Patent Document 4: JP 3283404

Patent Document 5: JP 2000-314015 A

Patent Document 6: JP 2008-138345 A

Disclosure of Invention

Problem to be Solved by the Invention

[0004] However, the above conventional sportswear and swimwear are low in stretchability, and thus hard to wear. The conventional stretch woven fabrics also have high surface friction resistance in the form of swimwear.

[0005] In order to solve the above conventional problems, embodiments of the present invention provides a highly stretchable woven fabric that can be worn easily (ease of wear) and that is low in surface friction resistance, and sportswear and swimwear employing the same.

Means for Solving Problem

[0006] According to a first aspect, there is provided a stretch woven fabric ~~of the present invention is a stretch woven fabric~~ including an elastic yarn. ~~The~~, wherein the elastic yarn is arranged in a warp yarn and a weft yarn, and the stretch woven fabric is stretchable in two-way directions. ~~In the fabric~~, and a plain weave part and a double weave part are formed alternately and repeatedly.

[0007] According to a second aspect, there is provided a ~~Sportswear~~ sportswear ~~and swimwear of the present invention include~~ including the above stretch woven fabric.

[0007a] According to a third aspect, there is provided a swimwear including the above stretch woven fabric

Effect of the Invention

[0008] The stretch woven fabric of the present invention includes elastic yarns in warp and weft yarns, and is stretchable in two-way directions. The plain weave part and the double weave part are formed alternately and repeatedly. Thus, it is possible to provide a stretch woven fabric with high stretchability and ease of wear, and low surface friction resistance, and sportswear and swimwear employing the same.

Brief Description of Drawings

[0009] [FIG. 1] FIG. 1 is a schematic plan view of a stretch woven fabric according to one embodiment of the present invention in which plain weave parts and weft double

7–9. FIG. 7A is a side view of a cylindrical base (model) to be used in this measurement, and FIG. 7B is a cross-sectional view taken along a line I–I in FIG. 7A. A front end portion 33 of the cylindrical base (model) 31 is spherical, and a rear end portion 34 thereof is tapered. A fabric sample 39 of the swimsuit is attached to a body 32 by wrapping the fabric sample 39 around the body 32, fixing the fabric sample 39 with cylindrical jigs 38a and 38b, and inserting the front end portion 33 and the rear end portion 34 into the body 32. The fabric sample 39 to be attached to the body 32 has an area of about ~~0.016 mm^2~~0.019 m^2. A weight 35 is inserted in the lower part of the body 32. A hollow member (pipe) 36 is positioned along the axis of the cylindrical base (model) 31 and receives a wire 37 as shown in FIGS. 8 and 9. The weight of the cylindrical base (model) 31 in water with the swimsuit fabric sample being attached thereto is 0.3 N, and the volume thereof is ~~1.2×10^{-3}~~1.710^{-4} m^3. The cylindrical base (model) 31 is entirely made of resin. The hollow member 36 has a diameter of 2.3 mm. The model 31 has a diameter of 30 mm, a length of 300 mm, and a length of a fabric attachment portion of 200 mm. The mass including the fabric sample is adjusted at 88 g. The buoyancy of the fabric and the model is taken into account, and a weight is placed in the cylindrical base (model) 31 so that the weight of the base in water will be 0.3 N.

[0028] FIG. 8 is an explanatory view showing a device 40 for measuring a time taken for the cylindrical base to drop into water. Water 42 is filled in a transparent water tank 41 made of, e.g., acrylic resin. A shielding sheet 43 is attached to the back side of the water tank 41, and a lamp 44 is arranged behind it. A high speed camera 45 is arranged on the front side. The water tank 41 is made of transparent acrylic resin, and is 1.7 m in height (H), and 0.22 m in width (L) and depth. The high speed camera 45 is arranged at a position 4.25 m away from the water tank and 0.85 m above the floor. The photographing speed of the high speed camera 45 is 1900 fps. In this state, the cylindrical base (model) 31 is quietly dropped from above the water tank. The cylindrical base (model) 31 drops along the wire 37.

[0029] FIG. 9 is an explanatory view showing a method and a device for measuring a time taken for the cylindrical base to drop a predetermined distance in water. First, the cylindrical base (model) 31 is positioned so that the rear end is located at the surface of the water. A point 200 mm below a front end 46 of the cylindrical base

density of 260 yarns/2.54 cm, a weight per unit area of 166 g/m^2, and a thickness of 0.42 mm was produced using a rapier loom. The finish width of the woven fabric as a whole was 115 cm. The woven fabric thus obtained had an elongation rate of 51.5% in the warp direction and 57.6% in the weft direction, and a stress at 30% elongation of 1.92 N/cm in the warp direction and 2.60 N/cm in the weft direction. The coefficient of friction resistance and the water entry time are as shown in Table 1.

[0047] (Comparative Example 4)

(1) Front

Cation-dyeable polyester (fineness: 56 decitex, the number of filaments: 24)

(2) Back

Polyurethane (fineness: 44 decitex, "LYCRA (registered trademark)" 254B manufactured by Toray Opelontex Co., Ltd.)

A half structure was knitted using a 32 gauge single tricot knitting machine.

Wale: 80 yarns/2.54 cm, course: 135 yarns/2.54 cm

The weight per unit area was 304 g/m^2, the thickness thereof was 0.55 mm, and the finish width of the knitted fabric as a whole was 150 cm. The knitted fabric thus obtained had an elongation rate of 122.9% in the warp direction and 106.1% in the weft direction, and a stress at 30% elongation of 1.06 N/cm in the warp direction and 0.44 N/cm in the weft direction. This knitted fabric is called a plain knitted fabric.

[0048] Next, the surface of the plain ~~woven~~ knitted fabric was subjected to smoothing. The smoothing is a process of heating and pressurizing a fabric between a pair of rolls. The roll temperature was set at 220°C, the linear load was set at 5500 kgf, and the roll speed was set at about 6–10 m/min. The ~~woven~~ knitted fabric after smoothing is called a smoothed product. The coefficient of friction resistance and the water entry time of this smoothed product are as shown in Table 1.

[0049] (Comparative Example 5)

(1) Front

Cation-dyeable polyester (fineness: 44 decitex, the number of filaments: 36)

(2) Back

Polyurethane (fineness: 44 decitex, "LYCRA (registered trademark)" 254B manufactured by Toray Opelontex Co., Ltd.)

A half structure was knitted using a 32 gauge single tricot knitting machine.

Wale: 80 yarns/2.54 cm, course: 120 yarns/2.54 cm

The weight per unit area was 220 g/m^2, the thickness thereof was 0.53 mm, and the finish width of the knitted fabric as a whole was 150 cm. The knitted fabric thus obtained had an elongation rate of 132.8% in the warp direction and 128.2% in the weft direction, and a stress at 30% elongation of 0.90 N/cm in the warp direction and 0.24 N/cm in the weft direction. This knitted fabric is called a plain knitted fabric.

[0050] Next, the surface of the plain ~~woven~~knitted fabric was subjected to smoothing. The smoothing is a process of heating and pressurizing a fabric between a pair of rolls. The roll temperature was set at 220°C, the linear load was set at 5500 kgf, and the roll speed was set at about 6–10 m/min. The ~~woven~~knitted fabric after smoothing is called a smoothed product. The coefficient of friction resistance and the water entry time of this smoothed product are as shown in Table 1.

[0051] [Table 1]

Experiment No.	Swimsuit fabric	Coefficient of friction resistance	Water entry time (second)
Ex. 1	Woven fabric of plain weave part + weft double weave part Width 1.0 mm	0.077	0.179
Ex. 2	Woven fabric of plain weave part + weft double weave part Width 0.5 mm	0.072	0.179
Ex. 3	Woven fabric of plain weave part + weft double weave part Width 1.0 mm + Smoothing	0.072	0.180
Ex. 4	Woven fabric of plain weave part + weft double weave part Width 0.5 mm + Smoothing	0.068	0.178
Comp. Ex. 1	Plain weave (1)	0.115	0.178
Comp. Ex. 2	Plain weave (2)	0.078	0.180
Comp. Ex. 3	Weft double weave	0.081	0.180
Comp. Ex. 4	Tricot (1) + Smoothing	0.078	0.175
Comp. Ex. 5	Tricot (2) + Smoothing	0.079	0.180

* Ex.: Example, Comp. Ex.: Comparative Example

[0052] The fabrics of Comparative Examples 1–5 are conventional swimsuit fabrics. As compared with these conventional products (Comparative Examples 1–5), the woven fabrics of Examples 1–4 had a low coefficient of friction resistance in water and short water entry time.

[0053] (Example 5)