

## UNITED STATES PATENT OFFICE

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## TREATMENT OF TEXTILE MATERIALS

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This invention relates to the treatment of textile materials and is more particularly concerned with the treatment of fabrics containing filaments or fibres of cellulose acetate or other cellulose derivative.

The invention is concerned with the production of designs and patterns on fabrics containing filaments, fibres or yarn of cellulose acetate or other cellulose derivative and also yarn of another material.

According to the invention cellulose acetate filaments or fibres are removed from fabrics over selected areas so as to produce a pattern or design by a process which comprises applying to the fabric a medium capable of dissolving the cellulose acetate under the conditions obtaining, then subjecting the fabric to treatment with a precipitant so as to bring the cellulose acetate in the treated areas into an amorphous form and then removing the amorphous cellulose acetate.

The fabric treated contains both filaments, fibres or yarn of cellulose acetate and yarn of another material, e. g. cotton, regenerated cellulose, silk or wool, the latter yarn forming a self-supporting fabric apart from the cellulose acetate present. In some fabrics of this type, e. g. in cloqué fabrics and some velvets, cellulose acetate filaments, fibres or yarn form a facing, backing or pile while in others, for instance where two types of material are the components of a doubled yarn from which the fabric is made, this may or may not be the case.

It has been found best in practice to use steam as the precipitant with which to reduce to an amorphous form the cellulose acetate in the treated areas of the fabric. This steam treatment removes all, or substantially all, solvent present, and it would appear that substantially complete removal of solvent from the fabric is important from the point of view of leaving the amorphous cellulose acetate in a form which is easily removable from the fabric. Volatile constituents of the solvent medium may, if desired, be removed before the steam treatment by an intermediate drying, but this step is not essential. On the other hand, instead of using steam, liquid water may be the precipitant employed, the fabric to which the solvent medium has been applied being plunged into water without any intermediate drying.

The solvent medium applied to the fabric includes a low-boiling volatile liquid, such as acetone or acetic acid, capable of dissolving cellulose acetate, and it has been found advantageous to include also a higher boiling solvent for the

cellulose acetate, benzyl alcohol being of particular value in this connection. Solvents of intermediate boiling point boiling say between 130 and 170° C., e. g. diacetone alcohol, may also be used and non-solvents may be present in the solvent medium, but the medium, as a whole, must be capable of dissolving the cellulose acetate in the fabric treated. A composition containing, as the liquid ingredients, 28-33 parts of acetic acid or acetone, 10-13 parts of water and 18-23 parts of benzyl alcohol, has been found to give very good results.

It has been found most advantageous to include in the medium applied to the fabric one or more solid substances having abrasive properties, for instance powdered silica, sodium sulphate, titanium dioxide or kieselguhr. The presence of these substances assists very considerably the removal of the amorphous cellulose acetate from the fabric which may be effected by scraping, rubbing or brushing the dry fabric or by a combination of such operations.

The application of the solvent medium together with any solid substance employed is usually effected by printing, stencilling or like operation, and it is found desirable, especially when a printing operation is contemplated, to include in the composition applied a thickener. Cellulose acetate may be employed in this connection but preferably only in very small quantity, say 2 to 3% or less by weight of the total composition, and likewise water-soluble cellulose ethers, e. g. oxyethyl cellulose, and gums, e. g. gum arabic, British gum or gum tragacanth.

The invention is of particular importance in connection with the production of lace-like effects by removing over selected areas the cellulose acetate from fabrics containing cellulose acetate yarns and yarns of another material, the latter yarns forming a self-supporting and gauze-like fabric, and the cellulose acetate yarn forming a facing or backing. According to the weave of the gauze-like fabric and the pattern chosen a variety of novel fabrics can thus be made and, by taking advantage of the different shrinking properties of the gauze-like fabric and the facing or backing, further ornamental effects can be obtained. As previously indicated, however, the invention also includes the production of ornamental effects on heavier fabrics, including velvets and other pile fabrics having a pile formed of cellulose acetate filaments supported by a fabric formed of yarn of other material.

The following example illustrates the produc-

tion of a lace-like fabric by the process of the invention:

#### Example

A viscose crêpe fabric having a cellulose acetate satin back is printed with the following composition:

|                                                  | Parts by weight |
|--------------------------------------------------|-----------------|
| Glacial acetic acid                              | 40              |
| 7.5-10% solution of oxy-ethyl cellulose in water | 16              |
| Benzyl alcohol                                   | 22              |
| Neosyl (anhydrous silica)                        | 22              |

After printing the fabric is, without drying, steamed for 20 minutes and then thoroughly dried. It is then passed over two knife edges, calendered and then brushed with a wire brush as it passes over a knife edge, the latter operation being carried out on both sides of the fabric. Finally, the fabric is given several passages through a machine known as a polisseuse.

The polisseuse is a machine which subjects the fabric to a rubbing action and consists of a compressed air-filled leather-faced cushion, over which the fabric passes, and a series of spindles over the cushion, parallel with the plane of the fabric and at right angles to the direction of movement of the latter, and carrying radially mounted steel blades which, on rotation of the spindles, rub against the fabric against the direction of motion of the latter. The spindles can be adjusted vertically so as to enable the pressure exerted on the fabric to be varied within very wide limits, and the blades do not extend uninterruptedly across the width of the fabric but are in the form of sections some three inches or so wide.

After this treatment the fabric may be washed, dried and subjected to such finishing operations as may be required.

While the invention has been described more particularly in connection with the treatment of fabrics comprising cellulose acetate filaments or fibres it may also be applied to fabrics comprising filaments or fibres of other cellulose derivatives, including both cellulose esters such as cellulose formate, cellulose propionate and cellulose butyrate, and cellulose ethers such as ethyl cellulose and benzyl cellulose. In all such processes the fabric treated contains, besides the cellulose acetate or other cellulose derivative, filaments or fibres of cotton, regenerated cellulose, wool, silk or other material which is unaffected by solvents for cellulose derivatives.

Furthermore, instead of using a solvent medium consisting almost entirely of one or more solvents for the cellulose derivative in the fabric treated, there may be employed a liquid which dissolves the cellulose derivative only at raised temperatures or a liquid mixture which loses its solvent properties with the evaporation of its more volatile constituent or constituents, for instance a mixture of a solvent and a less volatile non-solvent, or with change in temperature. Such liquids are, for example, the monoethyl ether of ethylene glycol, a mixture of acetone and amyl alcohol or a mixture of benzol and ethyl alcohol. However, whatever the exact nature of the solvent medium employed, it is preferred to subject the fabric having the solvent medium applied thereto to treatment with steam for the purpose of obtaining the cellulose derivative in the treated areas in an amorphous form.

Having described our invention, what we desire to secure by Letters Patent is:

1. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of an organic derivative of cellulose and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which is capable of dissolving only the cellulose derivative under the conditions obtaining, then without intermediate drying subjecting the fabric to treatment with a precipitant so as to bring the cellulose derivative in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose derivative from the dry fabric by mechanical means.

2. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of an organic derivative of cellulose and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which is capable of dissolving only the cellulose derivative under the conditions obtaining, then without intermediate drying subjecting the fabric to treatment with steam so as to bring the cellulose derivative in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose derivative from the dry fabric by mechanical means.

3. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of an organic derivative of cellulose and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which is capable of dissolving only the cellulose derivative under the conditions obtaining and comprises a solid substance having abrasive properties, then without intermediate drying subjecting the fabric to treatment with a precipitant so as to bring the cellulose derivative in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose derivative from the dry fabric by mechanical means.

4. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of an organic derivative of cellulose and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which comprises a volatile solvent for the cellulose derivative, a higher boiling solvent therefor and a solid substance having abrasive properties, then without intermediate drying subjecting the fabric to treatment with steam so as to bring the cellulose derivative in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose derivative from the dry fabric by mechanical means.

5. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of cellulose acetate and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which is capable of dissolving only the cellulose acetate under the conditions obtaining, then without intermediate drying subjecting the fabric to treatment with a precipitant so as to bring the cellulose acetate in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing

the amorphous cellulose acetate from the dry fabric by mechanical means.

6. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of cellulose acetate and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which comprises a volatile solvent for the cellulose acetate, a higher boiling solvent therefor and a solid substance having abrasive properties, then without intermediate drying subjecting the fabric to treatment with steam so as to bring the cellulose acetate in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose acetate from the dry fabric by mechanical means.

7. Method of producing an ornamental fabric, which comprises applying to predetermined areas of a fabric containing filaments, fibres or yarn of cellulose acetate and yarn of another material, the latter yarn itself forming a self-supporting fabric, a medium which comprises a volatile solvent for the cellulose acetate, benzyl alcohol and a solid substance having abrasive properties, then without intermediate drying subjecting the

5 fabric to treatment with steam so as to bring the cellulose acetate in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose acetate from the dry fabric by mechanical means.

8. Method of producing a lace-like fabric, which comprises removing cellulose acetate from selected areas of a fabric comprising cellulose acetate yarn and yarn of another material, the latter yarn itself forming a self-supporting and gauze-like fabric and the cellulose acetate yarn forming a facing or backing, by applying to the selected areas of the fabric a medium which comprises a volatile solvent for the cellulose acetate, benzyl alcohol and a solid substance having abrasive properties, then without intermediate drying subjecting the fabric to treatment with steam so as to bring the cellulose acetate in the treated areas into an amorphous form on the fabric, thoroughly drying the fabric and then removing the amorphous cellulose acetate from the dry fabric by mechanical means.

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