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VISUAL EFFECT AND SOFT HAND-FEEL
AFTER BEING STRETCHED AND
RECOVERED****Publication Classification**

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(CN)(21) Appl. No.: **14/324,093**(22) Filed: **Jul. 4, 2014**(57) **ABSTRACT**

A method of producing fabrics which show a silk-like visual effect and soft hand-feel and retains such effects after being stretched and returned to its original size. This method combines a specific fabric structure and the treatment with a silicon oil in the finishing process. The particular fabric structure has nylon yarns which is close looped and elastic spandex yarns which is open looped.

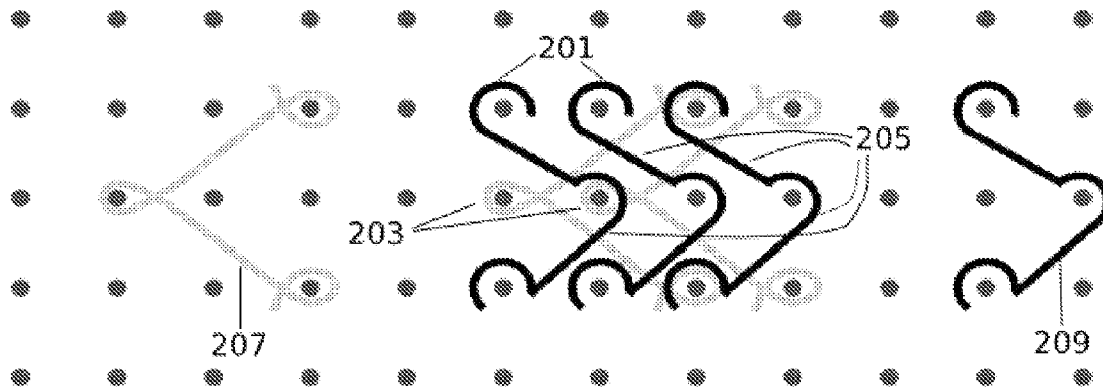


FIG.1

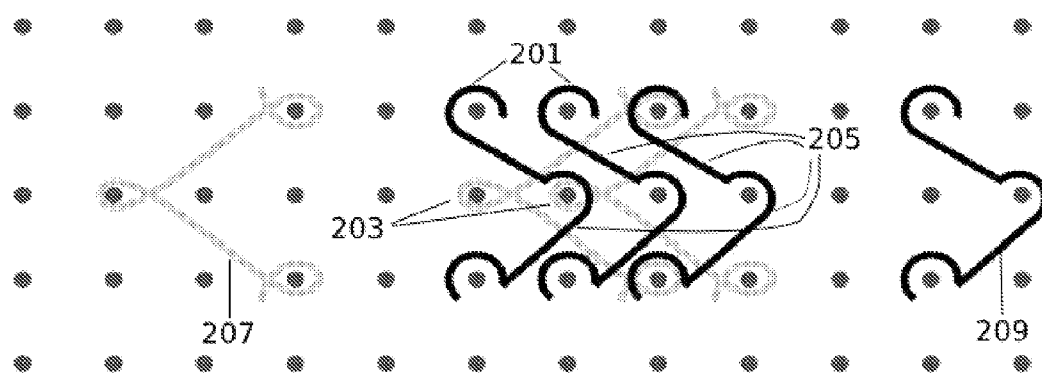


FIG.2

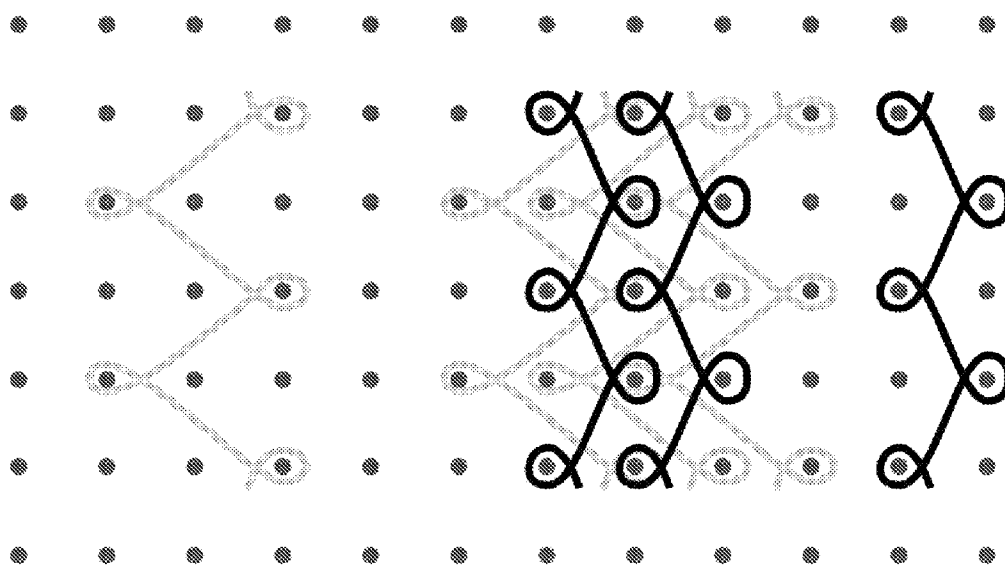


FIG.3

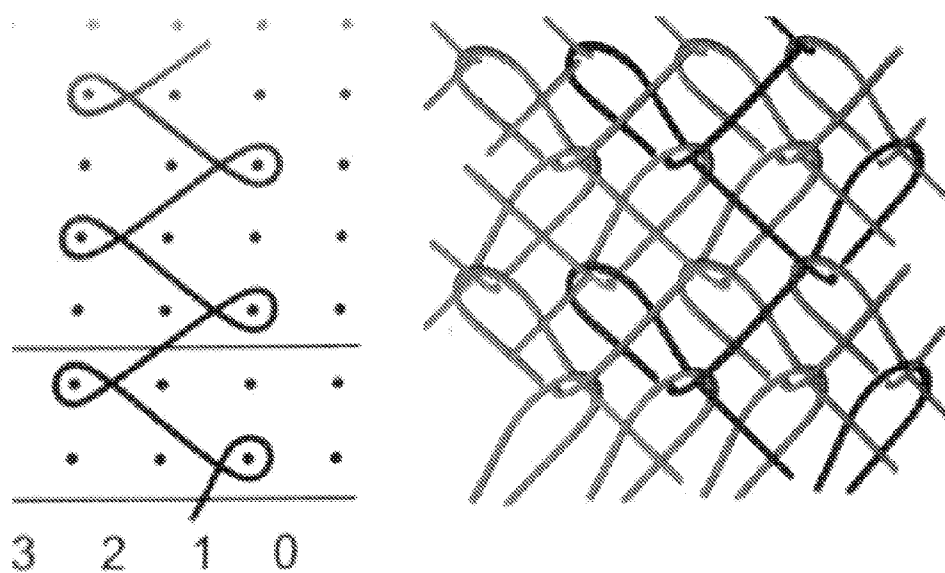
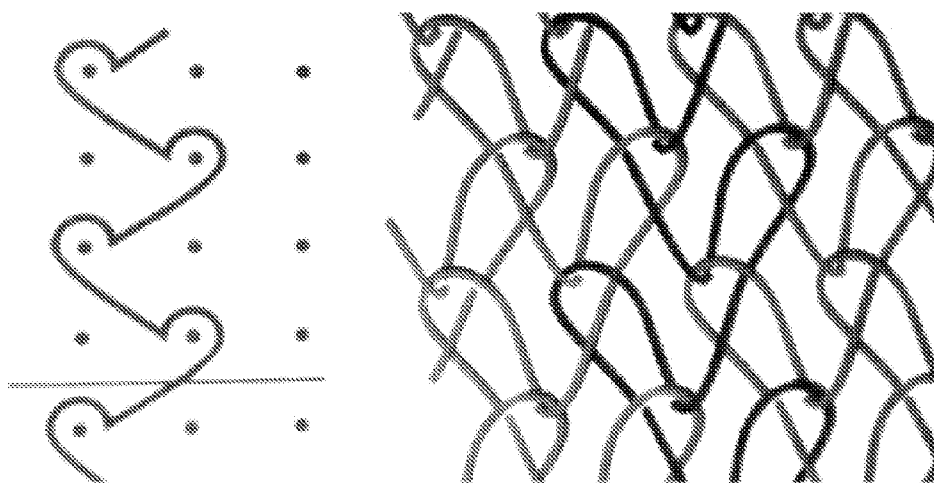


FIG.4



ELASTIC FABRIC MAINTAINING SILK-LIKE VISUAL EFFECT AND SOFT HAND-FEEL AFTER BEING STRETCHED AND RECOVERED

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit from U.S. provisional application No. 61/842,977, filed Jul. 4, 2013, the content of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to the field of making fabrics used in the garment industry. More particularly, it relates to production of an elastic fabric which has silk-like glossy surface and soft hand-feel and retaining such properties after being stretched and recovered.

BACKGROUND OF THE INVENTION

[0003] In the textile field, many efforts have been made to make fabrics of non-silk materials mimic the visual and hand-feel of the silk fabric, i.e., the smoother and lustrous look and soft hand feel. For example, satin is a weaving technique in which warp yarns are floated over weft yarns (warp-faced satin) or weft yarns are floated over warp yarns (weft-faced satin). The resulting fabric tends to have a high luster due to its significant amount of floats on the surface. However, the satin fabric generally has a limited stretchability. For instance, The warp-faced satin is not very much stretchable longitudinally. As such, the satin fabric lacks the sufficient elasticity for making certain clothing articles, such as, underwear and sportswear. Another technique for increasing the glossiness of fabrics is calendering, which refers to a finishing process in which the fabric is passed under rollers at a high temperature and pressure. While the fabric can be highly elastic, the calendering finish, however, is does not last long. The fabric loses the glossiness easily when it is being stretched or washed.

[0004] Therefore, there is still a need for methods which can produce fabrics which have silk-like look and feel and retain such effects even after having been stretched or washed.

SUMMARY OF THE INVENTIONS

[0005] One object of the present invention is accordingly to provide a method of producing a fabric which has a silk-like visual effect and soft hand-feel and retains such effects after being stretched and returned to its original size. The object is achieved by the combination of a particularly design fabric structure and a finishing treatment with a silicon oil.

[0006] The particularly designed fabric knitting structure is shown in FIG. 1, which is based on the convention type shown in FIG. 2. FIG. 3 and FIG. 4 show the comparison in terms of loop structure in the right and yarn threading diagram in the left between the fabric used in the present invention and the conventional one from which the former is derived. For the purpose of the present invention, the loop pattern defined in FIG. 1 is referred to as the "pigeon head" pattern. In this pattern, there are two types of yarns 207 and 209 (nylon and spandex, respectively) and the spandex yarns 209 are more elastic and form open loops 201 while the nylon yarns 207 are less elastic and form close loops 203, and the two yarns traverse in the same direction in the front of the needle while

they traverse in the opposite direction in the back of the needle. In this pigeon head pattern, the retraction of the highly elastic spandex yarns twists the closed nylon loops so that the extension segments 205 of the yarns are almost in the same plane, which in turn brings about the desired glossy effect on the fabric surface.

[0007] While producing a high glossy surface, the above pigeon head loop pattern alone is not sufficient to realize the goal of the present invention, because the resulting fabric has a poor retraction rate after being stretched (i.e., it has difficulty to return to the original size after stretch). To overcome this, as the second aspect of the present invention, it is discovered that, if adding a silicon oil (a commonly available off-the-shelf product) in the finished process, the resulting fabric surprisingly shows a number of advantageous effects: it is soft and highly glossy (looks and feels like a real silk material), has a high retraction rate (can instantly recover up to 95% after being stretched by 150%), and more importantly retains the smoothness and glossy effects after retraction to its original size. Therefore, the present invention has overcome the drawbacks of the known techniques such as calendering (poor retaining of the glossy effect) and satin (poor extendibility).

[0008] The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages, and specific objects attained by its use, reference should be made to the drawings and the following description in which there are illustrated and described preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 shows the yarn threading diagram of the fabric according to the present invention.

[0010] FIG. 2 is the yarn threading diagram of the prior art fabric from which the fabric of FIG. 1 is derived.

[0011] FIG. 3 shows the loop structure (right side) together with the yarn threading diagram (left side) of the prior art fabric shown in FIG. 2.

[0012] FIG. 4 shows the loop structure (right side) together with the yarn threading diagram (left side) of the fabric according to the present invention shown in FIG. 1.

DETAILED DESCRIPTION OF PARTICULAR EMBODIMENTS OF THE INVENTION

[0013] The present invention is now further described in connection with a particular embodiment in the following.

I: Warping of Yarns for Warp Knitting

[0014] (1) Warping of nylon full-drawn yarn: Warper machine used is Karl-Mayer DS 21/30 NC-2, with a passive-type yarn feeding mode. Warping ambient temperature is 23° C. Warping humidity is 65%. This sets the machine tension under the appropriate temperature and humidity so as to ensure the tension of the entire yarn sheet to be warped is balanced and the knitting is to proceed smoothly.

[0015] (2) Spandex warping: The warping machine used is Karl-Mayer DSE-H 21/30 NC-2, with an active-type yarn feeding mode. Warping ambient temperature is 24° C. Warping humidity is 78%. This sets the machine tensions and draft

parameters (different stretch values for spandex of different thickness) under the appropriate temperature and humidity for warp knitting.

II: Knitting the Blank

[0016] Weaving machine model is Karl-Mayer HKS2-3E.

[0017] Waving machine number range is E32-E50.

[0018] Yarn feeding digitals are GB1-1-0/2-3//and GB2-2-1/0-1//.

[0019] Threading mode: GB1 and GB2 are both full threading.

[0020] The knitting process on Karl-Mayer HKS is the result of the interaction between knitting needle, needle core, guide needle and sinker. The specific movement is described as follows:

[0021] Unseating (spindle rotation angle 0°)—knitting needle and needle core are at the lowest position, guide needle is at the most forward position and the needle back moves laterally, and sinker moves forward to the pulling direction.

[0022] Pulling loop (spindle rotation angle 60°)—sinker is swung to the machine forefront, and knitting needle begins to rise, core needle still remains at the lowest position, and guide needle stops and the needle back moves laterally.

[0023] Guide needle swings to the backward of the machine (spindle rotation angle 120°)—knitting needle continues to rise, needle core begins to rise, but the top of the needle core doesn't uncover the knit, sinker is still holding the old loop with a bit backward movement so as to loosen the loop. Guide needle stops and the needle back moves laterally towards the front needle so as to enable lateral movement before the needle.

[0024] Threading before needle (spindle rotation angle 185°)—guide needle reaches the machine and thread before the needle, the sinker loosens the old loop, and needle core runs through the old loop and continues to rise.

[0025] Put yarn into the needle mouth (spindle rotation angle 240°)—guide needle swings back to the forward of the machine, knitting needle drops, and put the yarn into needle hook, and needle core gradually extends outside, then the old loop is tensioned again.

[0026] Closed needle mouth (spindle rotation angle 315°)—sinker moves to the backward of the machine, knitting needle and needle core decline, needle core closes needle mouth, and the yarn fed into the needle hook is sealed inside the hook, the old loop is fit on knitting needle and needle core. Guide needle is at the forward of the machine and the needle back is ready for moving laterally.

[0027] Knocking over starts (spindle rotation angle 330°)—knitting needle and needle core simultaneously decline to below the sinker, and old loop falls off from the top of the needle, while the hook draws the yarn inside and forms a new loop. Sinker moves to the forwards of the machine, guide needle back begins moving laterally.

[0028] Therefore, the fabric we need can be produced only when each component works together under a given threading digital and in the loop forming manner. The fabric material blank uses two different types of yarns, and it's formed with the above warp knitting needle and through the interaction between closed loop and opened loop.

[0029] Chemical filament is made of a material of known type of nylon, such as polyester or polyamide fiber, and commonly used polyamide fibers include polyamide 6 and polyamide 66. For fiber fineness, 15-70 denier are suitable (de-

pends on machine number), in which fineness refers to denier of the filament, namely, weight of 9000 m fiber in grams.

[0030] Elastic fiber is also made of an elastic material of known type of spandex, such as polyurethane elastic fiber, and the suitable fineness ranges from 20 to 90 denier.

[0031] In knitting, chemical filament is set at the first guide bar (GB1), and elastic fibers is placed on the second guide bar (GB2), and the loop is formed through the up-and-down motions of knitting needle and the all-around motions of guide needle and furthermore the blank is formed. In FIG. 4, the left is filament yarn digital diagram, and the right is the filament loop diagram, which is compared with the equivalents shown in FIG. 3 for the conventional fabric.

III: Post-Treatment

[0032] The post treatment process can be summarized as (1) gray cloth degreasing, (2) pre-sizing, (3) dyeing, (4) post-finishing, and (5) fabric inspection, which are generally known in the art for producing the fabrics. The specific process is detailed as follows:

[0033] (1) Gray cloth degreasing (also referred to as washing or dry cleaning): The fabric is degreased by Germany Artos washing machine, and the operation includes preparation and production.

[0034] a) Preparation: Connect the main power and check whether the drain valve is closed; set the temperature of each wash tank and switch on each wash tank motor to heat up; check each transmission switch, and keep them switched on; set overfeeding of each washing tank cloth guiding roller (overfeeding and tension of the tank panel parameters shall be set up based on the actual process requirements, roughly between 0 and 10), open spray switch and close drain valve.

[0035] b) Production: Switch on vacuum and select the corresponding power according to process requirements, and there shall be no liquid residue or curling; set pump to be automatic, and switch on feeding (dedicated degreaser for washing), adding water and heating switch; set supper spray pressure according to process requirements; rang the horn, and press start-up switch until the power indicator light is on, so that the fabric being cleaned and rebound in washing machine under certain relaxed state so as to realize degreasing and pre-shrinking.

[0036] (2) Pre-sizing: In order to eliminate the internal stress of the fabric so that the fabric can be under a stable state and no crease is generated in the dyeing process and colorized easily and the specifications required by customers is ensured. The Germany Monforts tenter is used to process the fabric after washing. In this process, the temperature of the tenter is set at about 185°C .- 200°C . and the working speed is about 24 m/min.

[0037] (3) Dyeing: This fabric is dyed with a Germany THEN jigger, and the dyeing temperature is about 98°C .- 123°C .

[0038] (5) Finishing: In order to make the finished product has a good surface and stable dimensions and satisfy feel and functional requirements, the fabric is processed with a setter after dyeing and the processing temperature is generally 140°C .- 160°C . A silicon oil (a commonly available off-the-shelf commercial product, and an example is Silicone Oil for Polyester Staple Fiber DM-725 made by Guangzhou Derou Chemical Industry Co., Limited, Guangzhou, China.) is used to treat the fabric in the post-finishing process. The silicon oil is first diluted to 10-50g/L, preferably 20-30 g/L, with water.

The fabric is then soaked in the diluted silicon oil for about two seconds and dried to obtain the finished fabric.

[0039] The advantages of the finished product made by the present invention includes: a) The surface is smooth, silky, shiny, like a real silk material. b) Great rebound resilience, the fabric can restore to its original state immediately after being pulled (for instance to 150%), without any trace distortion left. In addition, the present invention described above is applicable to a wide range of fabrics regardless of the number of machine needles or the thickness of the yarns. Thus, fabrics of different weight or strength can be produced according to the present invention with a reasonable choice of weaving machine to meet different requirements of customers. Those choices may be made by a person of ordinary skill in the art.

[0040] While there have been described and pointed out fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes, in the form and details of the embodiments illustrated, may be made by those skilled in the art without departing from the spirit of the invention. The invention is not limited by the embodiments described above which are presented as examples only but can be modified in various ways within the scope of protection defined by the appended patent claims.

What is claimed is:

1. A method of producing a fabric, comprising a step of designing a particular looping structure of said fabric and a step of treating said fabric with a silicon oil in a finishing process, said looping structure being the pigeon head pattern.

2. The method of claim 1, wherein in said pigeon head pattern there are a first type of yarns and a second type of yarns, and said first type of yarns forms open loops and is more elastic than said second type of yarns which forms close loops, and wherein extension segments of said first type yarns are in the same plane.

3. The method of claim 2, wherein said first type of yarns is spandex.

4. The method of claim 2, wherein said second type of yarns is nylon.

5. A warp knitted fabric, comprising a pigeon head pattern of looping structure and being produced by the method according to claim 1.

6. The warp knitted fabric of claim 5, wherein in said pigeon head pattern there are a first type of yarns and a second type of yarns, and said first type of yarns forms open loops and is more elastic than said second type of yarns which forms close loops, and wherein extension segments of said first type yarns are in the same plane.

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