

(19)



(11)

EP 2 463 420 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

13.06.2012 Bulletin 2012/24

(51) Int Cl.:

D04B 1/22 (2006.01)(21) Application number: **11009658.3**(22) Date of filing: **07.12.2011**

(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**

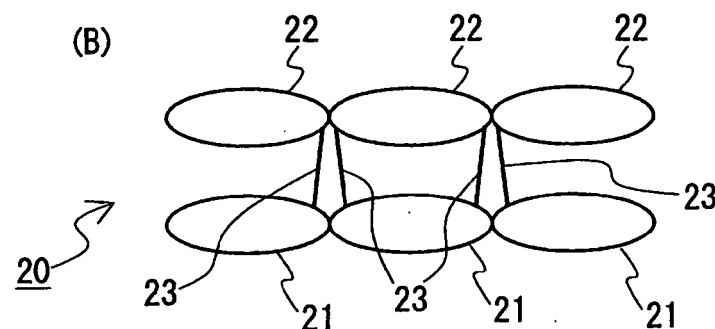
Designated Extension States:

BA ME(30) Priority: **10.12.2010 JP 2010276264**(71) Applicant: **SHIMA SEIKI MFG. LTD.****Wakayama-shi****Wakayama 641-8511 (JP)**(72) Inventor: **Okamoto, Kazuyoshi****Wakayama-shi****Wakayama, 641-8511 (JP)**(74) Representative: **Schmidbauer, Andreas Konrad****Wagner & Geyer****Patent- und Rechtsanwälte****Gewürzmühlstrasse 5****80538 München (DE)**(54) **Bind-off method of knitted fabric and knitted fabric**

(57) To provide a bind-off method of a knitted fabric capable of obtaining a tight bind-off processing portion having excellent contractile property.

After obtaining a state in which a stitch row is allocated to one needle bed (FB) and other needle bed (BB), following [1], [2] are alternately repeated using a same knitting yarn. [1] A stitch at an end on one side (stitch η) at an end in a starting end direction (RS) of the (FB) and a stitch (ϵ) closest in a bind-off direction (LS) from the

stitch (η) of the (FB) are overlapped on the (BB), a new stitch (P1) is formed following the double stitches (ϵ/η), and the new stitch (P1) is redefined as the stitch at the end on the one side. [2] A stitch at an end on the other side (stitch P0) at an end in the starting end direction (RS) of the (BB) and a stitch (δ) closest in the bind-off direction (LS) from the stitch (P0) of the (BB) are overlapped on the (FB), a new stitch (P2) is formed following the double stitches ($\delta/P0$), and the stitch (P2) is redefined as the stitch at the end on the other side.

Fig. 2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a bind-off method of a knitted fabric for performing a bind-off process on stitches at an end in a wale direction of a knitted fabric held on a needle bed when knitting a knitted fabric using a flat knitting machine, and a knitted fabric obtained by applying the bind-off method of a knitted fabric.

Description of the Related Art

[0002] When knitting a knitted fabric using a flat knitting machine, the bind-off process can be mentioned as a method of processing such that a stitch row (stitch row at the end in a wale direction) of the final course of the knitted fabric does not ravel. The bind-off process is a process of repeating overlapping of adjacent stitches of the stitch row held on a needle bed, and forming of a new stitch following the overlapped stitches (double stitches) from one end side toward the other end side in a knitting width direction of the knitted fabric (see e.g., Patent Document 1).

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0003] [Patent Document 1] Japanese Unexamined Patent Publication No. 2-091254

SUMMARY OF THE INVENTION

[0004] Stretching property is often demanded on a bind-off processing portion formed in the final course of a knitted fabric. For instance, a typical example is a neck of a sweater. The neck of the sweater needs to enable the head to pass through when wearing the sweater and to fit a human body when the sweater is worn.

[0005] However, it is hard to say that the bind-off processing portion obtained with the conventional bind-off method has sufficient stretching property. It is assumed that the stretching property of the bind-off processing portion is not satisfactory because a stretch allowance of a knitting yarn in the bind-off processing portion is small. The size (density) of a stitch may be increased to deal with the problem that the stretch allowance of the knitting yarn is small, but in this case, the bind-off processing portion may be flared thus affecting the appearance of the knitted fabric.

[0006] In view of the above situation, it is an object of the present invention to provide a bind-off method of a knitted fabric capable of obtaining a tight bind-off processing portion having excellent contractile property, and a knitted fabric knitted by applying such a bind-off

method.

[0007] A bind-off method of a knitted fabric according to the present invention is a bind-off method of a knitted fabric for performing a bind-off process on a stitch row at an end in a wale direction of a knitted fabric held on a needle bed using a flat knitting machine having at least a pair of front and back needle beds, at least either of which being capable of being racked in a transverse direction and a stitch held on a knitting needle of the needle bed being transferrable to a different knitting needle. Assuming that 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, the bind-off process method of the present invention alternately repeats the following steps [1] and [2] using the same knitting yarn with the stitch row allocated to one needle bed and other needle bed.

[1] Overlapping a stitch at an end on one side, which is at an end in the starting end direction of the one needle bed, and a stitch, which is closest from the stitch at the end on the one side in the bind-off direction of the one needle bed, on the other needle bed, forming a new stitch following the double stitches, and redefining the new stitch as the stitch at the end on the one side.

[2] Overlapping a stitch at an end on the other side, which is at an end in the starting end direction of the other needle bed, and a stitch, which is closest from the stitch at the end on the other side in the bind-off direction of the other needle bed, on the one needle bed, forming a new stitch following the double stitches, and redefining the new stitch as the stitch at the end on the other side.

The steps [1] and [2] are to be alternately carried out, and either one may be carried out first.

[0008] In the bind-off method of the knitted fabric according to the present invention, the allocation of the stitch row to the front and back needle beds is preferably carried out based on a certain rule. For instance, in the case of the stitch row of a plain structure, stitches are preferably allocated alternately one by one to the front and back needle beds from the starting end direction toward the bind-off direction (see first embodiment to be described later). In the case of the stitch row of a rib structure, front stitches and back stitches are allocated to the front and back needle beds when the stitch row is knitted, and thus the allocated state can be used as is (see fourth embodiment to be described later). In addition, the stitches of the stitch row of the rib structure may be allocated alternately one by one to the front and back needle beds. In this case, the front stitches are arranged on the one needle bed, the back stitches are arranged on the other needle bed, and the front stitches and the back stitches are alternately lined from the starting end direction toward the bind-off direction (see second and third embodiments to be described later).

[0009] In accordance with one aspect of the bind-off method of the knitted fabric of the present invention, a pickup stitch is preferably formed on an empty needle of

either the front or back needle bed before forming the new stitch in at least either the front or back needle bed; and the pickup stitch is preferably removed from the needle bed after forming the new stitch.

[0010] Specifically showing the timing of forming the pickup stitch on the empty needle, it may be before forming the new stitch of step [1] or it may be before forming the new stitch of step [2]. The pickup stitch may be formed, of course, at both before forming the new stitch of step [1] and before forming the new stitch of step [2]. The timing of removing the pickup stitch from the needle bed is not particularly limited as long as it is after the new stitch is formed. For instance, if the pickup stitch is formed before forming the new stitch of step [1], the pickup stitch may be removed from the needle bed immediately after forming the new stitch of step [1] or the pickup stitch may be removed from the needle bed after all the bind-off processes are finished.

[0011] In accordance with another aspect of the bind-off method of the knitted fabric of the present invention, an elastic yarn is preferably used for the knitting yarn. In this case, only the elastic yarn may be used, or the elastic yarn aligned with the non-elastic yarn may be used.

[0012] A knitted fabric of the present invention is a knitted fabric including a bind-off processing portion formed by repeating a bind-off process from one end side to 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, at least either of which being capable of being racked in a transverse direction and a stitch held on a knitting needle of the needle bed being transferrable to a different knitting needle. The bind-off processing portion arranged in the knitted fabric of the present invention has a bind-off stitch comprising a front stitch and a bind-off stitch comprising a back stitch alternately formed from one side to the other side in the knitting width direction of the knitted fabric with the same knitting yarn.

[0013] According to the bind-off method of the knitted fabric of the present invention, the knitted fabric of the present invention including a bind-off processing portion with a bind-off stitch (front bind-off stitch) comprising a front stitch and a bind-off stitch (back bind-off stitch) comprising a back stitch alternately formed from one side to the other side in the knitting width direction of the knitted fabric with the same knitting yarn can be knitted. Since the bind-off stitch comprising the front stitch and the bind-off stitch comprising the back stitch are connected with the cross-over yarn, the knitting yarn is reeled to the front bind-off stitch and the back bind-off stitch from the cross-over yarn so that the bind-off processing portion is stretched when the knitted fabric of the present invention is pulled in the knitting width direction of the knitted fabric. Therefore, the bind-off processing portion in the knitted fabric of the present invention exhibits stretching property better than the conventional bind-off processing portion. The bind-off processing portion is formed by alternately lining the front bind-off stitch and the back bind-off stitch like the rib structure, and thus is in a compactly folded

state. The line of the end of the bind-off processing portion is thus beautifully finished without unevenness, and the bind-off processing portion does not flare in the knitting width direction.

[0014] The yarn length can be increased between the front bind-off stitch and the back bind-off stitch, which are alternately formed, by forming the pickup stitch and removing the pickup stitch in the bind-off method of the knitted fabric of the present invention. Thus, the bind-off stitches can be formed to a size that the knitting yarn of a sufficient length can be reeled toward the cross-over yarn when the bind-off stitches are deformed, and the stretching property of the bind-off processing portion can be further enhanced.

[0015] A hole can be prevented from forming in the bind-off processing portion by the stretching property of the elastic yarn even if the yarn length is increased between the front bind-off stitch and the back bind-off stitch by using the elastic yarn in the bind-off method of the knitted fabric of the present invention. The stretching property of the bind-off processing portion can be enhanced by the stretching property of the elastic yarn itself.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a knitting step diagram related to a bind-off method of a knitted fabric described in a first embodiment;

Fig. 2(A) is a plan view of the knitted fabric according to the first embodiment, Fig. 2(B) is an image diagram of stitches when Fig. 2(A) is seen from the direction of the black arrow, Fig. 2(C) is a plan view of the knitted fabric when the knitted fabric of Fig. 2(A) is pulled in the knitting width direction, and Fig. 2(D) is an image diagram of stitches when Fig. 2(C) is seen from the direction of the black arrow;

Fig. 3 is a knitting step diagram related to a bind-off method of a knitted fabric described in a second embodiment;

Fig. 4 is a knitting step diagram related to a bind-off method of a knitted fabric described in a third embodiment; and

Fig. 5 is a knitting step diagram related to a bind-off method of a knitted fabric described in a fourth embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] Hereinafter, embodiments of the present invention will be described based on the drawings. The knitting described in the embodiments all describe a knitting example using 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, wherein the back needle bed is capable of be-

ing racked in the transverse direction and a stitch can be transferred between the front and back needle beds. The flat knitting machine to be used may, of course, be a four-bed flat knitting machine.

<First embodiment>

[0018] In the present embodiment, as shown in S1 of Fig. 1, an example of performing a bind-off process on a stitch row at an end in a wale direction of a knitted fabric of a plain knitting held on a front needle bed will be described. The description will be made with the number of knitting needles less than the number used in the actual knitting to facilitate the explanation.

[0019] In Fig. 1, "S + number" on the left column indicates the step number, and the right column shows the knitting state in each step. The vertical or diagonal arrow in the right column indicates transfer, and the reference numerals 1 to 12 indicate the positions of the knitting needles (black dots) of the front needle bed FB and the back needle bed BB. Furthermore, ○ in Fig. 1 indicates the stitch held on the needle bed, ⊙ indicates double stitches, ● indicates the stitch knitted in each knitting step, and reversed V-letter indicates a pickup stitch. In Fig. 1, regarding the transfer involving racking, the operation of such racking is not described.

[0020] In S1 of Fig. 1, a state in which the stitch row (stitches α to θ) of the final course of the knitted fabric is held on the FB is shown. From this state, the bind-off process of the relevant stitch row is started using an elastic yarn different from the knitting yarn (non-elastic yarn) used in the knitting of the knitted fabric. The bind-off process is started from the end in the right direction in the plane of drawing and carried out in the left direction, and hence the right direction in the plane of drawing is hereinafter referred to as the starting end direction RS, and the left direction is hereinafter referred to as the bind-off direction LS. The knitting procedure of the bind-off stitch (stitch P0 of S5) formed first through S2 to S5 following S1 is slightly different from the bind-off method of the knitted fabric of the present invention.

[0021] First, in S2, the stitches β , δ , ξ held on the knitting needles 2, 4, 6 of the FB are transferred to the knitting needles 2, 4, 6 of the opposing BB. In S3, the stitch ξ of the knitting needle 6 of the BB is overlapped on the stitch θ of the knitting needle 8 of the FB.

[0022] In the following S4, a pickup stitch κ is formed on the knitting needle 10 of the BB while moving a yarn feeder in the bind-off direction LS, the yarn feeder is further moved to a position beyond the double stitches ξ/θ , and a new stitch P0 following the double stitches ξ/θ formed on the knitting needle 8 of the FB in S3 is formed while moving the yarn feeder in the starting end direction RS in S5. The stitch P0 formed in S5 is the bind-off stitch formed first in the bind-off process, and is a front stitch. The pickup stitch κ formed in S4 may be formed on an empty needle of the FB. The pickup stitch κ may be formed while moving the yarn feeder in the starting end

direction RS.

[0023] The stitch P0 is transferred to the knitting needle 6 of the BB in the next S6, and thus is assumed as the stitch (stitch at the end on the other side) at the end in the starting end direction RS of the BB in the present embodiment. The stitch η held on the knitting needle 7 of the FB then becomes the stitch (stitch at the end on one side) at the end in the starting end direction RS of the FB. In other words, assuming that the stitch P0 is on the knitting needle 6 of the BB, the stitches of the stitch row of the plain knitting are alternately allocated one by one to the FB and the BB. After the next S6, step [1] and step

[2] of the bind-off method of the knitted fabric of the present invention are repeated.

[0024] In S6, the stitches η , P0 held on the knitting needles 7, 8 of the FB are respectively transferred to the knitting needles 5, 6 of the BB, and in S7, the pickup stitch κ is removed from the needle bed and the stitch ε held on the knitting needle 5 of the FB is transferred to the knitting needle 5 of the BB. At the time point when S7 is completed, the stitch η (stitch at the end on one side) which was at the end in the starting end direction RS of the FB in S5 and the stitch ε which was at the position closest to the stitch η on the FB are overlapped on the knitting needle 5 of the BB.

[0025] The yarn length of the knitting yarn to the stitch P0 from the start of the bind-off process can be increased by removing the pickup stitch κ formed in S4 from the knitting needle 10 of the BB in S7. The yarn length is determined more or less by to what extent the position of forming the pickup stitch κ is spaced apart from the position of forming the stitch P0. Thus, the position of the pickup stitch κ may be appropriately selected according to the necessary yarn length. The timing to remove the pickup stitch κ is not particularly limited as long as it is after the stitch P0 is formed in S5. For instance, the pickup stitch κ may be removed from the BB after all the bind-off process is finished.

[0026] In the following S8, the yarn feeder is moved in the bind-off direction LS to the position beyond the double stitches ε/η of S7, and then the yarn feeder is inverted in the starting end direction RS and a new stitch P1 following the double stitches ε/η is formed. The stitch P1 formed in S8 is a back stitch. The stitch P1 is held on the BB at the time point when S8 is completed, but is transferred to the FB in the next S9 to become the stitch at the end on one side at the end in the starting end direction RS of the FB.

[0027] In S9, the stitches P1, P0 held on the knitting needles 5, 6 of the BB are transferred to the knitting needles 5, 6 of the opposing FB, and the stitch δ held on the knitting needle 4 of the BB is transferred to the knitting needle 6 of the FB in S10. At the time point when S10 is completed, the stitch P0 (stitch at the end on the other side) which was at the end in the starting end direction

RS of the BB in S8 and the stitch δ which was at the position closest to the stitch P0 on the BB are overlapped on the knitting needle 6 of the FB. The stitch P1 in S8 is defined as the stitch at the end on one side of the FB, and thus is not the stitch closest to the stitch P0 that is the stitch at the end on the other side.

[0028] In S11, while again moving the yarn feeder in the bind-off direction LS, the pickup stitch λ is formed on the knitting needle 8 of the BB, the yarn feeder is moved to the position beyond the double stitches $\delta/P0$, and the yarn feeder is inverted in the following S12 to form a new stitch P2 following the double stitches $\delta/P0$.

[0029] Looking at the held state of the stitches and the position of the yarn feeder in S12, the stitches are less by one stitch in the FB and the BB from the state of S5. Therefore, in the subsequent knitting including S12, the bind-off process can be performed on the final course of the knitted fabric by repeating the knitting similar to S5 to S11.

[0030] The knitted fabric knitted by applying the bind-off method of the knitted fabric described above will be describe based on Fig. 2. Looking at a bind-off processing portion 20 formed in the final course of a knitted fabric 100 shown in Fig. 2(A) from the direction of the black arrow in the figure, a front stitch 21 and a back stitch 22, which are alternately formed, are lined in the thickness direction of the knitted fabric, as shown in the image diagram of Fig. 2(B). The front stitch 21 and the back stitch 22 are connected through a cross-over yarn 23, and the bind-off processing portion 20 is tightened like the rib structure.

[0031] As shown in Fig. 2(C), when the knitted fabric of Fig. 2(A) is pulled in the knitting width direction, the front stitch 21 and the back stitch 22 are stretched in the knitting width direction, and the cross-over yarn 23 connecting to the front stitch 21 and the back stitch 22 is reeled out to the front stitch 21 and the back stitch 22, as shown in the image diagram of Fig. 2(D). Thus, the bind-off processing portion 20 exhibits stretching property better than the conventional art. Furthermore, the knitting yarn configuring the bind-off processing portion 20 is less likely to break even if the bind-off processing portion 20 is stretched.

<Second embodiment>

[0032] In a second embodiment, an example of performing a bind-off process on a stitch row at an end in a wale direction of a knitted fabric having a 2x2 rib structure through a bind-off method of a knitted fabric of the present invention will be described based on the knitting process diagram of Fig. 3. The second embodiment shows an example of performing the bind-off process on the stitch row after stitches of the stitch row having the 2 x 2 rib structure are alternately allocated one by one to the FB and the BB.

[0033] The knitting process diagram of Fig. 3 is, unlike the knitting process diagram of Fig. 1, a knitting process

diagram expressed so that the state of racking of the BB can be seen. Among the stitches indicated with O in T1 of Fig. 3, the stitch denoted with a reference symbol of a capital alphabet held on the FB is the front stitch, and the stitch denoted with a reference symbol of a small letter alphabet held on the BB is the back stitch.

[0034] With respect to the stitch of having the 2 x 2 rib structure shown in T1 of Fig. 3, the BB is racked by one pitch in the starting end direction RS, and thereafter, back stitches a, c are transferred from the BB to the FB and front stitches B, D are transferred from the FB to the BB in T2. Then, in T3, the BB is further racked by one pitch in the starting end direction RS, and thereafter, the back stitches a, c are returned from the FB to the BB and the front stitches B, D are returned from the BB to the FB. In T4, the BB is racked by two pitches in the bind-off direction LS to return the BB to a standard position facing the FB.

[0035] Looking at the arrangement state of the stitches in T4, the front stitches and the back stitches are alternately lined on the FB and the BB except the front stitch F, that is, the back stitch (front stitch) is arranged between two front stitches (back stitches) adjacent in the longitudinal direction of the needle bed. Looking at the arrangement state of all the stitches of T4, the arrangement state same as S2 of Fig. 1 is obtained. Therefore, the 2 x 2 rib structure of the second embodiment is to be subsequently subjected to the bind-off process through the knitting similar to the first embodiment with reference to Fig. 1.

[0036] According to the bind-off method of the second embodiment described above, only the front stitches are arranged on the FB and only the back stitches are arranged on the BB, and furthermore, the alignment in the knitting width direction of the front stitches on the FB and the alignment in the knitting width direction of the back stitches on the BB can be subjected to the bind-off process while being maintained in a state when the rib structure is knitted. Therefore, according to the bind-off method of the present embodiment, the bind-off processing portion that is orderly and that has satisfactory appearance can be formed. Moreover, almost all the double stitches formed in the bind-off process of this embodiment are the double stitches in which the front stitch and the back stitch are overlapped. For instance, considering the bind-off process performed on the FB side, the end stitch of the FB and the adjacent stitch which is next to such an end stitch are overlapped, a new stitch (back stitch as it is formed on the BB) following the double stitches is formed, and such a back stitch is defined as the next end stitch, and thus the end stitch is always the back stitch and the adjacent stitch is always the front stitch. Similarly, in the bind-off process performed on the BB side, the end stitch is always the front stitch, and the adjacent stitch is always the back stitch. Therefore, one factor of realizing the bind-off processing portion of satisfactory appearance is that the combination of the stitches to be overlapped is orderly over the entire bind-off processing portion.

<Third embodiment>

[0037] In a third embodiment, an example of performing a bind-off process on a stitch row at an end in a wale direction of a knitted fabric having a 3 x 3 rib structure through a bind-off method of a knitted fabric of the present invention will be described based on the knitting process diagram of Fig. 4. In regards to the stitch row having the 3 x 3 rib structure as well, the bind-off process is performed on the stitch row after alternately allocating the stitches of the relevant stitch row one by one to the FB and the BB, similar to the first and second embodiments. Fig. 4 is viewed similar to Fig. 3.

[0038] With respect to the stitch row having the 3 x 3 rib structure shown in U1 of Fig. 4, front stitches B, E are transferred from the FB to the BB (U2), the BB is racked by one pitch in the starting end direction RS, and thereafter, the front stitches B, E are returned from the BB to the FB and back stitches a, d are transferred from the BB to the FB (U3). After racking the BB by one pitch in the starting end direction RS, the back stitches a, d are returned from the FB to the BB (U4), and then the BB is further racked by one pitch in the starting end direction RS, a front stitch C is transferred from the FB to the BB and a back stitch c is transferred from the BB to the FB (U5). After racking the BB by one pitch in the bind-off direction LS, the front stitch C is returned from the BB to the FB, the back stitch c is returned from the FB to the BB (U6), and lastly, the BB is racked by two pitches in the bind-off direction LS to return the BB to the standard position.

[0039] Looking at the arrangement state of the stitches in the U6, a state in which the front stitches and the back stitches are alternately lined one by one on the FB and the BB, that is, a state in which the back stitch (front stitch) is arranged between two front stitches (back stitches) adjacent in the longitudinal direction of the needle bed is obtained. Thereafter, a front stitch E and a back stitch e are first overlapped, a new stitch following the double stitches is formed, the new stitch is defined as the stitch (stitch at the end on one side) at the end in the starting end direction RS of the FB, and the knitting similar to the first embodiment with reference to Fig. 1 is carried out.

[0040] The bind-off method of the third embodiment described above can also form the bind-off processing portion having a satisfactory appearance due to reasons similar to the bind-off method of the second embodiment.

[0041] Similar to the second and third embodiments, the case of performing the bind-off process on the stitch row of the rib structure (e.g., various rib structures such as 2 x 1 and 2 x 3) different from the second and third embodiments can also form the bind-off processing portion having a satisfactory appearance by alternately arranging the front stitches and the back stitches one by one on the FB and the BB from the starting end direction RS toward the bind-off direction LS.

<Fourth embodiment>

[0042] In a fourth embodiment, when performing a bind-off process of a knitted fabric of the present invention on a stitch row having a 2 x 2 rib structure, an example of starting the bind-off process of the knitted fabric of the present invention on the stitch row with the same state as when the relevant stitch row is knitted will be described based on Fig. 5. Fig. 5 is viewed similar to Fig. 3.

[0043] In V1, a state in which the front stitches and the back stitches are alternately held by the two stitches on the FB and the BB is shown. The BB is racked by two pitches in the starting end direction RS from the state of V1, and thereafter, a pickup stitch μ is formed at a position spaced apart by four needles in the starting end direction RS from the back stitch c of the BB and the back stitch d is overlapped on a front stitch F (V2). Needless to say, the position of forming the pickup stitch μ is not limited to such a position.

[0044] The stitch P0 is formed following the double stitches d/F of V2 after racking the BB by one pitch in the bind-off direction LS (V3). The stitch P0 is defined as the stitch (stitch at the end on the other side) at the end in the starting end direction RS of the BB.

[0045] A stitch E that is the stitch (stitch at the end on one side) at the end on the starting end direction RS side of the FB is then transferred from the FB to the BB, and the stitch P0 is also transferred from the FB to the BB (V4). The BB is racked by three pitches in the bind-off direction LS, and thereafter, the pickup stitch μ is removed from the BB, a front stitch D is overlapped on the front stitch E transferred to the BB in V4 (V5), and the stitch P1 following the double stitches D/E is formed (V6). In V5, the front stitch D overlapped on the front stitch E is the stitch which was at the position closest in the bind-off direction LS from the front stitch E in V3.

[0046] The stitches P0, P1 are then transferred from the BB to the FB (V7), the BB is racked by two pitches in the starting end direction RS, and then the back stitch c is overlapped on the stitch P0 (V8). In V8, the back stitch c to be overlapped on the stitch P0 that is the end stitch of the BB is the stitch which was at the position closest in the bind-off direction LS from the stitch P0 in V4. The stitch E in V4 is not the stitch of the BB and thus is not the stitch proximate to the stitch P0.

[0047] The knitting substantially similar to V3 to V8 may be repeated after V8. Specifically, a new stitch following the double stitches c/P0 is formed, and such a new stitch is defined as the end stitch in the starting end direction RS of the BB. The stitch P1 that is the end stitch of the FB and the front stitch C are overlapped, a new stitch following such double stitches is formed, and such a new stitch is defined as the end stitch in the FB.

[0048] In the bind-off method of the fourth embodiment as well, the bind-off processing portion having a satisfactory appearance can be formed since the double stitches is a combination of the front stitch and the back stitch, similar to the bind-off method of the second and

third embodiments.

[0049] The embodiments of the present invention are not limited to the embodiments described above, and can be appropriately changed within a scope not deviating from the gist of the invention. For instance, in the case of the tubular knitted fabric in which the front side knitted fabric and the back side knitted fabric are respectively held on the FB and the BB, the bind-off process described in the above embodiments may be carried out on each of the front side knitted fabric and the back side knitted fabric.

Claims

1. A bind-off method of a knitted fabric for performing a bind-off process on a stitch row at an end in a wale direction of a knitted fabric held on a needle bed using a flat knitting machine having at least a pair of front and back needle beds, at least either of which being capable of being racked in a transverse direction and a stitch held on a knitting needle of the needle bed being transferrable to a different knitting needle, **characterized in that**

assuming that 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 comprising the steps of:

obtaining a state in which the stitch row is allocated to one needle bed (FB) and other needle bed (BB);
overlapping a stitch (η) at an end on one side, which is at an end in the starting end direction (RS) of the one needle bed (FB) and a stitch (ϵ), which is closest from the stitch (η) at the end on the one side in the bind-off direction (LS) of the one needle bed (FB), on the other needle bed (BB), forming a new stitch (P1) following the double stitches (ϵ/η), and redefining the new stitch (P1) as the stitch at the end on the one side;
overlapping a stitch (P0) at an end on other side, which is at an end in the starting end direction (RS) of the other needle bed (BB), and a stitch (δ), which is closest from the stitch (P0) at the end on the other side in the bind-off direction (LS) of the other needle bed (BB), on the one needle bed (FB), forming a new stitch (P2) following the double stitches ($\delta/P0$), and redefining the new stitch (P2) as the stitch at the end on the other side; and
alternately repeating the above using a same knitting yarn.

2. The bind-off method of the knitted fabric according to claim 1, **characterized in that**

a pickup stitch (κ) is formed on an empty needle of either the front or back needle bed before forming the new stitch (P1 (P2)) on at least either the front or back needle bed; and
the pickup stitch (κ) is removed from the needle bed after forming the new stitch (P1 (P2)).

3. The bind-off method of the knitted fabric according to claim 1, **characterized in that** an elastic yarn is used for the knitting yarn.

4. The bind-off method of the knitted fabric according to claim 2, **characterized in that** an elastic yarn is used for the knitting yarn.

5. The bind-off method of the knitted fabric according to any one of claims 1 to 4, **characterized in that** when the stitch row is knitted with a plain structure, stitches of the stitch row are alternately allocated one by one to the one needle bed (FB) and the other needle bed (BB) from the starting end direction (RS) toward the bind-off direction (LS) using transfer and racking.

6. The bind-off method of the knitted fabric according to any one of claims 1 to 4, **characterized in that** when the stitch row is knitted with a rib structure, front stitches of the stitch row are allocated to the one needle bed (FB) and back stitches are allocated to the other needle bed (BB) by having the stitch row in a state same as when knitted.

7. The bind-off method of the knitted fabric according to any one of claims 1 to 4, **characterized in that** when the stitch row is knitted with a rib structure, front stitches of the stitch row are allocated to one needle bed (FB) and back stitches of the stitch row are allocated to the other needle bed (BB), wherein the stitches are alternately arrayed one by one to the one needle bed (FB) and the other needle bed (BB) from the starting end direction (RS) toward the bind-off direction (LS) using transfer and racking.

8. A knitted fabric (100) including a bind-off processing portion (20) formed by repeating a bind-off process from one end side to 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, at least either of which being capable of being racked in a transverse direction and a stitch held on a knitting needle of the needle bed being transferrable to a different knitting needle, **characterized in that** the bind-off processing portion (20) has a bind-off stitch comprising a front stitch (21) and a bind-off stitch comprising a back stitch (22) alternately formed from one side to the other side in the knitting width direction of the knitted fabric with a same knitting yarn.

Fig. 1

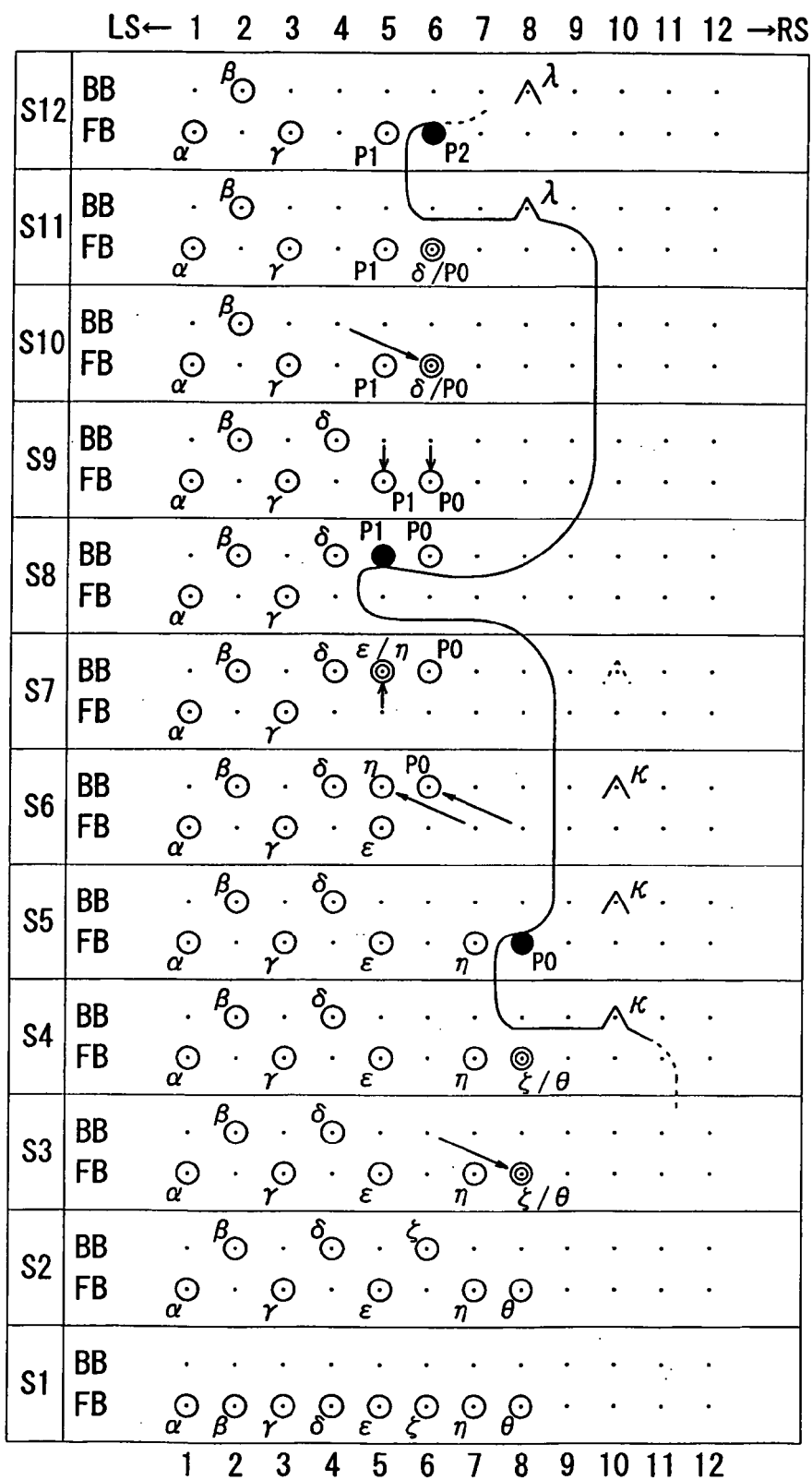


Fig. 2

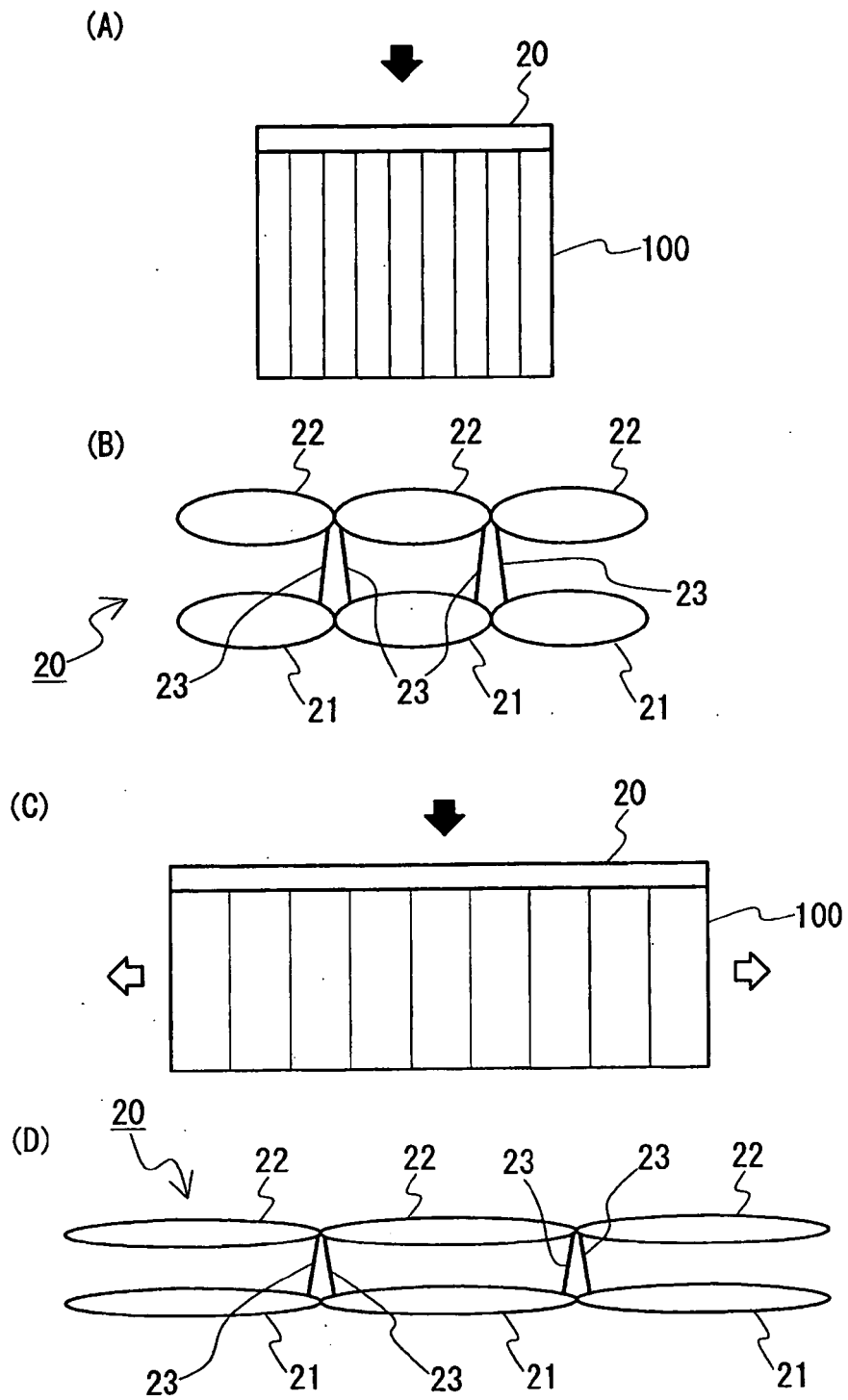


Fig. 3

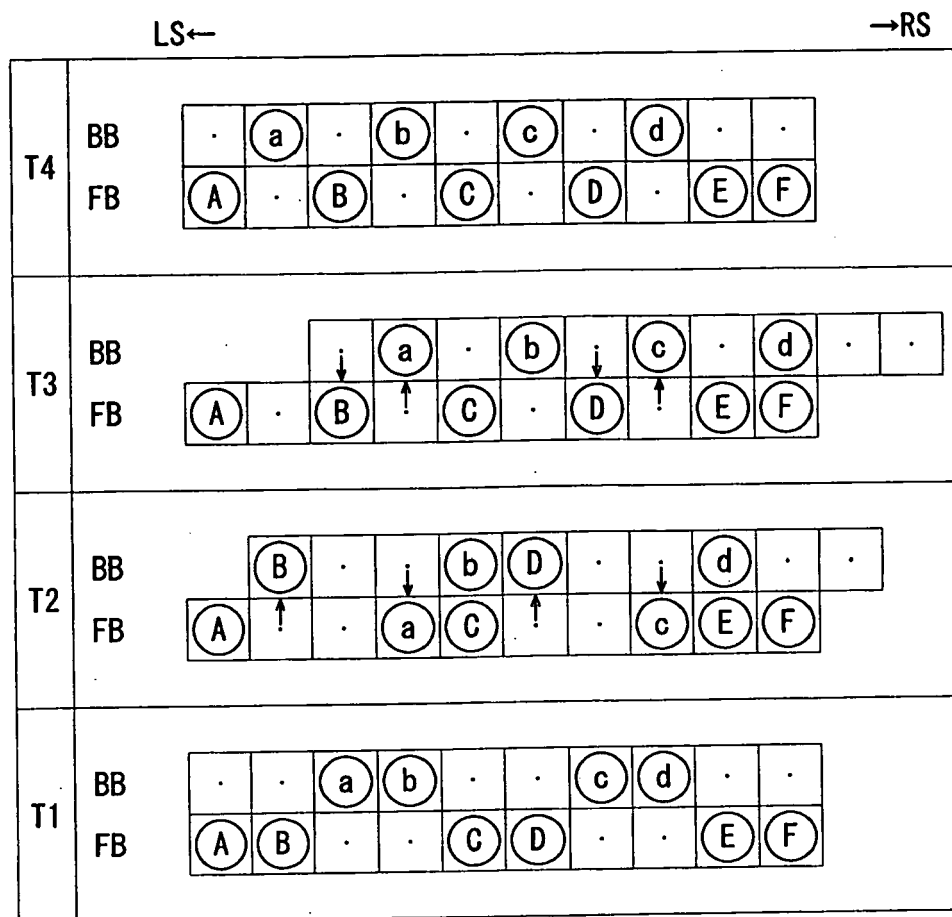


Fig. 4

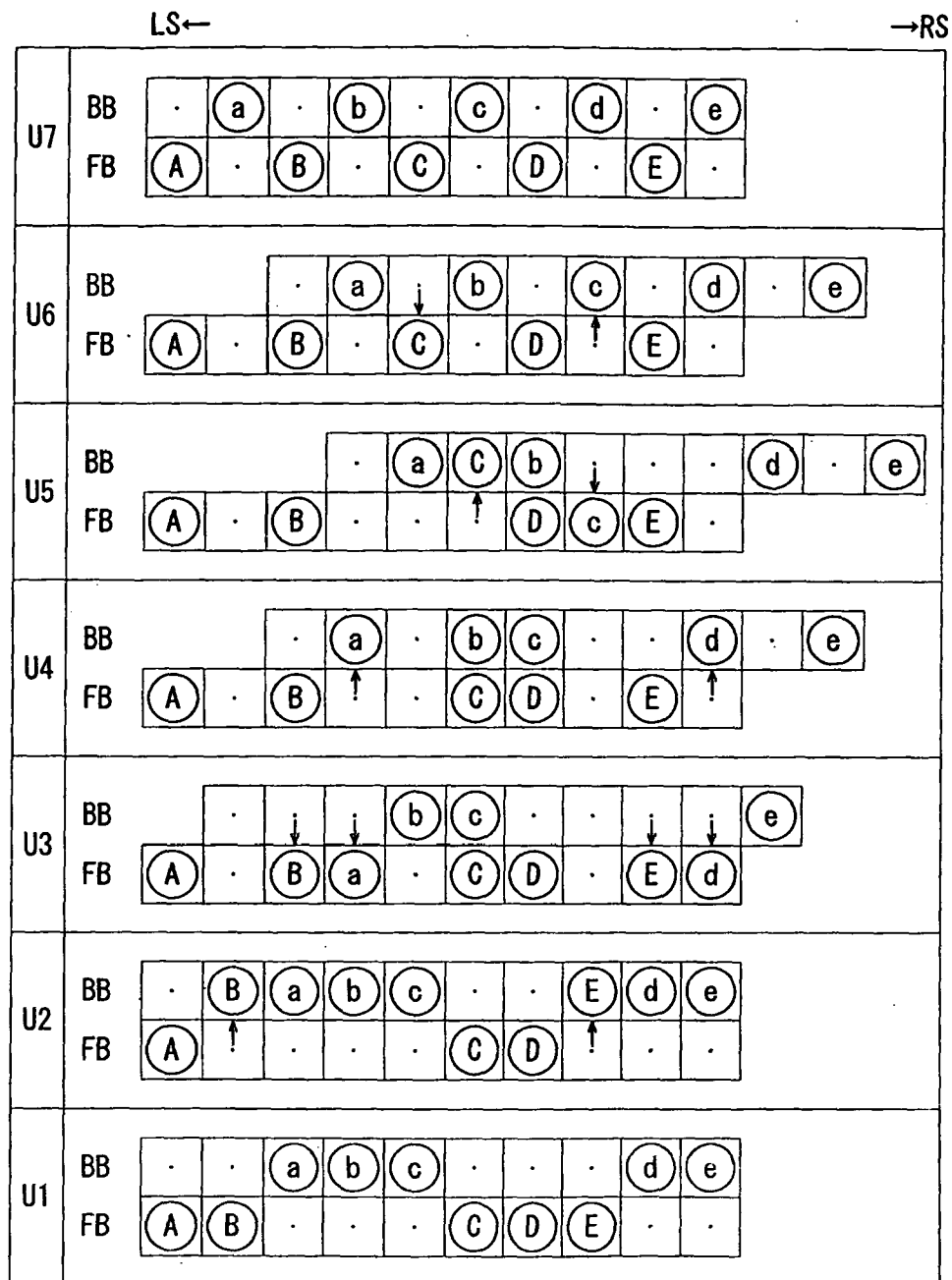
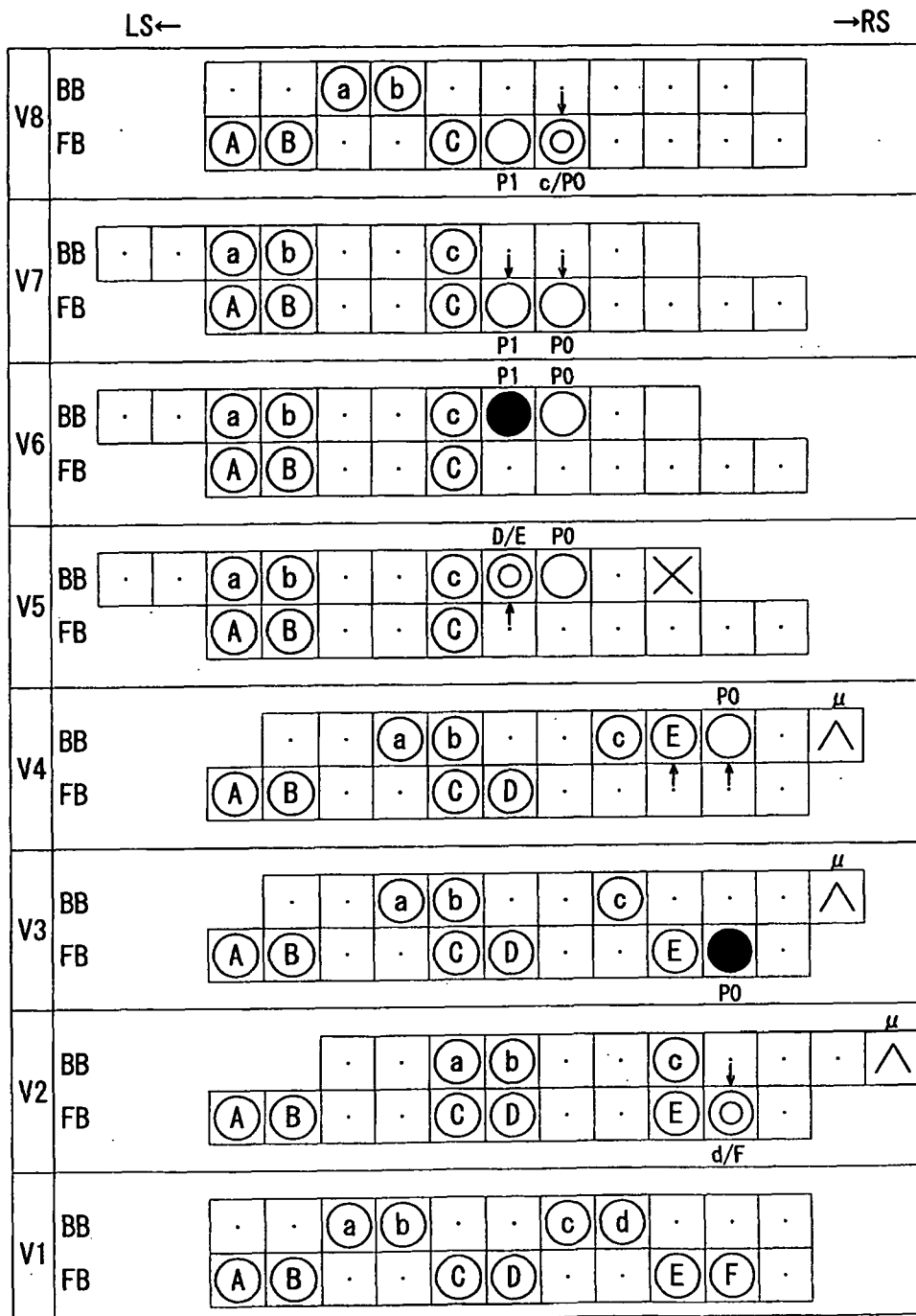


Fig. 5



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

- JP 2091254 A [0003]