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(54) **Method to produce textile threads and textile threads for anti-stress products made with such threads.**

(57) Method to produce textile threads which is employed to obtain anti-stress fabrics used advantageously, but not only, to make anti-stress articles of clothing, whether underwear and/or outer garments, clothing for medical use, household linen, blankets, hats, gloves, etc., such threads having as their base natural or synthetic fibres, the method arranging that the natural and/or synthetic fibres are combined with conductive fibres during a step of intimate mixture.

Textile thread for anti-stress fabrics which is produced according to the above method.

Anti-stress fabric to make articles of clothing, whether underwear and/or outer garments, clothing for medical use, household linen, blankets, hats, gloves, etc., the fabric being obtained by using the above method.

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This invention concerns a method to produce textile threads and also the textile threads thus produced and suitable to make anti-stress textile products, as set forth in the respective main claims.

The invention concerns in particular a method to produce textile threads suitable to possess a required conductivity.

The invention concerns also the production of textile threads suitable to make fabrics able to lessen the effect of electromagnetic waves coming from outside onto the human body and to eliminate zones of build-up of static electricity on the surface of the human body by creating a re-distribution of the static electricity and eliminating the same.

The anti-stress fabric according to the invention has the purpose of providing beneficial effects of relaxation and reduction of nervous tension and stress for its users together with an overall improvement of physical comfort.

The anti-stress fabric according to the invention is employed advantageously, but not only, to make articles of clothing, whether underwear or outer garments, clothing for medical use, household linen, blankets, hats, gloves, etc.

One of the known properties of textile fibres consists of their high resistivity, typically about values of 10^{13} W cm^{-1}, this being an index of a low screening and conductive power as against electromagnetic waves and/or electrostatic charges.

Conductive materials such as metals, for instance, have much lower values of resistivity and therefore a better capability to act as a screen against electromagnetic waves or as a means to concentrate and eliminate electrostatic charges.

The metal most widely employed in the field of conveying an electric current by a cable is copper, which has a resistivity of 10^{-6} W cm^{-1}.

With regard to research on the damaging effects of electromagnetic waves and electrostatic charges built up within the human organism the problem, in the textile field, of making products, such as yarns, fabrics or garments, which are characterised by good conductivity and good screening has been tackled.

The word "fabric" in this invention is to be understood as meaning a fabric made with warp and weft, or a non-woven fabric, or a knitted fabric.

The methods employed in this field so far have been substantially as follows.

The first method provides for direct impregnation of the fabric with antistatic chemical additives.

The second method consists in the direct application of a thin film of metallic material to the fabric.

The third method consists of the combination of a metallic or metallised thread with a basic yarn structure of traditional fibres.

The first two methods entail considerable shortcomings. The antistatic chemical additives, even though they are characterised by simplicity of application and a modest cost, require, if they are to ensure good results, at least a relative humidity between 20% and 40% in the environment, and in any event their effect is neither permanent nor constant in the long term.

The direct application of a film provides advantages because the treatment is applied at the end of the traditional processes and enables the effect of the finished product when touched to be limited. The shortcoming is due to the fact that it is impossible to impart a homogeneous degree of conductivity to the interior of the fabric too.

Moreover, this method of direct application is difficult to carry out on textile structures characterised by a given resilience or ability to be deformed during use, such as knitted fabrics for instance. This is so inasmuch as gaps become opened in the continuity of the protection applied, with a resulting reduction of the electrical properties of the product.

In the employment of the third method the so-called technical fabrics or fabrics for specific uses have been mostly produced, such as fabrics for filters, for flooring, for the aerospace industry, etc.

The combination of threads or yarns made with conductive fibres, such as fibres loaded with carbon, fibres coated with metallic salts, metallic or metallised fibres, with a basic structure of traditional yarns is a technical solution of the state of the art and is carried out with the doubling system.

The yarns produced by doubling consist of a main body of natural or synthetic fibres, about which are wound and coupled the conductive filaments.

This latter feature entails a plurality of shortcomings, among which is the situation of not having a smooth thread, with the resulting problems of conveying the thread on the machines, the problems arising in the steps of traditional weaving or knitting when a conductive fibre breaks, a non-uniform screening due to the uneven distribution of the conductive fibres and yet other shortcomings.

The present applicants have designed, tested and achieved this invention so as to overcome the shortcomings of the state of the art and to accomplish further advantages.

This invention is set forth and characterised in the respective main claims, while the dependent claims describe variants of the idea of the main solution.

The purpose of the invention is to provide a method which enables textile threads to be produced with a mixture of traditional fibres and conductive fibres so as to make fabrics suitable to exploit the properties of conductivity and screening

possessed by the conductive fibres in providing physical benefits for users.

According to the invention the threads include natural fibres such as cotton, linen, silk or wool or pure or mixed synthetic fibres in an intimate mixture with conductive fibres.

It is known that an intimate mixture is an operation that enables the components, which are to be mixed in the state of individual fibres, to be correctly dosed and apportioned.

According to the invention the threads are produced with normal spinning cycles typical of each type of fibre involved, whether the fibre be natural, synthetic or mixed, and with percentages of mixture according to the degree of conductivity to be achieved.

According to the invention the method is satisfactory either with the technique of intimate mixture of loose fibres or with the technique of intimate mixture of fibres in sliver form.

According to a first solution of the invention the conductive fibres in the form of slivers or rovings are combined with slivers or rovings of natural and/or synthetic fibres.

According to a variant the conductive fibres are combined with slivers or rovings of natural and/or synthetic fibres by being deposited thereon in a random manner.

According to the invention it is possible to make a textile product able to reflect the surrounding electromagnetic waves by producing threads with natural, synthetic or mixed fibres in an intimate mixture together with metallic or metallised conductive fibres in determined percentages.

A textile product made with such yarns enables a satisfactory barrier to be created against electromagnetic radiations and in particular against microwaves, which, as we said, are the subject of detailed research owing to their potential dangers to health.

This barrier effect is strengthened by the fact that the relative wave undergoes a series of successive reflections beginning with the surface of the thread and ending within the body of the thread as the wave meets the conductive fibres spread during the mixing operation.

Such a fabric can protect the human organism in the long term against the effect of the electromagnetic waves in the surrounding environment and can also eliminate a build-up of static electricity.

In experimental trials to produce anti-stress yarns according to the invention, conductive fibres were used which had an average diameter between 10 and 14 microns and an average length appropriate to the length of the blended fibre.

The percentage of conductive fibres in the embodiment of the blended thread or yarn in the trials was between a minimum of 1% and a maximum of 14%.

In experiments with natural fibres, wool fibres were used which had an average diameter between 16 and 24 microns and an average length of 45 to 90 millimetres; cotton fibres had an average diameter between 10 and 20 microns and an average length between 14 and 40 millimetres; linen fibres had an average diameter between 22 and 26 microns and an average length of the elementary fibre between 17 and 30 millimetres; silk fibres had an average diameter between 8 and 26 microns and an average length between 20 and 120 millimetres.

The count of yarn produced, expressed in tex according to the International System, namely the unit which identifies the weight of 1000 metres of the yarn in grams (1 tex = 10^{-6} kg. m^{-1}), was between 10 and 50 tex but advantageously between 15 and 40 tex.

An example of the production of anti-stress fabric was carried out with a yarn made of an intimate mixture of 95% wool and 5% metallized fibre.

The yarn count was 34 tex; the average diameter of the combed wool fibres was 21 to 21.5 microns and their average length was 70 millimetres.

The steps of the production of the yarn were as follows:-

- shrink-proof treatment of the wool fibres;
- bleaching the wool;
- mixture of the wool fibres and metallised fibres in two passes;
- two re-combing passes;
- preparatory intersecting;
- high draft spinning;
- winding with visual fault finding.

Claims

1. Method to produce textile threads which is employed to obtain anti-stress fabrics used advantageously, but not only, to make anti-stress articles of clothing, whether underwear and/or outer garments, clothing for medical use, household linen, blankets, hats, gloves, etc., such threads having as their base natural or synthetic fibres, the method being characterised in that it arranges that the natural and/or synthetic fibres are combined with conductive fibres during a step of intimate mixture.

2. Method as in Claim 1, whereby the conductive fibres in the form of slivers or rovings are combined with slivers/rovings of natural and/or synthetic fibres.

3. Method as in Claim 1, whereby the conductive fibres are combined with slivers/rovings of natural and/or synthetic fibres by being deposited thereon in a random manner.

4. Method as in any claim hereinbefore, whereby the conductive fibres are metallic fibres.

5. Method as in any of Claims 1 to 3 inclusive, whereby the conductive fibres are metallised fibres.

6. Method as in any of Claims 1 to 3 inclusive, whereby the conductive fibres are fibres loaded with carbon.

7. Method as in any of Claims 1 to 3 inclusive, whereby the conductive fibres are fibres coated with mineral salts.

8. Method as in any claim hereinbefore, whereby the average diameter of the conductive fibres is between 10 and 14 microns, but advantageously 12 microns.

9. Method as in any claim hereinbefore, whereby the percentage of conductive fibres in the total mixture is between 1% and 14%, but advantageously between 2% and 10%.

10. Method as in any claim hereinbefore, whereby the count of yarn produced is between 10 and 50 tex, but advantageously between 15 and 40 tex.

11. Method as in any claim hereinbefore, whereby the method is carried out according to the process of intimate mixing of loose fibres.

12. Method as in any of Claims 1 to 10 inclusive, whereby the method is carried out according to the process of intimate mixing of slivers.

13. Textile thread for anti-stress fabrics which is characterised in that it is produced according to the method of the claims hereinbefore.

14. Anti-stress fabric to make articles of clothing, whether underwear and/or outer garments, clothing for medical use, household linen, blankets, hats, gloves, etc., the fabric being characterised in that it is obtained by using the textile thread of Claim 13.

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EUROPEAN SEARCH REPORT

Application Number
EP 94 10 2931

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	GB-A-2 044 305 (AKZO) * claims 1,2,11-13 *	1-4,6,8,9,11-13	D02G3/44 D02G3/12 D03D15/00 A41D31/00
A	WO-A-89 12706 (NSP NUKLEARE SICHERHEITS-PRODUKTE) * claims 1,10,15-17 *	1-4,13,14	D04B1/14
A	CH-D-1 729 868 (TEIJIN) * claims *	1,5,7,13,14	
A	CH-A-497 596 (TEIJIN) * claims *	1,5,13,14	
A	DE-A-21 06 784 (IMPERIAL CHEMICAL INDUSTRIES) * the whole document *	1	
A	CA-A-1 043 088 (CELANESE CANADA) * claims 13-15 *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 004, no. 166 (C-031)18 November 1980 & JP-A-55 107 515 (TANAKA HIROYOSHI ET AL.) 18 August 1980 * abstract *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 320 (C-962)14 July 1992 & JP-A-04 091 248 (OZEKI JIRO) 24 March 1992 * abstract *	1,6	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)
D02G
A41D
D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 April 1994	Raybould, B

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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