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

(11) EP 2 436 811 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.04.2012 Bulletin 2012/14

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

(21) Application number: **11008038.9**

(22) Date of filing: **04.10.2011**

(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: **04.10.2010 JP 2010224745**

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

(72) Inventors:
- **Honda, Hirofumi**
  Wakayama-shi
  Wakayama, 641-8511 (JP)
- **Chan, Roger Kwok Hung**
  Wakayama-shi
  Wakayama, 641-8511 (JP)

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

(54) Stitch increasing method

(57) A latch needle (FB) on a front needle bed having a stitch (fb) in a hook thereof is advanced until the stitch (fb) is moved beyond a latch to the outside of the hook and, simultaneously a latch needle (BA) on a rear needle bed opposing thereto is advanced to allow a stitch (fb1) to be yarned over a hook of the latch needle (BA). Subsequently, the latch needle (BA) having the stitch (fb1) yarned over the hook is retracted to a retracted position while stopping the latch needle (FB) at its mid position to maintain the stitch (fb) in a state of being yarned on the outside of the hook without moving beyond the latch, whereby the stitch (fb) is doubled. Subsequently, the latch needle (FB) and a free needle (BZ) are advanced to transfer the stitch (fb) to the free needle (BZ).

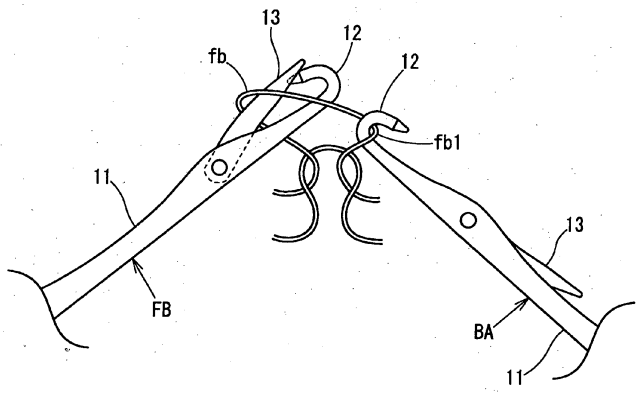

FIG. 3

EP 2 436 811 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a stitch increasing method for increasing the number of stitches in the course of knitting a fabric.

2. Description of the Related Art

[0002] In the related art, there is a known weft knitting machine including at least a pair of front and rear needle beds having a plurality of latch needles each having a hook configured to be opened and closed along with a pivotal movement of a latch and being capable of advancing and retracting in a sliding movement, the pair of front and rear needle beds being provided in a state in which teeth are positioned in proximity, and being capable of moving relatively in the lateral direction. When the weft knitting machine as described above is used, increase of the number of stitches is achieved by advancing a latch needle on one of the front and rear needle beds, allowing a stitch yarned over a latch needle on the other needle bed to be yarned over a hook of the advanced latch needle and, simultaneously, receiving a supply of yarn on a hook of the latch needle on the other needle bed, and retracting the latch needles on both of the needle beds (for example, see WO2007/119272A1).

[0003] There is also a weft knitting machine of a type having a plurality of compound needles each having a hook configured to be opened and closed along with a sliding movement of a slide. In the weft knitting machine of this type, increase of the number of stitches is achieved without a supply of yarn by allowing a stitch yarned over a hook of a compound needle on one of the front and rear needle beds to be yarned over a hook of a compound needle on the other needle bed by operating a slider of the compound needle on the other needle bed simultaneously with the advancement of the compound needle on the other needle bed (for example see Japanese Unexamined Patent Application Publication No. 3—279448).

[0004] However, in both of the weft knitting machines of the related art described above, since the structures of the knitting needles are different from each other, finished fabrics are different from each other depending on the presence or absence of the supply of yarn when increasing the number of stitches.

SUMMARY OF THE INVENTION

[0005] In view of such circumstances, it is an object of the invention to provide a stitch increasing method which is capable of increasing the number of stitches using a latch needle without being accompanied by a supply of yarn in the same manner as a compound needle.

[0006] In order to achieve the above-described object, the present invention is based on a stitch increasing method configured to increase the number of stitches by allowing a stitch yarned over a latch needle on one of front and rear needle beds to be yarned over a hook of the latch needle by advancing a latch needle on the other needle bed using a weft knitting machine including at least a pair of front and rear needle beds having a plurality of latch needles each having a hook configured to be opened and closed along with a pivotal movement of a latch and being capable of advancing and retracting in a sliding movement, the front and rear needle beds being provided in a state in which teeth are positioned in proximity, and being capable of moving relatively in the lateral direction. The method includes advancing the latch needle on the one of the needle beds over which the stitch is yarned in the hook until the stitch moves out of the hook beyond the latch, and advancing the latch needle on the other needle bed to yarn the stitch moved out of the hook of the latch needle on the one of the needle beds over the hook of the latch needle. Then, the method includes subsequently, retracting the latch needle to a retracted position in a state in which the stitch is yarned over the hook of the latch needle on the other needle bed when retracting the latch needles on the front and rear needle beds while stopping the retraction of the latch needle at its mid position so that the stitch moving in association with retraction of the latch needle of the one needle bed is maintained in a state of being yarned over the latch needle on the outside of the hook without moving beyond the latch, thereby yarning the stitch over the latch needles on the front and rear needle beds respectively and increasing the number of the stitch. The method subsequently includes advancing the latch needle on the one needle bed from its mid position and continuing a knitting operation for the stitch yarned over the latch needle on the outside of the hook.

[0007] The knitting operation may include an operation of transferring the stitch yarned over the latch needle on the one needle bed on the outside of the hook to the free needle on the other needle bed by advancing a free needle on the other needle bed when advancing the latch needle on the one needle bed from its mid position.

[0008] In contrast, the knitting operation may include an operation of newly supplying a knitting yarn when the latch needle on the one needle bed is advanced from its mid position, then retracting the latch needle to yarn the knitting yarn over the hook, knocking over the stitch yarned over the latch needle on the outside of the hook, and forming a new stitch on the hook continuing from the knocked over stitch.

[0009] According to the stitch increasing method in the invention, by stopping the retraction of the latch needle on one of the needle beds at its mid position so as to maintain the stitch doubled on the hook of the latch needle on the one needle bed to increase the number of stitches and yarned over the latch needle on the other needle bed on the outside of the hook to be kept in a

state of being yarned over the outside of the hook without moving beyond the latch even when moving toward the advancing side relatively in associate of the retraction of the latch needle on the one needle bed, the number of the stitches can be increased without being accompanied with the supply of yarn using the latch needle in the same manner as a compound needle.

[0010] Also, the operation of transferring a stitch yarned over the latch needle on the one needle bed on the outside of the hook to the free needle on the other needle bed by advancing the free needle on the other needle bed when advancing the latch needle on the one needle bed from its mid position can be performed continuously subsequent to the increasing operation.

[0011] In contrast, the operation of newly supplying a knitting yarn from the yarn supply port when the latch needle on the one needle bed is advanced from its mid position, then retracting the latch needle to yarn the newly supplied knitting yarn over the hook of the latch needle, knocking over the stitch yarned over the latch needle on the outside of the hook, and forming a new stitch on the hook continuing from the knocked over stitch can be performed subsequently to the increasing operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a side view illustrating a configuration of a latch needle according to a first embodiment of the present invention;

Fig. 2 is an explanatory drawing illustrating an operation of increasing the number of stitches and a subsequent operation of transferring the stitch according to the first embodiment of the invention;

Fig. 3 is a perspective view illustrating a state of increasing the number of stitches using the latch needle shown in Fig. 1;

Fig. 4 is explanatory drawing illustrating an operation of transferring the stitch subsequent to an operation of increasing the number of stitches according to a second embodiment of the invention; and

Fig. 5 is explanatory drawing illustrating an operation of forming a new stitch subsequent to an operation of increasing the number of stitches according to a third embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] Referring now to the drawings, a latch needle used in a stitch increasing method according to a first embodiment of the present invention will be described.

[0014] Fig. 1 is a side view illustrating a configuration of a latch needle 1, Fig. 2 is an explanatory drawing illustrating an operation of increasing the number of stitches and a subsequent operation of transferring the stitch, and Fig. 3 is a perspective view illustrating a state of increasing the number of stitches using the latch needle 1.

[0015] A number of rows of the latch needles 1 are provided on front and rear needle beds of a weft knitting machine, not shown. The front and rear needle beds are provided in a shape similar to a V-shape with tooth opening portions positioned close to each other, but not in contact with each other, and are provided in a weft knitting machine having a known structure configured to be capable of moving in the lateral direction relatively with respect to each other. Arranged in parallel on the front and rear needle beds are needle grooves configured to accommodate the respective latch needles 1 so as to be capable of advancing and retracting with respect to tooth openings in the direction of advancement and retraction of the latch needles 1.

[0016] The latch needle 1 is a general latch needle having a hook 12 configured to yarn a stitch over a needle body 11 on the distal end side facing the tooth opening and a latch 13 configured to open and close the hook 12. The needle body 11 includes a needle jack 14 connected to the proximal end thereof, and a blade 15 on one side thereof. The needle jack 14 is provided with a front butt 17 and a rear butt (not shown) at a distance from each other.

[0017] Subsequently, with reference to Steps S1 to S8 in Fig. 2, the operation of increasing the number of stitches from a stitch yarned over a latch needle on the front needle bed onto latch needles on the rear needle bed by the stitch increasing method of the invention, and a stitch transfer operation subsequent thereto will be described in detail. In this case, the description will be given using respective latch needles FA to FE on the front needle bed and respective latch needles BA (BZ) to BE on the rear needle bed.

[0018] First of all, stitches fa to fd are yarned over the respective latch needles FA to FD on the front needle bed in S1, then the latch needles FC, FD, which serve as transfer needles, are caused to advance toward the tooth opening according to a trajectory formed by a plurality of cams in a carriage (hereinafter, referred simply to as "advancement of the latch needle") in S2. At this time, the stitches fc, fd yarned over the hooks 12 of the latch needles FC and FD are relatively retracted with respect to the advancing latch needles FC, FD, open the hooks 12 by causing the respective latches 13 to pivot in the retracting side, move to positions of blades 15 along needle stems. From the opposing rear needle bed, the latch needles BC, BD, which are receiving needles, are advanced and the hooks 12 of the latch needles BC, BD are inserted into the blades 15 of the latch needles FC, FD (transfer needles). Subsequently, by retracting the respective latch needles FC, FD, BC, BD on the front and rear needle beds from the respective tooth opening sides thereof (hereinafter, referred simply as to "retraction of the latch needle") according to the trajectories formed by the respective cams in the carriage, whereby transfer of the stitches fc, fd to the latch needles BC, BD on the rear needle bed is completed. As a result of the transfer of

the stitches, the latch needles FC, FD are now free needles.

[0019] In S3, the rear needle bed is racked by an amount corresponding to one pitch (one needle pitch) rightward (the direction indicated by a hollow arrow in Fig. 2). Then, in S4, the stitches fc, fd on the latch needles BC, BD on the rear needle bed are transferred to the latch needles FD, FE on the front needle bed in the same procedure to leave the latch needle FC on the front needle bed free.

[0020] In S5, the latch needle FB on the front needle bed and the latch needle BA on the rear needle bed opposing thereto are advanced, respectively, so that the stitch fb which is retracted relatively with respect to the advanced latch needle BA is moved from the inside of the hook 12 to the position of the blade 15 along the needle stem, and the hook 12 of the latch needle BA on the rear needle bed is inserted into the stitch fb, whereby the stitch fb is yarned over the hook 12. Then, the latch needles FB, BA are retracted respectively. At this time, although the latch needle BA on the rear needle bed is completely retracted, the retraction of the latch needle FB on the front needle bed is stopped at its mid position so that the stitch fb advancing relatively with respect to the retracting latch needle FB is kept in the yarned state at a position outside of the hook 12 without moving beyond the latch 13 (at a position placed on the closed latch 13 as shown in Fig. 3, for example). Accordingly, the stitch fb of the latch needle FB on the front needle bed is added as a stitch fb1 of the latch needle BA on the rear needle bed. In this case, the stop of the retraction of the latch needle FB on the front needle bed at its mid position is achieved by the front butt 17 or the rear butt being guided by the respective cams in the carriage to a trajectory different from the normal trajectory for transferring the stitch.

[0021] In S6, the rear needle bed is further racked by an amount corresponding to one pitch (one needle pitch) rightward (the direction indicated by the hollow arrow in Fig. 2). Then, the latch needle BZ on the rear needle bed, which is a free needle, is positioned so as to oppose the latch needle FB on the front needle bed, which has been stopped retracting at its mid position in S5. Subsequently, the latch needle FB on the front needle bed is advanced from its mid position and the latch needle BZ on the rear needle bed is advanced as well. Subsequently, by retracting the latch needles FB, BZ on the front and rear needle beds respectively, the stitch fb yarned over the latch needle FB on the outsides of the hook 12 is transferred to the latch needle BZ (free needle) on the rear needle bed. Subsequently, in S7, the latch needles BZ, BA on the rear needle bed and the latch needles FB, FC on the front needle bed are respectively advanced, and the stitches fb, fb1 retracting relatively with respect to the advancing latch needles FB, FC are moved from inside the hooks 12 to the positions of the blades 15 along the needle stems. Then, the stitches fb, fb1 moved to the positions of the blades 15 are yarned over the hooks 12 of the latch needles FB, FC on the front needle bed, and the latch needles BZ, BA on the rear needle bed and the latch needles FB, FC on the front needle bed are caused to retract respectively, so that transfer of the stitches fb, fb1 to the latch needles FB, FC on the rear needle bed is completed. Then, the rear needle bed is racked by two pitches (an amount corresponding to two needles) leftward (in the direction indicated by the hollow arrow in Fig. 2) to its original position. Transfer of the stitches fb, fb1 to the latch needles FB, FC on the rear needle bed may be performed independently one by one instead of being performed two together.

[0022] In S8, the knitting yarn is supplied to form new stitches fa2 to fd2 subsequent to the stitches fa, fb1, fc, fd yarned over the latch needles FA, FC to FE on the front needle bed.

[0023] In this embodiment, by stopping the retraction of the latch needle FB at its mid position so as to maintain the stitch fb to be kept in a state of being yarned over the outside of the hook 12 without moving beyond the latch 13 of the latch needle FB on the front needle bed, the stitch fb can be doubled to increase the number of stitches without being accompanied with the supply of yarn using the latch needle in the same manner as the compound needle.

[0024] Also, by advancing the latch needle FB on the front needle bed from its mid position and advancing the latch needle BZ (free needle) on the rear needle bed opposing thereto, the operation to transfer the stitch fb yarned over the outside of the hook 12 of the latch needle FB on the front needle bed to the latch needle BZ on the rear needle bed can be performed continuously subsequent to the increasing operation.

[0025] Referring now to Fig. 4, a second embodiment of the present invention will be described.

[0026] Fig. 4 is explanatory drawing illustrating an operation of transferring the stitch subsequent to the stitch increasing operation according to a stitch increasing method of the invention. In this embodiment, the stitch yarned over the latch needle on the rear needle bed is doubled on the latch needle on the front needle bed to increase the number of stitches. In this embodiment, since the descriptions about S1 to S4 are overlapped with those in Fig. 2 described in the first embodiment, only the flow from S5 onward subsequent to S1 to S4 will be described.

[0027] In other words, in S5 in Fig. 4 subsequent to S1 to S4 in Fig. 2, the latch needle FB, which serves as a transfer needle, is advanced to the tooth opening and the latch needle BA, which serves as a receiving needle, is advanced from the rear needle bed opposing thereto. At this time, the stitch fb yarned over the hook 12 of the latch needle FB causes the hook 12 to open and is retracted relatively to the position of the blade 15, whereby being transferred to the hook 12 on the latch needle BA.

[0028] In S6, the latch needle BA on the rear needle bed and the latch needle FB on the front needle bed opposed thereto are advanced, respectively, so that the

stitch fb which is retracted to the position of the blade 15 relatively with respect to the advanced latch needle BA is yarned over the hook 12 of the latch needle FB on the front needle bed. Then, the latch needles BA, FB are retracted respectively. At this time, the latch needle FB on the front needle bed is completely retracted while the retraction of the latch needle BA on the rear needle bed is stopped in its mid position so that the stitch fb advancing relatively with respect to the retracting latch needle BA is kept in the yarned state at the position outside of the hook 12 without moving beyond the latch 13. Accordingly, the stitch fb of the latch needle BA on the rear needle bed is added as the stitch fb1 of the latch needle FB on the front needle bed.

[0029] In S7, the rear needle bed is further racked by an amount corresponding to one pitch (one needle pitch) rightward (the direction indicated by a hollow arrow in Fig. 4). Then, the latch needle FC, which is a free needle, on the front needle bed is positioned so as to oppose the latch needle BA on the rear needle bed, which has been stopped retracting at its mid position in S6. Subsequently, the latch needle BA on the rear needle bed is advanced from its mid position and the latch needle FC on the front needle bed is advanced as well. Subsequently, by retracting the latch needles FC, BA of the front and rear needle beds respectively, the stitch fb yarned over the latch needle BA on the outsides of the hook 12 is transferred to the latch needle FC (free needle) on the rear needle bed.

[0030] In S8, the rear needle bed is racked by two pitches (an amount corresponding to two needles) leftward (in the direction indicated by the hollow arrow in Fig. 4) to its original position. Subsequently, the knitting yarn is supplied to form new stitches fa2 to fd2 subsequent to the stitches fa to fd yarned over the latch needles FA, FC to FE on the front needle bed.

[0031] In this embodiment as well, by stopping the retraction of the latch needle BA at its mid position so as to maintain the stitch fb to be kept in the state of being yarned over the outside of the hook 12 without moving beyond the latch 13 of the latch needle BA on the rear needle bed, the stitch fb can be doubled to increase the number of stitches without being accompanied with the supply of yarn using the latch needle.

[0032] Also, by advancing the latch needle BA on the rear needle bed from its mid position and advancing the latch needle FC (free needle) on the front needle bed opposing thereto, the operation to transfer the stitch fb yarned over the outside of the hook 12 of the latch needle BA on the rear needle bed to the latch needle BA on the front needle bed can be performed continuously subsequent to the increasing operation.

[0033] Referring now to Fig. 5, a third embodiment of the present invention will be described.

[0034] Fig. 5 is an explanatory drawing illustrating a case where an operation of forming a new stitch on a stitch on the outside of the hook subsequent to the stitch increasing operation according to the stitch increasing method of the present invention. In this embodiment, the operation of forming a new stitch on a stitch on the outside of the hook is performed subsequent to the stitch increasing operation. In this embodiment, since the descriptions about S1 to S5 are overlapped with those in Fig. 2 described in the first embodiment, only the flow from S6 onward subsequent to S1 to S5 will be described.

[0035] In other words, in S6 in Fig. 5 subsequent to S1 to S5 in Fig. 2, the rear needle bed is racked by an amount corresponding to one pitch (one needle pitch) rightward (the direction indicated by a hollow arrow in Fig. 5). Then, the latch needle FC, which is a free needle, on the front needle bed is positioned so as to oppose the latch needle BA on the rear needle bed, over which the stitch fb1 doubled from the near FB on the front needle bed is yarned. Subsequently, in S7, the latch needle BA on the rear needle bed and the latch needle FC on the front needle bed are advanced, and then the latch needles FC, BA on the front and rear needle beds are retracted respectively, so that the stitch fb1 is transferred to the latch needle FC (free needle) on the front needle bed.

[0036] Subsequently, in S8, the rear needle bed is racked by two pitches (an amount corresponding to two needles) leftward (the direction indicated by the hollow arrow in Fig. 4) to its original position. Then, the latch needle FB on the front needle bed over which the stitch fb is yarned on the outside of the hook 12 is advanced from its mid position. Then, when a knitting yarn is newly supplied from a yarn supply port and the latch needle FB on the front needle bed is retracted, the knitting yarn newly supplied from the yarn supply port is yarned over the hook 12, and the stitch fb advancing relatively with respect to the retracting latch needle FB causes the latch 13 to pivot forward to close the hook 12, so that the stitch fb is knocked over. Then, a new stitch fb2 subsequent to the knocked over stitch fb is formed by a stitch yarned over the hook 12 (a newly supplied knitting yarn).

[0037] In this embodiment as well, by stopping the retraction of the latch needle FB at its mid position so as to maintain the stitch fb to be kept in a state of being yarned over the outside of the hook 12 without moving beyond the latch 13 of the latch needle FB on the front needle bed, the stitch fb can be doubled to increase the number of stitches without being accompanied with the supply of yarn using the latch needle.

[0038] Also, by retracting the latch needle FB after having supplied the knitting yarn from the yarn supply port newly when the latch needle FB on the front needle bed is advanced from its mid position, the knitting yarn supplied from the yarn supply port can be yarned over the hook 12 of the latch needle FB, and the stitch fb yarned over the latch needle FB outside of the hook 12 is knocked over, whereby the operation to form the new stitch fb2 continued from the stitch fb knocked over using the stitch (knitting yarn) yarned over the hook 12 can be performed subsequently to the increasing operation.

[0039] The present invention is not limited to the embodiments described above, and may be implemented

without departing the scope of the invention.

Claims

1. A stitch increasing method configured to increase the number of stitches by allowing a stitch yarned over a latch needle (1) on one of front and rear needle beds to be yarned over a hook (12) of the latch needle (1) by advancing a latch needle on the other needle bed using a weft knitting machine including at least a pair of front and rear needle beds having a plurality of latch needles (FA to FD, BA to BD) each having a hook (12) configured to be opened and closed along with a pivotal movement of a latch (13) and being capable of advancing and retracting in a sliding movement, the front and rear needle beds being provided in a state in which teeth are positioned in proximity, and being capable of moving relatively in the lateral direction, comprising:

   advancing the latch needle (FB) on the one needle bed over which the stitch is yarned in the hook (12) until the stitch moves out of the hook (12) beyond the latch (13), and advancing the latch needle (BA) on the other needle bed to yarn the stitch moved out of the hook (12) of the latch needle (FB) on the one needle bed over the hook of the latch needle (BA),
   retracting the latch needles (FB, BA) on the front and rear needle beds to retracted positions in a state in which the stitch is yarned over the hook (13) of the latch needle (BA) on the other needle bed while stopping the retraction of the latch needle at a mid position so that the stitch (fb) moving in association with the retraction of the latch needle (FB) on the one needle bed is maintained in a state of being yarned over the latch needle (FB) on the outside of the hook (12) without moving beyond the latch (13), thereby allowing the stitch to be yarned over the latch needles (FB, BA) on the front and rear needle beds and increasing the number of the stitches, and
   advancing the latch needle (FB) on the one needle beds from the mid positions and continuing a knitting operation for the stitches yarned over the latch needle (FB) on the outside of the hook (12).

2. The stitch increasing method according to Claim 1, wherein the knitting operation includes an operation of transferring the stitch yarned over the latch needle (FB) on the one needle bed on the outside of the hook (12) to the free needle (BA) on the other needle bed by advancing a free needle (BZ) on the other needle bed when advancing the latch needle (FB) on the one needle bed from the mid positions.

3. The stitch increasing method according to Claim 1, wherein the knitting operation includes an operation of newly supplying a knitting yarn when the latch needle (FB) on the one needle bed is advanced from the mid position, then retracting the latch needle (FB) to yarn the knitting yarn over the hook (12), knocking over the stitch yarned over the latch needle (FB) on the outside of the hook (12), and forming new stitch (fb2) on the hook (12) continuing from the knocked over stitch.

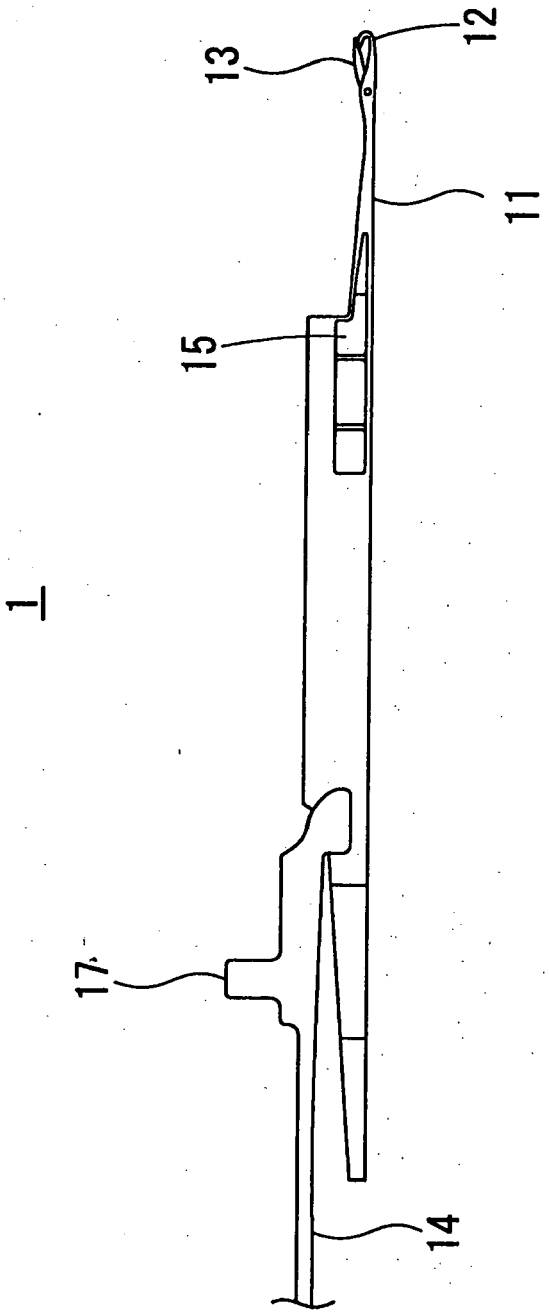

FIG. 1

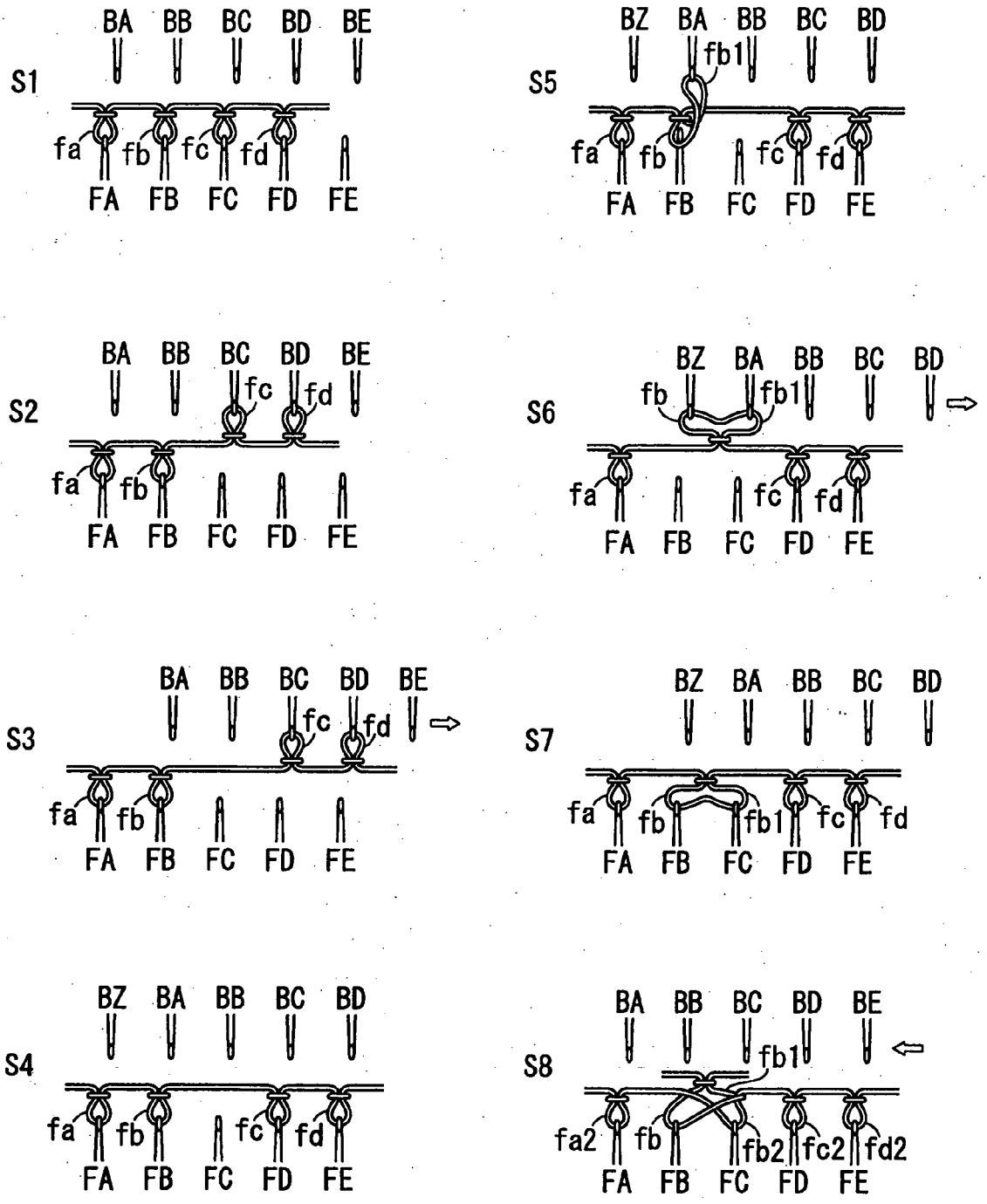
S1
BA BB BC BD BE
fa fb fc fd
FA FB FC FD FE
S2
BA BB BC BD BE
fc fd
fa fb
FA FB FC FD FE
S3
BA BB BC BD BE
fc fd
fa fb
FA FB FC FD FE
S4
BZ BA BB BC BD
fa fb fc fd
FA FB FC FD FE
S5
BZ BA BB BC BD
fb1
fa fb fc fd
FA FB FC FD FE
S6
BZ BA BB BC BD
fb fb1
fa fc fd
FA FB FC FD FE
S7
BZ BA BB BC BD
fa fb fb1 fc fd
FA FB FC FD FE
S8
BA BB BC BD BE
fb1
fa2 fb fb2 fc2 fd2
FA FB FC FD FE

FIG. 2

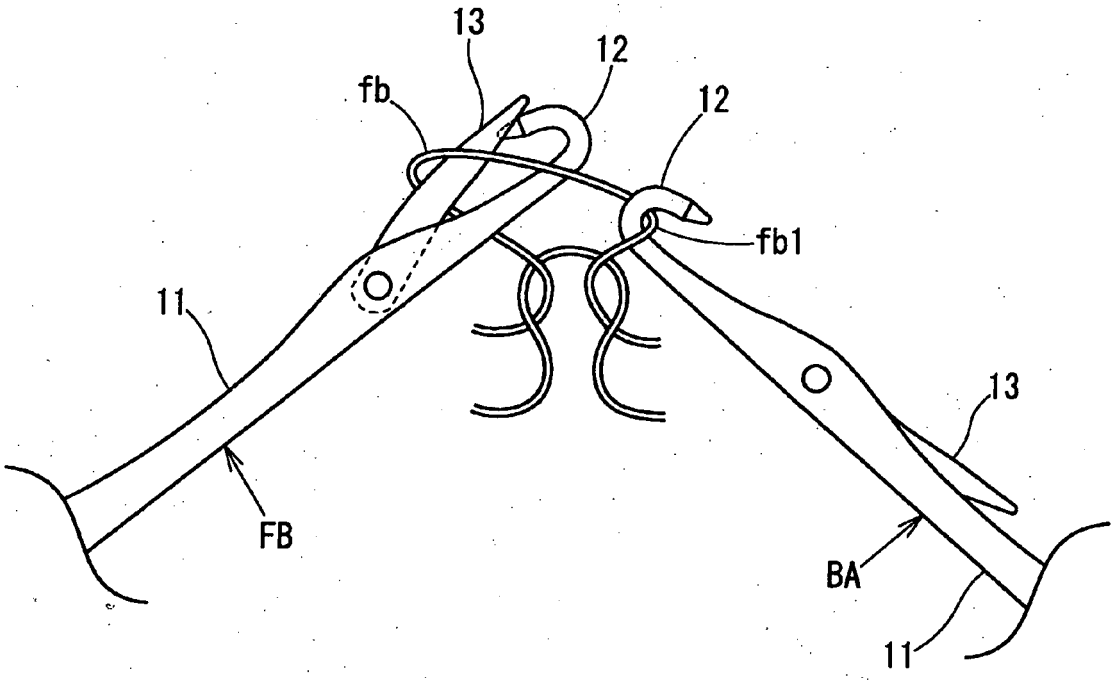

FIG. 3

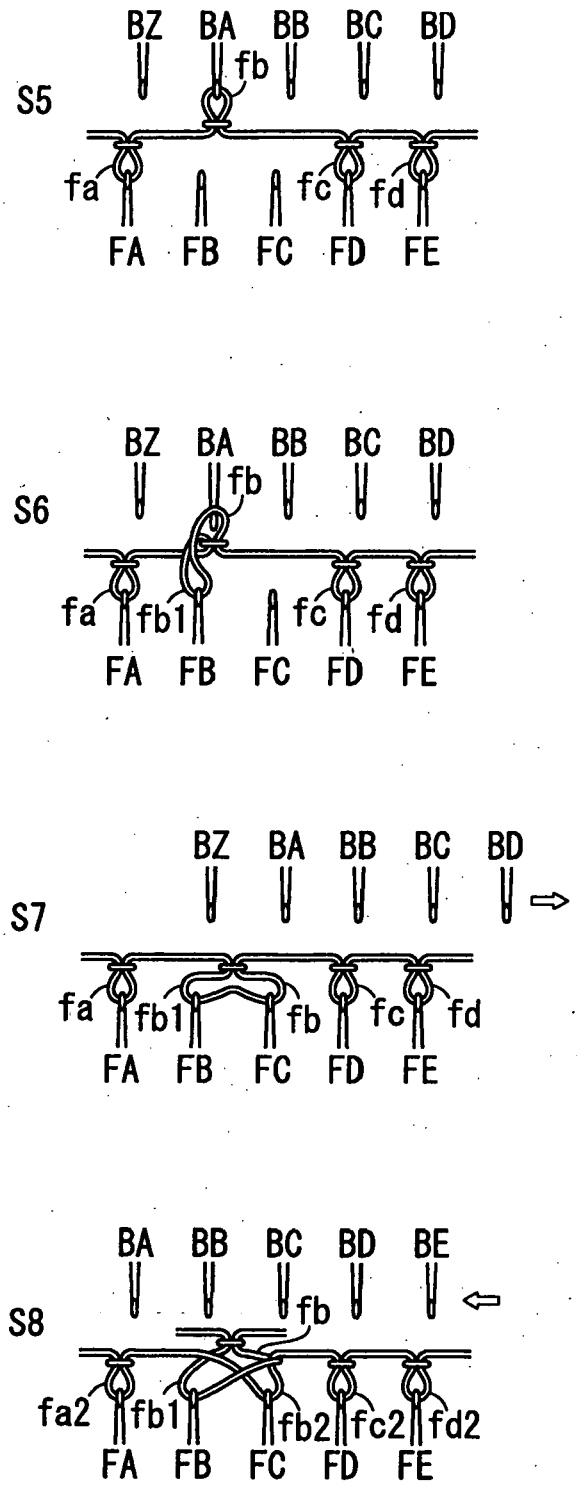
S5
BZ BA BB BC BD
fb
fa fc fd
FA FB FC FD FE
S6
BZ BA BB BC BD
fb
fa fb1 fc fd
FA FB FC FD FE
S7
BZ BA BB BC BD
fa fb1 fb fc fd
FA FB FC FD FE
S8
BA BB BC BD BE
fb
fa2 fb1 fb2 fc2 fd2
FA FB FC FD FE

FIG. 4

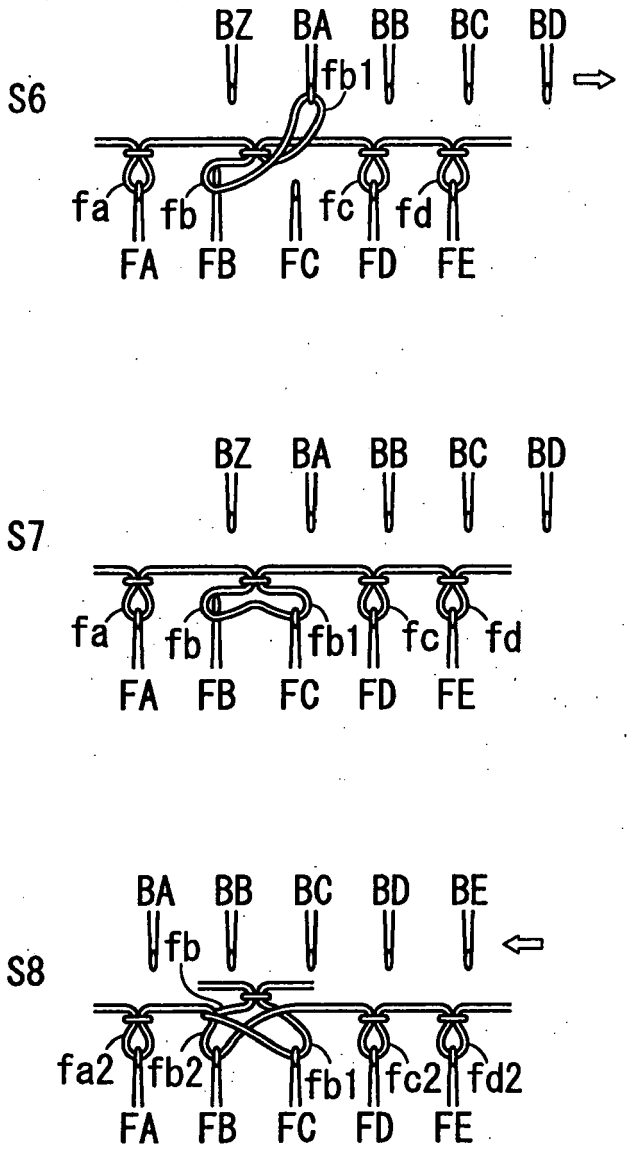
S6
BZ
BA
BB
BC
BD
fb1
fa
fb
fc
fd
FA
FB
FC
FD
FE
S7
BZ
BA
BB
BC
BD
fa
fb
fb1
fc
fd
FA
FB
FC
FD
FE
S8
BA
BB
BC
BD
BE
fb
fa2
fb2
fb1
fc2
fd2
FA
FB
FC
FD
FE

FIG. 5

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 2007119272 A1 **[0002]**
- JP 3279448 A **[0003]**