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TREATMENT AND MANUFACTURE OF
TEXTILE MATERIALS

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This invention relates to the treatment and manufacture of textile materials and in particular to the manufacture of staple fibre from spun yarns.

It is well known that filaments of artificial material such as cellulose acetate and other cellulose derivatives, cellulosic artificial silks, and to a less degree, natural silk are of a smooth nature, so that staple fibres of such materials are extremely liable to slip and are more difficult to spin into spun yarns than the relatively rough natural fibres such as cotton and wool. Further, spinning of such fibres, particularly in the case of fibres of cellulose acetate or other cellulose derivatives, is rendered difficult by reason of the tendency of the fibres to become electrified during the spinning operation. According to this invention these difficulties are overcome in a simple manner by a treatment of the filaments during their manufacture into staple fibre.

According to the invention filaments of cellulose acetate or other artificial materials are cut into staple lengths while wet following soaking in liquids consisting of or containing a substance selected from the class consisting of compounds having the formula R_1-X-R_2 , where R_1 is a hydroxy or basis amino radicle and R_2 is a different radicle that is a basic amino, acidylamino or acidyl hydroxy radicle and X is an aliphatic residue, and addition products of said compounds with acids. The compounds of this class therefore in all cases contain an aliphatic residue (X) and a salt-forming group (a hydroxy or basis amino radicle) and may also contain an acidylated salt-forming group (an acidylamino or acidyl hydroxy radicle). Such organic compounds which may be used in accordance with the present invention are the hydroxy alkylamines and/or their derivatives, such as salts, soaps, esters, acid amides, particularly of the higher fatty acids, ω -amino-alkylamides of the higher fatty acids, or di- or poly-hydric alcohol derivatives in which some of the hydroxy groups of the alcohols are esterified by fatty acids, particularly the higher fatty acids. Mixtures of two or more of such bodies may also be used. The filaments are preferably treated in thick bundles, so that the wetted filaments lie compactly, preferably parallel, or substantially so, it being found that such bundles of wet filaments are both easy to handle and that cutting is facilitated. At the same time, the application of the hydroxy alkylamine or other body is effected in a convenient manner so as to leave a quantity of such material on the fibres being spun which overcomes

any difficulty in the several spinning steps due to a tendency of electrification.

The hydroxy alkylamines or other bodies may be employed as such, or, where convenient or desired, in the form of solutions or suspension in water or organic solvents in presence or absence of other materials. In fact, it is preferable to apply the bodies in solvents which can be wholly or partially removed from the fibres after cutting to leave the fibres with the required quantity of the applied body and at the degree of dryness necessary for the subsequent spinning operation. The bodies or any other liquid in which they are applied should not be capable of exerting any detrimental action on the material of the yarns.

Though any of the simple hydroxy alkylamines such, for example, as mono-, di- or tri-ethanolamine, propanolamine, or dioxy-propylamine may be employed, it is, however, preferred that the hydroxy alkylamines or other bodies employed have a relative high molecular weight. Substituted hydroxy alkylamines such for example as hydroxy-ethyl-aniline may also be used. The hydroxy alkylamines may be employed as such or in the form of their derivatives, such as salts, soaps, esters, and acid amides and particularly their salts, soaps, esters, or acid amides of higher fatty acids such, for instance, as capric, lauric, myristic, oleic, and stearic acid. The salts or soaps may be the true salts or soaps i. e. containing the molecular equivalents of hydroxy alkylamine and acid or they may contain excess of the same or a different hydroxy alkylamine or of the same or a different acid.

As examples of partial esters of polyvalent alcohols which may be used according to the invention may be mentioned the higher fatty acid esters of glycols or glycerol, which esters contain free hydroxy groups, for example glycerol mono-oleate, glycerol di-oleate, ethylene glycol mono-oleate and diethylene glycol mono-oleate. Instead of the oleates there may be used corresponding esters of other saturated or unsaturated higher fatty acids containing more than 5, e. g. more than 10 carbon atoms, for example stearic, palmitic, or ricinoleic acid.

The filament bundles are conveniently in the form of hanks and may be treated with the liquid while still on the swift, reel, or drum on which the hank is wound or after removal therefrom. By arranging the filaments compactly, a larger amount of liquid can be taken up, giving the mass a firmness and consistency which is advantageous in handling and cutting while offer-

ing no inconvenience because of excess liquid. Thus the hanks prior to cutting may be placed while on the swift or other device on which they are wound, or after being removed therefrom, into a vessel containing the liquid to be applied. Solutions of ethanalamines in paraffin oils, such for instance as solutions of triethanolamine in paraffin oils with boiling points of about 110° and upwards, and containing from about 10 to 40% or more of triethanolamine, may be mentioned as examples of solutions that may be employed for the purposes of the invention.

After being allowed to drain until they contain the desired amount of liquid, the hanks are cut into staple lengths as by means of a guillotine cutting machine.

Drying of the masses of cut fibres may be carried out either by leaving the fibres on trays, conveyors or the like, or in bags or other containers exposed to the open air or by placing them in suitable chambers, and may be aided, if desired by such means as air currents, vacuum, or heat, or combinations thereof for the removal of less volatile constituents of the applied liquid. In this way the fibres are brought into a suitable condition for spinning, the hydroxy alkylamine or other body being left on the fibres to an amount dependent on the concentration of the applied liquid and the amount of liquid applied to the filaments. The drying operation referred to above may be preceded by a preliminary centrifuging operation, adapted to reduce the bulk of the liquid on the fibre from, say, 100%, which is a suitable proportion for the cutting operation, to, say, 30 to 40% of the weight of the fibre, the concentration of the hydroxy alkylamine or other body in the liquid applied being increased to correspond with the reduced bulk of liquid actually dried off the yarn.

Roughening media such as silica, barytes, lithopone, and kieselguhr, or the soluble salts described in U. S. application S. No. 585,381 filed 7th January, 1932, may be applied to the filaments or fibres conjointly with or separately from the hydroxy alkylamines or other bodies to increase the friction between the fibres and so aid the spinning operations. The filaments may be lubricated, e. g. with olive oil, prior to winding or cutting, or instead of or in addition to such lubricating, a lubricant may be added during the treatment with the hydroxy alkylamines or other bodies.

As stated above, liquids containing hydroxy alkylamines or other bodies may be applied to hanks of filaments by dipping the hanks in solutions. Other methods may, however, be employed in which more accurate control of the amount of applied hydroxy alkylamine or other body may be effected. For example, the hanks may be sprayed, or the bodies or liquids containing them may be applied to the filaments in winding operations, e. g. continuously with the production of filaments by the dry or evaporative method, the hanks or the packages formed being left wet in readiness for the cutting operation.

The fibres may be somewhat matted by the wet treatment, but this can be remedied by treatment of the fibres in an apparatus appropriate to their length. For example, in the case of fibres having a length of say 1½-2 inches, passage of the dried fibres through an opener, and subsequently through a scutcher, both of the type used in the preliminary operations of cotton spinning, readily brings them into a suit-

able state for the carding operation forming the first of the spinning steps to which such fibres are subjected.

If desired the bodies applied to the fibres may be removed from the yarns immediately after spinning, but in general it is sufficient to allow the usual scouring operation to which the yarns are subjected after being made into fabric to effect removal of the bodies.

The treatment according to the present invention may be applied not only in the manufacture of yarns consisting of one kind of fibre only, e. g. all cellulose acetate yarn, but to mixtures of fibres, e. g. mixtures of cellulose acetate fibres with viscose, silk, cotton, or wool.

What we claim and desire to secure by Letters Patent is:—

1. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments in a liquid containing a substance selected from the class consisting of compounds having the formula R_1-X-R_2 , where R_1 is a hydroxy group or basic amino radicle and R_2 is a different radicle selected from the group consisting of basic amino and acidylamino radicles and X is an aliphatic residue, and addition products of said compounds with acids, and then cutting the filaments into staple lengths while they are still wet.

2. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments in a liquid containing an ethanalamine, and then cutting the filaments into staple lengths while they are still wet.

3. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments in a solution of an ethanalamine in a paraffin oil, and then cutting the filaments into staple lengths while they are still wet.

4. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments in a solution of triethanolamine in a paraffin oil, and then cutting the filaments into staple lengths while they are still wet.

5. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments in a liquid containing an ω -amino-alkylamide of a higher fatty acid, and then cutting the filaments into staple lengths while they are still wet.

6. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments in a liquid containing a substance selected from the class consisting of compounds having the formula R_1-X-R_2 , where R_1 is a hydroxy group or basic amino radicle and R_2 is a different radicle selected from the group consisting of basic amino and acidylamino radicles and X is an aliphatic residue, and addition products of said compounds with acids, forming the continuous filaments into bundles and then cutting the filaments into staple lengths while they are still wet.

7. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments of an organic derivative of cellulose in a liquid containing a substance selected from the class consisting of compounds having the formula R_1-X-R_2 ,

where R_1 is a hydroxy group or basic amino radicle and R_2 is a different radicle selected from the group consisting of basic amino and acidyl-amino radicles and X is an aliphatic residue, and addition products of said compounds with acids, and then cutting the filaments into staple lengths while they are still wet.

8. Process for the production of staple lengths of artificial filaments, said process comprising soaking continuous artificial filaments of cellulose acetate in a liquid containing a substance selected from the class consisting of compounds having the formula R_1-X-R_2 , where R_1 is a hydroxy group or basic amino radicle and R_2 is a different radicle selected from the group consisting of basic amino and acidylamino radicles and X is an aliphatic residue, and addition prod-

ucts of said compounds with acids, and then cutting the filaments into staple lengths while they are still wet.

9. Process for the production of artificial staple fibres, which comprises soaking continuous artificial filaments in a liquid containing a hydroxy alkylamine and then cutting the filaments into staple lengths while they are still wet.

10. Process for the production of artificial staple fibres, which comprises soaking continuous artificial filaments in a liquid containing a partial acidyl derivative of a hydroxy alkylamine, and then cutting the filaments into staple lengths while they are still wet.

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