

UNITED STATES PATENT OFFICE

2,406,407

FIBER TREATMENT

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1

This invention relates to the conditioning of staple fiber materials and relates more particularly to the conditioning of staple fiber materials, having a basis of cellulose acetate or other organic derivative of cellulose, to render the same more amenable to textile processing operations.

An object of this invention is to provide an improved process for the treatment of cellulose acetate or other organic derivative of cellulose staple fiber materials.

Another object of this invention is the treatment of cellulose acetate or other organic derivative of cellulose staple fiber materials whereby static electricity developed during combing, carding and spinning operations may be easily and quickly removed.

Other objects of this invention will appear from the following detailed description.

In processing staple fiber materials having a basis of cellulose acetate or other organic derivative of cellulose, which are to be spun into yarns, threads, and the like, various liquid finishing agents are applied to said staple fiber materials to impart the desired frictional and electrical properties thereto. These finishing agents enable the treated staple fiber materials to be spun into yarns in a smooth and even manner and at the same time permit the static electricity generated as a result of the friction between the fibers and between fibers and machine elements to be removed. The presence of charge of static electricity on the fibers creates a substantial problem since it not only causes the short lengths of fiber to stick to the machinery but causes them to resist adherence to each other during spinning operations. This difficulty is particularly aggravated when the textile operations are conducted under conditions of low temperature and low humidity.

The finishing agents employed are usually applied to the staple fibers in the form of an aqueous emulsion and, after the removal of the water, the finishing agent is left uniformly distributed over the fibers. While a wide variety of finishing agents have been employed, very advantageous results have been obtained, for example, by employing finishing agents comprising a sulfonated long chain higher fatty acid, a sulfonated vegetable oil, mineral oil, an organic electrolyte and blending agents having a spreading or penetrating action, such as long chain aliphatic alcohols or alkyl substituted phenols, the acids present being substantially neutralized by adding sodium hydroxide and a hydroxyalkyl amine, such as triethanolamine, thereto. Such

2

compositions are reasonably efficient and in a large measure impart the desired processing characteristics to the staple fiber materials. The finishing agents are applied to the cellulose acetate or other organic derivative of cellulose staple fiber materials by spraying the fibers with an aqueous emulsion of the finishing agent or by passing the fibers through an aqueous bath containing the desired amount of finishing agent dispersed therein. Normally, the aqueous emulsion or dispersion is applied at about room temperature.

I have now discovered, however, that if said finishing agents are applied at temperatures above normal room temperatures, i. e. at temperatures of 40° to 45° C. and preferably at 50° C., the anti-static properties of said treated staple fibers are substantially improved. In addition, the treated fibers possess to an enhanced degree, all the necessary characteristics for smooth and even spinning into yarns.

In order further to illustrate my invention, the following example is given:

Example

A staple fiber finishing agent having a basis of partially sulfonated oleic acid and partially sulfonated peanut oil is applied in the form of a 2% aqueous emulsion at a temperature of 50° C. to cellulose acetate filaments of about 3 denier per filament and a staple fiber length of about 1.5 inches.

The mode of application of the emulsion of conditioning agent comprises passing the staple fibers in the form of a web or batt through the aqueous emulsion of the finishing agent contained in a trough, the fibers being compressed as they enter the trough, allowed to expand therein so as to absorb the emulsion and then squeezed as they leave the trough. The operation places about 1.25%, by weight, of finishing agent on the staple fibers. After evaporation of the water, the fibers are then processed into yarns. The processing characteristics, and particularly the anti-static properties, are found to be substantially superior to those of cellulose acetate staple fibers treated in the same way with the same emulsion of finishing agent but at temperatures of 25° C. to 35° C.

The finishing agent employed is prepared by reacting a mixture of oleic acid, a vegetable oil, such as peanut oil, and mineral oil with 20% oleum whereby the oleic acid and vegetable oil are partially sulfated and/or sulfonated and then adding to the sulfonated mixture a spreading and

penetrating agent, i. e., diamyl phenol, as well as triethanolamine and aqueous sodium hydroxide so as to substantially neutralize any free acid. Water and a fungicide such as sodium ortho-phenyl phenate may then be added to inhibit the growth of undesirable organisms in the resulting mixture. The preparation of said finishing agents is more particularly described in co-pending U. S. application S. No. 470,662, filed on December 30, 1942.

While this invention has been more particularly described in connection with the treatment of staple fibers having a basis of cellulose acetate, the processing qualities of staple fibers having a basis of other organic derivatives of cellulose may be improved in a similar manner. Examples of other organic derivatives of cellulose are cellulose esters, such as cellulose propionate and cellulose butyrate, mixed esters such as cellulose acetate-propionate and cellulose acetate-butyrate, and cellulose ethers such as ethyl cellulose and benzyl cellulose.

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 rendering staple fibers having a basis of an organic derivative of cellulose more amenable to textile operations by applying a conditioning agent thereto comprising the reaction product of a mixture of a long chain higher fatty acid, a vegetable oil and mineral oil with oleum, having added thereto a penetrating agent and neutralized with alkali and a hydroxyalkyl amine, the step which comprises applying said conditioning agent to said fibers at a temperature of at least 40° C.

2. In a process for rendering staple fibers having a basis of an organic derivative of cellulose more amenable to textile operations by applying a conditioning agent thereto comprising the reaction product of a mixture of a long chain higher fatty acid, a vegetable oil and mineral oil with oleum, having added thereto a penetrating agent and neutralized with alkali and a hydroxyalkyl amine, the step which comprises applying said conditioning agent in the form of an aque-

ous emulsion to said fibers at a temperature of at least 40° C.

3. In a process for rendering staple fibers having a basis of an organic derivative of cellulose more amenable to textile operations by applying a conditioning agent thereto comprising the reaction product of a mixture of a long chain higher fatty acid, a vegetable oil and mineral oil with oleum, having added thereto a penetrating agent and neutralized with alkali and a hydroxyalkyl amine, the step which comprises applying said conditioning agent in the form of an aqueous emulsion to said fibres at a temperature of at least 40° C., and then removing the water therefrom.

4. In a process for rendering staple fibers having a basis of cellulose acetate more amenable to textile operations by applying a conditioning agent thereto comprising the reaction product of a mixture of a long chain higher fatty acid, a vegetable oil and mineral oil with oleum, having added thereto a penetrating agent and neutralized with alkali and a hydroxyalkyl amine, the step which comprises applying said conditioning agent in the form of an aqueous emulsion to said fibers at a temperature of at least 40° C., and then removing the water therefrom.

5. In a process for rendering staple fibers having a basis of cellulose acetate more amenable to textile operations by applying a conditioning agent thereto comprising the reaction product of a mixture of oleic acid, peanut oil and mineral oil with 20% oleum, having added thereto diamyl phenol and neutralized with sodium hydroxide and triethanolamine, the step which comprises applying said conditioning agent in the form of an aqueous emulsion to said fibers at a temperature of at least 40° C.

6. In a process for rendering staple fibers having a basis of cellulose acetate more amenable to textile operations by applying a conditioning agent thereto, comprising the reaction product of a mixture of oleic acid, peanut oil and mineral oil with 20% oleum, having added thereto diamyl phenol and neutralized with sodium hydroxide and triethanolamine, the step which comprises applying said conditioning agent in the form of an aqueous emulsion to said fibers at a temperature of from 40° to 50° C.

F. J. SCHIESSLER.

Certificate of Correction

Patent No. 2,406,407.

August 27, 1946.

FRED J. SCHIESSLER

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 1, line 31, for "charge" read *charges*; line 49, for "organic" read *inorganic*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of November, A. D. 1946.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.

penetrating agent, i. e., diamyl phenol, as well as triethanolamine and aqueous sodium hydroxide so as to substantially neutralize any free acid. Water and a fungicide such as sodium ortho-phenyl phenate may then be added to inhibit the growth of undesirable organisms in the resulting mixture. The preparation of said finishing agents is more particularly described in co-pending U. S. application S. No. 470,662, filed on December 30, 1942.

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5. In a process for rendering staple fibers having a basis of cellulose acetate more amenable to textile operations by applying a conditioning agent thereto comprising the reaction product of a mixture of oleic acid, peanut oil and mineral oil with 20% oleum, having added thereto diamyl phenol and neutralized with sodium hydroxide and triethanolamine, the step which comprises applying said conditioning agent in the form of an aqueous emulsion to said fibers at a temperature of at least 40° C.

6. In a process for rendering staple fibers having a basis of cellulose acetate more amenable to textile operations by applying a conditioning agent thereto, comprising the reaction product of a mixture of oleic acid, peanut oil and mineral oil with 20% oleum, having added thereto diamyl phenol and neutralized with sodium hydroxide and triethanolamine, the step which comprises applying said conditioning agent in the form of an aqueous emulsion to said fibers at a temperature of from 40° to 50° C.

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