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RENDERING TEXTILE MATERIALS SUBSTANTIALLY RESISTANT TO CREASING

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The present invention relates to a process of rendering textile materials substantially resistant to creasing.

A great disadvantage of fibrous materials consisting of cellulose or its derivatives consists in the fact that they are readily permanently deformed under the action of pressure, which disadvantage is due to their relatively slight elasticity. A specially objectionable exhibition of this property is the creasing of fabrics and articles of clothing. It is usual therefore to employ for the preparation of higher quality articles of clothing wool or silk, because these have a considerably higher elasticity than, for example, vegetable fibrous materials and consequently do not retain permanent creases formed under the action of pressure.

I have now found that textile materials can be rendered substantially resistant to creasing by impregnating them with aqueous solutions of compounds reacting as formaldehyde (i. e. formaldehyde itself and compounds supplying the same) in the presence of non-oxidizing, acid-reacting compounds, acting on the materials with organic "non-resin compounds" containing a basic group and at least one radicle with at least 4 carbon atoms and heating to elevated temperatures. By the term "non-resin compounds" such compounds are meant as are not themselves resins and do not form resins with formaldehyde.

With special advantage, cotton, mercerized cotton or other hydrated celluloses, artificial silk, such as viscose or acetate artificial silk, or linens are treated according to the said process. The process may also be applied to mixed fabrics containing cellulose or its derivatives, such as, for example, those consisting of cotton and artificial silk, cotton and wool, or silk and artificial silk.

Formaldehyde may be employed in any available form; it is preferable to employ the usual 30 per cent aqueous formaldehyde solution, which may be diluted in a suitable manner depending on the textile materials to be treated (for example to 20 or 10 per cent or still lower concentrations). Instead of formaldehyde itself, substances supplying formaldehyde, such as, for example, trioxymethylene, may be employed.

As non-oxidizing, acid-reacting compounds there may be mentioned hydrochloric acid, amino-sulphonic acid, thiocyanic acid, acetic acid, chloracetic acid, ethionic acid, benzene disulphonic acids, for example, meta-benzene disulphonic acid, aluminium chloride or alum. These compounds are added to the aqueous formaldehyde solution in small amounts depending on the particular conditions. The amount of the acid-reacting substances is selected so that the treatment bath has a faintly acid reaction in order that the textiles under treatment may not be damaged. If water-insoluble amines are employed, the amount of acid is usually slightly higher than that required for converting the amines into their water-soluble salts.

As suitable "non-resin compounds" containing a basic group there may be mentioned basic nitrogenous organic compounds, such as dibutyl amine, (for example di-n-butylamine), diamylamine (for example di-n-amylamine or di-isoamylamine), dodecylamine, cetylamine and octodecylamine, dodecyl, cetyl, oleyl and octodecyl ethanolamines and the esters or amides from fatty acids of high molecular weight and hydroxyalkylamines, such as mono-, di- and triethanolamine, ethyl butanolamine, or cyclohexyl propanolamine, for example, triethanol amine mono-oleic acid ester, dibutyl ethanol amine palmitic acid ester, coconut oil fatty acid monoethanol amide, stearic acid monoethanolamide or oleic acid diethanol amide.

Furthermore the condensation products of ethylene oxide with amines of the said type or with esters or amides from fatty acids and alkylolamines for example, the reaction products of from 2 to 3 molecular proportions of ethylene oxide with 1 molecular proportion of coconut oil fatty acid monoethanolamide may also be employed. Aminocarboxylic and aminosulphonic acids, such as, for example, glycocoll, sarcosine, taurine, sulphanilic acid and their salts or derivatives, may also be advantageously employed.

Instead of the said nitrogenous compounds, oxygen-containing basic organic compounds, such as the reaction products of ethylene oxide on fatty acids of high molecular weight, such as coconut oil fatty acid, palmitic acid, stearic acid, ricinoleic acid or oleic acid or their glycerides, or on the alcohols of high molecular weight corresponding to the said fatty acids, such as lauryl, myristyl, cetyl, oleyl or octodecyl alcohol or octodecane diol, may be used with advantage. In these compounds the polyethenoxy ether group is the basic group on account of the oxonium valencies of the ether bridges. In particular the reaction products derived from 20 molecular proportions of ethylene oxide on 1 molecular proportion of oleyl alcohol or from 10 molecular proportions of ethylene oxide on 1 molecular proportion of dodecyl alcohol or from 40 molecular proportions of ethylene oxide in 1 molecular proportion of castor oil are suitable for the process according to the present invention.

Especially valuable are those organic "non-resin compounds" containing a basic group, which are derived from aliphatic compounds (namely acids, esters, amides, alcohols and amines) containing from 12 to 18 carbon atoms per molecule. For example, compounds obtained by condensing 10 molecules of ethylene oxide with such a compound containing 12 carbon atoms, or by condensing 30 molecules of ethylene oxide with such compounds containing 18 carbon atoms exert an excellent action. However, compounds containing lower or higher molecular proportions, for example, from 4 to 50 molecules of ethylene oxide per molecule may also be employed.

The process may be carried out by impregnating the textile materials to be treated in an aqueous solution of formaldehyde to which the non-oxidizing, acid reacting substance and one or several of the said substances having a basic group have been added at ordinary or slightly elevated temperature, squeezed or hydroextracted and dried by moderate heating. The goods are then treated for a short time at elevated temperature, for example, at between 100° and 160° or 200° C. The process may also be carried out while employing two baths. In this case the textile materials are first treated with the formaldehyde solution in the presence of acid and then, if desired, after previous squeezing and drying, in a second bath which contains the said substances containing a basic group.

The organic "non-resin compound" may be employed in varying proportions; usually not less than 0.1 gram and not more than 100 grams, preferably not more than 50 grams per litre are used.

The textile materials worked up in the said manner have a high resistance to creasing and a pleasant soft touch.

The following examples will further illustrate the nature of this invention, but the invention is not restricted to these examples.

Example 1

Artificial viscose silk fabric is treated at between 20° and 30° C. in 20 per cent aqueous formaldehyde to which have been added 0.2 per cent of concentrated hydrochloric acid and 0.7 per cent of the condensation product of 3 molecular proportions of ethylene oxide and 1 molecular proportion of triethanol amine monostearic acid ester. The goods are then squeezed, dried in the usual manner and treated for from 2 to 3 minutes in a drying drum heated with steam under a pressure of two atmospheres. A fabric having a good resistance to creasing is obtained, which at the same time has a very pleasant soft touch.

Example 2

Artificial viscose silk is impregnated at between 20° and 30° C. in a bath containing per litre 500 cubic centimetres of 35 per cent aqueous formaldehyde solution, 3 cubic centimetres of concentrated hydrochloric acid and 2 grams of monooleyl amine. The goods are then squeezed and hot-ironed at between about 140° and about 150° C. The fabric thus treated leaves no marks after having been creased and is moreover distinguished by a soft touch.

Example 3

1 gram of amidosulphonic acid corresponding to the formula $HO.SO_2.NH_2$ and 2.5 grams of sulphanilic acid sodium salt per litre are added to a 20 per cent aqueous formaldehyde solution. Artificial viscose silk fabric is treated for 5 minutes at room temperature in the said solution. The goods are then hydroextracted, dried at about 60° C. and then plaited at from 120° to 130° C. The resulting plaited material is substantially stable against mechanical deformation.

Example 4

A fabric of artificial silk from viscose is treated for 15 minutes at about 20° C. in a winge dye vessel containing a bath consisting of 1000 litres of a 20 per cent aqueous formaldehyde solution, 1 litre of concentrated hydrochloric acid free from iron and 500 grams of the hydrochloride of monostearyl amine. The fabric is then freed from the greater part of the aqueous solution by squeezing, dried on a frame at between 35° and 40° C. and then passed through a system of drying rolls which are heated by means of steam under a pressure of 2 atmospheres above atmospheric pressure. The fabric thus treated has an extraordinarily smooth touch and feel and is distinguished by an extraordinary resistance against creasing even under comparatively high pressures. This resistance against creasing also remains, when the fabric is washed under moderate conditions, such as are usual in washing fabrics from artificial silk.

Example 5

A fabric of artificial silk from viscose is treated for 15 minutes at about 20° C. in a winge dye vessel containing a bath consisting of 1000 litres of a 20 per cent aqueous formaldehyde solution, 600 cubic centimetres of concentrated hydrochloric acid free from iron and 2 kilograms of a condensation product from 20 molecular proportions of ethylene oxide and 1 molecular proportion of oleyl alcohol. The fabric is then freed from the greater part of the aqueous solution by squeezing, dried on a frame at between 35° and 40° C. and then passed through a system of drying rolls which are heated by means of steam under a pressure of 2 atmospheres above atmospheric pressure. The fabric thus treated has an extraordinarily smooth touch and feel and is distinguished by an extraordinary resistance against creasing even under comparatively high pressures. This resistance against creasing also remains, when the fabric is washed under moderate conditions, such as are usual in washing fabrics from artificial silk.

What I claim is:—

1. The process of rendering textile materials substantially resistant to creasing, which comprises impregnating said materials with an aqueous solution of a compound supplying formaldehyde in the presence of a non-oxidizing acid-reacting compound, acting on said materials with from 0.1 to 100 grams per liter of an organic compound containing a basic group with at least 4 carbon atoms, which compound is not itself a resin and does not form resins with formaldehyde, and is selected from the class consisting of non-aromatic, mono-carboxylic amides, aliphatic amines and polyethenoxy ether containing compounds, and heating to a temperature between about 100 and about 200° C.

2. The process of rendering textile materials substantially resistant to creasing, which comprises impregnating said materials with an aqueous solution of a compound supplying formalde-

hyde in the presence of a non-oxidizing acid reacting compound, acting on said materials with from 0.1 to 100 grams per liter of an aliphatic amine which has at least one radical with at least four carbon atoms, and which is not itself a resin and does not form resins with formaldehyde, and heating to a temperature between about 100 and 200° C.

3. The process of rendering textile materials substantially resistant to creasing, which comprises impregnating said materials with an aqueous solution of a compound supplying formaldehyde in the presence of a non-oxidizing acid reacting compound, acting on said materials with from 0.1 to 100 grams per liter of a compound derived from the condensation of an aliphatic compound containing from 12 to 18 carbon atoms per molecule and containing at least one hydroxyl group with 10 to 30 molecules of ethylene oxide per molecule of said aliphatic compound, which condensation product is not itself a resin and does not form resins with formaldehyde, and heating to a temperature between about 100 and about 200° C.

4. The process of rendering textile materials substantially resistant to creasing, which comprises impregnating said materials with an aqueous solution of formaldehyde in the presence of a non-oxidizing acid reacting compound, acting on said materials with from 0.1 to 100 grams per liter of an organic compound containing a basic group, and at least one radical with at least four carbon atoms, which compound is not itself a resin and does not form resins with formaldehyde, and is selected from the class consisting of non-aromatic, mono-carboxylic amides, aliphatic amines and polyethenoxy ether containing compounds, and heating to a temperature between about 100 and about 200° C.

5. The process of rendering textile materials substantially resistant to creasing, which comprises impregnating said materials with an aqueous solution of a compound supplying formaldehyde in the presence of a non-oxidizing, acid-reacting compound, acting on said materials with from 0.1 to 100 grams per liter of an aliphatic mono-carboxylic acid amide having a hydrocarbon chain of at least 4 carbon atoms, and which is not itself a resin and does not form a resin with formaldehyde, and heating to a temperature between about 100 and 200° C.

6. The process of rendering textile materials substantially resistant to creasing, which comprises impregnating said materials with an aqueous solution of a compound supplying formaldehyde in the presence of a non-oxidizing, acid-reacting compound, acting on said materials with from 0.1 to 100 grams per liter of a compound derived from the condensation of an aliphatic compound containing from 12 to 18 carbon atoms per molecule and containing at least one reactive hydrogen atom with from 10 to 30 molecules of ethylene oxide per molecule of said aliphatic compound, which compound is not itself a resin and does not form a resin with formaldehyde, and heating to a temperature between about 100 and 200° C.

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