TREATMENT OF NAPPED COTTON FABRIC WITH POLYAMIDE SOLUTION CONTAINING DISPERSED SULPHITED UNSATURATED OIL

REMOVAL OF EXCESS SOLUTION

COAGULATION OF POLYAMIDE

WASHING

TREATMENT WITH ALKALINE SOLUTION AND/OR WASHING

DRYING

INVENTOR

Petrus Johannes de Nijs

BY

Attorneys
This invention relates to a process for the manufacture of a textile material coated with a polyamide, and to the textile products thus manufactured.

Processes of this general character employing cotton fabrics are of course broadly old. For example by a known process fabrics are obtained which are whiter and less transparent than the starting fabrics and which are very supple. This suppleness is not obtained in the case of fabrics which are merely treated with a solution of a polyamide in a volatile solvent, after which the solvent is evaporated.

It has been discovered according to the present invention that coated textile products may be obtained which, in contrast to the products of the above-mentioned broadly old process, compare to a certain extent with natural wash-leather or leatherbrain.

According to the present invention, as illustrated by the flow sheet of the process in the drawing, a napped cotton fabric is treated with a polyamide solution containing a dispersed, sulphited unsaturated oil in an amount which is larger than that of the polyamide contained in the solution, the oil being at least partly removed by washing after the coagulation of the polyamide.

The weight per square meter of the cotton fabric should preferably be from 150 to 300 grams, and still more preferably from 175 to 225 grams. At such a weight the treated cotton fabric has the most favorable washing capacity. The cotton fabric should preferably be napped on both sides and during manufacture be subjected to a high degree of contraction or shrinkage.

Napping the fabric on both sides serves to insure that after the impregnation with the polyamide solution and the coagulation thereof, the precipitated polyamide will be firmly anchored substantially in the projecting cotton fibers. A high degree of contraction of the starting cotton fabric favorably influences the anchorage in the projecting cotton fibers.

The structure of the resulting textile product insures that the appearance and the "handle" thereof will correspond to a great extent to those of natural wash-leather.

Another essential condition for obtaining a product resembling wash-leather, in accordance with the present invention, is that a sulphited unsaturated oil is worked up in the polyamide solution.

By "a sulphited unsaturated oil" is to be understood an unsaturated oil or fat which is treated with sulphur dioxide in an amount such that the treated oil or fat is dispersible in strong formic acid. An example of such a sulphited oil is a sulphited fish-oil.

A specific example thereof is "Prinol T.G.," marketed by Messrs. Schimmer & Schwarz.

Such a sulphited oil may be obtained by treating unsaturated oils or fats, in a well known manner, at temperatures above 60° C. and, if desired, in the presence of suitable catalysts such as lead napthenate, cobalt soaps, manganese soaps, or zinc soaps, with oxidants and sulphites, for instance, sodium bisulphite, until the dispersibility of the resulting oils in water no longer increases. It appears that proceeding in this way the oils are only partly sulphited.

Unsaturated oils may also be sulphited by treating them with sulphites at temperatures between 70° and 110° C.

Products which are also suitable are, for instance, sulphited sperm oil, sulphited coconut oil, sulphited linseed oil, and other sulphited oils having an iodine number higher than 100, in particular an iodine number of about 160.

The sulphited oils must be added to the polyamide solution in an amount which is at least equal to that of the polyamide in the solution.

As far as moisture absorption capacity and washing power are concerned, the most favorable results are obtained if use is made of a polyamide solution containing an amount of sulphited oil which is twice that of the polyamide in the solution.

Generally, however, the sulphited oil is not used in an amount more than three times the amount of polyamide in the solution, since as a rule such an amount may give rise to difficulties in the preparation of the solution. It appears that the action of the sulphited oil is twofold. The polyamide precipitate is somewhat porous and, moreover, after washing, the product is still oil-retaining. Both facts are considered as contributing to the satisfactory water-absorption capacity of the final textile product. The amount of polyamide which is precipitated on the textile product may vary between fairly wide limits.

In order to obtain a supple textile product, it is preferred to treat the fabric with such an amount of the polyamide solution that the resulting synthetic wash-leather contains at the most 35% by weight, and preferably about 30% by weight of polyamide. As lower limit a value of 20% by weight, calculated on the synthetic leather product, may be taken as satisfactory.

As polyamides there may be used those based on diamines and dicarboxylic acids, or polyaminocarboxylic acids such as poly-ε-aminoaciproic acid. The latter type of polyamides, however, yield the best synthetic wash-leathers.

Generally speaking, since the polyamides per se are well known and form no part of the present invention it is deemed unnecessary in the interests of brevity to do more than refer in passing to typical prior art disclosures illustrative thereof merely by way of example, such as Du Pont's numerous U.S. patents to Carothers including Nos. 2,071,250-3 and 2,130,948 and the "Collected Papers of Wallace Hume Carothers on High Polymeric Substances," Interscience Publishers, Inc., New York, 1940. Another useful definition of these polyamides (patterned after Wakeman, "The Chemistry of Synthetic Plastics," Reinhold Publishing Corp., 1947, page 257) is that they are long-chain synthetic polymeric carbonamides which have recurring carbamidine groups as an integral part of the main polymer chain.

It should be mentioned in passing that the amount of polyamide to be used is to some extent dependent, on the one hand, on the weight of the fabric, and on the other hand, upon the length of the projecting fibers and the degree of napping, that is the number of projecting fibers per unit surface area of the fabric.

In the case of a large number of long projecting fibers per unit surface area of the fabric, the amount of polyamide applied will be relatively high, whereas relatively low percentages by weight will normally be used in the case of fabrics having relatively few or and short fibers per unit surface area.

Moreover, relatively small amounts of polyamide will be used for fabrics having relatively high weights per square meter.

In this connection, however, it has been found to be of some importance that the free ends of the projecting fibers shall be hardly, or not at all, covered by the polyamide.

In order to obtain a good distribution of the polyamide
on the cotton fabric, it is preferred to use a 10% polyamidic solution, although the use of solutions having different concentrations is within the contemplation of the invention.

If, however, the percentage of polyamide in the solution is lower than 5% by weight, then the desired amount of polyamide does not so readily precipitate on the fabric. In the case of percentages by weight higher than 20%, the high viscosity of the solution appears to be a drawback. Moreover, in the latter case the coagulation of the polyamide requires too much time.

Finally, in order to increase the washing action, or ease with which they may be washed, of the textile products to a grinding or abrading treatment after treating them with the polyamide solution but before drying.

The grinding treatment is preferably carried out by continuously passing a length of the polyamide-coated fabric over a grinding roller which is driven in the direction of travel of the fabric and, moreover, is simultaneously caused to move to and fro in axial direction.

The aforesaid grinding treatment is carried out after the fabric, following coagulation of the polyamide solution, has been deaerated with water. After the grinding treatment, a second wash may be carried out to remove the grindings. Also during grinding, water may be sprayed against the fabric.

The textile product may be dyed prior to drying, or a suitable dye stuff may be added to the polyamide solution itself.

Moreover, the drying step may be preceded by treating the "ground" and washed textile product with an alkaline solution, for instance a solution of sodium hydroxide, soda, sodium bicarbonate or ammonia. Such a treatment further is the de-swelling of the coagulate. In general, these alkaline reagents are preferably used in solutions of from 1 to 5% by weight.

As far as washing power is concerned, the textile products manufactured according to the present invention compare favorably with those products which are manufactured by treating fiber webs, in one or more process steps, with solutions of polyamides in formic acid and pore-forming substances being added to these solutions. This improvement is attributed to the use of napped cotton fabrics and, moreover, to the use of sulphited unsaturated oils in the processed polyamide solutions in amounts which are at least equal to the amounts of polyamides in the above solutions.

The present invention also relates to the textile products obtained by the methods described herein. The treated products are characterized by a napped cotton fabric having a weight of, preferably, 150 to 300 grams per square meter, which fabric is provided on at least one side with a discontinuous, porous layer of a polyamide. As a rule, these products contain at least 2.5% by weight of a sulphited oil, and 20-35% by weight of polyamide.

In order to indicate still more fully the nature of the present invention, the following example of typical procedures is set forth, it being understood, however, that this description is presented by way of illustration only, and not as limiting the scope of the invention.

Example

A cotton fabric (flannel) having a weight of 197 grams per square meter, 105 warp threads and 103 weft threads per 5 cms., showed a 25% shrinkage, which fabric had been napped on both sides, was treated in a continuous process with a solution of 10% by weight of polyaminocaproic acid in 85% by weight formic acid containing dispersed sulphited fish-oil in an amount twice that of the polyamide. This sulphited fish-oil was the product marketed by Messrs. Schimmer & Schwarz under the trade name "Prinol T.G."

After impregnation of the fabric, the excess of impregnation solution was removed by passing the fabric between two knife edges positioned at some distance from each other, as a result of which the textile product was also smoothed out. Subsequently, the fabric was passed into water at 10° C., as a result of which the polyamide solution was coagulated therefore, the scraping device was so adjusted that in the dried state the coated textile product had increased in weight by about 80 grams per square meter.

After coagulation, the coated textile product was washed with water at about 10° C. and subsequently passed over a grinding roller which was rotated in the direction of travel of the coated product and which was, moreover, caused to traverse in an axial direction. The grinding roller was clad with water-resistant Carborundum paper having a fineness of 400.

After grinding, the coated product was treated with a 4% by weight solution of sodium carbonate, at 60° to 70° C., mixed with water at 10° C. to wash out the sulphited unsaturated oil which was subsequently treated with water containing 1% by weight of a wetting agent, and finally dried.

If desired, a treatment with a dilute sodium bisulphite solution may be introduced between the treatment with the alkaline solution and the treatment with water, for the purpose of, for example, increasing the washing treatment. The dried wash-leather still contains more than 3% by weight of the sulphited oil.

Although the water-absorption capacity of the synthetic wash-leather manufactured in accordance with the present invention is lower than that of a natural wash-leather or chamois, the coated textile product made according to this invention feels like a natural wash-leather, and behaves as such as far as the quality is concerned, and is remarkable for its higher resistance to boiling water, synthetic detergents, decay, and adverse mechanical influences such as abrasion. Moreover, the product of the present invention will not become slimy in use.

Moreover, and in contrast with natural wash-leathers, it will also readily absorb moisture when in the air-dry state.

While a specific example of a preferred method and product embodying the present invention has been set forth above it will be understood that many changes and modifications may be made in the methods of procedure, and in the resulting products without departing from the spirit of the invention. It will therefore be understood that the example cited and the particular proportions and methods of operation and resulting products set forth above are intended to be illustrative only, and are not intended to limit the scope of the invention.

What is claimed is:

1. In a process for the manufacture of a textile material coated with a polyamide in which a cotton fabric is treated with a solution of a polyamide in formic acid and a sulphited unsaturated oil which is twice that of the polyamide in the solution, said solution.

3. A process as defined in claim 1, wherein the sulphited unsaturated oil is a sulphited fish-oil.

5. A process as defined in claim 1, wherein the cotton fabric is treated with such an amount of the polyamide.
solution that the treated fabric product contains from 20 to 35% by weight of polyamide.

6. A process as defined in claim 1, wherein the cotton fabric is treated with such an amount of the polyamide solution that the treated fabric product contains about 30% by weight of polyamide.

7. A process as defined in claim 1, wherein a solution of 10% by weight of polyaminocaproic acid in an aqueous solution of 85% by weight formic acid is employed as the polyamide solution.

8. A process as defined in claim 1, wherein the textile material is treated with an alkaline liquid before drying.

9. A textile product comprising a napped cotton fabric having a weight of 150 to 300 grams per square meter, and being provided on at least one side thereof with a discontinuous, porous layer of a polyamide and a sulfited, unsaturated oil, said polyamide constituting from 20% to 35% by weight of said textile product and said oil constituting at least 2.5% by weight of said textile product.

10. A textile product as defined in claim 9, wherein the polyamide content is about 30% by weight.

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WILLIAM D. MARTIN, Primary Examiner.

MURRAY KATZ, RICHARD D. NEVIUS, Examiners.