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ARTIFICIAL FILAMENT AND METHOD OF
MAKING THE SAMEWilliam Whitehead, Cumberland, Md., assignor
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ration of DelawareNo Drawing. Application May 1, 1934,
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4 Claims. (Cl. 18—54)

This invention relates to the manufacture of films or filaments and other artificial products, such as artificial yarns, fibres, bristles, straw, ribbons and the like, from solutions containing organic derivatives of cellulose.

An object of the invention is to prepare filaments or films containing organic derivatives of cellulose that are tougher and more pliable than those heretofore made. Another object of my invention is to form films or filaments containing organic derivatives of cellulose from solution containing Turkey red oil.

Another object of the invention is to form films or filaments containing organic derivatives of cellulose that become delustered readily. Other objects of the invention will appear from the following detailed description.

Artificial filaments containing organic derivatives of cellulose have been prepared formerly by extrusion of solutions of the derivative of cellulose in a volatile solvent through the orifices of a spinnerette into an evaporative atmosphere. Yarns made from such filaments are not as tough and pliable as may be desirable and, therefore, the amount of twist that may be imparted to them, is limited, as is the closeness with which such yarns may be knitted, since if a predetermined limit is exceeded, the yarns tend to break or become materially weakened. Moreover, such prior yarns, or fabrics made from such yarns, become delustered in dyeing or scouring baths only at temperatures approaching that of boiling water, unless other delustering agents have been employed in the bath.

It has been found that if Turkey red oil, that is a solvent for organic derivatives of cellulose at high temperatures, but not at normal spinning temperatures, is added to the spinning solution containing the organic derivatives of cellulose, there may be formed filaments that are tougher and more pliable, and also more readily delustered, than those made by the prior processes. Yarn made from such filaments among other desirable properties may have a much higher twist safely imparted thereto, may be safely knitted closely on a circular knitting machine, and may be delustered in dyeing or scouring baths that are not heated or heated only a very small amount.

In accordance with my invention, I prepare filaments or films from solutions containing organic derivatives of cellulose in a suitable solvent, in which solution there has been incorporated from 1 to 30% on the weight of the organic derivatives of cellulose, Turkey red oil.

The solution so formed, preferably after thorough mixing to obtain uniformity, may be filtered and then extruded through orifices of required size of a spinnerette either into a drying or evaporative atmosphere, as in dry spinning, or into a precipitating bath containing liquid such as water, kerosene, etc., as in wet spinning. The Turkey red oil may, however, if desired, be added to the spinning solution after the same has been filtered.

Turkey red oil is compatible with the organic derivatives of cellulose in the spinning solution and the mixture accordingly exists as one colloidal system however complicated. Turkey red oil, while it has softening and gelling power for organic derivatives of cellulose at high temperatures, at normal spinning temperature has no appreciable solvent power. It has, however, the property of quickly penetrating and distributing itself throughout the solution unlike many other oleaginous substance. Thus, in spinning a filament, it is first formed from a single colloidal system and on evaporation of the solvent, a precipitation or breaking down of this system results, this resulting in a discontinuity of structure at the surface, since Turkey red oil and the organic derivatives of cellulose will not form a single phase colloidal system. The discontinuity of the surface structure results in a filament that is more easily delustered.

From the filaments so formed, there is sufficient Turkey red oil sweat to the surface of the filament to maintain the same lubricated for such textile purposes as twisting, winding, knitting, weaving, etc. The Turkey red oil at the surface does not gum or become excessively tacky upon ageing and storing of the yarns and it therefore maintains the yarn in a workable condition for long periods of time.

The filaments that may be formed by this invention may be the fine filaments having a denier of, say, 1 to 10 such as are used for making yarns, or they may be much heavier, i. e. having a denier of, say, 50 to 2000 which may be used as artificial bristles for making brushes or for making artificial furs, etc. My invention may also be advantageously employed for making tough and pliable films for photographic or other purposes, for making plastics, etc., where pliability is required.

Any suitable organic derivative of cellulose may be used in my invention. These may be organic esters of cellulose such as cellulose acetate, cellulose formate, cellulose propionate and

cellulose butyrate, or cellulose ethers such as ethyl cellulose, methyl cellulose and benzyl cellulose. This invention is particularly applicable in connection with acetone-soluble cellulose acetate having acetyl values of around 54% (determined as acetic acid).

Any suitable solvent may be employed for making the solution of the organic derivatives of cellulose. Examples of such solvents are acetone, acetone and ethyl or methyl alcohol, chloroform, ethylene dichloride, ethylene dichloride and ethyl or methyl alcohol, methylene chloride and ethyl or methyl alcohol, etc.

There may be mixed with the Turkey red oil a suitable fatty acid or glyceride thereof that is a non-solvent or precipitant for the organic derivative of cellulose employed. Examples of fatty acids are stearic or oleic acids, while examples of glycerides of fatty acids are olein, stearin, castor oil, olive oil, etc.

The lustre of the films, filaments or yarns produced by this invention may be readily subdued with a treatment in warm to hot water depending upon the amount of the Turkey red oil employed. Thus, cellulose acetate yarns containing 26% Turkey red oil deluster in an aqueous bath at 40° C. while a similar yarn not containing Turkey red oil is not effected at such a temperature.

The yarns, filaments and films may contain besides the cellulose derivative base material and Turkey red oil, effect materials, for example pigments, filling materials, dyes or lakes, fire retardants, plasticizers, sizes and lubricants. The Turkey red oil has an emulsifying power on many solid effect materials such as metallic salts and oxides used as pigments and weighting material. Examples of metallic salts and oxides are mercurous chloride, antimony oxide, tin oxides, titanium dioxide and like materials.

As illustrations and not as limitations the following examples are given:

Example I

To a solution of 1 part by weight cellulose acetate 3 parts by weight of acetone solvent, is added 5% on the weight of the cellulose acetate of Turkey red oil. This mixture is thoroughly mixed, filtered and spun by the dry or evaporative method of spinning to a yarn of fine denier filaments. The resulting yarn is pliable and lubricated. It delusters readily in a 1 gram per litre soap solution at below 80° C.

Example II

To a solution of 1 part by weight cellulose acetate in 3 parts by weight of acetone solvent, is added 26% on the weight of the cellulose acetate of Turkey red oil. This mixture is thoroughly mixed, filtered and spun into yarn of fine denier filaments by the dry or evaporative method of spinning. The yarns are slightly delustered after spinning and delusters quite heavily in merely warm water.

It is to be understood that the foregoing detailed description is given merely 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. Lustrous artificial filaments, threads, yarns, ribbons, foils, films and the like which are delusterable by water at 40° C., and contain an organic derivative of cellulose and Turkey red oil in an amount equal to 26% based on the weight of the organic derivative of cellulose present.

2. Lustrous artificial filaments, threads, yarns, ribbons, foils, films and the like which are delusterable by water at 40° C. and contain acetone-soluble cellulose acetate and Turkey red oil in an amount equal to 26% based on the weight of the cellulose acetate present.

3. Process for the production of artificial filaments, threads, yarns, ribbons, foils, films and the like characterized by being delusterable by water at 40° C., which comprises forming a solution containing an organic derivative of cellulose, a solvent therefor and Turkey red oil in an amount equal to 26% based on the weight of the organic derivative of cellulose present, imparting the required shape to said solution, passing the shaped material into a setting medium and delustering said shaped material by treatment with an aqueous medium at 40° C.

4. Process for the production of artificial filaments, threads, yarns, ribbons, foils, films and the like characterized by being delusterable by water at 40° C., which comprises forming a solution containing cellulose acetate, a solvent therefor and Turkey red oil in an amount equal to 26% based on the weight of the cellulose acetate present, extruding said solution through a suitable orifice into a setting medium and delustering the extruded material by treatment with an aqueous medium at 40° C.

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