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(54) **FIBER STRUCTURE**

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(57) **ABSTRACT**

In order to provide a fiber structure having excellent heat retention and wearing comfort and a garment obtained by using the same, there is provided a fiber structure containing: a viscose rayon fiber in an amount of more than 15% by mass and less than 40% by mass; a cation dyeable polyester filament yarn in an amount of more than 10% by mass and less than 45% by mass; a polyacrylic synthetic fiber in an amount of more than 25% by mass and less than 60% by mass; and a spandex fiber in an amount of more than 3% by mass and less than 15% by mass, wherein the fiber structure has a nap formed on a front surface or a back surface thereof.

FIBER STRUCTURE

TECHNICAL FIELD

[0001] The present invention relates to a fiber structure with excellent heat retention and wearing comfort and a garment obtained by using the same, and in particular, to a fiber structure to be used preferably in underwear, T-shirts, etc. which are directly in contact with the skin of a human.

BACKGROUND ART

[0002] Conventionally, as a means for improving heat retention of a garment and the like, many garments having a three-layer structure including a lining, a heat retentive material such as an inner cotton, and an outer fabric are known (see Patent Document 1). However, the outer fabric of these garments is used for improving wind protection and heat retention, which causes a stuffy feeling when worn, and is not suitable to be used for innerwear due to a fabric thickness caused by the three-layer structure.

[0003] In addition, as for a heat retention fiber product suitable to be used for innerwear, a fiber structure containing a viscose rayon fiber, a cation dyeable polyester fiber, a polyacrylic synthetic fiber, and a spandex fiber is known (see Patent Documents 2 and 3). However, there is still a problem in that these fiber structures have a low heat retention rate. Therefore, there is a demand for a fiber product having higher heat retention.

PRIOR ART DOCUMENTS

Patent Documents

[0004] Patent Document 1: Japanese Examined Patent Publication No. 7-59762

[0005] Patent Document 2: International Publication No. 2014/192648

[0006] Patent Document 3: Japanese Patent No. 5453863

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

[0007] In order to solve the above problems, the present inventors intensively studied and found that, with a yarn in which viscose rayon is blended, that is, by using a viscose rayon fiber, a cation dyeable polyester fiber, a polyacrylic synthetic fiber, and a spandex fiber and performing a raising process, a fiber structure having excellent heat retention and wearing comfort can be obtained.

[0008] An object of the present invention is to provide a fiber structure having excellent heat retention and wearing comfort and a garment using the same.

Solutions to the Problems

[0009] In order to solve these problems, the fiber structure of the present invention is a fiber structure containing: a viscose rayon fiber in an amount of more than 15% by mass and less than 40% by mass; a cation dyeable polyester filament yarn in an amount of more than 10% by mass and less than 45% by mass; a polyacrylic synthetic fiber in an amount of more than 25% by mass and less than 60% by mass; and a spandex fiber in an amount of more than 3% by mass and less than 15% by mass, wherein the fiber structure has a nap formed on a front surface or a back surface thereof.

[0010] In a preferred aspect of the fiber structure of the present invention, the fiber structure is formed of a knitted fabric having a two-layer structure.

[0011] In a preferred aspect of the fiber structure of the present invention, a single fiber fineness of the cation dyeable polyester filament yarn is 0.6 dtex or more.

[0012] In a preferred aspect of the fiber structure of the present invention, a heat retention rate of the fiber structure is 25% or more.

[0013] In a preferred aspect of the fiber structure of the present invention, a hygroscopic heat generation of the fiber structure is 2.2° C. or more.

[0014] In a preferred aspect of the fiber structure of the present invention, a fluff adhesion of the surface of the fiber structure having the nap is 4.0 grade or more.

[0015] In a preferred aspect of the fiber structure of the present invention, a stretch recovery percentage of the fiber structure is 80% or more.

[0016] In the present invention, a garment can be obtained by using the fiber structure.

Effects of the Invention

[0017] According to the present invention, it is possible to obtain a fiber structure having excellent heat retention and excellent wearing comfort to be used as innerwear such as underwear, T-shirts, etc., as compared to the product of the related art. In addition, according to the present invention, it is possible to obtain a garment having excellent heat retention and excellent wearing comfort by using the fiber structure.

[0018] In the present invention, the viscose rayon fiber adsorbs a water vapor generated from a human body and a kinetic energy of a water molecule is converted into heat energy, such that warmth of the generated heat can be kept by heat insulation effects of the polyacrylic synthetic fiber and an air pocket formed between fibers of a raised surface.

EMBODIMENTS OF THE INVENTION

[0019] Next, a fiber structure according to an embodiment of the present invention will be described in detail.

[0020] The fiber structure of the present invention is a fiber structure containing: a viscose rayon fiber in an amount of more than 15% by mass and less than 40% by mass; a cation dyeable polyester filament yarn in an amount of more than 10% by mass and less than 45% by mass; a polyacrylic synthetic fiber in an amount of more than 25% by mass and less than 60% by mass; and a spandex fiber in an amount of more than 3% by mass and less than 15% by mass, wherein the fiber structure has a nap formed on a front surface or a back surface thereof.

[0021] The fiber structure of the present invention contains the viscose rayon fiber in an amount of more than 15% by mass and less than 40% by mass. The viscose rayon fiber is contained in the amount as described above, such that it is possible to obtain a fiber structure excellent in durability and having a hygroscopic heat generation performance. Since the fiber structure has the hygroscopic heat generation performance, the fiber structure is heated by a water vapor generated from a human body when worn, which can raise a clothing temperature. In a case where the amount of viscose rayon fiber is 40% by mass or more, the fiber structure is likely to be wrinkled after being washed due to a property of the viscose rayon fiber. In addition, in a case

where the amount of viscose rayon fiber is 15% by mass or less, the hygroscopic heat generation performance of the fiber structure is not sufficiently exhibited.

[0022] The amount of viscose rayon fiber is preferably 15 to 30% by mass and more preferably 15 to 25% by mass. When the amount of viscose rayon fiber is more than 15% by mass, it is possible to obtain a fiber structure having a more excellent hygroscopic heat generation performance.

[0023] The viscose rayon fiber used in the present invention is preferably used in a form of a spun yarn from the viewpoint of improving the heat retention. In addition, in this case, a count of the spun yarn is preferably 30 S to 100 S in a cotton count because the fiber structure is preferably used for underwear, T-shirts, and the like which are directly in contact with the skin of a human. More preferably, a spun yarn with a cotton count of 30 S to 60 S is used from the viewpoint of a thickness and heat retention of the fiber structure.

[0024] In addition, a single fiber fineness of a spun yarn is preferably 0.5 dtex to 2.5 dtex from the viewpoint of usage.

[0025] The viscose rayon fiber referred in the present invention is a regenerated fiber which is spun by a viscose method and is a spun yarn such as a viscose rayon fiber and a saponified acetate fiber.

[0026] The fiber structure of the present invention contains the cation dyeable polyester filament yarn in an amount of more than 10% by mass and less than 45% by mass. The cation dyeable polyester filament yarn is used, such that it is possible to perform dyeing at a lower temperature than in a case of a general polyester fiber and to perform dyeing with the same dye as used for a polyacrylic synthetic fiber. In addition, the cation dyeable polyester filament yarn can obtain an excellent color developing ability and fastness at a temperature of 105° C. to 115° C. Therefore, deterioration of the spandex fiber due to heat can be prevented.

[0027] In addition, the amount of cation dyeable polyester fiber is more than 10% by mass, such that an occurrence of wrinkles on the fabric structure after being washed is suppressed. When the amount of cation dyeable polyester filament yarn is 45% by mass or more, the hygroscopic heat generation performance of the fiber structure is lowered due to a property of the cation dyeable polyester fiber. In addition, in a case where the amount of cation dyeable polyester filament yarn is 10% by mass or less, the fiber structure is likely to be wrinkled after being washed.

[0028] The amount of cation dyeable polyester filament yarn is preferably 20 to 40% by mass and more preferably 20 to 35% by mass.

[0029] In a production of the cation dyeable polyester filament yarn of the present invention, a method of producing polyester which is generally known is used. In addition, cationic dyeing of conventional polyester is achieved, for example, by copolymerizing 1.0 to 3.0% by mole of a 5-sodium sulfoisophthalate component with the polyester as generally known.

[0030] A total fineness of a filament yarn bundle formed of the cation dyeable polyester filament yarns used in the present invention is preferably 50 dtex to 200 dtex because the fiber structure is used for underwear, T-shirts, and the like which are directly in contact with the skin of a human. The total fineness is more preferably 60 to 180 dtex and the total fineness is particularly preferable in the range of 70 to 160 dtex. As the cation dyeable polyester filament yarns used in the present invention, a polyester multifilament having the number of filament yarns of 36 to 192 is preferably used.

[0031] The fiber structure of the present invention contains the polyacrylic synthetic fiber in an amount of more than 25% by mass and less than 60% by mass. The polyacrylic synthetic fiber is contained in an amount of more than 25% by mass, which can provide the fiber structure with heat retention. When the amount of polyacrylic synthetic fiber is 60% by mass or more, the heat retention of the fiber structure is reduced due to a property of the polyacrylic synthetic fiber, resulting in lowering of the hygroscopic heat generation performance. In addition, in a case where the polyacrylic synthetic fiber is 25% by mass or less, a mixing ratio of micro acryl, which exhibits a heat insulation effect, to the fiber structure is decreased, and thus the heat retention is not sufficiently exhibited.

[0032] The amount of polyacrylic synthetic fiber is preferably 30 to 55% by mass and more preferably 35 to 50% by mass.

[0033] A single fiber fineness of the polyacrylic synthetic fiber used in the present invention is preferably 0.6 to 2.2 dtex. For a softer texture and improvement of heat retention, the polyacrylic synthetic fiber preferably has a small fineness, but in a case where a single fiber fineness of the polyacrylic synthetic fiber is less than 0.6 dtex, it may be difficult to perform spinning and a strength of the spun yarn may be reduced. In addition, when the single fiber fineness exceeds 2.2 dtex, a texture tends to be stiff for use particularly of innerwear and the like which are directly in contact with the skin of a human. In this respect, the single fiber fineness of the polyacrylic synthetic fiber is more preferably 0.6 dtex to 1.5 dtex.

[0034] The polyacrylic synthetic fiber used in the present invention is preferably used in the form of a spun yarn from the viewpoint of improving the heat retention. In addition, in this case, a count of the spun yarn is preferably 30 S to 100 S in a cotton count because the fiber structure is used for underwear, T-shirts, and the like which are directly in contact with the skin of a human. More preferably, a spun yarn with a cotton count of 30 S to 60 S is used from the viewpoint of a thickness and heat retention of the fiber structure. A fiber length is generally used in the range of 38 to 52 mm.

[0035] In addition, in the present invention, a spun yarn obtained by mixing the viscose rayon fiber or/and the polyacrylic synthetic fiber is preferably used for the polyacrylic synthetic fiber. The polyacrylic fiber referred in the present invention refers to a polyacrylic fiber obtained by copolymerizing or adding other compounds to an acrylic composition in addition to a regular type polyacrylic fiber formed of polyacrylonitrile, and an example of the polyacrylic fiber includes a polyacrylic fiber modified to an anti-pilling type, a water absorbing type, or the like.

[0036] The fiber structure of the present invention contains the spandex fiber in an amount of more than 3% by mass and less than 15% by mass. Therefore, a moderate elongation and gaps between knitted fabric loops can be increased, such that it is possible to smoothly follow movements of a body. As a result, wearing comfort is more effectively improved. The amount of spandex fiber is preferably 4 to 13% by mass and more preferably in a range of 4 to 12% by mass.

[0037] As the spandex yarn used for the present invention, the one with an elastic recovery percentage of 90% or more

at the time of stretching of 200% is preferable. When the elastic recovery percentage at the time of stretching of 200% is less than 90%, a knitted fabric may have come loose when repeatedly worn. In addition, a knit structure and a knit density can be arbitrarily set depending on an intended use.

[0038] A total fineness of filament yarns formed of the spandex fiber used in the present invention is preferably in a range of 15 dtex to 50 dtex and more preferably in a range of 20 to 45 dtex because the fiber structure is used for underwear, T-shirts, and the like which are directly in contact with the skin of a human. In addition, the spandex fiber is used in a form of general filament yarn (filament) and the number of filaments in the spandex fiber is preferably 1 to 3.

[0039] Further, in the fiber structure of the present invention, it is important that the fiber structure has a nap formed on a front surface or a back surface thereof. A raising process is performed to raise a surface layer of the fiber structure and form a nap thereon, thereby obtaining a fabric thickness, such that excellent heat retention can be realized. As a surface which is subjected to the raising process, a surface where the cation dyeable polyester filament yarns are mainly exposed to the surface layer is preferable. In a case of raising a surface of the fiber structure where spun yarns are exposed to the surface layer, the spun yarns may be cut and thus fine fluff may be generated by the raising process.

[0040] In addition, the cation dyeable polyester filament yarn having a single fiber fineness of 0.6 dtex or more is preferable from the viewpoint of suppressing a fluff generation. In a case where the single fiber fineness is less than 0.6 dtex, fluff may be generated by the raising process similarly to the case of spun yarns. In addition, the single fiber fineness of the cation dyeable polyester filament yarn is preferably 6.0 dtex or less and more preferably 0.8 to 5.5 dtex because the fiber structure is used for underwear, T-shirts, and the like which are directly in contact with the skin of a human.

[0041] An example of the fiber structure of the present invention may preferably be a knitted fabric. In addition, the viscose rayon fiber and the polyacrylic synthetic fiber can be used as either a filament yarn or a spun yarn; a preferred form of the fiber structure is a knitted fabric in which a spun yarn obtained by mixing a viscose rayon fiber and a polyacrylic synthetic fiber, a cation dyeable polyester filament yarn, and a spandex fiber are knitted to be used for underwear, T-shirts, and the like which are directly in contact with the skin, to achieve various functions.

[0042] The fiber structure of the present invention is preferably formed of a knitted fabric having a two-layer structure. In a case where the fiber structure has a single layer structure, a fabric is thin and is prone to lack of heat retention, and in addition, spun yarns are mixedly existed on a raised surface, which generate fluff. In addition, in a case where the fiber structure has a three-layer or more structure, the fiber structure is not suitable to be used for innerwear such as T-shirts, underwear, or the like due to a fabric thickness. Accordingly, to provide both heat retention and fluff generation suppression, in particular, a knitted fabric having a two-layer structure is preferable. The knitted fabric having a two-layer structure of the present invention is a knitted fabric which is knitted by a circular knit machine including a double cylinder, and knittings such as smooth knitting, double jacquard knitting, double pique knitting, ponte rome knitting, and the like are preferably used.

[0043] A preferred thickness of the fiber structure of the present invention is in a range of 1.30 to 1.80 mm.

[0044] The fiber structure of the present invention preferably has a heat retention rate of 20% or more. The heat retention rate is preferably as high as possible, and if the heat retention rate is 20% or more, a wearer can feel warm when wearing it. The heat retention rate is an index indicating whether a fabric diffuses heat with ease or difficulty. When the amount of cation dyeable polyester filament yarn or polyacrylic synthetic fiber having a low heat conductivity is increased, the heat retention rate is increased, but the hygroscopic heat generation performance is decreased due to a property of the fiber. More preferably, the heat retention rate is 25% or more.

[0045] In the present invention, furthermore, the hygroscopic heat generation performance of the fiber structure of the present invention is preferably 2.2° C. or more. The hygroscopic heat generation performance is preferable as high as possible, and if the hygroscopic heat generation performance is 2.2° C. or more, a wearer can feel warm when wearing it. Dry air (humidity: 10% RH or less) passed through a silica-gel container is fed to dry a specimen for 30 minutes or more, and then a maximum arrival temperature B of a specimen surface while air with a humidity of about 90% RH passed through ion exchange water is fed for 30 minutes, with respect to a surface temperature A when a specimen temperature is stable, is read, such that a temperature (° C.) of a difference B-A is used as a hygroscopic heat generation performance. Therefore, when the amount of viscose rayon fiber having a high hygroscopic property is increased, the hygroscopic heat generation performance is high, but when the amount of viscose rayon fiber is increased, the fiber structure is likely to be wrinkled after being washed and heat retention is reduced due to the property of the viscose rayon fiber.

[0046] In the fiber structure of the present invention, a nap is formed on a front surface or a back surface of the fiber structure by performing a raising process, but a fluff adhesion of a napped surface subjected to the raising process is preferably 4.0 grade or more. The fluff adhesion is an index indicating whether fine fluff generated on a fiber structure in a raising process is adhered to other garments with ease or difficulty when worn. In a case where a spun yarn or a filament with a small single fiber fineness is raised mainly, a yarn is likely to be cut and thus fluff is likely to be generated. In the present invention, it is preferable that a surface where the cation dyeable polyester filament yarns having a single fiber fineness of 0.6 dtex or more are exposed to the surface layer, is subjected to the raising process.

[0047] In addition, a stretch recovery percentage of the fiber structure of the present invention is preferably 80% or more. The stretch recovery percentage is a numerical value of the property in which a fabric is stretched at a certain load and then left to return to the original size thereof. When the stretch recovery percentage is less than 80%, a garment may be loose after being worn, and the garment may be not fitted when being worn again.

[0048] Further, in the fiber structure of the present invention, in addition to the viscose rayon fiber, the cation dyeable polyester filament yarn, the polyacrylic synthetic fiber, and the spandex fiber described above, a cation dyestuff non-dyeable polyester fiber, a polyester fiber obtained by copolymerizing polyester with a third component, a polyamide fiber, an acetate fiber, a natural cellulose fiber such as cotton,

hemp, pulp, and the like, a regenerated cellulose fiber other than viscose rayon, a protein fiber such as wool and the like can be used. The fiber described above constituting the fabric structure may be, for example, mixed, blended, mixed-woven, and cross-knitted.

EXAMPLES

[0049] Next, the fiber structure of the present invention will be described in detail based on examples. Here, methods of evaluating the respective properties in examples are as described below.

(1) Hygroscopic Heat Generation Performance:

[0050] A hygroscopic heat generation performance is read with a recorder in such a manner that a specimen of about 10 cm×10 cm in size is placed in a sealed container and a surface temperature sensor is mounted so that a temperature of the specimen can be measured. After starting to measure a temperature of the specimen, dry air (humidity: 10% RH or less) passed through a silica-gel container is fed from a room atmosphere at a measurement room temperature of 20° C. or less to dry the specimen. The specimen is dried for 30 minutes or more, a maximum arrival temperature B of a specimen surface while air with a humidity of about 90% RH passed through ion exchange water is fed for 30 minutes, with respect to a surface temperature A when a specimen temperature is stable, is read, such that a difference B-A is used as a hygroscopic heat generation performance (° C.).

(2) Fluff Adhesion:

[0051] A fluff adhesion test is measured according to a cellophane tape method. An adhesion surface of a cellophane tape is put on a napped surface of the specimen so as to be in contact therewith in a lateral direction, a load is applied so that the pressure is 3.9 kpa, and left for 5 seconds. The cellophane tape is gently peeled off and the same operation is repeated 5 times at other points. The cellophane tape to be used is No. CT-18/LP-18 having a width of 18 mm obtained by NICHIBAN CO., LTD. A grade is determined by comparing an amount of fluff adhered to the cellophane tape with a standard scale.

(3) Stretch Recovery Percentage:

[0052] A stretch recovery percentage is measured according to a method in JIS L1096 (2010) 8.16.2 B-1. Recovery percentages after 30 seconds and after 1 hour are measured as the stretch recovery percentage in the measurement, but the stretch recovery percentage after 1 hour is shown as that of the present invention.

(4) Heat Retention Rate:

[0053] A heat retention rate is measured according to JIS L1096 (2010) 8.27 heat retention 8.27.1 A method (isothermal method).

Example 1

[0054] 30% by mass of viscose rayon staple (1.4 dtex, 38 mm) and 70% by mass of polyacrylic fiber staple (1.0 dtex, 45 mm) were mixed by carding to obtain a spun yarn of 30 s.

[0055] The spun yarn thus obtained, a cation dyeable polyester filament yarn (84 dtex-72 filaments), and a spandex fiber (44 dtex-2 filaments) were cross-knitted by a double knitting machine with a cylinder diameter of 76.2 cm and the number of gauges of 18 gauges/2.54 cm to obtain a greige.

[0056] The greige thus obtained was processed by processes of heat-setting (185° C., 30 seconds), raising, scouring (70° C.), dyeing (115° C.), drying (130° C.), and heat-setting (130° C.). Only a surface where the cation dyeable polyester filament yarn was exposed to the surface layer was subjected to the raising process to obtain a fabric (fiber structure). As a result, the fabric (fiber structure) with a fabric mass of 330 g/m^2 containing 45% by mass of the polyacrylic fiber, 23% by mass of the viscose rayon fiber, 27% by mass of the cation dyeable polyester filament yarn, and 5% by mass of the spandex fiber in mass ratio in the fabric, was obtained.

[0057] The heat retention rate of the fabric obtained in Example 1 was evaluated. The results are shown in Table 1. The fiber structure having hygroscopic heat generation performance, fluff adhesion, stretch recovery percentage, and heat retention rate which are all good, and having high functionality as innerwear, was obtained.

Example 2

[0058] 30% by mass of viscose rayon staple (1.4 dtex, 38 mm) and 70% by mass of polyacrylic fiber staple (1.0 dtex, 45 mm) were mixed by carding to obtain a spun yarn of 40 s.

[0059] The spun yarn thus obtained, a cation dyeable polyester filament yarn (84 dtex-96 filaments), and a spandex fiber (44 dtex) were cross-knitted by a double knitting machine with a cylinder diameter of 76.2 cm and the number of gauges of 18 gauges/2.54 cm to obtain a greige.

[0060] The greige thus obtained was processed by processes of heat-setting (185° C., 30 seconds), raising, scouring (70° C.), dyeing (115° C.), drying (130° C.), and heat-setting (130° C.). Only a surface where the cation dyeable polyester filament yarn was exposed to the surface layer was subjected to the raising process to obtain a fabric (fiber structure). As a result, the fabric (fiber structure) with a fabric mass of 280 g/m^2 containing 42% by mass of the polyacrylic fiber, 18% by mass of the viscose rayon fiber, 31% by mass of the cation dyeable polyester, and 9% by mass of the spandex fiber in mass ratio in the fabric, was obtained.

[0061] The heat retention rate of the fabric obtained in Example 2 was evaluated. The results are shown in Table 1. The fiber structure having high functionality was obtained similarly to Example 1. The fabric mass is light by 50 g/m^2, as compared to Example 1, but the single fiber fineness of the cation dyeable polyester filament yarn is small, such that even though the fabric mass is light, the fiber structure having a fluffy raised surface and having the same heat retention was obtained.

Example 3

[0062] 30% by mass of viscose rayon staple (1.4 dtex, 38 mm) and 70% by mass of polyacrylic fiber staple (1.0 dtex, 45 mm) were mixed by carding to obtain a spun yarn of 40 s.

[0063] The spun yarn thus obtained, a cation dyeable polyester filament yarn (84 dtex-72 filaments), and a spandex fiber (44 dtex) were cross-knitted by a double knitting

machine with a cylinder diameter of 76.2 cm and the number of gauges of 18 gauges/2.54 cm to obtain a greige.

[0064] The greige thus obtained was processed by processes of heat-setting (185° C., 30 seconds), raising, scouring (70° C.), dyeing (115° C.), drying (130° C.), and heat-setting (130° C.). Only a surface where the cation dyeable polyester filament yarn was exposed to the surface layer was subjected to the raising process to obtain a fabric (fiber structure). As a result, the fabric (fiber structure) with a fabric mass of 300 g/m^2 containing 42% by mass of the polyacrylic fiber, 18% by mass of the viscose rayon fiber, 31% by mass of the cation dyeable polyester filament yarn, and 9% by mass of the spandex fiber in mass ratio in the fabric, was obtained.

[0065] The heat retention rate of the fabric obtained in Example 3 was evaluated. The results are shown in Table 1. The fiber structure having high heat retention was obtained similarly to Examples 1 and 2. Although the fineness of the spun yarn is smaller than that of Example 1 and the fabric mass becomes small, the fiber structure having a heat retention rate of 31% and high heat retention as innerwear was obtained.

Comparative Example 1

[0066] A fabric (fiber structure) was obtained in the same manner as in Example 1 except that a spun yarn was obtained by using only acrylic staple without using viscose rayon staple as a spun yarn. As a result of performing similar evaluations by using the obtained fabric (fiber structure), it could be confirmed that the fabric has heat retention but a hygroscopic heat generation of the fabric deteriorates as shown in Table 2.

Comparative Example 2

[0067] In Example 1, only a spun yarn and a spandex fiber were cross-knitted without using the cation dyeable polyester filament yarn. In addition, the raising process was performed on a surface where the spun yarns are exposed to the surface layer. A fabric (fiber structure) was obtained in the same manner as in Example 1 except for these conditions. As a result of performing similar evaluations by using the obtained fabric, it could be confirmed that the fabric has heat retention but a fluff adhesion of the fabric deteriorates as shown in Table 2.

Comparative Example 3

[0068] A fabric (fiber structure) was obtained in the same manner as in Example 1 except that a spun yarn was obtained by using only viscose rayon staple without using acrylic staple as a spun yarn. As a result of performing similar evaluations by using the obtained fabric, it could be confirmed that the fabric has a hygroscopic heat generation performance but heat retention of the fabric deteriorates as shown in Table 2.

Comparative Example 4

[0069] A fabric (fiber structure) was obtained in the same manner as in Example 1 except that only a spun yarn and a cation dyeable polyester filament yarn were cross-knitted without using the spandex fiber. As a result of performing similar evaluations by using the obtained fabric, it could be confirmed that the fabric has heat retention but a stretch recovery percentage of the fabric deteriorates as shown in Table 2.

Comparative Example 5

[0070] A fabric (fiber structure) was obtained in the same manner as in Example 3 except that a raising process was not performed. As a result of performing similar evaluations by using the obtained fabric, it could be confirmed that the heat retention of the fabric deteriorates as shown in Table 2.

TABLE 1

		Example 1	Example 2	Example 3
Mixing ratio	Viscose rayon fiber (% by mass)	20	18	18
	Cation dyeable polyester filament yarn (% by mass)	27	31	31
	Polyacrylic synthetic fiber (% by mass)	48	42	42
	Spandex fiber (% by mass)	5	9	9
Knitting (structure) of fiber structure		Two-layer structure	Two-layer structure	Two-layer structure
Raising process		Present	Present	Present
Single fiber fineness of filament yarn(dtex)		1.17	0.88	1.17
Hygroscopic heat generation		2.6	2.5	2.5
Fluff adhesion		4.5	4.5	4.5
Stretch recovery percentage (%) vertical/horizontal		88/83	88/85	91/85
Heat retention rate (%)		35	35	31

TABLE 2

		Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5
Mixing ratio	Viscose rayon fiber (% by mass)	0	29	68	21	18
	Cation dyeable polyester filament yarn (% by mass)	27	0	27	29	31

TABLE 2-continued

	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5
Polyacrylic synthetic fiber (% by mass)	68	66	0	50	42
Spandex fiber (% by mass)	5	5	5	0	9
Knitting (structure) of fiber structure	Two-layer structure	Two-layer structure	Two-layer structure	Two-layer structure	Two-layer structure
Raising process	Present	Present	Present	Present	Absent
Single fiber fineness of filament yarn (dtex)	1.17	—	1.17	1.17	1.17
Hygroscopic heat generation	0.5	2.6	3.1	2.5	2.5
Fluff adhesion	4.5	3.0	4.0	4.0	—
Stretch recovery percentage (%) vertical/horizontal	86/85	89/84	84/83	74/71	87/84
Heat retention lz rate (%)	33	34	19	30	18

INDUSTRIAL APPLICABILITY

[0071] The fabric structure of the present invention is not particularly limited as long as it is a garment put on a body, in addition to garments such as outerwear including T-shirts, blousons, slacks, skirts, and the like, and underwear including tights, spats, camisoles, underpants, and the like; the fabric structure of the present invention is preferably used for various garments.

1. A fiber structure comprising:

a viscose rayon fiber in an amount of more than 15% by mass and less than 40% by mass;

a cation dyeable polyester filament yarn in an amount of more than 10% by mass and less than 45% by mass;

a polyacrylic synthetic fiber in an amount of more than 25% by mass and less than 60% by mass; and

a spandex fiber in an amount of more than 3% by mass and less than 15% by mass, wherein

the fiber structure has a nap formed on a front surface or a back surface thereof.

2. The fiber structure according to claim **1**, wherein the fiber structure is formed of a knitted fabric having a two-layer structure.

3. The fiber structure according to claim **1**, wherein a single fiber fineness of the cation dyeable polyester filament yarn is 0.6 dtex or more.

4. The fiber structure according to claim **1**, wherein a heat retention rate of the fiber structure is 20% or more.

5. The fiber structure according to claim **1**, wherein a hygroscopic heat generation of the fiber structure is 2.2° C. or more.

6. The fiber structure according to claim **1**, wherein a fluff adhesion of the surface of the fiber structure having the nap is 4.0 grade or more.

7. The fiber structure according to claim **1**, wherein a stretch recovery percentage of the fiber structure is 80% or more.

8. A garment obtained by using the fiber structure according to claim **1**.

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