Patented Aug. 10, 1943

2,326,189

UNITED STATES PATENT OFFICE

2,326,189

PREPARATION OF LAMINATING FABRIC

William Whitehead, Rye, N. Y., assignor to Celanese Corporation of America, a corporation of Delaware

No Drawing. Application May 4, 1940, Serial No. 333,387

5 Claims. (Cl. 8—131)

This invention relates to the production of composite fabrics, and relates more particularly to the preparation of a laminating fabric for adhesively uniting the components of the composite fabric.

In processes for preparing fabrics of various degrees of stiffness, for use in wearing apparel or other technical or commercial articles, by effecting the coalescence of two or more layers of fabrics by operations involving the use of heat and pressure, one of said layers comprises a laminating fabric containing at least some yarns, filaments or fibers of an organic derivative of cellulose and a plasticizer for the organic derivative of cellulose. These laminating fabrics are prepared by applying to a fabric made of or containing yarns, filaments or fibers of an organic derivative of cellulose, a suitable plasticizer or plasticizing compound in any suitable manner, as by dipping, spraying or padding the plasticizer or plasticizing compound in a solution in a volatile solvent therefor on to the fabric.

I have found that with the laminating fabrics heretofore used, that while, for example, fabrics containing cotton or cellulosic yarns or fibers and thermoplastic fibers may be treated to cause the applied plasticizer substantially to migrate to the thermoplastic filaments or yarns, the plasticizer is not completely adsorbed by the thermoplastic fibers or yarns, appreciable quantities remaining on the surface thereof. I have further found that this surface plasticizer does not materially aid in securing adhesion in hot pressing between the layers, and thus if removed, the adhesion between layers obtained by pressing, is not appreciably changed. I have also found that frequently such surface plasticizer is undesirable for the reason that it imparts to the laminated article which, for example, may be a shirt collar, an oily cast which in some instances gives the collar an undesirable oily or soiled appearance when compared with the remaining portions of the shirt. This is particularly true when the shirt and collar are white or a very light shade. A disadvantage, in view of the presence of this surface plasticizer, is that foreign matter, such as, lint produced by cutting operations, tends to adhere to the fusible laminating fabric and cannot be easily brushed off. The presence of this lint can produce blemishes in the laminated articles, such as collars, causing serious defects in appearance, particularly where white fabrics or very light shade fabrics are involved and the foreign material or lint is of some darker color or shade.

It is, accordingly, an important object of this invention to provide a process for preparing an improved laminating fabric which will be free from the above-mentioned and other disadvantages and which will be simple and expeditious in operation and inexpensive in cost.

It is also an object of this invention to prepare a laminating fabric containing yarns, filaments or fibers of an organic derivative of cellulose and a plasticizer therefor which is dry to the hand and which will be free from stickiness even after long exposure to atmospheric conditions.

Another object of this invention is to prepare a laminating fabric containing yarns, filaments or fibers of an organic derivative of cellulose and a plasticizer therefor, which may be easily handled or stored and which has enhanced binding power or adhesion when employed in the production of composite fabrics.

A further object of this invention is to prepare improved laminating fabric, suitable for use in the production of composite fabric of any desired degree of increased stiffness, which is dry, not greasy to the touch and free from stickiness and which may be put up in roll or bolt form and stored for an indefinite period of time without danger of the same sweating out the plasticizer.

Still another object of the invention is the provision of a laminating fabric which, when employed in the production of composite fabrics, yields a product which will not appear wet and discolored due to the sweating of plasticizer through the outer layers thereof.

Other objects of this invention will appear from the following detailed description.

In accordance with this invention, I prepare a laminating fabric by applying a plasticizer to a fabric made of or containing an organic derivative of cellulose, by dipping, spraying, padding or otherwise treating said fabric with a plasticizer for the organic derivative of cellulose or solution thereof in a volatile solvent for said plasticizer, such as benzol, or preferably methyl or ethyl alcohol or other swelling agent for the organic derivative of cellulose, ageing the so-treated fabric for a period of 5 or more days and then passing the plasticized fabric over a surface or through a chamber heated to a high temperature, say at a temperature of 250 to 300° F. and preferably a temperature of about 265° F., with or without first removing the solvent or swelling agent from the fabric. Where the fabric is made of organic derivative of cellulose filaments or fibers and cellulose filaments or fibers, the ageing

process effects a migration of the plasticizer from the cellulose filaments or fibers to the organic derivative of cellulose filaments or fibers. While this migration removes a substantial proportion of the plasticizer from the surface of the fabric and causes the same to penetrate more deeply into the organic derivative of cellulose filaments or fibers, it has been found that even greater penetration of the plasticizer into the filaments or fibers of the organic derivative of cellulose is effected by subjecting the fabric after it has been aged for a suitable period of time to the action of a high temperature. The result of this temperature treatment is that substantially all of the superficial plasticizer is removed from the surface of the fabric thus eliminating greasiness or stickiness thereof.

While this invention is particularly applicable in connection with laminating fabrics containing cellulose acetate it may be used with other organic derivatives of cellulose such as cellulose propionate and cellulose butyrate and cellulose ethers such as ethyl cellulose and benzyl cellulose. My process also contemplates the use of fabrics containing mixed esters of cellulose such as, for example, aceto-propionate and cellulose aceto-butyrate, and also synthetic linear polyamide condensation products such as the polyamides derived from amino-acids or from condensation or diamines with carboxylic acid, e. g. polyhexamethylene adipamide. However, this invention will be described more specifically in connection with cellulose acetate, and while the acetone-soluble cellulose acetate will generally be employed because of its commercial availability, cellulose acetate of other solubility characteristics may be used in my process.

Any suitable plasticizer may be employed in accordance with my process. For example, in the case where the fabric to be treated contains cellulose acetate there may be employed ethyl paratoluene sulphonamide, monomethyl xylene sulphonamide, dimethyl phthalate, diethyl phthalate, triphenyl phosphate, dibutyl tartrate or mixtures of two or more of these. The amount of plasticizer used will generally be from 80 to 150% based on the weight of the cellulose acetate present in the fabric.

A preferred plasticizing solution for application to the fabric consists of about 60 parts of dimethoxy ethyl phthalate, and 40 parts of ethyl alcohol.

In order to increase the rate of absorption of the plasticizer by the cellulose acetate component of the fabric and in order to obtain a greater and better degree of absorption a penetrating agent for the cellulose acetate may be employed. These penetrating agents act upon the cellulose acetate component of the fabric in such a manner as to render the same more amenable to penetration by the plasticizer whereby the plasticizer is more readily absorbed thereby.

Any suitable penetrating agent may be employed. Examples of penetrating agents to be employed in this process in connection with cellulose acetate are Turkey red oil, xylene, toluene, "Monopole" oil, pine oil, sulphonated pine oil, cyclohexanol, cyclohexanone, diacetin, tetralin, or mixtures of two or more of these materials. Examples of such mixtures are a mixture of Turkey red oil and xylene, a mixture of Turkey red oil, tetralin and sodium silicate, and a mixture of cyclohexanol, tetralin and soap.

The plasticized fabric is aged, in roll form if desired, for at least 5 days in a suitable chamber maintained at a temperature of from 85 to 160° F. and, preferably about 125° F.

The fabric employed in accordance with this invention is preferably one containing filaments or fibers of cellulose acetate together with filaments or fibers of a non-thermoplastic compound, more preferably a fabric containing about 25 to 35% of cellulose acetate filaments or fibers and 75 to 65% of non-thermoplastic filaments or fibers. The fabric may be formed by weaving, knitting, knotting or netting the filaments or yarns of the cellulose acetate with filaments or yarns of non-thermoplastic materials into a fabric. The production of the fabric is preferably effected in such a manner that there is a uniform dispersion of the cellulose acetate filaments or yarns through the yarns or filaments of the non-thermoplastic compound. The non-thermoplastic component of the fabric may consist of cotton, regenerated cellulose, linen, etc. In weaving the fabric the cellulose acetate yarns may be arranged to alternate in the warp or in the weft or both in any desired degree to effect the uniform dispersion through the yarns of non-thermoplastic fibers.

Laminating fabric made in accordance with this invention is an improvement over laminating fabrics made in accordance with prior processes. Thus, laminating fabric made in accordance with this invention has no tendency to surface greasiness, nor to weld or coalesce into a solid tube when in roll or bolt form. Moreover, such laminating fabric does not discolor the outer layers of the composite fabric and the composite fabrics prepared with laminating fabric made in accordance with the present invention have excellent adhesive properties which are better than those on the fabrics made prior to this invention.

In order to further illustrate my invention, but without being limited thereto, the following specific example is given:

Example

A fabric formed by weaving 35% cellulose acetate yarns with 65% cotton yarns is treated by dipping the same into a bath containing about 60 parts dimethoxy ethyl phthalate and 40 parts of alcohol. The fabric is then passed through nip rollers to remove the excess solution of plasticizer. The temperature of concentration and time of treatment is so regulated that there remains about 40%, based on the weight of fabric, of plasticizer thereon. The fabric is then passed through a chamber heated to a temperature of about 265° F. which removes substantially all of the alcohol therefrom. In this chamber the temperature of the fabric does not reach 265° F. due to the evaporation of the solvent therefrom. The fabric is then rolled and placed in a room maintained at a temperature of about 120° F. for a period of about 5 days. The fabric is then unrolled, passed in contact with a cylinder heated to a temperature of 265° F., the time of contact with the heated cylinder or cylinders being about 10 to 20 seconds. The fabric is then permitted to cool and is repackaged. The so-treated laminating fabric is found to be free from greasiness and stickiness and when employed in the production of composite fabrics result in a product having an adhesion of about 50 to 100% greater than that produced by prior laminating fabrics and does not discolor the outer layers of the composite fabric.

It is to be understood that the foregoing detailed description is given merely by way of illus-

tration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. Process for preparing a laminating fabric, which comprises impregnating a fabric containing yarns of a compound, selected from the group consisting of cellulose carboxylic esters and cellulose ethers, with a plasticizer for said compound, ageing the impregnated fabric for at least 5 days at a temperature of 85 to 160° F. and then heating the aged fabric to a temperature of 250 to 300° F. for from 10 to 20 seconds, whereby superficial plasticizer is removed and there is obtained a laminating fabric free from greasiness and capable, under heat and pressure, of adhesively uniting the components in a composite fabric.

2. Process for preparing a laminating fabric, which comprises impregnating a fabric containing yarns of a compound, selected from the group consisting of cellulose carboxylic esters and cellulose ethers, with a plasticizer for said compound in an amount equal to from 80 to 150% based on the weight of the compound, ageing the impregnated fabric for at least 5 days at a temperature of 85 to 160° F. and then heating the aged fabric to a temperature of 250 to 300° F. for from 10 to 20 seconds, whereby superficial plasticizer is removed and there is obtained a laminating fabric free from greasiness and capable, under heat and pressure, of adhesively uniting the components in a composite fabric.

3. Process for preparing a laminating fabric, which comprises impregnating a fabric containing yarns of cellulose acetate with a plasticizer for said cellulose acetate, ageing the impregnated fabric for at least 5 days at a temperature of 85 to 160° F. and then heating the aged fabric to a temperature of 250 to 300° F. for from 10 to 20 seconds, whereby superficial plasticizer is removed and there is obtained a laminating fabric free from greasiness and capable, under heat and pressure, of adhesively uniting the components in a composite fabric.

4. Process for preparing a laminating fabric, which comprises impregnating a fabric containing yarns of a compound, selected from the group consisting of cellulose carboxylic esters and cellulose ethers, with a plasticizer for said compound in an amount equal to about 85% based on the weight of the compound, ageing the impregnated fabric for at least 5 days at a temperature of 85 to 160° F. and then heating the aged fabric to a temperature of 250 to 300° F. for from 10 to 20 seconds, whereby superficial plasticizer is removed and there is obtained a laminating fabric free from greasiness and capable, under heat and pressure, of adhesively uniting the components in a composite fabric.

5. Process for preparing a laminating fabric, which comprises impregnating a fabric containing cotton yarns and yarns of cellulose acetate with a plasticizer for said celiulose acetate, in an amount equal to about 85% based on the weight of said cellulose acetate yarns, ageing the impregnated fabric for at least 5 days at a temperature of 85 to 160° F. and then heating the aged fabric to a temperature of 250 to 300° F. for from 10 to 20 seconds, whereby superficial plasticizer is removed and there is obtained a laminating fabric free from greasiness and capable, under heat and pressure, of adhesively uniting the components in a composite fabric.

WILLIAM WHITEHEAD.