

## UNITED STATES PATENT OFFICE

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## TREATMENT OF TEXTILE AND OTHER MATERIALS

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This invention relates to improvements in the treatment of textile and other materials, and is more particularly concerned with the treatment of artificial filaments, threads, fabrics, ribbons and films composed of cellulose derivatives or of mixed threads and fabrics containing such artificial filaments or threads.

According to the present invention the impregnation of cellulose derivative filaments, threads, fabrics, ribbons, films and the like with cellulose is effected by a process which comprises treating such materials in a swollen condition with a viscose solution. Preferably the materials are treated with a swelling agent prior to the application of the viscous solution.

By means of the invention the cellulose appears to be better anchored to the surface of the materials than if they are treated in an unswollen condition. This is of considerable value in the treatment of fabrics, and is of great importance in the treatment of ribbons, films and like products. In addition, it is easier by the present invention to apply higher proportions, weight for weight, of cellulose to the materials under treatment, or to apply either low or high proportions using low concentrations of cellulose in the viscose solution. These low concentrations of cellulose are of advantage in minimizing or eliminating cementing of individual filaments together in the treatment of yarns.

The swelling agent, particularly when applied before the viscose solution, may be of such a character that it has the property of precipitating viscose, for example in the form of a xanthate. Such swelling agents are in general organic liquids. Some of them, for example alcohol, may be used without dilution since they are non-solvents for cellulose derivatives or for certain cellulose derivatives. On the other hand, other organic precipitating agents for viscose, for example acetic acid, must be diluted for example with water, benzene or the like, so as to prevent solution of the cellulose derivative. Whichever type of swelling agent be used, the precipitating or incipient precipitating action upon the viscose is of advantage, since in addition to anchoring the xanthate upon the filament, fabric, film or like material, it enables the material so impregnated to be given a light wash before conversion of the xanthate to cellulose, with the result that it is very easy to prevent filaments in a yarn from sticking together and to prevent interstices of a fabric being filled with cellulose where this is not desired.

As suitable swelling agents for the purpose of the present invention the following may be instanced:—methyl or ethyl alcohol; acids, for example formic acid, acetic acid, lactic acid and the like; esters, for example methyl formate, methyl acetate, ethyl formate, ethyl acetate, ethyl lactate, etc.; ketones, for instance acetone, methyl ethyl ketone and diacetone alcohol; cyclic ethers, for instance methylene ethylene ether, dioxane and their homologues and substitution products, 1,4-oxanone and its homologues and substitution products and similar cyclic ethers; certain ethers, esters or ether-esters of olefine or polyolefine glycols or other polyhydric alcohols, for example mono- or di-methyl ethylene glycol, glycol monoacetate, methyl glycol acetate and mono- or di-acetin; and aqueous solutions of thiocyanates, zinc chloride and other inorganic bodies having a solvent or swelling action upon cellulose derivatives.

The material made of or containing the cellulose derivative may be soaked, sprayed or otherwise treated with the swelling agent, and, with or without intermediate washing, impregnated with the viscose, which, as previously explained, may advantageously be of a low concentration, for example containing under 4% of cellulose and especially up to 2% of cellulose, and may finally be treated with an agent which converts the viscose into cellulose, for example mineral acids, strong organic acids, acid salts and the like. Gaseous or vaporous converting agents, for example steam, hydrochloric acid gas and the like, may be used.

As an alternative the swelling agent for the cellulose derivative may itself be capable of converting the viscose into cellulose, in which case it is merely necessary to wash the material after the impregnation with viscose. Such an agent is, for example, hydrochloric acid which in concentrated solution has the property of swelling cellulose acetate and at the same time can convert viscose into cellulose.

The material may be impregnated with any desired proportion of cellulose. Very small proportions may merely serve to raise the safe ironing point of the materials under treatment or to decrease the tendency of knitted fabrics to ladder or split or of woven fabrics to slip, while somewhat greater proportions may be applied for the purpose of enabling the materials to be dyed with cotton colours, as explained in British Patent No. 323,521.

The cellulose may, if desired, be applied so as to fill up or form a film over the interstices of a

fabric, which is of advantage for certain applications, for example for shoe fabrics.

The viscose to be applied in accordance with the present invention may contain, in addition to sodium cellulose xanthate or equivalent cellulose xanthate, any other desired substance, for example glycols, glycerine, oleaginous substances or other softening agents, or mineral or organic filling, pigmenting or colouring agents, for example barium sulphate, titanium oxide, carbon black, ochre and the like.

The invention further includes the local application of viscose to fabrics or other materials. Thus, the material may be uniformly swollen by immersion in or spraying with a suitable swelling agent and the viscose subsequently applied locally thereto, for example by means of printing rollers or the like.

The following examples illustrate the invention, but it is to be understood that these examples are given solely by way of illustration and are in no way limitative.

#### Example 1

Cellulose acetate threads in sheet form are run successively through a bath containing 75% ethanol at 40° C. and one containing a solution of viscose containing 1½-2% cellulose, the speed of running and the lengths of the baths being so arranged that the threads are in contact with the alcohol for 2-5 minutes and with the viscose solution for ½-1 minute.

In order to regenerate cellulose from the viscose carried by the threads, the threads are passed through a third bath containing a 30-40% solution of sodium bisulphate.

Combs or reeds or the like are provided at each end of the baths to separate the individual threads.

On leaving the third bath, the threads are thoroughly washed, dried and wound.

#### Example 2

A fabric woven from cellulose acetate yarns is treated for 1-2 minutes with 40% acetic acid at room temperature, and then, also for 1-2 minutes, with a solution of viscose containing 1-1½% cellulose, after which the fabric is given a light wash.

The fabric is then subjected to treatment with 60% benzene sulphonic acid, or other agent suitable for regenerating cellulose from the viscose carried by the fabric, and then thoroughly washed in water and dried.

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

1. Process for impregnating cellulose derivative filaments, threads, yarn and like materials with cellulose, which comprises subjecting said materials to the action of an organic liquid which swells said cellulose derivative, treating said materials with a viscose solution containing less than 2% of cellulose, said organic liquid having a precipitating action on said viscose solution, subjecting said materials to a light wash whereby the sticking together of the filaments or threads is prevented and then regenerating the cellulose from the viscose carried by said materials.

2. Process for impregnating cellulose acetate filaments, threads, yarn and like materials with cellulose, which comprises subjecting said materials to the action of ethanol, treating said materials with a viscose solution containing less than 2% of cellulose, said ethanol having a precipitating action on said viscose solution, subjecting said materials to a light wash whereby the sticking together of the filaments or threads is prevented, and then regenerating the cellulose from the viscose carried by said materials.

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