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PILE FABRIC

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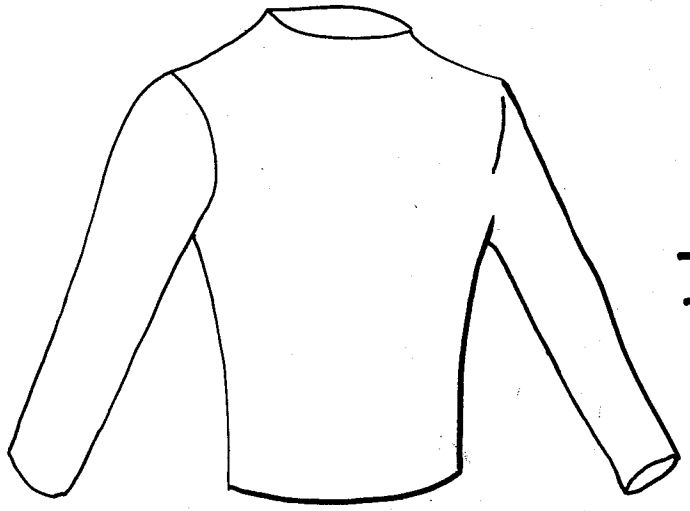


Fig. 1

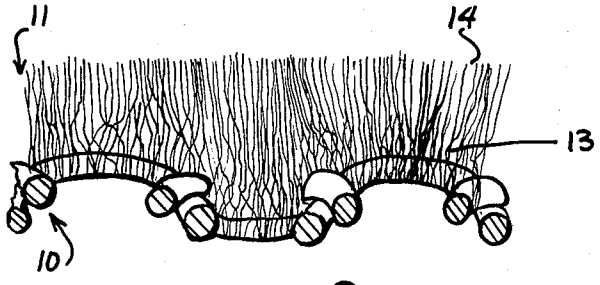


Fig. 2

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PILE FABRIC

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The present invention relates to a stretchable pile fabric and garments made of such fabric.

It is an object of the present invention to provide a novel fabric material and more particularly to a pile fabric having a high degree of stretchability and recovery.

A further object of the present invention is to provide a stretchable pile fabric in which the fabric is adapted to stretch at least 25% in any direction and in which the cover formed by the pile is not lost when the fabric is stretched to its maximum position.

A further object of the present invention is to provide a stretchable pile fabric adapted to be formed into garments wherein the pile cover has a substantial uniform appearance, even in stretched portions of the garment.

A still further object of the present invention is to provide a stretchable pile fabric for use in garments in which the fabric has a high degree of recovery.

In the present invention there is provided a stretchable pile fabric having a fabric backing formed of knit or woven elastomeric, stretch or spandex type yarns, thereby providing a backing having a high degree of elasticity.

The pile is preferably formed of staple fibers having low elongation with these fibers intertwined with the fabric backing. The staple fibers forming the pile are preferably intertwined or twisted in areas immediately above the yarns forming the fabric backing but are separated at their free ends.

These and other objects and advantages of the present invention will be more clearly understood when considered in conjunction with the accompanying drawings, in which:

FIG. 1 illustrates a garment in the form of a sweater made of stretchable material formed in accordance with the present invention, and,

FIG. 2 represents a greatly enlarged schematically cross section of stretchable pile fabric formed in accordance with the present invention.

The present invention comprises a fabric backing 10 and a pile 11 illustrated in a preferred form in FIG. 2. The fabric backing 10 is preferably formed as a knitted fabric but if desired may be formed as a woven fabric. The fabric is formed of any suitable yarn, elastomeric yarn or a spandex fiber, or other suitable and similar yarn or fibers. Stretch yarns which have been found satisfactory for the present invention are sold commercially as Helanca yarn of the Heberlein corporation, New York; Agilon of the Deering Miliken Research Corporation of Pendelton, South Carolina; Saaba Yarn of Leesona Corporation, Providence, Rhode Island; and Taslan of E. I. du Pont de Nemours & Co., Inc. of Wilmington, Delaware.

Spandex type yarns which are satisfactory are made under the trade name "Vyrene" by the United States Rubber Company, and "Lycra" of E. I. du Pont de Nemours & Co., Inc.

The yarn which is used should have a relatively high degree of recovery as well as high elongation. As used herein, yarns having a high elongation and recovery, are yarns of the type defined and illustrated above and in which yarn or fiber is capable of being repeatedly stretched to at least 1½ times its original length and upon release of the stress will return with force to approximately its original length. The yarn size should preferably be between 200 and 900 denier.

The pile material may be of any suitable type of staple fiber normally used for pile. The fiber forming the pile preferably should be relatively low in elongation as compared with the fiber forming the backing. Suitable pile material includes staple fibers of acrylic, modacrylic or wool preferably between 2 and 6 denier. It is particularly important that the pile form a good cover. It has been found that where the pile height is 0.3", the weight of the staple fibers forming the pile preferably should be betwen 7 and 18 ounces per square yard; where the pile height is 0.6" the weight of the staple fibers forming the pile preferably should be between 10 and 25 ounces per square yard; and where the pile height is 1.0" the weight of the staple fibers forming the pile preferably should be between 15 and 32 ounces per square yard.

The pile fibers should be formed as loops with the bights of said loops interlocked with said backing and with said fibers intertwined or matted at their base as illustrated at 13 and relatively unmatted or unentangled closer to their upper free ends, as illustrated at 14. This arrangement provides a uniform and unbroken cover even while the fabric is stretched, and in addition improves the recovery of the fabric. The pile should also be formed of fibers that are relatively tough; that is, the fibers should have a high degree of resistance to deformation.

The fabric may be formed by various suitable means. For example, a sliver of suitable pile fibers may be fed into a Wildman Sliver Knitting Machine in a conventional maner while the yarn of the type described is being knitted on the machine as a fabric backing. During the knitting process however, the yarn should be knit with a tension of substantially no more than three grams. Minimizing tension while the fabric backing is being formed and treated is important in order to maintain maxmum stretch and recovery of the fabric. However it is impossible to completely avoid stretch or tension during the knitting and subsequent processes in the formation of the fabric and therefore, it is necessary to relax the yarn in the fabric backing. This may be done in several ways. After the pile fabric is brushed, sheared and electrified in a conventional manner it may be tumbled in a tumble dryer, either dry or under the influence of heat or steam. Alternately moist heat may be applied to the fabric while the fabric is overfed on a tenter frame into a dryer. These steps relax the yarn of the fabric backing.

It has been found that the application of pile to a stretch fabric backing in the manner set forth above does not substantially impair the stretch or elongation of the fabric backing, but does in fact substantially increase its recovery. It is not altogether clear as to why this occurs. It may be due to the fact that the pile fibers have engaged and prestretched the yarn forming the fabric backing over limited areas so that with respect to the yarn forming the fabric backing, it is in a region of greater recoverability. That is, since the ratio of elongation to load is non-linear in elastic fabrics (with the rate of elongation decreasing with increased load), and since attachment of pile fibers to a fabric backing initially elongate portions of the yarn forming the fabric backing, the recoverability of the fabric backing is increased. This is obtained despite the fact that the yarn is knitted into the fabric backing under relaxed condition and with minimum tension.

It is also interesting to note that because of the bulk of the stretch yarn and the high coefficient of friction between the pile fibers and the stretch yarn, the pile fibers are gripped relatively tightly in the fabric back and there-

fore can be submitted to the usual finishing without loss of fibers, even though the fabric backing is susceptible to being stretched.

In FIG. 1 there is illustrated a sweater made with the material described. Since the pile imparts excellent cover even when the fabric is stretched and since the fabric may be stretched in local areas it is not necessary as illustrated to make garments full fashion, nor is it necessary to make garments to a particular numbered size.

What is claimed is:

1. A stretchable pile fabric comprising a fabric backing formed of yarn of between 200 and 900 denier and capable of being stretched to at least approximately one and one half times its original unstretched length having a high elongation and recovery said yarn being substantially relaxed when said fabric is in an unstretched condition and a pile formed on said backing of a multiplicity of uniformly distributed staple fibers formed as loops with the bights of said loops interlocked with said backing and the free ends of sad loops extending angularly from the plane of said backing.

2. A stretchable fabric comprising a fabric backing formed of an elastic filament yarn of between 200 and 900 denier and capable of being stretched to at least approximately one and one half times its original unstretched length having a high elongation and recovery said yarn being substantially relaxed when said fabric is in an unstretched condition and a pile formed on said backing of a multiplicity of uniformly distributed staple fibers of low elongation, formed as loops with the bights of said loops interlocked with said backing and the free ends of said loops extending angularly from the plane of said backing said pile having a height of between 0.3" and 1.0" and with the staple fibers forming said pile weighing between 7 and 32 ounces per square yard, whereby said pile forms a visually impervious cover when said backing is stretched and unstretched.

3. A stretchable pile fabric comprising a fabric backing formed of yarn of between 200 and 900 denier and capable of being stretched to at least approximately one and one half times its original unstretched length having high elongation and recovery and a pile formed on said backing of a multiplicity of staple fibers formed as loops with the bights of said loops interlocked with the stitches forming said fabric backing and with said pile fibers matted and twisted together in portions immediately above said fabric backing and relatively nonmatted at the free ends of said pile fibers at the surface of said pile.

4. A stretchable pile fabric comprising a knit fabric backing formed of a stretchable yarn having high elongation and recovery said yarn being substantially relaxed when said fabric is in an unstretched condition and a pile formed on said backing of a multiplicity of uniformly distributed staple fibers formed as loops with the bights of said loops interlocked with the stitches forming said fabric backing and with said pile fibers matted and twisted together in portions immediately above said fabric backing and relatively nonmatted at the free ends of said pile fibers thereby forming said pile as a cover visually impervious when said backing is stretched and unstretched.

5. A garment formed of material set forth in claim 4.

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