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(54) **Procedure of manufacturing a warp beam for clothing and elastic fabric obtained**

(57) Commencing with a warping machine with "déroulé" spools, with olefin or polyolefin monofilament or multifilament thread located on a creel, with predetermined tension, the threads of which are wound on a loom beam and where the winding on the loom beam consists of: a first phase in which the diameter of the said spools is calculated, and the tension, transmitting it to a CPU, a second phase in which the friction at the union of the threads is calculated, transmitting it to a

CPU, a third phase in which the loom beam diameter is calculated, together with the thread tension, transmitting it to a CPU, and a fourth phase in which the CPU calculates the revolutions of the spools and loom beam in order to increase or decrease the said revolutions so that the thread tension remains constant during the winding of the thread on the loom beam

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Description

[0001] A procedure for the manufacture of a warp fabric for clothing and the obtained elastic fabric, of the type that are manufactured initially commencing with a warping machine that incorporates spools, by "déroulé" reel rotation, with monofilament or multifilament elastomer thread located in a creel, with a predetermined tension, the threads of which are wound on a loom beam that is characterised in that the said elastomer is an olefin or polyolefin and because the folding or winding of the threads on the loom beam comprise the following phases: a first phase in which the diameter of the said creel spools is calculated, together with the tension of its respective threads, with the said information being transmitted to a CPU, which processes it, a second phase in which the friction at the union of the threads in the warping machine is calculated, with the said information being transmitted to a CPU, which processes it, a third phase in which the loom beam diameter is calculated, together with the tension of the respective threads, with the said information being transmitted to a CPU, which processes it, and a fourth phase in which the CPU calculates the revolutions of the following: the creel winding spools in consequence of the winding weight loss, and the loom beam because of its increase in weight as a result of the winding; in order to subsequently increase or decrease the said revolutions so that the thread tension remains constant during the entire winding operation of the said thread on the loom beam.

BACKGROUND TO THE INVENTION

[0002] Various patents and utility models are known in the state of the art, in which olefins are employed in the manufacture of woven and non-woven fabrics.

[0003] Thus, European patents No 0496888, in the name of the company KANEBO LTD, dating from the year 1991 is known, which consists of a compound of elastic filaments with a rough surface, comprising a preservative component that consists of a thermoplastic polymer formed by a fibre, such as a polyamide, a polyester or a polyolefin, together with a core comprising an elastomer formed by fibre, such as a polyester or polyurethane elastomer, in which the core to be preserved with a range of compounds with proportions of 1/1 to 100/1 in terms of proportion in cross section and the part of the core has a uniformly smooth surface extending in the direction of the axis of the fibre, whereas the rough part which covers the part of the core has a rough surface from which numerous projections form in the circumferential direction close to the fibre axis. This may be caused by the fused compound spinning the core or rough components in the compound percentage described above, followed by stretching 1.1 to 10.0-folding and relaxation. The filament possesses excellent elastic properties, a small surface coefficient of friction and a matt effect due to the light reflection diffusion

caused by the rough surface and is pleasant when worn in the form of a fibrous structure, particularly as ladies stockings.

[0004] European patent No 1065950, belonging to CHARNOS PLC dated 1999, is also found in the state of the art, and which consists of an undergarment comprising fabric cups for bust support, each of which includes a substantially rigid frame that is enclosed piece of elastomer edging material, with the frame, during use, extending from a central region located between the breasts, characterised in that the frame then extends upwards and outwards, moving away from lower bust profile, in a direction towards the front part of the shoulder, so that the frame provides a support structure for supporting the bust and the entire region of the bust is held and supported by the insertion piece. Claim 6 indicates that the elastomer material will be selected from the group comprising styrene ethylene-butylene styrene, styrene ethylene-propylene styrene, polyether amides and polyolefin elastomers.

[0005] In the non-woven fabric sector, European patent No 0720666 in the name of KIMBERLYCLARK WORLDWIDE, INC, dated 1994, is worthy of special mention, which consists of a series of multi-component polymer filaments, which includes a mixture of polymers of a butane polymer, a polyolefin other than butane and up to 10% of a polymer form of ethylene by weight. The mixture is applied to one side or the coating of the multi-component filaments. Also presented is a non-woven fabric made of such filaments that possesses enhanced softness characteristics. Composite materials are also presented that include the previously described fabric joined to both sides of an interior layer produced by blowing the melted mass and other garments and other articles made of the fabric.

[0006] European patent No 0286763 belonging to PLYMOUTH FRANCAISE, dated 1988, is also known, which protects an elastic fabric for use in underwear, among the components of which is a thermoplastic polymer, which is a polyolefin (in claim 3). Already in those years the lack of the use of rubber was appreciated because it was not recyclable, it was difficult to find natural rubber in a pure state (because the impurities caused the product to lose its properties), and finally, because this lost its elastic properties, either as a consequence of sunlight or through the use of sun tan lotions. For this reason, the possibility of employing a polyolefin was pointed out, but without specifically explaining to do this.

BRIEF EXPLANATION OF THE INVENTION

[0007] The previously cited background describes three completely different points of view referring to the application of olefins and polyolefins.

[0008] On the one hand, the KIMBERLY-CLARK WORLDWIDE patent refers to a non-woven fabric. This patent basically provides protection for nappies and similar products, in other words, a type of disposable

product, which is generally the use given to items manufactured from non-woven fabrics. With respect to the idea of manufacturing a non-woven fabric and a woven fabric, an expert in the material would easily recognise that there are two totally different manufacturing procedures involved that are not extrapolable from one sector to the other. Moreover the said non-woven fabric is not elastic.

[0009] The CHARNOS PLC does not initially protect the use of olefins and polyolefins in the textile sector. It merely states it in claim 6. Nor does it state how to produce it, because up to now it has not been possible to weave a polyolefin thread as an elastomer in fabrics. In fact, it protects a frame that provides a support structure for the bust, which is enclosed in a piece of elastomer edging and is not, strictly speaking, a fabric.

[0010] Along the same lines as the previous patent, the European one belonging to PLYMOUTH FRANKCAISE limits itself to citing the possibility of using a polyolefin, but without expressly stating how to accomplish this. Its application is that of elastic material for edge trimming.

[0011] Finally, the company KANEBO LTD describes how to manufacture an elastic fibre that incorporates a polyolefin. It comprises a core with a rough coating. This means that the material possesses greater sliding properties but, on the other hand, production costs greatly increase because of the use of the rough coating, which makes it economically unviable.

[0012] This invention is of considerable significance to the textile sector because it provides a solution to one of its biggest problems with respect to the use of thermoplastic polymers at low cost and with excellent durability.

[0013] The properties of olefins and polyolefins are well-known in relation to their known elasticity and enhanced durability with respect to chlorine used in swimming pools and saltpetre in seawater.

[0014] As has already been stated, it has not been possible to date to obtain an elastic warped fabric using olefins and polyolefins due to technical problems, because it was not known how to control the elasticity of the said elastomers in the warping machines to obtain a fabric washing and degreasing procedure.

[0015] The solution adopted by KANEBO is the most suitable, since it guarantees a sliding fibre thanks to the coating incorporated into the polyolefin fibre but, at the same time, this fibre is expensive and so it is not really economically viable. Additionally, it is only applicable to small diameter circular machines, for example, those employed in sock production.

[0016] One objective of this invention is a procedure for the manufacture of a warp fabric for a garment, of the type that are manufactured initially commencing with a warping machine that incorporates spools, by "déroulé" reel rotation, with monofilament or multifilament elastomer thread located in a creel, with a predetermined tension, the threads of which are wound on a

loom beam that is characterised in that the said elastomer is an olefin or polyolefin and because the folding or winding of the threads on the loom beam comprise the following phases: a first phase in which the diameter of the said creel spools is calculated, together with the tension of its respective threads, with the said information being transmitted to a CPU, which processes it, a second phase in which the friction at the union of the threads in the warping machine is calculated, with the said information being transmitted to a CPU, which processes it, a third phase in which the loom beam diameter is calculated, together with the tension of the respective threads, with the said information being transmitted to a CPU, which processes it, and a fourth phase in which the CPU calculates the revolutions of the following: the creel winding spools in consequence of the winding weight loss, and the loom beam because of its increase in weight as a result of the winding; in order to subsequently increase or decrease the said revolutions so that the thread tension remains constant during the entire winding operation of the said thread on the loom beam.

[0017] Another objective of this invention is a fabric in accordance with the procedure described in claims 6 or 7, which is characterised in that it comprises at least one monofilament or multifilament thread based on polyester, polyamide, PET, cotton or viscous etc, and by at least one olefin or polyolefin monofilament or multifilament.

A SPECIFIC EMBODIMENT EXAMPLE OF THIS INVENTION

[0018] Thus, is a specific embodiment example of this procedure for the manufacture of an elastic warp fabric for clothing commences with a warping machine.

[0019] Warping machines, whether cylindrical or of sections are basically composed of a creel or frame on which the reels (in this case, "déroulé" type reels), the union of the threads wound off the spools and the folding on the loom beam.

[0020] In this way, manufacture commences with a warping machine, by "déroulé" reel rotation as previously described, which incorporates spools with an olefin or polyolefin monofilament or multifilament thread on a creel, with a predetermined tension and with the threads wound on a loom beam.

[0021] The folding or winding of the threads on the loom beam comprises the following phases:

A first phase in which the diameter of the said creel spools and the tension of their respective threads is calculated, with this information being transmitted to the CPU, where it is processed.

A second phase in which the friction of the union of the threads in the warping machine is calculated, with this information being transmitted to the CPU, where it is processed. It is very important to take this friction into account in order to prevent "whip-

lash" effects, in other words, instantaneous stretching and compression.

In the third phase, the loom beam diameter is calculated, with this information being transmitted to the CPU, where it is processed.

Finally, during the fourth phase, the CPU calculates the revolutions that the creel winding spools should have as a consequence of the winding weight loss and the loom beam revolutions due to its weight increase as a result of the winding.

[0022] The four previous phases are performed in order to increase or decrease the said revolutions so that the thread tension remains constant through the winding of the referred thread on the loom beam.

[0023] The elastomers, specifically if the thread is an olefin or polyolefin, the said elasticity can exceed 400%, for which reason the previously described corrections are necessary, increasing or decreasing the spool and/or creel revolutions. In this way, the olefin or polyolefin thread tension on the creel spools will usually be less than that of the other threads in order to maintain the said spool wound. Later, during the winding of the creel spools to the union of the threads, the elastomer thread tension decreases still further, increasing at the referred union of threads, decreasing once again during transport between the union of threads and the loom beam. Finally, when the olefin or polyolefin thread is wound the tension is different. These tensions must be maintained constant so that there are no "whiplash" effects produced and that a thread is not under different tensions on the same loom beam.

[0024] The inventor has found it highly favourable to work under the following conditions: an environmental humidity level of between 50 and 80%, together with an environmental temperature of between 19 and 26°C. The warping machine must be balanced in function of these variables.

[0025] Titanium dioxide may be added to prevent any transparencies. The olefin and polyolefin polymers can be combined with other polymers, such as ethylenes.

[0026] In order to obtain the final elastic fabric, the obtained warp elastomer is combined with other warps fabrics and sections of other materials to obtain a fabric.

[0027] Thus, the CPU calculates the revolutions for the olefin or polyolefin loom beam should have, obtained in consequence of the weight loss by its winding to subsequently increase or decrease the said revolutions so that the thread tension remains constant throughout the winding of the referred thread on the loom beam.

[0028] It is necessary to insist that, in order to prevent elastic fabrics with irregularities, each filament must be wound with the same tension on the entire loom beam, for this reason the tension must always be the same, even when the creel spools and the loom beam decrease or increase in weight respectively.

[0029] For the finish of elastic fibres obtained using a warping machine, experiments have been carried out in

which fabric washing, prior to the dyeing and finishing operations, is performed at temperatures below 80°C, in fact they can be washed in cold water, when this is usually carried out above 85°C (which is the case of a traditional elastomer, such as polyurethane). The said cleaning operation is carried out to remove dust, oils and other impurities that may be clinging to the fabric and is in preparation for dyeing.

[0030] Thus, the fabric produced in accordance with the described procedure consists of at least one monofilament or multifilament based on polyester, polyamide, PET, cotton or viscous materials etc, and by an olefin or polyolefin monofilament or multifilament or combined with other polymers, such as ethylenes.

[0031] With respect to a weight per square metre of between 70 and 280 grams, the proportion of olefin or polyolefin will vary between 2 and 40%.

[0032] The obtained elastic fabric is especially indicated for manufacturing swimming costumes because the olefin or polyolefins are highly resistant to the chlorine employed in swimming pools and, in general, to corrosive agents. For this reason, an athlete's swimming costume must usually be discarded after one month, but with this type of elastomer, an indefinite duration may be obtained. They are also highly recommended for elastic underwear that is subject to energetic washing with household bleach without affecting its properties.

[0033] This invention described a new procedure for the manufacture of fabric for clothing and the obtained elastic fabric. The examples described here do not limit this invention and it may have various applications and/or adaptations, all of which are within the scope of the following claims.

Claims

1. A procedure for the manufacture of a warp fabric for clothing, of the type that are manufactured initially from a warping machine that incorporates spools, by "déroulé" reel rotation, with monofilament or multifilament elastomer thread located on a creel, with a predetermined tension, the threads of which are wound on a loom beam that is **characterised in that** the said elastomer is an olefin or polyolefin and because the folding or winding of the threads on the loom beam comprise the following phases:

- a first phase in which the diameter of the said creel spools is calculated, together with the tension of its respective threads, with the said information being transmitted to a CPU, which processes it,
- a second phase in which the friction at the union of the threads in the warping machine is calculated, with the said information being transmitted to a CPU, which processes it,
- a third phase in which the loom beam diameter

is calculated, together with the tension of the respective threads, with the said information being transmitted to a CPU, which processes it, and

- a fourth phase in which the CPU calculates the revolutions of the following:
 - the creel winding spools in consequence of the winding weight loss, and
 - the loom beam because of its increase in weight as a result of the winding;

in order to subsequently increase or decrease the said revolutions so that the thread tension remains constant during the entire winding operation of the referred thread on the loom beam

2. A procedure in accordance with claim 1, **characterised in that** the olefin or polyolefin is combined with another polymer. 20
3. A procedure in accordance with claim 1 or 2, **characterised in that** the environmental humidity level is between 50 and 80%. 25
4. A procedure in accordance with claim 1 or 2, **characterised in that** the environmental temperature is between 19 and 26°C. 30
5. A procedure in accordance with any of the previous claims from 1 to 4, **characterised in that** the obtained olefin or polyolefin warp fabric is combined with other warp fabrics and sections of other materials in order to obtain a fabric. 35
6. A procedure in accordance with claim 5, **characterised in that** the CPU calculates the revolutions that the olefin or polyolefin loom beam should have, obtained in the previous claims in consequence of the weight loss by the winding to subsequently increase or decrease the said revolutions so that the thread tension remains constant throughout the winding of the referred thread on the loom beam. 40
7. A procedure in accordance with claim 6, **characterised in that** the elastic fabrics are cleaned at temperatures of less than 80°C prior to the dyeing and finishing operations. 45
8. An elastic fabric in accordance with the procedure described in claims 6 or 7, which is **characterised in that** it comprises at least one monofilament or multifilament thread based on polyester, polyamide, PET, cotton or viscous etc, and by at least one olefin or polyolefin monofilament or multifilament thread. 50
9. An elastic fabric in accordance with claim 8, **characterised in that** the olefin or polyolefin is com-

bined with another polymer.

10. An elastic fabric in accordance with claim 8 or 9, **characterised in that**, with respect to a weight of between 70 and 280 grams per square metre, the elastomer proportion varies between 2 and 40%.
11. An elastic fabric in accordance with any of the previous claims from 9 to 11, **characterised in that** the mentioned garment is a swimming costume.
12. An elastic fabric in accordance with any of the previous claims from 9 to 11, **characterised in that** the mentioned garment is an elastic under wear garment.