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WOVEN STRETCH FABRICS

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ABSTRACT OF THE DISCLOSURE

A woven stretch fabric is made in the stretch direction with 20–50% core spun yarns distributed evenly with non-elastic yarns which can be set into a given configuration. The fabric is made by weaving the fabric while the core spun yarns are in a stretched condition, allowing the fabric to retract in the direction of the core yarns and heating the fabric in a relaxed condition to set the non-elastic yarn component.

This invention relates to woven stretch fabrics.

In the specification of United States Patent No. 3,316,-610 a process is described for making stretch fabrics from synthetic fibres having a glass rubber transition temperature above 80° C. in which the woven fabric is stretched in one direction and allowed to relax in the other direction to cause crimp interchange followed by heat setting and then cooling the fabric in that condition. By this method using "Terylene" polyester fibre yarns, a one-way stretch of about 15% can be obtained in a worsted type fabric using a plain weave construction. ("Terylene" is a registered trademark.)

The production of stretch fabrics using elastomeric filament yarns is also known. Such fabrics are expensive and they have an unusual handle which detracts from their use for certain applications.

We now provide a woven stretch fabric made up of 20–50% of core spun yarns, in which the core is an elastomeric filament yarn, said core spun yarns being evenly distributed among other yarns made of non-elastomeric filaments or staple fibres which can be set in to given configuration by heat, chemical treatment or other means, so that 1–4 of the other yarns are positioned on either side of each core spun yarn.

The core spun yarns comprise 3–10% of an elastomeric filament yarn core and a sheath of 97–90% of non-elastomeric fibres or yarns, which may be spun onto the core.

The remaining or "other" yarns which are made without an elastomeric core, are positioned in the fabric on either side of the core spun yarns to give a symmetrical pattern of one core spun yarn with up to 4 of the other yarns on either side of each core spun yarn. The other yarns are preferably spun yarns made from synthetic fibres particularly polyethylene terephthalate fibre, which is commercially available under the trademark "Terylene" polyester fibre but may consist of any fibre which can be set e.g. to a given configuration by heat or by a chemical treatment.

The fabric is woven with the core spun component under tension so that during fabric finishing prior to heat or chemical setting there is a 20 to 50% contraction. This setting then fixes the fabric in the contracted configuration thus imparting stretch characteristics to the fabric which depend partly on the properties of the elastomeric core component present, and partly on the contracted, set fibres in the sheath of the core yarn as well as the other yarn in the cloth. The sheath and the other yarns are preferably made from thermoplastic fibres. The

stretch properties can be in warp, weft or in both directions of the cloth.

The elastomeric filament yarns which are made from synthetic elastomers such as segmented polyurethane, may be extended elastically at least 100 and up to 800% at room temperature. Such elastomeric yarns are commercially available and sold, for example, under the registered trademark: "Lycra," "Vyrene," "Spanzelle."

The principle described can be used with any elastomeric yarn such as "Lycra," "Vyrene" or "Spanzelle," or with rubber filament yarn as the core component of the core spun yarn, and indeed, the effect is similar to one which could be obtained in the absence of an elastomeric yarn, by using any high shrinkage fine denier filament yarn as core, providing that the amount and type of this yarn did not unacceptably increase the forces required to extend the fabric in wear. Thus, once having shrunk the fabric by the mechanism described the permanent stretch properties are obtained essentially, by heat setting in the case of the thermoplastic e.g. polyester fibre components.

The following examples in which all parts and percentages are by weight illustrate but do not limit our invention.

Example 1

A stretch core spun yarn is made, in which the core consists of a 70 denier multifilament segmented polyurethane filament yarn ("Spanzelle" registered trademark). This core is stretched 350% on a spinning frame between the creel for the elastomeric yarn and the front rolls of the spinnnig frame. As the elastomeric filament yarn emerges from the front roll a sheath of 55/45% polyethylene terephthalate/wool fibre yarn (the polyethylene terephthalate fibres used in the sheath are "Terylene" polyestre fibres; "Terylene" is a registered trademark) is wrapped round the stretched elastomeric filament yarn so that the core yarn is covered with the spun staple fibre sheath and the so formed core yarn is wound up still under substantially the same extension. The composition of the yarn at this stage is approximately 5% core and 95% sheath.

A 2/2 twill fabric is then woven using a 55/45% polyethylene terephthalate/wool worsted yarn (the polyethylene terephthalate fibre component used is "Terylene," registered trademark) in the warp and a weft consisting of two picks of a normal non-stretch yarn as used in the warp with two picks of a stretch elastomeric core yarn as described above, whilst maintaining tension in the core spun yarn to preserve its extension of about 350%. As the fabric comes off the loom it contracts only very little in the weft and warp. The woven fabric contains 25%, by number; of core spun yarns which are positioned so that the two core yarns are adjacent to two non-elastomeric yarns in the weft direction, there being no elastomeric yarns in the warp.

The woven fabric is scoured with 3% soap and 3% aqueous soda liquor, dried, relaxed on a winch in water at 80° C., dried and heat set at 180° C. for 1 minute, cropped and steam relaxed again, decatised and pressed, so that the overall relaxation from the loom width to the finished state is 30%.

The finished fabric has about 30% stretch in the weft as measured on a 2 inch width of fabric under a load of 2 kgs.

Example 2

Another fabric is woven and finished as in Example 1, except that the weft is arranged to contain four picks of non-elastomeric and two picks of elastomeric core spun yarn. The contraction during finishing in this case is about 20% and the finished fabric has a stretch of about 20% on a two inch width of fabric under a load of 2 kgs.

The fabrics produced according to Examples 1 and 2 have a pleasant soft handle compared with a fabric in which the weft consists of 100% uncovered elastomeric yarn. In this latter type of fabric there is little resistance to distortion and the durability when tested and in wear is less than that of the fabrics described in these examples. Furthermore, as well as economising in the use of the expensive elastomeric yarn, the presence of non-stretch yarns prevents the fabric being distorted as much as can occur with 100% core spun stretch yarns in the weft or warp and so gives better shape retention in wear using the specified proportions claimed.

What is claimed is:

1. A process for making a woven stretch fabric comprising: making a core spun yarn of 3–10% core and 97–90% sheath by spinning non-elastomeric fibres as a sheath around an elastomeric filament core which is under sufficient tension to stretch it at least 100%, winding up the resulting core spun yarn under tension in the stretched condition; making a stretch fabric made up of 20–50% of said core spun yarns by evenly distributing said core spun yarns in parallel relationship with other yarns made of non-elastomeric staple fibres capable of being set into a given configuration, the distribution effecting 1 to 4 of said other yarns on at least one side of each core spun yarn, and weaving another set of parallel yarns with said distributed yarns while maintaining said core spun yarns in the stretched condition without setting thereof; releasing the tension on the resulting fabric and relaxing to effect retraction of the fabric in the direction of said core spun yarns due to contraction of said elastomeric cores and due to contraction of said fibres in said sheath and

contraction of said other yarns; and fixing the fabric in the retracted configuration by setting said other yarns in their contracted configuration.

2. A process as in claim **1** wherein the fabric is relaxed to the extent that there is a 20 to 50% retraction.

3. A process as in claim **1** wherein said setting operation is a heat setting operation.

4. A process as in claim **1** wherein four of said other yarns are positioned on at least one side of each core spun yarn.

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