among the vegetable oils; tallow, lard, oleo oil, tallow oil, etc., among the animal fats and oils; the hydrogenation should preferably be carried to an iodine value of 10 or lower.

The essential point is to hydrogenate a suitable oil to such a point that the product when saponified will produce soap crystals of unusually high melting range. This result is apparently due to the presence in the hydrogenated product of an unusually high percentage of saturated fatty acids like stearic acid, having 18 carbon atoms per molecule, or higher homologues, and a minimum of acids of lower molecular weight than palmitic. I have found that the fatty acids in the hydrogenated oils or fats which are suitable for my purpose always contain at least 45% of stearic acid and/or higher homologues, which percentage is considerably higher than is found in the fatty acids from any natural fat or oil, or any commercial product of same. Tallow, for example, ordinarily contains only about 15% of such fatty acids; palm oil 9%. Softer fats and natural liquid oils in general contain much less. Even commercial stearic acid contains only about 40% of actual stearic acid, with practically no higher homologues, most of the remainder being palmitic acid; rarely does the percentage exceed 42%. Oils or fats, however, which contain a sufficiently high percentage of unsaturated acids having 18 or more carbon atoms in the molecule can be hydrogenated to products containing 45% or more of stearic acid and/or higher homologues; the percentage may be as high as 90%. Such products are suitable for use in my improved soap

creams. This result is not obtained from hydrogenating coconut or palm kernel oil, but is obtained from most oils and fats outside the coconut oil group. Hydrogenated whale and fish oils may also be used, but make pure neutral soap creams of slower solubility although the texture at high temperatures is satisfactory.

Oils, fats, or fatty acids suitable for this purpose may be most easily selected by the following test: First hydrogenate until the iodine value is reduced to 10 or lower. Then convert 100 grams of the oil (or 95 grams of fatty acids) to potassium soap by boiling with caustic potash solution according to well known soap making procedure, taking care to avoid an excess of caustic potash, and adding sufficient water to give a total weight of 240 grams when finished. The resulting soap cream (containing the liberated glycerine if neutral stock was used), will contain about 40% fatty acids or about 45% real soap. Transfer a portion to a tight bottle, cool to 70° F., and hold at about this temperature for twelve hours or longer; then place in an oven at 95° F. for two hours, retaining another portion of the orignal soap cream at about 70° F. for comparison. If the potash soap thus made retains its opaque and creamy form and does not become gummy at 95° F., the hydrogenated oil or fat from which it was made will be suitable for use in making my improved product.

Formula A (below) shows a typical formula for making a pure shaving cream of the prior art, although small percentages of other ingredients, such as glycerine, salt, perfume, etc., are often added. This cream will make a good and lasting lather, and is of proper texture at ordinary temperatures, but changes to the usual gummy condition at temperatures of approximately 90° F.; it is difficult to keep it on the shaving brush or to spread it on the skin when used at these higher temperatures.

Formula B is the same except that the fatty acids from hydrogenated cottonseed oil (hydrogenated to an iodine value of less than 10) have been substituted for the commercial stearic acid of formula A. This cream shows practically identical texture at ordinary temperatures as does that from Formula A, but when used at temperatures above 90° F. it differs markedly in that it retains almost unchanged its creamy texture and can be spread on the brush or spread on the skin without difficulty, even at temperatures as high as 100° F.

Formula A

	Per cent
Commercial stearic acid	35.2
Coconut oil	4.8
Caustic potash, 42.2° Bé	17.6
Caustic soda, 42.2° Bé	2.9
Water	39.5
	100.0

Formula B

	Per cent
Fatty acids from hydrogenated cottonseed oil	35.2
Coconut oil	4.8
Caustic potash, 42.2° Bé	17.6
Caustic soda, 42.2° Bé	2.9
Water	39.5
	100.0

Both of these formulas will produce good soap creams, by ordinary soap making procedure, that will contain about 45% real soap, will be nearly free from unsaponified fatty material, and will contain no free alkali or other irritating ingredient.

Reference to the drawing, which is made from actual photographs, will show the difference in texture clearly.

The Figures 1 to 4 represent two samples of shaving cream made from Formulas A and B, respectively, as expelled from the usual form of collapsible tube at temperatures of 40° F., 70° F., 90° F., and 100° F., as indicated.

In all these cases, the creams were expelled from the tubes simultaneously and in equal amounts, and the photographs taken exactly one minute after the creams were expelled. It will be noted that at temperatures of 40° and 70° F., both samples were of such a soft creamy texture that they readily flattened out to a considerable extent, as should be expected. At 90° and 100° F., however, A, the prior art product, is so stiff and gummy that it will not flatten out, but B, the product of this invention, has flattened out, showing that its consistency even at the highest of these temperatures is practically the same as at lower temperatures, even as low as 40° F. It retains a good creamy consistency at all temperatures from 40° F. or lower up to temperatures considerably above 100° F.

The difference between these two creams is due to no other factor than the use of the hydrogenated oil (or fatty acids), and the difference in consistency and utility at warm temperatures is very striking. The same kind of improvement is found in all cases where hydrogenated oil or fat of the class described, and producing a soap of unusually high melting range, is substituted for ordinary commercial fats and oils in shaving creams. It is, of course, understood that in making the soap cream it is immaterial whether the hydrogenated oil or fat itself is used, or the fatty acids from same; the fatty acids may even be hydrogenated directly. The resulting soap cream will be practically identical, although when a neutral oil or fat is used, there will be a small amount of glycerine liberated by the saponification, instead of the water which is liberated by saponification of fatty acids, but this has no pronounced effect on the texture of the product.

While I have used commercial stearic acid in the example, this is merely because it has been found to be one of the best materials available for making soap creams in the prior art, of good texture, lathering properties and consistency at moderately warm temperatures, but it should be understood that this is used merely as one example of fatty substances well known to make relatively good soap creams. The same superiority of my soap creams would be at least equally obvious if any other ordinary fatty material had been chosen in place of stearic acid in the example.

The explanation of this improved and rather unexpected action obtained by the use of hydrogenated oils producing soaps of unusually high melting point as a dominant constituent in the fat formula is probably as follows: Soap creams normally consist at ordinary temperatures of a mass of fine crystals of soap surrounded by a quantity of soap solution. These crystals are readily apparent when the creams are examined under a microscope. The use of both soda and potash in making the soap gives the cream this advantage, that the soda and potash soaps crystallize in different forms which interlace with each other and prevent forming a solid compact

mass, such as might otherwise occur if the crystals all had the same form, especially if only soda were used. As long as the mass consists of crystals surrounded by soap solution, it retains its creamy consistency, but when the cream is heated to a certain point, varying with the nature of the fat used and the alkali, percentage of water, etc., the crystals eventually melt or change to a different soap phase. This change is from a mixture of crystals and solution, not to a liquid solution, but to the phase described in modern text books as "middle soap", which is the gummy condition previously referred to, and then it loses its creamy consistency.

Attempts to make a cream which will stand higher temperatures without becoming gummy by using fats which make soaps of lower melting range or by increasing the water content of the mass or other apparently simple means, have always failed because in all such cases the result is to make the cream too soft for use at ordinary temperatures, and in any event, it will still change to the gummy phase at moderately warm temperatures.

A temperature range of about 2° to 6° F. is usually necessary to complete the change to the gummy condition; that is, if a given soap cream begins to change to the "middle soap" phase at 87° F., for example, the change will be completed by the time the temperature reaches about 91° and little if any further change takes place on further heating within any ordinary range of temperature. With ordinary pure neutral soap creams, this change is substantially completed at temperatures varying from about 80 to 90° F. Soap creams can be made by my improved procedure, however, which will remain in the phase composed of crystals surrounded by soap solution until heated to temperatures of about 100° F., or even to 105° F. before changing to the "middle soap" or gummy phase, and thus have a desirable creamy texture over a wide range of temperature covering all the temperatures commonly met with in winter and summer conditions, including high summer temperatures at which ordinary soap creams assume the gummy state.

The proportion of hydrogenated oil in the total fat mixture necessary to keep the transition point to the "middle soap" phase above any predetermined point such as 95° F., for example, varies considerably according to circumstances and can best be determined by experiment in each case, but in general at least 50% of the fat in the formula should consist of hydrogenated oil as described. If the balance of the formula consists of fat or fatty acids yielding soap of relatively high melting point, such as commercial stearic acid, then the use of as little as 50% of hydrogenated oil will be found to give greatly improved results, but higher percentages will cause the product to stand a still higher temperature before changing to the gummy condition. If, however, the balance of the fat consists of fats or oils yielding soap of relatively low melting range, then it is necessary to use in all cases considerably higher percentages of hydrogenated oil in the mixture. I find that a fat formula consisting of about 85 to 90 parts of a suitable hydrogenated oil with 10 to 15 parts coconut oil (or their equivalent fatty acids), yields a soap cream of good properties which withstands the highest summer temperatures very satisfactorily, when made with substantially the relative proportions of potash and soda and under substantially the preferred conditions shown in this specification and in the example.

It should be understood that while I have mentioned the use of these soap creams for shaving purposes, this is by no means their only use, but they are well suited for many other uses, such as for general toilet use and for use in soap dispensers, etc.

It should also be understood that the terms "hydrogenated oil" and "hydrogenated fat" as used herein are essentially synonymous, and the term "hydrogenated oil" as used in the claims therefore covers either a fat or a fatty oil which has been hydrogenated, as described, or the fatty acids from same.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F. which when examined under a microscope at any temperature in this range is found to comprise crystals of soap in a mother liquor, said soap cream characterized in that of the real soap content thereof more than half thereof is made from oils suitable for soap making other than those of the coconut class, hydrogenated to an iodine value of not over 10.

2. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F. which when examined under a microscope at any temperature in this range is found to comprise crystals of soap in a mother liquor, said soap cream characterized in that of the real soap content thereof more than half thereof is made from oils suitable for soap making other than those of the coconut class hydrogenated so as to contain more than forty-five per cent of saturated fatty acids having at least eighteen carbon atoms per molecule.

3. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F. which when examined under a microscope at any temperature in this range is found to comprise crystals of soap in a mother liquor, said soap cream characterized in that more than half of the fatty acids contained in same are hydrogenated saturated fatty acids suitable for soap making having at least eighteen carbon atoms per molecule.

4. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F. which when examined under a microscope at any temperature in this range is found to comprise crystals of soap in a mother liquor, in which cream the creamy consistency at temperatures from 90° F. to 100° F. is due to the use of soap made from oils suitable for soap making other than those of the coconut class hydrogenated to an iodine value of not over 10, said soap constituting more than half of the total real soap present.

5. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F. which when examined under a microscope at any temperature in this range is found to comprise crystals of soap in a mother liquor, in which cream the creamy consistency at temperatures from 90° F. to 100° F. is due to the use of soap made from oils suitable for soap making other than those of the coconut class hydrogenated so as to contain more than forty-five per cent of saturated fatty acids having at least eighteen carbon atoms per molecule.

6. A soap cream having a creamy consistency

throughout the range of temperatures from 40° F. to 100° F. which when examined under a microscope at any temperature in this range is found to comprise crystals of soap in a mother liquor, in which cream the creamy consistency at temperatures from 90° F. to 100° F. is due to the use of soap in which more than half of the fatty acids present are hydrogenated saturated fatty acids having at least eighteen carbon atoms per molecule.

7. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F., said soap cream characterized in that of the real soap content thereof more than half thereof is made from oils suitable for soap making other than those of the coconut class, hydrogenated to an iodine value of not over 10.

8. A soap cream having a creamy consistency throughout the range of temperatures from 40° F. to 100° F., said soap cream characterized in that more than 45 per cent of the fatty acids contained in same are hydrogenated saturated fatty acids suitable for soap making having at least eighteen carbon atoms per molecule.

RALPH H. FERGUSON.