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COTTON YARN FOR DRIER FELTS AND THE LIKE AND METHOD OF MAKING THE SAME

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9 Claims. (Cl. 57—153)

This invention relates to improvements in cotton yarn or thread, particularly for use in drier felts for paper machines or other fabrics which are required to be resistant to heat and acid. It includes the method of making yarn heat and acid resistant as well as the yarn or thread itself.

In use drier felts for paper machines are subjected to conditions which tend more or less rapidly to deteriorate the fabric and destroy the natural desirable characteristics of the cotton of which they are made. These conditions include heat and moisture in the presence of acid and/or acid salts, as well as the friction, exerted by the felts on the rolls of the paper machine, which tends to disintegrate mechanically the surface of the felt and form a fine powder which appears to hasten deterioration of the felt by both chemical and physical action. Under these conditions the cellulose of the cotton yarn is oxidized and hydrolized and the strength of the fabric is reduced.

The object of the present invention is to provide for the production of a fabric which will better resist the refractory conditions under which drier felts are used and which will have longer life and thus reduce the cost of the maintenance of paper machines. A further object is to provide a yarn which is resistant to the attack of acid and heat so that fabrics may be produced therefrom which will retain the strength and flexibility of ordinary cotton fabrics, which will have less tendency to stretch or become deformed when wet or subjected to conditions such as surround drier felts on paper machines, and which will resist abrasion as well as the distintegrating effect of heat and acid.

According to the invention there is applied to cotton yarn an inert inorganic material, which is resistant to heat and acid, with a fluid binder which is water resistant and non-acid in character. Preferably the yarn is impregnated with an emulsion or suspension of the finely divided inert material in the binder. A plied or twisted yarn may be passed through the emulsion or suspension and after the excess fluid is removed by any suitable means the yarn is dried in a tunnel or chamber to the normal moisture content. A desired number of single yarn may be passed through the impregnating medium and after the surplus fluid is removed the yarn is but partly dried, then twisted, and finally dried to normal moisture content. Yarn produced by the latter method as compared with that produced by the former is more cylindrical in form, has a smaller diameter and higher resistance to heat, acid and friction. The impregnating medium may be applied to fabrics made from untreated yarn.

The inert inorganic material of the impregnating medium may be china clay, silica, asbestos, titanium dioxide, barytes, kieselghur, bentonite, glass, alkali silicates or like materials in finely divided form to act as an insulating agent for the yarn.

The fluid binder portion of the impregnating emulsion or suspension acts as an adhesive to cause the insulating particles to adhere to the yarn and is such that uniform distribution of the particles on the yarn is obtained. The bond between the particles and the yarn must be substantially insoluble. Thus to an adhesive such as glue or casein there is added an agent which renders the binder formed substantially insoluble under the conditions under which the fabric is used. As insolubilizing agents there may be used formaldehyde hexamine, furfural, aldehyde, ammonia, hexamethylene-tetramine, chromium salts and the like. Moreover, there may be added to the binder portion just described rubber latex or rubber dissolved in organic solvent, with or without known plasticisers, vulcanizing agents, accelerators and antioxidants for the rubber.

The binder may consist of an emulsion of resins which melt at a temperature of say above 100° C. Such resins must be of low acidity and capable of withstanding decomposition temperatures of substantially 200° C. Illustrative resins are esters of copal, coumarone, indene, phenol-formaldehyde, urea-formaldehyde and some of the alkyd resins.

In preparing the impregnating bath the finely divided insulating agent is suspended in the binder. The following examples illustrate the composition of the impregnating bath.

(1) Glue or gelatine 4.0 parts by weight, soap 0.5 part, 40% aldehyde solution 0.1 part, liquid ammonia 0.1 part, finely divided asbestos 10.0 parts, titanium dioxide 2.0 parts, china clay 10.0 parts and water 73.3 parts.

(2) Glue or gelatine 4.0 parts by weight, soap 0.5 part, 40% aldehyde solution 0.1 part, liquid ammonia 0.1 part, finely divided silica and asbestos 10 parts each, finely divided barium sulphate 5.0 parts, normal rubber latex 30.0 parts and water 40.3 parts.

(3) Casein 10.0 parts by weight, borax 1.5 parts, sodium fluoride 1.0 parts, hexamine 0.5

part, china clay 25.0 parts, asbestos 10.0 parts, titanium dioxide 5.0 parts and water 47.0 parts.

(4) Casein 5.0 parts by weight, borax 0.75 part, sodium fluoride 0.5 part, hexamine 0.25 part, insulating agent 35.0 parts, normal rubber latex 13.5 parts and water 40.0 parts.

(5) 50 parts of a benzol or toluol solution containing 10% of rubber and 30% of cumarone-indene resin (melting point 150° C.) are emulsified with 50 parts of a solution containing 10% casein, 0.5% soap and 3% of a plasticiser, such as sulphonated castor-oil, and 30% by volume of a finely divided insulating material is suspended in the emulsion.

Vulcanizing agents for rubber present in the binder may be added, as for example 1 to 3% of sulphur, 2 to 5% of zinc oxide and up to 1% each of an accelerator and an antioxidant.

The binder for the powdered insulating material may be formed in situ on the yarn. For example, the yarn may be impregnated with a solution of phenol or urea holding the powder in suspension, partially dried to remove surplus moisture and then impregnated with formaldehyde solution. When heated at a temperature of substantially 105 to 110° C. a film of the condensation product is formed and holds the powdered insulating material firmly adhering to the fibre.

In addition to its improved resistance to heat, acid and abrasion the yarn of the present invention has high tensile and relatively small capacity to stretch, all of which characteristics make the yarn particularly suitable for the production of fabrics for drier felts of paper machines. It will be understood, however, that the yarn and fabrics made therefrom may be used for any purpose for which these characteristics make it desirable.

While in the examples given specific proportions are given, it will be understood that these may be varied with the weight and other characteristics to be provided by the particular coating or impregnating medium.

We claim:

1. A method of treating yarn which comprises impregnating single threads with a fluid medium containing an adhesive, an agent to render the adhesive substantially insoluble and powdered inorganic insulating material, partially drying the threads, twisting a plurality of threads together and drying the yarn to normal moisture content.

2. A method of making heat, acid and corrosion resistant yarn which comprises treating cotton yarn with a solution of phenol or urea having powder of inorganic material suspended therein, partially drying the yarn to remove surplus moisture, impregnating the so treated yarn with formaldehyde and heating the yarn to form a condensation product with the powder interspersed therein.

3. A heat, acid and abrasion resistant yarn having high tensile strength and small capacity to stretch, comprising a plurality of continuous organic fibrous threads each coated with finely-divided inorganic material the particles of which are bonded together and to the thread with an adhesive containing an insolubilizing agent, the coated threads being twisted together and bonded to each other by said coating to form a unitary yarn.

4. A yarn having high tensile strength and small capacity to stretch and adapted to be woven to form a heat, acid and abrasion resisting fabric, comprising a plurality of cotton threads each coated with finely-divided inorganic material the particles of which are bonded together by a substantially insoluble adhesive, the individual threads being twisted together and having their coatings merged to form a unitary structure.

5. A fabric for drier felts for paper machines, comprising yarn as defined in claim 4.

6. A heat, acid and abrasive resisting yarn consisting of a cotton thread and a continuous coating thereon to preserve and strengthen said thread, said coating consisting of an adhesive rendered insoluble during application of said coating and finely-divided inert inorganic material bonded together and to the thread by said adhesive to form the coating and protect the thread when subjected to refractory conditions in use.

7. A fabric for drier felts for paper machines, comprising yarn as defined in claim 6.

8. A method of producing heat, acid and abrasion resisting yarn, which comprises passing individual fibrous thread through an aqueous suspension of finely-divided inorganic material containing an adhesive and an agent to render the adhesive substantially insoluble to coat the thread with the inorganic material, partially drying the coated thread, while in the partly dried condition twisting a plurality of threads together to form a yarn and cause a merging of the coatings on the threads and thereafter drying the yarn.

9. A fabric for drier felts for paper machines and the like comprising yarn as set forth in claim 3.

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