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METHOD OF TREATING TEXTILE MAKING MATERIALS

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Our invention relates to a lubricating and softening treatment for fibrous materials, and is directed to the treatment, for such purposes, of textile fibers and textile materials of animal, vegetable, or synthetic origin. Our invention has proved particularly valuable for the treatment of nitrogenous fibrous materials, such as wool, hair, etc., as well as for the treatment of synthetic fibrous materials of the kind exemplified by rayon of various types, such as viscose, cellulose acetate, cuprammonium rayon, cellulose nitrate, casein yarns, etc.

In the preparation of the above fibers, and throughout the various stages of working the same into yarns and finished goods made thereof, there is constant need for adequate and efficient lubrication which will have no deleterious effect upon the processing machinery or upon the materials themselves. This is particularly true in such operations as spinning, drawing, winding, warping, weaving, knitting, felting, etc. There is also need for a treating and lubricating agent which will properly soften the materials without altering their tensile strength and which, in addition, will minimize the effect of electrostatic charges developed on the materials during the above-mentioned operations by which the same are worked.

We have discovered that the esters of monohydric aliphatic alcohols with naphthenic acids are particularly well suited for the treatment of both nitrogenous and synthetic fibrous materials of the types mentioned, and that such esters have decided advantages over other treating substances used for like purpose prior to our invention.

Since naphthenic acids are a by-product of petroleum refining, our invention has the further advantage of providing a relatively inexpensive medium for attaining the desirable lubricating and softening effects hereinabove mentioned. By naphthenic acids, we mean the mixture of acids of that name currently obtained in petroleum refining, but also include naphthenic acids which are synthetically prepared or otherwise obtained.

The aliphatic alcohols which we esterify with these acids to produce the esters used in our process may be such alcohols as methyl, ethyl, butyl, isobutyl, amyl, octyl, oleyl, etc., which are generically known as alkyl or alkylene monohydric alcohols, and, in general, all esters of monohydric aliphatic alcohols with naphthenic acids which are liquids at ordinary room temperatures and which correspond to the general formula R.COO—R' in which R is a naphthenic radicle and R' is an alkyl or alkylene group. Esters prepared with alcohols containing less than 10 carbon atoms are preferred, however, because of their lower viscosity and low frictional value, and because they are more readily removed from the fibrous materials and less likely to have detrimental effects on the fibers during storage.

The esterification of the aliphatic alcohol and naphthenic acid may be carried out according to any of the known methods for preparing such esters, as for example by reaction of the alcohol and acid in the presence of a catalyst such as hydrochloric or sulfuric acid; or by reaction of the sodium or potassium salt of the acid with a chloride of the alcohol; or by any other suitable method.

Example I

Prior to knitting, cellulose acetate yarn is lubricated with methyl naphthenate, by means of rollers or wicks.

Yarn so treated has a low coefficient of friction, is soft and pliable, and therefore in a particularly desirable condition for the knitting process.

Example II

Isobutyl naphthenate is sprayed onto rayon staple fibers during the processing of these fibers into spun rayon.

This treatment results in a minimum of waste during carding and makes for more uniform drawing. The tensile strength of the spun yarn is also increased by this treatment, as against other treatments, because of the proper balance between friction and tackiness which isobutyl naphthenate imparts to the fibers.

Example III

A mixture of 75 parts ethyl naphthenate and 25 parts olive oil is used as a lubricating treatment for raw stock wool which has been scoured.

If desired, the olive oil of the above mixture can be replaced by mineral oil. Other similar mixtures containing various proportions of fatty oils and naphthenatic esters of the type disclosed can be used instead. The modification of the ester in this manner changes its tackiness sufficiently, i. e., increases its tackiness, to improve its effectiveness when it is used on materials such as wool or worsted fibers. Such mixtures of esters and oils, however, can also be used on other fibers with satisfactory results.

While the esters, when used as disclosed in the above examples, are readily removed from the fibrous materials by treatment with slightly

alkaline solution of soaps or other wetting agents, it is also possible, if desired, to apply these esters in a form which will render them readily removable by water alone. This can be accomplished by incorporating various proportions of emulsifying agents cuch as soaps, sulfonated oils, etc., into these esters, stabilizing the mixture, if necessary, with blending agents such as glycol ethers, alcohols or other mutual solvents. In this way, the esters are made emulsifiable and it becomes possible to remove them from the fibrous materials by simple treatment with water, or water containing a small proportion of soda ash if desired.

While the esters can also be applied as emulsions, or as solutions in organic solvents, it is generally preferable to use the straight esters, either in the non-emulsifiable or in the emulsifiable condition, so as to get the greatest benefit from their effects on the fibrous materials. Solutions or emulsions containing less than about 5% of the ester, for example, could not be expected to impart the desirable finish, softness, and pliability obtained when the straight ester is used to lubricate fibrous materials.

Since the presence of the ester on the fibers or yarns is necessary throughout the working processes in connection with which lubrication is required, it is also necessary that the quantity of ester on the fibers or yarns be sufficient to provide adequate lubrication during these processes. We have found that the quantity of ester thus required is of the order of 1.5 to 3.0% of the weight of the fibers or yarns, though slightly more or less may be used with satisfactory results. A quantity of ester amounting to less than 0.75% of the weight of the fibers or yarns, however, will not provide the proper lubricating effect and will not give the desirable softness and feel obtained on fibers and yarns treated with adequate amounts of the ester.

We claim:

1. A method for lubricating and softening textile materials which comprises applying thereto an ester of naphthenic acids with an aliphatic alcohol selected from the group consisting of alkyl and alkylene monohydric alcohols.

2. A method for lubricating and softening fibers and yarns of animal, vegetable or synthetic origin to improve the workability thereof in textile making operations which comprises applying thereto an ester corresponding to the general formula R.COO—R′ in which R is a naphthenic radicle and R′ is an alkyl or alkylene group.

3. A method for lubricating and softening textile materials which comprises applying thereto a fluid containing an ester of naphthenic acids with an aliphatic alcohol selected from the group consisting of alkyl and alkylene monohydric alcohols.

4. A method for lubricating and softening textile materials which comprises applying thereto an emulsifiable ester of naphthenic acids with an aliphatic alcohol selected from the group consisting of alkyl and alkylene monohydric alcohols.

5. A method for lubricating and softening textile materials which comprises applying thereto an emulsifiable fluid containing an ester of naphthenic acids with an aliphatic alcohol selected from the group consisting of alkyl and alkylene monohydric alcohols.

6. A method for lubricating and softening textile materials which comprises applying thereto an emulsion of an ester of naphthenic acids with an aliphatic alcohol selected from the group consisting of alkyl and alkylene monohydric alcohols.

7. A method for lubricating and softening textile materials, which comprises applying thereto an emulsion of a fluid containing an ester of naphthenic acids with an aliphatic alcohol selected from the group consisting of alkyl and alkylene monohydric alcohols.

8. A method for lubricating and softening fibers and yarns of animal, vegetable or synthetic origin to improve the workability thereof in textile making operations which comprises applying thereto methyl naphthenate.

9. A method for lubricating and softening fibers and yarns of animal, vegetable or synthetic origin to improve the workability thereof in textile making operations which comprises applying thereto ethyl naphthenate.

10. A method for lubricating and softening fibers and yarns of animal, vegetable or synthetic origin to improve the workability thereof in textile making operations which comprises applying thereto isobutyl naphthenate.

11. A composition for lubricating and softening textile materials comprising an ester corresponding to the general formula R.COO—R′ in which R is a naphthenic radicle and R′ is an alkyl or alkylene group.

12. A composition for lubricating and softening textile fibers and yarns comprising a fluid containing an ester corresponding to the general formula R.COO—R′ in which R is a naphthenic radicle and R′ is an alkyl or alkylene group.

13. A composition for lubricating and softening textile fibers and yarns comprising methyl naphthenate.

14. A composition for lubricating and softening textile fibers and yarns comprising ethyl naphthenate.

15. A composition for lubricating and softening textile fibers and yarns comprising isobutyl naphthenate.

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