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(54) **DENIM BASED FABRIC**

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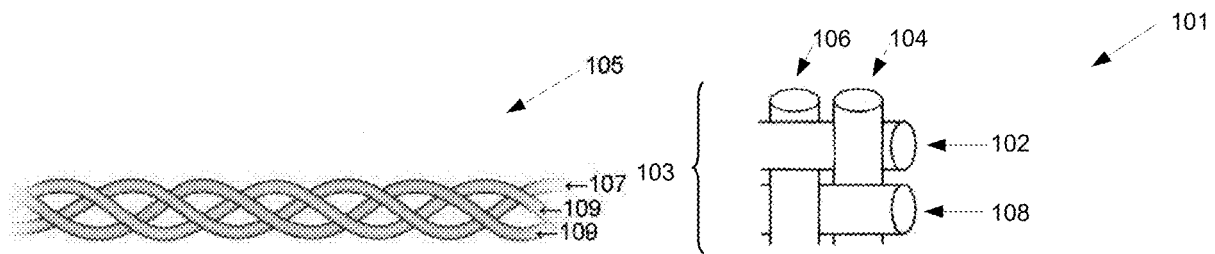
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(57)

ABSTRACT

A denim based fabric is provided. The denim based fabric is made from a blended yarn of denim and polypropylene fibers. Strings of the blended yarn are woven in plain, 2x1 twill, 3x1 twill, satin, or basket weave patterns, among others to produce the denim based fabric. The blended yarn is made from 15% to 50% polypropylene fiber and 85% to 50% cotton fiber by weight. In a preferred embodiment, the blended yarn is made from 30% polypropylene fiber and 70% cotton fiber by weight.



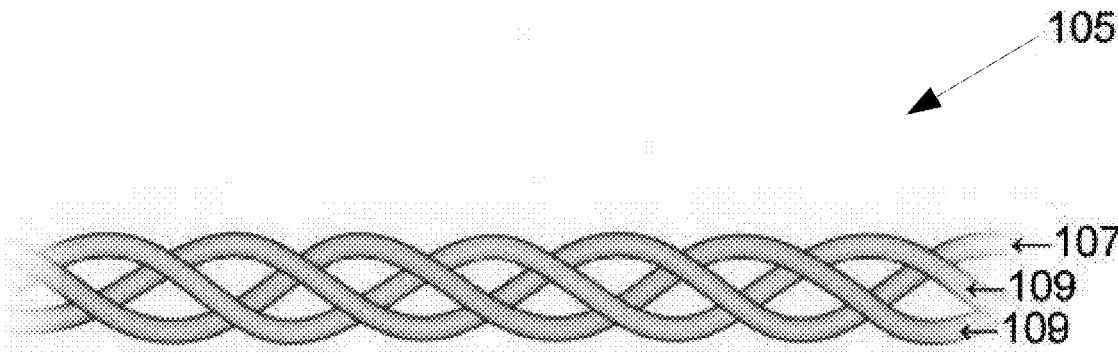


FIG. 1A

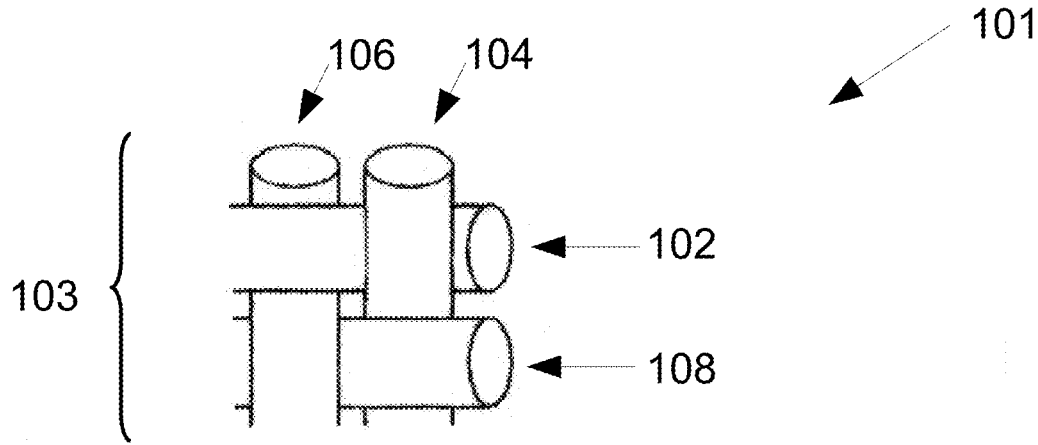


FIG. 1B

101

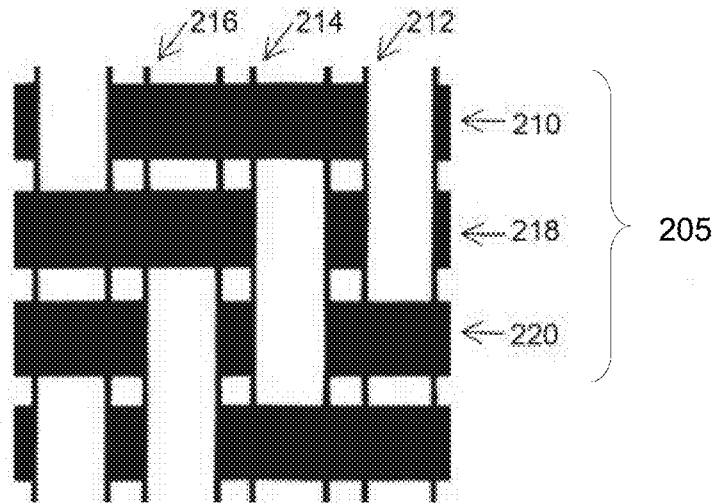


FIG. 2A

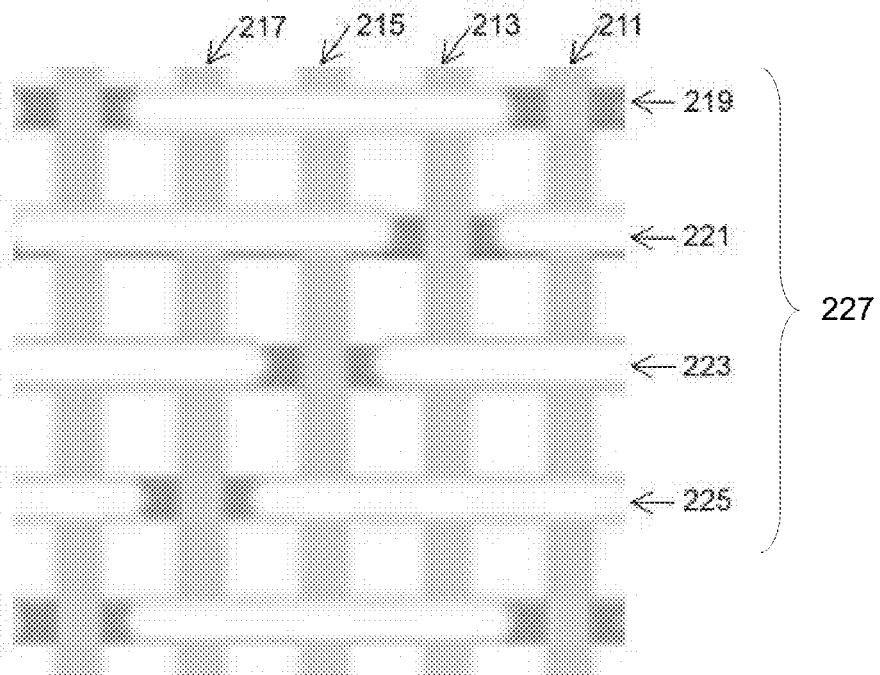


FIG. 2B

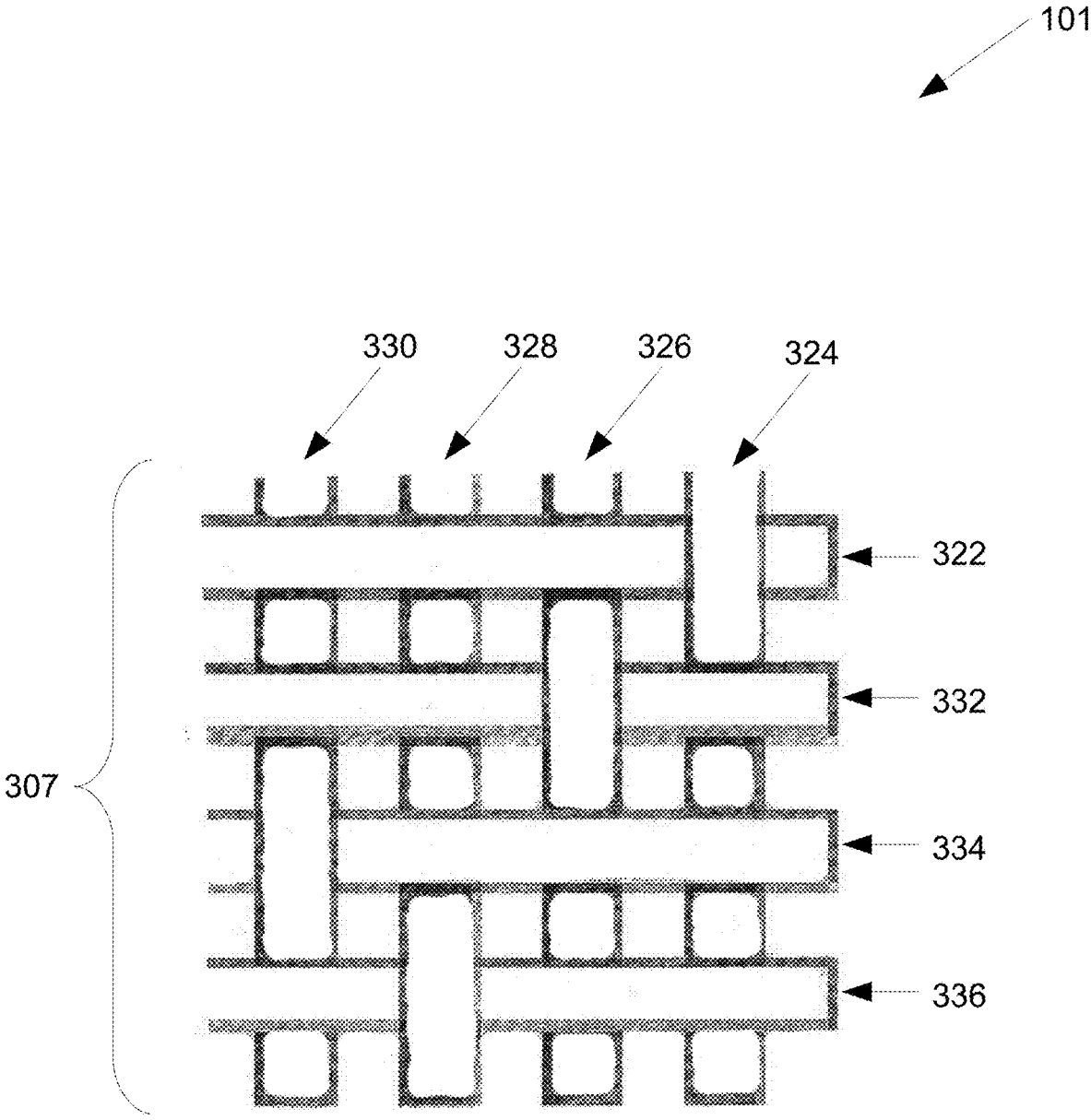


FIG. 3

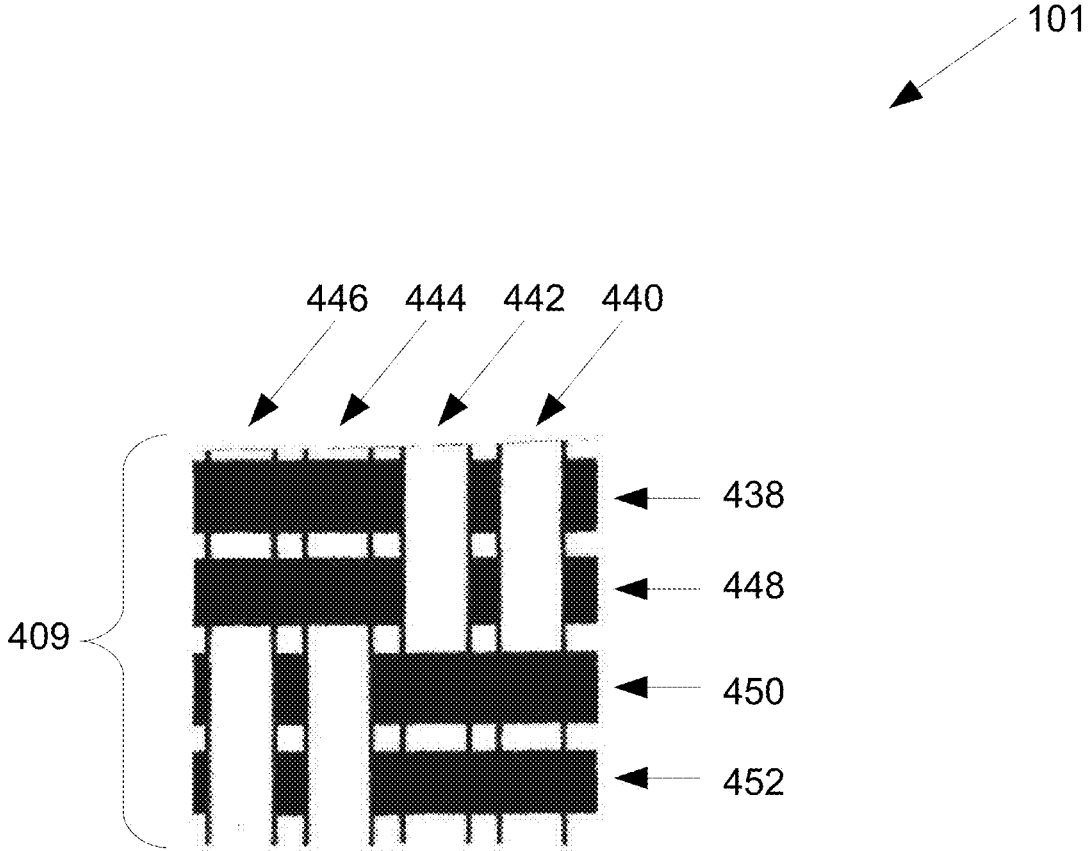


FIG. 4

DENIM BASED FABRIC

CLAIM OF PRIORITY

[0001] This application claims priority to U.S. Application Ser. No. 62/742,643 filed on Oct. 8, 2018, the contents of which are herein incorporated by reference in its entirety.

FIELD OF THE EMBODIMENTS

[0002] The field of the present invention and its embodiments relate to a denim based fabric produced by interlacing threads of cotton and polypropylene fibers in a blended yarn. Strings of the blended yarn are woven in a weave pattern to produce a repeatable section of the denim based fabric.

BACKGROUND OF THE EMBODIMENTS

[0003] Clothing and garment industry partakes in a significant proportion of the world economy. Extensive number of clothing products are produced by large populations of employees in diverse set of countries. Denim is a cotton based natural fabric that has a long history in the clothing and garment industry. Denim products make up a large portion of the products produced by the clothing and garment industry.

[0004] Cotton is a plant that is harvested to produce cotton fiber. Cotton fiber is extracted from a harvest of the cotton plant and spun to produce cotton thread. The cotton thread is woven by in factories in a variety patterns to produce the denim fabric. The denim fabric is used to produce a variety of natural clothing and garment products. However, despite their natural properties, denim based clothing and garment products are heavy because of the high density of the cotton fiber. As such, a lighter denim based product (produced by blending cotton fiber with other materials) may be highly desirable. Examples of blended clothing products are provided below.

[0005] For instance, U.S. Pat. No. 9,034,777 pertains to optionally dyed woven fabrics and garments that exhibit fire resistance, arc resistance, moisture management (water release rate and wicking), and abrasion resistance without the undesirable addition of topical treatments.

[0006] U.S. Pat. No. 6,666,235 pertains to a lightweight and durable high-performance denim fabric. More particularly, a lightweight durable denim comprising a high strength component and a natural fiber, which is constructed into a fabric having both about 15% lighter weight and about 15% higher durability than standard denim.

[0007] KR 19960029501A pertains to a fabric with excellent light and with heat retaining property, dyed in a color and washed by cooled outer air and, excellent durability.

[0008] US 2013/0101781 A1 pertains to a woven or knitted fabric with improved properties that is formed of core spun yarns each including a (i) core yarn of polyester filaments, mechanical stretch polyester filaments, fire retardant polyester filaments, spandex filaments, high strength polyester filaments, nylon filaments, mechanical stretch nylon filaments, Kevlar filaments, polypropylene filaments or a combination thereof; and (ii) a wrapper of cotton staple fibers, polyester staple fibers, rayon staple fibers, modal staple fibers, fire retardant staple fibers or a blend thereof. The fabric may be produced by ring spun, open-end or vortex. The fabric may be produced by different weaving and knitting methods. Regular yarns are mixed in the fabric.

[0009] Various systems and methodologies are known in the art. However, their structure and means of operation are substantially different from the present disclosure. The other inventions fail to solve all the problems taught by the present disclosure. At least one embodiment of this invention is presented in the drawings below and will be described in more detail herein.

SUMMARY OF THE EMBODIMENTS

[0010] The present invention and its embodiments relate to a denim based fabric. In an example embodiment of the present invention, the denim based fabric may include a blended yarn. The blended yarn may be made from 15% to 50% polypropylene fiber and 85% to 50% cotton fiber by weight.

[0011] In another embodiment of the present invention, a denim based fabric is described. The denim based fabric may include a blended yarn. The blended yarn may be made from 30% other fibers and 70% cotton fiber by weight. In an example scenario, the other fibers may include a polypropylene fiber and a spandex fiber. Alternatively, the other fibers may include a polypropylene fiber and a polyester fiber.

[0012] In yet another embodiment of the present invention, a method of producing a denim based fabric is described. The method includes weaving a repeatable section of the denim based fabric with a blended yarn of about 30% polypropylene fiber and about 70% cotton fiber by weight in a twill pattern by placing a first horizontal string of the blended yarn below a first vertical string of the blended yarn and above second and third vertical strings of the blended yarn, placing a second horizontal string of the blended yarn below the first and second vertical strings and above the third vertical string and placing a third horizontal string of the blended yarn above the first vertical string and below the second and third vertical strings.

[0013] It is an object of the present invention to provide a low weight denim based fabric.

[0014] It is an object of the present invention to provide a flexible denim based fabric.

[0015] It is an object of the present invention to blend the denim and polypropylene fibers in plain, twill, satin, and basket weave patterns to generate a blended yarn used in the production of the denim based fabric.

[0016] It is an object of the present invention to provide a high strength denim based fabric.

[0017] These and other features, aspects and advantages of the present invention will become better understood with reference to the following drawings, description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIGS. 1A-B show a blended yarn used to weave a repeatable section in a plain weave pattern of an embodiment of the present invention.

[0019] FIGS. 2A-B show repeatable sections in twill weave patterns of embodiments of the present invention.

[0020] FIG. 3 shows a repeatable section in a satin weave pattern of an embodiment of the present invention.

[0021] FIG. 4 shows a repeatable section in a basket weave pattern of an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] The preferred embodiments of the present invention will now be described with reference to the drawings. Identical elements in the various figures are identified with the same reference numerals.

[0023] Reference will now be made in detail to each embodiment of the present invention. Such embodiments are provided by way of explanation of the present invention, which is not intended to be limited thereto. In fact, those of ordinary skill in the art may appreciate upon reading the present specification and viewing the present drawings that various modifications and variations can be made thereto.

[0024] FIGS. 1A and 1B show a blended yarn 105 used to weave a repeatable section of a denim based fabric 101 in a plain weave pattern. Denim is a fabric that is made out of a cotton fiber. The cotton fiber is a product of a cotton plant. The cotton fiber is made out of almost pure cellulose. As such, the cotton fiber is used in natural fabric production. A natural fabric, such as denim, is produced from strings of the cotton fiber. Denim and other natural fabrics (made from the cotton fiber) are soft and breathable.

[0025] However, cotton based fabrics (such as denim) are usually heavy because of the cotton fiber's density. The cotton fiber has a density of approximately 1.55 g/cm³. As such, denim based clothing are comfortable to wear but are heavier than synthetic alternatives. Heavy weight associated with denim clothing may be overcome by producing a denim based fabric woven from strings of a blended yarn 105. The blended yarn 105 may include a polypropylene fiber 107 and cotton fiber(s) (109) interlaced together. Interlacing pattern (s) and number(s) of the polypropylene and cotton fibers (107 and 109) may be varied to produce the blended yarn 105. Furthermore, the blended yarn 105 may be weaved to produce the denim based fabric 101 that is lighter than a pure cotton based denim. The denim based fabric 101 may maintain the natural properties of the pure cotton based denim while having a lowered weight compared to the pure cotton based denim.

[0026] Polypropylene fiber 107 has a density of approximately 0.90 g/cm³. The blended yarn 105 may weigh less than a pure cotton yarn. As such, the blended yarn 105 may allow the denim based fabric 101 to preserve natural properties of the pure cotton based denim fabric (such as breathability and softness) while weighing less than the pure cotton based denim.

[0027] The polypropylene fiber 107 may make up a range from 15% to 50% of a weight of the blended yarn 105. The cotton fiber 109 may make up a range from 85% to 50% of the weight of the blended yarn 105. In a preferred embodiment, the polypropylene fiber 107 may make up 30% of the weight of the blended yarn 105. The cotton fiber 109 may make up 70% of the weight of the blended fiber 105.

[0028] The polypropylene fiber 107 may include a hollow fiber. A tube based shape may allow the polypropylene fiber 107 to have a low density, a high strength, and/or a high flexibility, among other properties. Additionally, the blended yarn 105 of the polypropylene and cotton fibers (107 and 109) may be dyed with a coloring solution. A choice of the coloring solution may be depended on use and demand scenarios associated with the denim based fabric 101. Furthermore, a weight of the denim based fabric 101 may be between 6 oz. to about 15 oz. per square yard.

[0029] In an example scenario, strings of the blended yarn 105 may be woven in a plain weave pattern 103 to produce the repeatable section of the denim based fabric 101. The repeatable section may be produced by placing a first horizontal string 102 of the blended yarn 105 below a first vertical string 104 of the blended yarn 105 and above a second vertical string 106 of the blended yarn 105. A second horizontal string 108 of the blended yarn 105 may be placed above the first vertical string 104 below the second vertical string 106 to form the repeatable section.

[0030] The placement of the vertical strings (104 and 106) is from right to left, starting with the first vertical string 104 on the right and ending with the second vertical string 106 on the left. The placement of the horizontal threads (102 and 108) is from top to bottom, starting with the first horizontal string 102 at the top and ending with the second horizontal string 108 at the bottom. Alternatively, the direction of the vertical and horizontal strings (104, 106, 102, and 108) may be reversed to produce a mirror image pattern of the plain weave pattern 103. Alternative orders and locations may also be used to weave the vertical and horizontal strings (104, 106, 102, and 108) into the repeatable section in the plain weave pattern 103.

[0031] In an alternative embodiment, the blended yarn 105 may include an interlacing of the cotton fiber and other fibers. The other fibers may include spandex and polypropylene fibers. Inclusion of the spandex fiber may produce the denim based fabric 101 that is stretchable. In a preferred embodiment the blend of the polypropylene and spandex fibers may make up 30% of the weight of the blended yarn 105. The cotton fiber 109 may make up 70% of the weight of the blended yarn 105.

[0032] In yet another alternative embodiment, the blended yarn 105 may include an interlacing of the cotton fiber and other fibers. The other fibers may include polyester and polypropylene fibers. In a preferred embodiment the blend of the polypropylene and polyester fibers may make up 30% of the weight of the blended yarn 105. The cotton fiber 109 may make up 70% of the weight of the blended yarn 105.

[0033] FIG. 2A shows a repeatable section of the denim based fabric 101 in a 2x1 twill weave pattern 205. The 2x1 twill weave pattern 205 may be produced by placing a first horizontal string 210 of the blended yarn below a first vertical string 212 of the blended yarn and above second and third vertical strings (214 and 216) of the blended yarn. A second horizontal string 218 of the blended yarn may be placed below the first and second vertical strings (212 and 214) and above the third vertical string 216. A third horizontal string 220 of the blended yarn may be placed above the first vertical string 212 and below the second and third vertical strings (214 and 216) to form the repeatable section.

[0034] The placement of the vertical strings (212, 214, and 216) is from right to left, starting with the first vertical string 212 on the right, continuing with the second vertical string 214, and ending with the third vertical string 216 on the left. The placement of the horizontal strings (210, 218, and 220) is from top to bottom, starting with the first horizontal string 210 at the top, continuing with the second horizontal string 218, and ending with the third horizontal string 220 at the bottom. Alternatively, the direction of the vertical and horizontal strings (212, 214, 216, 210, 218, and 220) may be reversed to produce a mirror image pattern of the 2x1 twill weave pattern 205. Alternative orders and locations may also be used to weave the vertical and horizontal strings

(212, 214, 216, 210, 218, and 220) into the repeatable section in the 2×1 twill weave pattern 205.

[0035] FIG. 2B shows a repeatable section of the denim based fabric 101 in a 3×1 twill weave pattern 227. The 3×1 twill weave pattern 227 may be produced by placing a first horizontal string 219 of the blended yarn below a first vertical string 211 of the blended yarn and above second, third, and fourth vertical strings (213, 215, and 217) of the blended yarn. A second horizontal string 221 may be placed above the first vertical string 211, below the second vertical string 213, and above the third and fourth vertical strings (215 and 217). A third horizontal string 223 may be placed above the first and second vertical strings (211 and 213), below the third vertical string 215, and above the fourth vertical string 217. A fourth horizontal string 225 may be placed above the first, second, and third vertical strings (211, 213, and 215) and below the fourth horizontal string 217 to form the repeatable section.

[0036] The placement of the vertical strings (211, 213, 215, and 217) is from right to left, starting with the first vertical string 211 on the right, continuing with the second and third vertical strings (213 and 215), and ending with the fourth vertical string 217 on the left. The placement of the horizontal strings (219, 221, 223, and 225) is from top to bottom, starting with the first horizontal string 219 at the top, continuing with the second and third horizontal strings (221 and 223), and ending with the fourth horizontal string 225 at the bottom. Alternatively, the direction of the vertical and horizontal strings (211, 213, 215, 217, 219, 221, 223, and 225) may be reversed to produce a mirror image pattern of the 3×1 twill weave pattern 227. Alternative orders and locations may also be used to weave the vertical and horizontal strings (211, 213, 215, 217, 219, 221, 223, and 225) into the repeatable section in the 3×1 twill weave pattern 227.

[0037] FIG. 3 shows of a repeatable section of the denim based fabric 101 a satin weave pattern 307. The satin weave pattern 307 may be produced by placing a first horizontal string 322 of the blended yarn below a first vertical string 324 of the blended yarn and above second, third, and fourth vertical strings (326, 328, and 330) of the blended yarn. A second horizontal string 332 of the blended yarn may be placed below the first vertical string 324, above the second vertical string 326, and below the third and fourth vertical strings (328 and 330). A third horizontal string 334 of the blended yarn may be placed above the first, second, and third vertical strings (324, 326, and 328) and below the fourth vertical string 330. Furthermore, a fourth horizontal string 336 of the blended yarn may be placed above the first and second vertical strings (324 and 326), below the third vertical string 328, and above the fourth vertical string 330 to form the repeatable section.

[0038] The placement of the vertical strings (324, 326, 328, and 330) is from right to left, starting with the first vertical string 324 on the right, continuing with the second and third vertical strings (326 and 328), and ending with the fourth vertical string 330 on the left. The placement of the horizontal strings is from top to bottom, starting with the first horizontal string 322 at the top, continuing with the second and third horizontal strings (332 and 334), and ending with the fourth horizontal string 336 at the bottom. Alternatively, the direction of the vertical and horizontal strings (324, 326, 328, 330, 322, 332, 334, and 336) may be reversed to produce a mirror image pattern of the satin

weave pattern 307. Alternative orders and locations may also be used to weave the vertical and horizontal strings (324, 326, 328, 330, 322, 332, 334, and 336) into the repeatable section in the satin weave pattern 307.

[0039] FIG. 4 shows a repeatable section of the denim based fabric 101 in a basket weave pattern 409. The basket weave pattern 409 may be produced by placing first and second horizontal strings (438 and 448) of the blended yarn below first and second vertical strings (440 and 442) of the blended yarn and above third and fourth vertical strings (444 and 446) of the blended yarn. Third and fourth horizontal strings (450 and 452) of the blended yarn may be placed above the first and second vertical strings (442 and 440) and below the third and fourth vertical strings (444 and 446) to form the repeatable section.

[0040] The placement of the vertical strings is from right to left, starting with the first vertical string 440 on the right, continuing with the second and third vertical strings (442 and 444), and ending with the fourth vertical string 446 on the left. The placement of the horizontal strings is from top to bottom, starting with the first horizontal string 438 at the top, continuing with the second and third horizontal strings (448 and 450), and ending with the fourth horizontal string 452 at the bottom. Alternatively, the direction of the vertical and horizontal strings (440, 442, 444, 446, 438, 448, 450, and 452) may be reversed to produce a mirror image pattern of the basket weave pattern 409. Alternative orders and locations may be used to weave the vertical and horizontal strings (440, 442, 444, 446, 438, 448, 450, and 452) into the repeatable section.

[0041] The repeatable sections of the plain, 2×1 twill, 3×1 twill, satin, and basket weave patterns (103, 205, 227, 307, and 409) may be replicated to produce the denim based fabric 101. Examples of the plain, 2×1 twill, 3×1 twill, satin, and basket weave patterns (103, 205, 227, 307, and 409) of weaving the blended yarn 105 were not provided in a limiting sense. The strings of the blended yarn may be woven together in other weave patterns to produce the denim based fabric 101.

[0042] A method of providing a denim based fabric is also described. The method includes a weaving a repeatable section of the denim based fabric with a blended yarn of about 30% polypropylene fiber and about 70% cotton fiber by weight in a twill pattern by placing a first horizontal string of the blended yarn below a first vertical string of the blended yarn and above second and third vertical strings of the blended yarn, placing a second horizontal string of the blended yarn below the first and second vertical strings and above the third vertical string, and placing a third horizontal string of the blended yarn above the first vertical string and below the second and third vertical strings.

[0043] Although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made only by way of illustration and that numerous changes in the details of construction and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention.

What is claimed is:

1. A denim based fabric comprising:

a blended yarn of about 15% to about 50% polypropylene fiber and about 85% to about 50% cotton fiber by weight.

2. The fabric of claim 1, wherein the blended yarn comprises about 30% of the polypropylene fiber and about 70% of the cotton fiber.

3. The fabric of claim 1, wherein the polypropylene fiber includes a hollow fiber.

4. The fabric of claim 1, wherein the blended yarn is dyed with a coloring solution.

5. The fabric of claim 1, wherein a weight of the denim based fabric is between 6 oz. to about 15 oz. per square yard.

6. The fabric of claim 1, wherein a repeatable section of the denim based fabric in a plain weave pattern includes:

- a first horizontal string of the blended yarn placed below a first vertical string of the blended yarn and above a second vertical string of the blended yarn, and
- a second horizontal string of the blended yarn placed above the first vertical string and below the second vertical string.

7. The fabric of claim 1, wherein a repeatable section of the denim based fabric in a 2x1 twill weave pattern includes:

- a first horizontal string of the blended yarn placed below a first vertical string of the blended yarn and above second and third vertical strings of the blended yarn,
- a second horizontal string of the blended yarn placed below the first and second vertical strings and above the third vertical string, and
- a third horizontal string of the blended yarn placed above the first vertical string and below the second and third vertical strings.

8. The fabric of claim 1, wherein a repeatable section of the denim based fabric in a 3x1 twill weave pattern includes:

- a first horizontal string of the blended yarn placed below a first vertical string of the blended yarn and above second, third, and fourth vertical strings of the blended yarn,
- a second horizontal string of the blended yarn placed above the first vertical string, below the second vertical string, and above the third and fourth vertical strings,
- a third horizontal string of the blended yarn placed above the first and second vertical strings, below the third vertical string, and above the fourth vertical string, and
- a fourth horizontal string of the blended yarn placed below the first vertical string and above the second, third, and fourth vertical strings.

9. The fabric of claim 1, wherein a repeatable section of the denim based fabric in a satin weave pattern includes:

- a first horizontal string of the blended yarn placed below a first vertical string of the blended yarn, above second, third, and fourth vertical strings of the blended yarn,

a second horizontal string of the blended yarn placed above the first vertical string, below the second vertical string, and above the third and fourth vertical strings,

a third horizontal string of the blended yarn placed above the first, second, and third vertical strings, and below the fourth vertical string, and

a fourth horizontal string of the blended yarn placed above the first and second vertical strings, below the third vertical string, and above the fourth vertical string.

10. The fabric of claim 1, wherein a repeatable section of the denim based fabric in a basket weave pattern includes:

first and second horizontal strings of the blended yarn s placed below first and second vertical strings of the blended yarn and above third and fourth vertical strings of the blended yarn, and

third and fourth horizontal strings of the blended yarn placed above the first and second vertical strings and below the third and fourth vertical strings.

11. A denim based fabric comprising:

a blended yarn of about 30% other fibers and about 70% cotton fiber by weight.

12. The fabric of claim 11, wherein the other fibers include a polypropylene fiber and a spandex fiber.

13. The fabric of claim 12, wherein the denim based fabric is stretchable.

14. The fabric of claim 11, wherein the other fibers include a polypropylene fiber and a polyester fiber.

15. A method of producing a denim based fabric, the method comprising:

weaving a repeatable section of the denim based fabric with a blended yarn of about 30% polypropylene fiber and about 70% cotton fiber by weight in a 2x1 twill weave pattern by:

placing a first horizontal string of the blended yarn below a first vertical string of the blended yarn and above second and third vertical strings of the blended yarn;

placing a second horizontal string of the blended yarn below the first and second vertical strings and above the third vertical string; and

placing a third horizontal string of the blended yarn above the first vertical string and below the second and third vertical strings.

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