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(54) TRI-KNIT COMFORT FABRIC AND METHODS FOR PREPARING AND USING THE FABRIC

(57) This invention provides a tri-knit comfort fabric and a preparation method and application thereof. The preparation method comprises steps of knitting a raw material with a three-thread yarn feeder to obtain a primary fabric, performing a greige fabric stenter finishing process on the knitted primary fabric, dying the primary fabric, then dewatering, treating through a flat-width fabric dryer and performing the stenter finishing process to the dyed fabric to obtain the tri-knit comfort fabric. The preparation method of the tri-knit comfort fabric of this invention improves the wearing comfort and moisture wicking function of the three-thread fabric, and the fabric prepared by the three-thread knitting method of adding the polyester component can be iron-free after washing. In addition, its moisture wicking, quick drying, water permeability, breathability and antistatic properties are also very good. It can also be separately added with independent functions such as thermal insulating, ice-feeling, anti-UV, antibacterial, anti-mildew and anti-mite. The process is simple, convenient for mass production, can save a lot of human and material resources, and has a good business prospect.

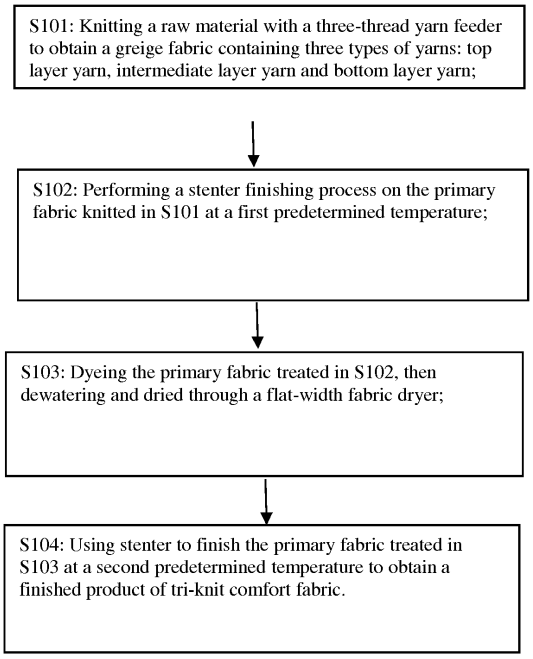

Fig. 1

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Description

RELATED APPLICATION

[0001] This application claims the benefit of the Chinese Patent Application CN201811243964.3 filed October 24, 2018, which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The invention relates to the field of textiles, in particular, to a comfort fabric and a preparation method and application thereof.

BACKGROUND OF THE INVENTION

[0003] There are many kinds of functional fabric knitted from two threads, i.e., Spandex and Polyester, on the market. The defects of the two-thread knitting method are mainly that the two sides of the fabric have the same composition and limited to single function. The fabric knitted from three threads, i.e., the bottom yarn and the elastic fiber, is relatively rare. The advantages of the three-thread knitting method compared with the two-thread knitting method are mainly that the two sides of the fabric have different components and different functions, which can serve different needs. For example, in three-thread knitting method, Polyester is a long-staple fiber, but the fabric knitted therefrom is less hygroscopic. If it is worn in summer, there will be a more obvious sultry feeling, and sweating will irritate the skin, which affects the wearing comfort of the fabric. Knitting fabrics with three-thread knitting method requires larger knitting works, and since the yarn feed count is halved, the capacity is less than half. In addition, three-thread fabrics need different dyestuffs to dye. Different component of the fabric and may easier resulting in color shading. Traditional three-thread knitting method is cumbersome in steps, complicated in process flow, and cost more human and material resources.

OBJECTS AND SUMMARY OF THE INVENTION

[0004] The object of this invention is to provide a preparation method of tri-knit comfort. fabric

[0005] The preparation method of tri-knit comfort fabric in this invention comprises steps of: S101: Knitting a raw material with a three- thread yarn feeder to obtain a greige fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn; S102: performing a stenter finishing process on the primary fabric knitted in S101 at a first predetermined temperature; S103: dyeing the primary fabric treated in S102, then dewatering and dried through a flat-width fabric dryer S104: using stenter to finish the primary fabric treated in S103 at a second predetermined temperature to obtain a finished product of tri-knit comfort fabric.

[0006] The preparation method of the tri-knit comfort fabric of this invention adopts the three-thread knitting method. Compared with two-thread fabrics e.g. Spandex and Polyester, in this method, the polyester component can be reduced, increasing new composition like Modal fiber, which itself has good softness and excellent hygroscopicity. Therefore, the wearing comfort and moisture wicking function of the tri-knit fabric are improved, and the fabric prepared by the tri-knit method of adding the polyester component may be iron-free after washing. In addition, its moisture wicking, quick drying, water permeability, breathability and antistatic properties are also very good. It can also be separately added with independent functions such as thermal insulating, ice-feeling, anti-UV, antibacterial, anti-mildew and anti-mite. Further, for the preparation method of the tri-knit comfort fabric of this invention, the process is simple, convenient for mass production, may save a lot of human and material resources, and has a good business prospect.

[0007] Moreover, above preparation method of the tri-knit comfort fabric of this invention may also have the following additional technical features:

[0008] Further, in the step S101, at least one of the three yarns is a blended yarn, and the blended yarn is at least two of polyester fiber, synthetic fiber and natural fiber; the other two of the three yarns are at least one of elastic fibers, polyester fibers, synthetic fibers, and natural fibers.

[0009] Further, the top layer yarn has a density number of 30 cm to 37 cm, the intermediate layer yarn has a density number of 8 cm to 12 cm, and the bottom layer yarn has a density number of 29 cm to 36 cm. Among them, the density number is a yarn length density of 100 G number of stitches.

[0010] Further, in the step S102, the speed upon greige fabric stenter finishing is 20 yards to 25 yards.

[0011] Further, in the step S104, the speed upon stenter finishing is 18 yards to 22 yards.

[0012] Further, in the step S102, the first predetermined temperature is 190 °C ~ 200 °C.

[0013] Further, in the step S104, the second predetermined temperature is 145 °C ~ 155 °C.

[0014] Another objective of this invention is to provide a tri-knit comfort fabric prepared by the method described.

[0015] Still another object of this invention is to provide an application of the tri-knit comfort fabric described in the

field of clothing and home textiles.

[0016] The additional aspects and advantages of this invention will be set forth in below description, in which parts will be clarified from the description below, or from the practice of this invention.

BRIEF DESCRIPTION OF THE FIGURE

[0017] The following detailed descriptions, given by way of example, and not intended to limit this invention solely thereto, will be best be understood in conjunction with the accompanying figure:

[0018] Fig. 1 is a flow chart demonstrating the method for preparing tri-knit comfort fabric in accordance with an exemplary embodiment of the claimed invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] The embodiments of the present invention are described in detail below, which are intended to be illustrative of this invention and are not to be construed as limiting.

Embodiment 1

[0020] Embodiment 1 provides a tri-knit comfort, fabric adopting knitting by three threads to obtain a primary fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn, wherein the top layer yarn includes a wool having a composition percentage of 53%, the bottom is a Polyester with a composition percentage of 37% and a Modal fiber with a percentage of 6%, and the intermediate layer yarn is a Spandex with a composition percentage of 4%. Further, the top layer yarn has a density number of 37 cm, the intermediate layer yarn has a density number of 12 cm, and the bottom layer yarn has a density number of 36 cm.

[0021] Referring to Fig. 1, the preparation method comprises the following steps:

(1) first, knitting a greige fabric with a three-thread yarn feeder to obtain a primary fabric containing a top layer yarn, an intermediate layer yarn and a bottom layer yarn.
(2) performing a greige fabric stenter finishing process on the primary fabric knitted by the step (1) at a machine speed of 20 yards under 200 °C.
(3) dyeing the primary fabric treated in the step (2), then dewatering and treating through a flat-width fabric dryer.
(4) performing stenter finishing to the dyed fabric treated in the step (3) under a temperature of 155 °C at a machine speed of 18 yards to obtain a finished product of tri-knit comfort fabric.

Embodiment 2

[0022] Embodiment 2 provides a tri-knit comfort fabric adopting knitting by three threads to obtain a primary fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn, wherein the top layer yarn includes nylon having a composition percentage of 39%, the bottom layer yarn is acrylic fiber with a composition percentage of 40% and cotton fiber with a percentage of 18%, and the intermediate layer yarn is a Spandex with a composition percentage of 3%. Further, the top layer yarn has a density number of 30 cm, the intermediate layer yarn has a density number of 8 cm, and the bottom layer yarn has a density number of 29 cm.

[0023] The preparation method comprises the following steps:

(1) first, knitting a greige fabric with a three-thread yarn feeder to obtain a primary fabric containing a top layer yarn, an intermediate layer yarn and a bottom layer yarn.
(2) performing a greige fabric stenter finishing process on the primary fabric knitted by the step (1) at a machine speed of 25 yards under 190 °C.
(3) dyeing the primary fabric treated in the step (2), then dewatering and treating through a flat-width fabric dryer.
(4) performing stenter finishing to the dyed fabric treated in the step (3) under a temperature of 145°C at a machine speed of 22 yards to obtain a finished product of tri-knit comfort fabric.

Embodiment 3

[0024] Embodiment 3 provides a tri-knit comfort fabric, adopting knitting by three threads to obtain a primary fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn, wherein the top layer yarn includes Polyester having a composition percentage of 86%, the bottom layer yarn composition is 9% Modal fiber, and the intermediate layer yarn composition is 5% Spandex. Further, the top layer yarn has a density number of 33 cm, the

intermediate layer yarn has a density number of 10 cm, and the bottom layer yarn has a density number of 33 cm.

[0025] The preparation method comprises the following steps:

(1) first, knitting a greige fabric with a three-thread yarn feeder to obtain a primary fabric containing a top layer yarn, an intermediate layer yarn and a bottom layer yarn.
(2) performing a greige fabric stenter finishing process on the primary fabric knitted by the step (1) at a machine speed of 22 yards under 195 °C.
(3) dyeing the primary fabric treated in the step (2), then dewatering and treating through a flat-width fabric dryer.
(4) performing stenter finishing to the dyed fabric treated in the step (3) under a temperature of 150 °C at a machine speed of 20 yards to obtain a finished product of tri-knit comfort fabric.

[0026] The wet thermal resistance of three samples of the tri-knit comfort fabric having a thickness of not more than 5 mm prepared from 3 Embodiments is tested under a temperature of (35 ± 0.1) °C and a humidity of (40 ± 3) %, and the results are shown in Table 1:

Table 1: Wet thermal resistance of tri-knit comfort fabric samples in each of the embodiments

	Wet thermal resistance (Ret/(m2·Pa)/W)
First sample	1.99
Second sample	1.74
Third sample	1.77
Arithmetic mean	1.83

[0027] As can be seen from Table 1, the mean of the wet thermal resistance of the tri-knit comfort fabric prepared by the preparation method of those embodiment of this invention reaches 1.83 (m2·Pa)/W, which indicates that the tri-knit comfort fabric prepared by the method of this invention has good functions of moisture wicking.

[0028] In summary, the preparation method of the tri-knit comfort fabric of this invention adopts the three-thread knitting method. Compared with two-thread fabrics Spandex and Polyester, in this method, the polyester component is reduced, increasing the composition of Modal, acrylic and cotton fibers, so that it has good softness and excellent hygroscopicity. Therefore, the wearing comfort and moisture wicking function of the three-thread fabric are improved, and the fabrics prepared by the three-thread knitting method of adding the polyester component may be iron-free after washing. In addition, its moisture wicking, quick drying, water permeability, breathability and antistatic properties are also very good. It can also be separately added with independent functions such as thermal insulating, ice-feeling, anti-UV, antibacterial, anti-mildew and anti-mite. For the preparation method of the tri-knit comfort fabric of this invention, the process is simple, convenient for mass production, may save a lot of human and material resources, and has a good business prospect.

[0029] In the description of the present specification, a description with reference to the terms "one embodiment", "some embodiments", "example", "specific example", or "some examples" and the like means that specific features, structures, materials, or characteristics described in connection with the embodiments or examples are included in at least one embodiment or example of the present invention. In this specification, the schematic representation of the above terms is not necessarily directed to the same embodiment or example. Furthermore, the specific features, structures, materials, or characteristics described may be combined in a suitable manner in any one or more embodiments or examples. In addition, various embodiments or examples described in the specification, as well as features of various embodiments or examples, may be combined and assembled without contradictions.

[0030] Although the embodiment of this invention has been shown and described above, it is to be understood that the above embodiments are illustrative and are not to be construed as limiting this invention. Changes, modifications, alterations and variations of the above-described embodiments may be made by those skilled in the field within the scope of this invention.

Claims

1. A method for preparing tri-knit comfort fabric, comprising the steps of:

S101: Knitting a raw material with a three-thread yarn feeder to obtain a primary fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn;
S102: Performing a greige fabric sternter finishing process on the primary fabric knitted in S101 at a first

predetermined temperature;
S103: Dyeing the primary fabric treated in S102, then dewatering and treating through a flat-width fabric dryer; and
S104: Performing a stenter finishing process to the primary fabric treated in S103 at a second predetermined temperature to obtain a finished product of tri-knit comfort fabric.

2. The method in claim 1, wherein, in the step S101:

at least one of the three yarns is a blended yarn;
the blended yarn is at least two of polyester fiber, synthetic fiber and natural fiber; and
the other two of the three yarns are at least one of elastic fibers, polyester fibers, synthetic fibers, and natural fibers.

3. The method in claim 1, wherein:

the top layer yarn has a density number of 30 cm to 37 cm;
the intermediate layer yarn has a density number of 8 cm to 12 cm; and
the bottom layer yarn has a density number of 29 cm to 36 cm.

4. The method in claim 1, wherein, in step S102, the speed upon greige fabric stenter finishing is 20 yards to 25 yards.

5. The method in claim 1, wherein, in step S104, the speed upon dyed fabric stenter finishing is 18 yards to 22 yards.

6. The method in claim 1, wherein, in step S102, the first predetermined temperature is 190 °C ~ 200 °C.

7. The method in claim 1, wherein, in step S104, the second predetermined temperature is 145 °C ~ 155 °C.

8. A tri-knit comfort fabric, prepared by a method comprising the steps of:

S101: Knitting a raw material with a three-thread yarn feeder to obtain a primary fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn;
S102: Performing a greige fabric stenter finishing process on the primary fabric knitted in S101 at a first predetermined temperature;
S103: Dyeing the primary fabric treated in S102, then dewatering and treating through a flat-width fabric dryer; and
S104: Performing a dyed fabric stenter finishing process to the primary fabric treated in S103 at a second predetermined temperature to obtain a finished product of tri-knit comfort fabric.

9. A method for using for clothing and home textiles a tri-knit comfort fabric, which is prepared by a method comprising the steps of:

S101: Knitting a raw material with a three-thread yarn feeder to obtain a primary fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn;
S102: Performing a greige fabric stenter finishing process on the primary fabric knitted in S101 at a first predetermined temperature;
S103: Dyeing the primary fabric treated in S102, then dewatering, and treating through a flat-width fabric dryer; and
S104: Performing a dyed fabric stenter finishing process to the primary fabric treated in S103 at a second predetermined temperature to obtain a finished product of tri-knit comfort fabric.

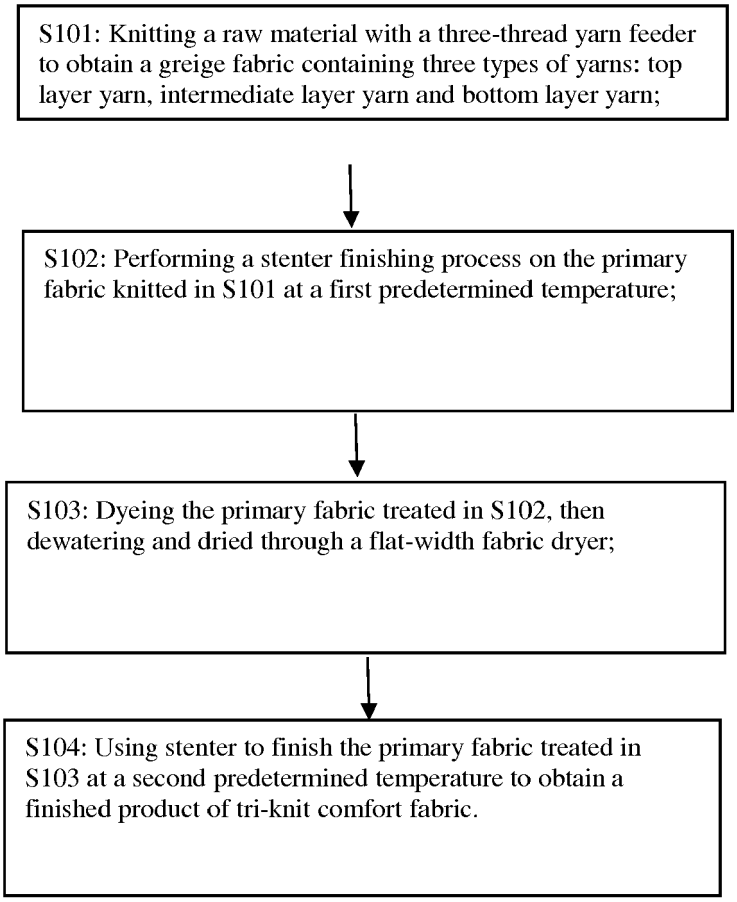
S101: Knitting a raw material with a three-thread yarn feeder to obtain a greige fabric containing three types of yarns: top layer yarn, intermediate layer yarn and bottom layer yarn;
S102: Performing a stenter finishing process on the primary fabric knitted in S101 at a first predetermined temperature;
S103: Dyeing the primary fabric treated in S102, then dewatering and dried through a flat-width fabric dryer;
S104: Using stenter to finish the primary fabric treated in S103 at a second predetermined temperature to obtain a finished product of tri-knit comfort fabric.

Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 19 15 1082

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2016/265146 A1 (LIAO TIANYI [US] ET AL) 15 September 2016 (2016-09-15) * paragraphs [0009] - [0012], [0033], [0039], [0043], [0045], [0048], [0053] - [0105], [0127] - [0129]; claims 1, 8, 9, 13, 17, 24; figures 1, 6, 9; examples 6, 8, 14, 16, 23, 24, 28, 29; tables 1-2 *	1-9	INV. D04B1/18

TECHNICAL FIELDS SEARCHED (IPC)

D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 August 2019	Sterle, Dieter

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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12-08-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016265146 A1	15-09-2016	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 201811243964 **[0001]**