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(71) Applicant: **Miyagi Lace Co., Limited**  
**Takarazuka-shi**  
**Hyogo-ken (JP)**

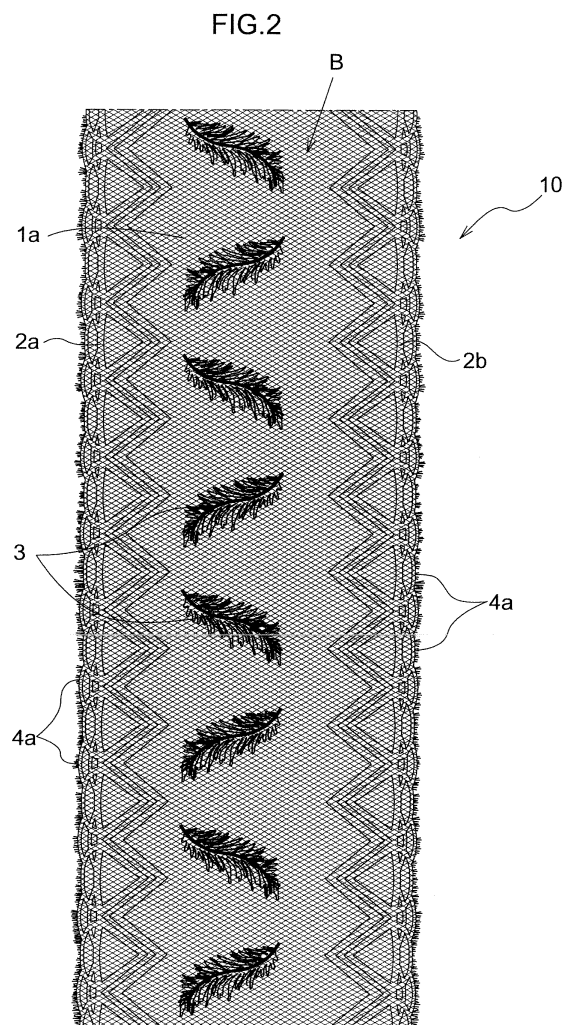
(72) Inventor: **Sawamura, Tetsuya**  
**Takarazuka-shi, Hyogo (JP)**

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(74) Representative: **Intes, Didier Gérard André et al**  
**Cabinet Beau de Loménie**  
**158, rue de l'Université**  
**75340 Paris Cedex 07 (FR)**

(54) **Embroidery lace, embroidery lace fabric, and method of manufacturing same**

(57) An embroidery lace includes a narrow lace body 1a having a scallop portion 2a, 2b at least at one of opposed ends thereof in its width direction, an embroidery portion 3 formed at least at a portion of an area between the opposed ends in the width direction of the narrow lace body 1a, with using an embroidery machine 3, and waste net cut portions 4 left at the opposed ends.



## Description

### [Technical Field]

[0001] The present invention relates to an embroidery lace including a narrow lace body having a scallop portion at least at one of opposed ends thereof in its width direction and an embroidery portion formed at least at a portion of an area between the opposed ends in the width direction of the narrow lace body. The invention relates also to an embroidery lace fabric from which such embroidery lace can be obtained as well as to methods of manufacturing such embroidery lace and embroidery lace fabric.

### [Background Art]

[0002] An embroidery lace having a scallop portion at least at one of opposed width-wise ends of the lace ground and an embroidery portion formed between the opposed ends has been used in such textile articles as a women's underwear, a curtain, etc. Next, the conventional method of manufacturing such embroidery lace will be explained step by step in [1] through [4] as follows, with reference, when appropriate, to a schematic of Fig. 8.

[0003] Incidentally, in the following example manufacturing method, there is manufactured an embroidery lace having a pair of scallop portions at opposed width-wise ends of a lace ground. However, the same method is used for a lace having a scallop portion only at one width-wise end of the lace ground and a cutting portion at the other width-wise end.

[1] A wide lace sheet 20 is prepared which has a lace pattern (including a construction provided as a simple mesh without any embellishing threads, the mesh per se forming a lace pattern) over an entire surface of a lace ground.

[2] The wide lace sheet 20 is set to a screen m3 of an embroidery machine M (Fig. 8 (a)).

[3] As an embroidery pattern to be inputted to an embroidery controlling section m1 of the embroidery machine M, there is prepared embroidery pattern data for forming a basic embroidery pattern having a plurality of scallop embroidery patterns SP alternating by a predetermined pitch P along the width direction of the wide lace sheet, capable of forming scallop portions at opposed ends in the width direction of the pattern. Then, based on this prepared embroidery pattern, an embroidering needle m2 of the embroidery machine M is operated to effect an embroidering operation to the entire face of the wide lace sheet 20 (Figs. 8 (b) through (d)).

[4] The wide lace strip 20 having the embroidery portions formed according to the basic embroidery pattern through the above steps is cut along cutting lines CL defined by respective scallop forming portions 30 of the embroidery.

[0004] The above-described technique is well-known and commonly practice in the embroidery lace industry. Therefore, no particular prior-art documents can be cited.

### [Disclosure of Claimed Subject Matters]

[0005] If the above-described conventional technique is employed, however, the scallop portion will be formed always with a scallop embroidery pattern. This can impose a significant design restriction in freedom of designing an embroidery lace. Further, with this technique, it is not possible to provide an embroidery portion only at a center portion of a lace having a predetermined width (excluding the scallop portion). As a result, it is not possible to obtain an embroidery lace having a neat/simple design.

[0006] To cope with the above, it is conceivable to manufacture in advance a single narrow lace strip having scallop portions at opposed width-wise ends thereof and then to add an embroidery to this narrow lace strip. However, this method cannot be implemented by a mechanical embroidering operation. Hence, mass production is not possible.

[0007] Incidentally, in the case of the conventional embroidery lace, embroidery pattern is provided to the entire lace fabric. Hence, when a principal lace portion (lace body) is cut along a cutting line from the embroidered lace fabric, the embroidery if present also in its waste net portion (i.e. a net portion to be eventually disposed of) present between adjacent principal lace portions will be wasted.

[0008] The present invention has been made in view of the above-described problems of the conventional art. The present invention aims at providing a narrow embroidery lace which is suitable for mass production, superior in its aesthetic impression, having high quality, an embroidery lace fabric from which such embroidery lace can be obtained, as well as methods of manufacturing such embroidery lace and embroidery lace fabric.

[0009] According to a characterizing feature of an embroidery lace to which the present invention pertains, an embroidery lace comprises:

a narrow lace body having a scallop portion at least at one of opposed ends thereof in its width direction; an embroidery portion formed at least at a portion of an area between said opposed ends in the width direction of the narrow lace body, with using an embroidery machine; and waste net cut portions left at said opposed ends.

[0010] For obtaining the embroidery lace having the above-described construction, first, there is manufactured an embroidery lace fabric including a lace ground and a plurality of lace patterned portions (each of these becomes what is referred to as "a narrow lace body" herein), each lace patterned portion having a scallop portion at least at one of opposed ends of the lace ground in its

width direction, and an embroidery portion provided at least at a portion of an area between the opposed width-wise ends of the narrow lace body, with using an embroidery machine. The use of the embroidery machine allows efficient mass production. In this, if the mechanical embroidering operation is effected to each row of lace patterned portions, the lace patterned portion will be pulled by embroidery threads. With this, there will occur change in the tension in the entire lace ground, thus leading to corresponding change in the positional relationship among various portions of the lace ground. On the other hand, with the above-described inventive construction, after completion of the embroidering operation on each row of lace patterned portion, the embroidery machine will be stopped and then tension adjustment will be made mechanically or manually, whereby the position of the first needle (standby position) for the next row of lace patterned portion can be set with accuracy. As a result, there may be obtained an embroidery lace fabric having a high quality with beautifully applied embroidery and without distortions. Then, only by cutting this embroidery lace fabric along the cutting portion or scallop portion which portion defines a cutting line, mass production of a narrow embroidery lace having superior aesthetic impression as well as high quality is made possible. Moreover, in the inventive construction described above, no embroidery is applied to the waste net portion formed with the cutting of the embroidery lace fabric. Therefore, waste of embroidery can be avoided and the manufacturing cost can be reduced accordingly.

**[0011]** According to a characterizing feature of an embroidery lace fabric to which the present invention pertains, an embroidery lace fabric comprises:

- a lace ground as a foundation, the lace ground including,
- a plurality of lace patterned portions, each patterned portion having either a combination of a cutting portion or a scallop portion defining a cutting line or a pair of scallop portions, along a width direction of said lace ground;
- an embroidery portion formed at least at a portion of an area between opposed ends of said lace patterned portion, with using an embroidery machine; and
- a waste net portion interconnecting different ones of said lace patterned portions.

**[0012]** With the embroidery lace fabric having the above-described construction, for a plurality of lace patterned portions (each of these becomes what is referred to as "a narrow lace body", as described above herein) each patterned portion having a scallop portion at least at one of opposed ends of the lace ground in its width direction, an embroidery portion is provided at least at a portion of the area between the opposed width-wise ends of the narrow lace body, with using an embroidery machine. The use of the embroidery machine allows efficient

mass production. In this, if the mechanical embroidering operation is effected to each row of lace patterned portions, the lace patterned portion will be pulled by embroidery threads. With this, there will occur change in the tension in the entire lace ground, thus leading to corresponding change in the positional relationship among various portions of the lace ground. On the other hand, with the above-described inventive construction, after completion of the embroidering operation on each row of lace patterned portion, the embroidery machine will be stopped and then tension adjustment will be made mechanically or manually, whereby the position of the first needle (standby position) for the next row of lace patterned portion can be set with accuracy. As a result, there may be obtained an embroidery lace fabric having a high quality with beautifully applied embroidery and without distortions.

**[0013]** According to a method of manufacturing an embroidery lace fabric, to which the present invention pertains, in the method of manufacturing an embroidery lace fabric from a lace ground including a plurality of lace patterned portions, each lace patterned portion having a scallop portion at least at one of opposed ends thereof in its width direction, said plural lace patterned portions being disposed with a predetermined spacing relative to each other in said width direction, and a waste net portion disposed between different lace patterned portions, the method comprises the steps of:

- (a) setting said lace ground to an embroidery machine;
- (b) forming an embroidery pattern in a first row of said lace patterned portions, from an operation initiating position of an embroidering needle of the embroidery machine;
- (c) effecting a relative movement of said embroidering needle to a standby position for a subsequent row of lace patterned portion, by moving said lace ground set to the embroidery machine;
- (d) stopping the embroidery machine;
- (e) adjusting tension in the lace ground such that a relationship between the subsequent row lace patterned portion and the standby position of the embroidering needle may agree with a relationship between the first row lace patterned portion and the operation initiating position of the embroidering needle;
- (f) forming the embroidery pattern in the subsequent lace patterned portion after the tension adjustment; and
- (g) repeating said steps (c) through (f) until the embroidery pattern is formed in a last row lace patterned portion.

**[0014]** According to the above-described manufacturing method of an embroidery lace fabric relating to the present invention, an embroidery lace pattern is provided to a lace ground including a plurality of lace patterned

portions (which are to constitute what is defined as a "narrow width lace" in this specification), each lace patterned portion having a scallop portion at least at one of opposed ends thereof in its width direction, and a waste net portion interconnecting different ones of the lace patterned portions, an embroidery portion formed at least at a portion of an area between opposed ends of the lace patterned portion is formed with using an embroidery machine. In the course of this, the lace patterned portion will be pulled by embroidery threads. With this, there will occur change in the tension in the entire lace ground, thus leading to corresponding change in the positional relationship among various portions of the lace ground. Hence, if the lace ground is moved under such condition, there will occur in an error in the standby position of the embroidering needle for the next row of lace patterned portion. On the other hand, with the above-described inventive construction, after completion of the embroidering operation on each row of lace patterned portion, the embroidery machine will be stopped and then tension adjustment will be made, such that a relationship between the subsequent row lace patterned portion and the standby position of the embroidering needle (the standby position at this stage is a standby position of the embroidering needle for forming an embroidery pattern to the next row lace patterned portion) may agree with a relationship between the first row lace patterned portion and the operation initiating position of the embroidering needle (the standby position at this stage is substantially a standby position of the embroidering needle for the first row lace patterned portion) (the above-described steps (c), (d), (e)). Therefore, the position of the first needle (standby position) for the next row of lace patterned portion can be set with accuracy. As a result, there may be obtained an embroidery lace fabric having a high quality with beautifully applied embroidery and without distortions. Then, by removing the waste net portion from such embroidery lace fabric, mass production of a narrow embroidery lace having a superior design and superior quality is made possible. Further, as no embroidery is applied to the removed waste net portion, there occurs no waste of embroidery, so that the manufacturing costs can be reduced.

**[0015]** In the inventive method, preferably, the lace patterned portion with the embroidery pattern formed therein is connected to the waste net portion, via a cutting portion or a scallop portion defining a cutting line.

**[0016]** With the above-described inventive method, as the lace patterned portion with the embroidery pattern formed therein is connected to the waste net portion, via a cutting portion or a scallop portion defining a cutting line, the subsequent cutting operation of the embroidery lace fabric can be effected easily.

**[0017]** In the inventive method, preferably, the lace patterned portion with the embroidery pattern formed therein is connected to the waste net portion, via a draw thread knitted in the fabric so as to define a separating line.

**[0018]** With the above-described inventive method, as the lace patterned portion with the embroidery pattern formed therein is connected to the waste net portion, via a draw thread knitted in the fabric so as to define a separating line, the subsequent separating operation of the embroidery lace fabric can be effected easily.

**[0019]** In the inventive method, preferably, the lace patterned portion with the embroidery pattern formed therein is connected to the waste net portion, via a dissolvable thread knitted in the fabric so as to define a separating line.

**[0020]** With the above-described inventive method, as the lace patterned portion with the embroidery pattern formed therein is connected to the waste net portion, via a dissolvable thread knitted in the fabric so as to define a separating line, the subsequent separating operation of the embroidery lace fabric can be effected easily.

**[0021]** In the inventive method, preferably, the embroidery machine includes a plurality of driving member accommodating portions together defining an alignment line along a longitudinal direction of the machine; and the tension adjusting step for the lace ground is effected by aligning, to the alignment line, a reference thread which has been inserted in the lace patterned portion along a longitudinal direction of the lace ground.

**[0022]** With the above-described inventive method, the embroidery machine includes a plurality of driving member accommodating portions together defining an alignment line along a longitudinal direction of the machine and a reference thread has been inserted in advance in the lace patterned portion along a longitudinal direction of the lace ground. Therefore, by only aligning this reference line provided in the lace ground to the alignment line provided in the embroidery machine, an error, if any, in the position of the lace ground occurring with the embroidery can be corrected. And, with repetition of such adjustment, for each row of lace patterned portion in the lace ground, the embroidering needle can be set with accuracy to the predetermined initiating position (standby position). As a result, a beautiful embroidery free from distortion can be formed under a predetermined position in each lace patterned portion. Further, as this adjustment can be done rationally without reliance on the operator's "technical instinct", even an inexperienced worker can reliably and easily form high quality embroidery.

**[0023]** According to a method of manufacturing an embroidery lace, to which the present invention pertains, in the method of manufacturing an embroidery lace from the embroidery lace fabric obtained by the above-described embroidery lace manufacturing method, the method further comprises separating the lace patterned portion and the waste net portion from each other by cutting along the cutting portion or the scallop portion of the embroidery lace fabric.

**[0024]** With the above-described inventive method of manufacturing an embroidery lace fabric, only with the simple operation of cutting along the cutting portion or

the scallop portion of the embroidery lace fabric, the lace patterned portion and the waste net portion can be separated from each other. Consequently, mass production of a narrow embroidery lace having a superior design and superior quality is possible.

**[0025]** According to a method of manufacturing an embroidery lace, to which the present invention pertains, in the method of manufacturing an embroidery lace from the embroidery lace fabric obtained by the above-described embroidery lace manufacturing method, the method further comprises separating the lace patterned portion and the waste net portion from each other by drawing and removing said draw thread knitted in the embroidery lace fabric.

**[0026]** With the above-described inventive method of manufacturing an embroidery lace fabric, only with the simple operation of drawing and removing said draw thread knitted in the embroidery lace fabric, the lace patterned portion and the waste net portion can be separated from each other. Consequently, mass production of a narrow embroidery lace having a superior design and superior quality is possible.

**[0027]** According to a method of manufacturing an embroidery lace, to which the present invention pertains, in the method of manufacturing an embroidery lace from the embroidery lace fabric obtained by the above-described embroidery lace manufacturing method, the method further comprises separating the lace patterned portion and the waste net portion from each other by dissolving away the dissolvable thread knitted in the embroidery lace fabric.

**[0028]** With the above-described inventive method of manufacturing an embroidery lace fabric, only with the simple operation of dissolving away the dissolvable thread knitted in the embroidery lace fabric, the lace patterned portion and the waste net portion can be separated from each other. Consequently, mass production of a narrow embroidery lace having a superior design and superior quality is possible.

#### **[Brief Description of the Drawings]**

##### **[0029]**

Fig. 1 is a schematic showing one embodiment of an embroidery lace fabric according to the present invention,

Fig. 2 is a schematic showing a narrow embroidery lace obtained by cutting the embroidery lace fabric shown in Fig. 1,

Fig. 3 is a schematic illustrating an inventive method of manufacturing an embroidery lace,

Fig. 4 shows an article of the embroidery lace according to the invention,

Fig. 5 is a partially cutaway plan view showing a lace ground set on a screen of an embroidery machine,

Fig. 6 is an enlarged view showing a knitted structure of a lace ground knitted with draw threads each of

which defines a separating line between a lace patterned portion and a waste net portion,

Fig. 7 is a schematic showing a narrow embroidery lace manufactured from the embroidery lace fabric knitted with the draw threads, and

Fig. 8 is a schematic for illustrating a conventional method of manufacturing an embroidery lace.

#### **[Detailed Description of Preferred Embodiments]**

**[0030]** Next, an embodiment of the present invention will be described with reference to the accompanying drawings. In the embodiment described below, there is manufactured first an embroidery lace fabric comprising a lace ground as a foundation, the lace ground including a plurality of lace patterned portions, each patterned portion having a pair of scallop portions each defining a cutting line along a width direction of the lace ground, an embroidery portion formed at least at a portion of an area between the paired lace patterned portions, with using an embroidery machine and a waste net portion interconnecting different ones of the paired lace patterned portions. Then, this embroidery lace fabric is cut along the cutting line, whereby there is obtained an embroidery lace comprising a narrow lace body having a pair of scallop portions at the opposed ends thereof in its width direction, an embroidery portion formed at least at a portion of an area between the paired scallop portions, with using an embroidery machine and waste net cut portions left at said opposed edges of the paired scallop portions. However, the invention is not limited to this embodiment or the constructions shown in the drawings. The invention is intended to be inclusive also of an article having a scallop portion only at one end in the width direction of the lace ground.

**[0031]** Fig. 1 is a schematic showing one embodiment of an embroidery lace fabric 100 according to the present invention. Fig. 2 is a schematic showing a narrow embroidery lace 10 according to the present invention, which is obtained by cutting the embroidery lace fabric 100 shown in Fig. 1.

**[0032]** In this embroidery lace fabric 100, in the lace ground 1 as a foundation, there are formed a plurality of lace patterned portions A with a predetermined pitch P along the width direction (the X direction in Fig. 1) of the lace ground 1. Each lace patterned portion A includes a pair of scallop portions 2a, 2b forming an area B therebetween. In this area B, there are formed a series of embroidery portions 3 along the longitudinal direction of the lace ground 1 (the Y direction in Fig. 1), with using an embroidery machine M (see Fig. 3) with a predetermined spacing from each other.

**[0033]** The lace ground 1 can be a raschel lace ground, a leaver lace ground, or an embroidery lace ground. The embroidery machine M can be an embroidery machine having a jacquard device operable to control threads by reading embellishing pattern data read from a card medium storing such pattern data therein. With use of such

embroidery machine M, it would be possible to form the embroidery portions 3 over the entire area B. However in the present invention requires only that the embroidery portion 3 be formed at least at a portion of this area B.

**[0034]** The lace patterned portions constituting the paired scallop portions 2a, 2b can present a same pattern or different patterns from each other. The paired scallop portions 2a, 2b are connected with an adjacent pair of scallop portions 2a, 2b via a waste net portion 4. The waste net portion 4 is a portion where the lace ground 1 is left as it is, i.e. un-treated. Hence, basically, no ornament such as embroidery is provided in this waste net portion 4.

**[0035]** Then, when the above-described embroidery lace ground 100 is cut along the scallop portions 2a, 2b each defining a cutting line, as shown in Fig. 2, there is obtained the narrow embroidery lace 10 including a narrow lace body 1a having the paired scallop portions 2a, 2b at its opposed ends in the width direction, the embroidery portions 3 formed at least at portions of the area B delimited between the paired scallop portions 2a, 2b with using an embroidery machine M, and waste net cut portions 4a left continuously along the respective edges of the paired scallop portions 2a, 2b.

**[0036]** In the above, the waste net cut portion 4a is a piece of thread left at the peripheral edge of the embroidery lace 10 by cutting and removing the waste net portion 4 from the embroidery lace ground 100 in Fig. 1. This thread piece is thinner than the main body of the embroidery lace 10, thus not influencing the design or function of the embroidery lace 10.

**[0037]** The inventive embroidery lace ground 100 can have any desired dimensions as long as such dimensions allow setting of this ground 100 to a screen m3 of the embroidery machine M. For instance, (i) a lace ground having dimensions of 1.2 m in width x 14.5 m in length, or (ii) a lace ground having dimensions of 1.5 m in width and 20.0 m in length, can be used with the embroidery machine M.

**[0038]** Also, the width of the narrow embroidery lace 10 of the invention is not strictly defined. Hence, the concept of "narrow" as used herein is understood to be inclusive of any dimensions with a width thereof being smaller than its length which allows some units of lace 10 to be obtained from the ground (wide lace) settable on the screen m3 of the embroidery machine M. For example, if a narrow embroidery lace 10 having a width of about 20 cm is to be obtained, in consideration of the width of the waste net portion 4, about five embroidery laces can be obtained from the lace ground (i) above and about eight embroidery laces can be obtained from the lace ground (ii) above, respectively. Further alternatively, the narrow embroidery lace 10 can have a width of about 9 cm, a width of about 13 cm or a width of about 17 cm.

**[0039]** Next, the method of manufacturing the narrow embroidery lace 10 relating to the present invention will be described in the following steps (1) through (9), with reference to the schematic of Fig. 3 when appropriate.

(1) First, there is manufactured a lace ground 1 including a plurality of lace patterned portions  $A_1, A_2, \dots, A_n$ , each of which has scallop portions 2a, 2b at width-wise opposed ends, the lace patterned portions being disposed with a predetermined pitch P in the width direction, and a plurality of waste net portions 4 each formed between different lace patterned portions (e.g. between  $A_1$  and  $A_2$ ).

(2) The lace ground 1 is set to the screen m3 of the embroidery machine M (Fig. 3 (a)). In doing this, the longitudinal direction of the lace ground 1 will be aligned with the longitudinal direction (the direction normal to the X direction in Fig. 3) of the embroidery machine M.

(3) As an embroidery pattern data to be inputted to an embroidery controlling section m1 of the embroidery machine M, there is prepared embroidery pattern data for forming a plurality of basic embroidery patterns alternating by a predetermined pitch P along the width direction of the lace ground 1. Incidentally, it is not absolutely needed for the predetermined embroidery pattern described above to include the scallop portions at the width-wise opposed ends of each pattern.

(4) For the first row of lace patterned portion  $A_1$  located at one end in the width direction (X direction in Fig. 3) of the embroidery machine M, an embroidering needle m2 of the embroidery machine M is operated from an operation initiating position to effect the previously inputted embroidering operation, thus forming the embroidery portion 3 (Fig. 3 (b)).

(5) After completion of the embroidering operation for the first row of lace patterned portion  $A_1$ , the embroidering needle m2 is moved to a standby position WP for the second row of lace patterned portion  $A_2$  which is displaced by a single pitch and then the embroidery machine M is stopped temporarily. This standby position WP becomes the position of the first needle for the next basic embroidery pattern (Fig. 3 (c)).

(6) The tension in the lace ground 1 is adjusted such that for the second row lace patterned portion  $A_2$ , the embroidering initiating position for this second row lace patterned portion  $A_2$  may be in agreement with the present standby position WP (position of the first needle) of the embroidering needle m2 (Fig. 3 (d)). This tension adjustment can be done manually by setting reference coordinates relative to e.g. a corner of the screen m3 as its origin and worker's visual determination of the position of the lace ground 1 by means of a scale or the like. Alternatively, it is possible to provide the screen m3 with a sensor for detecting the position of the lace ground 1 and an actuator for moving the lace ground 1, so that the lace ground 1 may be automatically moved to an optimum position under computer control.

(7) After completion of the tension adjustment, an embroidering operation according to the basic em-

broidery pattern is carried out for the lace patterned portion  $A_2$  to be treated presently, thus forming an embroidery portion 3 (Fig. 3 (e)). Thereafter, the embroidering needle m2 is relatively moved to a new standby position WP displaced by a single pitch P and stopped at this position.

(8) Thereafter, for subsequent lace patterned portions A disposed one after another along the width direction, the formation of the embroidery portion 3, the relative movement of the embroidering needle m2 to the next new first needle position, the stopping of the embroidery machine M and the tension adjustment of the lace ground 1 are repeated until completion of formation of embroidery portion 3 in the last row of lace patterned portion  $A_n$ .

(9) Then, the waste net portions 4 are cut along the respective scallop portions 2a, 2b provided in the lace ground 1. As a result, mass production of embroidery laces 10 having the embroidery portions 3 formed therein is made possible, each lace 10 including its scallop portions 2a, 2b being defined by the patterns of the lace ground 1 with using the embroidery machine M and having the predetermined embroidery patterns between the scallop portions 2a, 2b.

**[0040]** As shown in Fig. 4, the embroidery lace 10 thus manufactured is an embroidery lace product having, at a portion of the center of the lace ground 1, embroidery portions repeated according to the predetermined pattern along the longitudinal direction and having also the scallop portions at the width-wise opposed ends thereof. This scallop portion is defined by the pattern of the lace ground, with no embroidery being present therein. For this reason, this product exhibits a neat/simple design. Further, as no distortions have been made therein thanks to the tension adjustment effected, this product is superior also in its quality and functional aspects thereof. Incidentally, although a number of waste net cut portions are present on the outer sides of the scallop portions, these portions are small and thin, hence, being not so conspicuous or functionally detrimental.

**[0041]** As described above, in the present embodiment, for a plurality of lace patterned portions A having paired scallop portions 2a, 2b along the width direction of the lace ground 1, the embroidery machine M is used for forming the embroidery portions 3 at least at portions of the area B between the paired scallop portions 2a, 2b, whereby the embroidery lace fabric 100 is manufactured. The use of the embroidery machine M allows efficient mass production of the embroidery lace fabrics 100. In this, if the mechanical embroidering operation is effected to each row of lace patterned portions A, the lace patterned portion A will be pulled by embroidery threads. With this, there will occur change in the tension in the entire lace ground 1, thus leading to corresponding change in the positional relationship among various portions of the lace ground 1. However, with the above-de-

scribed inventive construction, after completion of the embroidering operation on each row of lace patterned portion  $A_1$  through  $A_n$ , the embroidery machine M is stopped and then tension adjustment is made mechanically or manually. With this, the position of the first needle for the next row of lace patterned portion can be set with accuracy. As a result, there may be obtained an embroidery lace fabric 100 having a high quality with beautifully applied embroidery and without distortions. Then, only by cutting this embroidery lace fabric 100 along the respective scallop portions 2a, 2b defining the cutting lines, mass production of the narrow embroidery lace 100 having superior aesthetic performance as well as high quality is made possible.

**[0042]** Also, in the present embodiment, the embroidery portions 3 are not formed in the waste net portions 4 which are stay portions remaining after the cutting of the embroidery lace fabric 100. Therefore, there is no waste of the embroidery. Hence, the manufacturing costs can be reduced correspondingly.

#### [Other Embodiments]

##### [0043]

(1) Instead of the "reference coordinates using a corner of the screen m3 as an origin" in step (6) in the "method of manufacturing a narrow embroidery lace 10" described in the foregoing embodiment, the tension adjustment can be done with using a different reference.

Fig. 5 is a plan view showing a lace ground 1 set on the screen m3 of the embroidery machine M, with a portion thereof being partially cutaway. In this ground lace 1, there is inserted, along each row of scallop portion 2b, a reference thread 50 distinguishable in its color from the lace ground 1 in the longitudinal direction (Y direction) of the lace ground 1.

A plurality of embroidering needles m2 of the embroidery machine M are disposed in opposition to the screen m3 across the lace ground 1. Incidentally, in Fig. 3 which was described hereinbefore, only one embroidering needle m2 is shown. But, this was shown only as the embroidering needle acting as the reference needle. In the construction shown in Fig. 5, this reference needle can be for instance the needle shown at the uppermost portion of the figure. In operation, as the embroidering needle m2 is moved back and forth between the front side (the immediate side in Fig. 5) and the back side (back side in Fig. 5) of the lace ground 1, an embroidery portion 3 formed of front threads is formed on the front side of the lace ground 1. That is to say, this embroidering needle m2 is reciprocated along the front/back direction of the plane of Fig. 5.

Further, the embroidery machine M includes a plurality of shuttles m4 which are arranged in a predetermined relationship relative to the screen m3 and

which carry back side threads in association with the reciprocating movement of the embroidering needle 2. More particularly, the shuttle m4 acts as a driving member which is reciprocated along the width direction (X direction) of the lace ground 1 so as to intertwine a back side thread with a front side thread carried by the embroidering needle 2 when this embroidering needle 2 has moved to a position on the back side from its position on the front side of the lace ground 1. That is, the shuttles m4 are moved as indicated by the respective arrows in Fig. 5. The screen m3 on which the lace ground 1 is set taut is moved in the X direction and in the Y direction to realize the above-described intertwining after the alignment of the first needle for the basic embroidery pattern.

Each shuttle m4 effecting the above-described reciprocating movement is accommodated within a respective shuttle box m5 as a "driving member accommodating portion". These plurality of shuttle boxes m5 are disposed with at least one ends thereof being aligned so as to together form an alignment line 60 along the longitudinal direction (Y direction) of the embroidery machine M. An example alignment line 60 is shown by a one-dot line in Fig. 5.

For effecting the tension adjustment in the embroidery machine M, after one pitch movement following completion of the embroidering operation for a certain one row of lace patterned portion A, the reference thread 50 of the lace ground 1 will be aligned with the alignment line 60 defined by the shuttle boxes m5. For instance, in the case of Fig. 5, after completion of the embroidering operation of the left-most row lace patterned portion A, with movement of the screen m3, the embroidering needles m2 will be relatively moved by one pitch to the adjacent right side row and with tension adjustment, the reference thread 50 will be aligned with the alignment line 60 in this right row. With this, any error if any in position of the lace ground 1 resulting from the embroidering operation can be corrected. With repetition of such adjustments, it is possible to set, with accuracy, the embroidering needles m2 at the predetermined respective initiating positions (standby positions) for each row of lace patterned portion A of the lace ground 1. As a result, it becomes possible to form the beautiful embroidery portions free from distortions in each row of lace patterned portion A under a predetermined condition. Further, as this adjustment can be done rationally without reliance on the operator's "technical instinct", even an inexperienced worker can reliably and easily form high quality embroidery.

Incidentally, the above-described tension adjustment aligning the alignment line 60 with the reference thread 50 is effective, in particular, for the adjustment in the width direction (X direction) of the lace ground 1. However, the tension adjustment can be done simultaneously in the longitudinal direction

(Y direction) of the lace ground 1 also. For instance, markings may be provided with a predetermined spacing on the reference thread 50. Then, when the alignment line 60 is to be aligned with the reference thread 50, the lace ground 1 may be moved such that the position of the marking on the reference thread 50 is aligned with a particular shuttle box m5. With this, the predetermined starting positions of the embroidering needles m2 can be set reliably between the respective rows in the longitudinal direction (Y direction) of the lace ground 1 also.

(2) The embroidery lace fabric 100 comprises the plurality of embroidery laces 10 and the waste net portions 4 formed in alternation, through changing of the knitting patterns. That is to say, the lace patterned portion A and the scallop portions 2a, 2b are formed by knitting pattern forming threads on the net (mesh) as a foundation, with predetermined patterns, whereas the waste net portion 4 is formed without knitting of such pattern forming threads therein. And, in the foregoing embodiment, by removing and cutting the waste net portion 4 from the embroidery lace fabric 100 along the cutting line, an embroidery lace 10 is obtained. That is, the border between the respective scallop portion 2a, 2b and the waste net portion 4 is cut.

[0044] In the present invention, however, in place of the above cutting step, at the border portion, a draw thread 5 may be knitted in advance in the lace ground 1 in a withdrawable knitting structure so as to define a separation line between the lace patterned portion A and the waste net portion 4. Then, after completion of the embroidering operations on the embroidery lace fabric 100, this draw thread 5 will be pulled out and removed therefrom. In this respect, Fig. 6 shows an enlarged view of the knitted structure of the lace ground 1 with knitting of such draw thread 5 defining the separation line between the lace patterned portion A and the waste net portion 4. In this knitted structure, respective warp threads constituting the lace ground 1 are interconnected via the weft threads only. Therefore, only by pulling out the draw thread 5 which is one of the warp threads, the separation between the lace patterned portion A and the waste net portion 4 can be effected easily. As a result, mass production of the embroidery laces 10 can be carried out in an efficient manner. And, due to no cutting of the waste net portion 4 along a cutting line from the embroidery lace fabric 100 in this method unlike the method described hereinbefore, it is possible to manufacture a narrow embroidery lace 10 having a neat/clear edge without the waste net cut portions, as shown in Fig. 7.

[0045] Further, in place of the draw thread 5, it is also possible to knit in advance a dissolvable thread in the lace ground 1 so as to define the separation line between the lace patterned portion A and the waste net portion 4, with the dissolvable thread being dissolvable with water or the like. So that, after completion of the embroidering



operation on the embroidery lace fabric, this dissolvable thread may be removed by its dissolution. With use of such dissolvable thread also, it is possible to manufacture a narrow embroidery lace 10 having a neat/clear edge without the waste net cut portions, as shown in Fig. 7.

[0046] Incidentally, the draw thread or dissolvable thread to be knitted into the embroidery lace ground 100 can be used also as the "reference thread" explained in the foregoing embodiment.

#### [Industrial Applicability]

[0047] The present invention is applicable, of course, in the field of embroidery lace. In addition, the technical concept of this invention is applicable to various lace-relating fields other than the embroidery lace as well.

#### Claims

1. An embroidery lace (10) **characterized in that** it comprises:

a narrow lace body (1a) having a scallop portion (2a, 2b) at least at one of opposed ends thereof in its width direction;

an embroidery portion (3) formed at least at a portion of an area between said opposed ends in the width direction of the narrow lace body, with using an embroidery machine; and  
waste net cut portions (4) left at said opposed ends.

2. An embroidery lace fabric (100) **characterized in that** it comprises:

a lace ground (1) as a foundation, said lace ground including,

a plurality of lace patterned portions (A), each lace patterned portion having either a combination of a cutting portion or a scallop portion defining a cutting line or a pair of scallop portions (2a, 2b), along a width direction of said lace ground;

an embroidery portion (3) formed at least at a portion of an area between opposed ends of said lace patterned portion, with using an embroidery machine (M); and

a waste net portion (4) interconnecting different ones of said lace patterned portions.

3. A method of manufacturing an embroidery lace fabric (100) from a lace ground (1) including a plurality of lace patterned portions ( $A_1, A_2, \dots, A_n$ ), **characterized in that** each lace patterned portion has a scallop portion (2a, 2b) at least at one of opposed ends thereof in its width direction, said plural lace patterned portions being disposed with a predetermined spac-

ing relative to each other in said width direction, and a waste net portion (4) disposed between different ones of said lace patterned portions, the method comprising the steps of:

- (a) setting said lace ground to an embroidery machine (M);
- (b) forming an embroidery pattern in a first row of said lace patterned portions ( $A_1$ ), from an operation initiating position of an embroidering needle (m2) of the embroidery machine;
- (c) effecting a relative movement of said embroidering needle to a standby position for a subsequent row of lace patterned portion, by moving said lace ground set to the embroidery machine;
- (d) stopping the embroidery machine;
- (e) adjusting tension in the lace ground such that a relationship between the subsequent row lace patterned portion ( $A_2, \dots, A_n$ ) and the standby position of the embroidering needle may agree with a relationship between the first row lace patterned portion ( $A_1$ ) and the operation initiating position of the embroidering needle;
- (f) forming the embroidery pattern in the subsequent lace patterned portion ( $A_2, \dots, A_n$ ) after the tension adjustment; and
- (g) repeating said steps (c) through (f) until the embroidery pattern is formed in a last row lace patterned portion ( $A_n$ ).

4. The method according to claim 3, **characterized in that** said lace patterned portion ( $A_1, A_2, \dots, A_n$ ) with the embroidery pattern formed therein is connected to said waste net portion (4), via a cutting portion or a scallop portion (2a, 2b) defining a cutting line.

5. The method according to claim 3, **characterized in that** said lace patterned portion ( $A_1, A_2, \dots, A_n$ ) with the embroidery pattern formed therein is connected to said waste net portion (4), via a draw thread (5) knitted in the fabric so as to define a separating line.

6. The method according to claim 3, **characterized in that** said lace patterned portion ( $A_1, A_2, \dots, A_n$ ) with the embroidery pattern formed therein is connected to said waste net portion (4), via a dissolvable thread knitted in the fabric so as to define a separating line.

7. The method according to any one of claims 3 to 6, **characterized in that** said embroidery machine (M) includes a plurality of driving member accommodating portions together defining an alignment line (60) along a longitudinal direction of the machine; and said tension adjusting step for the lace ground is effected by aligning, to said alignment line, a reference thread (50) which has been inserted in said lace patterned portion ( $A_1, A_2, \dots, A_n$ ) along a longitudinal direction of the lace ground.

8. A method of manufacturing an embroidery lace from the embroidery lace fabric obtained by the method of claim 4,  
**characterized in that** said method further comprises separating said lace patterned portion ( $A_1$ ,  $A_2$ , ... $A_n$ ) and said waste net portion (4) from each other by cutting along said cutting portion or said scallop (2a, 2b) portion of the embroidery lace fabric. 5
9. A method of manufacturing an embroidery lace (10) from the embroidery lace fabric (100) obtained by the method of claim 5,  
**characterized in that** said method further comprises separating said lace patterned portion ( $A_1$ ,  $A_2$ , ... $A_n$ ) and said waste net portion (4) from each other by drawing and removing said draw thread (5) knitted in the embroidery lace fabric. 10 15
10. A method of manufacturing an embroidery lace (10) from the embroidery lace fabric (100) obtained by the method of claim 6,  
**characterized in that** said method further comprises separating said lace patterned portion ( $A_1$ ,  $A_2$ , ... $A_n$ ) and said waste net portion (4) from each other by dissolving away said dissolvable thread knitted in the embroidery lace fabric. 20 25

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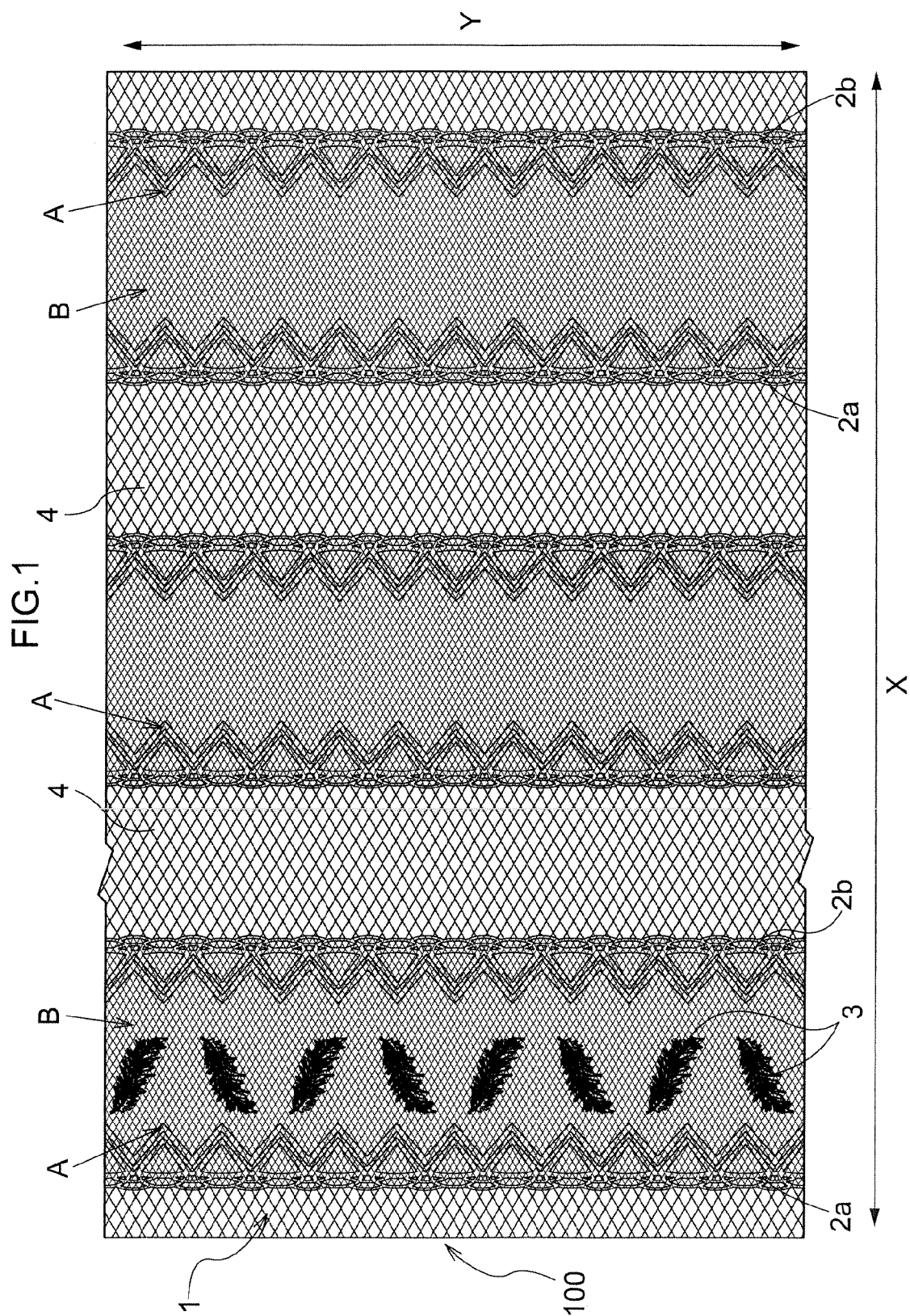


FIG.2

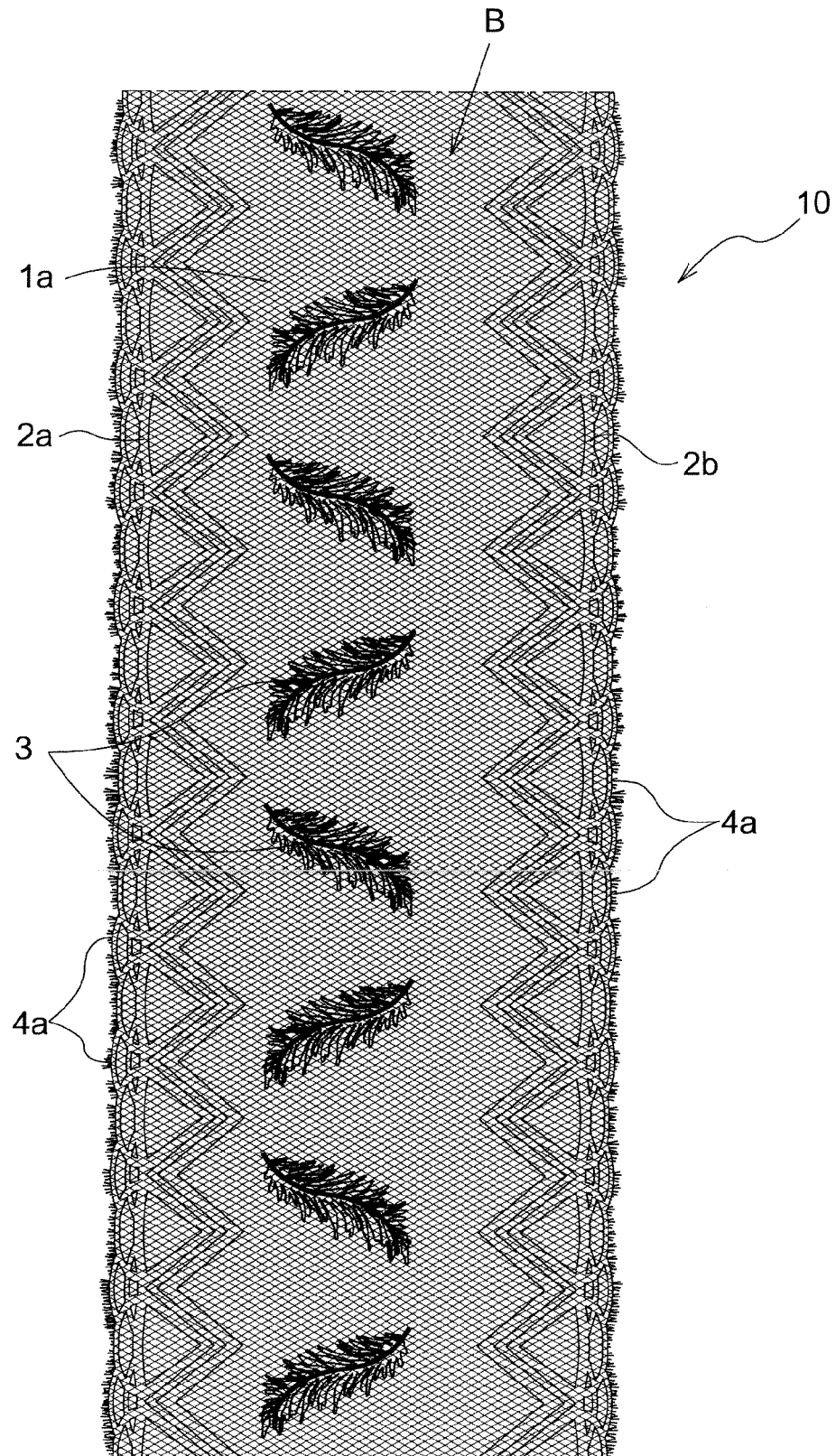


FIG.3

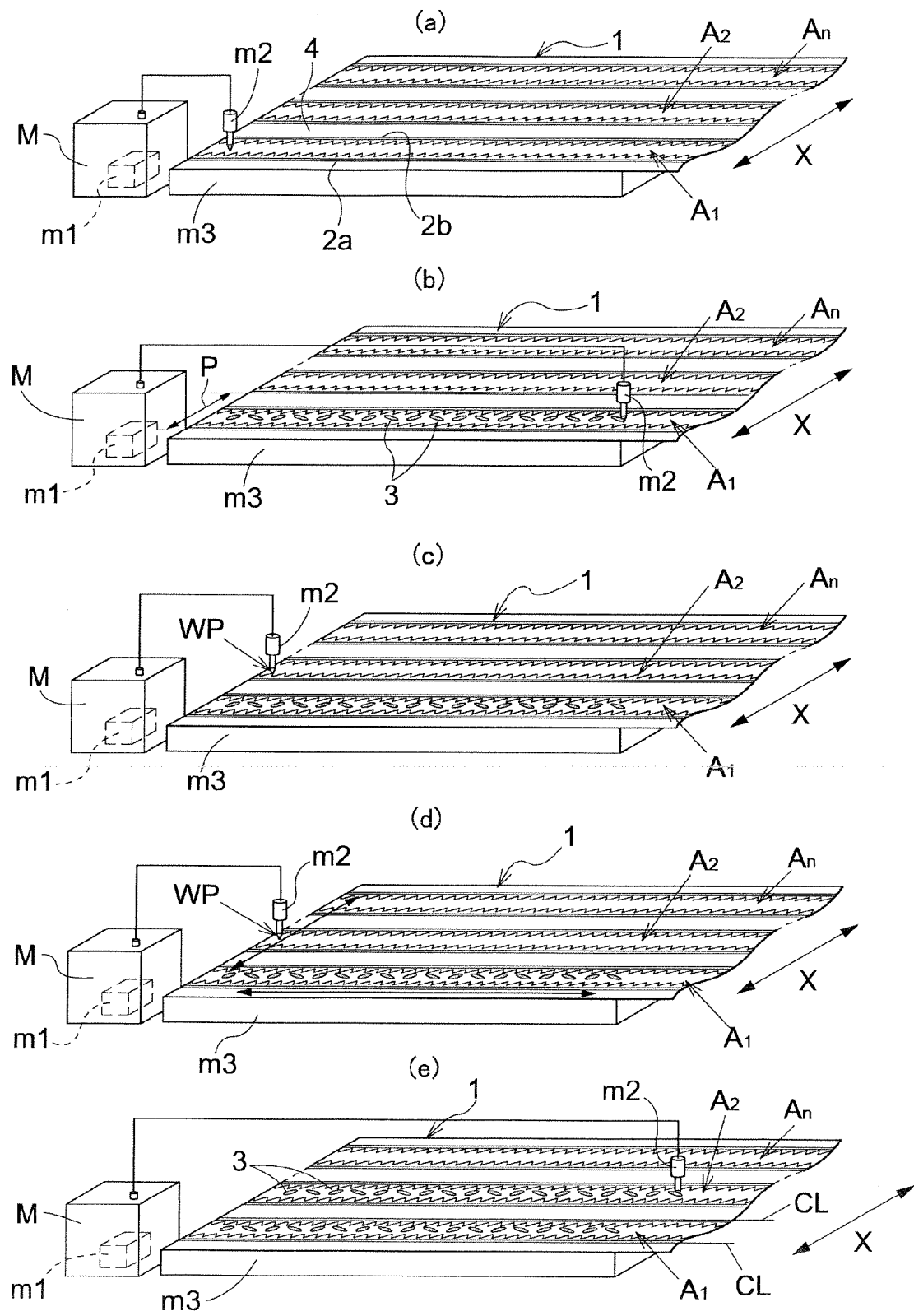
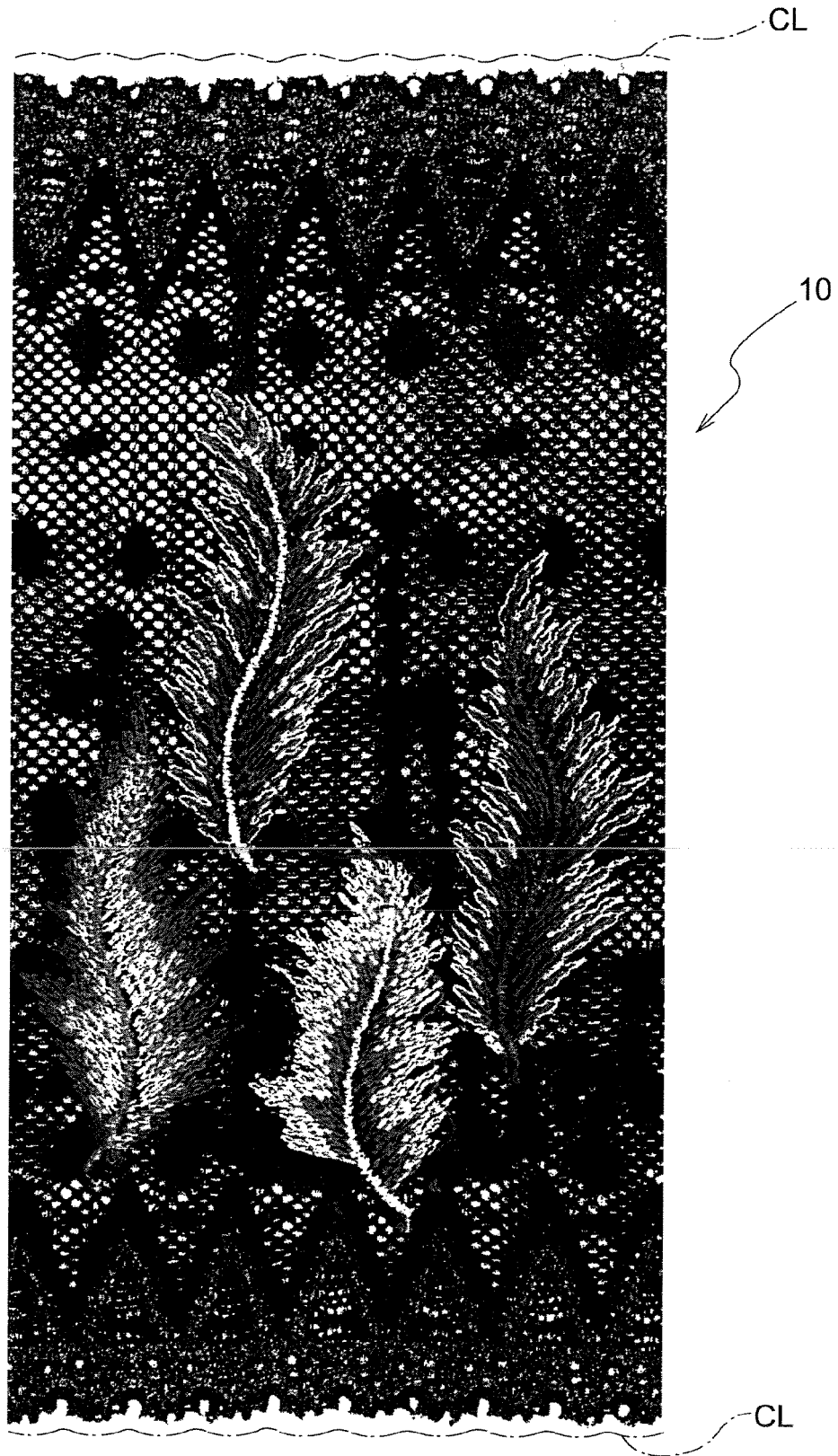


FIG.4



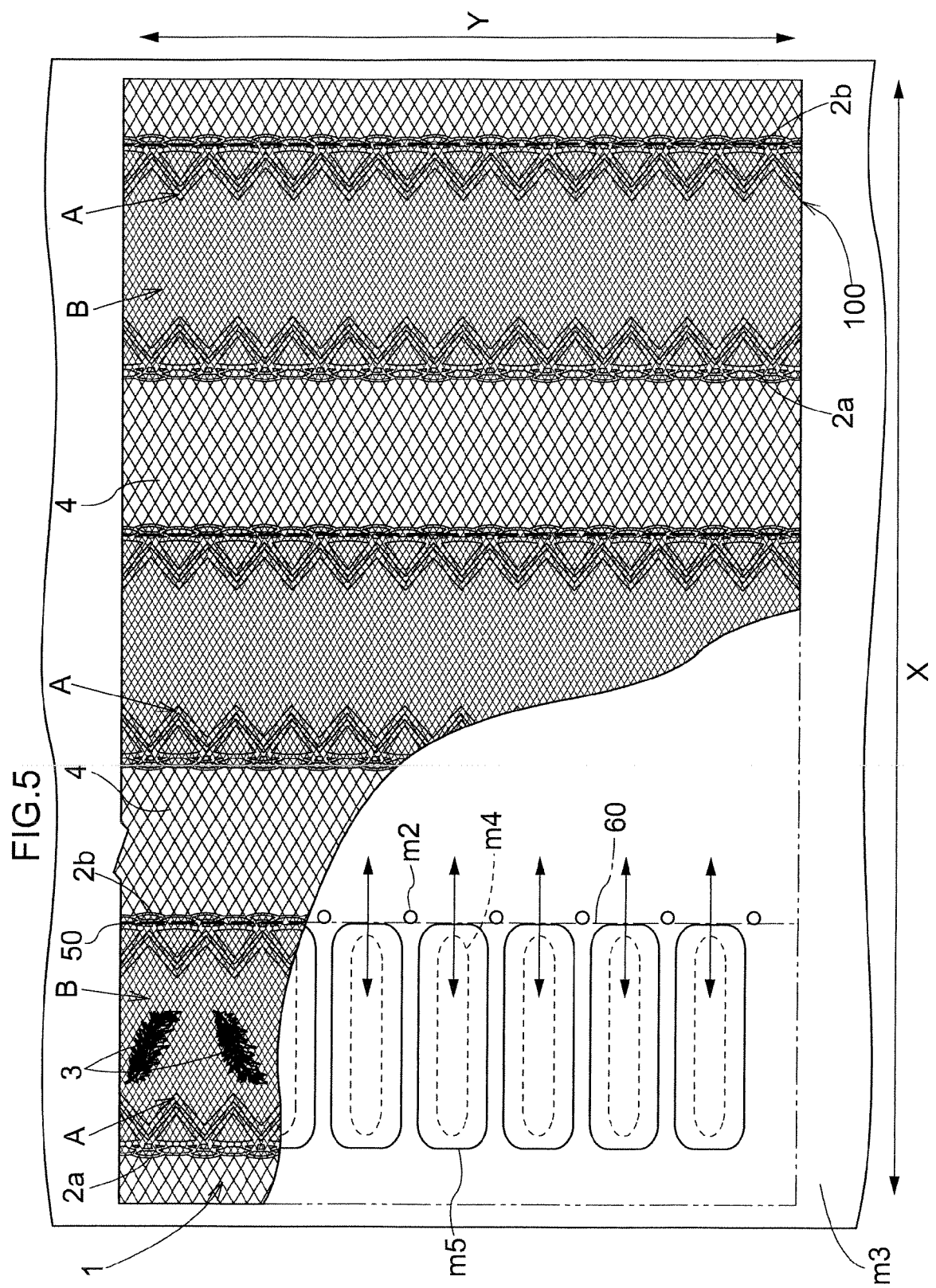


FIG.6

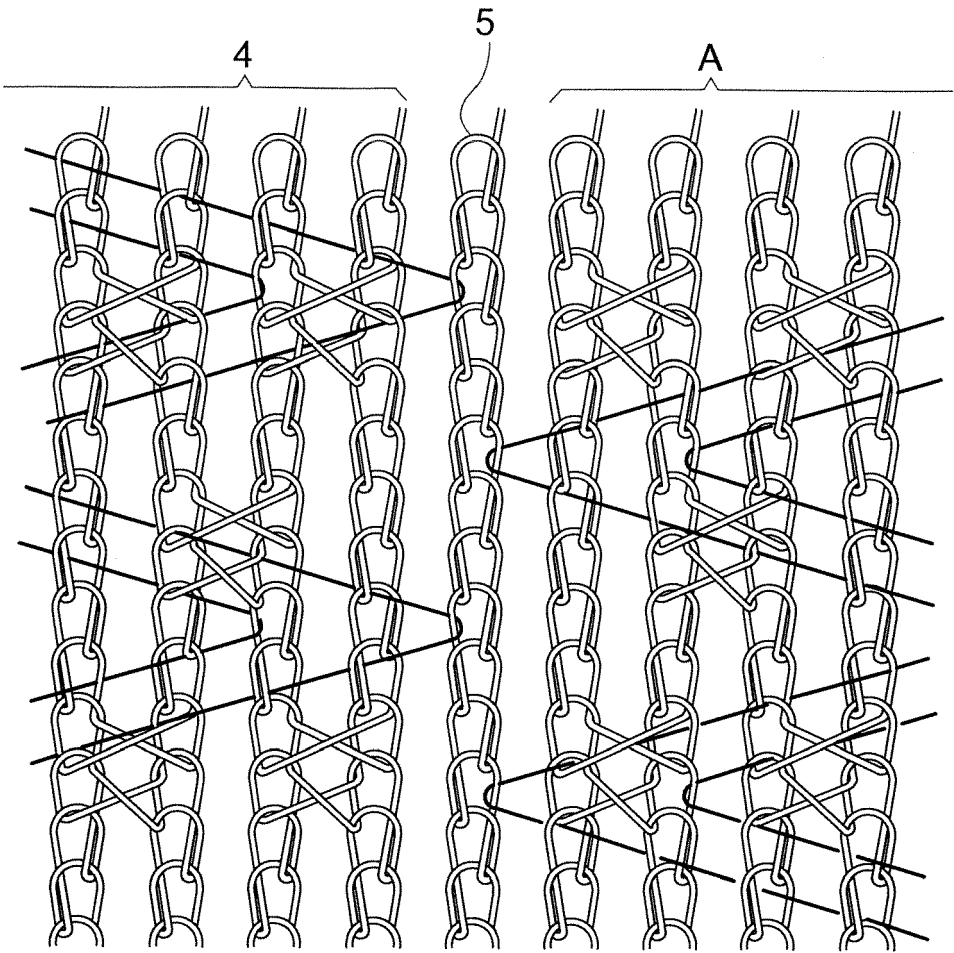




FIG.7

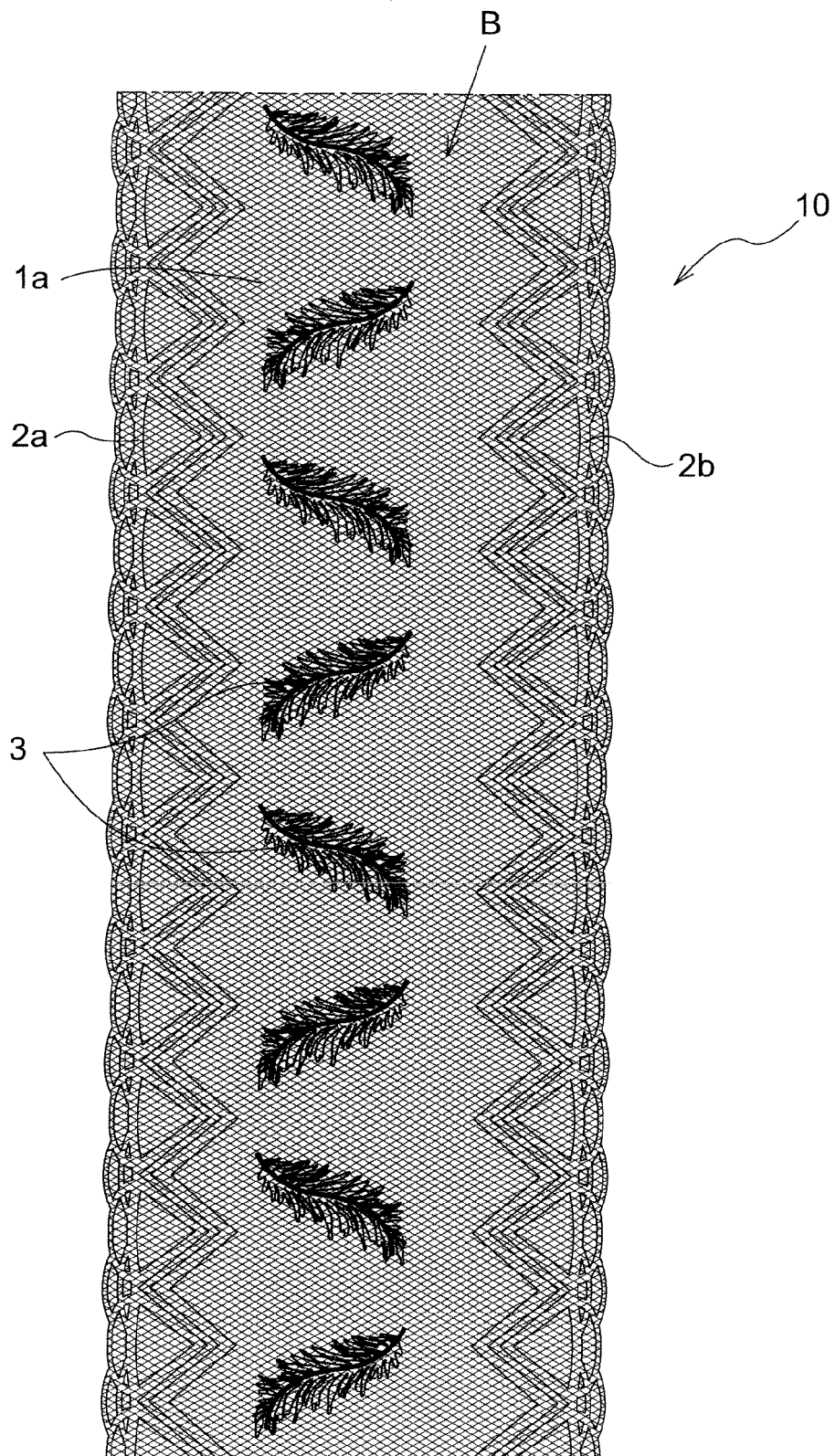
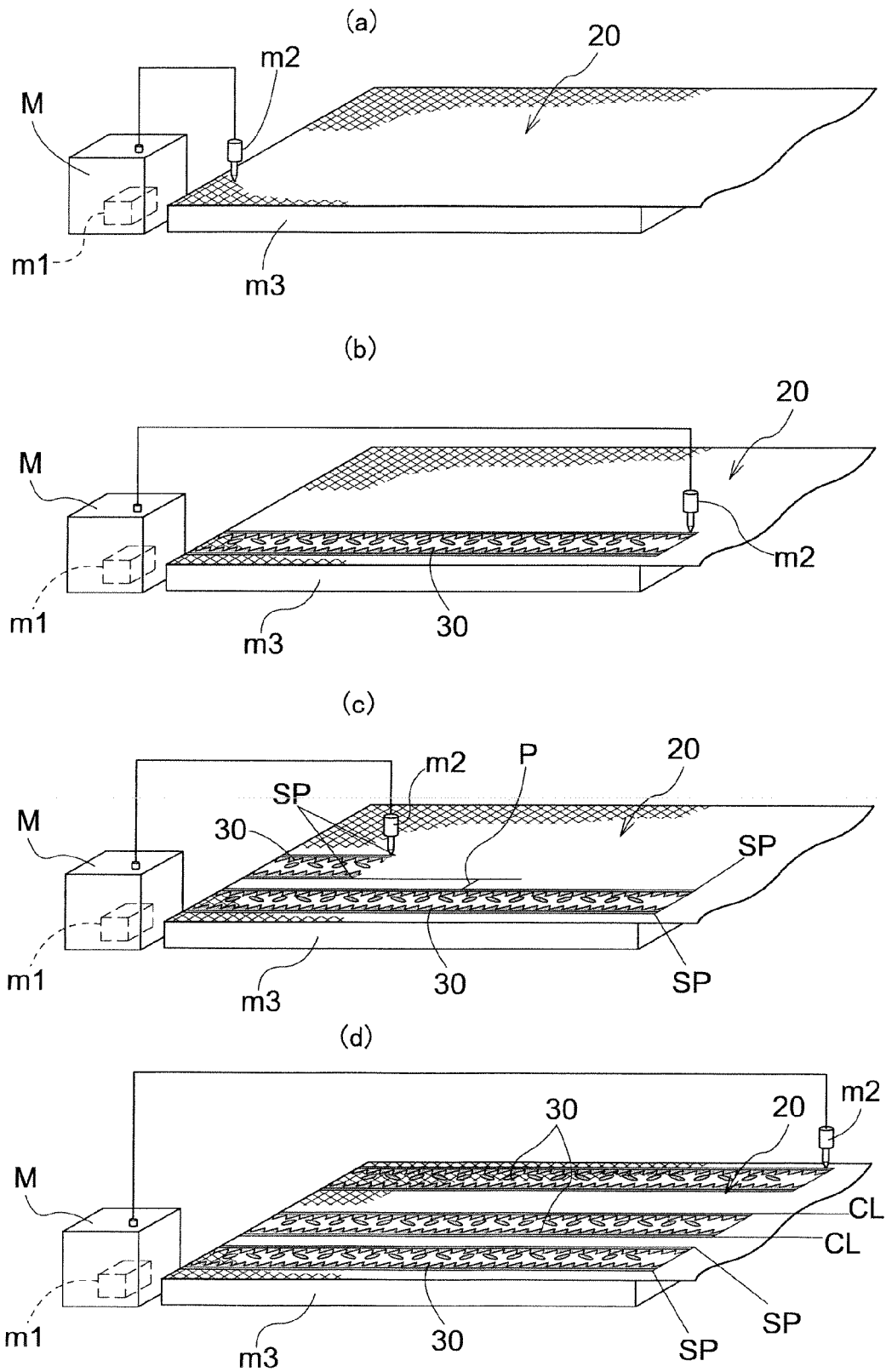


FIG.8





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 07 10 9343

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>4 June 2008</b>	Examiner <b>Herry-Martin, D</b>
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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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 07 10 9343

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