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PROCESS OF PRODUCING TEXTILE MATERIALS AND PRODUCT THEREOF

Camille Dreyfus, New York, N. Y., and William Whitehead, Cumberland, Md., assignors to Celanese Corporation of America, a corporation of Delaware

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This invention relates to the production of textile materials, and relates more particularly to the production of fabrics and the like which are more or less stiff and which fabrics contain organic derivatives of cellulose.

An object of our invention is to prepare textile materials that are stiff and which may be employed for all purposes to which stiff fabrics are put. Another object of our invention is to prepare fabrics which may be molded under heat and/or pressure to form articles of desired shape. A further object of our invention is to prepare a textile material whose face has the normal appearance of woven or knitted fabric but which is more or less impervious to moisture or water.

Further objects of our invention will appear from the following detailed description.

The preparation of a stiff fabric that is satisfactory for all general purposes is a matter of considerable importance. We have found that if a fabric, sheet or film containing an organic derivative of cellulose is brought together with a fabric of any suitable nature, and the assembly is pressed under such conditions that the fabric or film containing organic derivatives of cellulose is caused to dissolve or melt and coalesce to the other fabric, there is produced a fabric that is stiff and more or less impermeable to water and having a face which has the normal appearance of textile fabrics.

In accordance with our invention, we prepare a stiff fabric by placing a fabric, sheet, film or foil containing organic derivatives of cellulose in juxtaposition to a fabric of any suitable kind and subjecting the assembly to such conditions that the layer containing the organic derivative of cellulose is caused to coalesce, dissolve or melt and become anchored to the fabric that is to form the surface of the finished article.

The sheet-like material that is caused to melt, dissolve or coalesce may be of any form. Thus it may be a fabric containing yarns of organic derivatives of cellulose or it may be sheets, films, thin foils, artificial straws and the like containing such organic derivatives of cellulose. The organic derivatives of cellulose may be any suitable ones such as organic esters of cellulose or cellulose ethers. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate while examples of cellulose ethers are ethyl cellulose, methyl cellulose and benzyl cellulose.

The fabric that is to form the face of the finished fabric, and to which the sheet-like material containing organic derivatives of cellulose is caused to adhere, may be made of yarns of any character. Thus the fabric may consist wholly of warns of any of the organic derivatives of cellulose above mentioned, or it may contain such yarns in admixture with yarns of other fibres such as cotton, natural silk, reconstituted cellulose or wool. If desired this fabric may consist wholly of yarns other than organic derivatives of cellulose. In order to obtain desired colored effects, this fabric may be previously dyed or printed in any desired manner.

In carrying out the process, the fabric, sheet, film or foil containing organic derivatives of cellulose that is to be coalesced to the other fabric comprising the face of the finished material, may be wetted with a solvent or a latent solvent and placed next to such other fabric, and the assembly pressed by suitable means such as calender rolls which may or may not be heated. Any solvent or latent solvent may be used, examples of which are acetone, methyl alcohol, or relatively non-volatile solvents or plasticizers such as para toluene sulfonamide, dibutyl tartrate, diethyl phthalate, etc. If desired the use of a solvent or latent solvent may be dispensed with and coalescence obtained by the employment of heated pressing devices. If heat alone is employed, it is preferably applied only to the fabric or sheet to be melted and coalesced in cases where the fabric that is to form the face of the finished fabric also contains organic derivatives of cellulose. To obtain further stiffening effect, organic derivatives of cellulose may be dissolved in the solvents or latent solvents that are applied.

In carrying out our invention, the material may be made of any number of plies, which may be more than two if desired. Thus we may coalesce or cause to adhere to each other several layers of fabric, arranging them so that there is always at least one layer of fabric or sheet containing organic derivatives of cellulose that is to be coalesced, between the layers of the other fabric. If desired the finished product may have both surfaces or faces thereof composed of fabrics that have not been coalesced, thus giving a woven or knitted textile fabric appearance to both surfaces.

Since the materials produced by the process of our invention possess the thermoplastic properties of organic esters of cellulose, designs and the like may be embossed on the same by pressing them between heated embossing plates, rollers or similar devices. Such embossing process may be carried out either in conjunction with the coalescing process or in a separate process

either prior or subsequent to the coalescing process.

The thermoplastic nature of the materials employed may be advantageously used in shaping or molding the material into desired shape. Thus if the assembly of the materials to be coalesced is pressed between molds which may or may not be heated, the fabric is caused to assume the desired shape simultaneous with coalescing. If desired the fabric, after it has been formed, may be molded in a suitable manner to the desired shape. An example of producing the desired shape is the formation of hats and the like. Even when a fabric is employed that does not contain thermoplastic derivatives of cellulose, because of the presence of the same in the coalescing sheet or fabric, the product may be molded with substantially the same facility as those composed entirely of organic derivatives of cellulose, since the organic derivative of cellulose that is present is sufficient to control the molding and shaping of the complete product.

It is also possible, in the process of our invention, to effect the printing of patterns or designs onto the materials while the coalescence is being effected. This may be done by engraving suitable designs on the surface of the pressing device and employing a suitable printing paste to fill the engraved portion of such surface as in ordinary printing operations. When such surface is brought in contact with the materials to be printed, the dye paste is transferred to the same whereupon dyeing is effected, which dyeing may be made more permanent by steaming the material in an ager.

If it is desired to dye the material simultaneous with the coalescing process, suitable dyestuffs may be dissolved in the solvent or latent solvent that is applied to cause coalescence. Many ornamental effects may be obtained by employing a film or foil containing organic derivatives of cellulose in conjunction with the fabric. Thus if a fabric of open mesh or of thin construction such as voile is caused to adhere to a film or sheet containing organic derivatives of cellulose which has been prepared so as to have a grain, marble or nacreous effect there is produced a material in which the color effects of the film or sheet show through the face of the fabric.

By the process of our invention there is produced a textile material of desired stiffness having at least one face thereof of the normal appearance of a woven, knitted or other textile fabric. The product is one well coalesced material and can not be parted by wear, folding or severe treatment. Holes may be punched or otherwise made therein without any fraying at the edges of such holes either in the cutting of the holes or in subsequent wear. Dirt cannot penetrate through such fabric, and the material, when coalescence is complete and continuous, is extremely water proof and may even be employed for making containers for water or other liquid. The material has the usual thermoplastic properties of organic derivatives of cellulose and may thus be molded into any desired shape. Since the fabric surfaces are well held in position by the coalescence they may be brushed vigorously without losing shape or without the designs that may be printed thereon becoming deformed.

The fabric made in accordance with our invention may be employed in many uses. It may be cut into relatively thin strips and such strips may be employed as artificial straw, in the making of braids for hats, etc. The fabric in the wide form may be employed for making hats and as stiffening materials in making garments and for any other purposes such as for the manufacture of purses, handbags, artificial flowers, bathing bags, rainshields. Their hard wearing properties render them quite suitable for floor coverings in which many beautiful effects may be obtained by the imposing of a fabric on the surface which has a pile. This process may also be employed to produce material to replace linoleum and like materials.

A very useful property of the products of our invention is that in shaping, forming and printing, it is not at all necessary to sew the joints. These joints may be formed by dampening with solvents or liquids which become solvents for the organic derivatives of cellulose and pressing the edges to be joined together at ordinary or elevated temperatures. The joints may also be formed by applying a solution of an organic derivative of cellulose in a suitable volatile solvent to the parts to be joined.

In order further to illustrate our invention but without being limited thereto, the following specific examples are given.

Example I

Two layers of fabric both consisting wholly of yarns of an acetone soluble cellulose acetate are fed to a pair of calender rolls both of which are heated to approximately 90° C. The rate of feeding of the fabric may be 50 meters per minute. One of the fabrics is of a taffeta construction and on its passage to the calender rolls, is wetted by means of a felt roll or other suitable device with methyl alcohol. The other fabric is of satin construction and is not wetted with the methyl alcohol. As the assembly of fabrics reach the hot rolls, the methyl alcohol becomes a solvent for the cellulose acetate and the solvent action is such as to cause the wetted fabric partly to dissolve and coalesce and to be pressed well into one face of the unwetted fabric. The outer surface of the unwetted fabric retains its original woven appearance.

If instead of methyl alcohol, a mixture of 90 parts by weight of acetone and 10 parts by weight of water are employed, substantially identical results are obtained. If in this case, the rolls are not heated, the resultant fabric is somewhat softer in handle.

Example II

This is an example wherein coalescing and shaping take place simultaneously. The process is carried out in a manner similar to that described in Example I, with the exception that instead of employing calender rolls, a hat shaping press, such as is employed in shaping felt hats at elevated temperatures, is used. Preferably one layer of the fabric is wetted with para toluene sulfonamid, say in amounts equal to 25% of the weight of the fabric, and the so wetted fabric is laid over the other piece of fabric and the two pressed in the hat shaping device at elevated temperatures. The result is that the two layers of fabric coalesce together and the face of the fabric which was not wetted before coalescing has a woven fabric appearance and the other face has an appearance midway between that of a fabric and a film.

The fabric so formed is somewhat more flexible in handle than fabrics formed using volatile solvents, since the para toluene sulfonamid has plastifying or softening powers. If the slight in-

creased suppleness is not required, this softener may be washed out with an appropriate solvent such as benzene.

Example III

In order to print the fabric simultaneously with the coalescing process, the process of Example I is carried out with the exception that an engraved printing roller is substituted for one of the calender rollers. This roller is preferably not heated. Any suitable printing paste may be employed an example of which is:

	Parts by weight
Gum tragacanth	40
Ethylene dichloride	20
Di (methylamino) anthraquinone	0.5
Water	75.5

Di (methylamino) anthraquinone is a blue dyestuff and is first dissolved in the ethylene dichloride and then all the ingredients are emulsified to a homogeneous condition.

In feeding the fabrics to the rolls, the fabric which is not wetted is caused to come in contact with the unheated printing roll. The result of this process is that the woven fabric-like surface has a design printed on the one face and this design is of permanent nature. The gum tragacanth employed as thickener may be scoured off or brushed off as convenient.

Example IV

In order to obtain an embossed effect, the process of Example III is carried out with the exception that a pair of embossing rolls are employed. One of the rolls has a design engraved intaglio and the other roll has a design raised in relief which is the complement of the other design so that when the designs of the rolls register, the smooth part of the surfaces of the rolls meet in intimate contact and exert pressure on the fabric between them. The design of the rolls may be any suitable one such as to produce reptile skin effect and the like.

Example V

Often it is not desired to effect coalescence of the two fabrics over their entire surface. In this case two layers of fabric of yarns of organic derivatives of cellulose are employed as before but the one that is wetted with the solvent or latent solvent is so wetted only locally. This may be done by employing a wetting device which consists of a roll having a design of wool-felt raised thereon. This roll rotates at a peripheral speed equal to that of a linear speed of the fabric and dips into a trough containing acetone or any other solvent or latent solvent. In this manner the acetone is applied in pattern effect on the fabric, and when this fabric is pressed to the other fabric, the fabrics coalesce only at the wetted places. The product presents a very useful and novel effect and is particularly applicable for making hats.

If desired the design of the printing rolls may be that of stripes and in this manner there is produced a fabric which is coalesced along such stripes.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

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

1. Method of preparing articles of manufacture, comprising placing a fabric containing yarns of organic derivatives of cellulose in juxtaposition to another fabric and pressing with an embossing device so as simultaneously to emboss and to cause the yarns of organic derivatives of cellulose at least partially to coalesce and to adhere to said other fabric at the embossed portions only.

2. Method of preparing articles of manufacture, comprising placing a fabric containing yarns of cellulose acetate in juxtaposition to another fabric and pressing with an embossing device so as simultaneously to emboss and to cause the yarns of cellulose acetate at least partially to coalesce and to adhere to said other fabric at the embossed portions only.

3. An article of manufacture comprising a fabric containing yarns of organic derivatives of cellulose having embossed portions and having bound thereto at the embossed portions only a layer of another fabric.

4. An article of manufacture comprising a fabric containing yarns of cellulose acetate having embossed portions and having bound thereto at the embossed portions only a layer of another fabric.

5. An article of manufacture that is relatively stiff and one face thereof having the appearance of a textile fabric, comprising a plurality of fabrics at least one of which comprises yarns of organic derivatives of cellulose which are at least partially coalesced and adhering in selected areas only to another of the fabrics.

6. An article of manufacture that is relatively stiff and one face thereof having the appearance of a textile fabric, comprising a plurality of fabrics at least one of which comprises yarns of cellulose acetate which are at least partially coalesced and adhering in selected areas only to another of the fabrics.

CAMILLE DREYFUS.
WILLIAM WHITEHEAD.