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KNITTED PRODUCT AND METHOD FOR PRODUCING KNITTED PRODUCT

Abstract

A heat-fusible yarn that melts at 105° C. or less is fused with a whole or a part of a ground yarn that is a natural fiber yarn and/or a synthetic fiber yarn. A knitted product including the heat-fusible yarn in an unmelted state is efficiently produced by form-knitting with use of a flat knitting machine while knitting the heat-fusible yarn into the whole or a part of the ground yarn. The heat-fusible yarn melts at 105° C. or less, thereby causing the heat-fusible yarn to melt and to be fused with the ground yarn by a steam iron without using a large-scale heat treatment apparatus. The heat-fusible yarn is fused with the ground yarn of the knitted product, thereby preventing shrinkage and stretching of the ground yarn.

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Background/Summary

TECHNICAL FIELD

[0001] The present invention relates to a knitted product, such as a sweater or a cardigan.

BACKGROUND ART

[0002] For circular knitted fabrics used for knitted products that include corrective innerwear products including girdles, leggings and bras, and compression wear including sports bottom wear and sports underwear, there is a circular knitted fabric that has high stretching parts and low stretching parts (see Patent Literature (PTL) 1, for example).

[0003] In the circular knitted fabric disclosed in PTL 1, the same ground yarn is used for the low stretching parts and the high stretching parts. The low stretching parts contain a heat-fusible yarn, at least parts of which are thermally fused with each other. For the ground yarn in the circular knitted fabric disclosed in PTL 1, an elastic yarn, such as a polyurethane-based yarn or a polyether ester-based yarn, is used. The heat-fusible yarn in the circular knitted fabric disclosed in PTL 1 is a fiber that has the properties of melting and fusing due to heat treatment with dry heat at 120° C. for 1 minute, or due to heat treatment with wet heat at 110° C. for 30 seconds. As the heat-fusible yarn, a polyamide-based fiber, a polyester-based fiber, a polyurethane-based fiber, or other types of fiber are used.

CITATION LIST

Patent Literature

[0004] PTL 1: Japanese Patent No. 5688240

SUMMARY OF INVENTION

Technical Problem

[0005] A knit is formed by continuously forming loops, and thus has advantages of, for example, higher stretchability, higher flexibility, and higher heat retaining effect, compared with woven fabrics.

[0006] However, general knitted products in which a natural fiber yarn and/or a synthetic fiber yarn is used have disadvantages of easily losing shape, for example, stretching due to gravity when hung on a hanger, and of shrinking due to washing or the like.

[0007] Particularly, in the case of a knitted product in which a natural fiber yarn is used, when such a knitted product is washed with water, hydrophilic fiber may absorb moisture, thus thickening and shortening, leading to shrinkage of approximately 10%, for example.

[0008] In the case where a wool yarn is used as the natural fiber yarn, when a knitted product is washed with water or the like, a rubbing force, a scrubbing force, a pressing force, and other forces are applied to the knitted product in a wet state, so that fibers are tangled, thus causing shrinkage (felting).

[0009] In order to prevent shrinkage and stretching of the ground yarn, the heat-fusible yarn in the circular knitted fabric disclosed in PTL 1 may be used for knitted products, such as sweaters or cardigans, in which a natural fiber yarn and/or a synthetic fiber yarn is used. In such a case, it is necessary to perform heat treatment with dry heat at 120° C. for 1 minute, or heat treatment with wet heat at 110° C. for 30 seconds in order to cause the heat-fusible yarn to be fused with the

ground yarn. In the case of performing the heat treatment with dry heat at 120° C. for 1 minute, or heat treatment with wet heat at 110° C. for 30 seconds, there is a concern that fibers may be damaged, thus compromising the feel of the knitted products depending on the natural fiber yarn and/or the synthetic fiber yarn used in the knitted products.

[0010] In addition, to perform the heat treatment with dry heat at 120° C. for 1 minute, or the heat treatment with wet heat at 110° C. for 30 seconds, it is necessary to use a large-scale heat treatment apparatus, such as a pin tenter dry heat setting machine or an autoclave wet heat setting machine, after a knitted fabric including a heat-fusible yarn is knitted. Accordingly, required capital investment becomes necessary, and small lot production becomes difficult. In the case where heat treatment on a knitted fabric including a heat-fusible yarn is requested of a factory having the large-scale heat treatment apparatus, a long production period is required.

[0011] An object of the present invention is to effectively prevent shrinkage and stretching of a ground yarn of a knitted product in which a natural fiber yarn and/or a synthetic fiber yarn is used, without compromising the feel of the knitted product and without using a large-scale heat treatment apparatus.

Solution to Problem

[0012] A knitted product according to a first aspect of the present invention is a knitted product in which a natural fiber yarn and/or a synthetic fiber yarn is used. In the knitted product, a heat-fusible yarn that melts at 105° C. or less is fused with a whole or a part of a ground yarn.

[0013] In a knitted product according to a second aspect of the present invention in the knitted product according to the first aspect, the knitted product is formed by a flat knitting machine.

[0014] In a knitted product according to a third aspect of the present invention in the knitted product according to the first aspect or the second aspect, the heat-fusible yarn is a nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less.

[0015] In a knitted product according to a fourth aspect of the present invention in the knitted product according to the first aspect, fineness of the heat-fusible yarn is 30 deniers or more and 150 deniers or less.

[0016] A method for producing a knitted product according to a fifth aspect of the present invention includes: a first step in which, while a heat-fusible yarn that melts at 105° C. or less is knitted into a whole or a part of a ground yarn that is a natural fiber yarn and/or a synthetic fiber yarn, a knitted product including the heat-fusible yarn in an unmelted state is produced by a flat knitting machine; and a second step in which the heat-fusible yarn in the knitted product that has undergone the first step is melted by a steam iron to cause the heat-fusible yarn to be fused with the ground yarn.

[0017] In a method for producing a knitted product according to a sixth aspect of the present invention in the method for producing a knitted product according to the fifth aspect, the heat-fusible yarn is a nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less.

Advantageous Effects of Invention

[0018] The knitted product according to the present invention, and the knitted product produced by the method for producing a knitted product according to the present invention include a natural fiber yarn and/or a synthetic fiber yarn. A heat-fusible yarn is fused with the whole or a part of the ground yarn, thereby preventing shrinkage and stretching of the ground yarn that is the natural fiber yarn and/or the synthetic fiber yarn.

[0019] A knitted product including the heat-fusible yarn in an unmelted state is produced by form-knitting with use of, for example, a flat knitting machine while knitting the heat-fusible yarn into the whole or a part of the ground yarn that is the natural fiber yarn and/or the synthetic fiber yarn, thereby reducing the amount of usage of yarn and cutting loss, and also efficiently producing the knitted product including the heat-fusible yarn in an unmelted state.

[0020] The heat-fusible yarn melts at 105° C. or less. Accordingly, it is possible to cause, without using a large-scale heat treatment apparatus, the heat-fusible yarn to melt and to be fused with the

ground yarn by performing efficient work with a steam iron, i.e., by moving the steam iron in such a way as to steam a knitted product at desired portions at which the heat-fusible yarn is present. Therefore, there is no possibility of compromising the feel of the knitted product, and it is possible to achieve small lot and short cycle production that is suited to individualized and diversified needs of consumers.

Description

BRIEF DESCRIPTION OF DRAWINGS

[0021] FIG. **1** is a stitch diagram of a Milano rib stitch.

[0022] FIG. **2** is a stitch diagram of a half cardigan stitch.

DESCRIPTION OF EMBODIMENT

<Knitted Product>

[0023] A knitted product of the present invention includes a natural fiber yarn and/or a synthetic fiber yarn. Specifically, the knitted product is any one of a knitted product including only a natural fiber yarn, a knitted product including only a synthetic fiber yarn, or a knitted product including a blended yarn obtained by blending a natural fiber and a synthetic fiber at a predetermined mixing ratio. The fineness of the yarn ranges from 1 yarn count to 100 yarn count. For the natural fiber yarn, for example, a cotton yarn, a wool yarn, an animal hair yarn, or the like is used. For the synthetic fiber yarn, an acrylic yarn, a polyester yarn, or the like is used.

[0024] The knitted product of the present invention includes general knitted products that are formed by a flat knitting machine, and may be, for example, clothing, such as sweaters, cardigans, dresses and skirts, bags, such as tote bags, handbags and backpacks, and add-on pads for clothing, such as shoulder pads and knee pads.

[0025] There is no limitation on the type of knitting stitch for the knitted product of the present invention. That is, any knitting stitch may be used for the knitted product of the present invention provided that the knitting stitch is for flat knitting, and a plain stitch, a rib stitch, a Milano rib stitch, a cardigan stitch, a seed stitch, a garter stitch (pearl stitch), a lace stitch, or other stitches may be used.

[0026] In the knitted product of the present invention, a heat-fusible yarn that melts at 105° C. or less is fused with the whole or a part of a ground yarn that is the natural fiber yarn and/or the synthetic fiber yarn. The heat-fusible yarn melts at 105° C. or less, and is, for example, a nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less.

[0027] The fineness of the heat-fusible yarn is 30 deniers or more and 150 deniers or less, and the heat-fusible yarn is selected to obtain the desired feel of the knitted fabric in terms of the thickness and hardness.

[0028] In the knitted product of the present invention, the heat-fusible yarn is fused with the whole or a part of the ground yarn that is the natural fiber yarn and/or the synthetic fiber yarn. Accordingly, it is possible to prevent shrinkage and stretching of the ground yarn. By knitting a natural fiber, which is the ground yarn, and the heat-fusible yarn in a desired balance, it is possible to control the shrinkage ratio of the natural fiber.

<Method for Producing Knitted Product>

[0029] The knitted product of the present invention is produced by a flat knitting machine that forms a shape according to pattern. That is, while a heat-fusible yarn that melts at 105° C. or less is knitted into the whole or a part of the ground yarn that is the natural fiber yarn and/or the synthetic fiber yarn, a knitted product including the heat-fusible yarn in an unmelted state is produced by the flat knitting machine (first step). The knitted product is produced by form-knitting with use of, for example, the flat knitting machine, thereby reducing the amount of usage of yarn and cutting loss, and also efficiently producing the knitted product including the heat-fusible yarn in an unmelted

state.
[0030] Next, a steam iron that emits high temperature water steam from holes on the bottom surface is used on the knitted product including the heat-fusible yarn in an unmelted state to melt the heat-fusible yarn so that the heat-fusible yarn is fused with the ground yarn (second step). The heat-fusible yarn melts at 105° C. or less. Accordingly, it is possible to cause, without using a large-scale heat treatment apparatus, the heat-fusible yarn to melt and to be fused with the ground yarn by, for example, performing efficient work with an electric steam iron with 1000 W to 1500 W, i.e., by moving the steam iron in such a way as to steam the knitted product at desired portions at which the heat-fusible yarn is present.
<Example of Heat-Fusible Yarn that Melts at 105° C. or Less>
[0031] In a preferred embodiment, a nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less is used for the heat-fusible yarn that melts at 105° C. or less.
[0032] For the nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less, for example, “nylon heat-fusible yarn” (melting point 80° C.) made by CHANGZHOU CITY LINGXIAN TEXTILE EQUIPMENT CO., LTD., or “heat-fusible yarn **78**T made in Japan” (melting point 85° C.) made by Mitsubishi Chemical Corporation may be used.
<Example of Method for Interweaving Heat-Fusible Yarn>
(1) Case of Preventing Longitudinal Stretching and Lateral Stretching
[0033] A ground yarn and a heat-fusible yarn are interweaved in the entire part for a plain stitch, a rib stitch, a cardigan stitch, or the like. It is desirable to use pleating in which two different yarns are pulled through a loop at the same time to create stitches. The ground yarn and the heat-fusible yarn are directed to the head of the flat knitting machine from individual yarn insertion holes, and are brought together at the head.
(2) Case of Preventing Lateral Stretching while Maintaining Longitudinal Shrinkage and Stretching
[0034] In the stitch diagram of a Milano rib stitch shown in FIG. **1**, for example, (1) shows a ground yarn that forms loops with latch needles in front needle beds and latch needles in rear needle beds (a ground yarn for brioche stitch (rib stitch)), (2) shows a ground yarn that forms loops only with latch needles in rear needle beds, and (3) shows a ground yarn that forms loops only with latch needles in front needle beds. Of the yarns shown in (1) to (3), a heat-fusible yarn is arranged parallel to (a heat-fusible yarn is knitted into) the ground yarn shown in (2) and the ground yarn shown in (3).
[0035] Alternatively, in the stitch diagram of a half cardigan stitch shown in FIG. **2**, for example, (1) shows a ground yarn for a tuck stitch, and (2) shows a ground yarn for brioche stitch. A heat-fusible yarn is arranged parallel to (a heat-fusible yarn is knitted into) the ground yarn shown in (1).
(3) Case of Maintaining Shape Stability while Maintaining Shrinkage and Stretching of Knitted Fabric
[0036] In the stitch diagram of a Milano rib stitch shown in FIG. **1**, for example, a heat-fusible yarn is arranged parallel to (a heat-fusible yarn is knitted into) the ground yarn for a brioche stitch shown in (1).
[0037] Alternatively, in the stitch diagram of a half cardigan stitch shown in FIG. **2**, for example, a heat-fusible yarn is arranged parallel to (a heat-fusible yarn is knitted into) the ground yarn for a brioche stitch shown in (2).
<Specific Method for Adjusting Tension of Knitted Product>
[0038] The degree of tension (the width of shrinkage and stretching) of the knitted product is adjusted as described below, for example, by changing the method for interweaving a heat-fusible yarn with a ground yarn in a course that is a row of loops arranged in the lateral direction of knitted fabric.
(1) Case of Reducing Tension to Extremely Low Level
[0039] A ground yarn is knitted together with a heat-fusible yarn in all courses.
(2) Case of Decreasing Tension

[0040] A ground yarn is knitted together with a heat-fusible yarn in three courses, and only the ground yarn is then knitted in two courses and, thereafter, these procedures are repeated.

(3) Case of Obtaining Normal Tension

[0041] A ground yarn is knitted together with a heat-fusible yarn in one course, and only the ground yarn is then knitted in one course and, thereafter, these procedures are repeated.

(4) Case of Increasing Tension

[0042] A ground yarn is knitted together with a heat-fusible yarn in two courses, and only the ground yarn is then knitted in three courses and, thereafter, these procedures are repeated.

(5) Case of Increasing Tension to Extremely High Level

[0043] A ground yarn is knitted together with a heat-fusible yarn in one course, and only the ground yarn is then knitted in nine courses and, thereafter, these procedures are repeated.

<Evaluation for Washing Durability>

(Evaluation Method)

[0044] Based on the C4M method (washing at 40° C. for 6 minutes, rinsing for 2 minutes twice, each spinning for 3 minutes, line dry for drying) in JIS L 1930:2014 “Textiles-Domestic washing and drying procedures for textile testing”, the ratio of dimensional change after washing and drying is calculated as [(length after treatment)−(length before treatment)]/(length before treatment).

(Evaluation Target)

[0045] A sweater (100% cotton with a yarn count of 2/100 being used as a ground yarn) with a Milano rib stitch is used as the evaluation target.

Example and Comparison Example

[0046] As Example, the sweater was produced with use of a flat knitting machine by arranging “heat-fusible yarn **78**T made in Japan” (melting point 85° C.) with 50 deniers made by Mitsubishi Chemical Corporation parallel only to a ground yarn for a brioche stitch (1×1 rib) shown in (1) in the stitch diagram of a Milano rib stitch shown in FIG. **1**, and the heat-fusible yarn was melted by a steam iron to be fused with the ground yarn. The sweater including no heat-fusible yarn was used as Comparison Example.

(Evaluation Result)

[0047] Washing and drying were performed once according to the washing and drying procedures for testing in the evaluation method, and the washing and drying were repeated five times. Thereafter, the ratios of dimensional change of body length, body width, sleeve length, and hem width were calculated, the results of which are shown in Table 1. Positive numerical values indicate “stretching”, and negative numerical values indicate “shrinkage”.

TABLE-US-00001 TABLE 1 Sweater Test method Evaluation Comparison JIS L 1930 target product Example Example C4M method Number of times Five Five (Line dry) of repetition Once times Once times Ratio of Body length −1.7 −3.7 −3.0 −6.3 dimensional Body width −1.6 −2.7 −0.6 −1.3 change (%) Sleeve length −1.7 −3.3 −0.4 1.1 Hem width −1.7 −2.1 1.7 1.7

[0048] Regarding Comparison Example, after the washing and drying were performed once on the sweater, the body length, the body width, and the sleeve length decreased, whereas the hem width increased. After the washing and drying were performed on the sweater of Comparison Example five times, the body length and the body width decreased, whereas the sleeve length and the hem width increased. In the sweater of Comparison Example on which the washing and drying were performed five times, the amount of shrinkage in body length is large, that is, 6.3%.

[0049] In contrast, regarding Example, in both of a case where the washing and drying were performed once on the sweater and a case where the washing and drying were performed on the sweater five times, the body length, the body width, the sleeve length, and the hem width decreased.

[0050] In the sweater of Example on which the washing and drying were performed once, the amount of shrinkage in body length shows the largest amount of shrinkage, that is, 1.7%. This amount of shrinkage in body length (1.7%) is approximately 57% of the amount of shrinkage in

body length (3.0%) of the sweater of Comparison Example on which the washing and drying were performed once. In the sweater of Example on which the washing and drying were performed five times, the amount of shrinkage in body length shows the largest amount of shrinkage, that is, 3.7%. This amount of shrinkage in body length (3.7%) is approximately 59% of the amount of shrinkage in body length (6.3%) of the sweater of Comparison Example on which the washing and drying were performed five times.

[0051] As described above, it can be understood that the sweater of Example has extremely higher shape stability after repeated washing and drying, and has a significantly lower maximum amount of shrinkage compared with the sweater of Comparison Example.

<Manner of Operation and Advantageous Effects>

[0052] The knitted product according to the embodiment of the present invention described above includes a natural fiber yarn and/or a synthetic fiber yarn. The heat-fusible yarn is fused with the whole or a part of the ground yarn that is the natural fiber yarn and/or the synthetic fiber yarn. Accordingly, it is possible to prevent shrinkage and stretching of the ground yarn.

[0053] A knitted product including the heat-fusible yarn in an unmelted state is produced by form-knitting with use of, for example, a flat knitting machine while knitting the heat-fusible yarn into the whole or a part of the ground yarn, thereby reducing the amount of usage of yarn and cutting loss, and also efficiently producing the knitted product including the heat-fusible yarn in an unmelted state.

[0054] The heat-fusible yarn melts at 105° C. or less. Accordingly, it is possible to cause, without using a large-scale heat treatment apparatus, the heat-fusible yarn to melt and to be fused with the ground yarn by performing efficient work with a steam iron, i.e., by moving the steam iron in such a way as to steam the knitted product at desired portions at which the heat-fusible yarn is present. Therefore, there is no possibility of compromising the feel of the knitted product, and it is possible to achieve small lot and short cycle production that is suited to individualized and diversified needs of consumers.

[0055] All of the above descriptions of the embodiment are merely illustrative, and the present invention is not limited to the above. Various modifications and variations can be made without departing from the scope of the present invention.

Claims

1. A knitted product in which a natural fiber yarn and/or a synthetic fiber yarn is used, the knitted product comprising: a heat-fusible yarn fused with a whole or a part of a ground yarn, the heat-fusible yarn melting at 105° C. or less.

2. The knitted product according to claim 1, wherein the knitted product is formed by a flat knitting machine.

3. The knitted product according to claim 1, wherein the heat-fusible yarn is a nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less.

4. The knitted product according to claim 1, wherein fineness of the heat-fusible yarn is 30 deniers or more and 150 deniers or less.

5. A method for producing a knitted product, the method comprising: a first step in which, while a heat-fusible yarn that melts at 105° C. or less is knitted into a whole or a part of a ground yarn that is a natural fiber yarn and/or a synthetic fiber yarn, a knitted product including the heat-fusible yarn in an unmelted state is produced by a flat knitting machine; and a second step in which the heat-fusible yarn in the knitted product that has undergone the first step is melted by a steam iron to cause the heat-fusible yarn to be fused with the ground yarn.

6. The method for producing a knitted product according to claim 5, wherein the heat-fusible yarn is a nylon heat-fusible yarn having a melting point of 75° C. or more and 90° C. or less.