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Remarks:

Amended claims in accordance with Rule 137(2)
EPC.

(54) **BIELASTIC FABRIC AND ITS MANUFACTURING PROCESS**

(57) There are described a bielastic fabric comprising biopolyamide yarn and elastane yarn, having excellent elastic properties and high dimensional stability, and a cost-effective, efficient process for obtaining it.

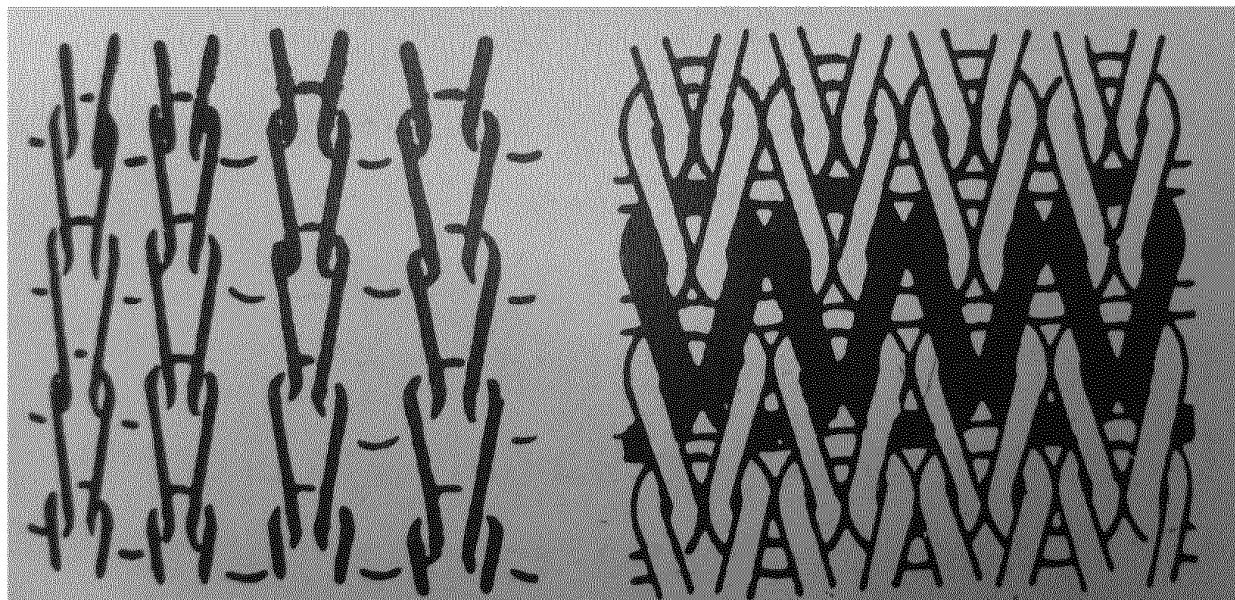


FIG. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a bielastic fabric comprising biopolyamide yarn and elastane yarn, having excellent elastic properties and high dimensional stability, as well as to a cost-effective, efficient process for obtaining it.

BACKGROUND ART

[0002] Environmental impact issues related to the textile industry, in particular water and air emissions, use of water and energy, are known and of current interest.

[0003] It is therefore an important goal to be able to produce textiles and clothing products which reduce energy consumption and environmental impact, without impairing the technical features of the products themselves.

[0004] It is thus an object of the present invention to provide a solution to such problems, which simultaneously allows excellent qualities and technical performance to be obtained.

SUMMARY OF THE INVENTION

[0005] Said object is achieved by a bioelastic fabric as claimed in claim 1.

[0006] In another aspect, the present invention relates to a process for obtaining such a bielastic fabric.

[0007] In a further aspect, the present invention relates to a clothing or furniture item, at least partially made of such a bielastic fabric.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The features and advantages of the present invention will become more apparent from the following detailed description, from the embodiments shown by way of non-limiting examples, and from the accompanying drawings, in which:

- Figure 1 shows the pattern of jersey fabric (weave of stocking stitch) seen from the knit side on the left and from the purl side on the right;
- Figure 2 shows the bielastic jersey fabric obtained from Example 1;
- Figure 3 shows the pattern of interlock fabric in which the front overlap of the front and back stitches is shown: the latter are represented by thinner lines solely to help understanding the figure itself, actually being all of the same length and width;
- Figure 4 shows the pattern of the same interlock fabric in Figure 1 in which the overlap of the front and back stitches is shown in perspective; and
- Figure 5 shows the bielastic interlock fabric obtained from Example 3.

DETAILED DESCRIPTION OF THE INVENTION

[0009] The invention thus relates to a bielastic fabric comprising biopolyamide yarn and elastane yarn.

[0010] The term "bielastic" means that the fabric is elastic in the warp and weft directions.

[0011] The term "biopolyamide" means a polyamide entirely or partly of plant origin. Preferably, the biomass from which the biopolyamide for the purposes of the present invention originates is the castor seed, referred to as "*Ricinus communis*". The monomers used in the polymerization process are partly or totally derived from castor oil.

[0012] Biopolyamides exhibit high resistance to chemical agents, in particular to hydrocarbons, dimensional stability, relatively low density and good processability.

[0013] Preferably, said biopolyamide is biopolyamide 6, biopolyamide 6.6, biopolyamide 6.10, biopolyamide 6.12, biopolyamide 11, biopolyamide 12, or a mixture thereof.

[0014] More preferably, said biopolyamide is biopolyamide 6.6.

[0015] In embodiments, the biopolyamide yarn has a count of 10-200 dTex, preferably 20-150 dTex.

[0016] By "elastane" it is meant a synthetic fiber of polyurethane, also known as Spandex or Lycra.

[0017] At present, polyurethane is typically produced from raw materials. The reaction takes place in two steps, in the first step a polyol is placed to react with a diisocyanate to form an intermediate referred to as prepolymer, which will later be co-linked with amines or glycols. The polyol is characterized in that it has hydroxyl functional groups (-OH) at both ends and will form the elastic part of the molecule; it may be a polyester or a polyether or a mixture thereof. The diisocyanate, instead, has isocyanate functional groups (-NCO) at its ends and will be the rigid part of the polyurethane. The isocyanate most used is diphenylmethane diisocyanate ("MDI", 1-isocyanate-4-[(4-phenylisocyanate)methyl]benzene).

[0018] The reaction takes place between -NCO and -OH groups to form the urea bond and since the molar ratio of isocyanate to polyol is 2:1, the final product will be a macrodiisocyanate, that is, the prepolymer will be a macromolecule having -NCO groups at the ends.

[0019] The chain extension is obtained by adding bi-functional amines (H_2NR-NH_2) to the prepolymer, which by reacting with the -NCO groups form a urethane bond. The exothermic reaction increases the molecular weight by hundreds of times and the viscosity therewith; in order to keep the product manageable, the reaction is conducted in a suitable solvent and small amounts of monofunctional amines regulate the final length thereof. The most common solvents are dimethylformamide (DMF) and dimethylacetamide (DMAc).

[0020] A suitable elastane yarn for the purposes of the present invention is the yarn described in the international patent application WO0181443.

[0021] In preferred embodiments, said elastane yarn

is the reaction product between (A) poly(tetramethylene-ether-co-2methyltetramethylene-ether)glycol, (B) a mixture of 1-isocyanate-4-[(4'-isocyanatephenyl)methyl]benzene (abbreviated "4,4'-MDI") and 23-55 mol% of 1-isocyanate-2-[(4'-isocyanatephenyl)methyl]benzene (abbreviated "2,4'-MDI") over the total diisocyanate, and (C) at least one chain extender.

[0022] More preferably, said elastane yarn is the reaction product between (A) poly(tetramethylene-ether-co-2methyltetramethylene-ether)glycol, (B) a mixture of 1-isocyanate-4-[(4'-isocyanatephenyl)methyl]benzene and 28-55 mol% of 1-isocyanate-2-[(4'-isocyanatephenyl)methyl]benzene over the total diisocyanate, and (C) at least one chain extender.

[0023] Preferably, the chain extender is ethylenediamine, 1,4-butanediamine, 1,6-hexanediamine, 1,2-propanediamine, 1,3-propanediamine, 2-methyl-1,5-pentanedi-amine, 1,4-cyclohexanediamine, 1,3-cyclohexanediamine, 1,3-diaminopentane, or a mixture thereof.

[0024] In preferred embodiments, the chain extender is ethylenediamine.

[0025] The elastane yarn is preferably obtained by dry spinning.

[0026] Preferably, the bielastic fabric comprises at least 60% of biopolyamide yarn, more preferably at least 70% of biopolyamide yarn.

[0027] Preferably, the bielastic fabric comprises at least 5% of elastane yarn, more preferably at least 15% of elastane yarn.

[0028] In embodiments, the elastane yarn has a count of 10-200 dTex, preferably 15-100 dTex. Alternatively, commercially available elastane yarns may be used, such as the Easy Set LYCRA® yarns marketed by Invista.

[0029] Preferably, the bielastic fabric has a basis weight of 50-270 g/sqm (grams/square meter). The basis weight is the weight of a fabric per unit area, expressed in grams per square meter, and is an indication of the total amount of fiber in the fabric. Typically, reference is made to a "nominal basis weight" rounded for practical reasons to tens of grams, therefore different from the actual basis weight, which corresponds to the actual weight per unit area. For the purposes of the present invention, the basis weight indicated is a nominal basis weight, which corresponds to the actual basis weight ± 5 g/sqm. The measurement of the basis weight is obtained by taking a fabric round having a diameter of 11 cm and weighed with a precision balance.

[0030] In some embodiments, the bielastic fabric comprises at least 60% of biopolyamide yarn and at least 5% of elastane yarn.

[0031] Preferably, the bielastic fabric comprises at least 70% of biopolyamide yarn and at least 15% of elastane yarn.

[0032] More preferably, the bielastic fabric comprises 75-90% of biopolyamide yarn and 15-25% of elastane yarn.

[0033] Preferably, the bielastic fabric has jersey stitch or interlock stitch.

[0034] "Jersey" is a fabric made of stocking stitch; the name refers to most of the products of the knitwear industry. Produced with knitting machines, it is elastic both in length and in width and if made in warp, it has ladder-proof properties. An example of jersey fabric pattern is shown in Figure 1.

[0035] "Interlock" is a crossed knitted fabric; it is a variant of jersey but easier to cut; it is one of the fundamental weaving of weft knitting, made on double knit machines, i.e. with two series of needles working in opposite positions. The cylinder needles are coincident with the dial needles, so they cannot stitch together; so, one yarn is worked by the odd needles of the cylinder needles and the even ones by the dial needles, thus forming a first row of rib stitch. The subsequent yarn is worked by the needles, which have not worked the first one: a second rib row is thus obtained, "crossed" with the first one. This results in a thickness and volume similar to those of the rib stitch but with a much more reduced extensibility. An example of interlock fabric pattern is shown in Figures 3 and 4.

[0036] More preferably, the bielastic fabric has a basis weight of 100-250 g/sqm, 40-200% of elasticity in the weft and 30-200% of elasticity in the warp.

[0037] For the purposes of the present invention, the elasticity is measured by taking 10×5 cm² strips of fabric and placing them in a dynamometer (e.g. dynamometer Zwick/Roell Z0,5). By "elasticity in the weft" it is meant the measure of the elasticity taken in the weft direction, while "elasticity in the warp" means the measure of the elasticity taken in the warp direction.

[0038] In some embodiments, the bielastic fabric comprises 75-90% of biopolyamide yarn and 15-25% of elastane yarn, and has jersey stitch, a basis weight of 180-210 g/sqm, 45-90% of elasticity in the weft and 35-80% of elasticity in the warp. Preferably, the bielastic fabric comprises 80-90% of biopolyamide yarn and 15-20% of elastane yarn, and has jersey stitch, a basis weight of 190-200 g/sqm, 50-80% of elasticity in the weft and 45-70% of elasticity in the warp.

[0039] In other embodiments, the bielastic fabric comprises 75-90% of biopolyamide yarn and 15-25% of elastane yarn, and has jersey stitch, a basis weight of 100-140 g/sqm, 120-200% of elasticity in the weft and 120-200% of elasticity in the warp. Preferably, the bielastic fabric comprises 70-80% of biopolyamide yarn and 20-30% of elastane yarn, and has jersey stitch, a basis weight of 110-130 g/sqm, 140-180% of elasticity in the weft and 140-180% of elasticity in the warp.

[0040] In further embodiments, the bielastic fabric comprises 75-90% of biopolyamide yarn and 15-25% of elastane yarn, and has interlock stitch, a basis weight of 160-200 g/sqm, 110-190% of elasticity in the weft and 50-100% of elasticity in the warp. Preferably, the bielastic fabric comprises 70-80% of biopolyamide yarn and 20-30% of elastane yarn, and has interlock stitch, a basis weight of 170-190 g/sqm, 130-180% of elasticity in the weft and 60-90% of elasticity in the warp.

[0041] Optionally, the bielastic fabric may further comprise at least one yarn of natural fiber selected from wool, cotton, silk, and flax.

[0042] Optionally, the bielastic fabric may further comprise at least one yarn of synthetic fiber selected from polyester, polyamide, acetate, acrylic, rayon, and polyolefin, such as polyethylene or polypropylene.

[0043] In some embodiments, the bielastic fabric consists essentially of biopolyamide yarn and elastane yarn. The expression "essentially consists of" indicates that the fabric may further comprise other types of yarns which, however, do not alter the technical features of the final bielastic fabric.

[0044] In further embodiments, the bielastic fabric consists of biopolyamide yarn and elastane yarn.

[0045] It is to be understood that all aspects identified as preferred and advantageous for the bielastic fabric comprising biopolyamide yarn and elastane yarn are to be considered similarly preferred and advantageous also for the bielastic fabric essentially consisting of biopolyamide yarn and elastane yarn, and for the bioelastic fabric consisting of biopolyamide yarn and elastane yarn.

[0046] In another aspect, the present invention relates to a manufacturing process of the bielastic fabric as described above, said process comprising the steps of:

- a) stitching biopolyamide yarn and elastane yarn to obtain a fabric,
- b) heat-setting said fabric at a temperature not higher than 160°C over a time period not higher than 100 seconds; and, optionally,
- c) dyeing the fabric thus heat-set.

[0047] In step a) of the process, a fabric is obtained according to procedures known in the field. Preferably, the fabric is obtained by circular knitting with stitching of the two yarns. More preferably, the fabric has jersey stitch or interlock stitch.

[0048] For the purposes of the present invention, the knitting looms are selected on the basis of the gauge of the stitches they produce; preferably, gauge E (expressed as "number of needles per English inch") ranges from E20 to E50.

[0049] In particular, the jersey fabric is obtained with a single knit machine, while the interlock fabric is obtained with a double knit machine.

[0050] In step b) of the process, the step of heat-setting of the fabric obtained in step a) is performed.

[0051] Heat-setting is a thermal treatment for setting the fibers, imparting dimensional stability to the fabric and constancy of mass per unit area of the finished fabric.

[0052] The thermal treatment may be carried out with various heat sources:

- warm air, in a tentering machine,
- steam under pressure, in vaporizer,
- warm water, in HT equipment.

[0053] For standard polyamide fabrics, the typical temperatures at which heat-setting is carried out are 190-195°C.

[0054] The biopolyamides allow the heat-setting temperature to be lowered down to about 165°C.

[0055] For standard elastic material fabrics, the typical temperatures at which heat-setting is carried out are 190-195°C.

[0056] It has been surprisingly found that by combining biopolyamide yarn and elastane yarn as described above, it is possible to obtain a heat-set fabric having excellent elastic properties and high dimensional stability by carrying out the heat-setting step b) at a temperature not higher than 160°C. This allows a clear advantage in terms of energy consumption and production efficiency, because the processing time is reduced, all without impairing the technical features of the fabric, such as softness to the touch and bioelasticity, while preserving the original and brilliant colors.

[0057] This result is even more surprising when considering that, for the Easy Set LYCRA® yarns marketed by Invista, the temperature indicated by the manufacturer for heat setting is 170-175°C.

[0058] Therefore, the combination of yarns of the invention goes beyond the already substantial advantages of the single yarns as compared to traditional yarns considered individually.

[0059] Preferably, the heat-setting step b) is carried out over a time period of 30-70 seconds, more preferably 40-45 seconds.

[0060] Preferably, the heat-setting step b) is carried out at a temperature of 100-160°C, more preferably of 120-160°C.

[0061] Optionally, the process also comprises a step c) of dyeing the heat-set fabric.

[0062] Said step may be carried out according to techniques known in the field, however, dyeing is preferably carried out in overflow machines at atmospheric pressure. In this type of machines, the fabric moves at variable speeds within the bath which consists of water, auxiliary products and dyes. The maximum temperature achievable is lower than 100°C.

[0063] In preferred embodiments, the dyeing step c) comprises the following substeps:

- i) scouring at 80-100°C for 10-20 minutes, preferably at 90°C for 15 minutes,
- ii) neutralizing the scouring at 50-70°C for 5-20 minutes, preferably at 60°C for 10 minutes,
- iii) dyeing, with dye dosage for 15-30 minutes at 90-110°C with permanence for 20-40 minutes, preferably for 24 minutes at 98°C with permanence for 30 minutes,
- iv) stripping at 30-50°C for 5-20 minutes, preferably at 40°C for 10 minutes,
- v) treating with a fixer at 50-90°C for 10-30 minutes, preferably at 70°C for 20 minutes, and
- vi) final cold washing.

[0064] After this step, the dyed fabric is discharged from the machines and opened, using a specific machinery.

[0065] Thereafter, the fabric is dried. Preferably, drying is carried out in a tentering machine at a speed of about 20 meters per minute at a temperature of 90°C.

[0066] In another aspect, the present invention relates to a bielastic fabric obtainable by the process described above, said bielastic fabric comprising biopolyamide yarn and elastane yarn.

[0067] The fabric thus obtained is very soft, comfortable and technical. It is therefore especially suitable for sea garments, such as swimwear, underwear and sportswear.

[0068] In a further aspect, therefore, the present invention also relates to a clothing item or a furniture item, at least partially made of the bielastic fabric of the invention.

[0069] By "clothing item" it is meant any article of clothing for men, women or children, such as shirt, pant, skirt, jacket, dress, shirt, blouse, sweater, as well as accessories such as handbags, briefcases, wallets, purses, key cases, cases for phones and tablets. In particular, it means clothing items suitable as sea garments, such as swimwear, underwear and sportswear.

[0070] "Furniture item" is meant to include any home linen article, such as bedspreads, curtains, tablecloths and linen for pillows, benches, armchairs, sofas, chairs, beds and ottomans.

[0071] It is to be understood that all aspects identified as preferred and advantageous for the bioelastic fabric should be deemed as similarly preferred and advantageous also for the manufacturing process and the bioelastic fabric obtained thereby, as well as for the clothing item or furniture item.

[0072] All the combinations of preferred aspects and embodiments of the bioelastic fabric, of the preparing process and of the bioelastic fabric obtained thereby, as well as of the clothing item or furniture item set forth above are further understood as also described.

[0073] The following are non-limiting working examples of the present invention.

EXAMPLES

Example 1.

[0074] A Jersey fabric was produced, having basis weight 195 g/sqm and comprising 83% of biopolyamide yarn (count 88 dTex) and 17% of elastane yarn (count 44 dTex), by knitting a biopolyamide yarn 6.6 (marketed as Fulgar Bio® by Fulgar SpA) and an elastane yarn (marketed as Easy Set LYCRA® by Invista) with circular knitting in a single knit machine (gauge E = E28).

[0075] The Jersey fabric thus obtained was subjected to heat-setting in a tentering machine at a temperature of 160°C over a time period of 40-45 seconds.

[0076] Thereafter, the dyeing step was carried out; the fabric was loaded in overflow machines and followed the

following dyeing cycle:

- scouring at 90°C for 15 minutes,
- neutralizing of the scouring at 60°C for 10 minutes,
- dyeing, dye dosage for 24 minutes at 98°C with permanence for 30 minutes,
- stripping at 40°C for 10 minutes,
- treating with a fixer at 70°C for 20 minutes, and
- final cold washing.

[0077] After this step, the dyed fabric is discharged from the machines and opened, using a specific machinery.

[0078] Thereafter, the fabric is dried in a tentering machine at a speed of about 20 meters per minute at a temperature of 90°C.

[0079] The bielastic fabric thus obtained is shown in Figure 2 and has a basis weight of 195 g/sqm, 60% elasticity in the weft and 50% elasticity in the warp. The measurement of the basis weight was obtained by taking a fabric round having a diameter of 11 cm and weighing with a precision balance. Instead, the elasticity was measured by taking 12 cm long fabric strips and placing them in a dynamometer Zwick/Roell Z0,5.

Example 2.

[0080] A Jersey fabric was produced, having basis weight 115 g/sqm and comprising 76% of biopolyamide yarn (count 28 dTex) and 24% of elastane yarn (count 22 dTex), by knitting a biopolyamide yarn 6.6 (marketed as Fulgar Bio® by Fulgar SpA) and an elastane yarn (marketed as Easy Set LYCRA® by Invista) with circular knitting in a single knit machine (gauge E = E44).

[0081] The Jersey fabric thus obtained was subjected to heat-setting in a tentering machine at a temperature of 160°C over a time period of 40-45 seconds.

[0082] Thereafter, the dyeing step was carried out; the fabric was loaded in overflow machines and followed the following dyeing cycle:

- scouring at 90°C for 15 minutes,
- neutralizing of the scouring at 60°C for 10 minutes,
- dyeing, dye dosage for 24 minutes at 98°C with permanence for 30 minutes,
- stripping at 40°C for 10 minutes,
- treating with a fixer at 70°C for 20 minutes, and
- final cold washing.

[0083] After this step, the dyed fabric is discharged from the machines and opened, using a specific machinery.

[0084] Thereafter, the fabric is dried in a tentering machine at a speed of about 20 meters per minute at a temperature of 90°C.

[0085] The bielastic fabric thus obtained has a basis weight of 115 g/sqm, 160% elasticity in the weft and 160% elasticity in the warp. The measurement of the basis

weight was obtained by taking a fabric round having a diameter of 11 cm and weighing with a precision balance. Instead, the elasticity was measured by taking 12 cm long fabric strips and placing them in a dynamometer Zwick/Roell Z0,5.

Example 3.

[0086] An Interlock fabric was produced, having basis weight 175 g/sqm and comprising 77% of biopolyamide yarn (count 28 dTex) and 23% of elastane yarn (count 22 dTex), by knitting a biopolyamide yarn 6.6 (marketed as Fulgar Bio® by Fulgar SpA) and an elastane yarn (marketed as Easy Set LYCRA® by Invista) with circular knitting in a double knit machine (gauge E = E40).

[0087] The Interlock fabric thus obtained was subjected to heat-setting in a tentering machine at a temperature of 160°C over a time period of 40-45 seconds.

[0088] Thereafter, the dyeing step was carried out; the fabric was loaded in overflow machines and followed the following dyeing cycle:

- scouring at 90°C for 15 minutes,
- neutralizing of the scouring at 60°C for 10 minutes,
- dyeing, dye dosage for 24 minutes at 98°C with permanence for 30 minutes,
- stripping at 40°C for 10 minutes,
- treating with a fixer at 70°C for 20 minutes, and
- final cold washing.

[0089] After this step, the dyed fabric is discharged from the machines and opened, using a specific machinery.

[0090] Thereafter, the fabric is dried in a tentering machine at a speed of about 20 meters per minute at a temperature of 90°C.

[0091] The bielastic fabric thus obtained is shown in Figure 5 and has a basis weight of 175 g/sqm, 150% elasticity in the weft and 70% elasticity in the warp. The measurement of the basis weight was obtained by taking a fabric round having a diameter of 11 cm and weighing with a precision balance. Instead, the elasticity was measured by taking 12 cm long fabric strips and placing them in a dynamometer Zwick/Roell Z0,5.

Example 4.

[0092] A Jersey fabric was produced, having basis weight 195 g/sqm and comprising 83% of biopolyamide yarn (count 88 dTex) and 17% of elastane yarn (count 44 dTex), by knitting a biopolyamide yarn 6.6 (marketed as Fulgar Bio® by Fulgar SpA) and an elastane yarn (marketed as Easy Set LYCRA® by Invista) with circular knitting in a double knit machine (gauge E = E28).

[0093] The Jersey fabric thus obtained was subjected to heat-setting in a tentering machine at a temperature of 150°C over a time period of 50-55 seconds.

[0094] Thereafter, the dyeing step was carried out; the

fabric was loaded in overflow machines and followed the following dyeing cycle:

- scouring at 90°C for 15 minutes,
- neutralizing of the scouring at 60°C for 10 minutes,
- dyeing, dye dosage for 24 minutes at 98°C with permanence for 30 minutes,
- stripping at 40°C for 10 minutes,
- treating with a fixer at 70°C for 20 minutes, and
- final cold washing.

[0095] After this step, the dyed fabric is discharged from the machines and opened, using a specific machinery.

[0096] Thereafter, the fabric is dried in a tentering machine at a speed of about 20 meters per minute at a temperature of 90°C.

[0097] The bielastic fabric thus obtained has a basis weight of 195 g/sqm, 60% elasticity in the weft and 50% elasticity in the warp. The measurement of the basis weight was obtained by taking a fabric round having a diameter of 11 cm and weighing with a precision balance. Instead, the elasticity was measured by taking 12 cm long fabric strips and placing them in a dynamometer Zwick/Roell Z0,5.

Claims

1. A bielastic fabric comprising biopolyamide yarn and elastane yarn.
2. The bielastic fabric of claim 1, having a basis weight of 50-270 g/sqm.
3. The bielastic fabric of claim 1 or 2, wherein said biopolyamide yarn has a count of 10-200 dTex, preferably 20-150 dTex.
4. The bielastic fabric of any one of claims 1-3, wherein said elastane yarn has a count of 10-200 dTex, preferably 15-100 dTex.
5. The bielastic fabric of any one of claims 1-4, comprising at least 60% of biopolyamide yarn and at least 5% of elastane yarn, preferably at least 70% of biopolyamide yarn and at least 15% of elastane yarn.
6. The bielastic fabric of any one of claims 1-5, having jersey stitch or interlock stitch.
7. The bielastic fabric according to any one of claims 1-6, having a basis weight of 100-250 g/sqm, 40-200% of elasticity in the weft and 30-200% of elasticity in the warp.
8. The bielastic fabric of claim 7, comprising 75-90% of biopolyamide yarn and 15-25% of elastane yarn,

- and having jersey stitch, a basis weight of 180-210 g/sqm, 45-90% of elasticity in the weft and 35-80% of elasticity in the warp, or comprising 75-90% of biopolyamide yarn and 15-25% of elastane yarn, and having jersey stitch, a basis weight of 100-140 g/sqm, 120-200% of elasticity in the weft and 120-200% of elasticity in the warp, or comprising 75-90% of biopolyamide yarn and 15-25% of elastane yarn, and having interlock stitch, a basis weight of 160-200 g/sqm, 110-190% of elasticity in the weft and 50-100% of elasticity in the warp.
9. The bielastic fabric of claim 8, comprising 80-90% of biopolyamide yarn and 10-20% of elastane yarn, and having jersey stitch, a basis weight of 190-200 g/sqm, 50-80% of elasticity in the weft and 45-70% of elasticity in the warp, or comprising 70-80% of biopolyamide yarn and 20-30% of elastane yarn, and having jersey stitch, a basis weight of 110-130 g/sqm, 140-180% of elasticity in the weft and 140-180% of elasticity in the warp, or comprising 70-80% of biopolyamide yarn and 20-30% of elastane yarn, and having interlock stitch, a basis weight of 170-190 g/sqm, 130-180% of elasticity in the weft and 60-90% of elasticity in the warp.
10. A process of manufacturing the bioelastic fabric of claim 1, comprising the steps of:
- a) stitching biopolyamide yarn and elastane yarn to obtain a fabric,
 - b) heat-setting said fabric at a temperature not higher than 160°C over a time period not higher than 100 seconds; and, optionally,
 - c) dyeing the fabric thus heat-set.
11. The process of claim 10, wherein the heat-setting step b) is carried out over a time period of 30-70 seconds.
12. The process of claim 10 or 11, wherein the heat-setting step b) is carried out at a temperature of 100-160°C, more preferably of 120-160°C.
13. The process of any one of claims 10-12, wherein the dyeing step c) comprises the following substeps:
- i) scouring at 80-100°C for 10-20 minutes, preferably at 90°C for 15 minutes,
 - ii) neutralizing of the scouring at 50-70°C for 5-20 minutes, preferably at 60°C for 10 minutes,
 - iii) dyeing, with dye dosage for 15-30 minutes at 90-110°C with permanence for 20-40 minutes, preferably for 24 minutes at 98°C with permanence for 30 minutes,
 - iv) stripping at 30-50°C for 5-20 minutes, preferably at 40°C for 10 minutes,
 - v) treating with a fixer at 50-90°C for 10-30 minutes, preferably at 70°C for 20 minutes, and
 - vi) final cold washing.
14. A bielastic fabric obtainable by the process of any one of claims 10-13, comprising biopolyamide yarn and elastane yarn.
15. A clothing or furniture item, at least partially made of the bielastic fabric of any one of claims 1-9 or with the fabric of claim 14.
- Amended claims in accordance with Rule 137(2) EPC.**
1. A bielastic fabric comprising biopolyamide yarn and elastane yarn.
 2. The bielastic fabric of claim 1, having a basis weight of 50-270 g/sqm.
 3. The bielastic fabric of claim 1 or 2, wherein said biopolyamide yarn has a count of 10-200 dTex, preferably 20-150 dTex.
 4. The bielastic fabric of any one of claims 1-3, wherein said elastane yarn has a count of 10-200 dTex, preferably 15-100 dTex.
 5. The bielastic fabric of any one of claims 1-4, comprising at least 60% of biopolyamide yarn and at least 5% of elastane yarn.
 6. The bielastic fabric of any one of claims 1-5, having jersey stitch or interlock stitch.
 7. The bielastic fabric according to any one of claims 1-6, having a basis weight of 100-250 g/sqm, 40-200% of elasticity in the weft and 30-200% of elasticity in the warp.
 8. The bielastic fabric of claim 7, comprising at least 70% of biopolyamide yarn and at least 15% of elastane yarn, and having jersey stitch, a basis weight of 180-210 g/sqm, 45-90% of elasticity in the weft and 35-80% of elasticity in the warp, or comprising at least 70% of biopolyamide yarn and at least 15% of elastane yarn, and having jersey stitch, a basis weight of 100-140 g/sqm, 120-200% of elasticity in the weft and 120-200% of elasticity in the warp, or comprising at least 70% of biopolyamide yarn and at least 15% of elastane yarn, and having interlock stitch, a basis weight of 160-200 g/sqm, 110-190% of elasticity in the weft and 50-100% of elasticity in the warp.

9. The bielastic fabric of claim 8, comprising 80-90% of biopolyamide yarn and 10-20% of elastane yarn, and having jersey stitch, a basis weight of 190-200 g/sqm, 50-80% of elasticity in the weft and 45-70% of elasticity in the warp, or 5
comprising 70-80% of biopolyamide yarn and 20-30% of elastane yarn, and having jersey stitch, a basis weight of 110-130 g/sqm, 140-180% of elasticity in the weft and 140-180% of elasticity in the warp, or 10
comprising 70-80% of biopolyamide yarn and 20-30% of elastane yarn, and having interlock stitch, a basis weight of 170-190 g/sqm, 130-180% of elasticity in the weft and 60-90% of elasticity in the warp. 15
10. A process of manufacturing the bioelastic fabric of claim 1, comprising the steps of:
- a) stitching biopolyamide yarn and elastane yarn to obtain a fabric, 20
 - b) heat-setting said fabric at a temperature not higher than 160°C over a time period not higher than 100 seconds; and, optionally,
 - c) dyeing the fabric thus heat-set. 25
11. The process of claim 10, wherein the heat-setting step b) is carried out over a time period of 30-70 seconds.
12. The process of claim 10 or 11, wherein the heat-setting step b) is carried out at a temperature of 100-160°C, more preferably of 120-160°C. 30
13. The process of any one of claims 10-12, wherein the dyeing step c) comprises the following substeps: 35
- i) scouring at 80-100°C for 10-20 minutes, preferably at 90°C for 15 minutes,
 - ii) neutralizing of the scouring at 50-70°C for 5-20 minutes, preferably at 60°C for 10 minutes, 40
 - iii) dyeing, with dye dosage for 15-30 minutes at 90-110°C with permanence for 20-40 minutes, preferably for 24 minutes at 98°C with permanence for 30 minutes,
 - iv) stripping at 30-50°C for 5-20 minutes, preferably at 40°C for 10 minutes, 45
 - v) treating with a fixer at 50-90°C for 10-30 minutes, preferably at 70°C for 20 minutes, and
 - vi) final cold washing. 50
14. A bielastic fabric obtainable by the process of any one of claims 10-13, comprising biopolyamide yarn and elastane yarn.
15. A clothing or furniture item, at least partially made of the bielastic fabric of any one of claims 1-9 or with the fabric of claim 14. 55

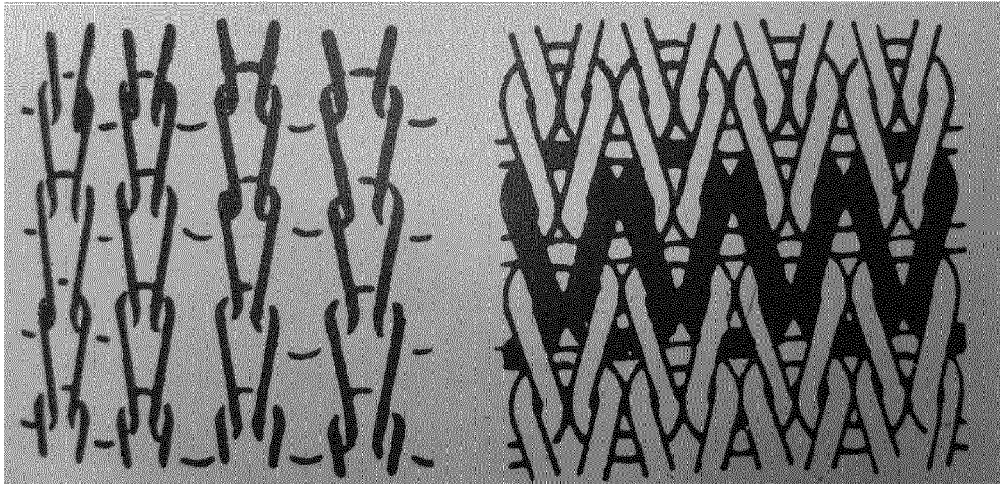


FIG. 1

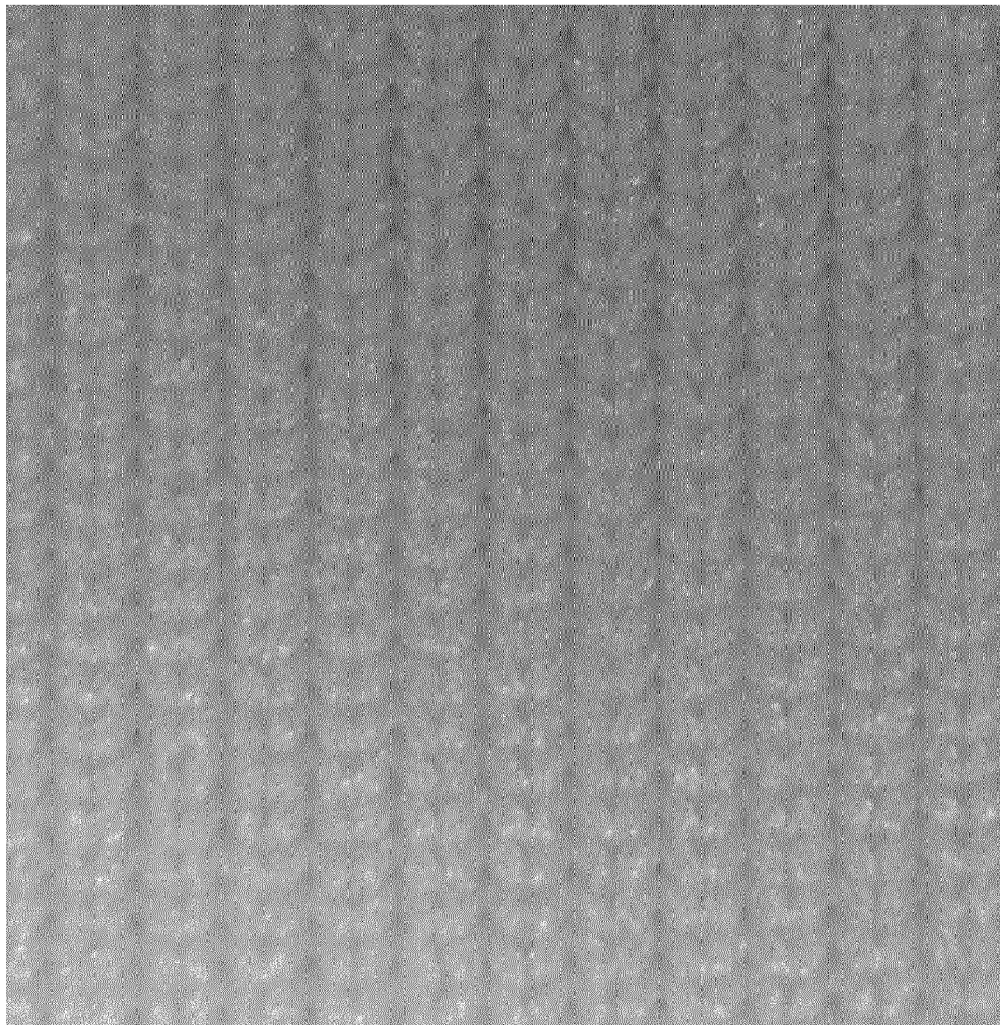


FIG. 2

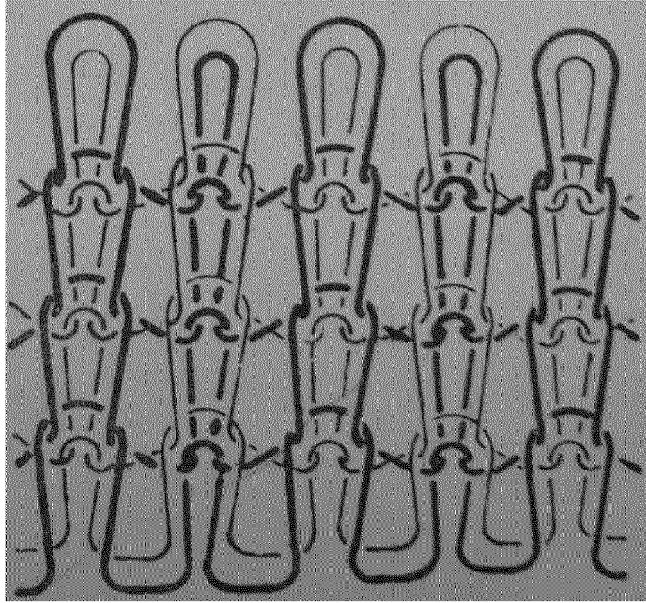


FIG. 3

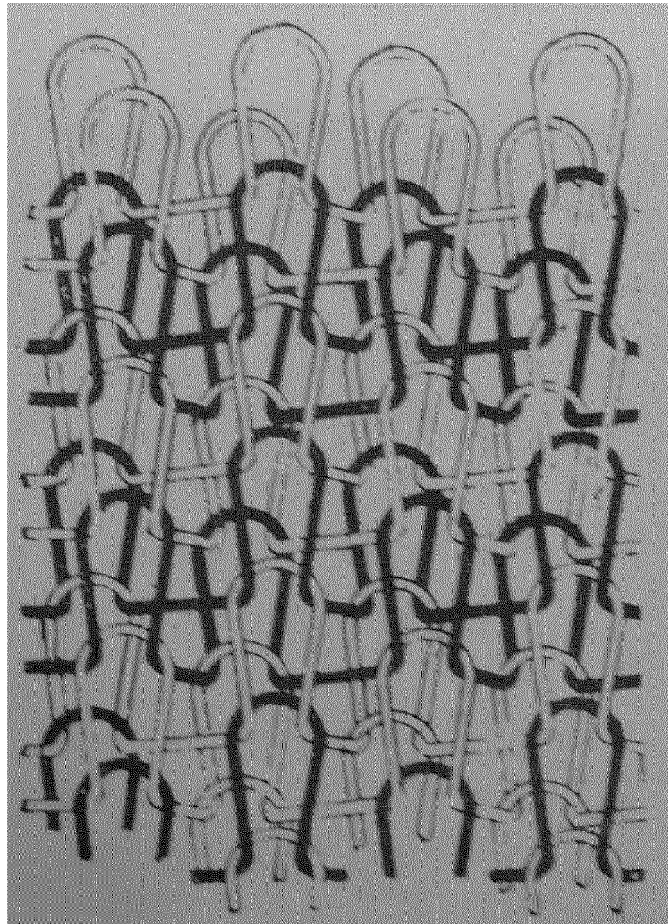


FIG. 4

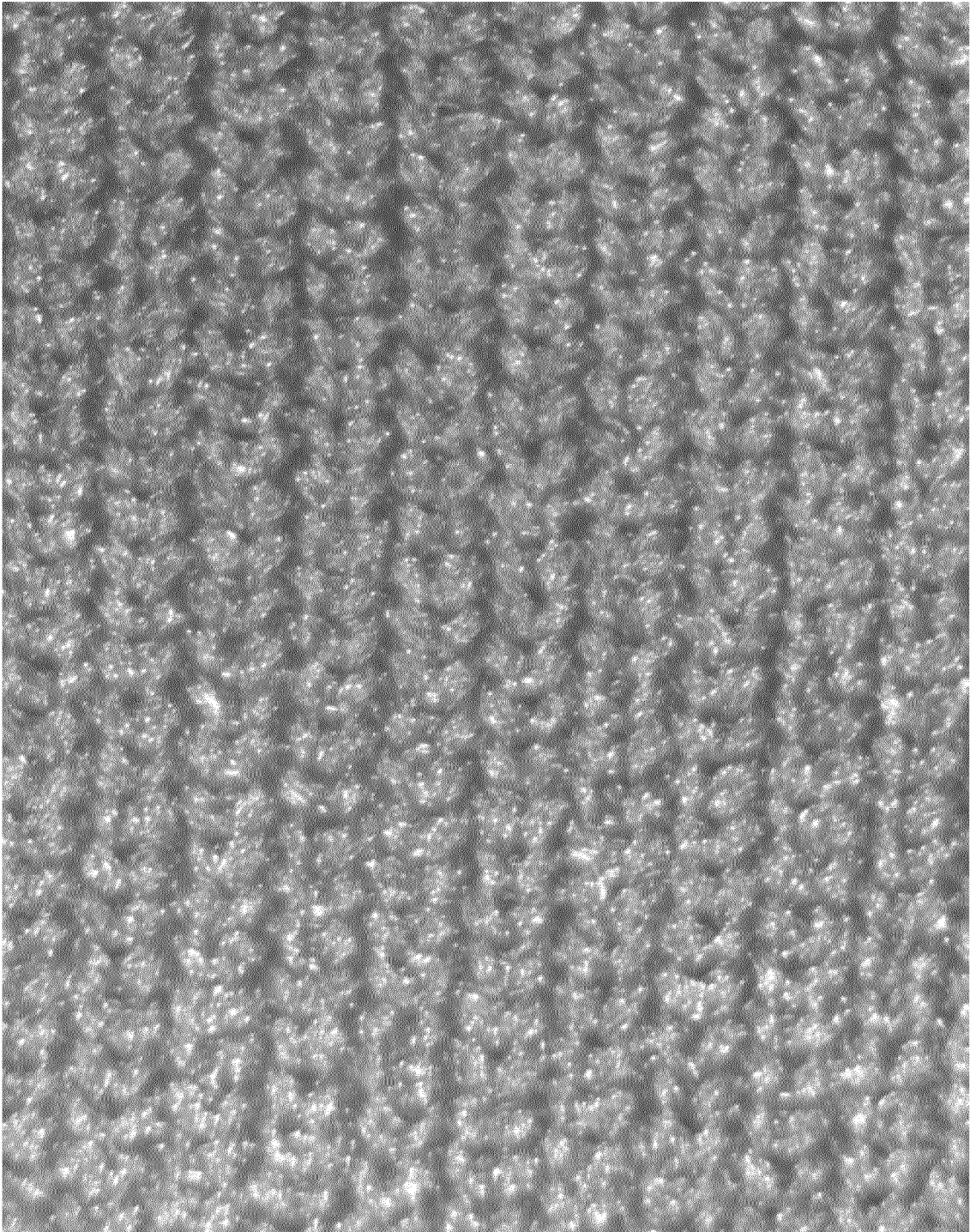


FIG. 5



EUROPEAN SEARCH REPORT

 Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/021387 A1 (CHUANG CHENG-YUAN [TW] ET AL) 2 February 2006 (2006-02-02)	1-15	INV. D04B1/18
Y	* paragraph [0045] * * tables 1, 2 * * paragraph [0133] - paragraph [0144]; figures 5, 6 * * claims 1-104 *	1-15	
Y	----- M. Misra, V. Nagarajan, J. Reddy, A.K. Mohanty: "Bioplastics and green composites from renewable resources: where we are and future directions!", 8 TH INTERNATIONAL CONFERENCE ON COMPOSITE MATERIALS 26 August 2011 (2011-08-26), XP055266245, Retrieved from the Internet: URL:http://www.iccm-central.org/Proceedings/ICCM18proceedings/data/2.%20oral%20Presentation/Aug23(Tuesday)/T03%20Composite%20Materials%20from%20Biorenewable%20Resources/T3-6-AF1961.pdf [retrieved on 2016-04-18] * the whole document *	1-15	
Y	----- Ana Marija GRANCARI, Ivona JERKOVI, Anita TARBUK: "Bioplastics in Textiles", University of Zagreb, Faculty of Textile Technology; Department of Textile Chemistry and Ecology, Zagreb 24 April 2013 (2013-04-24), XP002756640, Retrieved from the Internet: URL:http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=156234 [retrieved on 2016-04-18] * the whole document *	1-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) D04B
Place of search Munich		Date of completion of the search 18 April 2016	Examiner Braun, Stefanie
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EP 15 19 1811

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18-04-2016

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
15	US 2006021387	A1	02-02-2006	NONE
20	-----			
25				
30				
35				
40				
45				
50				
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

- WO 0181443 A [0020]