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## MANUFACTURE OR TREATMENT OF TEXTILE OR OTHER MATERIAL

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This invention relates to the treatment and also to the manufacture of artificial silk and other filaments or threads and to the treatment of yarns, fabrics or other materials made of or containing cellulose esters or ethers.

It is well known that commercial cellulose acetate artificial silk becomes delustred when treated with hot or boiling aqueous liquids or with moist steam. This property is particularly noticeable with dry-spun artificial silks but it is also observable in wet-spun fibres, for example the wet-spun fibres produced according to the processes described in U. S. Patent Application S. No. 402,785 dated 26th October 1929. This property of becoming delustred when subjected to the action of hot aqueous media or steam is often a drawback in the subsequent processing of the artificial silk.

The object of the present invention is to produce artificial material in filament, thread, yarn or fabric form which will not delustre when subjected to the action of hot aqueous liquids or moist steam or in which the extent to which delustring occurs with such media is considerably reduced, and also to relustre materials which have already been delustred by treatment with hot aqueous media.

I have found that the resistance of products made of or containing cellulose acetate to the delustring action of hot aqueous liquids or moist steam may be increased or they may be rendered entirely resistant by subjecting them to a steaming operation and particularly to a steaming operation with steam under pressure. The time of steaming will depend to some extent upon the nature of the cellulose acetate artificial silk under treatment and also upon the actual temperature of the steam or the temperature to which the artificial silk is raised during the steaming. At any given pressure temperatures approximating to or slightly above the boiling point of water at that pressure appear to be the most effective, but other temperatures may be employed. The duration of the steaming should not be extended beyond that necessary to achieve the desired results, though it is found that prolonging or decreasing the time above or below the optimum period does not in general substantially impair the qualities of the products. Too long a treatment, however, at very high temperatures should for obvious reasons be avoided. Apparently the drier the steam employed for the purpose, the better are the results obtained.

I have further found that, by steaming goods which have been delustered by means of hot aqueous media, lustering takes place and it appears that in general this lustering occurs before or during the early stages of rendering the materials non-delusterable.

The present invention includes this lustering of materials initially of low lustre, provided that the action is sufficiently prolonged to render them non-delusterable.

As indicated above the duration of the steaming depends upon a number of factors, such as temperature etc. If it is sufficiently short the steaming or heat treatment may be carried out continuously with the production of the artificial filaments or products. For example, dry-spun artificial filaments after leaving the spinning cells or chambers, or wet-spun artificial filaments after leaving the precipitating bath, and with or without intermediate drying, may be passed directly to a chamber or other apparatus where they are subjected for the necessary time to the action of steam. After leaving such chamber or apparatus the filaments may be wound or twisted and wound as usual.

The application of a stretch to the filaments, yarns or other products, and particularly a stretch beyond their elastic limit, either before or during their treatment by any of the processes outlined above may considerably assist in obtaining the required modification of their properties. Moreover, by applying a stretch, the temperature of the steaming may be reduced to below or considerably below the indications given above. A stretch may for example be applied to the goods just before or during the early part or the whole of the steaming.

The various processes described above are of course applicable to the treatment of cellulose acetate filaments or threads of any type, for example flat or ribbon-like filaments, semi-round and round filaments and the so-called hollow, tubular or voluminous filaments or threads containing the same. The products may be the normal lustrous products or may be products which have been spun in a lustreless condition or so as to have only a low lustre or products which have been delustered by treatment with moist steam or hot aqueous liquids and it will be appreciated that the final lustre or even the cross-section of the filaments treated by the processes is not necessarily the same as that of the starting materials. Thus, as already indicated, the present processes result in a lustering of products which, owing to the action of hot aqueous media, have little or no lustre. The processes of the invention are further applicable to the treatment of

fabrics or other products made of or containing cellulose acetate and to the treatment of filaments or threads, fabrics or other products made of or containing other cellulose esters for example cellulose formate, propionate or butyrate, or made of or containing cellulose ethers, such as methyl cellulose, ethyl cellulose or benzyl cellulose or the corresponding condensation products of cellulose and glycols or other polyhydric alcohols and also to the treatment of mixed materials containing cellulose esters or ethers in association with other fibres, e. g. cotton, the cellulosic type of artificial silk, wool or silk.

The following examples illustrate the invention but are not to be considered as limiting it in any way:—

*Example 1*

Cellulose acetate knit fabric is steamed for 30 minutes, with steam at 20 lbs. pressure and at a temperature of 137° C., i. e., approximating to boiling temperature at this pressure.

It now withstands boiling for 1½ to 2 hours in a 1% soap solution, untreated fabric soaped simultaneously being much delustred.

*Example 2*

Cellulose acetate woven fabric is steamed for 30 minutes with steam at 40 lbs. pressure, and 150° C., i, e, approximating to boiling temperature at this pressure.

It now withstands boiling for 1½–2 hours in a 1% soap solution, untreated fabric soaped simultaneously being badly delustred.

*Example 3*

Cellulose acetate knit fabric, delustred by boiling for 1 hour in a 1% soap solution, is steamed for 30 minutes with steam at 20 lbs. pressure and 137° C. It has now regained its original lustre, which is quite resistant to 1½–2 hours' treatment at the boil in a 1% soap solution.

*Example 4*

Cellulose acetate yarn which has been stretched in the dry state, and shows an increase in length of 11.3% is steamed for ½ hour at 137° C. and 20 lbs. pressure. It now retains its lustre after 2 hours' boiling in a 1% soap solution, unsteamed yarn being very much less resistant to this treatment.

The treatment of low lustre material forms the subject matter of divisional application, Serial No. 535,295, filed May 5, 1931.

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

1. Process for treating materials containing organic derivatives of cellulose, which comprises subjecting said materials, in the absence of swelling agents for the organic derivatives of cellulose, to the action of substantially dry steam until the resistance of the materials to the delustering action of hot aqueous media is increased.

2. Process for treating materials containing cellulose acetate, which comprises subjecting said materials, in the absence of swelling agents for the cellulose acetate, to the action of substantially dry steam until the resistance of the materials to the delustering action of hot aqueous media is increased.

3. Process for the manufacturing of materials of increased resistance to the delustering action of hot aqueous media comprising subjecting materials containing non-delustered cellulose derivatives which are substantially free from swelling agents therefor to a steaming operation with substantially dry steam.

4. Process for increasing the resistance of materials containing non-delustered organic derivatives of cellulose to the delustering action of hot aqueous media, comprising subjecting said materials in the absence of swelling agents for the organic derivatives of cellulose to a steaming operation with substantially dry steam.

5. Process for increasing the resistance of materials containing non-delustered cellulose acetate to the delustering action of hot aqueous media, comprising subjecting said materials in the absence of swelling agents for the cellulose acetate to a steaming operation with substantially dry steam.

6. Process for the manufacture of materials of increased resistance to the delustering action of hot aqueous media, comprising subjecting materials containing non-delustered organic derivatives of cellulose which are substantially free from swelling agents therefor to a steaming operation wherein substantially dry steam under pressure is employed.

7. Process for increasing the resistance of materials containing non-delustered cellulose acetate to the delustering action of hot aqueous media, comprising subjecting said materials in the absence of swelling agents for the cellulose acetate to a steaming operation wherein substantially dry steam under pressure is employed.

8. Process for the manufacture of materials of increased resistance to the delustering action of hot aqueous media, comprising subjecting materials containing non-delustered cellulose derivatives which are substantially free from swelling agents therefor to a steaming operation with substantially dry steam at 20–40 pounds pressure.

9. Process for increasing the resistance of materials containing non-delustered cellulose acetate to the delustering action of hot aqueous media, comprising subjecting said materials in the absence of swelling agents for the cellulose acetate to a steaming operation with substantially dry steam at 20–40 pounds pressure.

10. Process for the manufacture of materials of increased resistance to the delustering action of hot aqueous media, comprising subjecting materials containing non-delustered cellulose derivatives which are substantially free from swelling agents therefor to a steaming operation with substantially dry steam at 20–40 pounds pressure, said steaming operation being continued for upwards of half an hour.

11. Process for increasing the resistance of materials containing non-delustered cellulose acetate to the delustering action of hot aqueous media, comprising subjecting said materials in the absence of swelling agents for the cellulose acetate to a steaming operation with substantially dry steam at 20–40 pounds pressure, said steaming operation being continued for upwards of half an hour.

12. Process for the manufacture of materials of increased resistance to the delustering action of hot aqueous media, comprising subjecting material containing delustered organic derivatives of cellulose which are substantially free from swelling agents therefor to a steaming operation with substantially dry steam for a period substantially in excess of that necessary to restore their original lustre.

13. Process for the manufacture of materials of increased resistance to the delustering action of hot aqueous media, comprising subjecting ma-

terials containing delustered cellulose acetate which is substantially free from swelling agents therefor to a steaming operation with substantially dry steam under pressure for a period substantially in excess of that necessary to restore the original lustre.

14. Process for increasing the resistance of materials to the delustering action of a hot aqueous media, comprising subjecting materials containing delustered cellulose acetate which is substantially free from swelling agents therefor to a steaming operation with substantially dry steam at 20 to 40 lbs. pressure for a period substantially in excess of that necessary to restore their original lustre.

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