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(54) METHOD FOR MANUFACTURING WATER-PENETRATION-PREVENTING DOUBLE-LAYER FABRIC AND DOUBLE-LAYER FABRIC

(57) A method (10) for manufacturing a water-penetration-preventing double-layer fabric and a double-layer fabric (20). The double-layer fabric (20) includes two surface layer textures (21) and a cross-linked texture (24). The two surface layer textures (21) can be respectively formed by a base yarn (211) and a fusible yarn (212), or each of the two surface layer textures (21) includes the base and fusible yarns (211, 212). A melting point of the base yarn (211) is higher than that of the fusible yarn (212), one of the surface layer textures (21) is heated and pressed to melt the fusible yarn (212) to form a barrier layer (25), the cross-linked texture (24) cross-links the surface layer textures (21), a space between the surface layer textures (21) is formed with the cross-linked texture (24) provided with a yarn-stacked thickness (241) by a tuck knitting or a transfer knitting, and an increased temperature of the surface layer texture (21) without heating and pressing is not higher than a melting point of the fusible yarn (212).

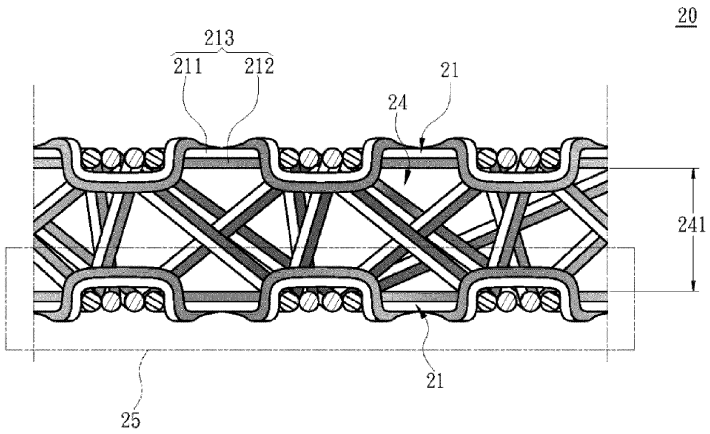

Fig. 4

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a method for manufacturing a water-penetration-preventing double-layer fabric and a double-layer fabric, and more particularly to a method for heating and melting one of surface layer textures to form a barrier layer for manufacturing a double-layer fabric capable of preventing water penetration and a double-layer fabric.

BACKGROUND OF THE INVENTION

[0002] According to investigation, there are at least two types of conventional waterproof fabrics, one type is products made of GORE-TEX film. This type of product is coated with GORE-TEX film on a surface of the fabric to achieve water blocking effect. However, GORE-TEX film tends to lose its waterproof effect after a long time usage, and the materials used in GORE-TEX film are special, which make the costs of waterproof fabrics made of GORE-TEX film expensive.

[0003] In this regard, the industry has developed waterproof glue or waterproof film made of plastic materials. Although the cost of this type of waterproof glue or waterproof film is lower than that of GORE-TEX film and can be commonly found in the market, however, after this type of fabric is coated with waterproof glue or waterproof film, the fabric will harden as the waterproof glue or waterproof film cures, causing the consumers to be unable to have a good, comfortable and soft feeling with this type of waterproof fabric worn on the body.

SUMMARY OF THE INVENTION

[0004] A main object of the present invention is to solve the problems of aging or limited effectiveness over a period of time, and high cost of the conventional GORE-TEX film.

[0005] Another object of the present invention is to solve the problem that the waterproof mechanism adopted by a waterproof fabric being incapable of providing a feeling of softness and comfort.

[0006] In order to achieve the above objects, the present invention provides a method for manufacturing a water-penetration-preventing double-layer fabric, comprising steps of:

step one: knitting two surface layer textures with current yarns, wherein the current yarns are selected from a group consisting of a base yarn, a fusible yarn, and a combination thereof, a melting point of the base yarn is higher than a melting point of the fusible yarn, and the two surface layer textures are selected from a first implementation type and a second implementation type, wherein:

in the first implementation type, each of the two surface layer textures comprises the base yarn and the fusible yarn; and

in the second implementation type, one of the two surface layer textures is formed with the base yarn, and the other one of the two surface layer textures is formed with the fusible yarn;

step two: forming a cross-linked texture by continuously cross-linking the two surface layer textures through a tuck knitting or a transfer knitting, and generating a yarn-stacked thickness during knitting at a reserved space between the two surface layer textures to extend a heat conduction path of the cross-linked texture;

step three: completing an intermediate product, wherein the intermediate product is a double-layer fabric; and

step four: heating and pressing one side of the intermediate product to melt the fusible yarn in one of the two surface layer textures which is heated and pressed and to form a barrier layer which prevents water penetration, wherein during heating and pressing the cross-linked texture, an increased temperature of one of the two surface layer textures that has not been heated and pressed is not higher than the melting point of the fusible yarn due to the yarn-stacked thickness of the cross-linked texture.

[0007] In one embodiment, in step two, the cross-linked texture is formed with the current yarns used for knitting the two surface layer textures or formed with an another yarn additionally fed.

[0008] In one embodiment, the another yarn additionally fed is selected from a group consisting of a first yarn type, a second yarn type and a third yarn type, wherein:

in the first yarn type, the another yarn additionally fed is the base yarn;

in the second yarn type, the another yarn additionally fed is the fusible yarn; and

in the third yarn type, the another yarn additionally fed is composed of the base yarn and the fusible yarn.

[0009] In one embodiment, a material of the fusible yarn is selected from polypropylene (PP) or thermoplastic polyurethane (TPU).

[0010] In one embodiment, a temperature for heating and pressing one side of the intermediate product is between 110°C and 190°C.

[0011] In one embodiment, when in step four, applying negative pressure to one of the two surface layer textures that has not been heated and pressed.

[0012] In one embodiment, in step four, locally heating and pressing one of the two surface layer textures which is heated and pressed with high frequency.

[0013] In addition to the foregoing, the present inven-

tion further provides a water-penetration-preventing double-layer fabric, comprising:

two surface layer textures, knitted with yarns selected from a group consisting of a base yarn, a fusible yarn or a combination thereof, the two surface layer textures are selected from a first implementation type and a second implementation type, wherein
in the first implementation type, each of the two surface layer textures comprising the base yarn and the fusible yarn; and
in the second implementation type, one of the two surface layer textures being formed with the base yarn, and the other of the two surface layer textures being the fusible yarn;
wherein a melting point of the base yarn is higher than a melting point of the fusible yarn, one of the two surface layer textures is heated and pressed and the fusible yarn thereof is melted to form a barrier layer which prevents water penetration; and
a cross-linked texture, cross-linking the two surface layer textures, the cross-linked texture is formed by a tuck knitting or a transfer knitting and comprising a yarn-stacked thickness located at a space between the two surface layer textures, wherein the yarn-stacked thickness at least meets a following condition that within a heating and pressing time, an increased temperature of one of the two surface layer textures that has not heated and pressed is not higher than the melting point of the fusible yarn.

[0014] In one embodiment, the cross-linked texture is formed with the yarns used for knitting the two surface layer textures or formed with an another yarn additionally fed.

[0015] In one embodiment, the another yarn additionally fed is selected from a group consisting a first yarn type, a second yarn type and a third yarn type, wherein
in the first yarn type, the another yarn additionally fed is the base yarn;
in the second yarn type, the another yarn additionally fed is the fusible yarn; and
in the third yarn type, the another yarn additionally fed is composed of the base yarn and the fusible yarn.

[0016] In one embodiment, a material of the fusible yarn is selected from polypropylene (PP) or thermoplastic polyurethane (TPU).

[0017] Through the aforementioned disclosure of the present invention, compared with the prior art, the present invention has the following features: one of the two surface layer textures is heated and pressed to make the fusible yarn to which the surface layer texture belongs to be melted to form the barrier layer capable of blocking water penetration, and a thickness of the cross-linked texture causes an increased temperature of one of the two surface layer textures that has not been heated and pressed not higher than a melting point of the fusible yarn during the heating and pressing process, thereby making the double-layer fabric capable of maintaining a softness of the fabric while providing a waterproof effect.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

FIG. 1 is a first flow chart of a first implementation type of the present invention;
FIG. 2 is a flow chart of a second implementation type of the present invention;
FIG. 3 is a second flow chart of the first implementation type of the present invention;
FIG. 4 is a first schematic diagram of a double-layer fabric of the first implementation type of the present invention;
FIG. 5 is a first schematic diagram of tuck knitting of the present invention;
FIG. 6 is a second schematic diagram of tuck knitting of the present invention;
FIG. 7 is a first schematic diagram of a double-layer fabric of the second implementation type of the present invention;
FIG. 8 is a second schematic diagram of the double-layer fabric of the second implementation type of the present invention; and
FIG. 9 is a second schematic diagram of the double-layer fabric of the first implementation type of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] The detailed description and technical content of the present invention are described below with reference to the drawings.

[0020] Please refer to FIG. 1, FIG. 2, FIG. 3, FIG. 4, FIG.5, FIG.6, FIG.7 and FIG. 8. The present invention provides a method 10 for manufacturing a water-penetration-preventing double-layer fabric, the method 10 comprising the following steps.

[0021] Step one 11: knitting two surface layer textures 21 with current yarns, wherein the current yarns are selected from a group consisting of a base yarn 211, a fusible yarn 212 and a combination thereof, a melting point of the base yarn 211 is higher than a melting point of the fusible yarn 212, and the two surface layer textures 21 are selected from a first implementation type and a second implementation type. In the first implementation type, each of the two surface layer textures 21 comprising the base yarn 211 and the fusible yarn 212. In the second implementation type, one of the two surface layer textures 21 being formed with the base yarn 211, and the other of the two surface layer textures 21 being formed with the fusible yarn 212.

[0022] Step two 12: forming a cross-linked texture 24 by continuously cross-linking the two surface layer textures 21 through a tuck knitting or a transfer knitting, and

generating a yarn-stacked thickness 241 during knitting at a reserved space between the two surface layer textures 21 to extend a heat conduction path of the cross-linked texture 24.

[0023] Step three 13: completing an intermediate product, wherein the intermediate product is a double-layer fabric 20.

[0024] Step four 14: heating and pressing one side of the intermediate product to melt the fusible yarn 212 in one of the two surface layer textures 21 which is heated and pressed and to form a barrier layer 25 which prevents water penetration, wherein during heating and pressing the cross-linked texture 24, an increased temperature of one of the two surface layer textures 21 that has not been heated and pressed is not higher than the melting point of the fusible yarn 212 due to the yarn-stacked thickness 241.

[0025] Specifically, the knitting related steps in the method 10 of the present invention are all completed by knitting using a flat knitting machine, and are realized by a front bed (FB) and a back bed (BB) comprised by the flat knitting machine. Specific structures of the front bed and the back bed are conventional techniques in the art, and will not be described here. In addition, the present invention will describe the two surface layer textures 21 in detail hereinafter, so the first implementation type and the second implementation type of the two surface layer textures 21 will be described hereinafter.

[0026] The two surface layer textures 21 which are the first implementation type are described. In step one 11, the two surface layer textures 21 are knitted by the current yarn through the flat knitting machine. The current yarn includes a base yarn 211 and a fusible yarn 212. The base yarn 211 can actually be an ordinary cotton yarn. A melting point of the fusible yarn 212 is lower than that of the base yarn 211, and the fusible yarn 212 can be made of a thermally fusible material, so that the fusible yarn 212 is melted by heat when being heated. In one embodiment, a material of the fusible yarn 212 is selected from polypropylene (PP) or thermoplastic polyurethane (TPU). Then, in step two 12, the flat knitting machine continuously cross-links the two surface layer textures 21 by the tuck knitting or the transfer knitting to form the cross-linked texture 24. It is worth noting that the cross-linked texture 24 described herein actually only cross-links the two surface layer textures 21, and does not have a function of supporting the two surface layer textures 21, that is, the cross-linked texture 24 is different from the support yarn texture described by those with ordinary skill in the art. Furthermore, the cross-linked texture 24 depicted in FIG. 4 herein is only for illustration, and the cross-linked texture 24 can actually be formed by stacking and interlacing multiple yarns, thereby enabling the two surface layer textures 21 to be tightly cross-linked. In addition, since the tuck knitting and the transfer knitting of the flat knitting machine can be programmed differently according to an operator's programming of the front bed and the back bed, knitting steps of the tuck knitting and the transfer knitting are different, so it will be described by making examples in the latter part of the specification, and will not be described in detail here. Further, in a process of cross-linking the two surface layer textures 21, the flat knitting machine makes a reserved space between the two surface layer textures 21 generate the yarn-stacked thickness 241 to enable the cross-linked texture 24 capable of extending a path of heat conduction. Afterwards, proceeding to step three 13, the flat knitting machine completes knitting and produces the intermediate product, the intermediate product is a semi-finished product of the present invention, that is, the double-layer fabric 20 that has not been heated and pressed. Proceeding to step four 14, using a heating and pressing equipment capable of providing a heat source to heat and press one side of the double-layer fabric 20, wherein the heating and pressing equipment can heat and press one side of the double-layer fabric 20 at the same time, or heating and pressing are performed separately on the double-layer fabric 20, and a heating temperature can be set in a range between 110°C and 190°C. After one side of the double-layer fabric 20 is heated and pressed, the fusible yarn 212 to which the surface layer structure 21 belongs is melted by heat to form the barrier layer 25, and the barrier layer 25 is capable of preventing water from penetrating from one of the surface layer textures 21 to the other of the surface layer textures 21. At the same time, the surface layer texture 21 after being heated and pressed further transfers heat energy toward the cross-linked texture 24, so that a part of the cross-linked texture 24 adjacent to one of the surface layer textures 21 being heated and pressed is also melted by heat. One of the two surface layer textures 21 that is not heated and pressed, due to the yarn-stacked thickness 241 providing a sufficient length of heat conduction path, has a raised temperature which is not higher than a melting point of the fusible yarn 212, thus it is not melted by heat, and a softness of the fabric is maintained.

[0027] Furthermore, please refer to FIG. 2, FIG. 7 and FIG. 8, the two surface layer textures 21 which are the second implementation type are described. In the following, in order to facilitate readers to distinguish the second implementation type from the first implementation type, the following implementation methods and steps are marked with different component numbers. In step one 51, the flat knitting machine knits the two surface layer textures 21 with the base yarn 211 and the fusible yarn 212 respectively. That is, after knitting of the two surface layer textures 21 is completed, one of the two surface layer textures 21 is the base yarn 211 (as indicated by reference number 214), and the other of the two surface layer textures 21 is the fusible yarn 212 (as indicated by reference number 215). Wherein, the base yarn 211 can actually be an ordinary cotton yarn, a melting point of the fusible yarn 212 is lower than that of the base yarn 211, and the fusible yarn 212 can be made of a thermally fusible material, so that the fusible yarn 212 is melted by heat when being heated. In one embodiment, a material

of the fusible yarn 212 is selected from polypropylene (PP) or thermoplastic polyurethane (TPU). Then in step two 52, the flat knitting machine cross-links the two surface layer textures 21, and continuously cross-links the two surface layer textures 21 by the tuck knitting and the transfer knitting to form the cross-linked texture 24. Further, in a process of cross-linking the two surface layer textures 21, the flat knitting machine makes a reserved space between the two surface layer textures 21 generate the yarn-stacked thickness 241 to enable the cross-linked texture 24 capable of extending a path of heat conduction.

[0028] Then, proceeding to step three 53, the flat knitting machine completes knitting and producing the intermediate product, the intermediate product is a semi-finished product of the present invention, that is, the double-layer fabric 20 that has not been heated and pressed. Proceeding to step four 54, using the heating and pressing equipment capable of providing a heat source to heat and press the one formed by the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215), wherein the heating and pressing equipment can heat and press the one formed by the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215) at the same time, or heat and press the one formed by the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215) separately. In one embodiment, a heating temperature applied by the heating and pressing equipment is in a range between 110°C and 190°C. After the double-layer fabric 20 is heated and pressed, the one formed by the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215) is melted by heat to form the barrier layer 25, and the barrier layer 25 is capable of preventing water from penetrating from one of the surface layer textures 21 to the other surface layer texture 21. At the same time, the one formed by the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215) further transfers heat energy toward the cross-linked texture 24, so that a part of the cross-linked texture 24 adjacent to the one formed by the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215) is also melted by heat, and the one formed by the base yarn 211 of the two surface layer texture 21 (as indicated by reference number 214), due to the yarn-stacked thickness 241 providing a sufficient length of heat conduction path, has a raised temperature which is not higher than a melting point of the fusible yarn 212, thus it is not melted by heat, and a softness of the fabric is maintained.

[0029] The present invention does not make the double-layer fabric 20 to achieve waterproof effect by using the conventional mechanism, but makes one of the two surface layer textures 21 of the double-layer fabric 20 to be melted by heat to produce the barrier layer 25, and at the same time, the cross-linked texture 24 is allowed to block the heat energy of one of the two surface layer textures 21 being hot-pressed from being transferred to the other one of the two surface layer textures 21, thereby directly forming the barrier layer 25 on the double-layer fabric 20 to achieve an object of preventing water penetration, and another side of the double-layer fabric 20 is not heated so as to maintain a softness of the fabric.

[0030] In one embodiment, FIG. 5 and FIG. 6 are used as examples to illustrate the programming of the tuck knitting. Using FIG. 5 for description, after a yarn feeding mechanism of the flat knitting machine feeds the yarn on the front bed, the flat knitting machine performs tuck knitting on the front bed at positions apart from each other by one stitch, so that a portion of the yarn located on the front bed can be tucked on the back bed. Using FIG. 6 for description, after the flat knitting machine knits the two surface layer textures 21, and the yarn feeding mechanism feeds the yarn, the flat knitting machine makes the yarn on the front bed tuck on the back bed at a position separated by several stitches, and then tuck the yarn located on the bed on the front bed at positions separated by several stitches. Wherein, in the present invention, the tuck knittings depicted in FIG. 5 and FIG. 6 are merely examples, and are not intended to limit the programming of the tuck knitting.

[0031] Furthermore, as shown in FIG. 3, FIG. 7, FIG. 8 and FIG. 9, in step two 12, the cross-linked texture 24 is formed with the yarn used for knitting the two surface layer textures 21 or formed with an another yarn 240 additionally fed. Specifically, as shown in FIG. 4, when the flat knitting machine knits the two surface layer textures 21, the cross-linked texture 24 can be knitted with the base yarn 211 and the fusible yarn 212 contained in each of the two surface layer textures 21. Alternatively, as shown in FIG. 7 and FIG. 8, the cross-linked texture 24 can be knitted with the base yarn 211 or the fusible yarn 212 when the flat knitting machine knits the two surface layer textures 21. In addition, as shown in FIG. 9, the cross-linked texture 24 can also be knitted by the flat knitting machine by means of additional yarn feeding, and the another yarn 240 used by the flat knitting machine for additional yarn feeding can be formed with the base yarn 211, or the fusible yarn 212, or a mixture of the base yarn 211 and the fusible yarn 212.

[0032] On the other hand, as shown in FIG. 3 and FIG. 4, in one embodiment, step four 14 further includes a sub-step 141 of applying negative pressure on the one that is not heated or pressed of the two surface layer texture 21. Specifically, after the double-layer fabric 20 forms the cross-linked texture 24, when the heating and pressing equipment heats and presses one of the two surface layer textures 21, the hot-pressing equipment can provide negative pressure on the other one of the two surface layer textures 21 simultaneously to form a temperature difference between the two surface layer textures 21, thereby inhibiting the transfer of heat energy through the cross-linked texture 24 to one of the surface layer textures 21 that has not been heated and pressed, and avoiding the one that has not been heated and pressed of the two surface layer textures 21 to be melted

by heat, and at the same time, hot-melting of the cross-linked texture 24 can be reduced. In addition, in another embodiment, when the present invention heats and presses one of the two surface layer textures 21 in step four 14, the heating and pressing equipment can provide high-frequency heat treatment with induced current to locally heat and press one of the two surface layer textures 21 which is heated and pressed. Through the high-frequency heat treatment in this embodiment, only a partial structure of the two surface layer textures 21 is heated and pressed, and a condition in which the two surface layer textures 21 being hot-pressed can be controlled more specifically.

[0033] It is worth noting that, in the foregoing content and figures, only the method 10 is used to illustrate the specific implementation modes of the present invention, and the specific implementation modes of a method 50 are the same as those of the method 10, so the modes will not be described again in the figures and specification.

[0034] On the other hand, as shown in FIG. 4, FIG. 7, FIG. 8 and FIG. 9, the present invention also provides the double-layer fabric 20 for preventing water penetration, and the double-layer fabric 20 can be manufactured by the method 10 or the method 50, respectively. First, the double-layer fabric 20 made by the method 10 will be described. The double-layer fabric 20 includes the two surface layer textures 21 and the cross-linked texture 24. Specifically, each of the two surface layer textures 21 includes a plurality of yarn loops 213, each of the yarn loops 213 is formed with the base yarn 211 and the fusible yarn 212, one of the two surface layer textures 21 is heated and pressed, so that the fusible yarn 212 of the one being heated and pressed of the two surface layer textures 21 forms the barrier layer 25 capable of preventing water penetration. On the other hand, the cross-linked texture 24 cross-links the two surface layer textures 21, the cross-linked texture 24 is formed by the tuck knitting or the transfer knitting at a space between the two surface layer textures 21, and therefore, the cross-linked texture 24 is provided with the yarn-stacked thickness 241. When one side of the double-layer fabric 20 is heated and pressed, the yarn-stacked thickness 241 causes an increased temperature of the one not being heated and pressed of the two surface layer textures 21 not higher than the melting point of the fusible yarn 212, so that the double-layer fabric 20 forms the barrier layer 25 only on one of the two surface layer textures 21, and the other of the two surface layer textures 21 is not melted by heat, thereby maintaining a feature of softness of the double-layer fabric 20.

[0035] Moreover, when the double-layer fabric 20 is knitted by the method 50, the double-layer fabric 20 also includes the two surface layer textures 21 and the cross-linked texture 24. The two surface layer textures 21 are respectively formed with the base yarn 211 and the fusible yarn 212, wherein a melting point of the base yarn 211 is higher than a melting point of the fusible yarn 212, and the surface layer texture 21 formed with the fusible yarn 212 (as indicated by reference number 215) is heated and pressed to cause the fusible yarn 212 form the barrier layer 25 capable of preventing water penetration. On the other hand, the cross-linked texture 24 cross-links the two surface layer textures 21, and the cross-linked texture 24 is formed by the tuck knitting or the transfer knitting at a space between the two surface layer textures 21, and therefore, the cross-linked texture 24 is provided with the yarn-stacked thickness 241. When the one formed with the fusible yarn 212 of the two surface layer texture 21 (as indicated by reference number 215) is heated and pressed, the yarn-stacked thickness 241 causes an increased temperature of the one formed with the base yarn 211 of the two surface layer texture 21 (as indicated by reference number 214) after a heating and pressing time not higher than the melting point of the fusible yarn 212, so that the double-layer fabric 20 forms the barrier layer 25 only on one of the two surface layer textures 21, and the other of the two surface layer textures 21 is not melted by heat, thereby maintaining a feature of softness of the double-layer fabric 20. The double-layer fabric 20 of the present invention does not achieve waterproof effect by using the conventional mechanism, and is capable of providing a comfortable feeling for wearers.

[0036] In one embodiment, the cross-linked texture 24 can be formed with the yarn used for knitting the two surface layer textures 21 or formed with the another yarn 240 additionally fed. Further, when the cross-linked texture 24 is knitted with the yarn used in the two surface layer textures 21, it means that the cross-linked texture 24 can be knitted with the yarn formed by mixing the base yarn 211 with the fusible yarn 212, the cross-linked texture 24 can also be knitted with the fusible yarn 212 of the one formed with the fusible yarn 212 of the two surface layer textures 21 (as indicated by reference number 215), or knitted with the base yarn 211 of the one formed with the base yarn 211 of the two surface layer texture 21 (as indicated by reference number 214). In addition, when the cross-linked texture 24 is formed with the another yarn 240 additionally fed, the another yarn 240 used in the cross-linked texture 24 can be formed with the base yarn 211, or the fusible yarn 212, or be composed of the base yarn 211 and the fusible yarn 212.

Claims

1. A method (10) for manufacturing a water-penetration-preventing double-layer fabric, comprising steps of:

   step one (11): knitting two surface layer textures (21) with current yarns, wherein the current yarns are selected from a group consisting of a base yarn (211), a fusible yarn (212), and a combination thereof, a melting point of the base yarn

(211) is higher than a melting point of the fusible yarn (212), and the two surface layer textures (21) are selected from a first implementation type and a second implementation type, wherein

in the first implementation type, each of the two surface layer textures (21) comprises the base yarn (211) and the fusible yarn (212); and
in the second implementation type, one of the two surface layer textures (21) is formed with the base yarn (211), and the other one of the two surface layer textures (21) is formed with the fusible yarn (212);

step two (12): forming a cross-linked texture (24) by continuously cross-linking the two surface layer textures (21) through a tuck knitting or a transfer knitting, and generating a yarn-stacked thickness (241) during knitting at a reserved space between the two surface layer textures (21) to extend a heat conduction path of the cross-linked texture (24);
step three (13): completing an intermediate product, wherein the intermediate product is a double-layer fabric (20); and
step four (14): heating and pressing one side of the intermediate product to melt the fusible yarn (212) in one of the two surface layer textures (21) which is heated and pressed and to form a barrier layer (25) which prevents water penetration, wherein during heating and pressing the cross-linked texture (24), an increased temperature of one of the two surface layer textures (21) that has not been heated and pressed is not higher than the melting point of the fusible yarn (212) due to the yarn-stacked thickness (241) of the cross-linked texture (24).

2. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 1, wherein in step two (12), the cross-linked texture (24) is formed with the current yarns used for knitting the two surface layer textures (21) or formed with an another yarn (240) additionally fed.

3. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 2, wherein the another yarn (240) additionally fed is selected from a group consisting of a first yarn type, a second yarn type and a third yarn type, wherein

in the first yarn type, the another yarn (240) additionally fed is the base yarn (211);
in the second yarn type, the another yarn (240) additionally fed is the fusible yarn (212); and
in the third yarn type, the another yarn (240) additionally fed is composed of the base yarn (211) and the fusible yarn (212).

4. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 1, wherein a material of the fusible yarn (212) is selected from polypropylene (PP) or thermoplastic polyurethane (TPU).

5. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 1, wherein a temperature for heating and pressing one side of the intermediate product is between 110°C and 190°C.

6. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 5, wherein in step four (14), applying negative pressure to one of the two surface layer textures (21) that has not been heated and pressed.

7. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 6, wherein in step four (14), locally heating and pressing one of the two surface layer textures (21) which is heated and pressed with high frequency.

8. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 1, wherein in step four (14), is applying negative pressure to one of the two surface layer textures (21) that has not been heated and pressed.

9. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 8, wherein in step four (14), locally heating and pressing one of the two surface layer textures (21) which is heated and pressed with high frequency.

10. The method (10) for manufacturing the water-penetration-preventing double-layer fabric as claimed in claim 1, wherein in step four (14), locally heating and pressing one of the two surface layer textures (21) which is heated and pressed with high frequency.

11. A water-penetration-preventing double-layer fabric, comprising:

two surface layer textures (21), knitted with yarns selected from a group consisting of a base yarn (211), a fusible yarn (212) or a combination thereof, the two surface layer textures (21) are selected from a first implementation type and a second implementation type, wherein

in the first implementation type, each of the two surface layer textures (21) comprising the base yarn (211) and the fusible yarn

(212); and
in the second implementation type, one of the two surface layer textures (21) being formed with the base yarn (211), and the other of the two surface layer textures (21) being the fusible yarn (212);

wherein a melting point of the base yarn (211) is higher than a melting point of the fusible yarn (212), one of the two surface layer textures (21) is heated and pressed and the fusible yarn (212) thereof is melted to form a barrier layer (25) which prevents water penetration; and
a cross-linked texture (24), cross-linking the two surface layer textures (21), the cross-linked texture (24) is formed by a tuck knitting or a transfer knitting and comprising a yarn-stacked thickness (241) located at a space between the two surface layer textures (21), wherein the yarn-stacked thickness (241) at least meets a following condition that within a heating and pressing time, an increased temperature of one of the two surface layer textures (21) that has not heated and pressed is not higher than the melting point of the fusible yarn (212).

12. The water-penetration-preventing double-layer fabric as claimed in claim 11, wherein the cross-linked texture (24) is formed with the yarns used for knitting the two surface layer textures (21) or formed with an another yarn (240) additionally fed.

13. The water-penetration-preventing double-layer fabric as claimed in claim 12, wherein the another yarn (240) additionally fed is selected from a group consisting a first yarn type, a second yarn type and a third yarn type, wherein

in the first yarn type, the another yarn (240) additionally fed is the base yarn (211);
in the second yarn type, the another yarn (240) additionally fed is the fusible yarn (212); and
in the third yarn type, the another yarn (240) additionally fed is composed of the base yarn (211) and the fusible yarn (212).

14. The water-penetration-preventing double-layer fabric as claimed in claim 11, wherein a material of the fusible yarn (212) is selected from polypropylene (PP) or thermoplastic polyurethane (TPU).

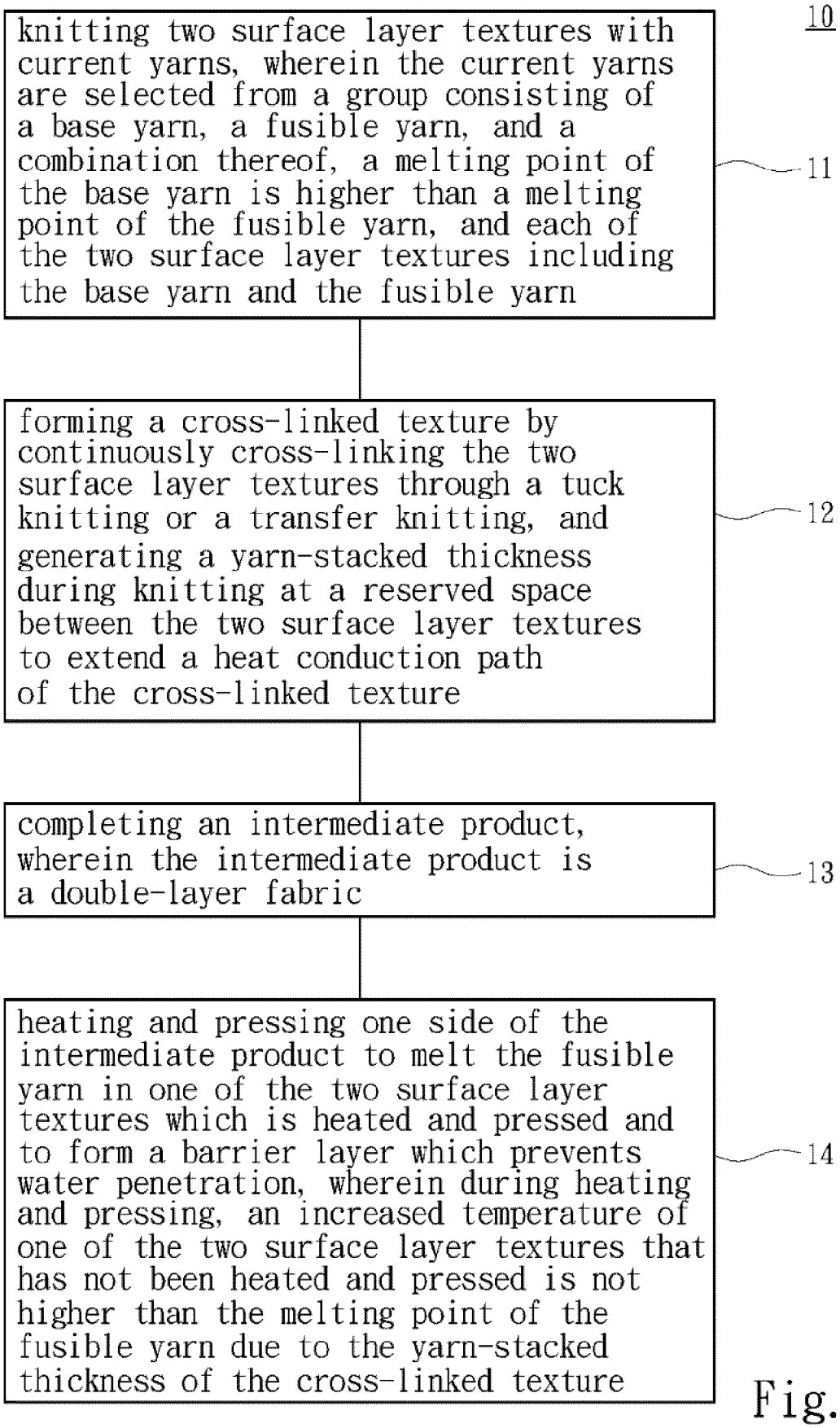
10
knitting two surface layer textures with current yarns, wherein the current yarns are selected from a group consisting of a base yarn, a fusible yarn, and a combination thereof, a melting point of the base yarn is higher than a melting point of the fusible yarn, and each of the two surface layer textures including the base yarn and the fusible yarn
11
forming a cross-linked texture by continuously cross-linking the two surface layer textures through a tuck knitting or a transfer knitting, and generating a yarn-stacked thickness during knitting at a reserved space between the two surface layer textures to extend a heat conduction path of the cross-linked texture
12
completing an intermediate product, wherein the intermediate product is a double-layer fabric
13
heating and pressing one side of the intermediate product to melt the fusible yarn in one of the two surface layer textures which is heated and pressed and to form a barrier layer which prevents water penetration, wherein during heating and pressing, an increased temperature of one of the two surface layer textures that has not been heated and pressed is not higher than the melting point of the fusible yarn due to the yarn-stacked thickness of the cross-linked texture
14

Fig. 1

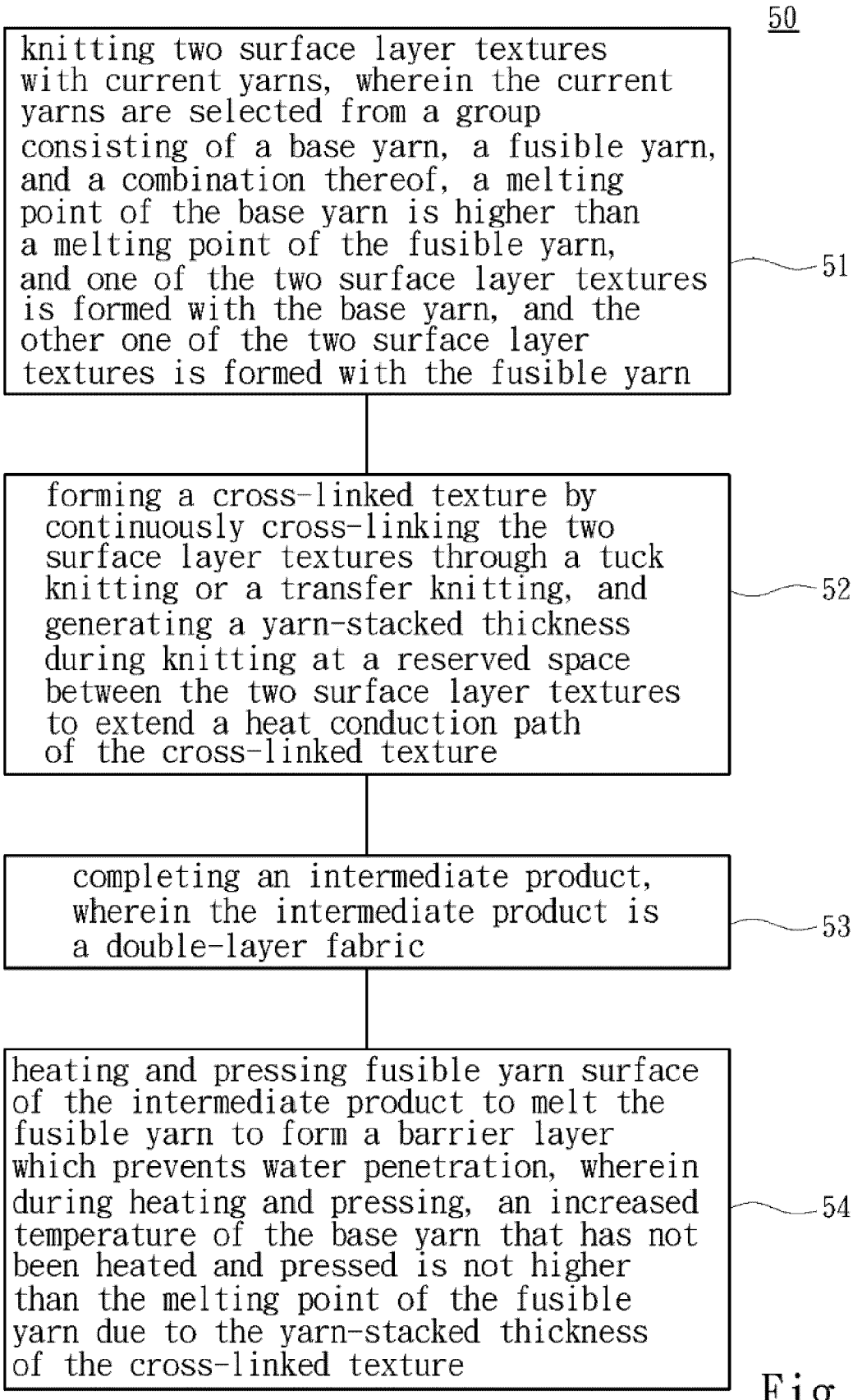
50
knitting two surface layer textures with current yarns, wherein the current yarns are selected from a group consisting of a base yarn, a fusible yarn, and a combination thereof, a melting point of the base yarn is higher than a melting point of the fusible yarn, and one of the two surface layer textures is formed with the base yarn, and the other one of the two surface layer textures is formed with the fusible yarn
51
forming a cross-linked texture by continuously cross-linking the two surface layer textures through a tuck knitting or a transfer knitting, and generating a yarn-stacked thickness during knitting at a reserved space between the two surface layer textures to extend a heat conduction path of the cross-linked texture
52
completing an intermediate product, wherein the intermediate product is a double-layer fabric
53
heating and pressing fusible yarn surface of the intermediate product to melt the fusible yarn to form a barrier layer which prevents water penetration, wherein during heating and pressing, an increased temperature of the base yarn that has not been heated and pressed is not higher than the melting point of the fusible yarn due to the yarn-stacked thickness of the cross-linked texture
54

Fig. 2

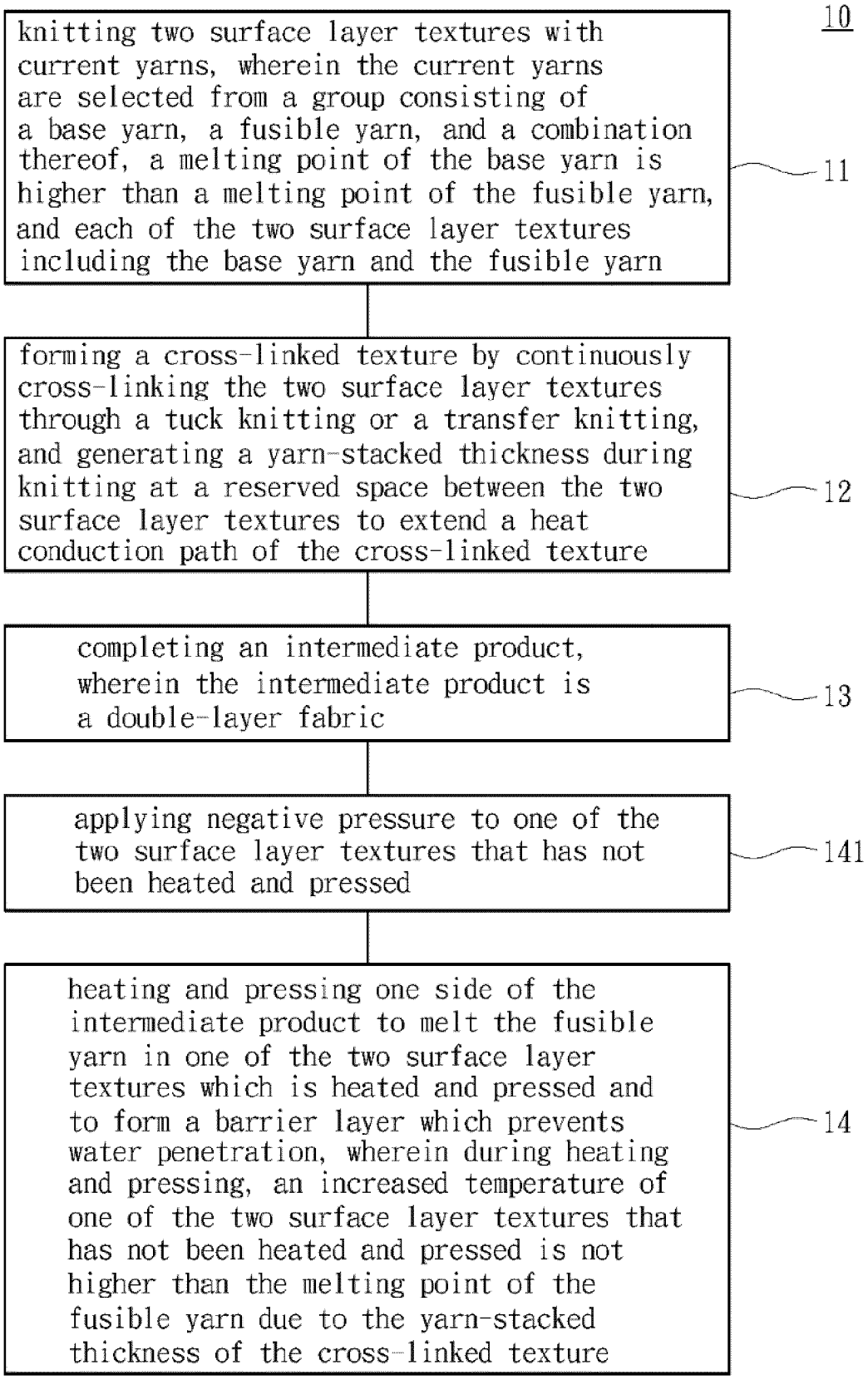
10
knitting two surface layer textures with current yarns, wherein the current yarns are selected from a group consisting of a base yarn, a fusible yarn, and a combination thereof, a melting point of the base yarn is higher than a melting point of the fusible yarn, and each of the two surface layer textures including the base yarn and the fusible yarn
11
forming a cross-linked texture by continuously cross-linking the two surface layer textures through a tuck knitting or a transfer knitting, and generating a yarn-stacked thickness during knitting at a reserved space between the two surface layer textures to extend a heat conduction path of the cross-linked texture
12
completing an intermediate product, wherein the intermediate product is a double-layer fabric
13
applying negative pressure to one of the two surface layer textures that has not been heated and pressed
141
heating and pressing one side of the intermediate product to melt the fusible yarn in one of the two surface layer textures which is heated and pressed and to form a barrier layer which prevents water penetration, wherein during heating and pressing, an increased temperature of one of the two surface layer textures that has not been heated and pressed is not higher than the melting point of the fusible yarn due to the yarn-stacked thickness of the cross-linked texture
14

Fig. 3

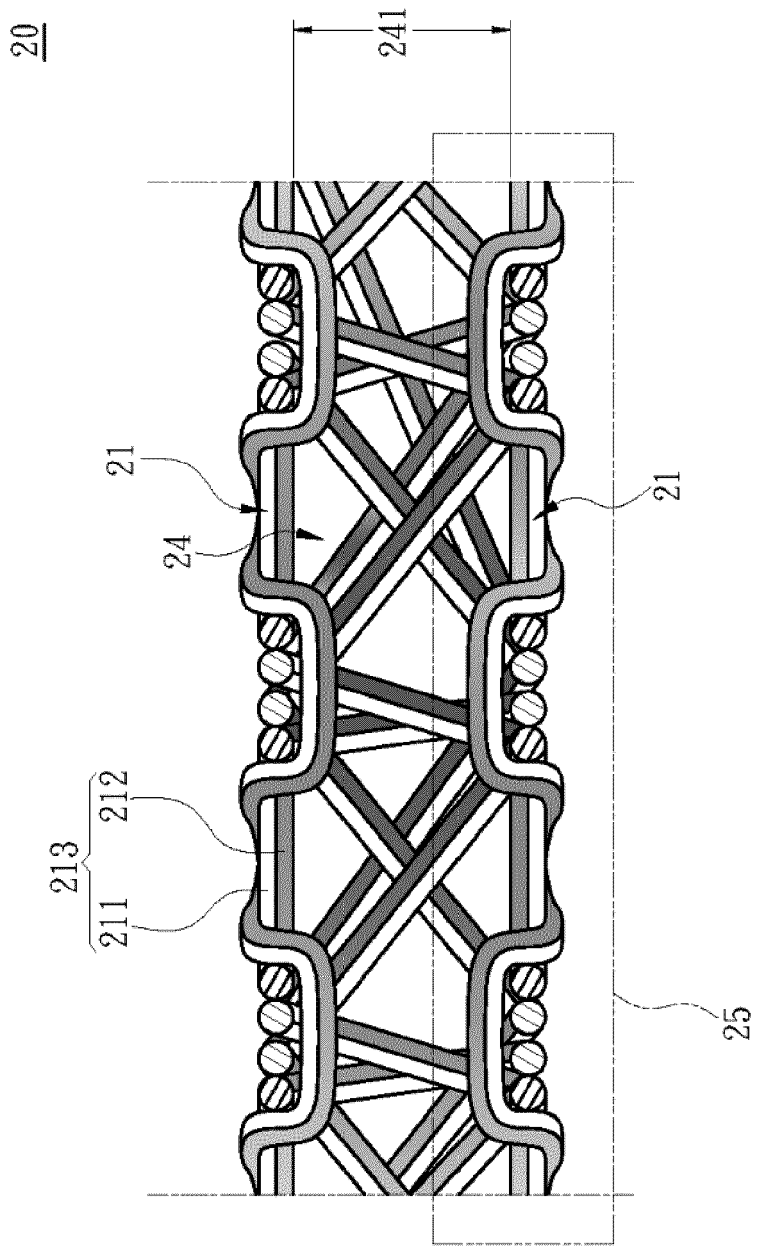

Fig. 4

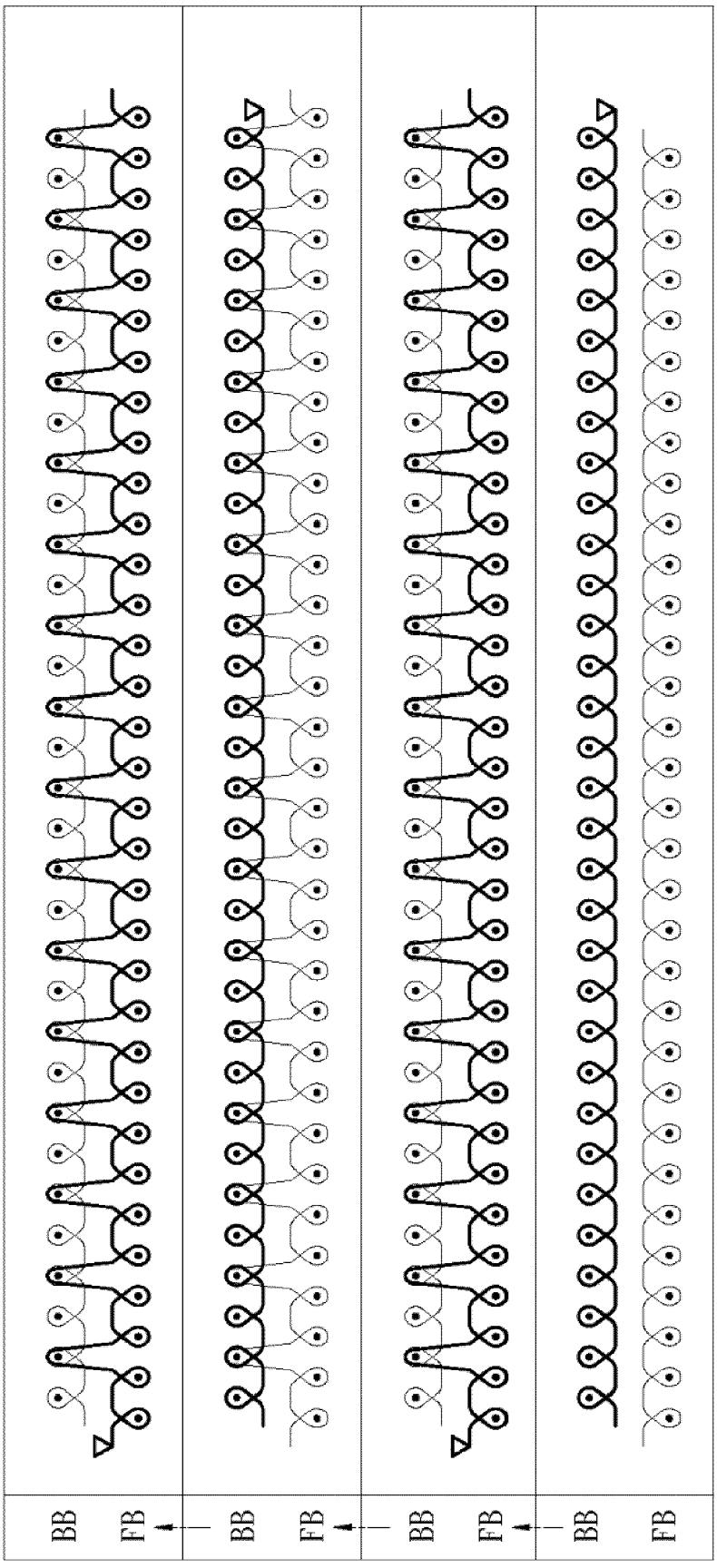

Fig. 5

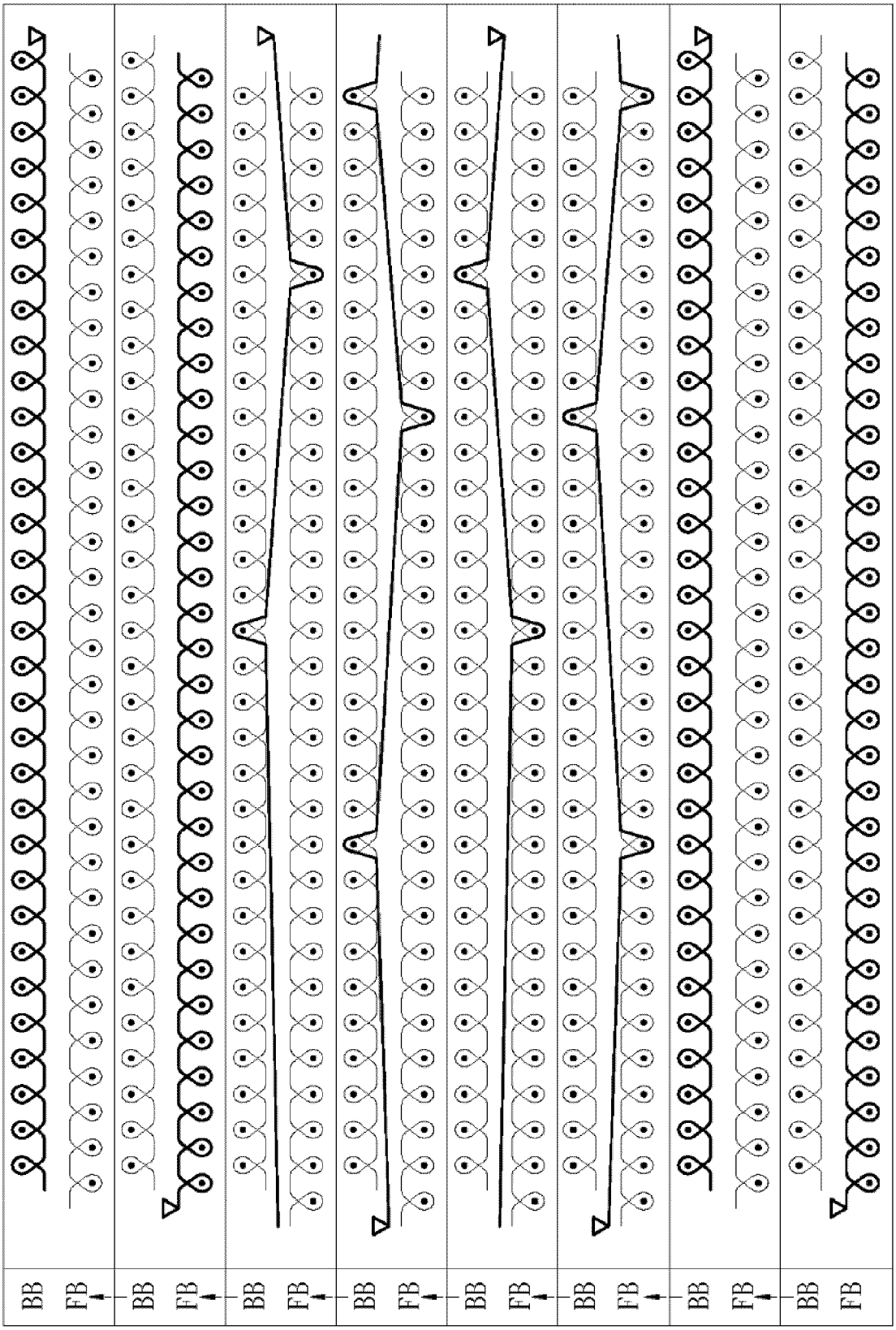

Fig. 6

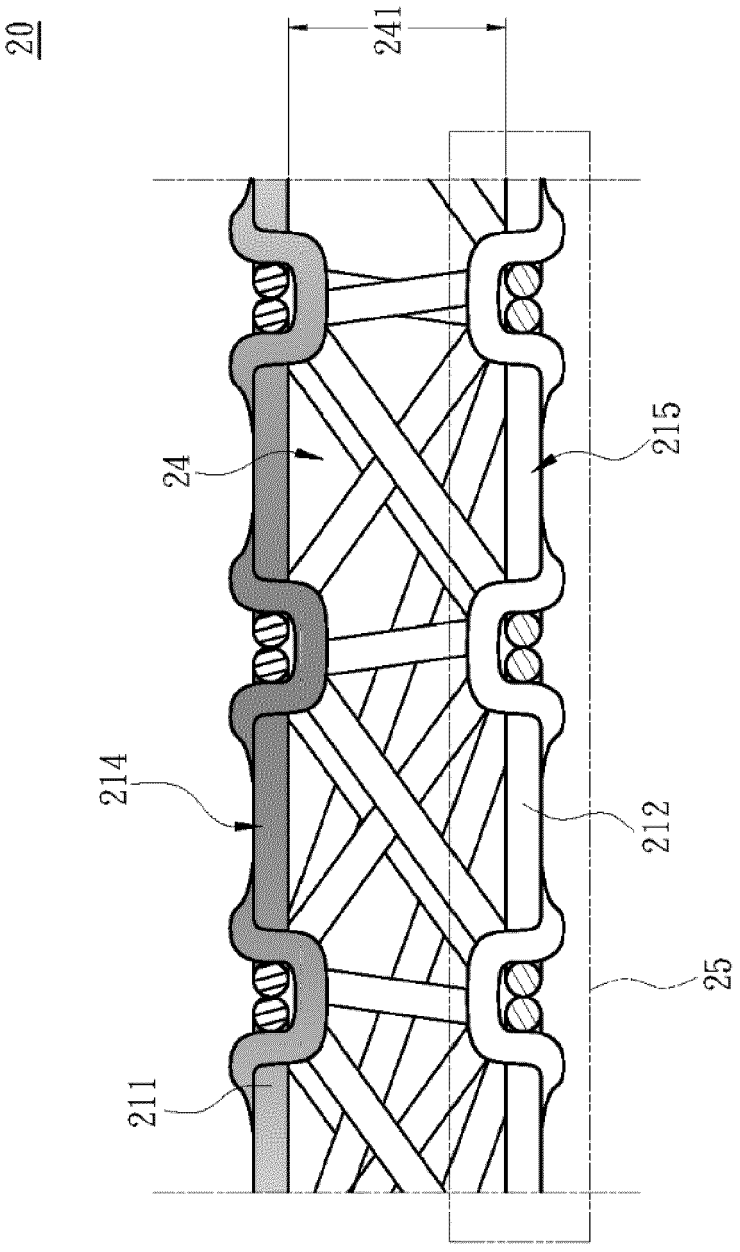

Fig. 7

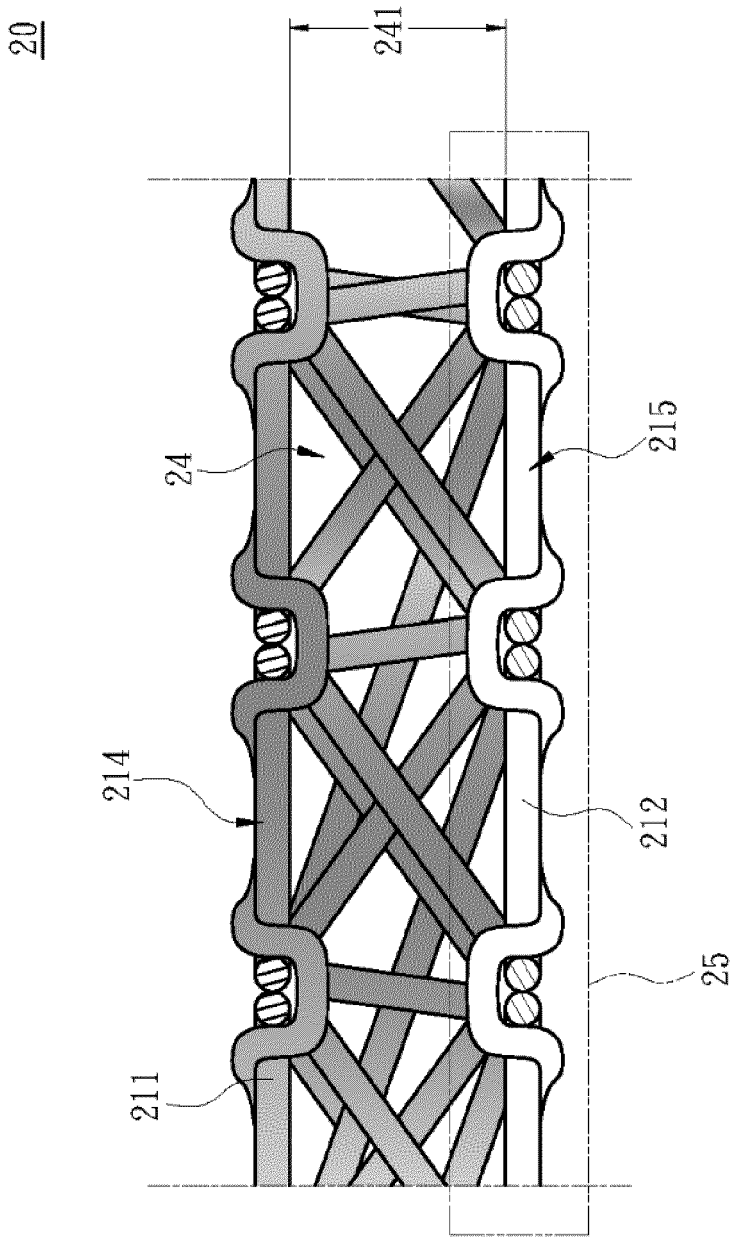

Fig. 8

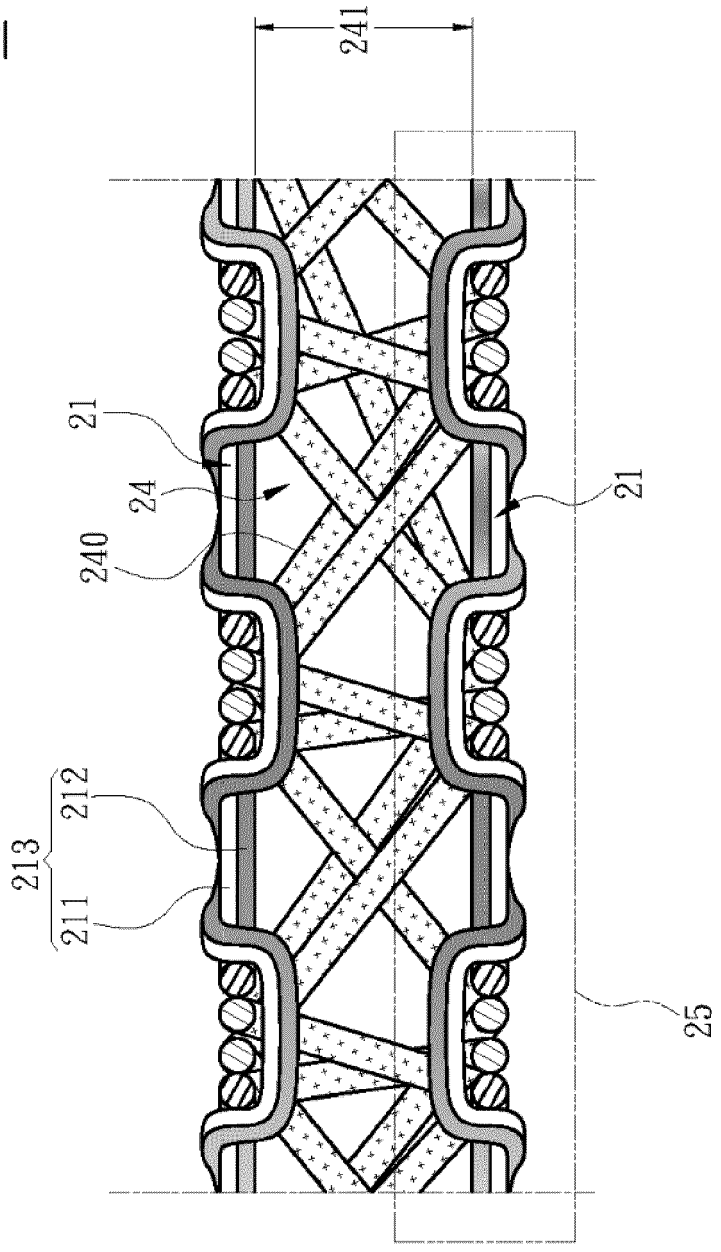

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 1874

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	WO 2015/100369 A1 (NORTH FACE APPAREL CORP [US]) 2 July 2015 (2015-07-02) * page 10, paragraph 4 - page 18, paragraph 3; claims 1, 2, 4, 5, 7, 10, 12, 14-17, 20, 21, 24, 25, 27; figures 2B, 2C, 3.1, 6A-7, 10B * * page 22, paragraph 3 - page 23, paragraph 2 * * page 29, paragraph 4 - page 43, paragraph 4 *	1-5, 10-14 6-9	INV. D04B1/16
X A	US 2019/203389 A1 (LIU YEN-TING [TW]) 4 July 2019 (2019-07-04) * paragraphs [0029], [0031] - [0033], [0039] - [0042], [0064] - [0065], [0068] - [0069]; claims 1, 3-6, 9; figures 17-20 *	1-5, 11-14 6-9	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 October 2021	Sterle, Dieter

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