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TEXTILE MATERIALS AND METHOD OF PREPARING SAME

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This invention relates to the lubrication of textile yarns, filaments and like materials, particularly those made of or containing organic derivatives of cellulose.

An object of the invention is the application of a lubricant dressing to textile yarns and filaments of organic derivatives of cellulose that retains its lubricative properties for long periods of time, that does not change the properties of the yarns or filaments and does not interfere with the application to the yarns or filaments of a conditioning dressing containing special treating agents. Other objects of the invention will appear from the following detailed description.

I have found that a mixture of oil and a sulphonated fatty alcchol and/or their salts are excellent lubricants when applied to or incorporated in the organic derivatives of cellulose, yarns, filaments or like materials, and that such a lubricant, when applied in an early stage of the textile operations, say at the formation of the yarn or filaments, does not prohibit a uniform application, at a later stage of the textile operation, of a yarn or filament conditioning dressing containing oil and a substance having at least a solvent or a latent solvent action on the derivative of cellulose, or of anti-static finishes containing organic or inorganic electrolytes.

Many textile lubricants are known. Some of these lubricants, although imparting to the yarn or filaments sufficient lubrication for textile processing develop quite a fair amount of free acidity upon ageing. Under certain conditions this change in the lubricant develops changes in the yarn or filaments such as their reaction to delustering baths. Some other lubricants are subjected to oxidative or hydrolytic changes that tend to cause polymerization or become gummy, thus producing yarns or filaments having a gummy or tacky surface, that cause a drag on yarns as they pass through guides, etc.

The lubricant dressing formed in accordance with this invention, when applied to yarns containing organic derivatives of cellulose, does not effect a change on the yarns or filaments. It does not give to the yarns or filaments a rough or harsh feel as do many lubricants upon long contact with the yarn, nor does it impart hardness and brittleness to the yarns. The lubricant dressing made in accordance with this invention does not develop rancid odors upon ageing and for this reason the fabrics formed of the yarns treated therewith need not be scoured entirely free of same. This property obviates the necessity for severe scouring baths and thereby reduces the possibility of injury to the fabric. Furthermore, the lubricant dressing formed in accordance with this invention is easily scourable from textile materials in either cold or hot, hard or soft water. Furthermore, it aids in the removal of finishes that may have been applied to the yarn or filaments.

A still further advantage of this invention is that yarns of organic derivatives of cellulose may be lubricated with the lubricant dressing as the said yarns or filaments are formed. The yarns or filaments so lubricated may be formed into large size packages; for instance, two-pound cheeses. The cheeses formed with yarns so lubricated do not develop a softness upon standing, which softness, when it occurs, gives rise to the sluffing-off of the yarns from the ends of the package. Furthermore, the lubricant dressing is such that even on the large size packages the yarn unwinds from said packages with even tension both from the outside windings and the inside windings. By lubricating yarns or filaments in accordance with this invention, large size packages may be formed, thus permitting the formation of warps direct from the first package as formed.

In accordance with my invention, I lubricate yarns or filaments with a lubricant dressing containing a sulphonated fatty alcohol compound and an oil. Also, in accordance with my invention I lubricate yarns, filaments or similar materials made from or containing organic derivatives of cellulose with a lubricant dressing containing a sulphonated fatty alcohol compound and an oil at the time the materials are formed, and then at some subsequent textile operation I apply a conditioning dressing containing an oil and a substance having at least a solvent or latent solvent action on the organic derivative of cellulose.

This invention is applicable to all types of yarns or filaments containing organic derivatives of cellulose such as the organic esters and ethers of cellulose. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of ethers of cellulose are ethyl cellulose, methyl cellulose and benzyl cellulose. By the term "yarns or filaments" is meant threads, assemblies or bundles of a number of continuous filaments which may be in parallel relationship or which may be twisted together, artificial bristles, straws, short lengths of staple fibers, or yarns spun from such staple fibers. This invention is also applicable to the production and treatment of films,

foils and sheet material made from or containing organic derivatives of cellulose.

The yarns or filaments may contain, besides the organic derivatives of cellulose base, various effect materials such as pigments, filling materials, dyes, or lakes, fire retardants, plasticizers, and sizes. Examples of fire retardants are beta chlornaphthalene, triphenyl phosphate and tricresyl phosphate. Examples of plasticizers are diethyl phthalate, dimethyl phthalate, ethyl toluene sulfonamide, etc. Examples of filling materials are powdered metals, powdered oxides and carbonates of metals, lamp black and opaque organic substances. The effect materials may be applied to the yarns or filaments as a coating or they may be added to the solution from which the yarns and filaments are to be spun.

The lubricant dressing may be applied to the yarns or filaments in the course of their production, or it may be applied subsequently before or during any textile operation in which they are employed. The lubricant dressing may be applied to the yarns and filaments by adding a suitable quantity of the same to the spinning solution from which the filaments are spun by either a dry evaporative method or by a wet spinning method. The amount of lubricant dressing applied to the yarns and filaments in this way may suffice for the subsequent textile operations. The lubricant dressing may, however, be applied to the yarn or filaments during any winding operation thereof by passing the same in contact with a wick, roller, disc or other furnishing device that dips into the lubricant dressing. The yarns or filaments may be drawn through a solution or emulsion of the lubricant dressing or the solution or emulsion may be sprayed upon the yarn. The particular nature of the lubricant dressing and the manner of applying it may vary considerably according to the particular textile operations in view of other circumstances. The lubricant dressing may also be applied to the yarns or filaments by hand dipping methods or by forcing the lubricant dressing through packages of the yarn. The yarns may also be lubricated by padding or spraying after they have been processed to a fabric.

The lubricant dressing forming a part of this invention contains from 5 to 30 parts of a sulphonated fatty alcohol compound and from 95 to 70 parts of a suitable oil. For the purpose of describing this invention and in the appending claims, the term "sulphonated fatty alcohol compound" is meant to include sulphonated fatty alcohols, the sodium, potassium or amine salts of the sulphonated fatty alcohols, sulphonated fatty alcohols or the salts of the sulphonated fatty alcohols containing unsulphonated fatty alcohols or mixtures of these. The sulphonated fatty alcohols may be the sulphonated product of any suitable fatty alcohol such as oleyl alcohol, stearyl alcohol, lauryl alcohol, palmityl alcohol and other highly fatty alcohols. The sulphonated fatty alcohols may contain either the sulphonate group or sulphate group, or both groups. Any suitable oil may be employed in this dressing, for instance, mineral oil, vegetable oil, sulphonated oil or oxidized vegetable oil. When mineral oil is employed, the viscosity of the same will depend largely upon the sulphonated fatty alcohol compound employed. For most purposes the mineral oil should have a viscosity such that the resulting mixture with the sulphonated fatty alcohol compound will be a liquid. Although any oil having suitable viscosity may be used, say from 25 to 200 second viscosity (Saybolt), mineral oil of from 45 to 60 second viscosity is preferable. Some or all of the mineral oil may be replaced by vegetable oil such as olive oil, castor oil, teaseed oil, cottonseed oil, etc., or the oxidized vegetable oils such as oxidized olive oil, oxidized castor oil, etc.

An advantage of using the lubricant dressing forming a part of this invention is that the application of the same to yarn does not interfere with the uniformity of the application of a second coating containing an oil and a solvent or latent solvent for organic derivatives of cellulose. This is extremely important as some of the prior finishes, although suitable with respect to their lubricative properties, shed the conditioning dressing so that the same was applied in a non-uniform manner, the yarn so treated, being uniform, produced effects which, when such yarns were processed into fabrics, there resulted fabrics containing warp streaks, weft bars, frostiness, etc., which of course reduced or destroyed the commercial value of the fabric. The conditioning dressing may contain from 60 to 90 parts by weight of a formal and from 10 to 40 parts by weight of an oil. The formals may be made by the condensation of formaldehyde, or other aldehyde with polyhydric alcohols or their partial ethers such as glycerol ethylene glycol, monomethyl ether of ethylene glycol, etc., or an aliphatic hydroxy carboxilic acid. Preferably the formal obtained by the reaction of formaldehyde with the monomethyl ether of ethylene glycol is used. In place of some or all of the formals, there may be employed other suitable relatively non-volatile substances having at least a solvent or latent solvent action on the organic derivatives of cellulose, such as ethyl oxybutyrate, benzyl alcohol, diacetone alcohol and the like. Any suitable oil may be employed in the conditioning dressing such as olive oil, castor oil, teaseed oil, cottonseed oil, etc. The oxidized vegetable oils may be substituted for all or a part of the unoxidized vegetable oils. A preferred conditioning dressing is made from about 80 parts by weight of formal, about 15 parts by weight of oxidized olive oil and about 5 parts by weight of olive oil.

The amount of lubricant dressing applied will vary with the type of yarn, the effect of materials therein or thereupon and to the intended use of the yarn. However, the types of cellulose acetate yarn most frequently employed in the trade require from 1% to 5% on the weight of the yarn of the lubricant dressing and particularly 1% to 2%, when the dressing is applied to the yarn as it leaves the spinning cabinet. An advantage of this invention is found in that the lubricant dressing may be applied to yarns of organic derivatives of cellulose which are made by the dry evaporative method of spinning as the yarns leave the spinning cabinet and still contain from 3 to 10% of residual solvent. The lubricant dressing may be applied at this point or at any subsequent textile operation while the yarns are in transit from one point to another as in a winding or twisting operation by causing the yarns to contact with a wick, a roller or other furnishing device which dips into said dressing.

When yarns of organic derivatives of cellulose have been coated with the lubricant dressing in accordance with this invention, they may have a further dressing applied thereto in a uniform manner. The second dressing may be a conditioning dressing such as a yarn softening dressing or an anti-static finish, by passing the yarn over

suitable furnishing devices such as a wick, roller or disc, during any winding operation. For instance, yarns of cellulose acetate may have from 1% to 3% on the weight of the yarn of a lubricant dressing applied as the same leaves the metier in which they are formed and then have from 2% to 10% on the weight of the yarn of a conditioning dressing applied thereto just prior to knitting, or, if staple fiber, just prior to carding.

The following are examples of practical applications of the invention, it being understood that these are given only by way of illustration and that the invention is in no way restricted thereto.

Example I

A yarn is spun by a dry evaporative method from a solution of cellulose acetate in acetone. Immediately after the yarn leaves the spinning cabinet and prior to being wound on the cap-winding bobbin, it is contacted with a standard cotton wick which dips into a bath of lubricant dressing containing a sulphonated fatty alcohol compound and oil. The wick is suitably adjusted so that it applies from 1% to 3% by weight of the lubricant dressing to the yarn. The yarn is found to be evenly and sufficiently lubricated for twisting, combing, warping and weaving. The yarn after storage for a long period of time, scours with uniform delustering.

Example II

The yarn from Example I is twisted, say to 5 turns per inch twist, and during the twisting operation, while the yarn is in transit from one package to another, the same contacts with a furnishing roller which applies 8% on the weight of the yarn of a conditioning dressing containing a formal and an oxidized vegetable oil. The yarn is found to be evenly and sufficiently lubricated and conditioned to circular knit with a good stitch shape or be otherwise formed into fabrics. The yarn after storage for a long period of time is easily scoured free of both dressings.

A still further advantage of this invention is that a lubricant dressing may be employed which contains a fugitive dyestuff, for instance xylene brilliant blue B. C., xylene light yellow 2G, xylene cyanol F. F. and acid green 2G. In this manner identifying tints, which are readily scourable from the yarn, may be applied to the yarn at its formation.

The lubricant dressing may be applied to the yarns and like materials while maintained at elevated temperatures for reducing the viscosity of the same. The lubricant dressing may also contain thinners or thickeners and may be applied to the yarns from aqueous emulsions. If desired, the lubricant dressing may be scoured from the yarn prior to the application of the conditioning dressing.

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. In a process for the manufacture of yarns, filaments and like materials containing an organic derivative of cellulose, the steps of applying to the materials a lubricant dressing comprising from 5 to 30 parts of a sulphonated fatty alcohol compound and from 95 to 70 parts of an oil and, at a subsequent operation, applying a conditioning dressing comprising 60 to 90 parts of a formal and from 10 to 40 parts of an oil so as to form a uniform coating over the lubricated materials.

2. In a process for the manufacture of yarns, filaments and like materials containing cellulose acetate, the steps of applying to the materials a lubricant dressing comprising from 5 to 30 parts of a sulphonated fatty alcohol compound and from 95 to 70 parts of an oil and, at a subsequent operation, applying a conditioning dressing comprising 60 to 90 parts of a formal and from 10 to 40 parts of an oil so as to form a uniform coating over the lubricated materials.

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