United States Patent Office 2,731,368
Patented Jan. 17, 1956

2,731,368

TREATMENT OF TEXTILE MATERIALS

Fred Fortess, Summit, and Marshall Duke, Morristown, N. J., assignors to Celanese Corporation of America, New York, N. Y., a corporation of Delaware

No Drawing. Application February 20, 1952, Serial No. 272,686

1 Claim. (Cl. 117—139.4)

This invention relates to the treatment of textile materials and relates more particularly to the treatment of textile materials having a basis of cellulose acetate or other organic derivative of cellulose.

An important object of this invention is to impart an improved resistance to creasing to textile materials having a basis of cellulose acetate or other organic derivative of cellulose.

A further object of this invention is to incorporate onto textile materials having a basis of cellulose acetate or other organic derivative of cellulose a small proportion of an elastomer whereby the resistance to creasing of said textile materials is greatly improved.

Other objects of this invention will be apparent from the following detailed description and claim.

It has long been known that an improved resistance to creasing may be imparted to textile materials, such as fabrics and the like, having a basis of cellulose, such as cotton, regenerated cellulose and the like, by incorporating into said textile materials certain synthetic resins of the urea-formaldehyde and melamine-formaldehyde class. The synethic resins are applied to the cellulose textile materials in a partially polymerized state, or components capable of forming said resins are applied to the cellulose textile materials, following which the materials are heated or otherwise treated to effect or complete the polymerization of the resins. The resins enter into the filaments and fibers themselves and change the physical characteristics thereof. Attempts to apply these and similar treatments to textile materials having a basis of cellulose acetate or other organic derivative of cellulose have, however, failed to improve the resistance to creasing of said textile materials and have, in some cases, actually rendered the said textile materials more liable to creasing. As a result, there has been little or no commercial use of anti-crease treatments on textile materials having a basis of cellulose acetate or other organic derivative of cellulose.

According to the present invention, it is possible to improve the resistance to creasing of textile materials having a basis of cellulose acetate or other organic derivative of cellulose by incorporating onto said textile materials a relatively small amount of an elastomer. Cellulose acetate textile materials, for example, treated in this manner not only display an improved resistance to creasing, but also have a firmer hand and a fuller body than the untreated textile materials without any tendency toward stiffness.

Elastomeric materials that are suitable for use in accordance with the present invention include, for example, polyvinyl butyral, vinyl chloride-vinylidene chloride copolymers and butadiene-styrene copolymers (Buna S). The elastomers may be applied to the textile materials from solution in organic solvents which will not dissolve the cellulose acetate or other organic derivative of cellulose. However, they are preferably applied to the textile materials from an aqueous dispersion or latex containing, if desired, a suitable dispersing agent. The elastomers of this invention are applied to the textile materials in their fully polymerized state and require no further polymerization. This represents an important saving over the use of partially polymerized resins or the components of resins used in treating cellulose textile materials both in eliminating the polymerization step and in avoiding possible damage to the textile materials as the result of the conditions necessary to effect the polymerization. The elastomers may be employed per se or they may be mixed with a plasticizer to impart a greater flexibility thereto. There may also be added to the elastomer, dyes, pigments, ultra-violet light absorbents, fire-retardants and other effect materials. The elastomers referred to above are characterized by having a high elongation when subjected to stress and a high recovery following removal of said stress.

In applying the elastomer to the textile materials, use may be made of conventional textile apparatus adapted for this purpose. For example, the textile materials may be passed through a latex of the elastomer and then between a pair of nip rolls to express from the textile materials the excess of latex adhering thereto above a predetermined amount. The textile materials may then be dried in a tenter or the like, following which they may be subjected to conventional treatments such as calendering, decatizing, button breaking and the like depending on the finish desired on the said textile materials.

The quantity of elastomer applied to the textile materials is critical and should not exceed about 2.0% by weight or preferably about 0.625% by weight and should range from about 0.1 to 2.0% by weight based on the weight of the textile materials. When the larger quantities of elastomer than those specified are applied, the textile materials actually exhibit a greater tendency to crease than untreated textile materials. This is surprising because in the treatment of cellulose textile materials with resins to improve the crease resistance thereof, it is common to employ at least 5% by weight of the treating agent and to go up to as high as 30% by weight of the treating agent with an improved resistance to creasing as the quantity of the treating agent is increased.

It is believed that the elastomer improves the resistance to creasing of the treated textile materials by forming elastic weld bonds between adjacent filaments and filament bundles without actually entering into or changing the physical properties of the filaments themselves. When the textile materials are creased, these weld bonds tend to prevent shifting of the filaments and filament bundles relative to one another and also provide an elastic restoring force once the crease producing force is removed. That this mechanism is probably correct is evidenced by the fact that the elastomer containing textile materials show an improved resistance to creasing not only on a short term basis, but also on a long term basis. Thus, if an elastomer treated textile material is creased by folding the same and applying a definite weight thereto for a given period of time, the recovery angle of the textile material will be greater than that of an untreated textile material both 5 minutes after the weight is removed and 24 hours after the weight is removed. When a higher proportion of elastomer than that specified above is employed, it seems to fill the spaces between the filaments and filament bundles and, depending upon the precise amount of elastomer employed, approaches more or less closely to the state of a film so that the elastic weld bonds are incapable of functioning in the foregoing manner.

This invention will now be described specifically in connection with the treatment of cellulose acetate textile materials since cellulose acetate is the most important organic derivative of cellulose at the present time. It may also be applied to the treatment of textile materials having a basis of other organic derivatives of cellulose

textile materials such as, for example, other lower aliphatic acid esters of cellulose including cellulose propionate, cellulose butyrate, cellulose acetate propionate and cellulose acetate butyrate. The textile materials may be formed of continuous filaments or staple fibers of an organic derivative of cellulose or of a mixture of organic derivatives of cellulose filamentary materials with other natural or synthetic fibers or filaments.

The following examples are given to illustrate this invention further.

Example I

A fabric woven in a plain weave from cellulose acetate yarns is immersed for 30 seconds into a latex of a polyvinyl butyral plasticized with 80% by weight of butyl ricinoleate, based on the weight of the polyvinyl butyral, and maintained at 50° C. The fabric is then passed between nip rolls adjusted to give a wet pick up of the latex in the amount of 50%, following which the fabric is dried at 70° C. and given a light steam pressing. The dried fabric contains 0.625% by weight of the plasticized polyvinyl butyral. A sample of the fabric is conditioned for 12 hours at 24° C. and 65% relative humidity, folded and placed for 5 minutes under a 1000 gram weight. After removal of the weight, the treated fabric exhibits a recovery of 134 degrees after 5 minutes and 154 degrees after 24 hours. An untreated sample of the same fabric, when creased in the same manner, exhibits a recovery of only 98 degrees after 5 minutes and only 142 degrees after 24 hours. An untreated sample of the same fabric when wetted and dried before creasing exhibits a recovery of only 92 degrees after 5 minutes and 124 degrees after 24 hours.

Example II

The fabric described in Example I is immersed for 30 seconds into a latex of a vinyl chloride-vinylidene chloride copolymer maintained at 50° C. The fabric is treated in the same manner as set forth in Example I and, after drying, contains 1.25% by weight of the copolymer. Upon creasing in the manner set forth in Example I, the treated fabric exhibits a recovery of 138 degrees after 5 minutes and 154 degrees after 24 hours.

Example III

The fabric described in Example I is immersed for 30 seconds into a latex of polyvinyl butyral plasticized with 40% by weight of butyl ricinoleate and maintained at 50° C. The fabric is treated in the manner set forth in Example I and, after drying contains 0.625% by weight of the plasticized polyvinyl butyral. Upon creasing in the manner set forth in Example I, the treated fabric exhibits a recovery of 134 degrees after 5 minutes and 150 degrees after 24 hours.

Example IV

The fabric described in Example I is immersed for 30 seconds into a latex of a Buna S butadiene-styrene copolymer maintained at 50° C. The fabric is treated in the manner set forth in Example I and, after drying contains 0.625% by weight of the copolymer. Upon creasing in the manner set forth in Example I, the treated fabric exhibits a recovery of 144 degrees after 5 minutes and 165 degrees after 24 hours. When the weight of the copolymer applied to the fabric is increased to 1.25%, the angle of recovery drops slightly although it is still markedly better than that of the untreated fabric.

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 our invention.

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

Process for improving the resistance to creasing of a textile material containing cellulose acetate yarn, which comprises immersing the said fabric for 30 seconds into a latex of a fully polymerized butadiene-styrene copolymer maintained at 50° C., and drying the so treated textile material, the proportion of the copolymer retained on said textile material being 0.625% by weight, based on the weight of the textile material.

References Cited in the file of this patent

UNITED STATES PATENTS

2,015,103	Dreyfus	Sept. 24, 1935
2,061,570	Frolich	Nov. 24, 1936
2,167,234	Dreyfus	July 25, 1939
2,270,285	Frolich	Jan. 20, 1942
2,298,841	Pyner	Oct. 13, 1942
2,343,095	Smith	Feb. 29, 1944
2,447,878	Rust	Aug. 24, 1948

FOREIGN PATENTS

518,916	Great Britain	of 1940