This invention relates to improvements in the production of pile fabrics.

More particularly stated, the invention relates not only to the random dispersion throughout the pile of the fabric of synthetic fibers having differing denier and deorientation characteristics, but also relates to the use of fluids to deflect and deorient pile fibers in preselected patterns.

It is the object of this invention to provide a method for producing pile fabrics having novel characteristics as to appearance and durability.

A special feature of the invention is the production of an artificial fur that has fibers whose characteristics as to position, deorientation, length and color resemble those of natural fur and attached patterns of natural pelts.

It is well-known that pile fibers simulating natural fur can be produced through the use of fibers having different deniers, lengths and heat-shrinkable characteristics. The use of heat treating chambers to deorient and shrink synthetic fibers is also old. One example of such a heat chamber is disclosed in U.S. Patent No. 2,815,558 to Bartovics et al., issued December 10, 1957.

The production of an artificial fur pile fabric having the highest commercial value requires that the fabric have a pattern simulating the hair arrangement on a natural pel and specifically simulating the darker color and convergent deflection of the hairs that grow along the back bone of the fur bearing animal (known as the "grizzled") and simulating the lighter color hairs that grow on the under side of the animal (known as the "bellies" or "sides" of the pel). It also must have a pattern simulating an arrangement of attached natural pelts as used for example in the making of fur garments. Prior to my invention, this much desired patterned effect was produced by printing or hand dyeing of the fibers. These methods have obvious drawbacks, such as non-permanence of the dyes and poor lustre qualities. In addition, these methods were unable to effect the deflection of fibers necessary accurately to simulate the pattern of attached natural pelts.

I have discovered a new and useful process for the production of a pattern pile fabric which simulates the arrangement of natural pelts thus having characteristics of fiber deflection and color heretofore unknown in the pile fabric art.

In the drawings:

FIG. 1 shows a diagrammatic view of the heat treatment apparatus known as high-low unit used in the manufacture of pile fabrics in accordance with this invention;

FIG. 2 is a sectional view of the to-be-treated pile fabric as it appeared before treatment;

FIG. 3 is a sectional view of the pile fabric during heat treatment in accordance with this invention; and

FIG. 4 shows a finished pile fabric having a pattern which resembles attached natural pelts.

These objects and others are achieved, as will be apparent from the following description as read with the accompanying drawings, wherein like reference numerals designate like elements in the several views.

When synthetic fibers are used in accord with this invention they are manufactured with a molecular arrangement such that subsequent heat treatment causes substantial shrinkage and curling. Fibers of the varying denier and shrinkage quality are woven or knitted into a fabric in a random manner. Fibers that shrink in proportion to the intensity and the amount of heat to which they are subjected are also used. It is contemplated that fibers of various colors will be used.

After the fabric has been woven or knitted it is subjected to heat treating to "set" the back; it is polished and then sheared. It is then heat treated to form a dual pile fabric or guard hair fabric having short fibers 7 and long fibers 8 which resemble the underfur and the guard hairs of natural fur.

This guard hair fabric is then carried into the high-low unit for the further treatment which produces the novel effect which is the essential part of my invention.

FIG. 1 shows diagrammatically the fabric 1 horizontally mounted on a material carrying or "center" frame 2 with the base or mat of the fabric 3 facing upward and the face or pile 4 facing downward. The material carrying frame is then moved over a plurality of rows of jets 5 located in cylindrical headers 6 whose axes are perpendicular to the direction of passage of the frame.

A hot fluid such as dry steam is introduced by pressure into the cylindrical headers 6 and flows through the jets and impinges on the pile 4 of the passing fabric. The jets are designed and arranged in the headers in such a manner that the impingement of the fluid on the fabric is substantially limited to a plurality of rows running parallel with a direction of passage of the frame.

It will be understood that dry steam is merely one of the acceptable fluids for use in the described heat treatment. Temperatures of about 550°F. are contemplated when dry steam is used. Temperatures and the rate of heating may be controlled by ventilation of the hood 9 through the use of the ventilator duct system 10, and the exhaust blower motor 14 as shown in FIG. 1.

After the fabric passes out of the fluid treatment area it enters a heated chamber where it is dried and set.

FIG. 3 shows a section cut perpendicular to the direction of passage of the frame during the fluid treatment and illustrates the additional shrinkage and deorientation of the fibers during this final treatment as caused by the heat, rate of temperature change, and other influences to which the fabric is subjected during the treatment and drying. It further illustrates the deflection of the fibers due to the kinetic forces. The rows of fibers 12 that are subjected to the direct flow of fluid from the jet shrinks to a greater degree than the adjacent fibers. The long fibers in these adjacent areas are deflected as shown 13.

FIG. 4 shows a plan view of a preferred embodiment of my invention which is an artificial fur which has a pattern that resembles attached natural pelts. The "grizzled" 15 and the "sides" or "bellies" 16 are shown.

One example of my invention is described below.

Example

A sliver consisting of 65% of a high shrinkage 3-denier Orlon or dyne and 35% of 16-denier non-crimp Velcr is used to make up the pile of a pile fiber having a knitted base comprised approximately of one half 16/1 dyne and one half 16/1 cotton. The Velcr is a dark shade of brown while the Orlon or dyne is a lighter shade of brown. Verer is an Eastman Kodak Chemical Products, Inc. trademark for a modified acrylic fiber. Velcr is soft, has good dyeability and is flame, heat and weather resistant. Orlon is an E. I. du Pont de Nemours & Co., Inc. trademark for an acrylic fiber.

The base or back of this pile fiber is then subjected to temperatures of about 280°F. to "set" the back and give it more rigidity and strength.

The face of the fabric is brushed or napped and then sheared. The face is then heat treated at about 270°F. to 280°F. During this heat treatment the Orlon or dyne fiber shrinks to form the short pile hairs while the Velcr fibers do not shrink thus forming the guard hairs. At this stage of the process, the fabric is known as a guard.
hair fabric or dual pile fabric. A section of the fabric at this stage is shown in FIG. 2.

The preceding steps in the process convert the guard hair fabric into a new and useful fabric heretofore unknown to the art.

The guard hair fabric is carried through a high-low unit (FIG. 1) on a tenter frame 2. Dry steam under about 100 p.s.i. escapes through steam holes 5 in the headers 6 and impinges on the face of the fabric. The steam is essentially dry, however some water condensation occurs on the fabric especially in the areas directly opposite the steam holes. This limited condensation along with the higher temperatures causes additional de-orientation and shrinkage of the fibers. The kinetic impingement of the steam causes a patterned deflection of the fibers.

The tenter frame then carries the fabric on into a drying chamber in tandem with steam-jet section of the high-low unit where the fibers are "set" and dried.

The pile fabric is then finished by polishing. This finished product has a remarkable fur-like appearance. When the Orlon or dyneel and the Verel of proper colors are used the fabric has the appearance of attached natural pelts of mink. The darker color of the “gruten” and the lighter color of the “bellies” or “sides” that is characteristic of a natural mink pelt are closely simulated. This fabric is particularly suited for use in making garments.

It is understood that other variations which would be obvious to one skilled in the pile fabric art, may be made in the described process without departing from the scope and spirit of my invention as defined by the following claim.

I claim:

A method of making a pile fabric simulating an arrangement of attached fur pelts having a predetermined pattern characterized by an arrangement of local areas of the pile face having particular fiber characteristics as to length, deflection, curl and color, which comprises heating a pile fabric having pile fibers of different length, denier, color and heat-shrinkable properties substantially uniformly dispersed throughout the pile face and oriented substantially normal to said face, to a temperature sufficiently high to bring about differential shrinkage of the fibers, directing against selected localized areas of said pile fabric at least one stream of hot fluid, the velocity of said hot fluid being sufficiently great to deflect a substantial portion of said pile fibers and the temperature of said hot fluid being sufficiently elevated to cause a substantial portion of the deflected pile fibers to retain the deflection for a substantial time, and thereafter heating the treated pile of the fabric to set and dry the pile.

References Cited in the file of this patent

UNITED STATES PATENTS


FOREIGN PATENTS

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