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LUBRICATION TREATMENT OF TEXTILE MATERIALS

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This invention relates to the treatment of textile materials and relates more particularly to an unstable emulsion containing a lubricant composition in the disperse phase and to a process for treating textile materials with said emulsion.

In the manufacture of yarn by the viscose process, the packages of yarn formed during spinning are purified, washed and dried, and the yarn on said packages is then rewound onto other packages and may have a twist imparted thereto to prepare it for further use. It is highly desirable to have a lubricant on the yarn during the rewinding operation to reduce friction and thereby prevent the build up of excessive tensions on the yarn which will impair its quality and may even cause the yarn to break. One of the methods heretofore employed for the application of lubricant to yarn has been to dip racks, each carrying a number of packages of yarn, into an emulsion containing the lubricant and setting the lubricant on the yarn by drying. Yarn has also been lubricated by spraying the lubricant on to the yarn while it is in package form. Both of these methods have distinct disadvantages. Thus, by employing the dipping process, the lubricant is not distributed uniformly through the packages of yarn. Moreover, the procedure is expensive if the dip bath is discarded after a single rack is dipped and, where several racks are dipped in the same bath, the dip bath becomes a source of contamination. Furthermore, the dipping process requires the handling of bulky racks with the danger of damaging the yarn being ever-present. In addition, if an excess of lubricant is picked up by the yarn, the several layers of yarn tend to slide relative to each other and slough off the package.

Where the spray method was employed, the packages of yarn were mounted on a rack and the lubricant applied manually by any suitable spraying means. By this method, the lubricant was applied only to the outer layers of yarn on the package and the lubricant was not distributed uniformly among the several packages on the rack. Moreover, this method required a considerable amount of labor and relatively expensive equipment making for an uneconomical process. Moreover, the lubricant which settled on the rack and on the package support was a handicap in the subsequent handling of the packages and a constant source of spotted and soiled yarn.

It is an important object of this invention to provide a lubricant composition and process for applying the same which will overcome the foregoing and other disadvantages of the prior methods, and which will be especially efficient in operation.

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A further object of this invention is to provide a process for lubricating textile materials in which an unstable emulsion containing a lubricant composition in the disperse phase is passed through said textile material whereby the lubricant composition is filtered out of said emulsion and deposited on said textile material.

Another object of this invention is the provision of a process for lubricating packages of yarn produced by the viscose process in which the water employed for washing said packages has a lubricant composition dispersed therein to form an unstable emulsion whereby said lubricant composition is filtered out of said emulsion and deposited on said yarn as the wash water is passed through said packages.

A still further object of this invention is to provide a lubricant composition which may be dispersed to form an unstable emulsion.

Other objects of this invention will be apparent from the following detailed description and claims.

In the viscose process, after a package of yarn has been produced, it must be treated to remove certain impurities therefrom. To this end, the package of yarn is usually placed in a pressure or vacuum tub and given a preliminary wash. Thereafter it is desulfurized, washed again and may be bleached before being soured. The yarn is then given a final wash after which it is ready to be dried and rewound.

I have now discovered that yarn produced by the viscose process may be effectively lubricated by dispersing a lubricant composition in the form of an unstable emulsion in the water employed in the final washing of the packages formed during spinning. As the wash water is passed through the packages of yarn the lubricant composition is filtered out of the water and deposited on the yarn lubricating the same. By applying the lubricant composition in this manner, there is obtained a uniform and effective lubrication of the yarn, and the separate step heretofore required for lubrication is completely eliminated.

As the continuous phase of the emulsion, water is preferred although other materials to which the yarn is inert are also suitable for this purpose. The disperse phase may comprise a mixture of two or more materials which are miscible with each other, at least one of said materials being an emulsifying agent, and at least one of said materials not being itself emulsifiable in the

continuous phase to form a stable emulsion. At least one or preferably all of the materials in the disperse phase are lubricants for the yarn and are deposited on the yarn during the lubrication process.

By controlling the relative quantities of the two materials, the stability of the emulsion may be adjusted so that it will break, or separate into two phases, within a definite period of time after it is prepared. To determine whether a particular mixture of materials is suitable, one part by weight of said mixture may be dispersed in three parts by weight of the material employed for the continuous phase and a determination made of the length of time necessary for the emulsion to begin to break. This time should be at least about 2 hours and should not exceed about 6 hours, since emulsions which break in shorter periods of time will break in the washing apparatus at points spaced from the yarn, whereas emulsions which break in longer periods of time are so stable that the lubricant composition will not be efficiently filtered out of the emulsion during its passage through the yarn.

Among the emulsifying agents which may be employed in preparing the lubricant composition of this invention are soaps, sulfonated compounds such as the sodium salt of sulfonated ethyl oleate, the sodium salt of sulfonated ethylmethyloleylamide, the sodium salt of sulfonated ethylmethylamide, and the sodium salt of alkylnaphthalenesulfonate; fatty acid esters such as polyglycol stearate, and the mixed palmitic and stearic acid esters of a polyhydroxy alcohol; other fatty acid derivatives such as the amine ester of stearic acid, and sodium oleyl sulfate. The materials that do not themselves form a stable emulsion include vegetable oils such as peanut, rice, bran, coconut, olive and castor oils; waxes such as sperm oil; fatty alcohols such as oleic, stearic, palmitic and lauric, and mineral oils or mixtures thereof. The relative quantities of these two classes of materials will depend upon the particular materials employed and upon the stability desired in the emulsion.

As is indicated above, the lubricant composition of this invention may be added to the water employed for the final wash, and the lubricant composition will be largely filtered out of the water and deposited on the yarn during its passage therethrough. The quantity of the lubricant composition may be varied over a wide range depending upon the total quantity of lubricating agent which it is desired to apply to the yarn. To effect a uniform and controlled distribution of the lubricating agent through the package of yarn, the total quantity of lubricant composition which is to be applied to the yarn may be added to the entire volume of water which will be employed during the final wash. As the water containing the lubricant composition is passed through the package of yarn, the lubricant composition will be filtered out and deposited on the yarn. Simultaneously, with the passage of time, the emulsion remaining in the incoming water will become more unstable so that the yarn will exert a progressively greater filtering effect on the remainder of the lubricant composition. When this final wash is completed, the packages of yarn are dried. The yarn may then be rewound and may have a twist imparted thereto in an uptwister, a ring rail twister, a skein winder or any other suitable type of twisting or winding apparatus without developing excessive tensions during the rewinding operation.

Although this invention has been described with particular reference to the lubrication of packages of yarn produced by the viscose process, in which it enables the elimination of a separate lubrication step, the lubricant composition and process of this invention may also be employed for other purposes. For example, the lubricant composition and process of this invention may be employed to lubricate textile materials such as filaments, yarn, tow, roving, sliver and the like having a basis of natural or artificial fibers which may be in the form of packages such as cones, cakes, bobbins, cheeses and the like.

The following example is given to illustrate this invention further.

Example

A sufficient quantity of a mixture of 30 parts by weight of a mineral oil having a Saybolt viscosity of 50, and 70 parts by weight of a composition containing 75 to 80% by weight of mineral oil having a Saybolt viscosity of 50, the sodium or potassium soap of a fatty acid such as oleic acid and a small amount of a stearic acid ester of diethylene glycol is dispersed in 4000 parts by weight of water to give a final concentration of 300 p. p. m. The water containing the lubricant composition is forced for 240 minutes through a bobbin of yarn produced by the viscose process during the final washing step in the purification of said yarn. As the wash water passes through the yarn the lubricant composition is filtered out of the water and deposited on the yarn lubricating the same. The packages of yarn are then dried and the yarn is rewound on an uptwister without developing excessive tension on the yarn during the rewinding operation.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. Process for the lubrication of textile materials in filamentary form, which comprises adding to an aqueous medium for washing said textile materials a mixture of textile lubricant and an emulsifying agent, which mixture forms an emulsion with said aqueous medium, passing said aqueous washing medium containing said emulsion through a mass of filamentary materials whereby the textile lubricant is removed from the aqueous phase and deposited on the textile materials, the proportions of textile lubricant and emulsifying agent in said mixture being such that when 1 part by weight of said mixture is added to 3 parts by weight of water, it forms an emulsion so unstable as to begin to break within 2 to 6 hours.

2. Process for the lubrication of textile materials in filamentary form, which comprises adding to an aqueous medium for washing said textile materials a mixture of mineral oil and an emulsifying agent, which mixture forms an emulsion with said aqueous medium, passing said aqueous washing medium containing said emulsion through a mass of filamentary materials whereby the mineral oil is removed from the aqueous phase and deposited on the textile materials, the proportions of mineral oil and emulsifying agent in said mixture being such that when 1 part by weight of said mixture is added

to 3 parts by weight of water, it forms an emulsion so unstable as to begin to break within 2 to 6 hours.

3. Process for the lubrication of textile materials in filamentary form, which comprises adding to an aqueous medium for washing said textile materials a mixture of mineral oil and an emulsifying agent comprising the potassium salt of oleic acid and the stearic acid ester of diethylene glycol, which mixture forms an emulsion with said aqueous medium, passing said aqueous washing medium containing said emulsion through a mass of filamentary materials whereby the mineral oil is removed from the aqueous phase and deposited on the textile materials, the proportions of mineral oil and emulsifying agent in said mixture being such that when 1 part by weight of said mixture is added to 3 parts by weight of water, it forms an emulsion so unstable as to begin to break within 2 to 6 hours.

4. Process for the lubrication of textile materials in filamentary form, which comprises adding to an aqueous medium for washing said textile materials a mixture of about 30 parts by weight of mineral oil and about 70 parts by weight of a composition containing 70 to 80% by weight of mineral oil, the remainder of said composition consisting of the potassium salt of oleic acid and the stearic acid ester of diethylene glycol, which mixture forms an emulsion with said aqueous medium, passing said aqueous washing medium containing said emulsion through a mass of filamentary materials whereby the mineral oil is removed from the aqueous phase and deposited on the textile materials, said mixture being such that when 1 part by weight thereof is added to 3 parts by weight of water, it forms an emulsion so unstable as to begin to break within 2 to 6 hours.

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