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TREATING JUTE FIBERS

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1

This invention relates to the treatment of textile material, and more particularly to a process and composition for the treatment of jute textiles used in the manufacture of sacks, bags, packages, container liners and the like and to correlated improvements in the articles produced.

Textiles, in particular when made of jute fibres, often have superficial fibres loosely attached to their surface and as these fibres are non-felting and wiry in character they have a tendency to become loosened and detached from the textile during use of the material. When such materials are made up into sacks or the like, the superficial fibres tend to shed into the contents of the sack.

A prior method of treating such textiles consists in depositing cellulose xanthate in viscous fluid form on the surface of the material and drying the xanthate so as to cause the superficial fibres to adhere to the surface. With certain materials such as jute, the alkalinity of the coating composition affects the material undesirably as regards color, strength and durability or affects the contents of a sack or the like made from the material.

It has also been proposed heretofore to coat jute textile materials with rubber or cellulose derivatives which are soluble only in organic solvents, but such substances interfere with the reuse of the waste textiles because such coating compositions can be removed only by means of organic solvents, the cost of which is prohibitive in most cases. If such compositions are not removed, the papers and textiles made from the waste cannot be properly or uniformly bleached, dyed, softened, or otherwise treated with aqueous solutions because the rubber and cellulose derivatives alter the permeability of the textile materials.

It is an object of the present invention to provide means for laying the surface hairs or fibres on textiles and to prevent the shedding of such fibres.

It is a general object of the present invention to provide for the treatment of textiles, in particular textiles formed in whole or in part of jute in such a manner to improve the appearance and durability and to lay the nap fibres without adversely affecting the strength or imparting to the textile an objectionable discoloration.

It is a specific object of the invention to provide a process for the laying of the nap fibres on jute textiles, which process is designed to render said textiles more adaptable for use in the

2

manufacture of sacks, bags, packages, container liners and the like.

It is a further specific object of the invention to provide a composition for the finishing of textiles, in particular jute textiles, so that the finishing material will not interfere with the recovery and reuse of the treated textile.

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

The present invention therefore provides for the treatment of textiles, in particular jute textiles, with an aqueous dispersion of a cellulosic material such as a compound of cellulose, the dispersion having a pH value less than 8.0, that is, a composition which is only slightly alkaline or neutral or acid in reaction, whereby the composition does not adversely affect the strength of the textile material and does not impart an objectionable color to the jute as a result of excess alkalinity present in said composition, thereby enabling the waste material to be reused without the necessity of removing the cellulose compound deposited thereon.

In a preferred embodiment, a jute textile is treated with a dispersion of cellulosic material, the dispersion being within the zone of litmus neutrality. It is to be understood that the expression "textile" includes material in the form of yarns, threads, cordage, as well as fabrics of all kinds. The invention has particular reference to the finishing of textiles made in whole or in part of jute fibres.

It has now been found that jute is not adversely discolored by liquid compositions having a pH value of less than eight. When jute fabric is treated with a cellulosic material dissolved in acid solution, i. e., pH less than 7, the acid does not ordinarily discolor or damage the jute as the time of contact of acid with the jute is relatively short. The cellulosic material is immediately coagulated on the jute after application, and the acid is promptly removed, as by washing or neutralization.

For forming suitable finishing compositions by dissolving the cellulosic materials in dilute acids, the cellulosic material is first ordinarily finely comminuted or pulverized. Solution is then effected by prolonged contact of the cellulosic material with the acid. Cellulosic materials are usually difficultly soluble in most acids, and hence acids are not as desirable as the dispersing agents as salts, water and various dispersion media of pH less than 8.0 herein described.

In selecting acids suitable for dissolving cellulosic materials for treating jute it is only nec-

essary to place a sample of the jute to be treated in the acid for a short period of time, for example, 2 minutes. The jute is then washed free of acid and examined and compared with a second, untreated sample. By this simple test it is possible to quickly and easily determine whether or not the acid is of concentration sufficient to deleteriously affect the jute material to be treated. Most acids (in a dilute condition) do not adversely affect the jute, but it is obvious that strong acids such as sulfuric or nitric acids, particularly when in concentrated solution, are unsuitable for use in treating jute. This is readily determined by placing a sample of jute in a concentrated solution of sulfuric acid for 2 minutes according to the above test and observing the harmful effect of such concentration on the jute. It is quite possible to use sulfuric acid of diluted concentrations successfully to dissolve certain cellulosic materials and then treat jute therewith without deleterious effects such as parchmentizing or discoloring the jute. However, the invention is applicable to textiles fabricated from other cellulosic fibres and which may be mixed or combined with jute, in particular, natural-occurring vegetable fibres, such as flax, hemp, cotton, wood or the like from which sacks and other containers may be formed for use in the packaging arts. In particular, the present invention provides a method of laying the surface of nap hairs on textiles made of jute alone and of preventing the shedding of loose jute fibres from such textiles, without weakening the fibres and without imparting a discoloroation thereto. It is to be understood that in the specification and claims the expression "solution" is meant to include a true solution and/or a colloidal solution.

The invention accordingly comprises a composition of matter possessing the characteristics, properties and the relation of components, a process comprising the several steps and the relation of one or more of such steps with respect to each of the others, and the product possessing the features, properties and the relation of constituents which are exemplified in the following detailed disclosure and the scope of the invention will be indicated in the claims.

In recent years the hydrogen ion concentration method of determining acidity, alkalinity and neutrality has come into use with the provision of delicately adjusted indicators to make possible more accurate determinations than heretofore available with the aid of litmus and the like. According to authorities, litmus indicates neutrality between a pH of 4 or 5 on the one hand (acid side) and a pH of 8 on the other hand (alkaline side). Within these limits there exists what may be termed a neutral zone defining neutrality as originally expressed in terms of litmus.

In the treatment of jute according to the present invention there may be employed, as a class, cellulosic materials which are soluble in dilute acids, water or alkali solutions of pH less than 8; preferably within the range of litmus neutrality. The cellulosic materials comprise cellulose per se, or cellulose derivatives as a class such for example as cellulose ethers and cellulose esters which are soluble in aqueous solutions having a pH below 8. The cellulose esters may comprise for example, low-esterified cellulose esters as cellulose acetate, cellulose nitrate, cellulose formate, cellulose butyrate and mixed cellulose esters which are soluble in water or dilute aqueous acids, alkali or salt solutions below pH of 8.0. Cellulose ethers may comprise, for example, alkyl ethers, hydroxy-alkyl ethers, carboxy-alkyl ethers, and mixed alkyl hydroxy-alkyl ethers of cellulose such, for example, as methyl cellulose, ethyl cellulose, propyl cellulose, hydroxy-ethyl cellulose, methyl hydroxy-ethyl cellulose, cellulose benzyl sulfonates, and the like. Mixed cellulose ether-esters may be employed such as hydroxy ethyl cellulose acetate, methyl cellulose nitrate, and the like. The carboxy-alkyl cellulose ethers which may be employed comprise cellulose glycolic acid ether and its homologues, and alkali metal salts of the carboxy-alkyl cellulose ethers.

There may be employed cellulose in its various forms which may be dissolved in aqueous solutions of less than pH of 8.0, for example, alpha cellulose, beta cellulose, oxycellulose, lignocellulose, degraded forms of such varieties of cellulose which may be produced by degradation and/or oxidation as by treatment with heat, acids, alkalies, and the like, which treatment results in producing a cellulose which is soluble in aqueous solutions having a pH below 8.0.

The various cellulosic materials employed in the invention may be dissolved in a variety of solvents such as dilute acids, alkalies or salts dispersed or dissolved in aqueous media such as water. The solvents which may be used for dissolving cellulosic materials comprise sodium hydroxide, potassium hydroxide, quaternary ammonium compounds, metallic thiocyanates and iodides, alkali metal perchlorates, zinc chloride, and acids such as hydrochloric, sulfuric, formic and phosphoric acids in aqueous solution or in admixture with the various salts, and sufficiently dilute to prevent the solution from dissolving the jute, preferably less than 62% concentration.

Cellulosic material dissolved in alkali solution is employed in treating jute only after the pH of the solution has been adjusted to less than pH of 8.0. When salts or acids are employed, the cellulosic material is dissolved in such solvents at elevated temperatures and then cooled to room temperature or slightly below 20° C. before being used for treating the jute.

In the now preferred embodiment of the invention, the water-soluble cellulose ethers which are soluble in substantially neutral aqueous solutions of pH approximately 7.0, e. g., water, appear to offer many advantages over other cellulose compounds for the reason that the cellulose compound on the jute waste material may be readily removed before reusing the jute fibres recovered therefrom in the textile and paper arts.

By way of illustration but not by way of limiting the invention the following examples will be given:

Example I

A fabric made of jute was passed through a composition comprising a cold solution of a pH of 7.0, formed by dissolving 5 parts of water-soluble ethyl cellulose in 95 parts of water. The composition was allowed to substantially penetrate the jute fabric and the excess then removed by passing the fabric through squeeze rolls. The fabric was then passed into hot water which coagulates the cellulose ether on the fabric. By passing the fabric through squeeze rolls for a second time the rollers lay the nap and the cellulose ether binds the nap fibres to the fabric, thus producing a product having a relatively smooth surface.

Example II

Jute bagging was treated in accordance with the steps of the process set forth in Example I, namely, the bagging was padded with a cold solution comprising 3 parts by weight of alpha cellulose dissolved in a 60% solution of zinc chloride by heating to between 60° and 80° C. for sufficient period of time to dissolve the cellulose. The solution of cellulose and zinc chloride was found to have a pH approximately of 1.5. After padding the jute bag for a period of time sufficient to impregnate the material, the padded material was immediately passed into cold water to partially coagulate the alpha cellulose thereon, then through hot water to further coagulate the cellulose on the bagging. After coagulation of the cellulose the material was washed to remove any excess zinc chloride and then dried at slightly elevated temperatures. The bagging had an improved hand and less tendency to nap.

Example III

A jute fabric in the form of a large roll was treated by passing the material in a continuous manner through a bath comprising an emulsion of hydroxy ethyl cellulose. The emulsion is prepared by first dissolving 4% by weight of alkali-soluble hydroxy ethyl cellulose in an aqueous solution of 3% sodium hydroxide, and then dispersing this solution in a mixture comprising equal proportions of Stoddard solvent (naptha) and sulfonated castor oil. While this mixture is being agitated there is introduced sufficient 5% aqueous acetic acid solution while stirring to adjust the pH to between 7.5 and 8.0. The jute was then padded with this emulsion immediately after it had been prepared, as these types of emulsion are not stable for long periods of time and must be used as they are made up. After padding, the cellulose ether was coagulated thereon by passing the fabric through a dilute aqueous solution comprising 5% hydrochloric acid, thereafter passing the fabric into water to remove the excess acid, then washing and drying in the usual manner. The above treatment did not produce objectionable discoloration in the jute fibres. The composition lays the nap and binds the loose fibres.

Example IV

Ordinary cotton was purified and dewaxed in the usual manner, then dried and comminuted to a fine powder. A padding composition for jute bagging was prepared by dissolving 5% of the cellulose in a 66% solution of hydrobromic acid at about 3° C. The acid concentration was then carefully adjusted to about 60% by addition of sufficient water. Jute fabric was then treated by padding with the above composition, then passed into hot water at about 65° C. to coagulate the cellulose on the fabric and to remove the acid. The fabric was then passed through squeeze rolls to bind the loose fibres to the fabric. The acid may be recovered and reused. All parts are by weight, based upon the acid. The jute fabric was not discolored or damaged by the composition during treatment.

The composition may be applied by spreading, brushing, dipping or otherwise to the surface of the fabric or material to be covered. While still wet, the material may be pressed, rolled or otherwise suitably treated so that the superficial hairs are effectively laid and adhere to the surface. the cellulose compound is then coagulated in a suitable manner and the material is dried and finished in the usual manner. The treatment does not produce an objectionable coloration of the jute fibres.

There may be added to the composition various fillers, loading materials, pigments, dyestuffs, sizes, dispersion assistants, wetting agents and agents for fireproofing, waterproofing, preserving, softening, and the like for imparting to the composition or the treated textiles various properties well known in the art.

Since certain changes may be made in carrying out the above process and in the product, and modifications effected in the composition for practicing the principle thereof, without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

The present invention is a continuation-in-part of the application Serial No. 281,534, filed June 28, 1939.

Having described this invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A process for the treatment of textile fabric comprising jute fibres which would be discolored by strong alkalis and which fabric is characterized by having loose nap fibres, which process comprises the steps of applying to such fabric a textile finishing composition having a pH value less than 8.0, said composition comprising a coagulable water insoluble alkali soluble cellulose ether dissolved in an alkaline aqueous solvent for the said cellulose ether, said solvent being of an alkali concentration insufficient to dissolve or discolor said jute, and thereafter coagulating said cellulose ether on said fabric whereby the said loose nap fibres are bound to the surface of said fabric by the coagulated cellulose ether.

2. A process for the treatment of textile fabric comprising jute fibres which would be discolored by strong alkalis and which fabric is characterized by having loose nap fibres, which process comprises the steps of applying to such fabric a textile finishing composition having a pH within the zone of litmus neutrality, said composition containing a coagulable cellulose ether dissolved in aqueous solvent therefor, said solvent being of concentration insufficient to dissolve or substantially discolor said jute, and thereafter coagulating said cellulose ether on said fabric, whereby the said loose nap fibres are bound to the surface of said fabric by the coagulated ether, without substantially discoloring said fabric.

3. As a new product, textile fabric comprising jute, dressed with a water insoluble cellulosic body adhering to the fibers thereof and free from stains which would be caused by the treatment of said textile material with an alkaline solution having a pH above 8, said product being substantially free from loose nap jute fibers.

4. As a new product, textile fabric comprising jute, dressed with a cellulose ether adhering to the fibers thereof and free from stains which would be caused by the treatment of said textile material with an alkaline solution having a pH above 8.

5. A process for the treatment of textile fabric comprising jute fibres which would be discolored by strong alkalis and which fabric is characterized by having loose nap fibres, which process comprises the steps of applying to such fabric an aqueous textile finishing composition having a pH value less than 7.0, said composition compris-

ing a dissolved water insoluble coagulable cellulosic body dissolved in an acid solvent therefor, said solvent being of a concentration insufficient to dissolve or discolor said jute, thereafter coagulating said cellulosic body on said fabric and washing said acid solvent from said fabric, whereby the said loose nap fibres are bound to the surface of said fabric by the coagulated cellulosic body.

GEORGE S. HILLS.

Executor of the Estate of Roger Wallach, Deceased.

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