Patented Sept. 21, 1937

2,093,863

UNITED STATES PATENT OFFICE

2,093,863

TEXTILE OILS

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No Drawing. Application December 1, 1933, Serial No. 700,618

22 Claims. (Cl. 87—9)

This invention relates to improvements in textile oils and more particularly to improvements in oils intended for the preparation of textile fibres for use in knitting machines, weaving machines and other textile machinery.

It is necessary, in the handling of textile fibres, to subject them to the action of machines which tend to rub and fray the individual threads or fibres. It is customary, prior to such operations, to impregnate the fibres with a fatty or oily substance which will act as a lubricant and thus decrease the wear upon the threads thereby decreasing the deleterious effect of rubbing in the machines. The fatty or oily substances which have customarily been employed, up to the present time, have comprised saponifiable oils mixed with a soap or a partially saponified oil. Recently it has been proposed to replace the saponified oils, either in whole or in part, by mineral oils of suitable viscosity characteristics. It has also been proposed in Patent 1,871,899 to employ oleic acid and the soaps of oil soluble sulfonic acids derived from mineral oil by treatment thereof with strong sulfuric acid.

After the textile fibres have been knitted or woven into fabric or otherwise handled in the various textile machinery, it is desirable and, in many cases, necessary to subject them to wet treatments such as bleaching or dyeing. If the textile fibres contain any material amount of oily materials, the bleaching or dyeing will be uneven and the fabric ruined. Accordingly, it is necessary to remove the oily or fatty substances from the textile fibres after the knitting, weaving and like operations have been completed. Therefore, materials such as soaps, oleic acid, sulfonated oils and the like have been added to the fatty or oily substances for lubricating the fibres in order that such fatty and oily substances may be removed from the fibres prior to bleaching, dyeing and like operations. The various materials, heretofore added to textile oils, have not proved to be entirely satisfactory since, even with these materials, it has been exceedingly difficult to remove the fatty or oily substances with sufficient completeness.

An object of the present invention is to provide textile oils of improved properties in the lubricating and softening of textile fibres without decreasing the tensile strength of the fibres to any substantial extent. A further object is to provide textile oils which may be more readily and completely removed from the textile fibres. A still further object is to provide a method for treating textile oils to improve their lubricating and softening properties and to render them more readily and completely removable from the fibre. Another object is to provide an improved method of lubricating and softening textile fibres without substantially decreasing their tensile strength. Other objects are to provide new compositions of matter and to advance the art. Still other objects will appear hereinafter.

These objects may be accomplished in accordance with our invention which comprises incorporating monohydric fatty or oily alcohols in textile oils comprising one or more of the mineral oils, saponifiable oils, oleic acid, soaps and sulfonated mineral oil soaps which have been employed heretofore.

Our invention is based upon the discovery that the monohydric fatty and oily alcohols may be readily admixed with any of the usual textile oils and, so admixed, will improve the lubricating and softening properties of the oils and will, at the same time, render such oils more readily and completely removable from the textile fibres by the ordinary and customary methods of washing such fibres. By the terms "fatty" or "oily alcohol", as employed herein, we intend to include aliphatic alcohols containing 12 or more carbon atoms which alcohols may be of the unsaturated or of the saturated series.

The textile oils of our invention are preferably prepared by mixing together from about 90 to about 60 parts of a purified mineral oil of low viscosity, say from about 40° to about 150° Saybolt at 100° F., with from about 1 to about 20 parts of oleic acid and from about 1 to about 20 parts of a monohydric fatty or oily alcohol containing at least 12 carbon atoms. The mineral oil may be replaced, in whole or in part, by a saponifiable oil such as olive oil or a partially saponified oil. The oleic acid is preferably partially neutralized by the addition of a concentrated solution of an inorganic base such as ammonium, sodium and potassium hydroxides, or by an alkyl amine such as diethylamine, dibutylamine, amylamine and trimethylamine to form an acid soap. It is to be understood that the acid soap may be formed before addition to the oil. However, desirable results will be obtained if no part of the oleic acid has been neutralized. Desirable results have also been obtained when part of the oleic acid was replaced by soaps of sulfonated mineral oils such as are described in Patent 1,871,889. Also, smaller amounts of other ingredients such as oil soluble dyes, odorants and blending agents, such as butyl alcohol or cyclohexanol, and antioxidants, such as catechol, hydroquinone and p-benzyl-amino-phenol, may also be added to our textile oils, as desired.

In order to more clearly illustrate our invention, the preferred modes of carrying the same into effect and the advantageous results to be obtained thereby, the following examples are given:

Example I

A mixture was prepared from 80 parts of refined mineral oil (viscosity 50 sec. Saybolt at

100° C.), 11 parts of commercial lauryl alcohol, 8 parts oleic acid and the whole stirred vigorously while 1 part of concentrated ammonia solution (28%) was added. The finished oil was a clear amber liquid, having a viscosity of about 54 sec. Saybolt at 100° F.

Example II

A mixture was prepared from 70 parts of a refined mineral oil of low viscosity (about 70 sec. Saybolt at 100° F.), 10 parts of pure oleyl alcohol, 14 parts of sodium soaps of a sulfonated mineral oil, 5 parts of oleic acid and the whole stirred vigorously while 1 part of 40% potassium hydroxide solution was added. The product was a clear light brown oil having a viscosity of about 78 sec. Saybolt at 100° F.

Example III

A mixture of 62 parts of refined mineral oil, 15 parts of olive oil, 6 parts oleic acid and 5 parts commercial oleyl alcohol (iodine number 81) was stirred vigorously while 1 part of 35% sodium hydroxide was added. The slight cloudiness of the oil was then removed by the addition of 1 part of methyl cyclohexanol. The finished oil was a clear yellow liquid of low viscosity.

In oils for textile purposes, for example in the coning or knitting of rayon and in the weaving of wool, it is of extreme importance that the oil be readily and completely removable from the fiber. This property is possessed by the products of our invention to a high degree.

To test this property two of the oils prepared according to the present invention were compared with an oil such as is ordinarily used at present. The latter was prepared in the same manner from the same ingredients as given in Example III with the exception that the oleyl alcohol was omitted. This oil was designated IV and was used for purposes of comparison with the products of Examples II and III, designated II and III, respectively.

Three portions of the same lot of rayon in skein form were then impregnated in a similar manner with the three different oils. Each portion was then divided into three samples, one of which was extracted with a suitable organic solvent and the percentage of oil taken up thus determined. One sample of each set was then washed in an identical manner in water containing 0.25% soap and 0.125% sodium carbonate at 140° F. The third sample of each set was washed in water containing 0.30% sodium carbonate alone at 140° F. After washing, the samples were then thoroughly dried and the residual oil determined by extraction. It is obvious that by this test the oil which is most completely removed by washing is the most suitable for the purposes described. The results are shown in the following table.

Table

Oil No.	Oil content of rayon		
	Original	After soap—Na_2CO_3	After Na_2CO_3
II	4.12%	0.39	0.17
III	3.98	0.67	0.54
IV	4.55	1.37	0.86

Both in percentage of total oil removed and in absolute amount of oil remaining, Oil Nos. II and III are superior to IV. This is particularly true where the soap and sodium carbonate wash was used, which is more usual in commercial practice than the more vigorous treatment with sodium carbonate alone.

Although the results cannot be evaluated in a quantitative fashion, it has also been found that textile fibers treated with the products of the invention possess a softness and suppleness superior to that of the same fibers treated with oil of identical composition except that the fatty alcohol was omitted. This property must therefore be attributed to the fatty alcohol.

Oils produced in accordance with our invention have no tendency to discolor textile fibers treated with them or to give rise to disagreeable odors. For instance, rayon skeins impregnated with oils as given in the three examples showed no change in color during baking at 230° F. for a period of two hours.

The products of our invention are suitable for the purpose of lubricating and softening viscose, nitrate, cuprammonium and acetate rayons or silk in preparation for coning or for knitting. They are also useful for preparing wool and silk for spinning and weaving. They are superior to other products which have heretofore been employed for this purpose, in the ease and completeness with which they may be removed from the fibre and also in softening and improving the feel of textiles, even after washing.

Other alcohols coming within our class and which merit special mention are the following:

Linoleyl, ricinoleyl, tetradecyl, cetyl, octadecyl, ceryl, myricyl, and batyl.

While we have disclosed the preferred embodiments of our invention, it will be readily apparent to those skilled in the art that many variations and modifications may be made therein without departing from the spirit of our invention. Accordingly, the scope of our invention is to be limited solely by the appended claims construed as broadly as is permissible in view of the prior art.

We claim:

1. A mineral oil for lubricating textile fibres having incorporated therein a small amount exceeding 1% of a monohydric aliphatic alcohol containing at least 12 carbon atoms sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

2. A mineral oil for lubricating textile fibres having incorporated therein a small amount exceeding 1% of oleyl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

3. A mineral oil for lubricating textile fibres having incorporated therein small amounts exceeding 1% of oleic acid and a monohydric aliphatic alcohol containing at least 12 carbon atoms sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

4. A mineral oil for lubricating textile fibres having incorporated therein small amounts exceeding 1% of oleic acid and oleyl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

5. A mineral oil for lubricating textile fibres having incorporated therein small amounts of oleic acid, an alkali hydroxide insufficient in amount to render the oil alkaline and small

amounts exceeding 1% of a monohydric aliphatic alcohol containing at least 12 carbon atoms sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

6. A mineral oil for lubricating textile fibres having incorporated therein small amounts of oleic acid, an alkali hydroxide insufficient in amount to render the oil alkaline and small amounts exceeding 1% of oleyl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

7. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of a monohydric aliphatic alcohol containing at least 12 carbon atoms and subsequently removing the oil from the fibre by washing in an aqueous solution.

8. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of oleyl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

9. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of oleic acid and a monohydric aliphatic alcohol containing at least 12 carbon atoms and subsequently removing the oil from the fibre by washing in an aqueous solution.

10. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of oleic acid and oleyl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

11. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts of oleic acid, an alkali hydroxide insufficient in amount to render the oil alkaline and small amounts exceeding 1% of a monohydric aliphatic alcohol containing at least 12 carbon atoms and subsequently removing the oil from the fibre by washing in an aqueous solution.

12. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts of oleic acid, an alkali hydroxide insufficient in amount to render the oil alkaline and small amounts exceeding 1% of oleyl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

13. A mineral oil for lubricating textile fibres having incorporated therein a small amount exceeding 1% of lauryl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

14. A mineral oil for lubricating textile fibres having incorporated therein small amounts exceeding 1% of oleic acid and lauryl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

15. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of lauryl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

16. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of oleic acid and lauryl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

17. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts of oleic acid, an alkali hydroxide insufficient in amount to render the oil alkaline and small amounts exceeding 1% of lauryl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

18. A mineral oil for lubricating textile fibres having incorporated therein a small amount exceeding 1% of octadecyl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

19. A mineral oil for lubricating textile fibres having incorporated therein small amounts exceeding 1% of oleic acid and octadecyl alcohol sufficient to render the oil more readily and completely removable from the textile fibres by washing in aqueous solution.

20. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of octadecyl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

21. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts exceeding 1% of oleic acid and octadecyl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

22. The method of lubricating textile fibres which comprises impregnating the fibres with a mineral oil having incorporated therein small amounts of oleic acid, an alkali hydroxide insufficient in amount to render the oil alkaline and small amounts exceeding 1% of octadecyl alcohol and subsequently removing the oil from the fibre by washing in an aqueous solution.

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