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(54) **TOWEL PRODUCT**

HANDTUCHPRODUKT

PRODUIT DE SERVIETTE

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(56) References cited:

**WO-A1-2007/100077 CN-A- 101 165 246
JP-A- H0 797 745 JP-A- H09 117 388
JP-A- H09 117 388 JP-A- 2007 177 373**

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Description**[TECHNICAL FIELD]**

[0001] The present invention relates to a towel product having a honeycomb weave structure.

[BACKGROUND ART]

[0002] Honeycomb weave towel products have been widely used mainly in Europe as a birthplace thereof. Recently, the honeycomb weave towel products are used also in Japan.

[0003] For example, the honeycomb weave towel products are used widely in many fields such as towels, bath towels, and gowns, e.g., towel-made robes, in addition to kitchen dishcloths. The honeycomb weave is sometimes referred to as a waffle fabric since it has a texture similar to Waffles (see, patent literature 1).

[0004] Unlike a typical towel having loop piles on its surface, a honeycomb weave towel has a woven fabric structure obtained by deforming a plain weave which is woven in a manner that a single warp yarn is crossed over a single weft yarn to continue weaving in this manner. Thus deformed woven fabric is characterized by having a concave-convex surface generated by shrinkage of fabric itself. This structure can provide the following advantageous effects.

[0005] For example, when one wipes off his sweat, he presses a towel against his skin softly. At the time, only convex parts of the towel touch his skin to absorb moisture. The moisture absorbed by the convex parts is partially evaporated and partially transferred to concave parts of the towel. As a result thereof, the convex parts can always keep a dry state.

[0006] With the above feature, the user of the towel can be provided with a dry touch feeling every time when the user repeats to wipe off his sweat. In other words, no stickiness remains in the towel after the use thereof. Equivalent effect can be produced when the above described feature is applied to a bath mat to be used in a bath room.

[0007] Further, the honeycomb weave towel is thinner than a towel having loop piles on its surface. Therefore, the honeycomb weave towel is compact. Still further, in the honeycomb weave towel, loosening of pile yarns hardly occurs and fluff comes out only a little.

[CITATION LIST]**[PATENT LITERATURE]**

[0008] Document JP H07 97745 discloses a core yarn produced by winding yarn around the outer circumference of a hollow filament. The hollow filament is composed of a polymer of a fiber-forming component having essentially a C-shaped cross section and the winding yarn is composed of cotton fiber.

[0009] In document CN 101 165 246 a hollow cotton towel is disclosed that is made through spinning blended yarn with water soluble fiber and cotton, weaving, and dissolving the water soluble fiber in water.

[0010] Document JP H09 117388 discloses a synthetic fiber spun yarn which is used as a warp and one or two or more kinds selected from synthetic fiber, synthetic fiber crimp yarn, synthetic fiber wooly yarn, synthetic fiber spun yarn, and natural fiber such as cotton, hemp, and wool are used as a weft. The warp and the weft are woven into a woven texture expressing recess/projection such as honeycomb weaving and sponge weaving. [PATENT LITERATURE 1] Japanese Unexamined Patent Application, First Publication No. 2009-160212

[SUMMARY OF INVENTION]**[TECHNICAL PROBLEM]**

[0011] However, in different perspectives, the above described feature of the honeycomb weave towel product may raise another problem.

[0012] Generally, it is preferable for towel products to have a well-balanced performance between water absorbency, a drying property, lightness, and a good touch feeling. For example, towels are frequently used in order to wipe off wet body after bathing, and thus the water absorbency is a performance essential for towels. Towels are used every day. Also, towels are used by people of all ages from children to the elderly. Therefore, it is preferable to achieve weight reduction. Since a towel directly touches a human skin, and thus its touch feeling affects on a comfort level of the user. Rough touch feeling and hard touch feeling make the user uncomfortable. Further, indoor drying for a long time invites growth of bacteria and generation of unpleasant smell. Drying with a drying machine for a long time invites waste of energy.

[0013] On the other hand, the conventional honeycomb weave towel has the following problem with respect to the water absorbency, the lightness, and the good touch feeling.

[0014] When wiping off moisture, one presses a towel against his skin softly. At the time, only convex parts touch his skin. In other words, a touch area is small. As a result thereof, satisfactory water absorbency cannot be realized.

[0015] Weaving densely achieved by using thick yarns improves the water absorbency. However, this leads to a heavy weight and a hard touch feeling.

[0016] Further, in the honeycomb weave towel, a densely woven structure is further shrunk to generate concaves and convexes on its surface. Therefore, weight per area becomes relatively large. More specifically, the honeycomb weave towel degrades in lightness for its compact appearance.

[0017] With the use of thin ordinary yarns, the lightness improves. However, since the thin ordinary yarns have a little shrinkage ratio, it is impossible for the thin ordinary

yarns to make a large concave-convex surface in a fabric. In other words, it is difficult to feel a three-dimensional appearance of the honeycomb weave. Further, the water absorbency degrades.

[0018] Still further, the honeycomb weave towel provides a bounce feeling by the concave-convex surface. However, in comparison with the towel with loop piles, the honeycomb weave towel has less soft touch feeling. Specifically, the touch feeling touched by the convex parts is hard.

[0019] A combination of the ordinary yarns made by less number of twisting and a loosely woven structure improves a soft touch feeling. However, both of the ordinary yarns made by less number of twisting and the loosely woven structure have a little shrinkage ratio. Thus, it is impossible to make a large concave-convex surface in the fabric. This makes it difficult to provide a feeling of three-dimensional appearance of the honeycomb weave. Further, the water absorbency degrades.

[0020] As described above, the conventional honeycomb weave towel has problem with respect to the water absorbency, the lightness, and the good touch feeling. Improvement of any one of the above listed performances degrades other performances. More specifically, it is difficult to improve all of the water absorbency, the lightness, and the good touch feeling at the same time.

[0021] The present invention is made to solve the above described problem. The present invention is directed to provide a towel product capable of maintaining features of honeycomb weave produced by the conventional technique as well as improving the water absorbency, the lightness, and the good touch feeling more than the towel products produced by the conventional technique.

[SOLUTION TO PROBLEM]

[0022] In order to solve the above described problem, the towel product of the present invention has a honeycomb weave structure and is woven by hollow yarns as claimed in claim 1.

[0023] In the honeycomb weave structure, warp yarns and weft yarns are shrunk. Therefore, mutual binding becomes loose. This ensures that hollow portions are not crushed remarkably even with the use of hollow yarns. In other words, shapes of hollow yarns can be kept.

[0024] With the above described structure, the water absorbency, the lightness, the good touch feeling, and the drying property can be improved more than the towel products produced by the conventional technique.

[0025] The hollow yarns have a hollow ratio of a range between 30% and 60%.

[0026] With the above range of hollow ratio, a person can actually feel, specifically, improved lightness.

[0027] Further preferably, the hollow yarns have a hollow ratio of a range between 40% and 50%.

[0028] With the above range of hollow ratio, more specific effects can be produced, and a concern about main-

taining of shapes of hollow yarns can be eliminated.

[0029] The hollow yarns are made by twisting fibers of raw cottons having an effective fiber length of a range between 25 mm and 42 mm.

[0030] Since the hollow yarns have a small cross sectional area, strength in an axis direction of the hollow yarns needs to be checked. That is, the hollow yarns have a problem in durability.

[0031] With the above described structure, it is possible to prevent the durability from being degraded.

[0032] Further preferably, the hollow yarns are made by twisting fibers of raw cottons having an effective fiber length of a range between 25 mm and 37 mm.

[0033] As a result, satisfactory durability can be produced as well as requirements of economic efficiency and practicality can be satisfied.

[ADVANTAGEOUS EFFECT OF INVENTION]

[0034] According to the present invention, features of a honeycomb weave produced by the conventional technique can be maintained as well as water absorbency, lightness, and a good touch feeling can be improved more than the honeycomb weave produced by the conventional technique.

[BRIEF DESCRIPTION OF DRAWINGS]

[0035] Fig. 1 is a schematic structural view.

[Description of Embodiments]

--Basic Structure--

[0036] An embodiment of the present invention will be described below. Fig. 1 illustrates a structural view of a honeycomb weave structure. A honeycomb weave structure of the present embodiment is similar to a typical honeycomb weave structure. The honeycomb weave structure is a woven fabric structure obtained by deforming a plain weave which is woven in a manner that a single warp yarn is crossed over a single weft yarn to continue weaving in this manner. The honeycomb weave structure is characterized in having a concave-convex surface obtained by shrinking a fabric itself. More detailed descriptions thereof will be omitted here.

--Featured Structure 1--

[0037] It is a feature of the present embodiment to employ hollow yarns having a hollow ratio of a range between 30% and 60%.

[0038] Meanwhile, in a case where the hollow ratio is less than 30%, satisfactory effects as mentioned below cannot be produced. For example, in a case where the hollow ratio is less than 30%, a weight of product decreases by less than 20%. This fails to make a person feel improvement of lightness. On the other hand, in a

case where the hollow ratio is equal to or more than 30%, a weight of product decreases by more than 20%. This ensures to make a person feel substantial effects such as improvement of lightness.

[0039] According to a search performed by the present inventor, almost all the persons could feel difference in lightness between the honeycomb weave towel woven by using the ordinary yarns (non- hollow yarn) and the 20% weight-decreased honeycomb weave towel (using the hollow yarn).

[0040] In a case where the hollow ratio is beyond 60%, a hollow yarn itself cannot maintain its shape. More specifically, the hollow ratio of 60% is an upper limit of practically usable hollow yarns.

[0041] Further, a preferable hollow ratio is a range between 40% and 50%. This range produces more pleasant effect as well as eliminates a concern about maintaining of a shape of hollow yarns.

--Advantageous Effects--

[0042] In the honeycomb weave structure, warp yarns and weft yarns are caused to be shrunk, and thus mutual binding is loose. Therefore, the hollow structure would not be crushed remarkably even when the hollow yarns having a hollow ratio of a range between 30% and 60% are used. In other words, shape of the hollow yarns can be maintained. Further, descriptions will be made below as to water absorbency, lightness, a good touch feeling, and a drying property.

[0043] For example, with the use of hollow yarns having a hollow ratio of 50%, weight of the resulting product will be decreased by more than 30%. Therefore, one can actually feel improvement of lightness.

[0044] Meanwhile, with the use of hollow yarns having the hollow ratio of 50%, the hollow structure is slightly crushed and deformed. This decreases bulkiness of towel in comparison with a towel woven by using the ordinary yarns (non- hollow yarn). In order to keep the bulkiness of the towel at a level equivalent to the bulkiness of the towel woven by the ordinary yarns, it is necessary to weave the towel with a higher structural density (i.e., to weave the towel with the more number of yarns). As a result thereof, it becomes impossible to decrease the weight of towel by 50% even with the use of the hollow yarns having the hollow ratio of 50%.

[0045] When wiping off a small amount of moisture such as sweat, one presses a towel against his skin softly. At the time, only convex parts touch his skin. If the amount of moisture is small, the moisture can be absorbed only with the convex parts.

[0046] When one wipes off his wet body after bathing, one presses the towel against his body to cause the towel to closely touch his skin. The hollow yarns having the hollow ratio of the range between 30% and 60% has highly improved flexibility and pliability in comparison with those of the ordinary yarns. As a result thereof, the concave parts also come to touch his skin in addition to the

convex parts. In other words, a touch area increases to provide him with satisfactory water absorbency.

[0047] A hollow yarn having the hollow ratio of the range between 30% and 60% has remarkably improved flexibility and pliability in comparison with those of the ordinary yarns. This can provide a soft good touch feeling of a towel itself.

[0048] Further, the use of hollow yarns having the hollow ratio of the range between 30% and 60% facilitates quick drying.

[0049] As described above, the lightness, the water absorbency, the good touch feeling, and the drying property can be improved more than those of a towel produced by the conventional technique.

[0050] On the other hand, even with the use of the hollow yarns having the hollow ratio of the range between 30% and 60%, features of the honeycomb weave of the conventional technique can be maintained.

20 --Newly Arising Problem--

[0051] However, in a case where a towel is woven only with hollow yarns having a specially large hollow ratio, e.g., hollow ratio of the range between 30% and 60%, the resulting towel is weak in strength as a fabric and, therefore, would be damaged largely by washing thereof. Therefore, such towel lacked in value (durability) as an item for sale. Therefore, it was essential to study how to weave a towel when weaving the towel using hollow yarns.

[0052] Meanwhile, as a result of various experiments, the inventor confirmed that the hollow structure would not be crushed remarkably if hollow yarns had the hollow ratio of a value equal to or less than 60% (see, the above description). More specifically, there is no problem in strength in a cross sectional direction of the hollow yarns. Next, it becomes necessary to study about strength in an axis direction of the hollow yarns.

40 --Featured Structure 2--

[0053] The hollow yarns of the present embodiment are characterized in that fibers of raw cottons having an effective fiber length of a range between 25 mm and 42 mm are twisted.

[0054] When raw cottons are decomposed, fibers of various lengths can be obtained. Generally, longer fiber cottons can provide yarns having only a small number of junctions when they are formed into yarns. This can provide increased strength.

[0055] Generally, in manufacturing a towel, fibers of raw cottons having an effective fiber length of a range between 20 mm and 25 mm are mixed, and cotton yarns having an average value of the effective fiber length of a range between 22 mm and 23 mm are used.

[0056] To the contrary, in a case where hollow yarns are made by twisting fibers of raw cottons having an effective fiber length less than 25 mm, satisfactory strength

cannot be obtained. However, in a case where hollow yarns are made by twisting fibers of raw cottons having an effective fiber length equal to or more than 25 mm, practically durable strength can be obtained.

[0057] An effective fiber length of 42 mm is an upper limit of a fiber length of typical raw cottons. No fiber having a length beyond 42 mm can be obtained although there are differences in fiber length between raw cottons.

[0058] Further, a preferable effective fiber length is of a range between 25 mm and 37 mm. Fibers having the effective fiber length of 42 mm can be obtained only from limitative specific kinds of raw cottons. Therefore, gathering fibers having the effective fiber length of 42 mm is difficult in the light of economic efficiency and practicality. Under the circumstances, fibers of raw cottons having the effective fiber length of the range between 25 mm and 37 mm are distributed in markets for the use of luxury garments and beddings. Use of the distributing raw cottons for the sake of towels satisfies requirements of both of the economic efficiency and practicality.

--Advantageous Effects--

[0059] Use of the hollow yarns made by twisting fibers of raw cottons having the effective fiber length of a range between 25 mm and 42 mm ensures obtaining of satisfactory strength in its axis direction. As a result thereof, it becomes possible to obtain durability for repetitive washing.

--Supplementary Note--

[0060] For achieving the present invention, the inventor studied about the use of hollow yarns having a hollow ratio of 20% for producing a honeycomb weave towel. It is noted that, for the following reasons, hollow yarns having the hollow ratio of about 20% are generally used for various towels in order to achieve weight saving thereof.

[0061] When hollow yarns having the hollow ratio of 20% are used, a hollow structure is somewhat crushed to be deformed. Therefore, bulkiness decreases in comparison with towels woven by the ordinary yarns. In order to maintain the bulkiness equivalent to the bulkiness of the towel woven by the ordinary yarns, it is necessary to weave the towel with high structural density (with the increased number of yarns). As a result thereof, even with the hollow yarns having the hollow ratio of 20%, the weight could be decreased by only from 10% to 15%.

[0062] Satisfied improvement in lightness could not be actually felt from the decrease of weight by 10%. More specifically, decrease of weight by 10% does not meet an actual feeling of decrease of weight by 10%.

[0063] According to a research performed by the inventor, only a small number of persons could feel a difference in lightness between a honeycomb weave towel woven by the ordinary yarns and a honeycomb weave towel of which weight is decreased by 10%.

[0064] Apart from the honeycomb weave structure, the

inventor made a hollow yarn having a hollow ratio of 50% and studied about the use thereof. For example, in a simple plain woven fabric structure, a towel is woven in a manner that warp yarns and weft yarns are crossed alternately up and down, and thus the warp yarns and the weft yarns are mutually constrained, i.e., the warp yarns bind the weft yarns and the vice versa. Consequently, if hollow yarns having the hollow ratio of 50% are used, a hollow structure thereof will be crushed, and thus a plain woven fabric structure cannot be maintained as well as features of hollow yarns cannot be maintained. Therefore, it was essential for the inventor to study the use of hollow yarns having the hollow ratio of 50% while understanding features of a towel structure.

[0065] The inventor paid an attention to a fact that, in the honeycomb weave structure, the mutual binding between the warp yarns and the weft yarns is loose since the warp yarns and the weft yarns are shrunk. Then, the inventor studied about application of the hollow yarns having the hollow ratio of 50%. Finally, the inventor achieved the present invention.

[0066] The inventor could conceive of the present invention on the basis of his knowledge about both of features of the honeycomb weave structure and features of the hollow yarns.

[INDUSTRIAL APPLICABILITY]

[0067] The present invention is specifically effective for the use of products such as towels, bath towels, and towel-made gowns. Further, the present invention is effective not only for towel products but also for materials of clothes such as room wears and pajamas and for materials of articles for infants.

Claims

1. A towel product comprising a honeycomb weave structure **characterised in that** the towel product is woven by hollow yarns made of raw cottons; wherein the hollow yarns have a hollow ratio of a range between 30% and 60%; and wherein each of the hollow yarns is made by twisting fibers of raw cottons having an effective fiber length of a range between 25 mm and 42 mm.
2. The towel product according to claim 1, wherein the hollow yarns have a hollow ratio of a range between 40% and 50%.
3. The towel product according to claim 1 or 2, wherein each of the hollow yarns is made by twisting fibers of raw cottons having an effective fiber length of a range between 25 mm and 37 mm.

Patentansprüche

1. Handtuchprodukt aufweisend:

eine Wabengewebestruktur, 5
dadurch gekennzeichnet, dass das Hand-
 tuchprodukt aus hohlen Garnen, die aus Roh-
 baumwollen hergestellt sind, gewoben ist;
 wobei die hohlen Garne ein Hohlverhältnis im 10
 Bereich zwischen 30% und 60% haben; und
 wobei jedes der hohlen Garne durch Zwirnen
 von Fasern aus Rohbaumwollen hergestellt ist,
 die eine effektive Faserlänge in einem Bereich
 zwischen 25mm und 42mm haben.

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2. Handtuchprodukt nach Anspruch 1, wobei die hohlen Garne ein Hohlverhältnis in einem Bereich zwischen 40% und 50% haben.

3. Handtuchprodukt nach Anspruch 1 oder 2, wobei jedes der hohlen Garne durch Zwirnen von Fasern aus Rohbaumwollen hergestellt ist, die eine effektive Faserlänge in einem Bereich zwischen 25mm und 37mm haben.

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Revendications

1. Produit de serviette comprenant une structure de tissage en nid d'abeilles **caractérisé en ce que** le produit de serviette est tissé par des fils creux constitués de cotons bruts ; 30 dans lequel les fils creux présentent un rapport de creux d'un intervalle de 30 % à 60 % ; et dans lequel chacun des fils creux est constitué en 35 torsadant des fibres de cotons bruts ayant une longueur de fibre effective d'un intervalle de 25 mm à 42 mm.

2. Produit de serviette selon la revendication 1, dans lequel les fils creux présentent un rapport de creux d'un intervalle de 40 % à 50 %. 40

3. Produit de serviette selon la revendication 1 ou 2, dans lequel chacun des fils creux est constitué en 45 torsadant des fibres de cotons bruts ayant une longueur de fibre effective d'un intervalle de 25 mm à 37 mm.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H0797745 B [0008]
- CN 101165246 [0009]
- JP H09117388 B [0010]
- JP 2009160212 A [0010]