(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 327 818 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.06.2011 Bulletin 2011/22

(51) Int Cl.:
D04B 1/22 *(2006.01)*

(21) Application number: **10014843.6**

(22) Date of filing: **22.11.2010**

(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

(30) Priority: **25.11.2009 JP 2009267000**

(71) Applicant: **Shima Seiki Mfg., Ltd**
Wakayama-shi,
Wakayama 641-8511 (JP)

(72) Inventor: **Maeoka, Shigeki**
Wakayama-shi
Wakayama 641-8511 (JP)

(74) Representative: **Emde, Eric**
Wagner & Geyer
Gewürzmühlstrasse 5
80538 München (DE)

(54) Knitting method of knitted fabric, and knitted fabric

(57) A knitting method of knitted fabric capable of making inconspicuous a set-up portion formed by entwining knitting yarns so as to tangle each other between front and back needle beds. A yarn feeder 4 is moved in one longitudinal direction of the needle bed to form a hooked loop (in a needle C), and is then moved in the other longitudinal direction immediately after. Subsequently, a yarn feeder 6 is moved in the one longitudinal direction of the needle bed to form a hooked loop, and is then moved in the other longitudinal direction immediately after. By continuously repeating the movement of the yarn feeders 4, 6, and the formation of hooked loops, the set-up portion is formed, in which the knitting yarn fed from the yarn feeder 4 and the knitting yarn fed from the yarn feeder 6 are entwined so as to tangle each other between the front and back needle beds.

EP 2 327 818 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a knitting method of knitted fabric having a set-up portion formed by entwining knitting yarns to be used in front and back needle beds so as to tangle each other, when the knitted fabric is knitted using a flat knitting machine, and the knitted fabric having the set-up portion obtained by the same method.

BACKGROUND ART

[0002] When knitted fabric is knitted by using a flat knitting machine including at least a pair of front and back needle beds and a plurality of yarn feeders that feed knitting yarns to needles arrayed in these needle beds, in some cases, knitting is performed by feeding the knitting yarn to the needles of the back needle bed through the yarn feeder located on the front needle bed side, and feeding the knitting yarn to the needles of the front needle bed through the yarn feeder located on the back needle bed side. For example, in Patent Document 1, a set-up portion of the knitting fabric is formed by the knitting using the yarn feeders in the above-described manner. In this Patent Document 1, there is disclosed a technique in which in forming the set-up portion, the knitting yarn fed from one yarn feeder and the knitting yarn fed from the other yarn feeder are entwined so as to tangle each other between front and back needle beds.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0003]

Patent Document 1: WO2009/084167

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004] However, in the above-described technique of Patent Document 1, the set-up portion knitted by entwining the knitting yarns fed from front and back yarn feeders so as to tangle each other may be too conspicuous in the knitted fabric.

[0005] Fig. 4 is a loop diagram of knitted fabric obtained by forming a set-up portion across front and back needle beds by the technique of Patent Document 1 and then performing plain knitting with the set-up portion used as a starting position. Fig. 5 is a photograph of the knitted fabric. As is obvious from Fig. 4, in a knitted fabric portion 20 formed through a yarn feeder 6 and a knitted fabric portion 30 formed through a yarn feeder 4, the knitting yarns are drawn out of former stitches from a front side toward a back side of a paper face to form stitches. In contrast, a set-up portion 10 where the knitting yarns of the knitted fabric portions 20, 30 are entwined, the knitting yarn of the knitted fabric portion 30 (20) is drawn out of the knitting yarn of the knitted fabric portion 20 (30) from the back side toward the front side of the paper face. This makes the set-up portion 10 clearly perceptible in the knitted fabric as seen from the photograph of the knitted fabric shown in Fig. 5.

[0006] The present invention has been made in light of the above-described situation, and an object of the present invention is to provide a knitting method of knitted fabric capable of making inconspicuous a set-up portion formed by entwining knitting yarns so as to tangle each other between front and back needle beds in the knitted fabric, and the knitted fabric having the set-up portion knitted by the knitting method.

MEANS FOR SOLVING THE PROBLEMS

[0007] The present invention is a knitting method of knitted fabric having a set-up portion by using a flat knitting machine including at least a pair of front and back needle beds and a plurality of yarn feeders that feed knitting yarns to needles arrayed in the respective needle beds, the set-up portion knitted by feeding the knitting yarn to the needles of the back needle bed through the yarn feeder located on the front needle bed side and feeding the knitting yarn to the needles of the front needle bed through the yarn feeder located on the back needle bed side. The knitting method of knitted fabric of the present invention forms the set-up portion in which the knitting yarn fed from one yarn feeder and the knitting yarn fed from the other yarn feeder are entwined so as to tangle each other between the front and back needle beds by continuously repeating the following steps 1 to 4:

(Step 1)
One yarn feeder of the front and back yarn feeders is moved in one longitudinal direction of the needle bed, and a hooked loop is formed during this movement.
(Step 2)
After step 1, the one yarn feeder is moved in an opposite direction of the movement direction in step 1.
(Step 3)
After step 2, the other yarn feeder is moved in the one longitudinal direction of the needle bed, and during this movement, a hooked loop is formed.
(Step 4)
After step 3, the other yarn feeder is moved in the opposite direction of the movement direction in step 3.

[0008] Meanwhile, knitted fabric of the present invention is a knitted fabric having a set-up portion, which is knitted using a flat knitting machine including at least a pair of front and back needle beds and a plurality of yarn

feeders that feed knitting yarns to needles arrayed in the respective needle beds, the knitted fabric including a stitch row on one side made of a plurality of stitches, a stitch row on the other side made of a plurality of stitches knitted using a different knitting yarn from a knitting yarn of the stitch row on the one side. The knitted fabric of the present invention has the set-up portion in which the knitting yarn of the stitch row on the one side and the knitting yarn of the stitch row on the other side are entwined so as to tangle each other by drawing the stitch of the stitch row on the one side out of a sinker loop of the stitch row on the other side from the front side toward the back side of the knitted fabric, and new stitches formed on the stitches of the stitch row on the one side and new stitches formed on the stitches of the stitch row on the other side are also drawn out from the front side toward the back side of the knitted fabric.

[0009] Here, the set-up portion of the knitted fabric by the knitting method of knitted fabric of the present invention can be identified by observing the knitted fabric. This set-up portion is a portion where the knitting yarns fed from the different yarn feeders are entwined with each other, so that in the portion of the knitted fabric, there is a trace showing that the plurality of knitting yarns are inserted or taken out. For example, from a photograph of the knitted fabric having the set-up portion knitted in an embodiment described later (Fig. 3), a yarn-in portion 5 can be seen in an end portion in a knitting width direction of the knitted fabric, and a set-up portion 1 can be identified from this yarn-in portion 5.

EFFECTS OF THE INVENTION

[0010] According to the knitting method of knitted fabric of the present invention, there can be formed knitted fabric having a set-up portion in which a sinker loop connecting two stitches formed adjacently in one needle bed, and a sinker loop connecting two stitches formed adjacently in the other needle bed are entwined so as to tangle each other. The set-up portion in the knitted fabric can be made inconspicuous (refer to Fig. 3 of the embodiment described later) by forming the knitted fabric portions in the respective needle beds, using, as a starting position, the set-up portions knitted by the knitting method of knitted fabric of the present invention. The knitting method of knitted fabric of the present invention can also be utilized to join front and back knitted fabric portions held in the front and back needle beds, respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a knitting process chart of a set-up portion of knitted fabric according to an embodiment.

Fig. 2 is a loop diagram of a vicinity of the set-up portion of the knitted fabric according to the embodiment.

Fig. 3 is a photograph of the vicinity of the set-up portion of the knitted fabric according to the embodiment.

Fig. 4 is a loop diagram of a vicinity of a set-up portion of knitted fabric by a knitting method of knitted fabric according to Patent Document 1.

Fig. 5 is a photograph of the vicinity of the set-up portion of the knitted fabric by the knitting method of knitted fabric according to Patent Document 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Hereinafter, an embodiment of a knitting method of knitted fabric of the present invention is described with reference to Figs. 1 to 3. Knitting described in this embodiment is performed, using a two-bed flat knitting machine having a pair of front and back needle beds that extend in a transverse direction and are disposed opposite to each other in a cross direction, and including a plurality of yarn feeders that reciprocate in a direction parallel to a longitudinal direction of the needle beds. Obviously, the knitting method of knitted fabric of the present invention can also be carried out, using a four-bed flat knitting machine.

[0013] Fig. 1 is a diagram showing a part of a knitting process for forming a set-up portion of the knitted fabric. In the figure, a left column indicates a number of a knitting step ("S + a numeric character"), a middle column indicates a way of knitting in each of the steps, and a right column indicates a movement direction of the yarn feeder in each of the knitting steps. In the figure, capital alphabets A to L denote needles in the back needle bed (hereinafter, referred to as BB), and small alphabets a to l denote needles in the front needle bed (hereinafter, referred to as FB). Moreover, a sign ● denotes a hooked loop newly knitted in each of the knitted steps, a sign ○ denotes a former hooked loop held in the needle, a sign ▼ denotes a yarn feeder 4 arranged on the FB side, and a sign ∇ denotes a yarn feeder 6 arranged on the BB side. Furthermore, the knitting yarn fed from the yarn feeder 4 is indicated by a heavy line, and the knitting yarn fed from the yarn feeder 6 is indicated by a thin line. Here, for convenience of explanation, less needles are displayed than in reality in Fig. 1.

[0014] In S1, a state is shown where a hooked loop is formed in a needle A of BB, using the knitting yarn from the yarn feeder 4 on the FB side, and a hooked loop is formed in a needle b of FB, using the knitting yarn from the yarn feeder 6 on the BB side. These hooked loops correspond to an end portion of the set-up portion.

[0015] The set-up portion starts to be formed from the state of S1. First, while the yarn feeder 4 is moved to the right side of the paper face, a hooked loop is formed in a needle C of BB (S2), and then, the yarn feeder 4 is moved in the opposite direction of S2 (S3). A stop position of the yarn feeder 4 in S3 is a position where the knitting yarn extending from the yarn feeder 6 to the needle b of

FB will be entwined with the knitting yarn extending from the yarn feeder 4 to the needle C of BB, when the yarn feeder 6 is moved to the right side of the paper face in next S4.

[0016] Subsequently, the yarn feeder 6 is moved to the right side of the paper face. At this time, the knitting yarn extending from the yarn feeder 6 to the needle b of FB vertically sandwiches the knitting yarn connecting the hooked loop of the needle A and the hooked loop of the needle C in BB (the knitting yarn derived from the yarn feeder 4), and the knitting yarn extending from the yarn feeder 4 to the needle C of BB to thereby be entwined with both the knitting yarns. In the state where the knitting yarn from the yarn feeder 6 is entwined with the knitting yarn from the yarn feeder 4, a hooked loop is formed in a needle d of FB while moving the yarn feeder 6 in the right direction of the paper face (S4).

[0017] After the hooked loop is formed in the needle d of FB in S4, the yarn feeder 6 is moved in the opposite direction of S4 (S5). A stop position of the yarn feeder 6 in S5 is a position where the knitting yarn extending from the yarn feeder 4 to the needle C of BB will be entwined with the knitting yarn extending from the yarn feeder 6 to the needle d of FB when the yarn feeder 4 is moved in the right direction of the paper face in next S6.

[0018] After that, the knitting similar to the knitting shown in S2 to S5 is repeated to complete the set-up portion. A state is shown in S6, where after the knitting in S5, a hooked loop is formed while moving the yarn feeder 4 in the right direction of the paper face as in S2. When the yarn feeder 4 is moved in the right direction of the paper face from the state shown in S5, the knitting yarn extending from the yarn feeder 4 to the needle C of BB vertically sandwiches the knitting yarn connecting the hooked loop of the needle b and the hooked loop of the needle d of FB (the knitting yarn derived from the yarn feeder 6), and the knitting yarn extending from the yarn feeder 6 to the needle d of FB to thereby be entwined with both the knitting yarns. In the state where the knitting yarn from the yarn feeder 4 is entwined with the knitting yarn from the yarn feeder 6, a hooked loop is formed in a needle E of BB while moving the yarn feeder 4 in the right direction of the paper face (S6) .

[0019] After hooked loops forming the set-up portion of the knitted fabric are formed in the needles of FB and BB in accordance with the knitting steps in Fig. 1, knitting of the knitting fabric is performed with the hooked loops used as a starting position. In the present embodiment, all stitches newly formed on the respective hooked loops making up the set-up portion are knitted in the needles in which the hooked loops are held. A loop diagram of the knitted fabric knitted by this series of knitting is shown in Fig. 2.

[0020] As shown in the loop diagram of Fig. 2, in the knitted fabric knitted in accordance with the knitting process in Fig. 1, a drawing state of the knitting yarn in the knitted fabric portions 2, 3 and a drawing state of the knitting yarns in the set-up portion 1 where the knitting yarns of the knitted fabric portions 2, 3 are entwined with each other are identical. This brings about an effect that the set-up portion 1 is hardly distinguishable in the knitted fabric. As seen from Fig. 3, which is a photograph of the actual knitted fabric, the set-up portion 1 in the knitted fabric can hardly be identified in the knitted fabric, although it can be marginally found from the presence of the yarn-in portion 5 extending from a side end of the knitted fabric outside the knitted fabric.

DESCRIPTION OF SYMBOLS

[0021]

FB	front needle bed
BB	back needle bed
1, 10	set-up portion
2, 3, 20, 30	knitted fabric portion
5	yarn-in portion
4	yarn feeder (FB side)
6	yarn feeder (BB side)

Claims

1. A knitting method of knitted fabric, using a flat knitting machine including at least a pair of front and back needle beds and a plurality of yarn feeders that feed knitting yarns to needles arrayed in the respective needle beds, the knitted fabric having a set-up portion knitted by feeding the knitting yarn to the needles of the back needle bed through the yarn feeder located on the front needle bed side, and feeding the knitting yarn to the needles of the front needle bed through the yarn feeder located on the back needle bed side, the method comprising:

a step 1 of moving one yarn feeder of the front and back yarn feeders in one longitudinal direction of the needle bed, and forming a hooked loop during the movement;
a step 2 of moving the one yarn feeder in an opposite direction of the movement direction in step 1 after step 1;
a step 3 of moving the other yarn feeder in the one longitudinal direction of the needle bed, and forming a hooked loop during this movement after step 2; and
a step 4 of moving the other yarn feeder in the opposite direction of the movement direction in step 3 after step 3,
wherein by continuously repeating the steps 1

to 4, the set-up portion is formed, in which the knitting yarn fed from the one yarn feeder and the knitting yarn fed from the other yarn feeder are entwined so as to tangle with each other between the front and back needle bed.

2. Knitted fabric having a set-up portion, which is knitted using a flat knitting machine including at least a pair of front and back needle beds and a plurality of yarn feeders that feed knitting yarns to needles arrayed in the respective needle beds, the knitted fabric comprising:

a stitch row on one side made of a plurality of stitches;
a stitch row on the other side made of a plurality of stitches knitted using a different knitting yarn from a knitting yarn of said stitch row on the one side; and
the set-up portion in which the knitting yarn of the stitch row on the one side and the knitting yarn of the stitch row on the other side are entwined so as to tangle each other by drawing the stitch of said stitch row on the one side out of a sinker loop of the stitch row on the other side from the front side toward the back side of the knitted fabric,
wherein new stitches formed on the stitches of said stitch row on the one side and new stitches formed on the stitches of said stitch row on the other side are also drawn out from the front side toward the back side of the knitted fabric.

Fig. 1

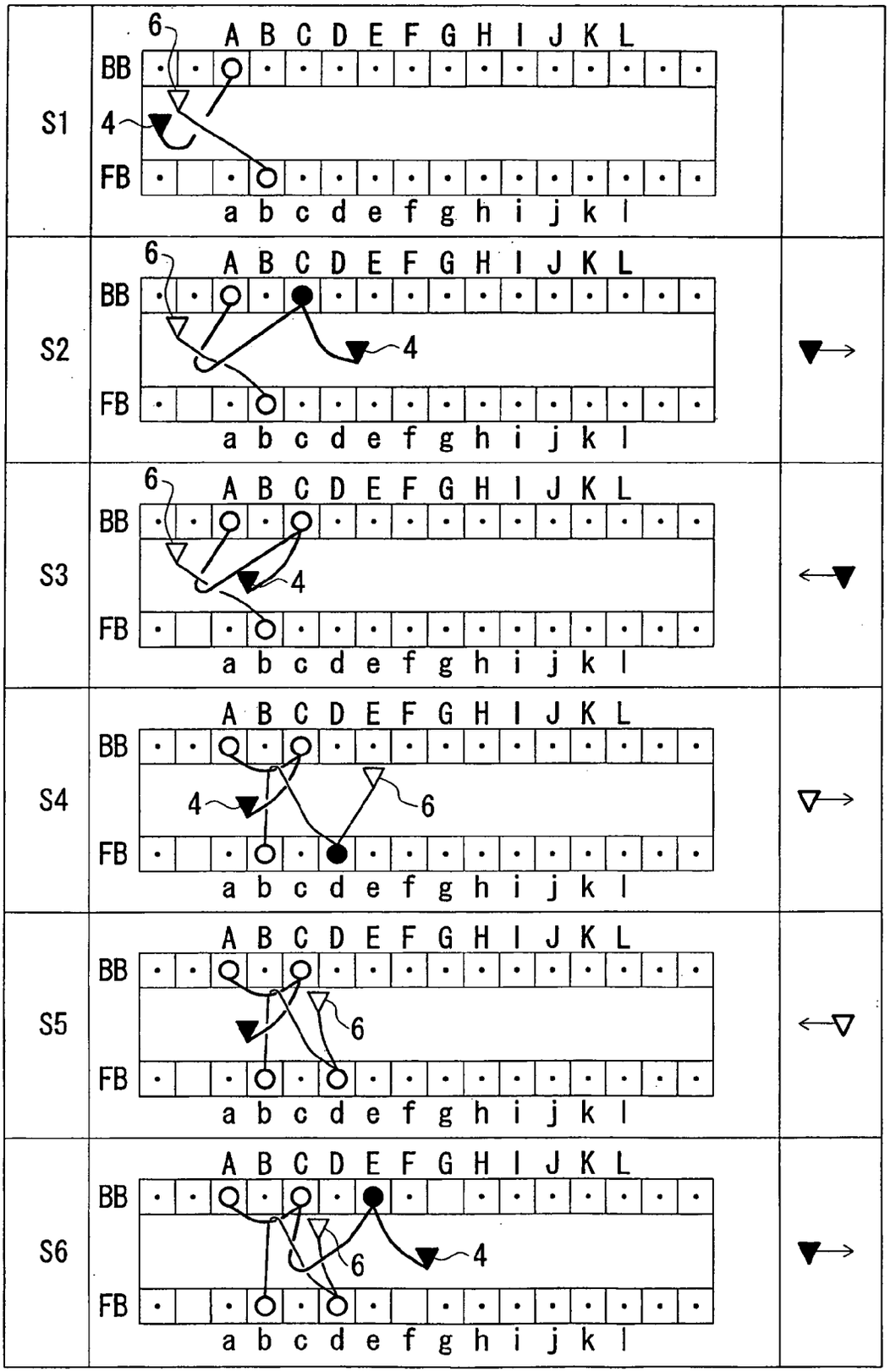


Fig. 2

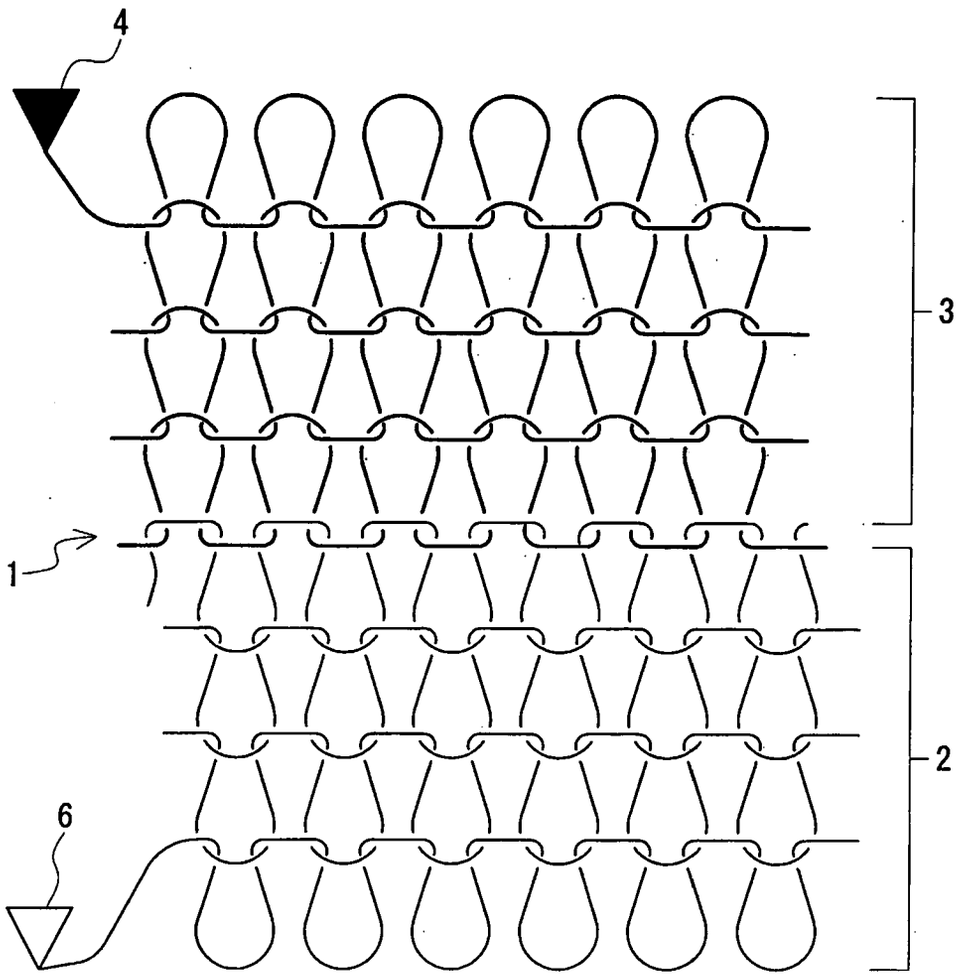


Fig. 3

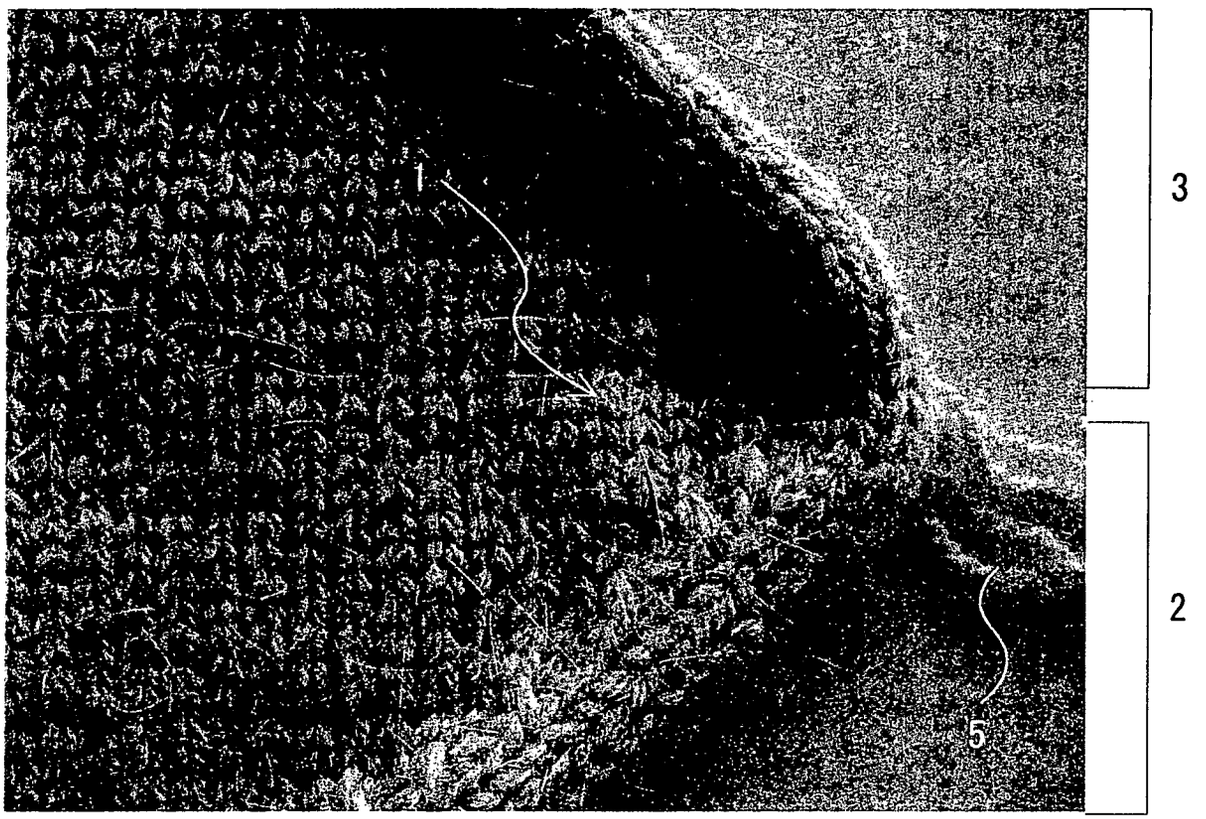


Fig. 4

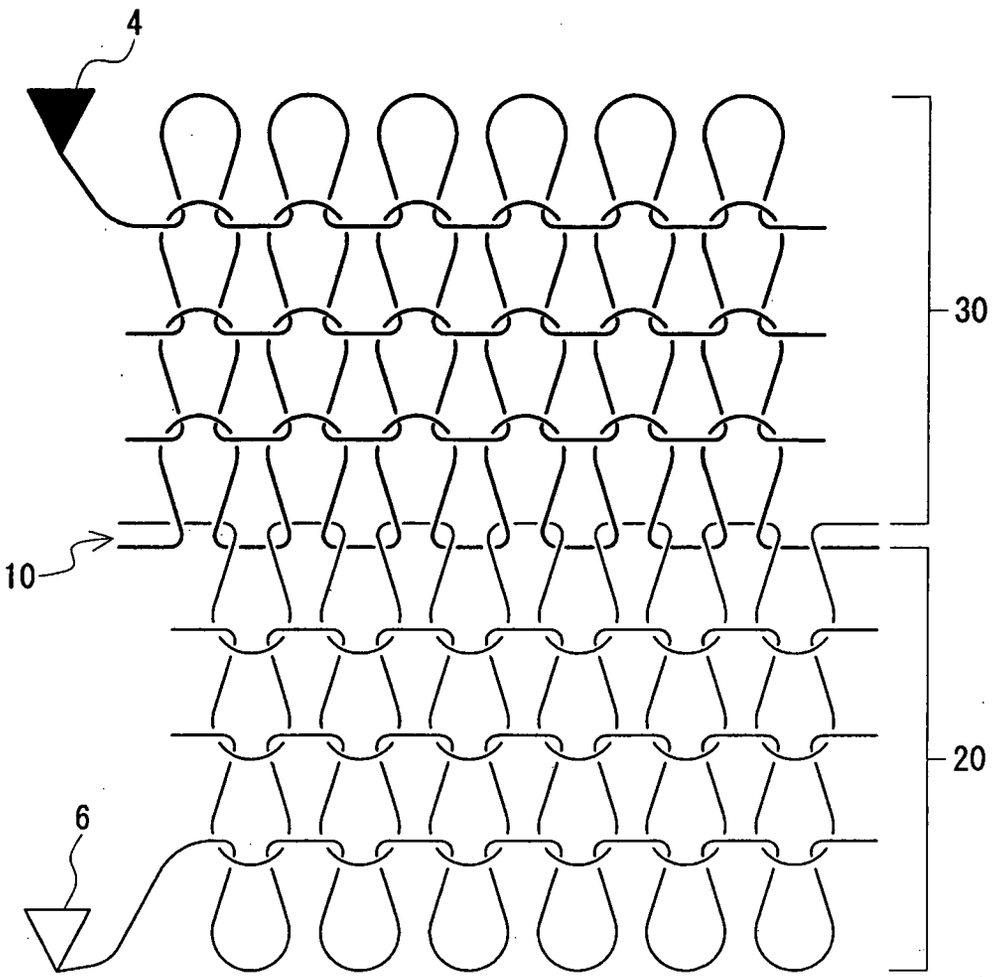
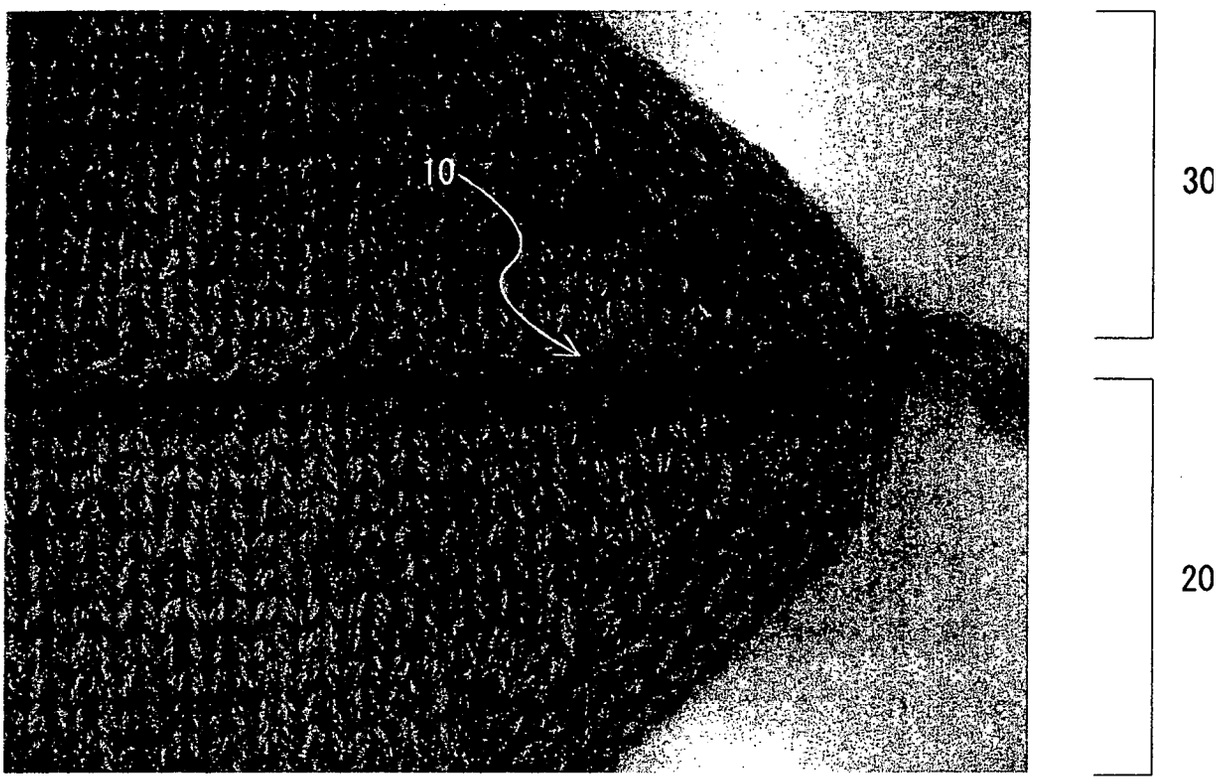


Fig. 5



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 10 01 4843

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	WO 2009/084167 A1 (SHIMA SEIKI MFG [JP]; UEDA RISA [JP]; MAEOKA SHIGEKI [JP]) 9 July 2009 (2009-07-09) * figure 2 * & EP 2 226 417 A1 (SHIMA SEIKI MFG [JP]) 8 September 2010 (2010-09-08) * paragraphs [0001], [0012], [0031] - [0037]; figure 2 *	1,2	INV. D04B1/22
A	EP 1 408 145 A1 (SHIMA SEIKI MFG [JP]) 14 April 2004 (2004-04-14) * paragraph [0001] - paragraph [0010]; figures 2-9 *	1,2	

TECHNICAL FIELDS SEARCHED (IPC)

D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 April 2011	Zirkler, Stefanie

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 01 4843

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-04-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009084167 A1	09-07-2009	CN 101910485 A	08-12-2010
		EP 2226417 A1	08-09-2010
EP 1408145 A1	14-04-2004	CN 1516761 A	28-07-2004
		WO 02101133 A1	19-12-2002
		JP 4203414 B2	07-01-2009
		US 2004231367 A1	25-11-2004

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2009084167 A **[0003]**