

UNITED STATES PATENT OFFICE

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PRODUCTION OF CLOSE WOVEN CELLULOSE
FABRICS BY DISSOLVING TERYLENE SUP-
PORT YARNBertram Pusey Ridge, Potters Bar, England, as-
signor to Imperial Chemical Industries Lim-
ited, a corporation of Great BritainNo Drawing. Application March 8, 1949, Serial
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2 Claims. (Cl. 8-114.6)

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This case relates to the production of improved fabrics from cotton, regenerated cellulose or other alkali resistant yarn, as hereinafter defined, and particularly to the production of fabrics from twistless alkali resistant yarn.

British specification 550,525 relates to a process for the production of fabric from yarn consisting wholly or partly of soluble alginic fibres and thereafter modifying the fabrics by dissolving or gelatinising some or all of the alginic fibres. The process described suffers from the disadvantage that alginic yarns possess only low tenacity. When this process is applied to the production of fabrics from twistless yarns e. g. cotton yarns, this disadvantage is particularly marked. Yarns for use in the making up of such fabrics are composite yarns wherein the twistless cotton yarn is strengthened by the alginic yarn being twisted round the twistless yarn and acting as a supporting thread. Because of the low tenacity of the alginic yarn, the spinning operation whereby the twistless yarn and the alginic supporting thread are brought together, must be conducted at a relatively slow speed otherwise breakages occur. Furthermore to obtain a composite yarn strong enough to withstand the tensions used in normal weaving operations it is necessary to use an alginic yarn or filament of relatively heavy denier, e. g. 100. The removal of such a yarn or filament from the composite fabric leaves a loosely packed fabric. A further disadvantage is the large quantity of alginic yarn or filament which is dissolved away and the resultant high cost of such a process.

Fabrics produced from twistless yarn have many excellent characteristics. For example, they have a soft hand, warmth without bulkiness, a silky appearance and lustre and high strength. Difficulty is however experienced in producing close packed fabrics from these yarns by the methods of the prior art.

The use of an easily removable yarn in the production of fabric also makes possible the production of decorative effects in the fabric. The removable yarn may, for example, be introduced in the form of a pattern and partially or wholly dissolved away as desired. It will be appreciated that there are many possible variations in the manner in which the fabrics, or the yarns used in the fabrics, may be made up to provide a great variety of original decorative fabrics.

An object of the present invention is the production of new and improved fabrics from alkali-resistant yarns. A further object is the production of an improved fabric from twistless alkali

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resistant yarn. A further object is the production of a close packed fabric from twistless alkali resistant yarns. A still further object is the provision of a process whereby fabric composed of twistless alkali resistant yarn may be produced more easily and more cheaply than by the methods of the prior art. Yet a further object is the production of decorative effects in fabrics comprising alkali resistant yarns.

According to the present invention these objects are accomplished by a process wherein fabrics comprising alkali resistant yarn and yarn composed of a highly polymerised polymethylene terephthalate, wherein the polymethylene group contains from 2 to 10 carbon atoms inclusive, are treated with caustic soda solution to remove at least some of the highly polymerised polymethylene terephthalate yarn.

In a preferred form of the invention the alkali resistant yarn is a twistless yarn and is supported by the highly polymerised polymethylene terephthalate yarn during the manufacture of the fabric. The twistless yarn may be supported by twisting the highly polymeric linear ester yarn or filament round the twistless yarn or by any other means known in the art.

Alkali resistant yarns include cotton and regenerated cellulose.

The production of the highly polymerised polymethylene terephthalates is described and claimed in British specifications 578,079 and 590,451. These highly polymeric linear esters may be melt spun into filaments having tenacities of the order of 5 to 8.5 gms. per denier. Thus it is possible to obtain a filament or yarn of the specified polyester which is very fine e. g. 10-15 denier and yet has sufficient strength to support the twistless yarn during the spinning of the composite yarn and also to support the yarn during the production of fabrics from these composite yarns. The polymeric esters from which the supporting threads are made give threads of high tenacity which are much stronger than the alginic yarns previously used. In the production of composite yarns for use in the production of fabrics from twistless yarn this high tenacity enables the spinning of the composite yarns to be carried out at speeds considerably higher than those previously used without undue breakage. This increase in the production rate enables the yarns and thus the fabrics made therefrom to be produced more cheaply than was formerly possible.

The process of the present invention is applicable to fabrics made up of any alkali resistant

yarn but it is particularly suitable for application to cotton fabrics. Cotton fabrics of all types are usually subjected to a treatment in caustic soda, i. e. a Kier Boil treatment, as a step in the scouring of the fabric. This treatment commonly involves treating the fabric in a 0.8%-2% caustic soda solution under a pressure of from 5 to 60 lbs. per sq. in. gauge, for times up to 8 hours. We have found that such a treatment is sufficient to remove all the threads of the highly polymeric polymethylene terephthalate if desired. As an alternative to pressure boiling the terephthalate yarn present in the fabric may be "skinned down" to any desirable extent, or if necessary removed completely by treating the composite fabric at atmospheric pressure on a jigger or winch machine, or even by steeping in a vat, with a 4% solution of caustic soda at a temperature near to the boil. Treatments of this sort are again common practice with cotton goods. By the use of the process of this invention, therefore, cotton fabrics composed of twistless yarn or with decorative effects may be produced without subjecting the woven, knitted or braided fabric to any process other than those normally used in the treatment of cotton fabric.

In the production of fabric from twistless yarn it is desirable to remove all the supporting threads. The twistless yarn with its attendant supporting threads may be used in the warp or weft but to obtain a fabric having all the advantages of a twistless yarn fabric the twistless yarn and supporting thread must be used in both warp and weft. The supporting threads may be so fine because of their high strength that it is possible to obtain a fabric which after the removal of supporting threads is close packed and has all the other desired properties of a twistless yarn fabric. The fact that such fine supporting thread can be used also reduces the cost of the fabrics considerably as the amount of material dissolved out and discarded is not so great as the amount lost using the methods of the prior art.

While the process has been described particularly with reference to the production of fabric from twistless yarn it will be appreciated how easily the process may be applied to the production of decorative fabrics. The caustic soda treatment can remove some or all of the highly polymeric polymethylene terephthalate yarns according to the severity of the treatment.

The following examples illustrate but do not limit the scope of our invention.

Example 1

A 10 denier yarn of polyethylene terephthalate was twisted round a 1/30 cotton thread (equivalent in dimensions to 170 denier thread) so that the thread remained twistless. This composite yarn was then woven into a plain fabric. The resulting tightly woven fabric was treated in a 2% solution of caustic soda at the boil at 40 lbs. pressure in an autoclave for one hour, then washed with water. All the polyethylene terephthalate yarn was dissolved and a fine, soft, warm fabric of high strength and silky appearance was obtained.

Example 2

A portion of the original fabric of Example 1 was treated in an open vessel containing a 4% solution of caustic soda at the boil. The yarns of polyethylene terephthalate were removed after 7 hours treatment.

Example 3

In the weaving of a cotton fabric from 1/30 cotton thread (equivalent in dimensions to 170 denier thread) polyethylene terephthalate (20 denier) was introduced as alternate weft threads over a portion of the fabric. On treating the fabric as in Example 2 the polyethylene terephthalate yarns were dissolved and a fabric with a stripe of more loosely woven material resulted.

Example 4

The original fabric of Example 3 was treated in an open bath of 4% caustic soda solution for 4 hours only, at the boil. The resultant fabric had a stripe of material where some of the weft yarns were finer than others, i. e. where the polyethylene terephthalate yarns had been partially dissolved.

It will be appreciated that the expression "alkali-resistant yarns," as used in the foregoing description, does not necessarily mean yarns which are totally insoluble in caustic soda solutions of all concentrations. The meaning which this terminology is intended to convey, as those skilled in the art will appreciate, is that the yarns from which the fabrics are to be made and which are themselves too weak to be woven alone, are resistant, i. e., substantially unaffected or substantially insoluble to the caustic soda solutions utilized to dissolve out the alkali-soluble, highly polymerized polymethylene terephthalate yarn.

I claim:

1. A process for the production of improved fabric from a twistless yarn selected from the group consisting of cotton and regenerated cellulose yarns which comprises forming a composite yarn from said twistless yarn and a yarn of a highly polymerized polymethylene terephthalate having from 2 to 10, inclusive, carbon atoms in the methylene group, producing a fabric from said composite yarn and thereafter dissolving out said polymethylene terephthalate yarn from said fabric by immersing said fabric in an .8 to 4% solution of caustic soda under a pressure of from 0 to 60 lbs. per square inch gauge for a time sufficient to dissolve said terephthalate yarn up to eight hours, the conditions utilized in the dissolution of said terephthalate yarn being such as to leave said twistless yarn substantially unaffected.

2. The process of claim 1, wherein the polymethylene terephthalate yarn is a polyethylene terephthalate yarn of 10 to 20 denier.

BERTRAM PUSEY RIDGE.

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