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PROCESS OF COATING WITH PRESERVATIVE COMPOSITIONS

Edwin R. Littman, Westfield, and John R. M. Klotz, Montclair, N. J., assignors to Stanco, Inc.

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2 Claims. (Cl. 117—65)

This invention relates to the coating of cellulosic materials with fusible salts of organic acids and it relates particularly to mildew-proofing or rot-proofing of fabrics or other textile and paper products.

The use of coating agents on cellulosic materials such as fabrics, paper and rope is well known. Such coatings have generally been applied to modify the physical characteristics of the treated articles without regard to rot-proofing characteristics against micro-organisms such as fungi or maring algae. Where rot-proofing coatings have been applied from a volatile solvent, difficulty has been experienced in securing even deposition and covering of the cellulose fibres without using an excessive amount of protective material, an amount greatly in excess of the threshold quantity required to poison the attacking micro-organism. By the methods described in this invention, it has been found that improved protection of cellulosic material against micro-organisms is obtained without the addition of excessive quantities of preservative. It has been further found that by the practice of this invention, the physical properties of the untreated article such as rope, cord, duck, etc., remain largely unchanged. Added stiffness, slipperiness, etc., are either absent or reduced to a minimum when the articles are treated according to the methods described.

The fusible metallic salts of organic acids that are used in the practice of this invention are those which are liquid at about 150° C. and solid or very viscous at ordinary temperatures and which do not flow appreciably at about 0° C. While salts falling within the fusible range of about 0°–150° C. may be used, those fusing between about 20° C. and 125° C. are preferred. Salts which may be used in the practice of this invention are copper naphthenate, oleate, resinate, etc. Zinc naphthenates, resinates and oleates are also used. Uranium, thorium, cerium and nickel salts of these organic acids may likewise be used. Mixtures of these various salts that fuse in the above range may likewise be used.

The fusible metallic salts of the organic acids are generally dissolved in volatile solvents such as low boiling naphthas that are used in the paint or dry cleaning business, for example, Varsol and V. M. P. naphthas which have narrow boiling ranges between 150° C. and 325° C. Other volatile solvents such as ketones, esters and alcohols or mixtures of these various volatile solvents may be used. By a volatile solvent is meant those that will evaporate at atmospheric temperatures without leaving any appreciable residue. If desired, drying oils such as China-wood oil, linseed oil, etc., may likewise be incorporated in the solvents.

The fusible salts of the above organic acids have, in the past, been dissolved in these various solvents and applied to the surface of the cellulosic material by means of a brush, spray or by dipping. After air-drying, the treated articles were placed into use. By the above treatment, uneven distribution of protective material was obtained because of variables introduced into the coating operation. Undesirable stiffness may also result from the above method of application of fusible metallic salts of organic acids. By the present invention, these difficulties are largely eliminated.

The treated material is dried whereby all volatile materials are evaporated and then subjected to heat sufficient to cause the deposited salt to flow, whereby the fusible metallic salt of the organic acid will flow evenly over the surface and penetrate into the interfibre spaces. When first applied to the fabric and dried there is, in some cases, a certain stiffness imparted to the fabric but when the fabric with the coating is subjected to heat, the fusible metallic salt will flow evenly over the surface of the fabric and it is not apparent, in some cases, to the naked eye or feel, that the fabric had been treated with a fusible metallic salt of the organic acid. The temporary stiffness is gone and the coated fabric appears to retain its original flexibility and ability to be bent or handled without the rupture of any of the treated material or interference with future fabrication.

Non-volatile solvents may also be used, for example, the lighter grades of mineral white oil, cordage oils which may or may not be partly emulsified, fuel oil, etc. These non-volatile solvents are generally used when it is desirable to prepare a cellulosic material whose fibers are being lubricated or where it is necessary to waterproof the material. This treated fabric likewise, when first treated appears to be stiffened to a certain extent but this stiffness is readily overcome upon heating the fabric and the original feel of the fabric is again returned. The temperature at which the cellulosic material is heated is governed by the fusion point of the fusible metallic salt of the organic acid and the maximum temperature at which it is safe to heat cellulose without danger of destroying its desirable properties. In general, the desirable temperature

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range is between 40° and 125° C. though temperatures outside this range may be used under certain operating conditions. The method of applying heat to the fabric containing the fusible salt is per se relatively unimportant. In practice, heating is accomplished by means of a heated drying or squeeze roll or in a drying tunnel or similar device using circulating heated air or other gas.

The quantity of coating composition generally applied may be greatly varied, that is, where it is necessary only to maintain material strength and not waterproof it to a great extent, small quantities may be used and a light coating may be applied but on the other hand, where the material is used to coat cable, rope or cord and a definite lubricating and waterproofing effect is desired, enough of the material is added to coat it to a substantial degree. Therefore the proportions on a percentage basis may be from about 2 to 15%, based upon the cellulosic material.

It is not necessary to use a solvent as the vehicle for the fusible metallic salts of organic acids. Most fabrics are finished by a wet process and drying is the final operation. The use of solvent solutions of preservatives introduces one or two additional operations thereby raising the cost of the treatment as well as creating a fire hazard. It is a general practice to apply preservatives from the size bath which process adds no appreciable cost, but that for materials, to the operation.

Various types of naphthenate emulsions may be applied to fabrics. For example, a zinc naphthenate emulsion prepared from zinc naphthenate, water and Dupont M. E. dry (sulfated higher fatty alcohol) and containing 50% solids is applied to a fabric by passing the fabric through the emulsion, then through a squeeze roll. The wet fabric is then dried over a heated drum or in a heated tunnel to remove moisture and "set" the preservative. If a lower concentration of zinc naphthenate on the fabric is desired, it is necessary only to dilute the emulsion before application. The emulsion may be applied either hot or cold though temperatures between about 125°–200° F. seem to produce the best results. Emulsions of the above type are for the application of preservative material only.

Where it is desired to increase water repellency as well as resistance to rotting, naphthenate emulsions containing wax or a similar material may be used. Two emulsions for the purpose are shown below.

Zinc base:	Grams
Zinc naphthenate	200
Paraffin	200
Aluminum naphthenate	50

Copper base:	Grams
Copper naphthenate	200
Paraffin	200
Aluminum naphthenate	50

The bases are prepared by melting together the products shown. Temperatures as high as 700° F. may be used.

Zinc emulsion

To 300 g. boiling water add 9 g. stearic acid and 3.5 g. triethanol amine and stir to a smooth soap. To this solution add 88 g. zinc base heated to 200° F. and previously mixed with 10 g. of an oil soluble sulphonate known as 302–S (Stanco product) and stir very rapidly for 5 minutes and occasionally until cool.

Copper emulsion

This emulsion is prepared as above except that 20 g. of 302–S is required.

These emulsions may be applied full strength or diluted with hot water as desired.

After passing through the squeeze rolls, the fabric is passed through a dilute acid bath such as 5% acetic acid, again squeezed through rolls and dried at an elevated temperature. When used full strength, the zinc naphthenate emulsion leads to the deposition of 18–19% material on No. 6 duck whereas if diluted with an equal weight of water a 6.5–7.0% deposit is obtained.

For use as water repellents only emulsions containing paraffin or wax and aluminum or cerium naphthenates may be prepared. The function of the last two materials is to decrease the temperature effect on paraffin or similar waxes and reduce the "sweating" at elevated temperatures and embrittlement at low temperatures.

We claim:

1. Process of coating a cellulosic fibrous material without substantially changing the original physical properties of flexibility and ability to be bent without rupturing the materials which comprises preparing an emulsion of copper naphthenate, alumina naphthenate, paraffin, water and an emulsifier, impregnating a cellulosic fibrous material, submitting the cellulosic fibrous material to pressure to expel the major portion of the water and subjecting to a temperature sufficiently high to cause the whole fusible metallic salt of the organic acid to fuse and penetrate into the interfibre spaces.

2. Process of coating a cellulosic fibrous material according to claim 1 in which the emulsion is applied to the cellulosic fibrous material at an elevated temperature.

EDWIN R. LITTMAN.
JOHN R. M. KLOTZ.