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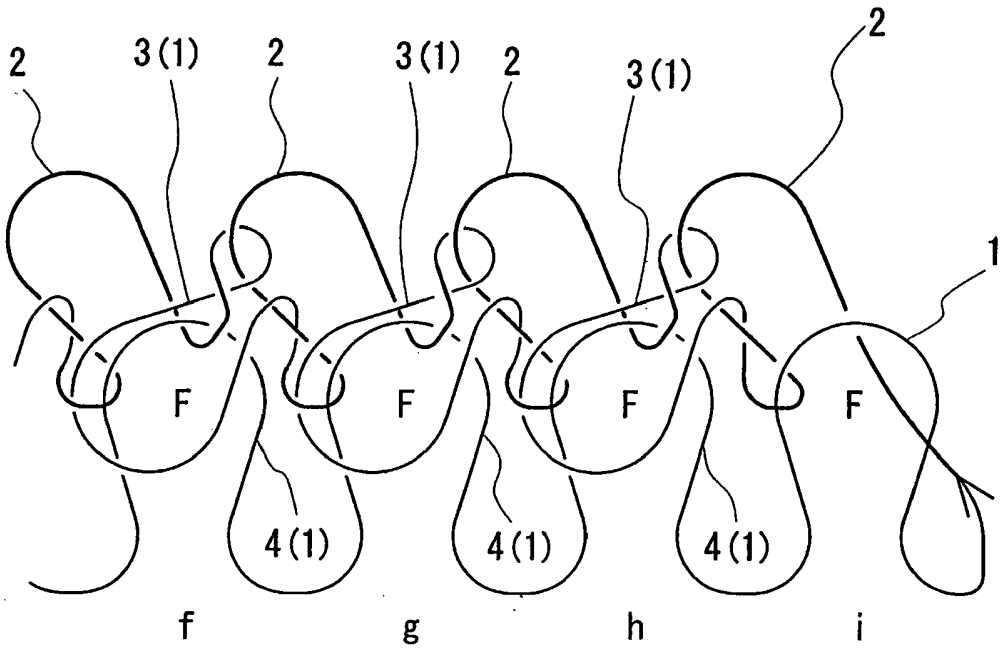
(54) **Method for knitting knitted fabric and knitted fabric**

(57) To provide a method for knitting a knitted fabric capable of knitting a bind off portion of high stretchability, and a knitted fabric knitted by applying such a knitting method. When a direction in which a bind off stitch is sequentially formed in a longitudinal direction of the needle bed is a bind off direction LS and a direction opposite to the bind off direction LS is a starting end direction RS, the method includes a step A of forming a first stitch 2 and a second stitch 3, which are two new stitches following in a wale direction of a target stitch 1 to become the target of the bind off process, with one as a front stitch and the other as a back stitch; and a step B of overlapping a proximate stitch 4 proximate in the bind off direction with respect to the target stitch 1, and the second stitch 3. The double stitch formed in the step B is redefined as a new target stitch 1, and the step A and the step B are repeated.

Fig. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to a method for knitting a knitted fabric in which stitches at the end in a wale direction of a knitted fabric portion held on the needle beds are subjected to a bind off process when knitting a knitted fabric using a flat knitting machine, and a knitted fabric obtained by applying such a method for knitting a knitted fabric.

BACKGROUND ART

[0002] When knitting a knitted fabric with a flat knitting machine, a bind off process is one of the methods for processing so that the stitches (stitches at the end in the wale direction) in the final course of the relevant knitted fabric do not ravel. The bind off process is a process of repeating the knitting in which proximate stitches, of the stitches of the knitted fabric portion held on the needle beds, are overlapped and a new stitch is formed following such overlapped stitches (double stitch), from one end side toward the other end side in the knitting width direction of the knitted fabric.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0003]

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004] However, the conventional bind off portion may not have sufficient stretchability. For instance, the collar of a turtle neck sweater needs to enable the head to pass through when wearing the sweater, but the peripheral length cannot be made very long due to restriction in design. Therefore, development of a method for knitting the knitted fabric capable of knitting the bind off portion of high stretchability is desired.

[0005] The present invention has been made in view of the above circumstances, and an object thereof is to provide a method for knitting a knitted fabric capable of knitting a bind off portion of high stretchability, and a knitted fabric knitted by applying such a knitting method.

MEANS FOR SOLVING THE PROBLEMS

[0006] The reason the stretchability of the bind off portion is not satisfactory is assumed to be because the new stitch is formed following the double stitch where the proximate stitches are overlapped, and the stretch margin of the knitting yarn at the bind off portion is small. The present inventor came to complete the present invention after thoroughly reviewing the method for knitting the knitted fabric for ensuring the stretch margin of the knitting yarn in the bind off portion.

[0007] A method for knitting a knitted fabric according to the present invention is a method for knitting a knitted fabric in which stitches of a knitted fabric portion held on a needle bed is subjected to a bind off process, using a flat knitting machine having at least a pair of front and back needle beds and in which stitches held on a knitting needle of the needle bed are transferable to a different knitting needle. The method for knitting the knitted fabric of the present invention includes, when a direction in which a bind off stitch is sequentially formed in a longitudinal direction of the needle bed is a bind off direction and a direction opposite to the bind off direction is a starting end direction, a step A of forming two new stitches, a first stitch and a second stitch, following in a wale direction of a target stitch which is a target of the bind off process, with one as a front stitch and the other as a back stitch; and a step B of overlapping a proximate stitch proximate in the bind off direction with respect to the second stitch, and the second stitch. In the method for knitting the knitted fabric of the present invention, the double stitch formed in the step B is redefined as a new target stitch, and the step A and the step B are repeated.

[0008] The "front stitch" and the "back stitch" in the method for knitting the knitted fabric of the present invention refer to the state of the stitch when the knitted fabric portion is viewed from the needle bed side on which the knitted fabric portion is knitted before the bind off process. For instance, if the knitted fabric portion is mainly knitted with the front needle bed, whether the stitch is the "front stitch" or the "back stitch" is determined from the state of the stitch when the knitted fabric portion is viewed from the front needle bed side. Furthermore, "front side of knitted fabric portion" mentioned in the next paragraph refers to the needle bed side on which the knitted fabric portion is held before the bind off process. For instance, if the knitted fabric portion is mainly knitted with the front needle bed, the front needle bed side of the knitted fabric portion is the "front side of knitted fabric portion".

[0009] Moreover, "proximate stitch" in the method for knitting the knitted fabric of the present invention is the stitch positioned at the end in the starting end direction when performing the step B of the stitches held at the needle bed before the step A.

[0010] In the method for knitting the knitted fabric of the present invention, variations of four patterns below can be assumed depending on which of the first stitch or the second stitch to have as the front stitch, and on whether to arrange the second stitch on the front side or the back side of the knitted fabric portion.

[1] First stitch = front stitch, second stitch = back stitch, second stitch is arranged on front side of knitted fabric portion

[2] First stitch = back stitch, second stitch = front stitch, second stitch is arranged on front side of knit-

ted fabric portion

[3] First stitch = front stitch, second stitch = back stitch, second stitch is arranged on back side of knitted fabric portion

[4] First stitch = back stitch, second stitch = front stitch, second stitch is arranged on back side of knitted fabric portion

Among the knitting of such four patterns, the knitting of [2], that is, having the first stitch as the back stitch and the second stitch as the front stitch in the step A, and overlapping the second stitch on the proximate stitch so that the second stitch is arranged on the front side of the knitted fabric portion in the step B is particularly preferable.

[0011] In one aspect of the method for knitting the knitted fabric of the present invention, the following steps are preferably carried out sequentially in the step A if the first stitch is the back stitch, the second stitch is the front stitch, and the second stitch is overlapped on the proximate stitch so that the second stitch is arranged on a front side of the knitted fabric portion.

(Step 1) Form the first stitch while moving a yarn feeder in the bind off direction.

(Step 2) Move the yarn feeder in the starting end direction than the first stitch.

(Step 3) Transfer the first stitch to an opposing needle bed.

(Step 4) Move the yarn feeder in the bind off direction than the first stitch.

(Step 5) Form the second stitch while moving the yarn feeder in the starting end direction.

[0012] A knitted fabric of the present invention is a knitted fabric including a bind off portion formed by repeating overlapping of proximate stitches and forming of a bind off stitch following the double stitch from one end side toward the other end side in a knitting width direction using a flat knitting machine having at least a pair of front and back needle beds and in which stitches held on a knitting needle of the needle bed are transferable to a different knitting needle. The bind off stitch in the bind off portion of the knitted fabric of the present invention comprises a first stitch formed following in the wale direction of the double stitch, and a second stitch formed following in the wale direction of the first stitch and to be overlapped on a proximate stitch proximate to the double stitch; where one of the first stitch and the second stitch is a front stitch, and the other is a back stitch.

EFFECTS OF THE INVENTION

[0013] According to the method for knitting the knitted fabric of the present invention, a knitted fabric of the present invention in which the bind off stitch in the bind off portion comprises two stitches continuing in the wale direction, one of the two stitches being the front stitch and the other being the back stitch, can be knitted.

In such a knitted fabric, the stretch margin of the bind off stitch becomes greater than in the prior art since the bind off stitch is formed from two stitches continuing in the wale direction. Therefore, the bind off portion of the knitted fabric of the present invention has excellent stretchability compared to the bind off portion of the knitted fabric of the prior art. The bind off stitch can be formed to a compactly folded state since one of the two stitches forming the bind off stitch is the front stitch and the other is the back stitch. As a result, the bind off stitch does not appear bulky if the bind off stitch comprises the front stitch and the back stitch compared to when the bind off stitch is simply formed with two front stitches (or back stitches).

[0014] The bind off portion obtained in the knitting of [2] of the knitting of [1] to [4] becomes the bind off portion with the most satisfactory appearance in terms of the arrangement of the knitting yarn.

[0015] According to the method for knitting the knitted fabric including the steps 1 to 5, the knitting yarn connecting the first stitch and the second stitch in the knitting process pulls and twists the first stitch toward the starting end. As a result, the bind off portion of the finished knitted fabric is curled toward the back side of the knitted fabric, and hence the line at the end of the bind off portion becomes smooth.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a knitting process diagram of a knitted fabric according to a first embodiment.

Fig. 2 is a loop diagram of a bind off portion in the knitted fabric according to the first embodiment.

Fig. 3 is a knitting process diagram of a knitted fabric according to a second embodiment.

Fig. 4 is a loop diagram of a bind off portion in the knitted fabric according to the second embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] Embodiments of the present invention will be hereinafter described with reference to the drawings. All the knitting described in the embodiments describe a knitting example in which a two-bed flat knitting machine having a pair of front and back needle beds extending in a transverse direction and disposed opposite to each other in a cross direction, and in which stitches can be transferred between the front and back needle beds is used. The flat knitting machine to use, obviously, may be a four-bed flat knitting machine.

[First Embodiment]

[0018] As shown in S1 of Fig. 1, an example in which a knitted fabric portion held on a front needle bed is sub-

jected to a bind off process by a method for knitting a knitted fabric according to the present invention will be described in the first embodiment. In Fig. 1, the number of knitting needles is less than the number actually used in the knitting to simplify the explanation. The knitting method of the present invention may also be applied to the bind off process of a tubular knitted fabric held in a tubular form on the front needle bed and the back needle bed.

[0019] The "alphabet + number" on the left side of Fig. 1 indicates the process number, the arrow in the left and right direction indicates the moving direction of the yarn feeder (V in the figure), "K" + arrow indicates the knitting direction, and the arrow in the up and down direction or diagonal direction indicates the direction of transfer. A to J in the figure indicate the knitting needles of the front needle bed (hereinafter referred to as FB) and the back needle bed (hereinafter referred to as BB). O in the figure indicates the stitch held on the needle bed, ⊙ indicates the double stitch, and ● indicates the stitch knitted in each knitting process, and the operation actually performed in each knitting process is shown with a thick line. In the figure, the operation of racking is omitted in the transfer that involves racking.

[0020] S1 of Fig. 1 shows a state in which the yarn feeder is moved in the right direction in the plane of drawing, and the stitches of the final course of the knitted fabric are knitted. From such a state, the stitches of the final course of the knitted fabric are subjected to the bind off process by the method for knitting the knitted fabric of the present invention. The bind off process is carried out toward the left direction starting from the end on the right direction in the plane of drawing, and hence the right direction in the plane of drawing is hereinafter referred to as starting end direction RS and the left direction is referred to as bind off direction LS. When performing the bind off process on the tubular knitted fabric in which the knitted fabric portion is held on both the FB and the BB, the bind off process at the BB is carried out with the left direction in the plane of drawing as the starting end direction RS after the bind off process at the FB is finished.

[0021] First, in S2, the stitch (target stitch 1) at the termination of the final course held on the knitting needle I of the FB is transferred to the knitting needle I of the opposing BB. In S3, the yarn feeder is moved in the bind off direction LS, and a stitch (first stitch 2) following the stitch 1 held on the knitting needle I of the BB transferred in S2 is formed. The stitch 2 formed in S3 is a back stitch.

[0022] In the following S4, the back stitch 2 formed in S3 is transferred to the knitting needle I of the FB, and in S5, a stitch (second stitch 3) is formed following the back stitch 2. The stitch 3 formed in S5 is a front stitch.

[0023] According to S2 to S5, the stitch column of two stages (stitch column of first stage comprises the back stitch 2, stitch column of second stage comprises the front stitch 3) following the wale direction of the stitch row held on the knitting needle in S1 is formed. In S6 and subsequent process following S5, the bind off process is carried out using the stitch column of two stages.

[0024] In S6, a stitch (proximate stitch 4) held on the knitting needle H of the FB and adjoining the front stitch 3 formed in S5 is transferred to the knitting needle H of the opposing BB. The proximate stitch 4 is a stitch positioned at the end of the starting end direction RS of a plurality of stitches still held on the knitting needle at the stage S5 is terminated of a plurality of stitches held on the knitting needles in S1. The front stitch 3 formed in S5 is overlapped on the stitch 4 transferred to the knitting needle H of the BB (S7). The stitch 3 overlapped on the stitch 4 in S7 is arranged on the front side of the knitted fabric with respect to the stitch 4.

[0025] In S8, the double stitch held on the knitting needle H of the BB formed in S7 is redefined as a new target stitch 1, and a first stitch 2 following the double stitch 1 is formed. The first stitch 2 is transferred to the knitting needle H of the opposing FB (S9), and a new second stitch 3 following the first stitch 2 held on the knitting needle H of the FB by being transferred in S9 is formed (S10).

[0026] Thereafter, the knitting of S6 to S10 is repeated to carry out the bind off process on the final course of the knitted fabric. Fig. 2 shows a loop diagram of the vicinity of a bind off portion in the knitted fabric knitted by applying the knitting method of the knitted fabric described above. The stitches shown using reference numerals in Fig. 2 correspond to the stitches shown using reference numerals in Fig. 1. As shown in Fig. 2, the bind off stitch in the bind off portion comprises two stitches of the first stitch 2 and the second stitch 3 continuing in the wale direction and thus has a large stretch margin in the knitting width direction of the knitted fabric. Since the first stitch 2 is the back stitch and the second
stitch 3 is the front stitch, the bind off stitch comprising such stitches 2 and 3 in the actual knitted fabric finely fits between the target stitch 1 and the proximate stitch 4, and thus satisfactory appearance of the bind off portion is realized.

[Second Embodiment]

[0027] In a second embodiment, a knitting method different from the first embodiment will be described with reference to Figs. 3 and 4. The manner of looking at Figs. 3 and 4 is similar to Figs. 1 and 2 of the first embodiment.

[0028] First, from the state in which the final course of the knitted fabric is knitted shown in T1, similar to the first embodiment, the stitch (target stitch 1) of the knitting needle I of the FB is transferred to the knitting needle I of the opposing BB (T2), and the back stitch (first stitch 2) following the transferred stitch 1 is formed (T3).

[0029] Subsequently, similar to the first embodiment, the front stitch (second stitch 3) following the back stitch 2 formed in T3 is formed, but the yarn feeder is moved to the left and right before forming the front stitch 3 in the second embodiment so that the back stitch 2 is in a twisted state. Specifically, the yarn feeder is once moved toward the starting end direction RS side than the back

stitch 2 formed in T3 so that the knitting yarn extending from the yarn feeder traverses the front side of the back stitch 2 in the starting end direction RS (T4), and then the back stitch 2 is transferred to the knitting needle I of the opposing FB (T5). Furthermore, the yarn feeder is moved toward the bind off direction LS side than the back stitch 2 so that the knitting yarn extending from the yarn feeder traverses the back side of the back stitch 2 in the bind off direction LS (T6). The yarn feeder is then reversed and moved in the starting end direction RS, and the front stitch 3 following the back stitch 2 is formed in the meantime (T7).

[0030] In the following T8, the yarn feeder is moved toward the bind off direction LS side than the knitting needle H so that the knitting yarn extending from the yarn feeder traverses the back side of the stitches 3 and 4 in the bind off direction LS. The stitch (proximate stitch 4) held on the knitting needle H of the FB is then transferred to the knitting needle H of the opposing BB (T9), and the front stitch 3 formed in T7 is overlapped on the stitch 4 to form a double stitch (T10). The double stitch of T10 is then redefined as the target stitch 1, the yarn feeder is moved toward the starting end direction RS side than the double stitch 1 held on the knitting needle H so that the knitting yarn traverses the front side of the double stitch 1 in the starting end direction RS (T11), and the yarn feeder is immediately reversed in the bind off direction LS to form the back stitch 2 following the double stitch 1 (T12).

[0031] Looking at the held state of the stitches of T12, the state substantially same as T3 is obtained. After T12, knitting similar to T4 to T12 is repeated. Fig. 4 shows a loop diagram of the vicinity of the bind off portion in the knitted fabric knitted by applying the knitting method of the knitted fabric of the second embodiment described above. As shown in Fig. 4, the first stitch 2 is pulled in the twisting direction by the knitting yarn connecting from the first stitch 2 to the second stitch 3, and hence the first stitch 2 is drawn toward the far side in the plane of drawing so as to resolve such a twisted state. As a result, the end of the knitted fabric gets drawn toward the far side in the plane of drawings, so that the line at the end becomes smooth and has satisfactory appearance.

[0032] The embodiments of the present invention are not limited to the embodiments described above, and may be appropriately changed within a scope not deviating from the gist of the present invention. For instance, one part of the knitting process of the first embodiment may be interchanged and performed. In S2 to S7 of Fig. 1, the first stitch 2 is the back stitch and the second stitch 3 is the front stitch, but the knitting process may be appropriately interchanged such that the first stitch 2 is the front stitch and the second stitch 3 is the back stitch. In S6, S7 of Fig. 1, the second stitch 3 is overlapped on the front side of the proximate stitch 4, but S7 may be carried out first and S6 may be carried out afterwards so that the second stitch 3 is overlapped on the back side of the proximate stitch 4. In addition, two stages of the stitch column having a width of two or more stitches in the knitting width direction may be arranged in the bind off process. In this case, at least one (may be all) of the stitches configuring the stitch column of the second stage may be overlapped on the proximate stitch as a bind off stitch. In this case, obviously, if the stitch column of the first stage is configured by the back stitch (or front stitch), the stitch column of the second stage is configured by the front stitch (back stitch).

DESCRIPTION OF SYMBOLS

[0033]

A	to J knitting needle
FB	front needle bed
BB	back needle bed
LS	bind off direction
RS	starting end direction
1	target stitch (stitch, double stitch)
2	first stitch (stitch, back stitch)
3	second stitch (stitch, front stitch)
4	proximate stitch (stitch)

Claims

1. A method for knitting a knitted fabric in which stitches of a knitted fabric portion held on a needle bed is subjected to a bind off process, using a flat knitting machine having at least a pair of front and back needle beds and in which stitches held on a knitting needle of the needle bed are transferable to a different knitting needle, wherein the method comprises:

when a direction in which a bind off stitch is sequentially formed in a longitudinal direction of the needle bed is a bind off direction (LS) and a direction opposite to the bind off direction (LS) is a starting end direction (RS),
a step A of forming two new stitches, a first stitch (2) and a second stitch (3), following in a wale direction of a target stitch (1) which is a target of the bind off process, with one as a front stitch and the other as a back stitch; and
a step B of overlapping a proximate stitch (4) proximate in the bind off direction (LS) with respect to the second stitch (3), and the second stitch (3), wherein
the double stitch formed in the step B is redefined as a new target stitch, and the step A and the step B are repeated.

2. The method for knitting a knitted fabric according to claim 1, wherein
in the step A, the first stitch (2) is the back stitch and the second stitch (3) is the front stitch, and
in the step B, the second stitch (3) is overlapped on the proximate stitch (4) so that the second stitch (3) is arranged on a front side of the knitted fabric portion.

3. The method for knitting a knitted fabric according to claim 2, wherein
in the step A,
a step 1 of forming the first stitch (2) while moving a yarn feeder in the bind off direction (LS),
a step 2 of moving the yarn feeder in the starting end direction (RS) than the first stitch (2),
a step 3 of transferring the first stitch (2) to an opposing needle bed,
a step 4 of moving the yarn feeder in the bind off direction (LS) than the first stitch (2), and
a step 5 of forming the second stitch (3) while moving the yarn feeder in the starting end direction (RS),
are sequentially carried out.

4. A knitted fabric including a bind off portion formed by repeating overlapping of proximate stitches and forming of a bind off stitch following in a wale direction of the double stitch from one end side toward the other end side in a knitting width direction, using a flat knitting machine having at least a pair of front and back needle beds and in which stitches held on a knitting needle of the needle bed are transferable to a different knitting needle, wherein
the bind off stitch in the bind off portion includes,
a first stitch (2) formed following in the wale direction of the double stitch, and
a second stitch (3) formed following in the wale direction of the first stitch (2) and to be overlapped on a proximate stitch (4) proximate to the double stitch, and
one of the first stitch (2) and the second stitch (3) is a front stitch, and the other is a back stitch.

Fig. 1

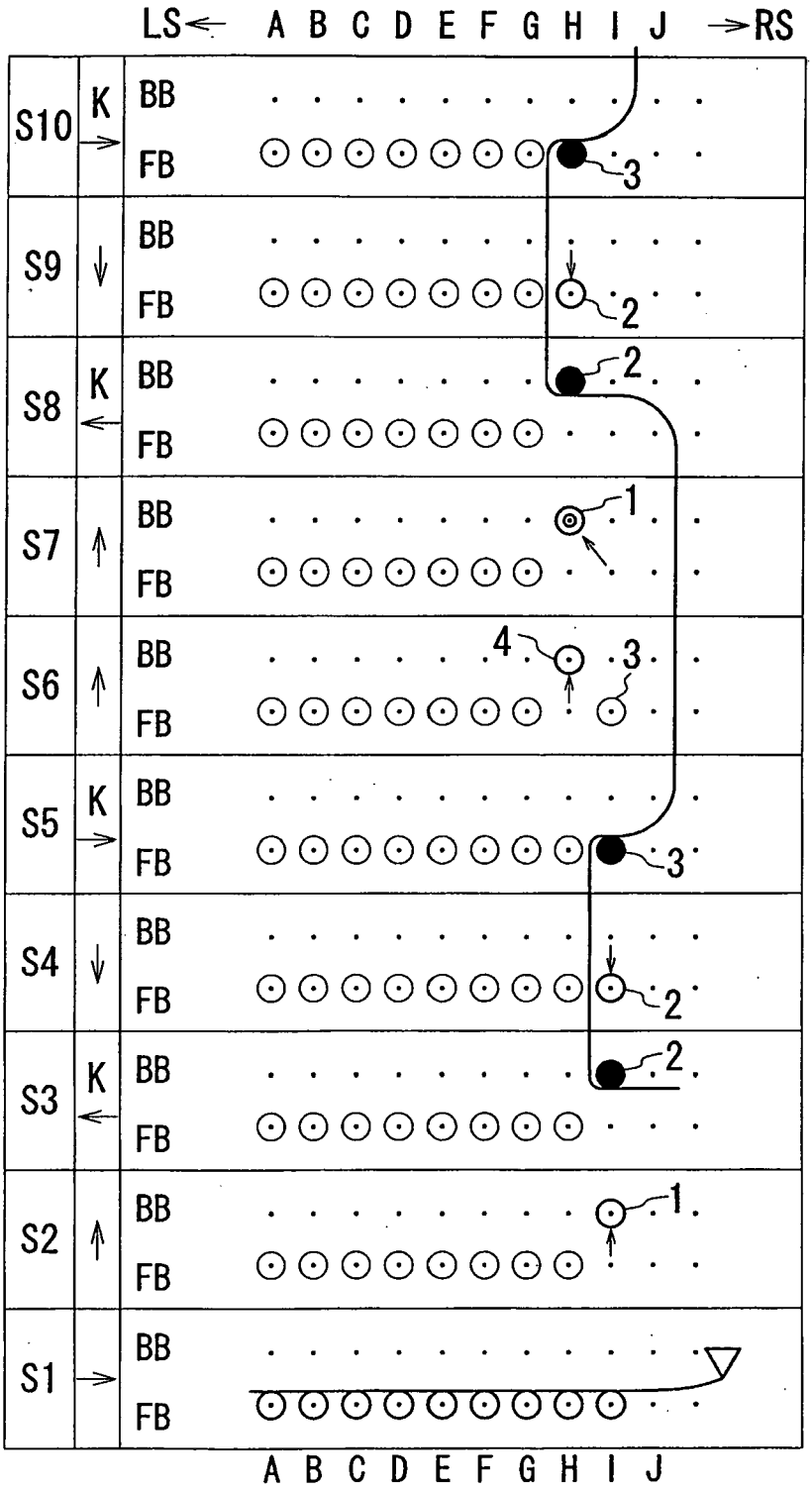


Fig. 2

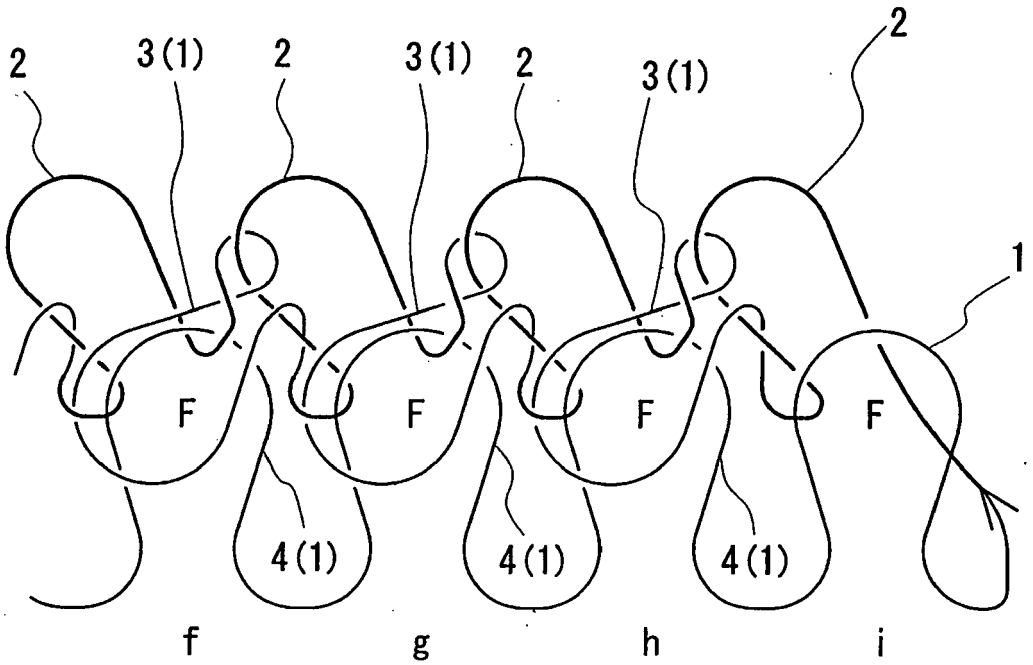


Fig. 3

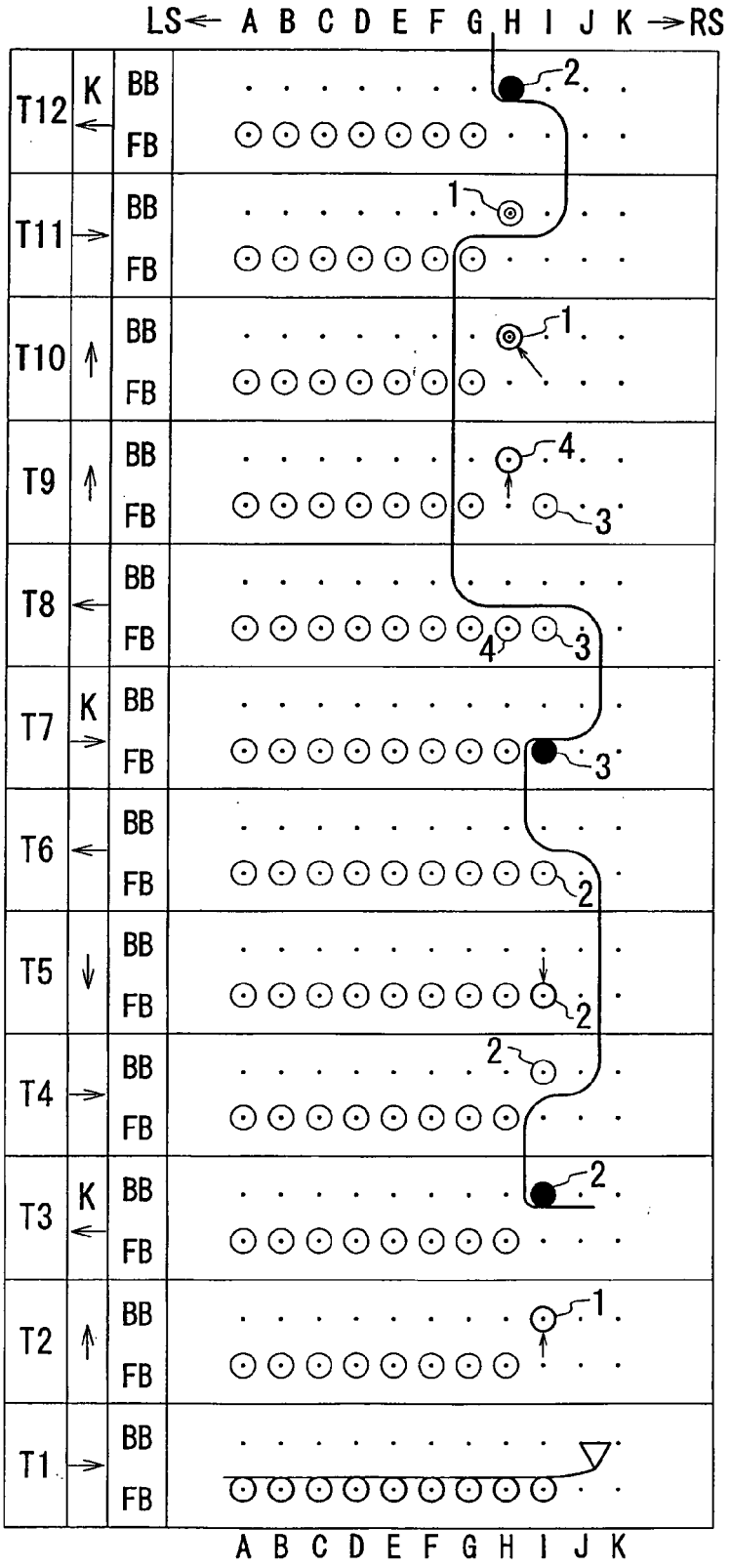
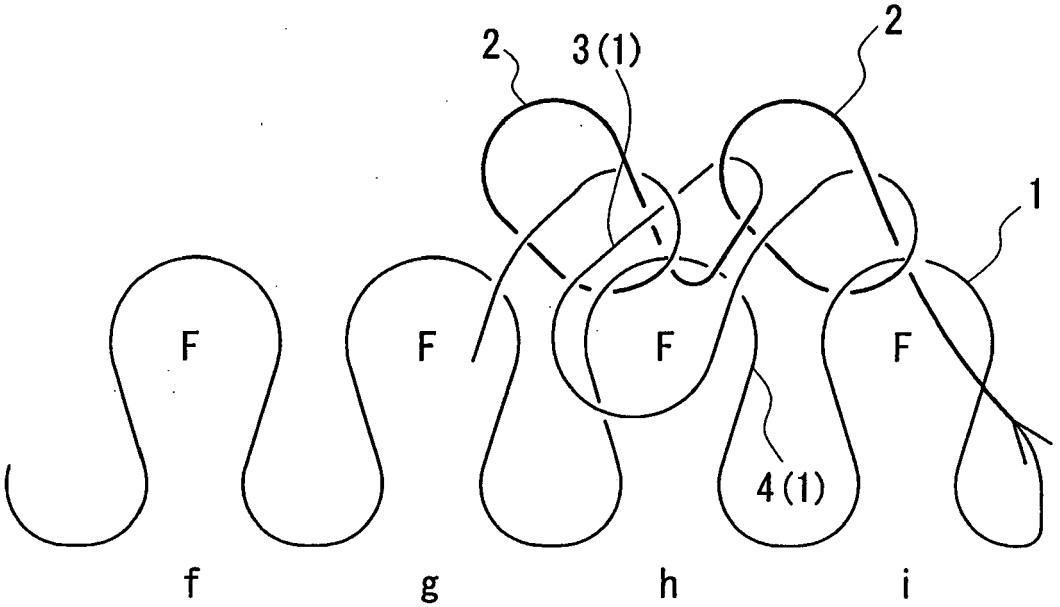

LS← A B C D E F G H I J K →RS
T12
K
BB
FB
T11
T10
T9
T8
T7
T6
T5
T4
T3
T2
T1
1
2
3
4
A B C D E F G H I J K

Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 11 00 6033

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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	28 November 2011	Zirkler, Stefanie

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 00 6033

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
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