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TREATMENT OF TEXTILE MATERIALS CONTAINING CARBONIZABLE FIBERS AND PRODUCT THEREOF

No Drawing.

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This invention relates to the treatment of yarns or fabrics containing vegetable fibers, such as cellulose, that are readily carbonizable by certain carbonization processes and fibers or threads of a material, such as organic esters of cellulose, silk or wool that are not readily carbonizable by such processes, whereby novel effects are obtained.

An object of our invention is to produce novel effects with textile materials containing mixtures of materials that are readily carbonizable by a given process, and materials that are not readily carbonizable by such process by wholly or partially carbonizing the readily carbonizable material.

Another object of our invention is to produce novelty fabrics by subjecting a mixed fabric containing a readily carbonizable yarn, such as cellulose, and a yarn, such as organic derivatives of cellulose, that are not readily carbonized by the same method to a carbonizing treatment, either locally or throughout its surface, whereby lace-like effects are produced. Other objects of our invention will appear from the following detailed description.

In accordance with our invention, we treat a textile material containing fibers that are readily carbonizable by the subsequent treatment and threads or fibers that are not readily carbonizable by such treatment with a composition of matter containing a solution that promotes carbonization of the readily carbonizable material, and we then subject the textile material to elevated temperature, whereby the readily carbonizable material is removed or rendered removable while the other material is hardly affected at all.

The textile material to be treated may be yarns or it may be a woven knitted or netted fabric.

The readily carbonizable fibers employed in our invention are vegetable fibers such as cotton or flax or fibers of reconstituted cellulose (rayon).

The yarns, threads or fibers of material that is not readily carbonized by the subsequent treatment may comprise organic derivatives of cellulose. Examples of organic derivatives of cellulose are organic esters of cellulose such as cellulose acetate, cellulose formate, cellulose proportionate and cellulose butyrate, or cellulose ethers such as methyl cellulose, ethyl cellulose and benzyl cellulose.

Any suitable carbonizing agent may be used. Among the carbonizing agents that are suitable for use when an organic derivative of cellulose is present or when animal fibers are present in the textile materials, are solutions of aluminum chloride or hydrochloric acid of suitable concentration; while if animal fibers such as natural silk or wool are the only carbonization-resistant fibers present, stronger carbonizing agents such as sulphuric or sodium or potassium acid sulphate may be employed. The carbonizing solution may be employed as such, and may be applied to the textile material by dipping, immersion, padding or spraying. On the other hand, the carbonizing solution may be employed in admixture with a thickening agent such as starch, dextrine, British gum, gum tragacanth, etc. and applied in the form of a paste locally in any desired pattern, or over the entire surface of the fabric.

After the textile material has been treated with the composition of matter containing the carbonizing solution, it is heated to elevated temperatures, say 110° C. to 120° C. for a sufficient period of time to carbonize the vegetable or cellulosic material, after which the carbonized material is removed by brushing or washing.

One application of our invention is for the preparation of "spun" yarns made of organic derivatives of cellulose. Organic derivatives of cellulose yarns are made from solutions of the organic derivatives of cellulose by extrusion of the solutions through fine orifices and the removal of the solvent from

the filaments thus formed. Since the filaments are formed continuously, the yarns formed therefrom are of continuous length. Often it is desirable to prepare yarns of these materials that comprises short lengths of such filaments or fibers that are spun together. However, because of the lack of cohesion between filaments or fibers of cellulose acetate, it is not possible to prepare satisfactory "spun" yarns unless fibers of other materials are associated with the short lengths of the cellulose acetate filaments or fibers.

By our invention "spun" yarns consisting wholly of cellulose acetate staples may be prepared by spinning a mixture of the short cellulose acetate staples and vegetable fibers such as cotton, reconstituted cellulose, etc. to form a yarn, and then subjecting the mixed yarn to a carbonization treatment as herein described to remove the vegetable fibers, thus leaving a "spun" yarn consisting wholly of short staples of cellulose acetate fibers. Obviously some animal fibers, such as silk or wool, may be mixed with the cellulose acetate and cotton fibers, and since they are unaffected by the carbonization treatment, a yarn comprising cellulose acetate fibers and animal fibers will remain.

Another application of our invention is for the preparation of lace-like or gauze effects. This may be done by taking a fabric that is woven, knitted or netted, and which contains a mixture of readily carbonizable yarns and difficultly carbonizable yarns as above described. The fabric is then subjected to the selected carbonization treatment, whereupon the readily carbonizable yarns are removed, thus leaving an open mesh fabric consisting of the carbonization-resisting yarn. By varying the proportion of difficultly carbonizable and readily carbonizable yarns, various patterns and effects may be obtained. Further beautiful effects may be obtained by printing the mixed fabric with a printed paste containing the carbonizing solution with any suitable or desired design, and then subjecting the fabric to elevated temperatures, after which, the fabric is brushed or washed to remove the carbonized fibers. This will produce the lace-like or gauze like effects in the printed portion against the solid background of the unprinted portion.

In another mode of applying our invention, a fabric is woven on a suitable textile machine, say a Jacquard loom, with readily carbonizable yarns and difficultly carbonizable yarns as above described to produce various woven designs in the fabric. After subjecting this fabric to a carbonization process, as herein described, because of the removal of the carbonizable yarns, beautiful designs of lace-like effect are produced.

Obviously the textile material may be dyed, bleached, etc., either before or after the

carbonization treatment, in any suitable manner as is well understood in the art. If it is desired to prevent delustering of the fabric containing the organic derivatives of cellulose, deluster-preventing salts such as Glauber's salt or any of the deluster-preventing salts mentioned in U. S. Patent #1,765,581 of June 24, 1930, may be added to the treating solution.

In order further to illustrate our invention, the following detailed description of two examples are given.

Example I

A fabric of simple weave, comprising alternate sets of five yarns of cellulose acetate, which are resistant to carbonization, and three yarns of cheap cotton, or reconstituted cellulose, which is easily carbonized, both in the warp and in the weft, is selected. This fabric is immersed in a bath containing, or padded with, a solution of aluminum chloride of 6 to 13° Bé. at ordinary room temperature. The excess of aluminum chloride solution is then removed by pressing, squeezing, or hydroextraction, etc. and the fabric is then placed in a carbonizing dryer and treated at a temperature of 110° to 115° C. for from 1 to 1½ hours. The fabric is then removed from the dryer and is brushed or washed, whereupon the carbonized cotton is removed. Since the cellulose acetate yarn is unaffected, a fabric having a lace structure with open squares is produced. Obviously by employing different mixed fabrics, different patterns or designs may be produced.

Example II

A mixed fabric woven in a Jacquard loom and having designs of a preponderance of cotton, woven on a background having a preponderance of cellulose acetate yarn, is passed through an aqueous bath containing 1 to 2% of hydrochloric acid at 40° C. The excess acid solution is then squeezed out, and the fabric is then slightly hydroextracted. The thus treated material is passed into a carbonizing drier at a temperature of 120° C. After carbonization the fabric is washed to remove the carbonized cotton, thus leaving an open work design against the comparatively dense background of cellulose acetate yarns.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of this invention.

Having described our invention, what we claim and desire to secure by Letters Patent is:

1. Process of producing open work fabric of predetermined design comprising treating fabrics constructed with a predetermined pattern of organic derivatives of cellulose yarn and vegetable fiber yarn with a mineral

acidic carbonizing promoting compound and then subjecting the fabric to carbonizing temperatures.

surface thereof of open mesh, said fabric comprising cellulose acetate, said fabric having been formed from fabric containing vegetable fibers at least part of which had been removed by carbonization by subjecting the same to carbonizing temperatures in the presence of a mineral acidic carbonizing promoting compound. 70

In testimony whereof, we have hereunto subscribed our names. 75

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2. Process of producing open work fabric of predetermined design comprising treating fabrics constructed with a predetermined pattern of cellulose acetate yarn and vegetable fiber yarn with a mineral acidic carbonizing promoting compound and then subjecting the fabric to carbonizing temperatures. 10

3. Process of producing open work fabric of predetermined design comprising treating fabrics constructed with a predetermined pattern of cellulose acetate yarn and cotton fiber yarn with a mineral acidic carbonizing promoting compound and then subjecting the fabric to carbonizing temperatures. 15

4. The process of producing open work fabric comprising treating the fabric of mixed organic derivatives of cellulose yarn and mixed vegetable fiber yarn associated in a predetermined manner with a solution containing aluminum chloride and then treating the fabric at elevated temperature. 20

5. The process of producing open work fabric comprising treating the fabric of mixed cellulose acetate yarn and mixed vegetable fiber yarn associated in a predetermined manner with a solution containing aluminum chloride and then treating the fabric at elevated temperature. 25

6. The process of producing open work fabric comprising treating the fabric of mixed cellulose acetate yarn and mixed cotton fiber yarn associated in a predetermined manner with a solution containing aluminum chloride and then treating the fabric at elevated temperature. 30

7. Process of producing open work fabric comprising treating a fabric of mixed cellulose acetate yarn and mixed vegetable yarn associated in a predetermined manner with a solution containing aluminum chloride of 6° to 13° Bé., treating the fabric at 110° to 120° C. for 1 to 1½ hours and then removing the carbonized yarn. 35

8. Process of producing open work fabric comprising treating a fabric of mixed cellulose acetate yarn and mixed cellulosic yarn associated in a predetermined manner with a solution containing aluminum chloride of 6° to 13° Bé., treating the fabric at 110° to 120° C. for 1 to 1½ hours and then removing the carbonized yarn. 40

9. A fabric having at least a part of the surface thereof of open mesh, said fabric comprising organic derivatives of cellulose, said fabric having been formed from fabric containing vegetable fibers at least part of which had been removed by carbonization by subjecting the same to carbonizing temperatures in the presence of a mineral acidic carbonizing promoting compound. 45

10. A fabric having at least a part of the 50

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