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THICKENER FOR DECORATING TEXTILES OF ORGANIC DERIVATIVES OF CELLULOSE

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3 Claims. (Cl. 8—63)

This invention relates to the treatment of textile materials with thickened preparations and particularly to the production of designs on textile materials having a basis of organic derivatives of cellulose, especially by printing processes. This application is a continuation-in-part of our co-pending Application S. No. 195,579, filed March 12, 1938.

The preparations employed in processes of printing textile fabrics and other processes involving the local treatment of textile materials are commonly thickened with vegetable gums in order to reduce the tendency of the preparations to spread after application and particularly during the subsequent steaming or ageing operation which is generally required. In many cases it is found necessary to employ highly concentrated gum solutions, e. g. gum arabic solutions of up to 50% concentration. The use of large proportions of gum, however, is undesirable in that it makes the print particularly liable to crack during subsequent treatment. Moreover after printing with the thickened preparations commonly in use it is usually necessary to apply a vigorous washing or scouring treatment to the textile materials which is liable to damage the print if not the materials themselves.

It has now been found that it is possible to obtain excellent prints or other designs on textile materials having a basis of an organic derivative of cellulose if there are employed thickened aqueous compositions which contain a substantial proportion of a high-boiling solvent or swelling agent, hereinafter referred to briefly as a solvent, for the organic derivative of cellulose, and which are thickened with a water-soluble cellulose ester or ether of which an ester or ether radicle contains a hydroxyl group or an acidic or basic group. An important advantage of the compositions of the present invention as compared with thickened compositions in general is that by their use fabrics having a soft handle and exhibiting sharply defined permanent prints or designs may be obtained on simply drying the products without steaming and without washing.

According to the invention, therefore, aqueous compositions for modifying the appearance of a textile material having a basis of a water-insoluble organic derivative of cellulose comprise a substantial proportion of a high-boiling solvent for the said organic derivative of cellulose and, as a thickening agent, a water-soluble organic derivative of cellulose of which a substituent radicle contains a hydroxyl group, an acidic group or a basic group.

The solvent for the cellulose derivative of the textile material which is employed in the compositions according to the invention preferably has a boiling point of 120° C. or more, advan-

tageously, at least 150° C. Solvents of boiling point between 150° and 200° C. are particularly useful. Amongst suitable solvents are, for example, ethyl lactate, diacetone alcohol, diethyl tartrate, dibutyl tartrate, benzyl alcohol, and the esters and ether-esters of glycols and glycerols, e. g. glycol mono-acetate and the acetates of glycol mono-methyl- and mono-ethyl-ethers.

The proportion of solvent present in the compositions to give the desired fixing of the modifying substance depends upon the nature of the modifying substance and upon the nature of the cellulose derivative in the textile material, as well as upon the solvent power of the solvent itself. In general a proportion of the order of 40–60% based on the weight of the composition is effective, though higher proportions or lower proportions, e. g. 20%, may be employed.

The water-soluble cellulose derivatives may be employed in any suitable proportions, but proportions of 1.5–4%, based on the weight of the composition, are found to be particularly satisfactory.

As examples of water-soluble cellulose derivatives which may be employed according to the invention, mention may be made of hydroxyalkyl ethers of cellulose soluble in water, e. g. hydroxyethyl-, hydroxybutyl- and hydroxypropyl- celluloses, such as are obtainable by the action of alkylene oxides or alkylene chlorhydrins on alkali cellulose. Further, there may be employed cellulose derivatives, soluble in water, obtainable by etherification of cellulose with glycidic alcohol and other compounds containing an alkylene oxide radicle, or with glycerine chlorhydrin and other compounds yielding cellulose ethers in which an ether radicle contains more than one hydroxyl group. Examples of other cellulose derivatives which can be employed according to the invention are water-soluble carboxyalkyl ethers of cellulose, e. g. carboxy-methyl cellulose, and water-soluble cellulose esters obtainable by the action, on an acyl ester of cellulose, of organic hydroxy acids or organic di- or polybasic acids. For instance, products obtainable by the action of lactic acid, oxalic acid or tartaric acid on cellulose acetate can be employed. Mixtures of the cellulose derivatives soluble in water can be employed.

The water-soluble cellulose derivatives need not necessarily be employed in the pure state. For example, the product obtained by interaction of alkali cellulose with ethylene oxide and treatment of the resulting etherification product with boric acid, and which contains borax (cf. U. S. Patent No. 2,135,128) can be used with substantially the same results as are obtained with the purified hydroxyethyl-cellulose.

The water-soluble cellulose esters and ethers

employed according to the invention can be prepared by any convenient method. Suitable methods of preparation are described in U. S. Patents Nos. 2,135,128 and 2,184,564.

The invention particularly contemplates the use of water-soluble cellulose derivatives of high viscosity. Products of high viscosity can, for instance, be obtained by treating cellulose with aqueous caustic alkali at low temperature to form alkali cellulose and etherifying the product with the appropriate etherifying agent at low temperature without intermediate ripening of the alkali cellulose, as in U. S. Patent No. 2,184,564 mentioned above. The viscosity of the cellulose derivative employed is advantageously such that its aqueous solution has a specific viscosity, as defined below, of 20-30 when the concentration is between about 2% and 5%, e. g. 4%. Products of still higher viscosity, e. g. products of which solutions of as little as 1% concentration have a viscosity of 20-30 may be used. Again, products of lower viscosity can be employed, e. g. products of which solutions up to 15% concentration have a viscosity of 20-30.

The specific viscosity referred to above is given by the formula

$$\frac{t_1 d}{t_2}$$

where t_1 is the time in seconds required for a given volume of the solution at 20° C. to flow through a given capillary tube, t_2 is the time in seconds required for the same volume of water at 0° C. to flow through the same capillary tube, and d is the density of the solution in grams per c. c.

The present invention finds application in various treatments for modifying the appearance of cellulose derivative textile materials. For example, it may be applied to discharging and/or delustering processes by employing compositions made up with a solvent for the cellulose derivative base of the textile materials, a water-soluble cellulose derivative of the type described above, and a discharging agent and/or a delustering pigment. Most advantageously, however, it is applied in colouring cellulose derivative textile materials.

Various classes of colouring matters can be used when applying this latter process to cellulose ester or ether textiles. For example, water-soluble or water-insoluble colouring matters having direct affinity for cellulose ester or ether materials when applied from aqueous baths, e. g. the water-insoluble aminoanthraquinone, azo and nitro-di-arylamine colouring matters, and sulphuric esters of colouring matters containing hydroxy-alkyl groups such as are used for colouring cellulose acetate textile materials. Again, many colouring matters which have little or no affinity for cellulose esters or ethers when applied from aqueous baths can be fixed by the process, e. g. many acid wool dyestuffs.

The new process is particularly well adapted for the treatment of cellulose acetate materials. It is, however, applicable to the treatment of textile materials of other cellulose esters, e. g. cellulose butyrate and propionate, and to materials of cellulose ethers, e. g. methyl, ethyl, butyl, propyl and benzyl celluloses.

While, as mentioned above, the invention is particularly applicable to processes in which textile materials are treated to produce local modification of their appearance or properties, it can

also with advantage be applied to processes in which textile materials are uniformly treated. For example padding liquors or other preparations for the uniform treatment of cellulose derivative textiles by mechanical impregnation methods may contain solvents for the cellulose derivative of the textiles and may be thickened with the above-mentioned cellulose derivatives. The inclusion of a solvent and of a thickening agent in such preparations is frequently beneficial as regards the uniformity and permanence of the processed goods.

The following example illustrates the invention but is not to be taken as limiting it in any way. The parts are given by weight.

Example

A cellulose acetate fabric is printed with the following paste:

	Parts
2:4-dinitro-4'-amino-diphenylamine	1
Diacetone alcohol	50
Water	19
Aqueous solution of high viscosity hydroxy-ethyl cellulose (75:1000)	30
	100

The material is then dried. Excellent golden yellow prints of good fastness to water are obtained.

By substituting for the nitro-diarylamine dyestuff 0.5 part of 1-amino-2-sulpho-4-p-toluidine-anthraquinone or 0.5 part of magenta, blue or red prints respectively are obtained, likewise of good fastness to water.

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

1. An aqueous composition containing a substance capable of modifying the appearance of a textile material having a basis of a water-insoluble organic derivative of cellulose, said composition being adapted to yield a sharply-defined pattern when applied locally to said textile material and comprising a substantial proportion of a high-boiling solvent for said organic derivative of cellulose and, as a thickening agent, a water-soluble carboxy alkyl ether of cellulose which yields a 5% aqueous solution having a specific viscosity of at least 20.

2. An aqueous composition containing a substance capable of modifying the appearance of a textile material having a basis of a water-insoluble organic derivative of cellulose, said composition being adapted to yield a sharply-defined pattern when applied locally to said textile material and comprising a substantial proportion of a solvent for said organic derivative of cellulose having a boiling point of 150-200° C. and, as a thickening agent, a water-soluble carboxy ether of cellulose which yields a 5% aqueous solution having a specific viscosity of at least 20.

3. An aqueous composition containing a substance capable of modifying the appearance of a textile material having a basis of cellulose acetate, said composition being adapted to yield a sharply-defined pattern when applied locally to said textile material and comprising a substantial proportion of a high-boiling solvent for said cellulose acetate and, as a thickening agent, a water-soluble carboxy alkyl ether of cellulose which yields a 5% aqueous solution having a specific viscosity of at least 20.

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CERTIFICATE OF CORRECTION.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 58, claim 2, before the word "ether" insert "--alkyl--"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of August, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.