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ARTIFICIAL TEXTILE MATERIAL

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This invention relates to the manufacture of artificial filaments and yarns of organic derivatives of cellulose that have enhanced knitting and other textile properties in that they are made more pliable and are also lubricated by the inclusion in the filaments of an oxidized oil.

An object of the invention is the economic and expeditious production of yarns, filaments, films and foils that have enhanced properties such as greater pliability, etc. Other objects of the invention will appear from the following detailed description.

Accordant to my invention I incorporate with yarns and films of organic derivatives of cellulose from 1 to 25% of an oxidized oil by adding the oil to the spinning solution from which the filaments and films are formed. The spinning solution containing the derivatives of cellulose dissolved in a solvent mixed with from 1 to 25% on the weight of the derivative of cellulose of an oxidized oil may be formed by any of the known methods of forming such materials such as by dry method of spinning, the wet method of spinning and of casting onto film-forming wheels.

This invention is applicable to filaments, yarns, films and foils, containing organic derivatives of cellulose such as the organic esters of cellulose and the cellulose ethers. Examples of organic esters of cellulose are cellulose acetate, cellulose propionate, cellulose butyrate and cellulose formate while examples of cellulose ethers are methyl cellulose, ethyl cellulose and benzyl cellulose.

Filaments and films may be formed from organic derivatives of cellulose by dissolving the same in suitable solvents and extruding the solution through suitable orifices or casting or flowing the solution onto suitable surfaces in a solidifying medium. For the purpose of this invention this solution will be termed the spinning solution whether for spinning filaments or forming films or foils. In employing organic esters of cellulose it is quite common to employ acetone or mixtures of acetone and water or alcohol as the solvent in the spinning solution. This solvent may be removed from the formed or shaped article by evaporation as in dry spinning and wheel casting or the cellulosic material may be precipitated from the solvent by liquids as in wet methods of spinning.

By any method of forming the articles it is often necessary that the spinning solution be kept for hours prior to being formed into articles. Due to this standing, effect materials added to the spinning solution and thus incorporated with

the article, must be such that they do not readily separate out in the solution or as it is termed, form an unstable solution. One of the advantages of this invention is that a lubricated and pliable filament and/or foil is produced containing an oil which is somewhat soluble in acetone and acetone mixtures. Moreover, the spinning solution acquires long stability from the presence of the oil.

Some oils upon oxidation become very viscous which prohibits their use as a yarn lubricant while others, such as cocoanut oil, corn oil etc., develop a high acidity during oxidation which renders them less suitable for the purpose of this invention. I have found, however, that oxidized olive oil, peanut oil, cottonseed oil, castor oil or other vegetable or animal oils and the like have a great compatibility with organic derivatives of cellulose in acetone or acetone mixture, solutions. These oxidized oils are also soluble in acetone solutions to the extent of more than 3%. Thus when they are mixed into spinning solutions they are compatible therewith and form relatively stable spinning mixtures. These oxidized oils may be used in amounts of from 1 to 25% on the weight of the organic derivative of cellulose.

The formed yarns, filaments and films may contain besides the organic derivative of cellulose base material and the oxidized oil lubricant, effect materials such as plasticizers, pigments, filling materials, dyes or lakes and fire retardants. These effect materials may also be added to the spinning solution or they may be incorporated with the formed material as a coating or applied to the material in the presence of swelling agent or by other suitable means. With the oxidized oils there may be employed equal or less quantities of glycerol and/or glycol, their derivatives and substitution products. If glycols and/or their derivatives are employed it is preferable that sufficient water be added to same to form an equilibrium of water of absorption prior to incorporating same in a spinning solution.

The oxidation of the oil is preferably carried out under conditions that do not promote polymerization and other special conditions which form a part of my invention, although normally blown oil may be employed. It is obvious that best operating results are obtained with the lower viscosity and lower surface tension products. The temperature and pressure under which the reaction can be carried out vary in an inverse ratio, that is, when the pressure is increased the temperature might well be decreased, however, I have found that oils oxidized under

greater pressure and lower temperatures produce a type of lubricant most suitable for the purpose of incorporating in filaments and films i. e. those that are most free of acid and have low viscosity and low surface tensions.

The oxidized oil to be employed in this invention may be obtained by oxidizing a vegetable oil in the presence of a catalyst, say 3.5 to 4.5% preferably 4% of whale oil which percentage gives consistent results, that is, it has the minimum amount of separation with the maximum speed of catalytic reaction. The oxidation of the oil is performed in a closed kettle. The pressure of the oxygen in the kettle may be any suitable pressure dependent upon the temperature employed. It is preferable however to employ pressure of above 45 pounds per square inch, say between 45 and 60 pounds per square inch above atmospheric pressure. The higher pressures and lower temperatures result in an oxidized oil of lower viscosity that more readily distributes itself in and on the yarn. The temperature employed during the reaction may be any suitable temperature from 100° C. to 200° C. but preferably from 100° C. to 125° C. It is preferable to circulate the oil in the kettle through an atomizer blowing the atomized liquid into the oxygen space of the kettle. The rate of flow of the oil through the atomizer may be at any suitable rate and a large variation in the rate of circulation of the liquid is permissible without a great effect upon the quantity of oil oxidized per unit time or the type of oil produced. Such an oxidized oil is referred to in the claims as "catalytically oxidized oil."

As description and not as a limitation the following example is given.

Example

To the solution containing one part cellulose acetate dissolved in 3 parts by weight of acetone, there is added about 0.10 part by weight of an oxidized oil to form a spinning solution. The oxidized oil may be any of the oils listed above and more particularly olive oil which has been oxidized under such conditions that it is light in color and has a viscosity at 210° F. of 150 Saybolt seconds or less with a water tolerance of 8.5%. By water tolerance is meant the amount of a mixture of 70 parts diethylene glycol to 30 parts of water soluble in or absorbed by the oxidized oil. The oil is not actually hydroscopic but with the accompanying diethylene glycol it will tolerate a relatively high percentage of water. This solution is spun by the dry method of spinning. The filaments produced are pliable and may be knit into fabrics with a free delivery. The yarns formed from a group of filaments may be further lubricated by applying to same a coating of a

mixture of oxidized oil, water, and glycol or a derivative or substitution product of glycol.

It is to be understood that the foregoing detailed description is merely given by way of illustration and many alterations 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 method of manufacturing products containing organic derivatives of cellulose by processes involving the formation of a solution of an organic derivative of cellulose in a solvent, the step of incorporating in said solution catalytically oxidized oil selected from the group consisting of olive oil, peanut oil, cotton seed oil and castor oil.

2. In a method of manufacturing products containing cellulose acetate by processes involving the formation of a solution of cellulose acetate in a solvent, the step of incorporating in said solution catalytically oxidized oil selected from the group consisting of olive oil, peanut oil, cotton seed oil and castor oil.

3. In a method of manufacturing products containing cellulose acetate by processes involving the formation of a solution of cellulose acetate in a solvent comprising acetone, the step of incorporating in said solution a catalytically oxidized oil selected from the group consisting of olive oil, peanut oil, cotton seed oil and castor oil in amounts of from 1 to 25% on the weight of the cellulose acetate.

4. In a method of manufacturing products containing cellulose acetate by processes involving the formation of a solution of cellulose acetate in a solvent comprising acetone, the step of incorporating in said solution a catalytically oxidized oil, selected from the group consisting of olive oil, peanut oil, cottonseed oil and castor oil, having a viscosity of at most 150 Saybolt seconds at 210° F., in amount between 1 and 25% on the weight of the cellulose acetate.

5. Filaments, yarns, films and foils containing organic derivatives of cellulose having incorporated therein from 1 to 25% of a catalytically oxidized oil selected from the group consisting of olive oil, peanut oil, cottonseed oil and castor oil.

6. Filaments, yarns, films and foils containing organic derivatives of cellulose and having incorporated therein from 1 to 25% of a catalytically oxidized oil of low viscosity selected from the group consisting of olive oil, peanut oil, cottonseed and castor oil.

7. Filaments, yarns, films and foils containing cellulose acetate and having incorporated therein from 1 to 25% of a catalytically oxidized olive oil of low viscosity.

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