

UNITED STATES PATENT OFFICE

2,086,544

TEXTILE MATERIAL AND METHOD OF PREPARING THE SAME

Camille Dreyfus, New York, N. Y.

No Drawing. Application August 18, 1932, Serial No. 629,309. In Great Britain September 29, 1931

8 Claims. (Cl. 19-66)

This invention relates to the treatment of textile materials and more particularly to the treatment and manipulation of relatively short lengths of filaments, tapes, straws, ribbons, bristles and the like (hereinafter referred to as filaments).

This application is in part a continuation of my copending application, S. No. 485,323 filed September 29, 1930.

An object of my invention is to treat short lengths of filaments made of or containing organic derivatives of cellulose and especially cellulose acetate and other cellulose esters to render them more suitable for spinning or other textile operations. Other objects of this invention will appear from the following detailed description.

I have found that staple fibre, that is material comprising relatively short lengths of artificial or natural textile filaments, may very readily be rendered amenable to spinning into yarns, or to operations involved in the production of yarn from staple fibre, by applying thereto a hygroscopic or deliquescent solid in an alcoholic medium. Particularly is this the case with staple fibre composed of material of very low electrical conductivity and which therefore readily acquires and retains an electrostatic charge. Staple fibre composed of or containing cellulose ester or ether filaments for instance is exceedingly difficult to spin into yarn, as owing to the electrification which so readily takes place, the individual filaments tend to fly apart and so lead to the production of an unsatisfactory yarn. This tendency to electrification may be completely removed by treatment with a hygroscopic solid in the alcoholic medium.

According to the present invention therefore the manipulation of staple fibre and particularly its conversion into yarn, is facilitated by means of a hygroscopic or deliquescent solid in an alcoholic medium.

The alcoholic medium may be for instance methyl or ethyl alcohol or mixtures of water and alcohol, for example, aqueous alcohol of 40-60% strength.

As regards the hygroscopic or deliquescent solids employed, particularly satisfactory results are obtained by the use of such substances as are electrolytes, that is substances which yield in water electrically conducting solutions. Especial mention may be made of organic or inorganic salts, and especially salts of metals, for example sodium, potassium or ammonium acetate, formate, or phosphate, ammonium citrate, magnesium chloride, and other chlorides such

as those of calcium, zinc, iron and strontium, also the nitrates of magnesium, calcium, zinc, iron, cobalt and nickel. Again, there may be used hygroscopic or deliquescent solid organic substances, for example amides such as acetamide and salts of amines, such as methylamine hydrochloride and quaternary ammonium salts. Mixtures of two or more hygroscopic or deliquescent substances may be employed if desired.

As examples of specific compositions for use in accordance with the invention mention may be made of a 2-10 per cent. solution of magnesium chloride in ethyl alcohol or aqueous alcohol of 40, 50 or 60 per cent. strength. Such liquids may be applied to the extent of say 8 per cent. on the weight of the material, so that on evaporation the material contains about .15-.75 per cent. magnesium chloride. Calcium chloride may be applied in a similar manner.

An advantage of the treatment with a hygroscopic solid in an alcoholic medium in accordance with the invention is that for many purposes further lubrication of the staple fibre is not essential. If desired, however, lubricants may also be applied to the filaments either in the same liquid as that in which the hygroscopic solid is applied or separately. Such lubricants are for instance olive oil, castor oil, coconut oil, rape oil, animal oils such as neat's-foot oil and lard oil, heavy and light mineral oils such as lubricating oils obtained from petroleum, and fatty acids derived from animal or vegetable oils. Further, if desired there may be applied, in conjunction with the hygroscopic solids, softeners or swelling agents which have a more pronounced action than has the alcoholic medium upon the particular filaments being treated, for example, triacetin, the ethers of ethylene- or other olefine- or poly-olefine-glycols, e. g. the mono methyl ether of ethylene glycol, the mono ethyl ether of ethylene glycol, and the di-ethyl ether of diethylene glycol. Such softeners or swelling agents operate to increase the flexibility of the filaments and render them less brittle, and at the same time to lubricate them somewhat.

The invention, as previously indicated, is of especial value in connection with the treatment of staple fibre consisting of or containing filaments or organic derivatives of cellulose, for example cellulose acetate, formate, propionate or butyrate or ethyl or benzyl cellulose. The filaments may be prepared in any desired manner, for example by wet or dry spinning methods, but the invention is of special benefit in

connection with dry spun filaments, especially those of cellulose esters. The invention is not however restricted to the treatment of cellulose ester or other materials and may be applied to the treatment of staple fibre generally, particularly staple fibre consisting of or containing materials of which manipulation is rendered difficult by electrification, as is the case, for example, with natural silk. The treatment of mixed materials is also included within the scope of the invention, for example mixtures of cellulose ester or other filaments with cotton, silk, wool or regenerated cellulose.

The hygroscopic solid in an alcoholic medium may be applied to the staple fibre in any desired manner and at any suitable stage of its manufacture or manipulation. Thus, the relatively short lengths of filament may be treated with the alcoholic liquid or filaments, yarns or the like, for instance in the form of hanks, may be treated with the alcoholic liquid and thereafter cut up into staple fibre of the desired length. Staple fibre may for instance be sprayed with the necessary proportion of a liquid containing the hygroscopic or deliquescent solid, or may be immersed in the said liquid and thereafter pressed, centrifuged or the like until it contains the desired proportion of liquid, and thereafter dried.

Again if desired the liquid containing the hygroscopic solid may be applied to travelling filaments or continuous filament yarns. Thus artificial filaments may be treated with the hygroscopic solids continuously with their production and may thereafter be cut up into staple fibre either continuously with production or in a separate operation, as may be preferred. Again continuous filament yarns may be treated with the alcoholic liquids during a winding operation. Such application may be effected for instance by allowing the yarn to pass over wicks or pads dipping into the liquid or supplied by means of a drip tube, by means of orifices through which the liquid is forced or by means of rollers or discs supplied with the liquid, as for example a rotatable disc mounted in a plane at an angle to the path of the yarn, so that the yarn in sweeping across the edge of the disc takes up the liquid carried by the disc. Whatever the means employed to apply the liquid, it is preferable to arrange that the liquid may be applied in a uniform manner and to a predetermined amount. Thus, where a wick is employed, its height above the liquid level may be adjusted. Variation in the size of the wick also enables a control over the quantity to be obtained.

The application of the liquids to yarn in the form of hanks, bobbins, or other packages may be effected for instance by immersion. Thus, hanks of yarn may be immersed in a liquid of such concentration that after draining, centrifuging, or the like, and drying of the hanks a predetermined amount of hygroscopic solid is retained by the yarn. Again, the yarn may be wound on perforated tubes, bobbins, or other supports to enable the liquid to be forced by pressure or suction through the yarn on the support.

Spraying may also be employed to apply the alcoholic liquids containing the hygroscopic solids, and where the medium contains a volatile or fairly volatile liquid, the latter may evaporate during the spraying to leave the solid only on the filaments.

If desired cellulose acetate or other cellulose ester or other filaments may be subjected to a delustering operation, for example delustering by means of wet steam or hot aqueous soap or other solutions prior to treatment with hygroscopic solids in accordance with the invention.

Staple fibre produced and treated in accordance with the invention may comprise filaments of any desired length, for example filaments of .75 to .10" or more. Again, the filaments may be of any desired denier, for example of denier between 1 and 30 e. g. 1.9, 3.5 or 5.5 denier.

The treated staple fibre may be spun into yarn or threads in any desired manner, the spinning operation including opening, filling, dressing, spreading, drawing and roving as may be desired or necessary. Any of the well-known spinning systems may be utilized, such as the "cotton", the "French", the "worsted", the "wool", the "spun silk" and the "Bradford" system.

It is to be understood that the foregoing detailed description is given merely by way of illustration and 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 the method of forming "spun" yarn containing comparatively short lengths of filaments comprising organic derivatives of cellulose, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing a solid electrolyte dissolved in an aqueous volatile alcohol of 40 to 60% strength.

2. In the method of forming "spun" yarn containing comparatively short lengths of filaments comprising cellulose acetate, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of a solid electrolyte dissolved in an aqueous volatile alcohol of 40 to 60% strength.

3. In the method of forming "spun" yarn containing comparatively short lengths of filaments comprising organic derivatives of cellulose, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of a hygroscopic or deliquescent solid electrolyte dissolved in an aqueous volatile alcohol of 40 to 60% strength.

4. In the method of forming "spun" yarn containing comparatively short lengths of filaments comprising cellulose acetate, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of a hygroscopic or deliquescent solid electrolyte dissolved in an aqueous volatile alcohol of 40 to 60% strength.

5. In the method of forming "spun" yarn containing comparatively short lengths of filaments comprising organic derivatives of cellulose, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of magnesium chloride dissolved in an aqueous volatile alcohol of 40 to 60% strength.

6. In the method of forming "spun" yarn containing comparatively short lengths of filaments comprising cellulose acetate, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of magnesium chloride dissolved in aqueous ethyl alcohol of 40 to 60% strength.

7. In the method of forming "spun" yarn containing comparatively short lengths of filaments comprising organic derivatives of cellulose, the

step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of calcium chloride dissolved in an aqueous volatile alcohol of 40 to 60% strength.

comprising cellulose acetate, the step which comprises incorporating in the filaments subsequent to the spinning thereof a solution containing 2 to 10% of calcium chloride dissolved in aqueous ethyl alcohol of 40 to 60% strength.

5 8. In the method of forming "spun" yarn containing comparatively short lengths of filaments

CAMILLE DREYFUS. 5