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FABRIC AND METHOD OF MAKING SAME

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The present invention relates to yarns and fabrics, and methods of producing the same.

More particularly, the present invention pertains to a new and improved fabric and/or yarn in which notwithstanding use of fibres of synthetic materials throughout, the fabric has many of the apparent characteristics of wool, such as "feel," resilience, bulk, warmth.

Among the objects of this invention are to produce a yarn and a fabric in which synthetic materials are used throughout yet having the apparent characteristics of wool yarn or fabrics, and to accomplish this end without any extra or special treatment of the yarn or the fabric.

It is another object of this invention to provide alternate arrangements by which yarns of synthetic materials, and fabrics made therefrom, may have the apparent characteristics of wool imparted thereto, as may suit individual conditions.

It is another object of this invention to so combine fibres of synthetic materials in yarns made therefrom as to increase the bulk, resilience and warmth factors thereof in the course of normal scouring, de-sizing and/or dyeing operations, and to some degree regulate the extent thereof.

It is a further object of this invention to provide a method of producing a fabric which is woven or knit from yarns made substantially entirely of synthetic fibres in which the fabric may be treated to impart thereto the apparent characteristics of wool, and further to thereafter preserve those characteristics in the fabric without harming its utility.

It has heretofore been proposed to produce simulated wool yarn and fabric when composed in part of synthetic materials, by shrinking one fibre more than another to produce bulking, with concommitant air content and "wooliness," but in such cases, the shrinking has been accomplished by heat or by special treatment, with chemicals, of the fibre content being shrunk. See, for example, the patent to Harris et al., No. 2,504,523, issued April 18, 1950, in which one of the fibres is protein or regenerated protein. I have discovered that the apparent characteristics of wool or wool composition fabrics can be imparted to yarns and to fabrics without the use of such chemical or heat treatments to cause the shrinking of shrinkable fibres. Moreover, my discovery is applicable to yarns and to fabrics composed entirely of synthetic materials, such as viscose, rayon, and similar products, and also with fibres which normally are considered non-shrinking.

The present invention is characterized by the fact that the shrinking fibre contracts upon ordinary scouring, or de-sizing, or dyeing operations, to which yarns and fabrics are normally subjected; and the force of contraction is sufficient to accomplish good bulking with what are normally regarded as non-shrinking fibres and other than those of the softness and costliness of the protein fibres.

The desirable results of this invention can be had by using a mixture of shrinkable and non-shrinkable fibres, or by using a mixture of two different fibres respectively having different shrinkage characteristics. Further according to this invention, contraction or differential contraction is accomplished only by selection of the shrinking fibre and without the addition of extra hard or unbalanced twist, although the use thereof is not precluded.

In the broad sense, the objectives of the invention are accomplished by blending, as by spinning, a non-shrinkable fibre with one which shrinks on wetting, and thereafter wetting the shrinkable fibre so that it shrinks and

thereby bulks the non-shrinkable fibre. The result is a fluffy fibrous network caused by arch-like loops in the non-shrinkable fibres as they are put under tension by the shrinking of the shrinkable fibres. The air pockets thus formed give the desired warmth characteristics simulating wool. This broad idea may be implemented by the following inventive thoughts: First, in order to insure that the non-shrinking fibres will actually bulk and form arches as described (some available fibres are too stiff to bulk), fibres of ¾ denier or less are used so that they will have insufficient stiffness to prevent bulking. Secondly, the shrinking fibres are highly pre-stretched to give them the property of shrinking upon wetting. It is common practice in the production of some synthetic fibers to shrink them to a relatively more stable condition after the "stretch spinning." The omission of such shrinking is to be regarded as an equivalent of restretching for purposes of this patent. Thirdly, the fibres, after shrinking, are locked in position permanently by suitable means in order to prevent subsequent shifting which would cause matting.

In one embodiment, presently preferred, viscose rayon staple made from highly stretched filaments is blended or commingled in spinning with a different fibre having markedly less contraction characteristic, for example, viscose process staple not especially stretched out, but preferably of the fine denier referred to above.

For a more specific example: a 40/2 ply cotton count yarn may be spun from fifty per cent highly stretched rayon staple and fifty per cent ordinary process viscose staple, the latter preferably ¾ denier or less. Such yarn may be knitted as wool jersey, and this fabric then immersed in a dye bath while maintaining the piece as free from tension as possible. The yarn thus attains an unhindered contraction of about ten to twenty-five per cent. The action in the dye bath is that the fibres of the highly stretched filament shrink or contract to a much greater degree than those of the ordinary process staple. Good bulking of the yarn results, increasing the air pockets throughout, and increasing the resilience of the yarn.

The jersey fabric thus produced then may be resin treated in any suitable manner for a generally stabilizing effect and to maintain the fibres in the shapes, positions and condition resulting from the bulking treatment. As will be understood, such resin treatment will maintain the status of the fibres and consequently the air spaces in the yarn after the fabric is in use, without unduly stiffening the fabric and to substantially eliminate felting.

The proportions of the highly shrinkable and the less shrinkable or the non-shrinkable fibres need not be in equal amounts, the choice of proportions depending upon the effects desired in the finished fabric. Likewise, the choice of fibres to be combined in the yarn may be varied as dictated by the desired characteristics in the finished fabric. Fibres of nylon filaments, or of Orlon are examples of other non-shrinking fibres, and cellulose acetate fibres may be used since they are not normally affected by ordinary wetting.

It also is obvious that similar results will be obtained by dyeing the yarn in the skein and prior to the weaving or knitting of the fabric; and the shrinking to produce the desired bulking may be accomplished incident to the scouring or de-sizing operations.

In another application, I have discovered that hard twisting yarns having the mixture of fibres described, contrary to what might be expected, further increases the bulking of the yarns under the wetting in the normal operation incident to the producing of the fabric.

The principles of my invention may be applied to yarns or fabrics composed of fibres of the same material. As an example of this, a mixture of pre-stretched and unstretched fibres of a Dynel (understood to be polyacrylonitrile-polyvinyl chloride) 24/2 ply cotton count may be woven into a plain weave 56 x 52 threads per inch, the yarn being plied in a hard twist of the order of that of a tropical worsted twist, or a yarn of highly stretched Dynel fibres, with or without the hard twist, may be used. This fabric may likewise be dyed while maintained as nearly free of tension as possible, with a resultant shrinkage which will cause the individual yarns to bulk up about forty-five per cent over their original size. This fabric

also may be resin treated to fix sufficient of the fibres in position to maintain the air spaces in the yarn. It will be understood that when I use the terms "shrinkage" and "non-shrinking" or their equivalents, I use the terms not in an absolute sense but intend to refer rather to a relative shrinking or non-shrinking of the fibres with respect to each other since all fibres shrink to greater or lesser extent.

In the specification, I have explained the principles of my invention and the best mode in which I have contemplated applying those principles, so as to distinguish my invention from other inventions; and I have particularly pointed out and distinctly claimed the part, improvement or combination which I claim as my invention or discovery.

While I have shown and described certain preferred embodiments of my invention, it will be understood that modifications and changes may be made without departing from the spirit and scope thereof, as will be clear to those skilled in the art.

This application is a continuation-in-part of my application Serial No. 171,249, filed June 29, 1950, now abandoned.

I claim:

1. The process of producing a substitute for wool which comprises blending a first fibre which shrinks on wetting with water with a second fibre having a natural stiffness exceeding that of protein fibre and of not greater than ¾ denier which is normally unaffected on wetting with water, spinning the blend into a yarn and subsequently wetting the yarn to shrink the shrinkable fibre and thereby cause the other fibre to bulk.

2. The process of producing a substitute for wool which comprises blending a prestretched fibre which shrinks on wetting with water with one having a natural stiffness exceeding that of protein fibre and of not greater than ¾ denier which is normally unaffected thereby, spinning the blend into a yarn and subsequently wetting the yarn to shrink the shrinkable fibre and thereby cause the other fibre to bulk.

3. The process as in claim 2 in which the prestretched filaments are polyacrylonitrile-polyvinyl chloride.

4. A substitute for wool comprising a yarn formed of highly stretched water-shrinkable synthetic fibres blended with bulkable relatively unshrinkable fibres having a natural stiffness exceeding that of protein fibre and not greater than ¾ denier not so stretched.

5. The process of producing a wool substitute which comprises blending fibres produced from highly-stretched viscose shrinkable in water and unstretched regular rayon staple non-shrinkable in water, said regular rayon staple having not greater than ¾ denier, spinning the blend into a yarn, and wetting the yarn to shrink the stretched fibres thereby to cause the other fibres to bulk.

6. The process of producing a wool substitute comprising blending 50 per cent of fibres of highly-stretched rayon staple shrinkable in water and 50 per cent of fibres of ordinary process viscose staple non-shrinkable in water, said non-shrinkable fibres having not greater than ¾ denier, immersing the blended yarn in a water bath while maintaining the yarn under minimum tension to effect contraction of the highly-stretched fibres, thereby causing the other fibres to bulk, and thereafter resin-treating the blended yarn to stabilize same.

7. A substitute for wool comprising a yarn formed of one set of contracted fibres blended with a second set of fibres which are bulked and which have a natural stiffness exceeding that of protein fibre, said second set of fibre having a size not greater than ¾ denier.

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