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TREATMENT OF FABRICS CONTAINING ORGANIC DERIVATIVES OF CELLULOSE

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This invention relates to the finishing of fabrics containing organic derivatives of cellulose to produce stiffened yet substantially unglazed fabrics such as organdies and the like. Thus organdies may be formed from voiles or ninons woven from yarns containing organic derivatives of cellulose or more especially from cellulose acetate.

An object of the invention is the economic and expeditious production of stiff fabrics, the stiffness of which is permanent to dry cleaning and washing, i. e. the production of fabrics such as organdie from voiles or ninons, linings from taffeta, and like stiff fabrics from other types of weaves. Other objects of the invention will appear from the following detailed description.

It has been customary in the past to form organdie material from voiles made of cotton by sizing the voiles with resins, gums, waxes, gelatins, etc. These sizing materials are all more or less affected by dry cleaning and washing and ironing; some being soluble, some becoming sticky, while others, in the laundering processes, make the yarns brittle and weak. By this invention, however, no sizing material is added to be affected by laundering, use or ageing. The stiffness imparted to fabrics according to this invention is not destroyed by scouring in soap baths or by the ordinary dry cleaning treatments. The stiffness is imparted to the fabric without imparting a starched or filled appearance, thus forming a more beautiful and more transparent fabric than by the prior processes. There is no coating material present to discolor, streak or make opaque the fabric upon washing and ironing.

By this invention a good organdie effect is obtained, the fabric showing no change in shade, substantially no weakening, no tendency to crack or mark when creased or wrinkled, no odor, and excellent fastness to dry cleaning. The property of being distorted into desired shape or distorted by wear resulting in bagginess or sagging is controllable. Thus, organdies and other stiffened fabrics that are rigid to local stresses may be formed, or such stiffened fabrics may be so made that by local stresses a substantial amount of shape may be imparted to the material while still retaining its stiffness and without cracking.

According to this invention, I subject textile fabrics containing organic derivatives of cellulose to the action of a solvent of sufficient concentration that the filaments forming the yarns are tacked together, yet of such a concentration that the filaments do not coalesce and lose their appearance of individual filaments nor give to the fabric as a whole a glazed appearance. While

the fabric contains the solvent, it is lightly calendered or passed through a palmer finishing machine which smooths the fabric, presses the filaments into contact with each other and removes the solvent. By choosing the solvents according to their boiling points, the permanency of the fabric to retain its shape or to be shaped is controlled. Thus, the low boiling solvents are completely removed from the fabric and the fabric is resistant to distortions, while the high boiling solvents are not completely removed from the fabric and the fabric is in condition to be slightly stretched by local pressure.

The fabrics that lend themselves to this invention are those formed substantially of filaments of organic derivatives of cellulose. Fabrics of mixed yarns, however, may be employed and the results will be proportional to the percentage of the yarn formed of organic derivatives of cellulose. The organic derivatives of cellulose may be the organic esters or ethers of cellulose or the mixed ethers and/or esters of cellulose. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of organic cellulose ethers are methyl cellulose, ethyl cellulose and benzyl cellulose.

The fabrics to be finished may be formed by weaving, warp knitting, circular knitting, knotting or netting of yarns, of any degree of twist, containing at least some filaments or fibers of organic derivatives of cellulose. The filaments, fibers or yarns of organic derivatives of cellulose may contain, besides the cellulose derivatives, effect materials such as pigments, filling materials, dyes or lakes, fire retardants, plasticizers and lubricants. The desired properties and the reagents necessary to produce the desired properties obtained through the use of the effect materials are known to one practicing the art.

The dilute solvent is preferably applied to the fabric by a furnishing device. However, it may be applied by spraying the dilute solvent upon the fabric, by passing the fabric through solvent vapors or by passing the fabric through a dilute solution or a suspension of the solvent. The preferred method, however, is to pad direct with a solution of the solvent, i. e. the fabric is passed directly between nip rollers or belts or other furnishing devices employed in padding, which furnishing devices are wetted with the solvent solution and the fabric is not entered into the bath of padding solution at all. The padded fabric may then be passed immediately through a calender or palmer finishing machine,

which consists of a large steam-heated roll against which the goods are tightly pressed by an endless woolen blanket.

The particular solvent employed and its concentration in the diluent employed, as well as the particular diluent used will depend upon the type of organic derivative of cellulose found in the material to be treated and the thickness of the material. The stronger the solvent solution employed the lower will be the temperature required in the calendering action. The solvent should be selected as to kind, strength, and boiling point such that the filaments acted upon are not substantially dissolved but merely to the extent that they become tacky and weld together only where they contact. With the above in mind, any one or a mixture of solvents in a variety of mediums may be used, for example, acetone, acetone and ethyl or methyl alcohol, chloroform, ethylene dichloride, ethylene dichloride and ethyl or methyl alcohol, methyl chloride and ethyl or methyl alcohol, and diacetone alcohol may be dissolved in any one or a mixture of suitable diluents such as water, carbon tetrachloride, benzene or other suitable liquids of fairly low boiling point that have no or little action on the organic derivative of cellulose found in the material being treated.

As a guide to strengths of solvent solutions and not as a limitation the following example is given.

Example

An all cellulose acetate voile fabric is padded direct with a solution containing 10 liters of diacetone alcohol dissolved in 90 liters of carbon tetrachloride. The fabric is then passed immediately through a palmer finishing machine heated by steam to between 100° and 110° C. A very perfect organdie is produced that retains its stiffness permanently and is only slightly inclined to stretch. By raising the temperature slightly so that more of the solvent is removed, or by employing a lower boiling solvent, such as acetone in water, a fabric is obtained that is not subject to distortions even upon a heavy stress on localized parts.

The liquid used to dilute the solvent for the organic derivative of cellulose may be removed by passing the material through an aspirating hot-air chamber prior to calendering or passing the material through a palmer finishing device. In either method the diluent and solvent should preferably be removed in such a manner as to make possible the recovery of the same. This may be accomplished by placing a suction hood over the places or devices which are heated with which the material passes or comes in contact.

By properly selecting the solvent and its diluent there is produced a fabric in which the

filaments of each yarn are tacked together, the more so if a twist of 10 turns per inch or more has been placed in the yarn, yet there is slight, if any, tacking of one yarn to another due to the relatively great distance between yarns as compared with the distance between filaments. A slight tacking of the yarns where they cross is not objectionable, yet too strong a solvent will tend, during the calendering and solvent removing steps, to cause the filaments to coalesce into monofilaments and one yarn to pass through instead of over and under the other yarns, giving a glazed or sheet appearance to the material. There are wide limits, however, to the strength of solvent used and to certain extent these limits are controlled by the amount of pressure and heat employed in the later process of solvent removal. The higher the temperature, and especially the pressure, employed the more dilute the solvents which must be employed. The pressure should never be so great as to give the yarns a flattened cross section.

The fabric may be dyed prior to or after the stiffening treatment, which stiffening treatment has no effect on the shade of color taken on by the fabric. It is preferable to dye the fabric prior to the stiffening treatment for the unstiffened fabric is more easily handled in the dye bath.

It is to be understood that the foregoing detailed description is merely given by way of illustration and many alterations 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 the stiffening of fabrics containing yarns of organic derivatives of cellulose, which comprises padding said fabric with a dilute solution of 10 parts by volume of diacetone alcohol in 90 parts by volume of carbon tetrachloride, removing the carbon tetrachloride, and then subjecting the fabric to pressure at temperatures of 100° to 110° C. under such conditions that the filaments comprising the yarns of the fabric maintain substantially their original shape and the yarns are tacked together where they cross.

2. Process for the stiffening of fabrics containing yarns of cellulose acetate, which comprises padding said fabric with a dilute solution of 10 parts by volume of diacetone alcohol in 90 parts by volume of carbon tetrachloride, removing the carbon tetrachloride, and then subjecting the fabric to pressure at temperatures of 100° to 110° C. under such conditions that the filaments comprising the yarns of the fabric maintain substantially their original shape and the yarns are tacked together where they cross.

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