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PROCESS FOR PRODUCING A TEXTILE
FABRIC

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This invention relates to knitted fabrics and especially to knitted fabrics having a patterned appearance.

We have found that by knitting a fabric from both yarns of cellulose acetate filaments and yarns of artificial filaments of linear polymers which have been oriented as by cold drawing, fabrics can be obtained which undergo a change in appearance upon being subjected to a hot aqueous treatment and that valuable patterned fabrics can thus be obtained.

The present invention comprises a knitted fabric in which the yarns knitted together comprise alternate groups of yarns of cellulose acetate filaments and yarns of filaments of synthetic linear polymers which have been oriented as by cold drawing.

The commercial yarn of filaments of the nylon obtainable by condensing hexamethylenediamine with adipic acid (nylon 66) which yarns have undergone cold drawing, for example to the extent of several hundred percent of their length as spun, is an example of such a cold drawn product. The invention will be more particularly described with reference to the use of this type of oriented product.

Thus, a plain warp knitted fabric may be knitted up from alternate groups of cellulose acetate yarns and nylon 66 yarns, that is a two bar fabric of which the yarns of each bar consist of alternate groups of cellulose acetate yarns and nylon 66 yarns and the nylon yarns of the two bars are in corresponding positions in the fabric. These groups may consist alternately of say 9 threads of the nylon yarn (e. g. yarn of about 45 denier) and of 18 threads of cellulose acetate yarn (e. g. of about 55 denier). Again, the groups may consist alternately of a group of 18 threads of the nylon yarn and a group of 10 threads of the cellulose acetate yarn. Upon scouring the knitted fabric with or without dyeing, for example, at a temperature of 70–80° C. and thereafter finishing in the manner usual for cellulose acetate warp knitted fabrics, a product of marked ribbed character is obtained in spite of the fact that all the constituent yarns have been knitted into the fabric in the same manner. The nylon 66 portions of the fabric form ribs which stand up on the face of the fabric in the direction of the length of the fabric, that is, at right angles to the knitting

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courses. The effect appears to be due, in part at least, to the nylon yarn undergoing more shrinkage during the hot aqueous treatment than the cellulose acetate yarn. The effect thus obtained is remarkably permanent, resisting for example many launderings without substantial change in appearance.

The fabric may be a lock-knit fabric, i. e. a two bar warp-knit fabric in which each yarn of the back bar moves from wale to wale between successive courses while each yarn of the front bar moves from one wale to the next wale but one. Alternatively, the yarns of one or both bars may move between courses over a greater distance than in the case of a lock-knit fabric. Again the fabric may be a three bar or more complex warp knit fabric.

Further, the cellulose acetate yarns and the nylon yarns may be in smaller groups than those indicated above. For example groups of 2 to 4 yarns may alternate (on each bar). In general the most attractive effects are obtained in the case of a two bar fabric when the groups of one kind of yarn on each bar contain not more than 30 yarns, for instance not more than 20 yarns.

The fabrics of the invention may be of types of knit other than warp knit. For example they may be circular knit fabrics or flat knit (i. e. weft knit fabrics). In the case of plain circular knit fabrics the effect of the alternating groups of yarns is to give a rib in the direction of the yarns in the fabric, i. e. parallel with the knitting courses. Such fabrics may be produced on circular knitting machines provided with yarn changing mechanism to permit of knitting the desired number of courses of one kind of yarn in alternation with the desired number of courses of the other kind of yarn.

Particularly attractive fabrics are those of warp, circular or flat knit in which the bands of fabric derived from one of the kinds of yarn each contain not more than 60 yarns, for example not more than 40 yarns. As already indicated such fabrics are obtained in the case of two bar warp knitting by having groups of half the number of yarns on each bar.

If desired the knit, whether a warp or other knit, may be such as would give a striped or other patterned effect, even if the fabric were constructed wholly of yarns of a single kind. In such a case the presence of the nylon yarns in

the knitted fabric can be used to modify profoundly the character of the fabric, especially when scoured and finished.

The effects produced by the simultaneous employment of the cellulose acetate yarns and the nylon yarns may be still further accentuated or modified if the nylon yarns are under higher tension during knitting than the cellulose acetate yarns. This can be effected in the case of a warp knit fabric for example, by feeding the cellulose acetate yarns of each bar from one beam and the nylon to the same bar from a second beam arranged to deliver its yarn at a higher tension than the beam of cellulose acetate yarns. Immediately after knitting the nylon yarns retract still more relative to the cellulose acetate yarns than is the case when the two kinds of yarn are knitted under equal tension and a patterned effect is obtained which can be substantially accentuated by subjecting the knitted fabric to a hot aqueous treatment.

The hot aqueous treatment applied to the knitted fabrics in accordance with the invention may be such as would normally be used in the scouring and dyeing of a cellulose acetate knitted fabric. Scouring and dyeing may, for example, be effected at a temperature of 60–85° C. and particularly at a temperature of 75–80° C. Soap or other detergents or wetting agents may be employed in the scouring or dyeing baths. The duration of the treatment may be conveniently of the order of an hour or somewhat more. A shorter period is frequently sufficient to yield the desired modification of the knitted material. Higher treatment temperatures can, however, be employed, for example, temperatures up to 100° C., particularly where delustring of the cellulose acetate is not objectionable. Instead of using water in liquid form steam may be employed whether at atmospheric pressure or at lower or higher pressures, for example, saturated steam at pressures of 10–30 lb. per sq. in. above atmospheric. It is desirable that the material should have considerable freedom to shrink, at least in one direction, during the hot aqueous treatment.

The invention is further illustrated by the following example:

Example

A plain lock-knit fabric is knitted up using for each of the two bars alternate groups of 9 nylon yarns of 45 denier and 18 cellulose acetate yarns of 55 denier. A second fabric is similarly prepared using for each bar alternate groups of 18 of the nylon yarns and 10 of the cellulose acetate yarns. The fabrics are sewn up into tubular form and loaded into a dye winch charged with cool water containing 2 grams per litre of textile soap and 1 cc. per litre of Turkey red oil. The ratio of liquor to goods is about 20:1 by weight. The temperature of the bath is raised to 75° to 80° C. during half an hour and the fabrics processed at this temperature for 3½ hours. The temperature of the bath is then lowered to below 40° C. by displacing part of the hot liquor with cold water and the fabric unloaded, hydroextracted and finished in the manner usual for lock-knit fabrics.

Both fabrics exhibit a marked striped effect due to the nylon portions standing out from the face of the fabric.

If coloured fabrics are required suitable dispersed acetate rayon dyes may be introduced into the processing liquor after half an hour at 75° to 80° C.

The invention has been described more particularly with reference to the use of cold drawn filaments of nylon 66 as the yarn to be knitted in with the cellulose acetate yarn. In place of this yarn, yarn of oriented filaments of other synthetic linear polymers (whether condensation polymers or addition polymers) may be employed. For example yarn of filaments, oriented by drawing, of linear polymers of the following kinds.

Polyamides other than nylon 66, particularly those from polymethylene diamines and polymethylene dicarboxylic acids.

Polyurethanes, e. g. those obtainable from polyalkylene glycols and polyalkylene diisocyanates or from polyalkylene diamines and chloroformic esters of polyalkylene glycols.

Polyaminotriazoles described in U. S. Patents Nos. 2,512,667, 2,512,600, 2,512,601, 2,512,628 and 2,512,629.

Polyesters, e. g. those obtainable from terephthalic acid and a polyalkylene glycol.

Copolymers of vinyl chloride with a minor proportion of vinyl acetate.

Acrylonitrile polymers (including co-polymers such as those with vinyl chloride or methacrylonitrile).

Again, the cellulose acetate yarn may be replaced by yarn of filaments of another cellulose ester of carboxylic acid e. g. cellulose propionate, cellulose acetate-propionate or cellulose acetate-butyrate, or of a cellulose ether, e. g. ethyl cellulose.

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

1. A process for producing an ornamental knit fabric, which comprises subjecting to a hot aqueous treatment of warp knitted fabric of which the yarns knitted together comprise alternate groups of yarns of filaments having a basis of a material selected from the group consisting of a cellulose ester of a carboxylic acid and a cellulose ether, and yarns of filaments of oriented synthetic linear polymer.

2. A process for producing an ornamental knit fabric, which comprises subjecting to a hot aqueous treatment a warp knitted fabric of which the yarns knitted together comprise alternate groups of yarns of cellulose acetate filaments and yarns of filaments of oriented synthetic linear polymer.

3. A process for producing an ornamental knit fabric, which comprises subjecting to a hot aqueous treatment a warp knitted fabric of which the yarns knitted together comprise alternate groups of yarns of cellulose acetate filaments and yarns of filaments of oriented nylon 66.

4. A process for producing an ornamental knit fabric, which comprises subjecting to a hot aqueous treatment at a temperature of above 75° C. a warp knitted fabric of which the yarns knitted together comprise alternate groups of yarns of cellulose acetate filaments and yarns of filaments of oriented nylon 66.

5. A process according to claim 4, wherein the fabric is such that the bands of fabric derived from one of the kinds of yarn each contain at the most 60 yarns.

6. A process according to claim 4, wherein the fabric is a plain 2 bar warp knit fabric.

7. A process for producing an ornamental knit fabric, which comprises subjecting to a hot aqueous treatment at a temperature of above 75° C. a lock-knit fabric in which the yarns of each bar consist of alternate groups of yarns of cel-

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lulose acetate filaments and yarns of oriented nylon filaments, the nylon yarns of the one bar corresponding in position with the nylon yarns of the other bar, and the groups of yarns of one kind of each bar each contain from 4 to 18 yarns.

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