Patented May 27, 1952

2,597,947

UNITED STATES PATENT OFFICE

2,597,947

TEXTILE TREATING COMPOSITIONS

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No Drawing. Application January 15, 1947, Serial No. 722,290. In Great Britain January 25, 1946

4 Claims. (Cl. 252—8.75)

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The present invention relates to the dressing of textile materials, especially for the purpose of facilitating their manipulation.

Various textile materials, for example, natural silk and cellulose ester and ether artificial silk, have a low electrical conductivity and tend to acquire and retain electrical charges, especially while undergoing textile operations such as, for example, twisting and winding, knitting, and the working up of staple fibre yarns. Such electrification of the materials leads to great difficulties in carrying out many of the textile operations which they are normally required to undergo, as, for example, those mentioned above. Numerous agents have been proposed for application to textile materials with a view to reducing electrification, but in many cases the agents have been found to induce serious corrosion of machine parts with which they come into contact.

In the manipulation of textile materials it is also generally desirable to lubricate them so as to facilitate the operations. This is particularly the case, for example, with dry-spun cellulose acetate immediately after its production and prior to its being wound or twisted and wound. Again, the knitting properties of cellulose acetate yarn are greatly improved by lubrication. It is clearly of great advantage if the agent which reduces electrification can be applied simultaneously with the lubricant, and particularly if the agent is soluble in the lubricating oil.

According to the present invention textile filaments, fibres, yarns and the like are dressed with salts of quaternary ammonium bases and organic sulphonic acids.

The salts for use according to the invention may be derived from mono- or poly-acid quaternary ammonium bases or from mixed amino-quaternary ammonium bases in which the amino group may be primary, secondary or tertiary. Preferably all the quaternary ammonium and the amino groups in the bases are aliphatic groups, i. e. the nitrogen atom of each such group is not directly attached to an aromatic nucleus. Especially high efficiency in reducing the electrification of textile materials has been found to be possessed by the salts of bases containing two or more quaternary ammonium groups. These salts formed from organic sulphonic acids and poly-acid quaternary ammonium bases are believed to be new compounds, and the invention includes their manufacture as well as compositions containing them. Examples of suitable bases, the organic sulphonic acid salts of which

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may be employed according to the invention, are lauryl trimethyl ammonium hydroxide, diethyl-methyl ethanol-ammonium hydroxide, triethyl ethanol-ammonium hydroxide, cyclohexyl diethyl-methyl ammonium hydroxide, ethylene bis-(triethyl ammonium hydroxide), ethylene bis-(diethyl ethanol-ammonium hydroxide), hexamethylene bis-(triethyl ammonium hydroxide) and ethylene bis-(lauryl diethyl ammonium hydroxide). Preferably the quaternary bases contain at most one alcoholic hydroxyl group for each quaternary nitrogen atom.

Particularly valuable salts are those derived from the aliphatic sulphonic acids, more particularly such as contain more than 8 carbon atoms, and especially those containing 12 or more carbon atoms, whether the aliphatic radicle is saturated or unsaturated. Preferably the aliphatic radicle of the sulphonic acid is an unsubstituted saturated hydrocarbon radicle, and accordingly preferred acids are cetyl and stearyl sulphonic acids and particularly lauryl sulphonic acid. The aliphatic sulphonic acids may be produced by the reaction of an aqueous solution of the sodium salt of the corresponding aliphatic sulphate with sodium sulphite at elevated temperatures, e. g. above 170° C., and pressures, e. g. about 500 lbs., and subsequent isolation of the acids by known methods.

Salts for use in the compositions of the present invention should preferably contain, either in the acid or in the base from which they are derived, groups containing several carbon atoms, e. g. 6 or more, united one to another in the group. The presence of a straight chain of several carbon atoms, especially 8, 10, 12 or more carbon atoms, is particularly advantageous.

Various methods are available for the manufacture of the salts. Thus, they may be produced by the reaction of the free quaternary ammonium base in a suitable solvent with the free sulphonic acid. For example, a free quaternary ammonium base in methanol solution, as formed by the treatment of the chloride or bromide of the base with the calculated quantity of caustic soda or potash in methanol solution and after the separation of the precipitated alkali halide may be treated with the acid and the desired salt so formed separated from the methanol. Thus, for the preparation of triethyl ethanol-ammonium hydroxide, 610 gms. of mono-ethanolamine in 3 litres of methanol may be ethylated in three stages by heating and stirring in each stage, with 1290 gms. ethyl chloride at 100–130° C. for 24 hours. After each stage excess ethyl chloride is

removed by distillation together with some methanol and the residual liquor treated in the cold with a solution of 400 gms. of sodium hydroxide in 3 litres of methanol. Finally, sodium chloride is removed by filtration to leave a methanol solution of the desired base, containing small amounts of diethyl ethanolamine and sodium chloride. This residue is treated with the calculated quantity of lauryl-sulphonic acid and the tertiary base removed by vacuum distillation to leave the desired salt, slightly contaminated with sodium chloride. According to a second method, the salts may be formed by the double decomposition of the halide, sulphate, oxalate or other suitable salt of the quaternary ammonium base and the sodium or other metallic salt of the organic sulphonic acid in a medium in which one or other reaction product is insoluble. Thus, for example the acid oxalate of a quaternary ammonium base and the potassium salt of the organic sulphonic acid may be reacted in aqueous solution to form the desired salt with precipitation of potassium hydrogen oxalate. Alternatively, the salts may be produced without the preliminary formation of a quaternary ammonium compound, as by reacting a tertiary amine with the appropriate ester of the organic sulphonic acid to produce the desired salt directly.

For reducing the electrification of textile materials, e. g. materials of cellulose ester or ether, dressing according to the invention is conveniently effected by applying to the materials solutions of the salts, for example aqueous solutions. Thus, the materials can, for example, be moistened with these solutions and thereafter dried in order to leave a deposit of the salt on the material. For instance, continuous filaments as spun may be treated with the solutions, e. g. by wick, bath, roller or spray methods, dried, if desired, as by passage through a hot chamber, and wound or twisted and wound. Continuous filament yarn in hank or package form may be immersed in the solutions, excess liquid removed by centrifuging, pressing or otherwise, and the material dried. Again, cellulose acetate or other cellulose ester or ether staple fibre may be similarly treated or sprayed with a solution of the salt; by this treatment the subsequent working up into sliver, yarn or other form, may be greatly facilitated due to the reduced tendency of the dressed material to become electrified. Textile materials dressed with salts according to the present invention are found to have no substantial corrosive action on machine parts with which they contact.

A particular merit of the salts described is that they are soluble in many of the oils commonly used in the lubrication of textile materials in order to facilitate the manipulation of the latter. By using as lubricant a solution of a salt of a quaternary ammonium base and organic sulphonic acid in a lubricating oil, the tendency of the material to develop electrical charges is simultaneously reduced. The lubricating oils which may be employed for this purpose are, for instance, animal or vegetable oils, e. g. coconut oil, olive oil or arachis oil, and esters of polymerised and/or oxidised unsaturated fatty acids, especially those of the monohydric alcohols, e. g. cyclohexanol or methyl cyclohexanol. An example of the last-mentioned type of lubricating oil is the polymerised and oxidised oleic acid ester of methyl cyclohexanol. Lubricants comprising mineral oils may also be used in conjunction with the salts to produce dressings in accordance with the present invention. If desired, the lubricating oil and the quaternary ammonium salt may be applied to the textile materials in separate operations, the salt being applied, for example, in aqueous solution.

The incorporation of the salts with a lubricating oil can frequently be facilitated by the simultaneous presence of a higher fatty alcohol, particularly one containing twelve or more carbon atoms, e. g. oleyl alcohol. Other hydroxylated compounds may also be present in the lubricating composition to assist in the incorporation of the salt and to modify the characteristics of the lubricant. By the use of such compounds as assistants, it is often possible to incorporate in the oil greater proportions of the salt than would otherwise be possible. An example of a suitable lubricating composition, particularly for use with cellulose acetate materials, has the following composition:

	Percent
Ethylene bis-(triethyl ammonium lauryl-sulphonate	7.5
Methyl cyclohexanol	7.5
Oleyl alcohol	5
White mineral oil (medium viscosity)	40
Arachis oil	40

Olive oil may be substituted for part or the whole of the arachis oil in this composition.

When solutions of the salts in lubricating oils are required, it is often convenient to incorporate with the oil a crude preparation of the salt still containing inorganic salts formed in its production. The oil then dissolves the desired organic salt and the inorganic salts may be separated by filtration. In this way the use of a separate organic solvent, such as alcohol or acetone, in the production of the salts can be avoided.

Having described our invention, what we desire to secure by Letters Patent is:

1. A composition suitable for lubricating cellulose acetate textile material, said composition consisting essentially of a lubricating oil, a higher fatty alcohol, and a salt of an aliphatic sulphonic acid containing 8 to 18 carbon atoms with ethylene-bis (triethyl ammonium hydroxide), the proportion of alcohol being sufficient to render the composition homogeneous and the proportion of the salt sufficient to render cellulose acetate textile material difficult to electrify when lubricated with the composition.

2. A composition suitable for lubricating cellulose acetate textile material, said composition consisting essentially of a lubricating oil, a higher fatty alcohol of at least 12 carbon atoms, and a salt of ethylene-bis(triethyl ammonium hydroxide) with an aliphatic sulphonic acid of which the aliphatic radicle is an unsubstituted saturated hydrocarbon radicle of 8 to 18 carbon atoms, the proportion of the alcohol being sufficient to render the composition homogeneous and the proportion of the salt sufficient to render cellulose acetate textile material difficult to electrify when lubricated with the composition.

3. A composition suitable for lubricating cellulose acetate textile material, said composition comprising a lubricating oil, a higher fatty alcohol and a salt of ethylene-bis(triethyl ammonium hydroxide) with lauryl sulphonic acid, the proportion of the alcohol being sufficient to render the composition homogeneous and the proportion of the salt sufficient to render cellulose

acetate textile material difficult to electrify when lubricated with the composition.

4. A composition suitable for lubricating cellulose acetate textile material, said composition comprising a mixture of mineral lubricating oil and vegetable oil, oleyl alcohol and a salt of ethylene-bis(triethyl ammonium hydroxide) with lauryl sulphonic acid, the proportion of the alcohol being sufficient to render the composition homogeneous and the proportion of the salt sufficient to render cellulose acetate textile material difficult to electrify when lubricated with the composition.

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