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

(54) **HIGH-STRENGTH FABRIC SYSTEM**

(57) A description is given of a process for obtaining a compact textile fabric, 100% acrylic or partially blended with other yarns also non-acrylic, having a stiff and rough hand, suitable for creating integral, partial or shaped article, single cloths or by the metre which upon shrinkage can be used as finished products, semi-manufactured

products or as simple parts of finished product for clothing and/or furniture, such as for example shoe uppers, belts, bags, hats, shoelaces or other accessories for clothing or furniture, where the textile fabric derives from the heat treatment of a knitted fabric obtained using an unshrunk 100% acrylic yarn.

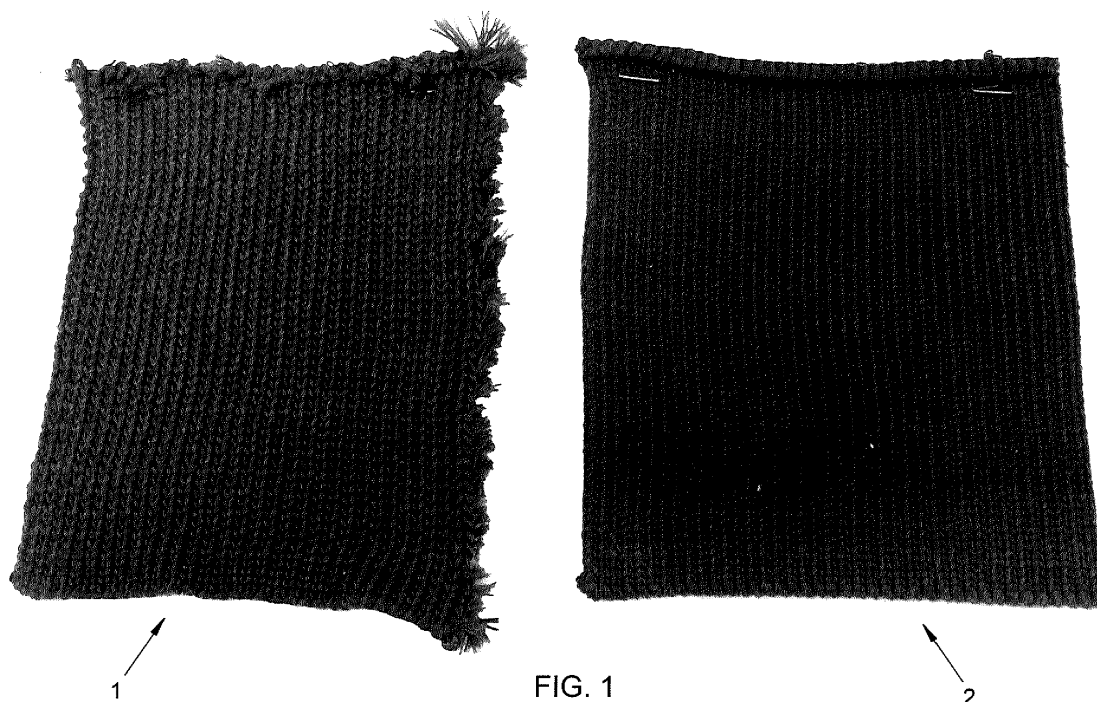


FIG. 1

Description

[0001] The present invention relates to a high-strength fabric system.

[0002] In particular the present invention relates to a process for obtaining a synthetic or partially synthetic fabric, of extremely compact consistency and having a stiff and rough hand, with improved resistance to horizontal and vertical traction and to perforation, so as to be suitable for creating integral, partial or shaped articles, single cloths or by the metre which, thanks to the shrinkage undergone, can be used as finished products, semi-manufactured products or as simple parts of finished products intended for the sector of footwear, for example shoe uppers, shoelaces, for the sector of accessories for clothing such as for example belts, bags, hats, watch straps, for the sector of furniture or its accessories, such as rugs including mats for cars.

[0003] More particularly the present invention relates to a process for obtaining the aforementioned textile fabric comprising the heat treatment of a knitted fabric obtained by working at least one particular 100% acrylic yarn of the unshrunk type.

[0004] The 100% acrylic yarns currently available on the market are "fixed" acrylic yarns or HB (high bulk) acrylic yarns, the latter generally used in knit weaving in that they create knitwear having softness and volume, for example outer knitwear or pile fabrics.

[0005] The "fixed" acrylic yarn is formed solely by stretched fibres while the HB 100% acrylic yarn is formed by a blend of acrylic fibres where a portion of fibres of the blend were stretched previously while the remaining portion of fibres has not been stretched: the blend is spun and the yarn obtained in this way is then subjected to a heat treatment which generates a shrinkage solely of the stretched fibres, where the degree of swelling of the yarn is mainly a function of the percentage of shrinkage of the portion of stretched fibres.

[0006] The 100% acrylic yarns are also used in weaving with loom, creating fabrics whose consistency is not very suited to obtaining shaped manufactured products of high compactness and stiffness such as to be able to make shoe uppers, belts, bags or other accessories for clothing or furniture such as watch straps or mats for cars.

[0007] An increasingly felt need in the textile sector is that of finding materials of great fashion effect, for example with jacquard type effects such as those which can be obtained by knitting, having however a greater compactness and strength, and which represent a valid alternative to the fabrics and/or materials currently available on the market, more particularly in order to produce shoe uppers, belts, bags, hats, shoelaces or other accessories for clothing or furniture such as watch straps or mats for cars.

[0008] The object of the present invention is that of overcoming, at least in part, the disadvantages of the prior art by providing alternative textile materials, preferably of extremely compact and stiff consistency, with im-

proved resistance to horizontal and vertical traction and to perforation, such as to be suitable for obtaining single cloths, cloths by the metre, integral articles, partial articles, shaped manufactured products and the like, for accessories for clothing and/or furniture, such as for example shoe uppers, belts, bags, watch straps, hats, shoelaces, rugs, mats for cars or other accessories for clothing and/or furniture.

[0009] These and other objects are achieved by the textile material in accordance with the present invention obtained with a process having the features listed in the appended independent claim 1, using a particular 100% acrylic yarn.

[0010] Advantageous embodiments of the invention are disclosed by the dependent claims. An object of the present invention relates to a process for obtaining a finished fabric, synthetic or partially synthetic, defined here also as knitted fabric, having at least one stiffened portion with an extremely compact consistency, preferably such as to result in a fabric with low wearability and/or drapability.

[0011] "Extremely compact" here is meant to identify a fabric which is rigid and "solid" to horizontal and vertical traction, understood to have little stretch in the directions of width and length (dimensional stability) and resistant to perforation to a much greater extent than other fabrics with the same thickness.

[0012] "Knitted fabric" here is meant to identify a product of industrial knitting, of any form, made by hand or with knitting machines, preferably machines of the linear or rectilinear type, rather than with a weaving loom.

[0013] The knitted fabric differs from woven fabrics having a warp and a weft because it is made up of a curvilinear weave (loops) formed by a continuous yarn which weaves sinuously, binding by means of crossings, which are arranged horizontally (wale) and/or vertically (course).

[0014] The stiffened portions of the present fabric derive from a particular heat treatment whereto the knitted fabric made with at least one unshrunk 100% acrylic yarn is subjected, optionally knitted in machine with other different yarns (of natural and/or synthetic fibres), where all the yarns used in the knitting go to make up and form the curvilinear weaves of wale and course which make up the structure of said knitted fabric.

[0015] "Yarn" here is meant to identify the group of textile fibres held together by a twisting to form a thread of length far greater than the fibres and "100% acrylic yarn" here is meant to identify a yarn formed exclusively by acrylic fibres.

[0016] "Acrylic fibres" here is meant to identify the acrylic fibres which are produced generally by extrusion of a polymer constituted by at least 85% of acrylonitrile monomer, the possible remaining part to 100 of monomer units being formed by one or more comonomers.

[0017] The extrusion of the aforesaid polymer leads to the formation of a continuous multifilament thread which can be colourless or coloured through pigmentation. This

staple is crimped in order to undulate it and then torn through traction in order to obtain discontinuous fibres, generally with length of 72/74 mm approximately, and subsequently the fibres can be stretched if intended to form a fixed acrylic yarn, or non-stretched if intended to form a portion of the blend of an HB acrylic yarn.

[0018] The present unshrunk 100% acrylic yarn is formed by a blend of acrylic fibres where part of the fibres of the blend, for example 55%, have been previously stretched, while the remaining fibres, for example 45%, have not been stretched. This yarn composed in this way is therefore ready for use in order to be knitted in accordance with the present invention.

[0019] The term "different yarns" here is meant to identify all the yarns which are different from the present unshrunk yarn, for example yarns of only natural fibres, yarns of only synthetic fibres other than 100% acrylic, yarns of natural and synthetic fibres in a blend, and the like.

[0020] After the heat treatment each stiffened zone of the present knitted fabric exhibits poor or reduced stretch in the directions of width and length.

[0021] Generally the stretch in both directions, which the stiffened zones of the present fabric exhibit after the present heat treatment, is less than 5%, even if it is possible to reach values below or equal to 3%, even up to 0%, according to the thickness of the unshrunk 100% acrylic yarn used and the type of knitting.

[0022] It is also to be noted that with the same metric count of the yarn there could also be different stretches according to the fineness worked and the pattern or knit stitch of the knitting: therefore according to the degree of final stretch required of the end product a choice will be made of the thickness of the yarn, the type of knitting and the fineness of the working.

[0023] "Fineness" here refers to the dimension of the knit stitch which is determined by the number of needles present in a certain length of the machine. The greater the value, the smaller the dimension of the knit.

[0024] Moreover each stiffened zone of the aforesaid knitted fabric in accordance with the present invention has a very similar consistency and aesthetic appearance to a felt rather than to a woven fabric such as flannel or the like which are highly drapable and therefore wearable fabrics thanks to their softness.

[0025] Said knitted fabric with one or more stiffened portions can be in the form of single cloths, cloths by the metre (pieces), integral articles, partial articles (parts of end products) or shaped manufactured products deriving therefrom.

[0026] Since the object of the present invention is that of reducing as far as possible the stretch of a knitted fabric, a preferred embodiment of the present fabric is that made by knitting a single unshrunk 100% acrylic yarn so as to obtain advantageously a fabric substantially without stretch in both directions.

[0027] Thanks to its stiffness and dimensional stability, the present knitted fabric is found to be particularly suit-

able for obtaining shoe uppers, belts, bags, watch straps, hats, shoelaces, mats for cars or other garments or accessories for clothing and/or furniture. In fact the abovementioned properties are the end result of the use of acrylic fibre in one of its "non-usual" states and not currently available commercially.

[0028] In practice, without wanting to be bound to any particular theory, it can be presumed that the extreme compactness, the stiff and rough hand, the improved resistance to horizontal and vertical traction and to perforation, are due to the stiffening undergone by the area of knitted fabric containing the particular unshrunk 100% acrylic yarn defined above, when said yarn is subjected to heat, while the other types of conventional yarns, for example those of wool, do not undergo this stiffening.

[0029] "Hand" here is meant to identify the touch sensation given by a fabric. Generally the sensation which the hand notices when touching the fabric can be softness, warmth, stiffness, compactness, hairiness, slip, deriving from a hand which is, for example, soft, crinkled, full-bodied, smooth, heavy, grainy, pliant, dry, hard, fine, swollen, rough, undulated, smooth.

[0030] It is to be noted that, after the aforesaid heat treatment, the present knitted fabric can also be subjected to a chemical treatment of waterproofing if necessary for the end use (for example uppers) without thereby departing from the scope of the present invention.

[0031] As already mentioned, the knitted fabrics in accordance with the present invention can be made also by knitting one or more unshrunk 100% acrylic yarns as defined above, with one or more yarns for knitting which are different from the present unshrunk 100% acrylic yarn, for example of natural and/or synthetic fibres. The resulting fabrics will exhibit very stiff and compact areas for the unshrunk 100% acrylic yarn in accordance with the invention, and less stiff and less compact areas for the other types of yarn which are usual for knitting operations.

[0032] When the abovementioned finished textile fabric, having at least one stiffened portion of extremely compact consistency, is presented in the form of single cloths or by the metre it is possible to obtain integral, partial or shaped articles which can be used as finished products, semi-manufactured products or as simple parts of finished product intended for the sector of footwear, for example shoe uppers, shoelaces, for the sector of accessories for clothing such as for example belts, bags, watch straps, hats, jewellery, for the sector of furniture or its accessories, such as rugs including mats for cars.

[0033] "Single cloths or by the metre" is meant here to identify a flat fabric with large surface with respect to its thickness, suitable for being shapable by cutting.

[0034] It is to be noted that the stiffness of the stiffened zones obtained by the present process is such as not to require, in the obtaining of the fabric, a second support yarn, hidden and not forming the curvilinear weaves of wale and/or course (a laid-in yarn), in order to give stability to transverse traction.

[0035] Going into detail, the process for obtaining a knitted fabric, synthetic or partially synthetic, in the form of single cloth, cloth by the metre (piece), integral article, parts of end manufactured products, which has at least one stiffened portion of extremely compact consistency and appearance similar to felt, preferably of such a consistency as not to be substantially wearable and/or drapable, and preferably with a stretch in both directions less than 5%, more preferably less than or equal to 3% even up to 0%, said process comprising the following steps:

(A) preparing, in a predefined metric count, an unshrunk 100% acrylic yarn as defined above from acrylic fibres, preferably coloured and not undyed, said unshrunk yarn being able to be associated with one or more different yarns in order to form a single yarn comprising said unshrunk 100% acrylic yarn;

(B) knitting one or more of said yarns prepared in step (A) to obtain said knitted fabric directly shaped on the machine, preferably rectilinear machines or of the linear type, in the form of single cloth, cloth by the metre (piece), integral article, parts of end products,

said yarns prepared in said step (A) being fed into the machine in such a way as to form curvilinear loops of wale and/or of course forming the structure of said knitted fabric;

(C) subjecting to heat treatment said knitted fabric obtained from the aforementioned step (B), preferably in humid heat conditions, more preferably passing said knitted fabric of step (B) through a first continuous ironing machine with heated smooth rollers and then through a second ironing machine with press cover, so as to obtain said knitted fabric wherein at least said stiffened portion has little stretch in the directions of width and length, preferably a stretch in both directions less than or equal to 5%, more preferably less than or equal to 3% even up to 0%;

(C') subjecting the knitted fabric obtained from step (C) to cooling.

[0036] In step (B) said 100% acrylic yarns prepared in step (A) can be knitted in a knitting machine such as the linear one, also together with one or more different yarns as defined above. The different yarns can be fed separate in the machine to create zones of different materials or fed together in the machine so as to form one or more mixed yarns (twist) intended to create one or more mixed yarn zones, on condition that all the yarns used for the knitting are fed into the machine in such a way as to form exclusively the curvilinear loops of wale and/or course of said knitted fabric.

[0037] It is to be noted that when a knitted fabric obtained by working the aforementioned unshrunk 100% acrylic yarn with other yarns of different composition is subjected to heat treatment an extremely compact textile fabric is obtained, having at least one first stiffened por-

tion with a stiff and rough hand for the percentage of acrylic yarn, and a second portion having a soft hand in the percentage of the other yarns. Said fabric is therefore particularly suitable for creating wearable garments such as caps, characterised in that they have both rigid parts (e.g. visor) and soft parts such as the head or vice versa (this produces a cap with a composition not exclusively 100% acrylic).

[0038] In practice the extension of the stiffened portion of the fabric obtained after the present process is proportional to the extension of the knitted fabric containing said unshrunk 100% acrylic yarn.

[0039] The metric count of the unshrunk 100% acrylic yarn in accordance with the invention can be any count normally used in the knitting sector: the knitwear can in fact be created with any count depending on the result that is to be obtained. In fact the greater the thickness of the yarn, the greater the thickness of the fabric.

[0040] "Metric count" here is meant to identify the number of metres (Nm) for making up the weight of 1000g and represents the bulkiness or thickness of the yarn.

[0041] An example of the metric count of the present unshrunk acrylic yarn suitable for industrial knitting can be 1/18000 but can also be produced in a different count, for example with a metric count of 1/500 (i.e. to reach 1kg in weight 500 metres of yarn are needed) or 1/700, or 1/30000 (i.e. to reach 1kg in weight 30000 metres of yarn are needed), or 1/40000: the metric count of the yarn to be knitted will therefore influence the fineness at which the yarns can be worked.

[0042] Knitting of the present unshrunk 100% acrylic yarn can be performed with any method already used in the art of knitting, for example with weft stitch and chain stitch, where the density of the stitches (number of wales and courses per centimetre) will be chosen on the basis of the compactness which is to be achieved in the knitted fabric.

[0043] Moreover the present unshrunk 100% acrylic yarn can be worked with any fineness so as to reproduce all the types of the knitted textile working of the art, always giving rise to a fabric with stiffened zones after the heat treatment.

[0044] As already mentioned, the heat treatment of step (C) applied to the knitted fabric, obtained with the yarn described above in accordance with the present invention, can be compared to a shrinkage treatment in that operating at a temperature of around 100-120°C, using a thermal fluid selected from steam, hot air or boiling water, preferably steam.

[0045] After the treatment of step (C), the knitted fabric is cooled, preferably through aspiration in that it allows also the residual moisture to be removed and also the shrinkage step to be accelerated, making the fabric reach the definitive dimensional stability.

[0046] It is to be noted that the present heat treatment (C) in hot-humid conditions is preferably performed by means of the use of ironing machines which supply both heat and humidity, passing said knitted fabric of step (B)

through the smooth and heated rollers of a first continuous ironing machine, which helps to keep open the pores between the meshes during the shrinkage, and then through a second ironing machine with press cover, also capable of supplying heat and humidity to the fabric, in such a way as to complete the shrinkage and at the same time impart a dimensional stability to the fabric as defined above.

[0047] It is to be noted that the fabric deriving from the aforesaid heat treatment can be comparable aesthetically to a "felted" fabric in that it has become more compact, heavier and of greater thickness with respect to the knitted fabric before the heat treatment, in addition to having thickened its mass, thus becoming less permeable to air similarly to boiled wool or felted wool. However this invention was found to be unexpected in that the felting is a typical phenomenon of wool while the synthetic fibres including acrylic fibres are notoriously not subject to the phenomenon of felting.

[0048] Therefore, in the present invention, the particular nature of the yarn given by the material used and by its working together with the effect of the heat treatment of the knitted fabric, have allowed the fabric which is the object of the present invention to reach a high consistency and a compactness such as to be able to be shaped not only on the machine but also by cutting, without having to be lined with an adhesive material to avoid the fraying of the edges, operation which instead has to be carried out for conventional knitted fabrics.

[0049] It is to be noted in fact that conventional knitted fabrics are not shaped by cutting since they are very suitable for being reduced or increased directly on the machine but not for being cut.

[0050] The process of production of the present fabric is also found to be more advantageous with respect to the processes of loom weaving in that in the latter a high outlay of time is required for the preparation of the loom and a minimum production quantity (production minimums) is necessary for operating the looms which always operate with a very high number of reels, while with the present process even one single piece can be produced advantageously and fast whose shape is obtained directly on the machine using a single reel of yarn.

[0051] Further features of the invention can be made clearer by referring to some of its embodiments purely by way of a non-limiting example, illustrated in the accompanying drawings, in which:

Figure 1 illustrates two samples of parts of knitwear, before and after the heat treatment of step (C);
 Figure 2 illustrates a two-colour knitted cap, both worn by a mannequin and not worn, which has not been subjected to the heat treatment of step (C);
 Figure 3 illustrates the two-colour knitted cap of Figure 2 after having undergone the heat treatment of step (C), both worn by a mannequin and not worn.

[0052] Referring to Figure 1 the sample on the left, de-

noted by reference numeral 1, is what is obtained by knitting one or more "unusual" yarns in that they are not shrunk in accordance with the present invention.

[0053] The illustrated sample 1 is knitted with fabric stitch, with fineness 7, using a 1/18,000 100% acrylic yarn. This yarn is not a conventional knitting product since the yarn has not been subjected to shrinkage (retraction) before knitting and therefore is to be considered as the precursor of the product which can be obtained through the method of the present invention.

[0054] As can be seen from the photo, this sample 1 has undulations which are an indication of its deformability, despite the fact it has been fabric stitched. More particularly, if said sample 1 is subjected to traction in a transverse direction, it tends to stretch, similarly to known knitted fabrics, even if in a more marked manner.

[0055] It is for this reason that unshrunk yarns of acrylic fibres have never been used to produce knitwear.

[0056] The sample on the right, denoted by reference numeral 2, is that which is obtained by subjecting the sample 1 to step (C) of heat treatment and to subsequent cooling (C'). As can be seen from Figure 1, this sample 2 does not have undulations, has narrower meshes, and if said sample 2 is subjected to traction in the transverse direction it does not stretch, similarly to felts which are however typically in natural fibres.

[0057] As mentioned above, the knitted fabric obtained from the process in accordance with the present invention is found to be, where stiffened, very compact and solid, resistant to horizontal/vertical traction and to perforation in a much more marked manner than any other similar fabric, which can also be detected with instruments. Moreover it is stable, insulating, with raw edge, does not fray, solid and resistant at the sewing points, and exhibits a possibility of colours with high fastness to light, to washing and to rubbing, having moreover a particular stability to washing by hand and in a machine.

[0058] Referring to Figures 2-3, a hat is illustrated before (Fig. 2) and after the heat treatment (C) (Fig. 3). This hat has been made using, in the same machine for knitting, an unshrunk 100% acrylic yarn as defined above to make the soft black cap and a wool yarn to make the white band placed around the black cap.

[0059] From the comparison of Figure 2 with Figure 3 it is clear that the heat treatment (C) and the cooling (C') confer to the black portion of the cap (relating to the head) such rigidity and compactness as to transform the cap (Fig. 2) into a rigid beret, leaving instead unchanged the band and the consistency of the white band in wool.

[0060] As mentioned above, one or more unshrunk 100% acrylic yarns as defined above can be used in association and/or in combination with one or more yarns of different composition, even not acrylic. This includes both the case wherein the two (or more) different yarns are knitted in the machine in order to produce a single shaped article formed by a mixed yarn, and the case wherein the acrylic yarn as defined above is used in the construction of a first element of a shaped article and

different yarns, for example wool, are used in the construction of other elements belonging to the shaped article, as in the case of the hat illustrated in Figures 2-3.

[0061] Moreover the present unshrunk 100% acrylic yarn can be used in association and/or in combination with one or more yarns of different composition, also not acrylic, in order to form a twisted yarn to be used in turn as single yarn in order to obtain a knitted fabric to be subjected to the present heat treatment.

It is to be understood that the heat treatment of step (C) and cooling of step (C') can also be performed on a portion of knitted fabric without thereby departing from the spirit of the present invention.

[0062] It is to be understood moreover that the present unshrunk 100% acrylic yarn can also be used in weaving with a loom without thereby departing from the spirit of the present invention.

[0063] The present invention is not limited to the particular embodiments described previously and illustrated in the accompanying drawings, but instead numerous detail changes may be made thereto within the reach of the person skilled in the art, without thereby departing from the scope of the same invention, as defined in the appended claims.

Claims

1. Process for obtaining a finished fabric, synthetic or partially synthetic, having at least one stiffened portion with an extremely compact consistency and appearance similar to felt, said fabric being directly shaped on the machine in the form of single cloths, cloths by the metre (piece), integral articles, parts of end products or shaped products deriving therefrom, said process comprising the following steps:

(A) preparing, in a predefined metric count, an unshrunk 100% acrylic yarn as defined above from acrylic fibres, preferably coloured and not undyed,

said unshrunk yarn being optionally associated with one or more different yarns in order to form a single yarn comprising said unshrunk 100% acrylic yarn;

(B) knitting one or more of said yarns prepared in step (A) to obtain said knitted fabric directly shaped on the machine, preferably rectilinear machines or of the linear type, in the form of single cloth, cloth by the metre (piece), integral article, parts of end products,

said yarns being fed into the machine in such a way as to form curvilinear loops of wale and/or course of the structure of said knitted fabric;

(C) subjecting to heat treatment said knitted fabric obtained from the aforementioned step (B), preferably in humid heat conditions, so as to obtain said knitted fabric wherein at least said stiff-

ened portion has little stretch in the directions of width and length, preferably with a stretch in both directions less than 5%, more preferably less than or equal to 3% even up to 0%;

(C') subjecting the knitted fabric obtained from step (C) to cooling.

2. Process according to claim 1, wherein the heat treatment of step (C) is performed by passing said knitted fabric of step (B) through a first continuous ironing machine with heated smooth rollers and then through a second ironing machine with press cover, so as to obtain said knitted fabric.
3. Process according to claim 1 or 2, wherein the heat treatment of step (C) is performed at a temperature of around 100-120°C, using a thermal fluid selected from steam, hot air or boiling water, preferably steam.
4. Process according to any one of the preceding claims, wherein the fabric in the form of single cloth, cloth by the metre (piece), obtained from the heat treatment of step (C) and from the cooling of step (C') is then subjected to one or more cutting operations (D) to obtain shaped products or parts of shaped manufactured products for accessories for clothing and/or furniture, such as for example shoe uppers, shoelaces, belts, bags, watch straps, hats or other accessories for clothing and/or furniture such as for example rugs, mats for cars.
5. Process according to any one of the preceding claims, wherein the cooling of step (C') is performed by means of aspiration.
6. Process according to any one of the preceding claims, wherein the yarn has a metric count of 1/18,000, also possible to make in other counts.
7. Process according to any one of the preceding claims, wherein the extension of the stiffened portion of the fabric obtained after step (C') is proportional to the extension of the knitted fabric containing said 100% acrylic yarn made up solely of unshrunk fibres.
8. Process according to any one of the preceding claims, wherein in step (B) said 100% acrylic yarn obtained in step (A) is knitted in a knitting machine together with one or more different yarns to form curvilinear weaves of wale and/or course of structure of said knitted fabric.
9. Knitted fabric, synthetic or partially synthetic, comprising at least one stiffened portion of consistency and appearance similar to felt and dimensional stability in both directions, preferably a stretch in both

directions less than 5%, more preferably less than or equal to 3% even up to 0%, obtained with the process defined in any one of claims 1-8 in the form of single cloths, cloths by the metre (piece), integral articles, parts of end products, or shaped manufactured products deriving therefrom, which can be used as finished product, semi-manufactured product or part of finished products for accessories for clothing and/or furniture, such as for example shoe uppers, shoelaces, belts, bags, watch straps, hats or other accessories for clothing and/or furniture such as for example rugs, mats for cars.

10. Accessories for clothing and/or furniture such as for example shoe uppers, shoelaces, belts, bags, watch straps, hats or other accessories for clothing and/or furniture such as for example rugs, mats for cars, comprising the end knitted fabric as defined in any one of the preceding claims 1-9.

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

1. Process for obtaining a synthetic or partially synthetic knitted fabric having at least one stiffened portion, said fabric being directly shaped on a knitting machine in the form of single cloths, cloths by the metre (piece), integral articles, parts of end products or shaped products deriving therefrom, said process comprising the following steps:

(A) preparing, in a predefined metric count, a not shrunk 100% acrylic yarn consisting of acrylic fibres not shrunk, preferably coloured and not undyed;

(B) knitting one or more of said not shrunk 100% acrylic yarns consisting of acrylic fibres not shrunk as prepared in step (A) to obtain said knitted fabric directly shaped on the knitting machine, preferably rectilinear machines, in the form of single cloth, cloth by the metre (piece), integral article, parts of end products, said yarns being fed into the machine in such a way as to form curvilinear loops of the structure of said knitted fabric;

(C) subjecting to heat treatment said knitted fabric obtained from the aforementioned step (B), preferably in humid heat conditions, so as to obtain said at least one stiffened portion which has a stretch in the directions of width and length less than 5%, preferably less than or equal to 3% even up to 0%;

(C') subjecting the knitted fabric obtained from step (C) to cooling.

2. Process according to claim 1, wherein the heat treatment of step (C) is performed by passing said knitted

fabric of step (B) through a first continuous ironing machine with heated smooth rollers and then through a second ironing machine with press cover, so as to obtain said knitted fabric.

3. Process according to claim 1, wherein the heat treatment of step (C) is performed at a temperature of around 100-120°C, using a thermal fluid selected from steam, hot air or boiling water, preferably steam.

4. Process according to any one of the preceding claims, wherein the fabric in the form of single cloth, cloth by the metre (piece), obtained from the heat treatment of step (C) and from the cooling of step (C') is then subjected to one or more cutting operations (D) to obtain shaped products or parts of shaped manufactured products for accessories for clothing and/or furniture, such as for example shoe uppers, shoelaces, belts, bags, watch straps, hats or other accessories for clothing and/or furniture such as for example rugs, mats for cars.

5. Process according to any one of the preceding claims, wherein the cooling of step (C') is performed by means of aspiration.

6. Process according to any one of the preceding claims, wherein the yarn has a metric count of 1/18,000 Nm, also possible to make in other counts.

7. Process according to any one of the preceding claims, wherein the stiffened portion of the fabric obtained after step (C') is proportional to the portion of the knitted fabric containing said 100% acrylic yarn made up solely of unshrunk fibres.

8. Process according to any one of the preceding claims, wherein in step (B) one or more yarns different from said 100% acrylic yarn not shrunk are fed separate in the knitting-machine to create zones of different materials.

9. Knitted fabric, synthetic or partially synthetic, in the form of single cloths, cloths by the metre (piece), integral articles, parts of end products, or shaped manufactured products deriving therefrom, which can be used as finished product, semi-manufactured product or part of finished products for accessories for clothing and/or furniture, such as for example shoe uppers, shoelaces, belts, bags, watch straps, hats or other accessories for clothing and/or furniture such as for example rugs, mats for cars, said knitted fabric being obtained with the process defined in any one of claims 1-8.

10. Accessories for clothing and/or furniture such as for example shoe uppers, shoelaces, belts, bags, watch

straps, hats or other accessories for clothing and/or furniture such as for example rugs, mats for cars, comprising the end knitted fabric as defined in any one of the preceding claims 1-9.

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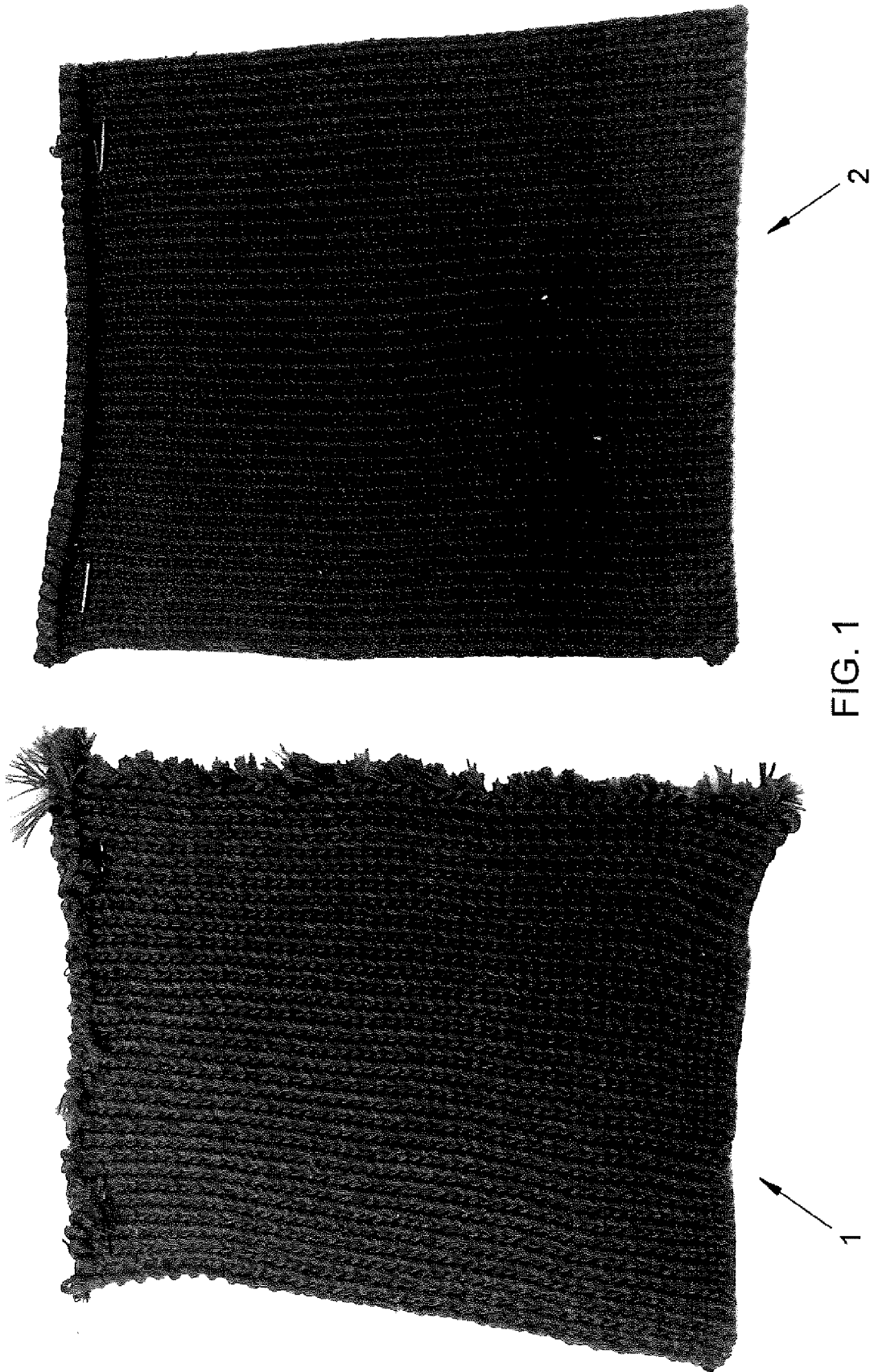




FIG. 2

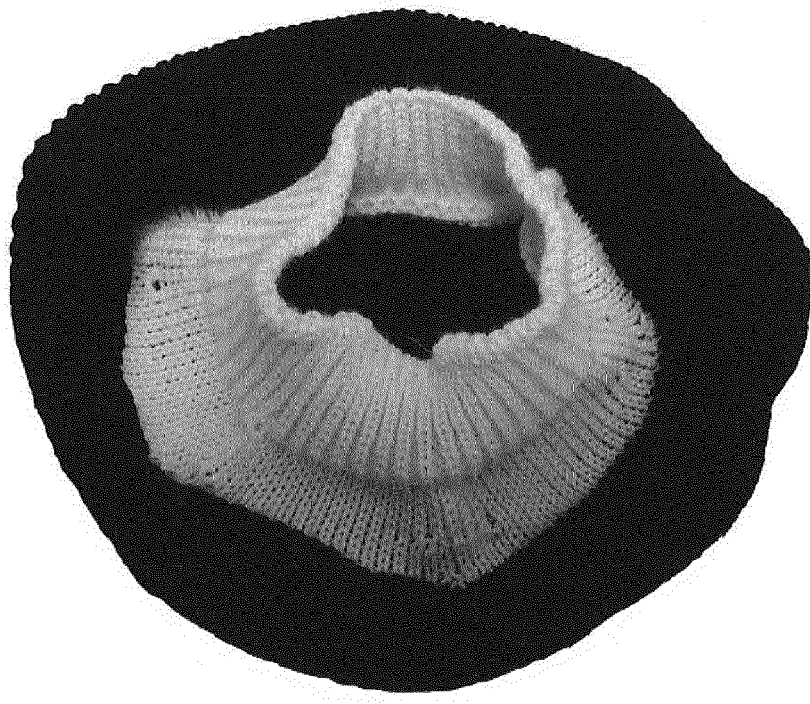




FIG. 3





EUROPEAN SEARCH REPORT

 Application Number
 EP 16 16 3294

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			D04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 September 2016	Examiner Braun, Stefanie
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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