



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.04.2017 Bulletin 2017/16

(51) Int Cl.:
D04C 1/10 (2006.01)

(21) Application number: **16188436.6**

(22) Date of filing: **13.09.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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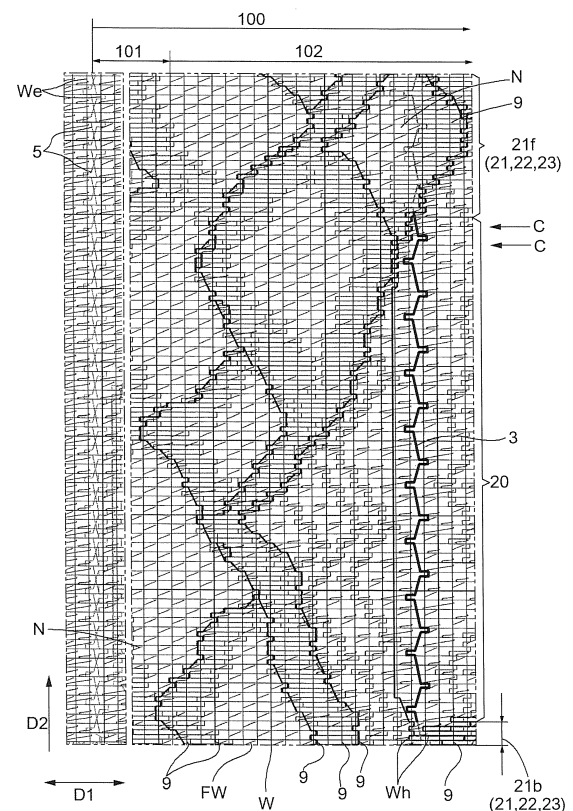
(30) Priority: **17.09.2015 JP 2015183597**

(54) **METHOD OF MANUFACTURING LEAVERS LACE FABRIC AND LEAVERS LACE FABRIC**

(57) A method of manufacturing a perforated lace which has highly decorative properties and in which holes can be freely provided at arbitrary positions is provided.

A cross-over yarn for hole formation (3) is interwoven alternately between hole formation target wales (Wh) which are located in each of both side end edges in a width direction (D1) and are a pair of wales adjacent to each other, wefts (FW, BW) are retained at any one wale of the hole formation target wales (Wh) in a hole formation target site (20) in a lace knitting direction (D2) between the hole formation target wales (Wh), a knitting process of providing a weft interweaving site (22) in which the wefts (FW, BW) are interwoven between the hole formation target wales (Wh), and a pattern yarn interweaving site (23) in which the pattern yarns (8, 9) are interwoven between the hole formation target wales (Wh), in only each of sites (21) other than the hole formation target site, is carried out, and after treatment such as dyeing is performed on the obtained lace, the cross-over yarn for hole formation (3) is removed from the treated knitted fabric.

FIG. 3



Description

[Technical Field]

[0001] This application relates to a method of manufacturing a Leavers lace fabric and a Leavers lace fabric which is obtained by carrying out the method.

[Background Art]

[0002] Recently, in the fashion industry, products having a so-called natural worn-out feeling have formed one type of trend. In order to obtain a product having such a worn-out feeling, analysis regarding fabrics and fibers which are used in the fabrics has been repeated (for example, Patent Documents 1 and 2). As a technique of applying damage to a product, stone wash processing, sandblasting, or the like is carried out. This type of processing is basically processing after a final product is obtained.

[0003] Also with regard to a lace product, this trend exists, and there is also a case where a product is referred to as a damaged lace. As a representative of damaged lace, there is a lace in which a lace surface is subjected to wear processing to some extent, or a lace product in which holes are formed at specific sites therein. In a case of manufacturing such a perforated lace, after a completed product without damage is obtained through processes such as knitting, dyeing, cutting, and sewing of a lace fabric, damage processing such as stone washing is carried out. There is also a case where it is preferable to perform such damage treatment on a specific site in a product. In a case where damage is perforation, in a cut and sewn product adopting a lace pattern or a lace having the lace pattern, it is necessary to specify positions of holes in consideration of an application state.

[0004] On the other hand, a lace product (in particular, an original fabric) is manufactured to have a specified lace width. In general, in the knitting of lace, several rows of lace are knitted in a state of being arranged sideways, and the portions of lace are separated from each other at predetermined positions which are specified in a width direction. Such techniques are disclosed in Patent Documents 3, 4, and 5. The techniques disclosed in Patent Documents 3 and 4 are techniques using a drawn yarn, and the technique disclosed in Patent Document 5 is a technique of cutting yarns crossing at separated locations which are basically set in a width direction.

[0005] In the techniques disclosed in these documents, a Raschel knitting machine which proceeds with wale formation while knitting a chain stitch is used.

[Related art Document]

[Patent Document]

[0006]

[Patent Document 1] JP-A-7-173766
 [Patent Document 2] JP-A-2005-264390
 [Patent Document 3] JP-A-2001-159058
 [Patent Document 4] JP-A-2014-5582
 [Patent Document 5] JP-A-2000-328406

[Summary of the Invention]

[Problem that the Invention is to Solve]

[0007] The techniques disclosed in Patent Documents 1 and 2 are not techniques which are specifically targeted at lace, and cannot cope with a technique in which position formation of holes specifically taking into account a lace pattern or an application state of lace is required.

[0008] Further, the damage processing is basically performed on a final stage product in which processing other than damage has been completed, and therefore, if the damage processing is performed on lace in which knitting is completed, the lace itself cannot delicately maintain a shape, a lace design changes (a shape is lost), and a pattern is disturbed, and thus it is difficult to obtain a good product.

[0009] The drawn yarn shown in Patent Documents 3 and 4 is a technique of separating a knitted lace fabric along a knitting direction and does not aim at the formation of a hole which this application intends to attain. In Patent Document 5, by cutting a connection yarn 14a, separation along the knitting direction is likewise performed.

[0010] However, in Patent Documents 3, 4, and 5, as a knitting machine, a Raschel knitting machine is used. In this case, as indicated previously, if an attempt to change the position, the number, or the like of holes which are provided in lace, in response to a pattern, is made according to a customer's request, basically, in the Raschel knitting machine, the position of the drawn yarn cannot be freely selected, and therefore, it is necessary to change a machine itself (for example, the selection or the number of reeds which are used for the drawn yarn, the position of a reed in a reed row, or the like), a monthly period is required in only this mechanical change, and thus a delivery time becomes longer, and it is not possible to cope with today's demands for large item small volume production.

[0011] On the other hand, as a technique of forming holes in a textile product, there is a technique using a soluble yarn. However, in this technique, the soluble yarn is dissolved before dyeing, and if the soluble yarn is dissolved, a lace itself loses a shape, and the beauty of a lace is lost due to there being wrinkles.

[0012] Therefore, an object of the present invention is to obtain a method of manufacturing a lace fabric, which is related to a method of manufacturing a perforated lace which has highly decorative properties and in which holes can be freely provided at arbitrary positions, and in which a problem such as wrinkles does not occur even if the lace fabric passes through a knitted fabric treatment proc-

ess after knitting, such as dyeing.

[Means for solving the problem]

[0013] In order to achieve the above object, there is provided a method of manufacturing a Leavers lace fabric, including: forming a base weave by appropriately connecting adjacent course sites of wales, each composed of a bobbin yarn, by a weft; performing knitting by interweaving a large number of pattern yarns forming a pattern design into the base weave; and forming both side end edges in a width direction, each of which extends along the wale, in which a cross-over yarn for hole formation is interwoven alternately across a predetermined number of courses between hole formation target wales that are a pair of wales which are located in each of both side end edges in a width direction and are adjacent to each other in a width direction of a lace fabric, and the weft is retained at any one wale of the hole formation target wales in a hole formation target site in a lace knitting direction between the hole formation target wales, and a Leavers lace fabric having a hole is obtained by carrying out a knitting process of providing a weft interweaving site in which the weft is interwoven between the hole formation target wales, and a pattern yarn interweaving site in which the pattern yarn is interwoven between the hole formation target wales, in only each of sites other than the hole formation target site in the lace knitting direction, carrying out a treatment process of treating a Leavers lace obtained in the knitting process, and carrying out a hole formation process of removing the cross-over yarn for hole formation from a knitted fabric.

[0014] In a case of carrying out the method of manufacturing a Leavers lace fabric according to this application, basically, work advances in the order of the knitting process, the treatment process, and the hole formation process.

[0015] In the knitting process, the knitting of a lace based on a weave drawing created in advance is carried out. In this process, the cross-over yarn for hole formation is interwoven between the hole formation target wales of a lace which is required to be, for example, a damaged lace. Then, after the treatment process such as dyeing is performed, in the hole formation process which becomes a substantive final process, the cross-over yarn for hole formation interwoven in a knitting stage is extracted.

[0016] However, in a case where the treatment process can be omitted, work advances without performing substantive treatment, or in a case where the influence of the treatment which is carried out in the treatment process on the Leavers lace fabric is slight, work may advance in the order of the knitting process, the hole formation process, and the treatment process.

[0017] The hole formation targets wale as referred to in this application are a pair of wales adjacent to each other in the width direction of the lace fabric in the lace

fabric. Therefore, after the cross-over yarn for hole formation is interwoven, if an operation of extracting the cross-over yarn for hole formation from the knitted fabric (the lace fabric) is performed, with regard to the hole formation target site, there is neither the weft nor the pattern yarn between the pair of wales, and therefore, the site is separated in the knitting direction. On the other hand, with regard to the weft interweaving site and the pattern yarn interweaving site which are sites different from the hole formation target site, the weft, the pattern yarn, or both of them are interwoven between the wales, and therefore, the sites are not separated.

[0018] As a result, for example, as shown by reference numeral 2 in Fig. 1A, it is possible to form a hole extending between specific wales in the knitting direction.

[0019] In this application, such holes can be formed in an arbitrary number at an arbitrary positions between both side end edges in the width direction of the lace fabric. Further, the hole can be formed in an arbitrary length at an arbitrary position in the knitting direction of the lace fabric. As a result, a hole having a form specific to this application and extending in the knitting direction can be formed in accordance with a pattern which is formed in the lace fabric, and thus it is possible to obtain a lace with a hole as a damaged lace, and it is possible to obtain a lace having a distinctive design as shown in Fig. 1A, for example.

[0020] Furthermore, in this application, as a knitting machine, a Leavers lace machine is used, and therefore, the position adjustment of the cross-over yarn for hole formation in the lace fabric width direction can be easily performed. Further, the specification of the hole formation target site is also easy.

[0021] Although such adjustment can be performed by a user even in a Raschel machine, it means a change in the specification of the Raschel machine, and therefore, about one month is required for the change, and thus it is not practical. Further, fine adjustment such as providing a hole at a desired location in response to each lace pattern, or changing the position or the length of a hole including the lace fabric width direction after a sample is first created and then evaluated by a customer is practically impossible in a Raschel machine.

[0022] In this application, a machine capable of mechanically manufacturing a Leavers lace is referred to as a Leavers lace machine. Leavers lace has a braid-like structure, and therefore, there is also an opinion that it is a woven fabric. However, in terms of being a machine capable of manufacturing a Leavers lace having a structure which will be described later (Paragraphs [0024] to [0031]), this makes no difference. In a case of being based on an opinion that it is a woven fabric, the width direction of the lace fabric as referred to in this application corresponds to a direction of arrangement of warps (bobbin yarns), and the knitting direction is a direction in which weaving advances.

[0023] Further, it is also preferable that in the formation of the weft interweaving sites, sites in which interweaving

densities of the wefts are different in the lace knitting direction are provided.

[0024] In the lace fabric according to this application, in the weft interweaving site, the weft is interwoven between the hole formation target wales, and therefore, the hole as described previously is not formed in this site. However, even in a case where the hole formation target wales are connected by the weft, the density thereof is adjusted, whereby in an area in which the density of the weft is high, a lace part in which the wales extend securely in the knitting direction is made, and an area in which the density is low becomes a part in which due to relatively loose connection, a rough net (mesh) is present. As a result, for example, if dense areas are formed on the knitting advance side and the retreat side of the hole formation target site specific to this application in the knitting direction, the hole can be made to be clear, and if a rough area is provided and the front thereof is made to be dense, a configuration in which transition from the hole to the dense weave is sequentially made can be realized.

[0025] Further, a configuration in which in the execution of the knitting process, a weft-alone interweaving site in which only the weft is interwoven between the hole formation target wales, and a pattern yarn and weft interweaving site in which both the pattern yarn and the weft are interwoven between the hole formation target wales are provided is also a preferable configuration.

[0026] A net-alone site and a part with a pattern can be formed by forming the weft-alone interweaving site and the pattern yarn and weft interweaving site, and various lace designs can be developed by the interposition of the hole formation target site, or the like.

[0027] Further, it is preferable that a first fiber is used for a yarn of a part of the weft or the pattern yarn, and a second fiber is used for a yarn of the other part of the weft or the pattern yarn, which is different from the weft or the pattern yarn composed of the first fiber, a fiber thicker than the second fiber is used as the first fiber, and with regard to a knitting weave in the knitting direction of the lace fabric, an area in which a density of the first fiber is higher than a density of the second fiber in a comparison between the areas in the knitting direction is formed.

[0028] In a case of adopting this manufacturing method, a cover form in a case of looking at a lace fabric in which a hole of a lace is covered with a yarn can be appropriately adjusted by, for example, the interposition of the hole formation target site, or the like, due to the selection of the thickness of a yarn.

[0029] Further, if fibers having different color-development properties with respect to a specific dye are selected as the first fiber and the second fiber, a change of a color can also be adjusted in accordance with a cover form of the lace fabric.

[0030] By using the method of manufacturing a Leavers lace fabric which has been described hitherto, it is possible to mechanically and easily manufacture a Leavers lace fabric having a hole which extends over a plurality of courses in the lace knitting direction and is pro-

vided in each of both side end edges in a width direction.

[Brief Description of the Drawings]

5 **[0031]**

Figs. 1A and 1B are diagrams showing the external appearance of a Leavers lace with a hole according to this application.

10 Figs. 2A and 2B are explanatory diagrams showing the weave configuration of the Leavers lace.

Fig. 3 is a weave diagram of an original fabric with a cross-over yarn for hole formation interwoven therein.

15 Figs. 4A and 4B are explanatory diagrams showing a hole formation process.

Fig. 5 is a diagram showing another embodiment of a weft around the cross-over yarn for hole formation.

20 [Best Mode for Carrying Out the Invention]

[0032] Embodiments of this application will be described based on the following drawings.

25 **[0033]** Fig. 1A is a diagram showing an external appearance when a Leavers lace fabric 1 according to this application is viewed from the front surface side.

30 **[0034]** The feature of this application is that a hole 2 extending a knitting direction D2 is formed in the Leavers lace fabric 1, as also shown in the drawing, and along with a lace pattern which is composed of a pattern yarn or the like, the hole 2 specific to this application also forms a part of a lace design. In the Leavers lace fabric 1 according to this application, the positions of the holes 2 in a lace fabric width direction D1 and the lace fabric knitting direction D2 can be freely adjusted, and the length of the hole 2 and the structure of a net N before and after the hole 2 can also be freely adjusted.

35 **[0035]** In Fig. 3, an example of a weave structure of a knitting weave for forming the hole 2 is shown, and the formation principle of the hole 2 is shown in Figs. 4A and 4B.

40 **[0036]** The lace fabric according to this application is manufactured by being knitted by a Leavers lace machine (not shown) and thereafter, extracting a cross-over yarn for hole formation 3 specific to this application after predetermined treatment is performed on a knitted fabric.

45 **[0037]** In the following description, first, the weave of a Leavers lace will be described. Further, also with regard to a yarn which is used, a specific example is shown. However, these examples are merely preferred examples.

50 **[0038]** A weave in a case where the Leavers lace fabric 1 is viewed from the knitted fabric front surface side is shown in Figs. 2A and 2B. As shown in Fig. 2A, in the Leavers lace fabric 1, a bobbin yarn 7 (yarn type: nylon, thickness: a range of 30 to 50 deniers) which forms a foundation of the weave and extends in the knitting direction D2 which is referred to as a wale W is provided

as a warp, and a back warp BW (yarn type: nylon covered yarn with polyurethane as a core, thickness: a range of 140 to 420 deniers, or a nylon yarn or the like having a thickness in a range of 30 to 50 deniers) is interwoven with the bobbin yarn 7 in the width direction of the knitted fabric. Further, with respect to a weave composed of the bobbin yarn 7 and the back warp BW, a front warp FW (yarn type: nylon, thickness: a range of 30 to 50 deniers) is interwoven on the front side of the back warp BW. The back warp BW and the front warp FW serve as wefts for configuring a base weave 4 (the net N) of a warp knitted fabric.

[0039] A weaving direction of each of the back warp BW and the front warp FW, or a gimp yarn 8 and a liner yarn 9 (both of which will be described later) becomes the width direction D1 of the lace fabric, which is orthogonal to the knitting direction D2 described previously.

[0040] A yarn stroke motion of each of the back warp BW and the front warp FW is to make interweaving proceed by performing a traverse between the bobbin yarns 7 adjacent to each other or between a predetermined number of bobbin yarns 7 in the same course C, and the back warp BW has a form in which it is located on the back surface side of the bobbin yarn 7 when the yarn performs a rightward traverse with respect to the bobbin yarn 7, and located on the front surface side of the bobbin yarn 7 at the time of a leftward traverse, when viewed from the front surface side of a knitted fabric, as shown in Fig. 2A. Conversely, the front warp FW is knitted so as to be located on the front surface side at the time of a rightward traverse with respect to the bobbin yarn 7 and be located on the back surface side at the time of a leftward traverse.

[0041] The base weave 4 of the Leavers lace fabric 1 is completed with the bobbin yarn 7 (a warp), the back warp BW (a weft), and the front warp FW (a weft). Further, in the Leavers lace fabric 1, for the purpose of patterning or the like, with respect to the base weave 4, the gimp yarn 8 (yarn type: cation, nylon, cotton, or the like, thickness: a range of about 50 to 150 deniers) is inserted between the front warp FW and the back warp BW, and the liner yarn 9 (yarn type: nylon, cation, cotton, or the like, thickness: about 300 deniers) is inserted on the front surface side of the front warp FW, as shown in Fig. 2B.

[0042] Fig. 2B is a weave in which a single representative gimp yarn 8 and a single representative liner yarn 9 are inserted into the base weave 4 of Fig. 2A. As can also be seen from this drawing, the same yarn stroke motion as that of the back warp BW described previously is performed in the gimp yarn 8, and the same yarn stroke motion as that of the front warp FW is performed in the liner yarn 9.

[0043] In the case of the Leavers lace fabric 1, the number of gimp yarns 8 is generally about 60 pieces and the number of liner yarns 9 is also generally about 60 pieces.

[0044] The Leavers lace fabric 1 is composed of a liner yarn layer 90, a front warp layer FWL, a gimp yarn layer

80, and a back warp layer BWL as shown in Fig. 1B, if the knitted fabric is viewed in a thickness direction T thereof.

[0045] The positional relationship in a knitted fabric front-and-back direction between the respective yarns is determined by the positional relationship between reeds in a knitting operation. From a relationship of configuring a knit, it goes without saying that the respective yarns are interwoven with each other to follow the configuration shown in Fig. 2B in the front-and-back direction.

[0046] It is also possible to adopt a configuration in which from the front surface side of the lace fabric 1, the liner yarn layer 90, the gimp yarn layer 80, the front warp layer FWL, and the back warp layer BWL are disposed, in which although it is the disposition in a Leavers lace fabric front-and-back direction T of the respective layers (the liner yarn layer 90, the front warp layer FWL, the gimp yarn layer 80, and the back warp layer BWL) in the lace fabric 1 described above, a positional relationship in which the front warp layer FWL and the gimp yarn layer 80 are reversed in the front-and-back direction is made.

[0047] In the Leavers lace according to this application, in addition to the bobbin yarn 7, the wefts (the front warp FW and the back warp BW), and pattern yarns (the gimp yarn 8 and the liner yarn 9) which have been described hitherto, a cross-over yarn for hole formation 3 (yarn type: nylon, thickness: about 420 deniers) specific to this application is interwoven into the lace fabric. Further, a net yarn for lace fabric connection 5 (yarn type: nylon, thickness: about 420 deniers) is used in order to knit a plurality of lace fabrics 1 at both side ends in the width direction of the lace fabric by a single knitting operation in a Leavers lace machine. The cross-over yarn for hole formation 3 is a yarn which is interwoven into the lace fabric in order to form the hole 2 in a specific site (in this application, this site is referred to as a hole formation target site 20) of the lace fabric, and the net yarn for lace fabric connection 5 is an operation yarn for connecting the lace fabrics 1, each of which becomes a unit, in a case of knitting a plurality of lace fabrics 1 by a single knitting operation by using a Leavers lace machine.

[0048] Hereinafter, description will be made using Figs. 3, 4A, and 4B.

[0049] The Leavers lace fabric 1 according to this application is the Leavers lace fabric 1 in which the hole 2 extending in the knitting direction is formed at an arbitrary position of the intended lace fabric through a knitting process, a treatment process, and a hole formation process. Therefore, in the following description, description will be made in the order of the processes while appropriately referring to weave drawings (Figs. 3, 4A, and 4B) of the Leavers lace. However, in order to facilitate understanding, in Figs. 4A and 4B, only the wefts FW and BW and the bobbin yarn 7 are shown and the pattern yarns 8 and 9 are omitted. Further, the net yarn for lace fabric connection 5 does not appear.

[0050] In these drawings, each line in a vertical direction indicates the position of the bobbin yarn 7 which

forms a wale W, and each line in a horizontal direction corresponds to a course C, and lines passing in the direction of a weft correspond to the wefts (FW and BW), the pattern yarns (in the example shown in the drawings, mainly the liner yarn 9), the cross-over yarn for hole formation 3, and the net yarn for lace fabric connection 5.

[0051] The cross-over yarn for hole formation 3 performs the same yarn passage as that of the front warp FW described previously, and the net yarns for lace fabric connection 5 and 5 which can be provided in a pair also perform the same yarn passage as that of the front warp FW.

[0052] In Fig. 3, a pair of net yarns for lace fabric connection 5 is interwoven between specific wales We and We at the left end of the drawing. Each net yarn for lace fabric connection 5 forms a weave in which a yarn stroke motion, in which the yarn passes between the wales We and We which form a pair, every three courses, and turns to the back surface side or the front surface side of the bobbin yarn 7 and thereafter, returns to the original wales We and We again in a state where the yarn has advanced by three courses, is repeated.

[0053] The right side of a lace fabric connection area in which the pair of net yarns for lace fabric connection 5 is interwoven becomes an area of a lace fabric main body 100. In the lace fabric main body 100, a scallop part 101 is provided on the end portion side and a pattern part 102 continue therefrom and has the hole formation target site 20 which has been described hitherto, at a site on the right side thereof (the inside when viewed from the lace fabric). In the weave example exemplarily shown in Figs. 4A and 4B, in the hole formation target sites 20, a left hole formation target site 20a extends over about thirty courses, a central hole formation target site 20b extends over about ten courses, and a right hole formation target site 20c extends over about thirty courses.

[0054] As can also be seen from this weave drawing, in the knitting stage which is shown, only the cross-over yarn for hole formation 3 described previously is interwoven between the wales W (between the bobbin yarns 7) in the respective hole formation target sites 20 (20a, 20b, and 20c shown in Fig. 4A). In Fig. 3, the cross-over yarn for hole formation 3 is shown by a dark thick line and a light thick line. However, the cross-over yarn for hole formation 3 is a single continuous yarn. A yarn stroke motion of the cross-over yarn for hole formation 3 in the example shown in Fig. 3 has a configuration in which a yarn stroke motion, in which the yarn passes between wales Wh and Wh which form a pair, every three courses, and turns to the back surface side or the front surface side of the bobbin yarn 7 and thereafter, returns to the original wales Wh and Wh again after the yarn has advanced by three courses, is repeated. In the example shown in Figs. 4A and 4B, the cross-over yarn for hole formation 3 performs yarn passage between the wales Wh every five or six course.

[0055] Further, as shown in Fig. 3, tracing an area between the wales Wh and Wh with which the cross-over

yarn for hole formation 3 is interwoven, at a site 21 (a retreated site 21b or an advanced site 21f in the knitting direction) deviated from the hole formation target site 20, the weft FW or BW (BW is not shown) or the pattern yarn 9 or 8 (8 is not shown) straddles between the wales Wh and Wh, thereby forming the net N and forming a pattern.

[0056] As can be seen from the above description, in the Leavers lace fabric 1 according to this application, the hole formation target wales Wh and Wh which are a pair of wales adjacent to each other in the width direction D1 of the lace fabric are specified in each of both side end edges in a width direction, at which the net yarn for lace fabric connection 5 is located, and the cross-over yarn for hole formation 3 is alternately interwoven across a predetermined number of courses between the specified hole formation target wales Wh and Wh. Further, in the hole formation target site 20 in the lace knitting direction between the hole formation target wales Wh and Wh, the weft FW is retained at any one wale of the hole formation target wales Wh and Wh, and a weft interweaving site 22 in which the weft FW is interwoven between the hole formation target wales Wh and Wh is provided in only each of the sites 21 (21b and 21f) other than the hole formation target site in the lace knitting direction D2.

Also with regard to the pattern yarns 8 and 9, a pattern yarn interweaving site 23 in which the pattern yarns 8 and 9 are interwoven between the hole formation target wales Wh and Wh is provided in only each of the sites 21 (21b and 21f) other than the hole formation target site 20.

[0057] The above is the basic configuration of a weave design of the Leavers lace according to this application, and in the knitting process, an original fabric is knitted according to this basic design concept. In the original fabric, the cross-over yarn for hole formation 3 remains. Therefore, the original fabric can favorably maintain the lace design thereof in the subsequent operation.

[0058] After the knitting is completed, scheduled treatment such as dyeing or shaping is performed on the obtained original fabric. This process is the treatment process.

[0059] With respect to the treated original fabric which has substantively reached a produce level by carrying out the above treatment, the cross-over yarn for hole formation 3 is removed from the treated knitted fabric. This is the hole formation process. As a result, the Leavers lace fabric 1 having a hole which extends in the knitting direction at a position according to the basic design of the lace fabric can be obtained. If the manufacturing procedure of this embodiment is adopted, it is possible to obtain a lace fabric with a hole, in which hole formation can be performed at the final stage of the manufacturing, without disturbing a distinctive lace design of a lace fabric.

[Other Embodiments]

[0060]

(1) In the embodiment shown in Fig. 3, the example in which the weft interweaving site 22 and the pattern yarn interweaving site 23 are provided in approximately the same site is shown. However, as shown in Fig. 5, in the execution of the knitting process, a weft-alone interweaving site 24a in which only the wefts FW and BW are interwoven between the hole formation target wales Wh and Wh, and a pattern yarn and weft interweaving site 24b in which both of the pattern yarns 8 and 9 and the wefts FW and BW are interwoven between the hole formation target wales may be separately provided.

(2) Further, in the embodiment described above, with regard to the weft or the pattern yarn, in particular, the thickness of the yarn is not particularly mentioned. However, it is preferable that a first fiber is used for a yarn of a part of the weft or the pattern yarn, and a second fiber is used for a yarn of the other part of the weft or the pattern yarn, which is different from the weft or the pattern yarn composed of the first fiber, a fiber thicker than the second fiber is selected as the first fiber, and with regard to a knitting weave in the knitting direction of the lace fabric, an area in which a density of the first fiber is higher than a density of the second fiber in the comparison between the areas in the knitting direction is formed. If such a configuration is adopted, areas having different coverages in the knitting direction of the lace fabric can be formed, and in a case where a dyed state is made, a shade of a color can also be realized.

(3) On the other hand, as further shown in Fig. 5, in the formation of the weft interweaving site, sites in which interweaving densities of the wefts FW and BW are different in the lace knitting direction D2 (in a site denoted by reference numeral 22 in Fig. 3, the weft FW skips over three courses and alternately and repeatedly passes through two continuous courses, whereas in a site denoted by reference numeral 24 in Fig. 5, the weft FW performs yarn passage in which the yarn skips over three courses and returns back to the original wale at two continuous courses) may be formed. If such a configuration is adopted, a lace structure (such as whether or not the hole is securely fixed) and a design in the vicinity of the hole after the cross-over yarn for hole formation 3 is extracted can be adjusted.

(4) In the embodiment described above, as the most preferable example, the example in which work advances in the order of the knitting process, the treatment process, and the hole formation process is shown. However, as indicated earlier, in a case where the treatment process can be omitted, substantive treatment is not carried out, or in a case where the influence of the treatment which is carried out in the treatment process on the Leavers lace fabric is slight, work may advance in the order of the knitting process, the hole formation process, and the

treatment process.

[Industrial Applicability]

- 5 **[0061]** As described above, a perforated lace which has highly decorative properties and in which holes are freely provided at arbitrary positions can be manufactured mechanically and without greatly disturbing a lace design. Further, it is possible to obtain a method of manufacturing a lace fabric, in which a problem such as wrinkles does not occur even if work passes through a knitted fabric treatment process after knitting, such as dyeing.

[Description of Reference Numerals and Signs]

[0062]

- | | |
|------|---|
| 1: | Leavers lace fabric |
| 2: | hole |
| 3: | cross-over yarn for hole formation |
| 4: | base weave |
| 5: | net yarn for lace fabric connection |
| 7: | bobbin yarn |
| 8: | gimp yarn (pattern yarn) |
| 9: | liner yarn (pattern yarn) |
| 20: | hole formation target site |
| 20a: | left hole formation target site |
| 20b: | central hole formation target site |
| 20c: | right hole formation target site |
| 21: | deviated site |
| 21b: | retreated site |
| 21f: | advanced site |
| 22: | weft interweaving site |
| 23: | pattern yarn interweaving site |
| 24: | weft interweaving site of different weave |
| 24a: | weft-alone interweaving site |
| 24b: | weft and pattern yarn interweaving site |
| 80: | gimp yarn layer |
| 90: | liner yarn layer |
| 100: | lace fabric main body |
| 101: | scallop part |
| 102: | pattern part |
| BW: | back warp (weft) |
| BWL: | back warp layer |
| D1: | width direction of lace fabric |
| D2: | knitting direction of lace fabric |
| FW: | front warp (weft) |
| FWL: | front warp layer |
| N: | net |
| W: | wale |
| We: | wale |
| Wh: | wale |

55 Claims

1. A method of manufacturing a Leavers lace fabric, comprising:

forming a base weave (4) by appropriately connecting adjacent course sites of wales (W), each composed of a bobbin yarn (7), by a weft (FW, BW);

performing knitting by interweaving a large number of pattern yarns (8, 9) forming a pattern design into the base weave (4); and
forming both side end edges in a width direction (D1), each of which extends along the wale, wherein a cross-over yarn for hole formation (3) is interwoven alternately across a predetermined number of courses between hole formation target wales (Wh) that are a pair of wales which are located in each of both side end edges in a width direction and are adjacent to each other in a width direction (D1) of a lace fabric, the weft is retained at any one wale of the hole formation target wales (Wh) in a hole formation target site (20) in a lace knitting direction (D2) between the hole formation target wales, and a Leavers lace fabric having a hole is obtained by carrying out a knitting process of providing a weft interweaving site (22) in which the weft is interwoven between the hole formation target wales (Wh), and a pattern yarn interweaving site (23) in which the pattern yarn (8, 9) is interwoven between the hole formation target wales, in only each of sites other than the hole formation target site in the lace knitting direction (D2), carrying out a treatment process of treating a Leavers lace obtained in the knitting process, and carrying out a hole formation process of removing the cross-over yarn for hole formation (3) from a knitted fabric.

2. The method of manufacturing a Leavers lace fabric according to Claim 1, wherein in the formation of the weft interweaving sites (22), sites in which interweaving densities of the wefts (FW, BW) are different in the lace knitting direction are provided.
3. The method of manufacturing a Leavers lace fabric according to Claim 1 or 2, wherein in the execution of the knitting process, a weft-alone interweaving site (24a) in which only the weft is interwoven between the hole formation target wales (Wh), and a pattern yarn and weft interweaving site (24b) in which both the pattern yarn and the weft are interwoven between the hole formation target wales (Wh) are provided.
4. The method of manufacturing a Leavers lace fabric according to any one of Claims 1 to 3, wherein a first fiber is used for a yarn of a part of the weft or the pattern yarn, and a second fiber is used for a yarn of the other part of the weft or the pattern yarn, which

is different from the weft or the pattern yarn composed of the first fiber,

a fiber thicker than the second fiber is used as the first fiber, and

with regard to a knitting weave in the knitting direction (D2) of the lace fabric, an area in which a density of the first fiber is higher than a density of the second fiber in a comparison between the areas in the knitting direction is formed.

5. A Leavers lace fabric which is manufactured by the method of manufacturing a Leavers lace fabric according to any one of Claims 1 to 4, and has a hole (2) which extends over a plurality of courses in the lace knitting direction and is provided in each of both side end edges in a width direction (D1).

FIG. 1A

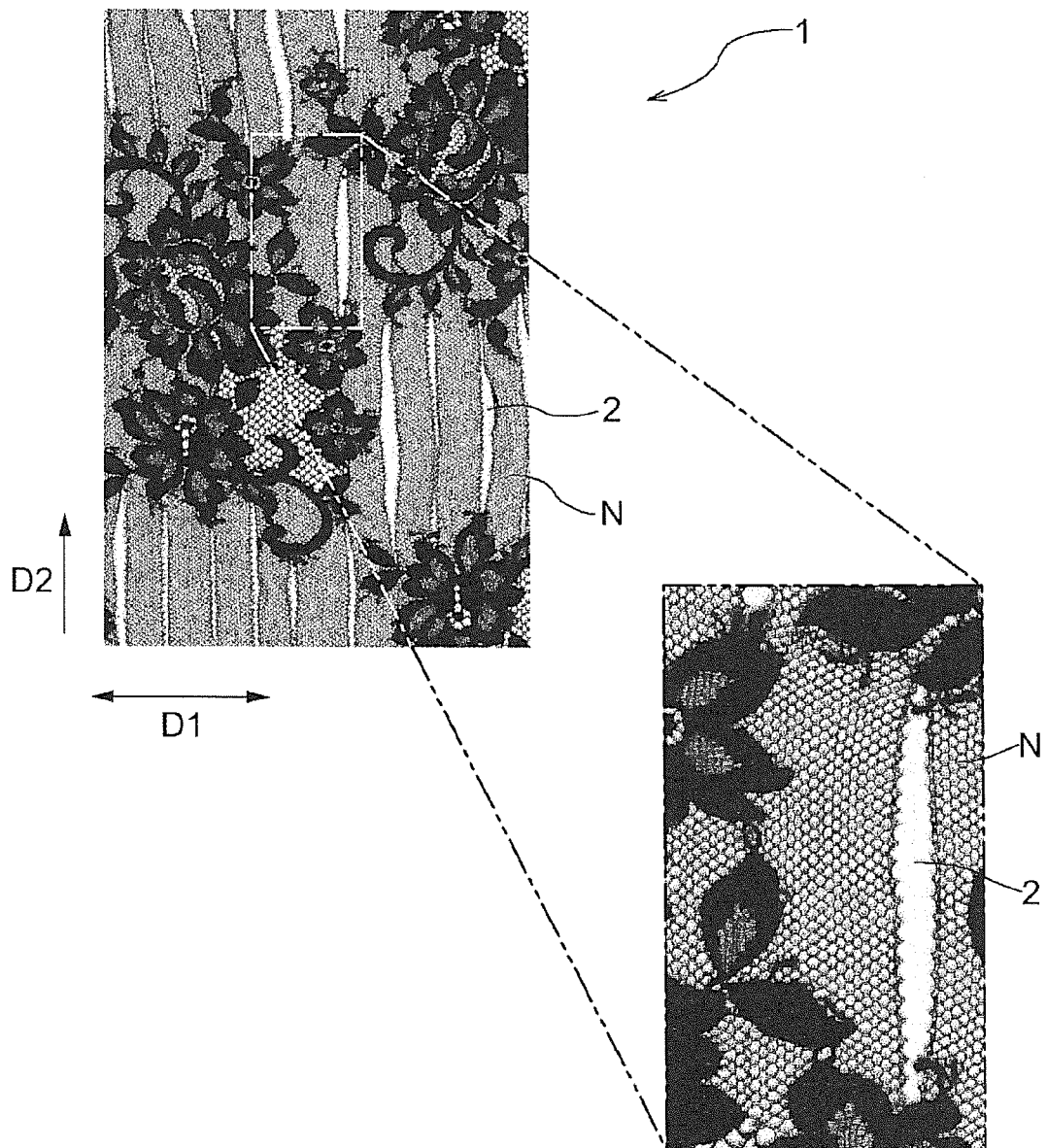


FIG. 1B

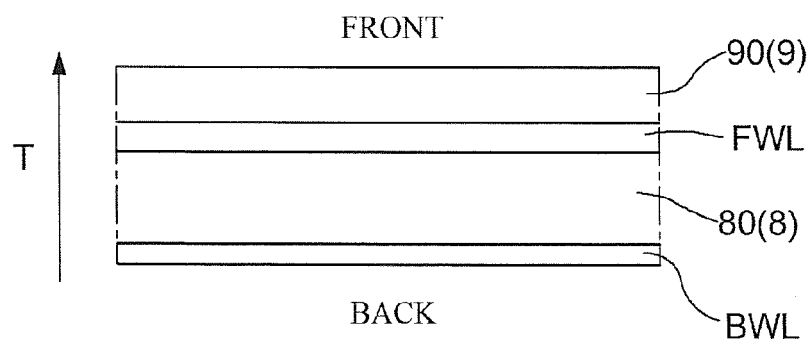


FIG. 2A

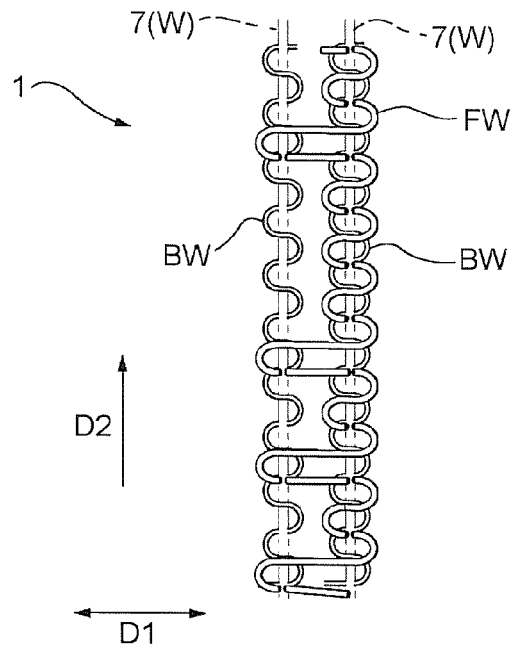


FIG. 2B

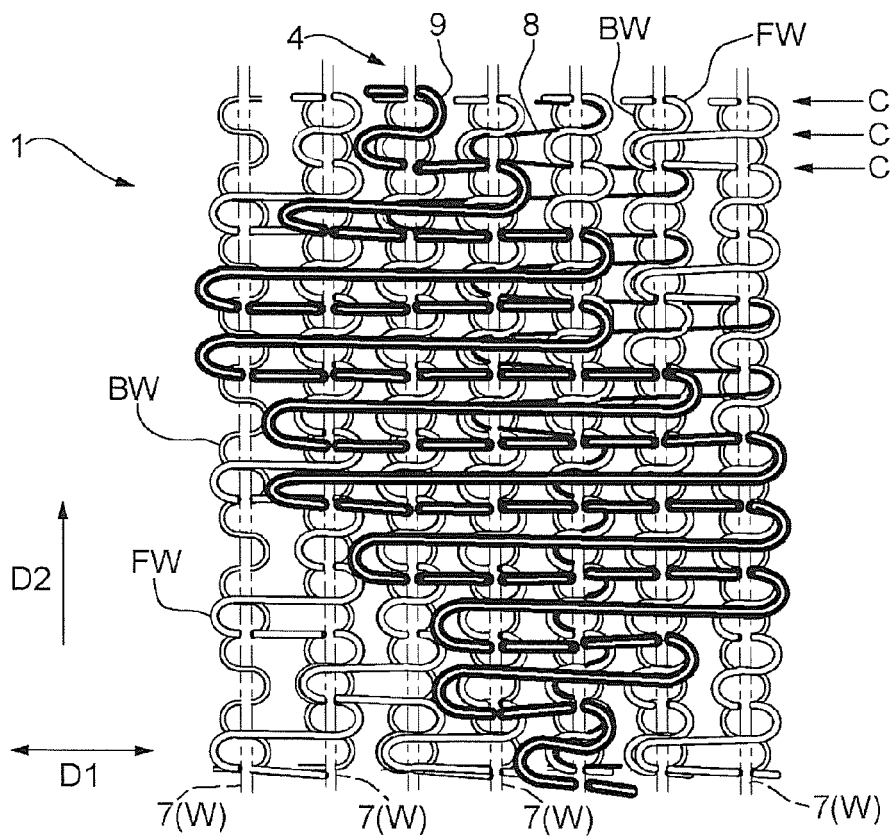


FIG. 3

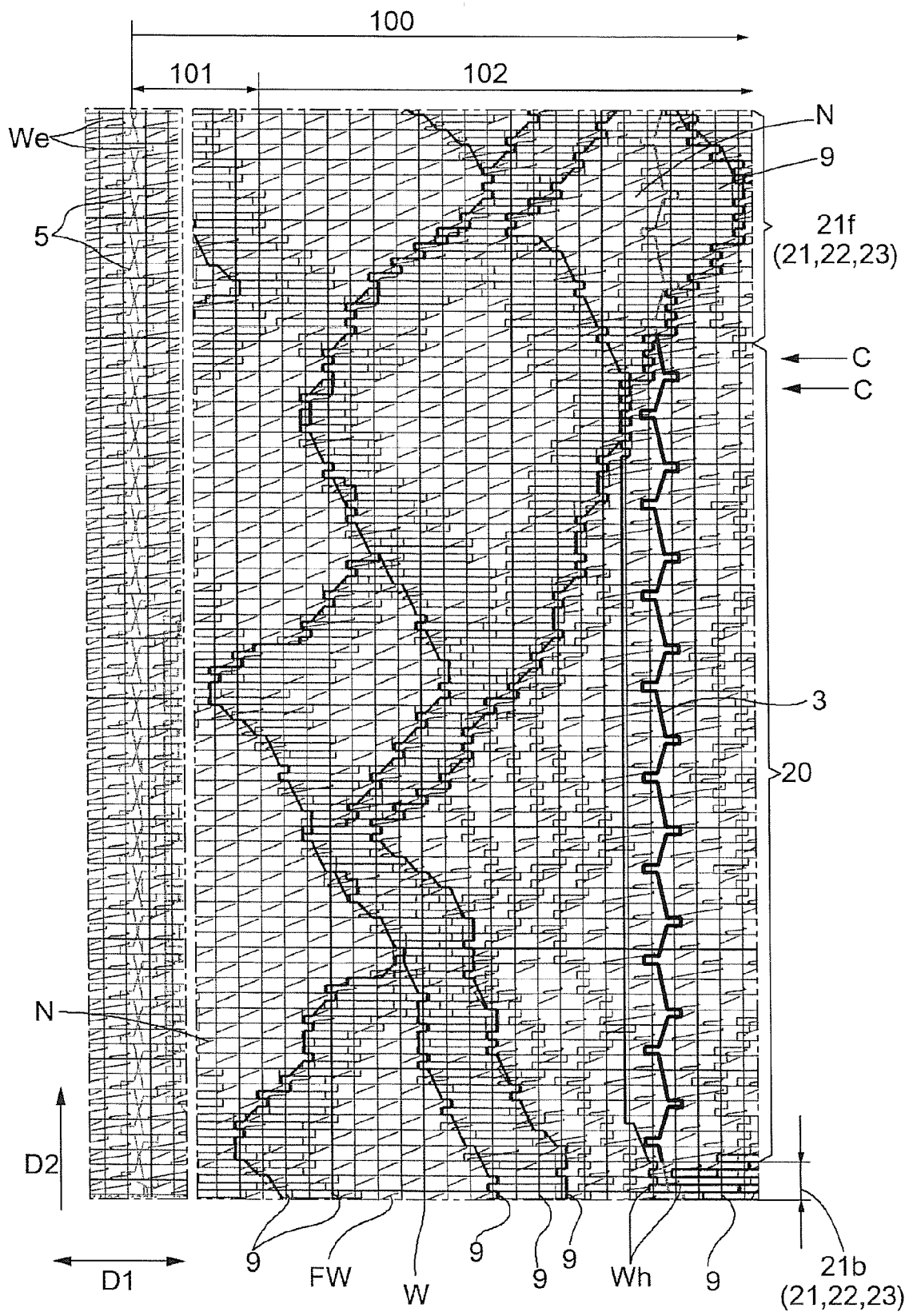


FIG. 4A

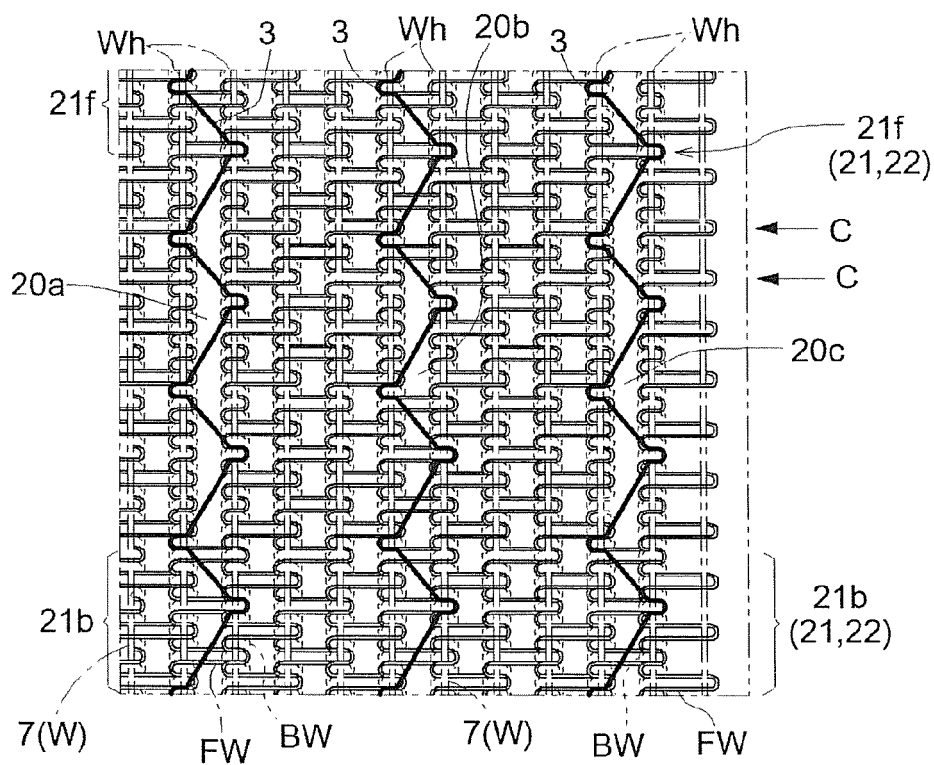


FIG. 4B

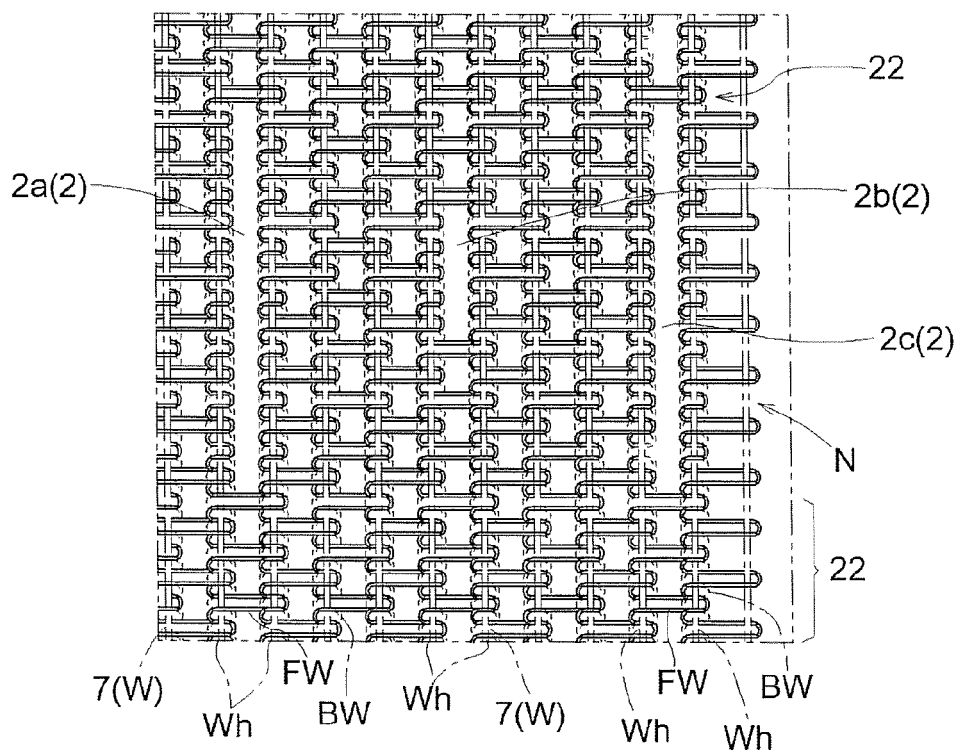
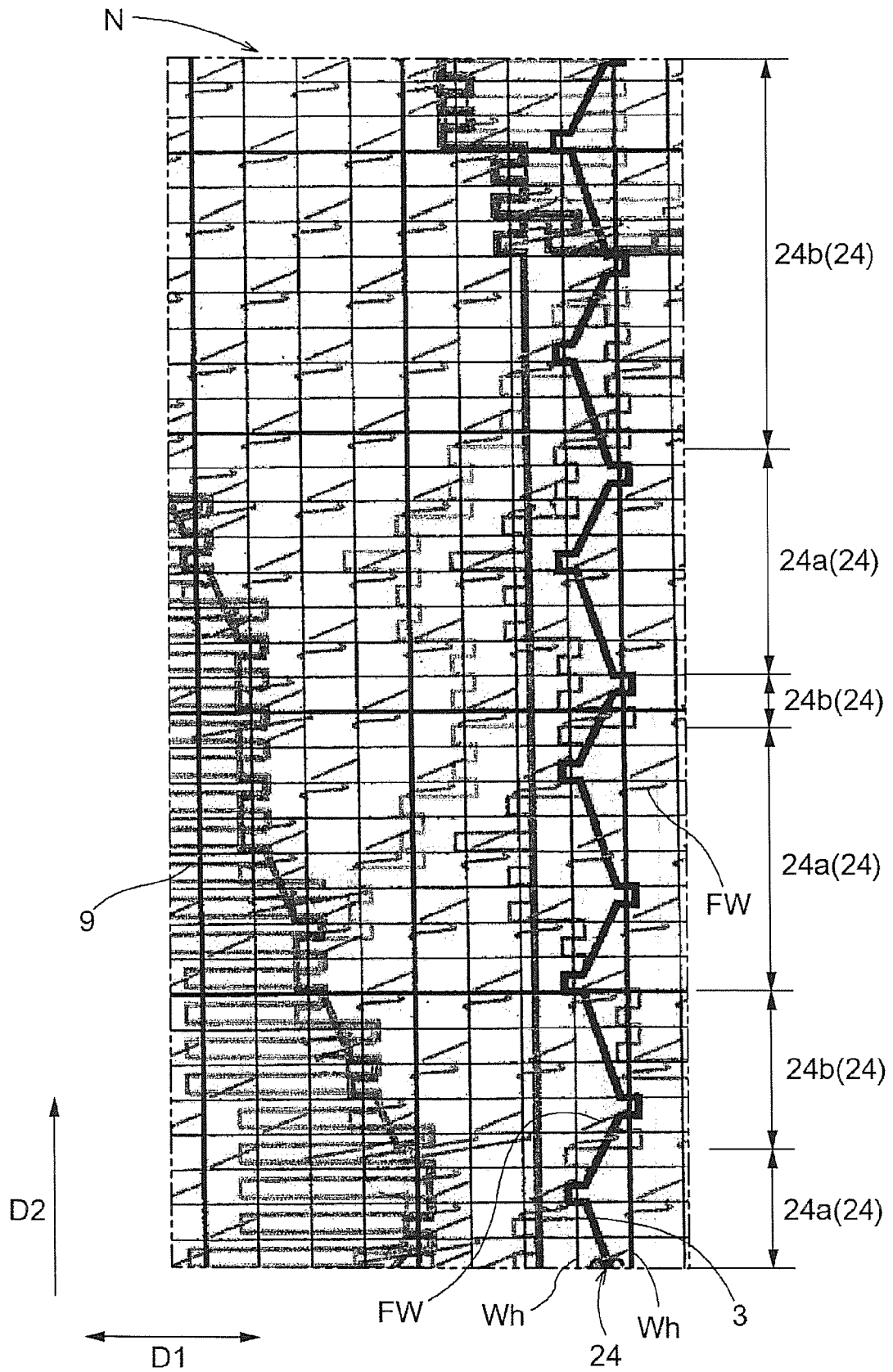


FIG. 5





EUROPEAN SEARCH REPORT

Application Number
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A	----- The present search report has been drawn up for all claims	1	
Place of search		Date of completion of the search	Examiner
Munich		16 March 2017	Sterle, Dieter
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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The members are as contained in the European Patent Office EDP file on
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