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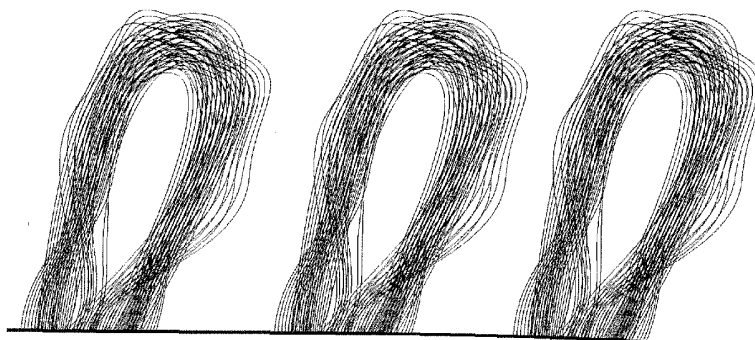
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(54) **TOWEL PRODUCT**

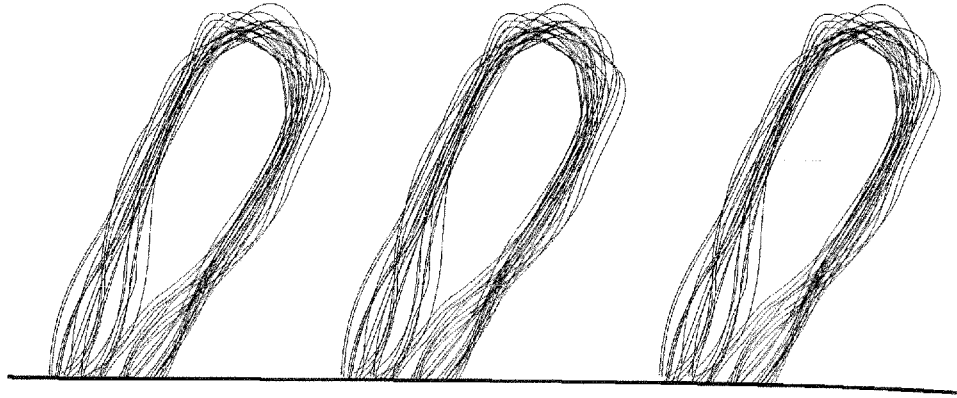
(57) To provide a towel product having a pile formed of a non-twisted yarn, wherein good touch feeling, lightness, and breathability are improved and sewing thereof can be eased. A non-twisted yarn having a fine count (a yarn count of 40-90) is employed as a pile yarn, as compared to the conventional art. This contributes to enhancement of good touch feeling, lightness, and breathability and suppression of bulkiness feeling. Further, this contributes to maintaining of heat-retaining property. As a result thereof, a towel cloth having a pile formed of a non-twisted yarn can be applied to clothes. The non-twisted yarn is formed by twisting fibers of raw cotton that has an effective fiber length (34-42 mm) longer than the usual. Further, the non-twisted yarn is adjusted its adjustable range of reverse within a predetermined range (-10~10%). Accordingly, fluff come-out can be suppressed as well as stability of quality can be achieved.

FIG. 1A



conventional towel product

FIG. 1B



present embodiment

Description

[TECHNICAL FIELD]

5 **[0001]** The present invention relates to a towel product. More specifically, the present invention relates to a towel product having piles formed of a non-twisted yarn.

[BACKGROUND ART]

10 **[0002]** A towel that is manufactured by using a non-twisted yarn as a pile yarn has been proposed (e.g., patent literature 1).

[0003] Typically, a twisted yarn is used for towels. The twisted yarn is formed by twisting raw cotton fibers. To the contrary, a non-twisted yarn is formed in such a manner that twisting of a twisted yarn is reversely twisted to make it a non-twisted state.

15 **[0004]** A pile formed of a non-twisted yarn is fluffily inflated and retains a large amount of air between fibers. Accordingly, a towel having a pile formed of a non-twisted yarn is characterized by soft touch feeling and lightness property for its bulky appearance, as compared to a typical towel having a pile formed of a twisted yarn. Further, the towel having a pile formed of a non-twisted yarn, that traps water in a gap between fibers, is characterized by a high water absorbency property. Still further, the towel having a pile formed of a non-twisted yarn is characterized by high heat-retaining property and thus is sometimes used as a toweling blanket.

20 **[0005]** In many cases, a non-twisted yarn having a yarn count of 16-30 is employed for the towel having a pile formed of a non-twisted yarn.

[CITATION LIST]

25

[PATENT LITERATURE]

[0006] [PATENT LITERATURE]
JP 2000-079072A

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[SUMMARY OF INVENTION]

[TECHNICAL PROBLEM]

35 **[0007]** The inventor has devoted himself to innovative enhancement in a field of towel industry. For example, the inventor has been studying about application of towel cloth to clothes by utilizing water absorbency property and heat-retaining property that the towel cloth has. Bathrobes have already been marketed as clothes made of towel cloth. The inventor further tries to apply the towel cloth to shirts, indoor gowns, nightclothes, and clothes for babies.

40 **[0008]** As described above, a towel having a pile formed of a non-twisted yarn has characteristics excellent in good touch feeling, lightness, breathability, etc., in addition to water absorbency property and heat-retaining property. However, a level of characteristics required for clothes that always keep close contact with skin differs from a level of characteristics required for bath towels that is used for wiping wet body after bathing. More specifically, it is concluded that the conventional towel cloth is acceptable as a towel; however, further enhancement in characteristics is required when the towel cloth is used as clothes.

45 **[0009]** In addition, in a case where the towel cloth having a pile formed of a non-twisted yarn is applied to clothes, there are the following problems.

[0010] As described above, the pile formed of a non-twisted yarn shows bulkiness. Generally speaking, bath towels having bulkiness in appearance tends to be preferred for their high-class image.

50 **[0011]** On the other hand, in a case where the towel cloth having a pile formed of a non-twisted yarn is applied to clothes, the towel cloth is required for an advantage of easy sewing. Bulkiness makes the towel cloth thick, and the thickness of towel cloth makes sewing difficult.

55 **[0012]** The present invention is made in order to solve the above described problem. Therefore, a purpose of the present invention is to provide a towel product having a pile formed of a non-twisted yarn that enhances good touch feeling, lightness property, and breathability, as compared to those of the conventional towel products made by the conventional technology.

[SOLUTION TO PROBLEM]

[0013] The towel product of the present invention that solves the above described problem has a pile that is formed of a non-twisted yarn having a yarn count of 40-90 (both inclusive).

[0014] More preferably, the pile is formed of a non-twisted yarn that has a yarn count of 50-80 (both inclusive).

[0015] By using a non-twisted yarn having a fine count, as compared to a yarn used in the conventional art, improved good touch feeling, lightness property, breathability, hygroscopicity, and water absorbency property can be obtained. Further, the use of the non-twisted yarn having a fine count makes sewing easier.

[0016] Further preferably, the non-twisted yarn is formed by twisting fibers of raw cotton having an effective fiber length of 34-42 mm (both inclusive).

[0017] This enables securing of strength even with a yarn having a fine count and suppression of fluff come-out.

[0018] Further preferably, the non-twisted yarn is adjusted within an adjustable range of reverse between -10% and 10% (between equal to or more than -10% and equal to or less than 10%).

[0019] Further preferably, the non-twisted yarn is adjusted within an adjustable range of reverse between -8% and -3% or between 3% and 8%.

[0020] This ensures securing of strength even with a yarn having a fine count and suppression of fluff come-out.

[0021] Still further preferably, the towel product includes clothes.

[ADVANTAGEOUS EFFECT OF INVENTION]

[0022] According to the present invention, good touch feeling, lightness property, and breathability can be enhanced, and easy sewing is achieved. Further, the fluff come-out can be remarkably suppressed. This allows application of towel cloth to clothes. In this case, the heat-retaining property is maintained.

[BRIEF DESCRIPTION OF DRAWINGS]

[0023] Fig. 1 is a comparative illustration in which a pile of a towel product of an embodiment is compared to a pile of the conventional towel product.

[DESCRIPTION OF EMBODIMENTS]

[0024] A towel product of a present embodiment uses a non-twisted yarn having a fine count as a pile yarn, compared to the usual pile yarn (first structure). Further, the non-twisted yarn is formed by twisting fibers of raw cotton having an effective fiber length longer than the usual (second structure). Still further, a degree of reverse twisting (untwisting) is adjusted within a predetermined range (third structure). Characteristics of the respective structures and effects thereof will be described below.

[0025] Meanwhile, the towel product has a pile length of 4-7 mm. This falls within almost the same range of a typical pile length of a pile formed of a non-twisted yarn (usual pile length).

~First Structure and Effects Thereof~

[0026] Conventionally, as a pile formed of a non-twisted yarn, a non-twisted yarn having a yarn count of 16-30 is generally used. On the other hand, the present embodiment employs, as a pile formed of a non-twisted yarn, a non-twisted yarn having a yarn count of 40-90 (both inclusive), more preferably, a non-twisted yarn having a yarn count of 50-80 (both inclusive). For example, the present embodiment employs a non-twisted yarn having a yarn count of 60 as a pile yarn.

[0027] Fig. 1 is a conceptual diagram in which a comparison is made between a structure of the usual pile and a structure of a pile of the present embodiment. Fig. 1A illustrates the structure of the usual pile, and Fig. 1B illustrates the structure of the pile of the present embodiment.

[0028] The inventor made a comparison of various characteristics between one example of the usual pile formed of a non-twisted yarn (yarn count of 30) and a trial product of a pile formed of a non-twisted yarn (yarn count of 60) of the present embodiment. A comparison result thereof is shown in Table 1, and the inventor's opinion about the result follows. For the sake of reference, characteristics of a typical pile formed of a twisted yarn (yarn count of 30) (reference example) will also be listed in Table 1.

[Table 1]

TEST ITEM	TEST METHOD	TEST LAB	UNIT	twisted yarn reference examples	non-twisted yarn		ratio to convention
					conventional examples	embodiment	
Thickness	JIS L 1096 A (load of 0.3kpa)	QTEC	mm	4.07	5.18	4.15	80%
Lightness	JIS L 1096 weight per unit area	In-houseLAB	g/m ²	386.1	302.5	213.5	71%
Breathability	JIS L 1096/1018	QTEC	cm ³ /cm ² ·S	65.3	60.5	117.6	194%
Drying Property (time to 1% of water rates)	JIS L 1096A	In-houseLAB	min.	200	150	110	73%
Hygroscopicity	QTEC(64%RH)	QTEC	%	5.9	6.2	6.50	105%
Water Absorbency (maximum speed)	JIS L 1907 Surface Water Absorption Test	Boken Quality Evaluation Institute	ml/s	0.2	0.11	0.14	127%
Water Absorbency (performance index)	JIS L 1907 Surface Water Absorption Test	Boken Quality Evaluation Institute	INDEX	870	514	633	123%
Heat-retaining	JIS L 1018/1096	QTEC	%	52.7	62.5	59.10	95%
Warm/Cold Feeling in Contact (Q-max)	Max Heat Absorption Speed (Q-max)	QTEC	W/cm ²	0.125	0.092	0.106	115%

Good Touch Feeling

[0029] The present embodiment employs a pile that is formed of a non-twisted yarn having a fine count, as compared to the usual pile formed of a non-twisted yarn. This degrades rigidity of the pile. As a result thereof, the pile tends to easily fall down. Both of the usual pile and the pile of the present embodiment have a pile length of 6 mm. In a case where a weak pressure (0.3kpa) is applied, a thickness of the conventional towel product is 5.18 mm, whereas a thickness of the towel product of the present embodiment is 4.15 mm. That is, the thickness of the towel product of the present embodiment is 80% of the thickness of the conventional towel product. Specifically, when the pile is brought into contact with skin, the pile of the towel product of the present embodiment falls down remarkably, as compared to the usual pile.

[0030] When a pile has high rigidity and stands extremely, a contact area that contacts skin becomes small. This provides a consumer of the towel product a hard touch feeling. Alternatively, if a pile lies down from the beginning, bounce is lost. Therefore, it is impossible to provide a consumer with a soft touch feeling. To the contrary, if a pile falls down according to a gradually increasing pressure, a contact area that contacts skin gradually increases. This gives a better impression of a soft touch feeling to the consumer. As a result thereof, no uncomfortable feeling is provided to the consumer even when the consumer wears such towel product as clothes.

Lightness Property

[0031] According to the present embodiment, use of a pile that is formed of a non-twisted yarn having a fine count ensures improvement of lightness property, as compared to a case of using the usual pile. Unit weight of the conventional towel product is 302.5 g/m², whereas unit weight of the towel product of the present embodiment is 213.5 g/m². In other words, the unit weight of the towel product of the present embodiment is 71% of the unit weight of the conventional towel product.

[0032] The inventor executed questionnaire to consumers in addition to the above described comparison. From a result of the questionnaire, the inventor confirmed that consumers can feel the improvement of lightness when weight reduction of more than 20% is achieved. The conventional towel product is also characterized by lightness; however, more improved lightness can be achieved in the towel product of the present embodiment. Therefore, the towel product of the present embodiment provides not only lightness in quantity but also a feeling of lightness to consumers. This also provides no uncomfortable feeling to consumers even when the consumers wear clothes made of the towel product of the present embodiment.

Breathability

[0033] The present embodiment employs a pile that is formed of a non-twisted yarn having a fine count, as compared to the usual pile. This makes a gap between piles wider. As a result thereof, breathability improves. An index of breathability of the conventional towel product is 60.5 cm³/cm²·S, whereas an index of breathability of the towel product of the present embodiment is 117.6 cm³/cm²·S. In other words, the index of breathability of the towel product of the present embodiment is 194% of the index of breathability of the conventional towel product. The excellent breathability of about 2 times of the breathability of the conventional towel product is achieved in the towel product of the present embodiment. In a case where a consumer wears clothes made of the towel product having such breathability, the consumer does not feel sweatiness when he sweats.

Drying Property

[0034] Improvement of breathability involves enhancement of drying property. An index of drying property of the conventional towel product is 150 min., whereas an index of drying property of the towel product of the present embodiment is 110 min. In other words, the drying property of the towel product of the present embodiment is 73% of the drying property of the conventional towel product. This means that clothes made of the towel product of the present embodiment can be dried quickly after the clothes are washed. Further, the comfortable good touch feeling maintains because the clothes dry quickly even when the clothes become sweaty.

Hygroscopicity Property and Water Absorbency Property

[0035] Generally, water absorbency property of a towel becomes higher as bulkiness of the towel becomes larger. Therefore, in the course of studying the present invention, it was considered that use of a pile that is formed of a non-twisted yarn having a fine count reduces bulkiness, and this involves possible degradation of hygroscopicity property and water absorbency property. However, contrary to the inventor's expectation, the hygroscopicity property and the water absorbency property enhanced about 10-20% in a comparison test.

[0036] Accordingly, in a case where a consumer wears the clothes made of the towel product of the present embodiment, a comfortable good touch feeling continues because the clothes can constantly absorb sweat.

Heat-retaining Property

[0037] In a step of studying the present invention, it was considered that use of a pile that was formed of a non-twisted yarn having a fine count would sacrifice (degrade) heat-retaining property. However, according to a comparison test, an index of heat-retaining property of the conventional towel product was 62.5%, whereas an index of heat-retaining property of the towel product of the present embodiment was 59.1%. That is, the index of heat-retaining property of the towel product of the present embodiment was about the same as (5% smaller than) the index of heat-retaining property of the conventional towel product. An index of heat-retaining property of a typical towel product shown as a reference example (formed of a twisted yarn having a yarn count of 30) is 52.7%. In comparison with this reference example, it is found that the non-twisted yarn of the present embodiment maintains characteristics of the heat-retaining property. In other words, the towel product of the present embodiment can maintain the heat-retaining property equivalent to the conventional towel product.

[0038] It is considered as a consequence of an effect that many small gaps are made within a pile based on a combination of the first structure, and the below mentioned second structure and third structure. More specifically, because the gaps retain air, the air within the gaps becomes immovable. This makes the heat-retaining property high.

Warm/Cold Feeling in Contact

[0039] A warm/cold feeling in contact is an index showing a warm feeling how a consumer feels when a fabric contacts his skin. Larger value shows more amount of heat transfer from skin to fabric. The larger heat transfer makes the consumer feel cool. To the contrary, smaller value shows less amount of heat transfer from skin to fabric. The smaller heat transfer makes the consumer not feel cool when the fabric contacts his skin.

[0040] An index of warm/cold feeling of the conventional towel product is 0.092 W/cm², whereas an index of warm/cold feeling of the towel product of the present embodiment is 0.106 W/cm². Generally, if a difference of the index of warm/cold feeling between two samples is equal to or less than 0.03 W/cm², it is determined that there is no significant difference in feeling. An index of warm/cold feeling of the reference example (formed of a twisted yarn having a yarn count of 30) shown for the reference sake is 0.125 W/cm². In comparison with this reference example, it is found that the towel product of the present embodiment maintains characteristics of the warm/cold feeling of a non-twisted yarn. More specifically, the towel product of the present embodiment can maintain characteristics of the warm/cold feeling of the conventional towel product.

Bulkiness Reduction

[0041] Further, in a case where a towel in which a non-twisted yarn is employed as pile yarn is applied to clothes, if the towel is bulky, the towel as cloth becomes thick. As a result thereof, it becomes hard to sew and form the towel into clothes.

[0042] In the present embodiment, a weak pressure is applied to the cloth so that the thickness of the cloth is reduced by about 20%. As the pressure to be applied is made larger, the cloth can be made thinner. This contributes to easy sewing. Release of the application of pressure allows recovery of the thickness (bulkiness) of the cloth.

[0043] As described above, in the present embodiment, a trade-off relationship does not appear between a strong point and a weak point. More specifically, a weak point can be improved while the strong point of the conventional towel product is maintained.

[0044] Incidentally, as a result of the verification test, in a case where a non-twisted yarn having a yarn count of less than 40 (thicker than a yarn count of 40) was used for a pile, a remarkable difference in effects was not seen, as compared to the conventional towel product. Meanwhile, in a case where a non-twisted yarn having a yarn count greater than 90 (finer than a yarn count of 90) was used for a pile, satisfactory water absorbency property and heat-retaining property could not be obtained.

[0045] If a non-twisted yarn having a yarn count of 50-80 (both inclusive) was used for a pile, the above described effects could be ensured.

~Second Structure and Effects Thereof~

[0046] There has been a problem of fluff come-out because bundling among fibers is weak in a non-twisted yarn. Specifically, the first structure remarkably shows this problem.

[0047] In the conventional art, there has been the following methods for preventing the fluff come-out. For example,

a loop pile is woven into a short length, and a surface is covered with a fine yarn. However, in these methods, soft touch feeling, lightness property, and drying property are lost. That is, effects of the present invention is lost.

[0048] Further, in a case where the towel cloth is applied to clothes, since the clothes always keep tight contact with skin, the fluff come-out raises a problem of adhesion of the fluff to skin. As a result thereof, the fluff come-out comes to draw attention. This also may give unpleasant feeling to consumers.

[0049] If the fluff come-out further progresses, the effects of the present invention may be lost. For example, the progress of fluff come-out may dramatically degrade a feel of soft touch to skin.

[0050] As described above, it is important to solve the problem of the fluff come-out.

[0051] Meanwhile, when raw cotton is dissolved, fibers having various kinds of lengths can be obtained. Generally, as cotton is made of longer fibers, less number of seems are made when they are formed into a yarn. This makes the yarn strong. Here, as cotton is made of longer fibers, the fibers become thinner.

[0052] Generally, cotton fibers obtained in the following manner are employed: Raw cotton having an effective fiber length of 20-30 mm (both inclusive) are mixed and raw cotton having an average value of the effective fiber length of 24-25 mm are selected therefrom.

[0053] In contrast, in the present embodiment, the non-twisted yarn is formed by twisting cotton fibers of raw cotton having an effective fiber length of 34-42 mm (both inclusive). More preferably, the non-twisted yarn is formed by twisting cotton fibers of raw cotton having an effective fiber length of 37-42 mm (both inclusive).

[0054] The inventor repeated verification tests, and obtained the following result. If raw cotton has an effective fiber length of 34 mm or more, the resulting yarn can have strength bearable in the practical use, and the fluff come-out can be suppressed. Further, if raw cotton has an effective fiber length of 37 mm or more, sufficient practical strength can be ensured disregarding kinds of raw cotton.

[0055] An effective fiber length of 42 mm is an upper limit of a fiber length of popular raw cotton. Although a fiber length varies depending on raw cotton, a fiber having a length beyond 42 mm cannot be obtained.

[0056] Accordingly, even in a case where the first structure (a yarn having a fine count) is employed, the fluff come-out can be suppressed, as even compared to the conventional towel product. Further, satisfactory strength can be secured even when the yarn is fine.

~Third Structure and Effects Thereof~

[0057] The fluff come-out is suppressed by the above described second structure (fiber length of cotton) to assure stable quality. The inventor employs a third structure in order to achieve continuous stable quality.

[0058] Generally, a typical non-twisted yarn is adjustable within an adjustable range of reverse between -3% and 3% (For example, after a fiber is twisted for 100 times, the fiber is then reversely twisted (untwisted) for 97-103 times.). In contrast, the non-twisted yarn of the present embodiment is adjustable within an adjustable range of reverse between -10% and 10% (For example, after a fiber is twisted for 100 times, the fiber is then reversely twisted (untwisted) for 90-110 times.). More preferably, the non-twisted yarn of the present embodiment is adjustable within an adjustable range of reverse between -8% and -3% (-3% is not inclusive). Alternatively, the non-twisted yarn of the present embodiment is adjustable within an adjustable range of reverse between 3% and 8% (3% is not inclusive).

[0059] Normally, the adjustable range of reverse is strictly (narrowly) controlled for the purpose of securing characteristics of a non-twisted yarn. While repeating the verification tests, the inventor noticed the following fact. Employment of the first structure (a yarn having a fine count) ensures obtainment of characteristics equivalent to or more than the characteristics of the conventional towel product even if the control of the adjustable range of reverse is more or less eased (widened).

[0060] If twisting is not completely reversed, the fluff come-out can be suppressed, and stable quality can be achieved. Further, this secures strength even if a yarn having a fine count is used.

[0061] However, the inventor repeated the verification tests to confirm the following fact. When the adjustable range of reverse is less than -10% (not inclusive) or more than 10% (not inclusive), such yarn rapidly loses characteristics of a non-twisting yarn. In such case, such yarn rather comes to have characteristics closer to those of a soft twisted yarn.

~Effects~

[0062] The first structure (a yarn having a fine count) enhances good touch feeling, lightness property, and breathability and eases sewing.

[0063] The second structure (fiber length of cotton) and the third structure (adjustable range of reverse) contribute to suppression of fluff come-out. This achieves stable quality.

[0064] With the first to the third structures, many small gaps can be made in a pile. As a result thereof, hygroscopicity and water absorbency property are enhanced, and heat-retaining property is maintained.

[0065] Production of the above described effects enables application of a towel cloth having a pile formed of a non-

twisted yarn to clothes.

<Supplementary Note>

5 ~Supplementary Note 1~

[0066] Generally, in the towel industry, as a towel can show more bulkiness, the towel is preferred as having more high-class image. Further, as a towel is formed of a yarn having a thicker count, the towel can show more bulkiness. Therefore, a person skilled in the art has been interested in how to effectively use a yarn having a thick count.

10 **[0067]** Meanwhile, the inventor has been studying how to apply a towel cloth to also clothes for dairy use such as shirts, in addition to bathroom things such as bathrobes.

In the course of studying, the inventor focused on a yarn having a fine count.

[0068] In other words, an idea of a present invention is directed to another side of the technological orientation of the person skilled in the art. Therefore, it is difficult for a person skilled in the art to conceive the idea of the present invention with ease.

~Supplementary Note 2~

20 **[0069]** When the present invention was made, the inventor concerned about such a possibility that, if a yarn having a fine count is employed, heat-retaining property, i.e., one of the material characteristics of a non-twisted yarn, is degraded. Therefore, the inventor performed a plenty of verification tests and confirmed that the heat-retaining property would not be degraded in so far as a yarn count falls within a predetermined range.

[0070] More specifically, the inventor conceived of the present invention based on a plenty of verification tests and examination of the test results. Thus, it is difficult for a person skilled in the art to readily conceive the present invention.

25 [INDUSTRIAL APPLICABILITY]

[0071] The present invention is suitable to be applied to clothes such as shirts, indoor gowns, nightclothes, and clothes for babies. The present invention can be applied not only to clothes but, as a matter of course, also to other towel products including towels.

Claims

35 1. A towel product comprising:

a pile formed of a non-twisted yarn having a yarn count of 40-90 (both inclusive).

40 2. The towel product according to claim 1, wherein the pile is formed of a non-twisted yarn having a yarn count of 50-80 (both inclusive).

3. The towel product according to claim 1 or claim 2, wherein the non-twisted yarn is formed by twisting fibers of raw cotton that has an effective fiber length of 34-42 mm (both inclusive).

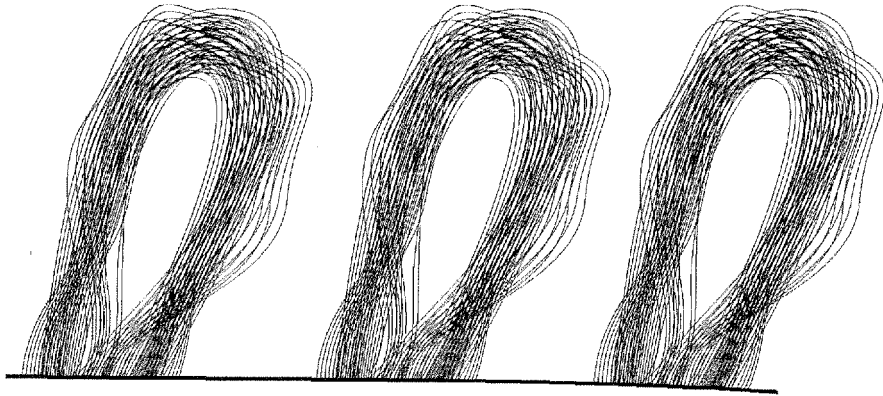
45 4. The towel product according to any one of claim 1 to claim 3, wherein the non-twisted yarn is adjusted within an adjustable range of reverse of -10 to 10%.

50 5. The towel product according to any one of claim 1 to claim 3, wherein the non-twisted yarn is adjusted within an adjustable range of reverse of -8 to -3% or 3 to 8%.

6. The towel product according to any one of claim 1 to claim 5, wherein the towel product comprises clothes.

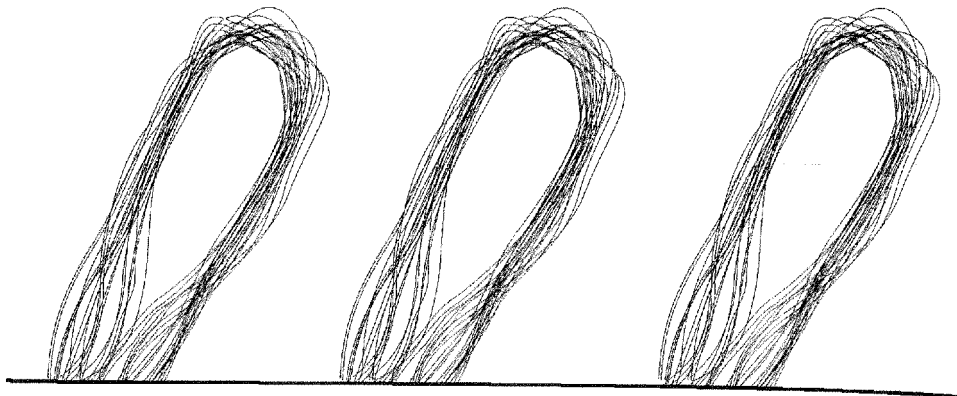
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FIG. 1A



conventional towel product

FIG. 1B



present embodiment

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/059563

A. CLASSIFICATION OF SUBJECT MATTER

D03D27/00(2006.01)i, A41D31/00(2006.01)i, A47K10/02(2006.01)i, D02G3/02
(2006.01)i, D03D1/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D03D1/00-27/18, A41D31/00, A47K10/02, D02G3/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014

Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2009-228140 A (Teijin Fibers Ltd.), 08 October 2009 (08.10.2009), paragraphs [0001] to [0002], [0044] to [0045], [0048], [0052], [0060] to [0063] & WO 2009/104607 A1 & TW 201009148 A	1, 2, 6
X	JP 2002-30543 A (Kabushiki Kaisha Matsufuji Terry), 31 January 2002 (31.01.2002), claims; paragraphs [0008], [0010], [0015] (Family: none)	1
X Y A	JP 2007-154363 A (Teijin Fibers Ltd.), 21 June 2007 (21.06.2007), paragraphs [0012] to [0016], [0020] to [0021], [0025], [0028] to [0029] (Family: none)	1, 2, 6 3, 4 5

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search
09 June, 2014 (09.06.14)

Date of mailing of the international search report
17 June, 2014 (17.06.14)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/059563

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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REFERENCES CITED IN THE DESCRIPTION

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- JP 2000079072 A [0006]