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PROCESS FOR FINISHING TEXTILES AND THE PRODUCT PRODUCED

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This invention relates to a process for finishing textile materials, and more particularly relates to a process for treating pile fabrics and the article so produced, and to correlated improvements designed to enhance the properties and to increase the utility of such products.

Heretofore, pile fabrics such as carpets, velvets, plush, mohairs, velours, and the like, have been coated on the back with rubber latex in order to bind the pile yarns to the ground yarns but this has been found to be not entirely satisfactory as the rubber tends to become brittle with age, and is not resistant to laundry fluids containing bleaching agents. Since normal rubber latex contains an average of from about 28% to 38% rubber solids, large quantities are necessary for an effective treatment. As latex is a relatively expensive and unstable material it is desirable to decrease the quantity employed for this purpose. Other attempts have been made to bind the pile yarns to the ground yarns with solutions of synthetic resins and the like, but these attempts have not been entirely satisfactory, because they necessitate the use of toxic and/or inflammatory organic solvents.

It is a general object of the present invention to decrease the quantity of rubber latex used in the treatment of fabrics.

It is a further object of the invention to provide a process for backing pile fabrics whereby the fabric is rendered more resistant to ageing and laundering by means of a suitable backing composition.

It is another object of the invention to provide a pile fabric in which the piles are permanently bound to the ground material in a manner whereby the pile yarns are secured against withdrawal.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

According to the present invention a pile fabric of any type is treated, preferably by back filling, with a composition comprising an alkaline dispersion of an alkali-soluble water-insoluble cellulose material and rubber latex media, the rubber solids and cellulose material are conjointly coagulated upon the fabric, thereby forming a continuous permanent coating which binds the pile tufts and individual fibers to the ground threads of the fabric. Various fillers, pigments, and the like, may be added to the mixture before or during application of the composition to the fabric. The invention also relates to a pile fabric treated in accordance with the foregoing process.

The expression "pile fabric" as used in the specification and claims is intended to include fabrics wherein the yarn shows an end, in contrast to a side. The pile may be warp pile, weft pile, knotted pile, loop pile, or pile on pile, according to the method of weaving, tying, lashing, shearing or cutting. Pile fabrics which may be treated in accordance with the invention comprise velvets, velveteens, plush, corduroy, velours, mohairs, terry, astrakhan and the like. Such pile fabrics may be used as rugs, carpeting, furniture upholstering, automobile lining and seat covering, wearing apparel and the like.

The invention accordingly comprises the several steps and relation of one or more of such steps with respect to each of the others, and the article possessing the features, properties, and the relation of elements, which are exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

Cellulose ethers which may be employed in the invention comprise as a class those cellulose ethers which are soluble in aqueous alkali solutions but which are insoluble in water, such for example, as alkyl cellulose ethers, hydroxy-alkyl cellulose ethers, carboxy-alkyl cellulose ethers, mixed ethers such as the alkyl, hydroxy-alkyl cellulose ethers, and the like. The alkyl ethers of cellulose comprise methyl cellulose, ethyl cellulose, propyl cellulose and the like. The hydroxy-alkyl ethers of cellulose comprise hydroxy-methyl cellulose ethers, hydroxy-ethyl cellulose ethers, as well as mixed alkyl, hydroxy-alkyl cellulose ethers such as methyl hydroxy-ethyl cellulose, and the like. The carboxy-alkyl cellulose ethers which may be employed comprise cellulose glycolic acid ether and its homologues.

In addition to employing alkali-soluble cellulose ethers, there may be employed alkali-soluble celluloses such as degraded alpha-cellulose, beta-cellulose and oxy-cellulose, which may be produced by degradation and/or oxidation by heat, acids, alkali and the like, which treatments result in a product which is soluble in alkali, such as 8%–10% caustic soda solution, upon cooling or freezing the solution. From such solutions the alkali-soluble cellulose may be precipitated by the same coagulants which are used for precipitating the alkali-soluble cellulose ethers.

The rubber latex employed may be crude rubber latex or concentrated or creamed rubber latex depending upon the quality of the finish desired, to which there may be added the usual compounding ingredients as sulphur, zinc oxide, accelerators, antioxidants, and the like, which are necessary for vulcanization of the latex; also

latex which is pre-vulcanized and/or heat-sensitive, i. e. latex containing a latent coagulant which is activated by heat such as formaldehyde, sodium ethyl sulfate, ammonium persulfate. The use of a heat-sensitive latex with the cellulose ether is advantageous, since both the rubber solids and the cellulose ether can be simultaneously caused to coagulate by merely heating the fabric treated therewith and thus subsequent wetting (as with an acid bath) of the fabric is avoided. There may be added to the composition suitable inert fillers, such, for example, as talc, wood flour, fuller's earth, chalk, clay, and the like, to provide additional weight. Various alkali-stable pigments, dyes and the like may be employed for coloring the composition.

Preferably, in forming the coating composition for a pile fabric, a colloidal solution comprising from 1–12% alkali-soluble water-insoluble cellulose material in from 2–16% aqueous solution of a fixed alkali, for example sodium hydroxide or potassium hydroxide, is slowly mixed with a rubber latex solution comprising 28–70% rubber solids. In a preferred embodiment there is employed an alkali solution of from 3–8% alkali concentration having dispersed therein from 3–8% alkali-soluble water-insoluble cellulose ether in which there is dispersed a latex solution having from 1–16% rubber content by weight. The ratio of rubber solids to solid cellulose ether may be varied depending on the type of fabric treated and the type of back finish desired. In general, the cellulose ether may be mixed with a solution of rubber latex in widely differing proportions, for example, in a ratio of 2 or 3 parts of cellulose ether to 1 part rubber solids. In a preferred embodiment there is employed a ratio of 1 part cellulose ether to 1 part of rubber solids by weight. In many cases it may be desirable to employ a greater amount of rubber solids contained in the latex solution in proportion to the amount of cellulose ether employed, as, for example, 2 parts of rubber solids to 1 part of cellulose ether by weight.

For simultaneously coagulating the cellulose ether and the rubber there may be used the known coagulants for cellulose ether and rubber latex such, for example, as an acid, acid gas and acid salt or a concentrated salt solution which coagulates by salting out, or by heating the composition, or by evaporating the water by means of a stream of hot air.

By way of illustrating but not by way of limiting the invention, the following examples are given. All percentages recited are based upon the dry weight of the materials used.

Example I

A colloidal solution was prepared by dissolving 8 parts of alkali-soluble water-insoluble hydroxyethyl cellulose in 92 parts of a 4% sodium hydroxide solution. To 100 parts of the above solution there were added 9.5 parts of a rubber latex containing 64% rubber solids. The composition was then mixed thoroughly to provide an homogeneous dispersion and then applied to a pile fabric by back-filling. In this manner the composition was pressed around the loops of the pile tufts which extended through the back of the fabric as well as around the warp and filling threads.

After back-filling, the treated fabric was passed into an aqueous solution comprising 5% acetic acid which simultaneously coagulated the cellulose ether and the rubber. The fabric after passage through the acid bath was washed and finished in the usual manner. The coating on the fabric was insoluble in water and resistant to wear and laundering. The fabric thus coated was found to be quite flexible and did not crack or peel after considerable ageing.

Example II

A wool plush fabric, intended as an automobile body lining, was treated in manner similar to that recited in Example I, employing 4 parts of alkali-soluble water-insoluble hydroxy-ethyl cellulose dispersed in 96 parts of a 4% aqueous caustic alkali solution to which there was added a sufficient amount of a 64% rubber latex to give an amount of rubber equivalent to the weight of the hydroxy-ethyl cellulose present. The coating composition was sprayed on the back of the plush fabric, and the surplus composition was scraped off by means of a doctor blade which caused the composition to spread and form a continuous film on the fabric. The plush fabric was next passed through a coagulating bath comprising approximately 10% sulfuric acid which simultaneously coagulated the rubber and the cellulose ether. The plush was found to have less rubbery feel and an increased resistance to abrasion. This permitted finishing the plush in conventional manner and the finished material had improved appearance and handle.

Various thickening agents may be employed to enhance the mechanical application of the composition to the pile fabric. Such thickeners tend to increase the viscosity, and may comprise starch, casein, gelatin, water-soluble cellulose ethers but in general these are not needed since the alkali-soluble cellulose ether serves this purpose.

Among the advantages of the coating composition is that there is formed an improved anchoring film for the pile threads. Furthermore, the alkali-soluble water-insoluble cellulose ether employed in applicant's composition forms a surface coating for the individual rubber particles thus increasing their resistance to ageing. It has been found that applicant's composition is more stable than a latex composition used alone. This is probably due to the increase in alkali content employed to dissolve the cellulose ether, which fixed alkali has a tendency to stabilize the composition. Both alkali-soluble water-insoluble cellulose ether and rubber in the form of latex are hydrophilic, but when the latex is coagulated to form a deposited rubber the solid rubber is hydrophobic, the cellulose ether still remaining hydrophilic. Hence the film or coating formed from the present ether-latex composition is more water-repellent than is a film formed from the cellulose ether alone.

Further, it has been found that a satisfactory binding and finish is provided for a pile fabric employing the present composition as compared to the use of rubber latex alone, at the same time using considerably less latex, thus resulting in a saving in cost and material. When employing rubber latex alone the textile acquires the character of a rubberized fabric, whereas the present composition results in a textile finish which does not alter materially the textile appearance and "hand" of the article.

In addition, the alkali-soluble water-insoluble cellulose ether employed is not subject to oxidation and therefore protects the rubber from oxidation. The alkali-soluble cellulose ether employed in the present composition enables one to

vary the viscosity of the composition and thus make the process more flexible in industrial application. Since the viscosity of rubber latex alone is not easily varied per se, the invention enables the composition to be used in a wider range of different fabrics and processes.

Since certain changes in carrying out the above process, and certain modifications in the article which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a process for finishing a pile fabric, the steps comprising back-filling said pile fabric with a composition comprising a dispersion in an aqueous solution of a fixed caustic alkali, an alkali-soluble water-insoluble cellulose hydroxy-alkyl ether and rubber latex, conjointly coagulating the rubber and the cellulose ether on the fabric, thereby forming a continuous permanent finish on the fabric.

2. In a process for finishing a pile fabric, the steps comprise back-filling said fabric with a composition comprising a dispersion in an aqueous solution of a fixed caustic alkali, an alkali-soluble water-insoluble hydroxy-ethyl cellulose ether and rubber latex, the amount of said cellulose ether being greater than the amount of rubber, in said dispersion, conjointly coagulating the rubber and the cellulose ether upon the fabric, thereby forming a permanent deposit which binds the pile tufts to the fabric.

3. In a process for finishing a pile fabric, the steps comprising padding the back of said fabric with a composition comprising a dispersion in an aqueous solution of a fixed caustic alkali, an alkali-soluble water-insoluble cellulose ether containing hydroxy-alkyl groups and rubber latex, passing said padded fabric into an acid which conjointly coagulates the rubber and the cellulose ether on the fabric, thereby forming a continuous permanent finish on the back of the fabric.

4. In a process for finishing a pile fabric, the steps comprising treating the back of said fabric with a composition comprising a dispersion in an aqueous solution of a fixed caustic alkali, an alkali-soluble water-insoluble hydroxy-alkyl cellulose ether and rubber latex, the amount of said cellulose ether being greater than the amount of rubber therein, conjointly coagulating the rubber and the cellulose ether on the fabric, thereafter vulcanizing the rubber, thereby forming a continuous permanent coating for the back of said pile fabric.

5. In a process for finishing a pile fabric, the steps comprising treating the back of said fabric with a composition comprising a dispersion in an aqueous solution of a fixed caustic alkali, an alkali-soluble water-insoluble hydroxy-alkyl cellulose ether and a heat-sensitized rubber latex, heating the fabric to conjointly coagulate the heat-sensitized latex and the cellulose ether on the fabric, thereby forming a continuous permanent finish on the fabric.

6. As an article of manufacture, a pile fabric having a permanent deposit on its back comprising a conjointly coagulated alkali-soluble water-insoluble hydroxy-alkyl cellulose ether and rubber.

7. As an article of manufacture, a pile fabric back-filled on its reverse side with a composition comprising a conjointly coagulated deposit consisting essentially of an amount of alkali-soluble water-insoluble hydroxy-alkyl cellulose ether and a smaller amount of rubber, said cellulose ether and said rubber being intimately admixed.

8. An adhesive composition suitable for application to the back of pile fabrics, comprising an aqueous dispersion of an alkali-soluble water-insoluble cellulose ether, rubber latex, and a fixed caustic alkali, the alkali serving to maintain the cellulose ether in solution and also to stabilize the rubber latex against coagulation.

9. An adhesive composition suitable for application to the back of pile fabrics, comprising an aqueous dispersion of alkali-soluble water-insoluble cellulose ether, heat-sensitized rubber latex, a vulcanizing accelerator for the rubber, and a fixed caustic alkali, the alkali serving to maintain said cellulose ether in solution and to stabilize the rubber latex against coagulation.

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