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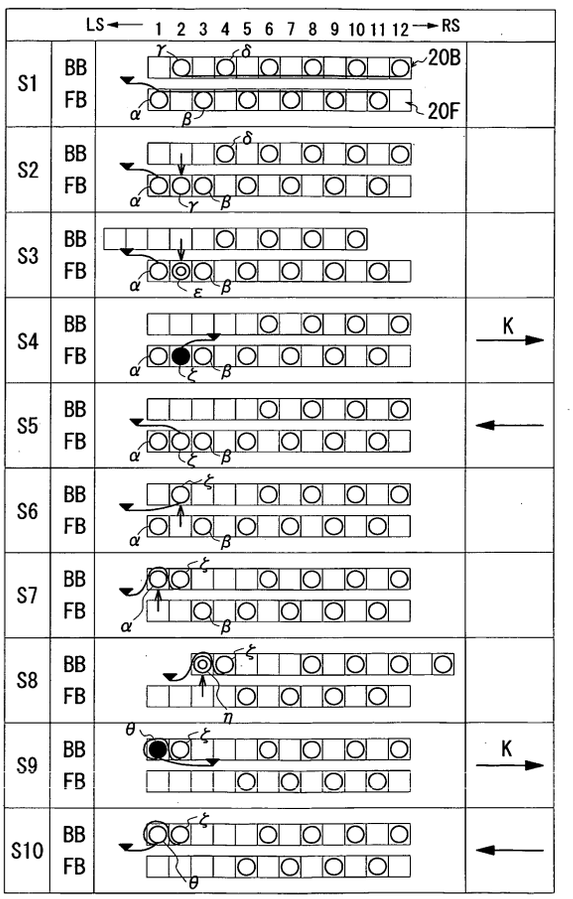
(54) FABRIC FORMATION METHOD AND FABRIC

(57) Provided are a knitting method of a knitted fabric enabling front and back knitted fabric portions to be knitted in a seamless manner when the boundary of the front and back knitted fabric portions is viewed from a front side of the knitted fabric when connecting stitches at ends in a wale direction of the front and back knitted fabric portions through a bind-off process, and a knitted fabric knitted by applying the method. Back stitches ζ, θ are alternately formed on a stitch at an end in a wale direction of a front side knitted fabric portion 20F and a stitch at an end in a wale direction of a back side knitted fabric portion 20B, and the back stitches ζ, θ are subjected to the bind-off process on the back side of the knitted fabric. In this case, the yarn feeder is moved so that the knitting yarn extending to the yarn feeder from the back stitch ζ (θ) formed first crosses the front side of the back stitch ζ(θ), and then the next back stitch θ(ζ) is formed.

Fig. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a knitting method of a knitted fabric in which stitches at an end in a wale direction of each of knitted fabric portions held on front and back needle beds are connected through a bind-off process using a flat knitting machine, and a knitted fabric obtained by the knitting method.

BACKGROUND ART

[0002] When knitting a knitted fabric with a flat knitting machine, a bind-off process is known as a method of processing such that stitches of the final course of the knitted fabric (stitches at end in wale direction) are not raveled. The bind-off process overlaps adjoining stitches in the final course of the knitted fabric, and newly forms a stitch of a next course following the overlapped stitches (double stitch). The knitting of overlapping such a newly formed stitch with a stitch next thereto and forming a stitch of the next course is repeated from one end side towards the other end side in a knitting width direction of the knitted fabric.

[0003] Such a bind-off process can also be used to connect the knitted fabric portions respectively formed with the front and back needle beds. For instance, Patent Documents 1 and 2 disclose a knitting method of a knitted fabric for arranging bind-off stitches on a back side of the knitted fabric so that, when the knitted fabric is worn, the bind-off stitches do not appear on the front side of the knitted fabric when joining the shoulder portions of front and back knitted fabric portions and carrying out the bind-off process.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0004]

[Patent Document 1] Japanese Patent No. 3044368
[Patent Document 2] Japanese Patent No. 3798062

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005] The knitted fabric knitted in the techniques of Patent Documents 1 and 2 has the bind-off stitches arranged on the back side of the knitted fabric and the protrusions of the knitted fabric on the front side suppressed, but the portion subjected to the bind-off process appears as a boundary of the front and back knitted fabric portions on the front side of the knitted fabric. As one example, Fig. 9 shows a photograph of the bind-off processed portion knitted with the knitting method of Patent Document 1. This boundary can be assumed as the design of the knitted fabric and thus is not particularly a problem, but it is desired that the boundary of the front and back knitted fabric portions become unrecognizable from the front side of the knitted fabric with diversification of needs in recent years.

[0006] In view of the above situations, it is an object of the present invention to provide a knitting method of a knitted fabric enabling the front and back knitted fabric portions to be knitted in a seamless manner when the boundary of the front and back knitted fabric portions are viewed from the front side of the knitted fabric when connecting the stitches at the ends in the wale direction of the front and back knitted fabric portions through the bind-off process, and a knitted fabric knitted by applying such a method.

MEANS FOR SOLVING THE PROBLEMS

[0007] In solving the above problems, the inventors first thought that the boundary of the front and back knitted fabric portions would be prevented from standing out by forming a back stitch on the stitch at the end in the wale direction of the knitted fabric portion and arranging the back stitch on the back side of the knitted fabric as a bind-off stitch with respect to the front and back knitted fabric portions alternately. The back stitch was a stitch pulled out from the old stitch from the front side towards the back side of the knitted fabric, where the knitting yarn connecting the alternately formed back stitches was assumed to appear as a stitch when appeared on the front side of the knitted fabric at the boundary of the front and back knitted fabric portions.

[0008] Considerable patterns of knitting were actually attempted to arrange the back stitch on the back side of the knitted fabric as a bind-off stitch, but the boundary of the front and back knitted fabric portions stood out more than in the knitted fabric knitted with the knitting method shown in Patent Documents 1 and 2. The inventors thus thoroughly reviewed the experimental knitted fabric, and found that a part of the knitting yarn extending from the bind-off stitch (back stitch) formed in one knitted fabric portion to the bind-off stitch (back stitch) formed in the other knitted fabric portion was arranged to wrap around the other bind-off stitch. Furthermore, it was found that such a knitting yarn pulled the other bind-off stitch and significantly deformed the bind-off stitch and the old stitch on which the relevant bind-off stitch was formed by inverting or twisting them, for instance, and the bind-off stitch arranged on the back side of the knitted fabric was exposed to the front side of the knitted fabric.

[0009] As a result of above trial and error, the inventors found that the problem in that the bind-off stitch arranged on the back side of the knitted fabric was inverted could be solved by controlling the arrangement state of the knitting yarn extending from the yarn feeder when forming the back stitch at the front and back needle beds alternately, and contrived the present invention. The present

invention will be provided below based on such knowledge.

[0010] A knitting method of a knitted fabric according to the present invention is a knitting method of a knitted fabric, using a flat knitting machine which has at least a pair of front and back needle beds, capable of being racked in a traverse direction and transferring a stitch between the front and back needle beds, for connecting stitches at an end in a wale direction of knitted fabric portions held on the front and back needle beds by a bind-off process. Assuming a direction in which bind-off stitches are sequentially formed in a longitudinal direction of the needle bed is a bind-off direction, and a direction opposite to the bind-off direction and towards a portion where the bind-off stitches start to be formed is a starting end direction, the knitting method of the knitted fabric of the present invention includes a process of alternately repeating [1] and [2] using a knitting yarn fed from one yarn feeder.

[1] Overlapping two adjoining stitches of a knitted fabric portion held on one needle bed such that a stitch on a starting end side of the stitches becomes a bind-off stitch arranged on a back side of the knitted fabric portion, and newly forming a back stitch to become the next bind-off stitch arranged on the back side of the knitted fabric portion following such a double stitch.

[2] Overlapping two adjoining stitches of a knitted fabric portion held on the other needle bed such that a stitch on a starting end side of the stitches becomes a bind-off stitch arranged on a back side of the knitted fabric portion, and newly forming a back stitch to become the next bind-off stitch arranged on the back side of the knitted fabric portion following such a double stitch.

The knitting method of the knitted fabric of the present invention has a **characteristic in that** when alternately forming the back stitches in the above process, the yarn feeder is moved so that a knitting yarn extending to the yarn feeder from the back stitch formed first crosses the front side of the back stitch, and then the next back stitch is formed.

[0011] The back stitch is formed by once transferring the old stitch held on one needle bed to the other needle bed, and performing knitting on the old stitch. When the formed new stitch is looked from one needle bed side, it is the back stitch pulled out from the old stitch from one needle bed side towards the other needle bed. The "front side of the back stitch" in the present specification is the one needle bed side of the newly formed stitch (back stitch) in the above example.

[0012] In accordance with one aspect of the knitting method of the knitted fabric of the present invention, assuming a stitch on the starting end direction side is a stitch α and a stitch on the bind-off direction side is a stitch β of the adjoining stitches of the knitted fabric portion held on one needle bed, and a stitch on the starting end direction side is a stitch γ and a stitch on the bind-off direction side is a stitch δ of the adjoining stitches of the knitted fabric portion held on the other needle bed, the knitting method includes the following steps A to H, which steps A to H are preferably repeated.

[Step A] Transferring the stitch γ to the opposing one needle bed with the yarn feeder arranged on the starting end direction side of the stitch γ.

[Step B] Forming the double stitch ε by overlapping the stitch γ with the stitch δ.

[Step C] Feeding yarn to a knitting needle on which the double stitch ε is held while reciprocating the yarn feeder so as to pass the double stitch ε to form a back stitch ζ.

[Step D] Transferring the back stitch ζ to the other needle bed.

[Step E] Transferring the stitch α to the opposing other needle bed with the yarn feeder arranged on the starting end direction side of the stitch α.

[Step F] Forming the double stitch η by overlapping the stitch α with the stitch β.

[Step G] Feeding yarn to a knitting needle on which the double stitch η is held while reciprocating the yarn feeder so as to pass the double stitch η to form a back stitch θ.

[Step H] Transferring the back stitch θ to the one needle bed.

[0013] In the knitting method of the knitted fabric of the present invention including the step A to the step H described above, at least one of the formation of the back stitch ζ in the step C and the formation of the back stitch θ in the step G is carried out in a forward movement in the bind-off direction of the reciprocating movement of the yarn feeder.

[0014] Furthermore, at least one of the formation of the back stitch ζ in the step C and the formation of the back stitch θ in the step G is carried out in a backward movement in the starting end direction of the reciprocating movement of the yarn feeder.

[0015] A knitted fabric of the present invention is a knitted fabric including a front side knitted fabric portion, a back side knitted fabric portion, and a bind-off processed portion for connecting stitches at ends in a wale direction of the front and back knitted fabric portions with bind-off stitches. When the knitted fabric is seen from a front side, the bind-off processed portion of the knitted fabric of the present invention includes an area where a first bind-off stitch, which comprises a back stitch overlapped from a back side of the knitted fabric with the stitch at the end in the wale direction of one knitted fabric portion, and a second bind-off stitch, which comprises a back stitch overlapped from a back side of the knitted fabric with the stitch at the end in the wale direction of the other knitted fabric portion, are alternately and sequentially arranged. According to the knitted fabric of the present invention,

in the bind-off processed portion, a cross-over yarn that connects the first bind-off stitch and the second bind-off stitch and that crosses between the stitches at the ends in the wale direction of the front and back knitted fabric portions is arranged on the front side of the knitted fabric of the first bind-off stitch and the second bind-off stitch.

EFFECTS OF THE INVENTION

[0016] According to the knitting method of the knitted fabric of the present invention, the knitted fabric of the present invention can be knitted in which the bind-off stitches formed in the front and back knitted fabric portions are arranged on the back side of the knitted fabric, and the cross-over yarn connecting the bind-off stitches formed in the front and back knitted fabric portions appears on the front side of the knitted fabric.

[0017] Furthermore, the knitted fabric of the present invention appears as if knitted in a seamless manner when the bind-off processed portion connecting the front and back knitted fabric portions configuring the knitted fabric is seen from the front side of the knitted fabric, and thus it has a very satisfactory appearance. This is because the bind-off stitches of the bind-off processed portion are arranged on the back side of the knitted fabric, and the cross-over yarn connecting the bind-off stitches alternately formed in the front and back knitted fabric portions appears as a stitch on the front side of the knitted fabric (see Fig. 4 in the embodiment described later).

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

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

Fig. 2 is a knitting step diagram following Fig. 1.

Fig. 3 is a loop diagram of a knitted fabric knitted through the knitting method of the knitted fabric described in the first embodiment.

Fig. 4 is a photograph of the knitted fabric knitted through the knitting method of the knitted fabric described in the first embodiment.

Fig. 5 is a knitting step diagram related to a knitting method of a knitted fabric described in a second embodiment.

Fig. 6 is a knitting step diagram following Fig. 5.

Fig. 7 is a loop diagram of a knitted fabric knitted through the knitting method of the knitted fabric described in the second embodiment.

Figs. 8(A) and 8(B) are loop diagrams of a knitted fabric knitted through a knitting method of a knitted fabric described in a third embodiment.

Fig. 9 is a photograph of the knitted fabric knitted through a knitting method of a knitted fabric described in Patent Document 1.

MODE FOR CARRYING OUT THE INVENTION

[0019] First to third embodiments of the present invention will be hereinafter described with reference to the drawings. The knitting described in the embodiments is a knitting example using a two-bed fiat knitting machine having a pair of front and back needle beds laterally extending and disposed opposite to each other in a cross direction. The flat knitting machine to use may be a four bed flat knitting machine as a matter of course.

[First Embodiment]

[0020] In the first embodiment, as shown in S1 of Fig. 1, a description will be given of an example of joining a front side knitted fabric portion 20F held on a front needle bed (hereinafter referred to as FB) and a back side knitted fabric portion 20B held on a back needle bed (hereinafter referred to as BB) through a bind-off process. The "capital letter alphabet + number" shown on the left column in Fig. 1 to be referenced indicates the number of the knitting step, the arrow shown on the right column indicates a moving direction of the yarn feeder, and "K" indicates that knitting is to be carried out with the movement of the yarn feeder. In Fig. 1, ○ indicates a stitch held on the needle bed, ● indicates a stitch knitted in each knitting step, ◎ indicates a double stitch, and ▼ indicates the yarn feeder. In Fig. 1, the bind-off stitches start to be formed from the left side in the plane of drawing and the bind-off process is sequentially carried out towards the right side, and hence the right direction in the plane of drawing is called a "bind-off direction RS" and the left direction in the plane of drawing is called a "starting end direction LS". The definitions in Fig. 1 are similar in Figs. 2, 5 and 6, to be described later.

[0021] First, from the state of S1 of Fig. 1 in which the front side knitted fabric portion 20F is held on the FB and the back side knitted fabric portion 20B is held on the BB, the stitch γ at the left side end of the back side knitted fabric portion 20B held on the knitting needle 2 of the BB is transferred to the opposing knitting needle 2 (knitting needle between stitch α and stitch β) of the FB (S2). In this case, the yarn feeder is on the starting end direction LS side of the stitch γ, and the knitting yarn extending from the yarn feeder is connected to the stitch α held on the knitting needle 1 of the FB. A stitch δ held on the knitting needle 4 of the BB adjacent to the stitch γ in S1 is overlapped with the stitch γ transferred in S2 to form the double stitch ε (S3). When forming the double stitch ε, the racking of the needle bed may be used.

[0022] New stitch ζ following the double stitch ε formed on the knitting needle 2 of the FB in S3 is formed while moving the yarn feeder in the bind-off direction RS (S4). Thereafter, the yarn feeder is moved in the starting end direction LS and stopped on the starting end direction LS side of the stitch α at the left side end of the front side knitted fabric portion 20F (S5), and the new stitch ζ formed in S4 is transferred to the opposing knitting needle

2 of the BB (S6). The stitch ζ newly formed in S4 to S6 is the stitch that becomes the bind-off stitch in the post-step, and is the back stitch formed following the stitch of the back side knitted fabric portion 20B. The stitch γ at the left side end of the back side knitted fabric portion 20B where the bind-off process is started is arranged on the back side of the finished knitted fabric.

[0023] After the bind-off process on the stitch γ at the left side end of the back side knitted fabric portion 20B is finished by S1 to S6, the bind-off process on the stitch α at the left side end of the front knitted fabric portion 20F is now started. Specifically, the stitch α at the left side end of the front side knitted fabric portion 20F held on the knitting needle 1 of the FB is transferred to the knitting needle 1 of the BB (S7), the stitch β held on the knitting needle 3 of the FB is overlapped with the transferred stitch α to form the double stitch η (S8). In this case, the knitting yarn extending from the stitch ζ formed in S4 and held on the knitting needle 2 of the BB at the time point of S7 to the yarn feeder is arranged on the front side of the stitch α transferred to the knitting needle 1 of the BB in S7, that is, the front side of the front and back knitted fabric portions 20F, 20B to be joined.

[0024] New stitch θ following the double stitch η formed in S8 is formed while moving the yarn feeder in the bind-off direction RS (S9), and thereafter, the yarn feeder is moved in the starting end direction LS and the yarn feeder is positioned on the starting end direction LS side of the stitch θ held on the knitting needle 1 of the BB (S10). The newly formed stitch θ is a stitch that becomes the bind-off stitch in the post-step, and is the back stitch since it is a stitch formed following the stitches of the front side knitted fabric portion 20F. The stitch θ and the stitch ζ are directly connected with the knitting yarn.

[0025] Furthermore, the stitches held on the knitting needle 1 and the knitting needle 2 of the BB are respectively transferred to the knitting needle 3 of the FB and the knitting needle 4 of the BB from the state of S10 of Fig. 1 (S11 of Fig. 2). The stitch γ (stitch same as stitch ζ formed by S2 to S6) held on the knitting needle 4 of the BB that has become the stitch at the left side end of the back side knitted fabric portion 20B held on the BB through S1 to S11 is subjected to the bind-off process, and the stitch α (stitch same as stitch θ formed by S7 to S10) held on the knitting needle 3 of the FB that has become the stitch at the left side end of the front side knitted fabric portion 20F is subjected to the bind-off process in the following manner.

[0026] First, the stitch γ held on the knitting needle 4 of the BB is transferred to the opposing knitting needle 4 of the FB (S12), and the stitch δ held on the knitting needle 6 of the BB is overlapped with the stitch γ to form the double stitch ε (S13). A new stitch ζ following the double stitch ε of the knitting needle 4 of the FB is formed while moving the yarn feeder in the bind-off direction RS (S14), and the yarn feeder is immediately moved in the starting end direction LS and the yarn feeder is arranged on the starting end direction LS side of the stitch α of the front side knitted fabric portion 20F (S15), and thereafter, the stitch ζ formed in S14 is transferred to the knitting needle 4 of the BB (S16).

[0027] The stitch α held on the knitting needle 3 of the FB, which is the stitch at the left side end of the front side knitted fabric portion 20F through S1 to S11, is then subjected to the bind-off process. Specifically, the stitch held on the knitting needle 3 of the FB is transferred to the opposing knitting needle 3 of the BB (S17). In this case, the knitting yarn extending from the stitch ζ formed in S14 and held on the knitting needle 4 of the BB at the time point of S17 to the yarn feeder is arranged on the front side of the stitch α transferred to the knitting needle 3 of the BB in S17, that is, the front side of the front and back knitted fabric portions to be joined. From such a state, the stitch β of the knitting needle 5 of the FB is overlapped with the stitch α transferred in S17 (S18), and a new stitch θ following the double stitch η formed in S18 is formed while moving the yarn feeder in the bind-off direction RS (S19). The yarn feeder is moved in the starting end direction LS, and the yarn feeder is positioned on the starting end direction LS side of the stitch θ formed in S19 and held on the knitting needle 3 of the BB (S20).

[0028] Looking at the arrangement state of the stitches of S20, the stitches of the front and back knitted fabric portions are reduced by one stitch each and the stitches are overall shifted in the bind-off direction RS by two needles compared to the arrangement state of the stitches in S10 of Fig. 1. Therefore, the knitting similar to S11 to S20 is repeated in the bind-off process after S20.

[0029] Fig. 3 shows a loop diagram of the knitted fabric obtained through the above knitting steps, and Fig. 4 shows the photograph of the knitted fabric. In Fig. 3, the front side knitted fabric portion 20F and the back side knitted fabric portion 20B are shown with a thin line, and a bind-off processed portion 20X is shown with a thick line.

[0030] As apparent from the loop diagram shown in Fig. 3, a back stitch θ formed following the stitch at the end in the wale direction of the front side knitted fabric portion 20F and a back stitch ζ formed following the stitch at the end in the wale direction of the back side knitted fabric portion are alternately formed, where the back stitches θ, ζ are arranged on the back side of the knitted fabric (far side in plane of drawing) as bind-off stitches. In the knitted fabric, the knitting yarn (cross-over yarn) that connects the front and back bind-off stitches and crosses between the front and back knitted fabric portions is arranged on the front side of the bind-off stitches when the knitted fabric is viewed from the front side. Therefore, regardless of being on either side of the front side knitted fabric portion 20F or the back side knitted fabric portion 20B, the bind-off stitch θ(ζ) formed with respect to the double stitch comprising the bind-off stitch α(γ) on the starting end direction side (left side in plane of drawing) and the stitch β(δ) at the end of the knitted fabric portion is pulled out from the front side towards the back side of the knitted fabric. According to the relation-

ship between such bind-off stitches and the cross-over yarn, the cross-over yarn does not pull and invert the bind-off stitches and furthermore, the cross-over yarn looks like a stitch arranged between the front and back knitted fabric portions, so that the bind off processed portion connecting the front and back knitted fabric portions can be scarcely discriminated, as shown in the photograph of Fig. 4.

[Second Embodiment]

[0031] In the second embodiment, a knitting method of a knitted fabric in which a part of the procedure of the bind-off process is different from the first embodiment, and a knitted fabric obtained by the knitting method will be described based on Figs. 5 to 7. The knitting step of the second embodiment and the knitting step of the first embodiment are common in most part, and thus only the difference will be described below.

[0032] The second embodiment differs from the first embodiment in the following points. First, in the first embodiment, the back stitch $\zeta(\theta)$ is formed when the yarn feeder is moved in the bind-off direction RS when forming the back stitch $\zeta(\theta)$ to become the bind-off stitch following the double stitch $\varepsilon(\eta)$, as shown in S4, S9 of Fig. 1 and S14, S19 of Fig. 2. In the second embodiment, on the other hand, when forming the back stitch $\zeta(\theta)$ to become the bind-off stitch following the double stitch $\varepsilon(\eta)$, the back stitch is not formed when the yarn feeder is moved in the bind-off direction RS (T4, T9 of Fig. 5 and T14, T19 of Fig. 6) but is formed when the yarn feeder is turned to the starting end direction LS (T5, T10 of Fig. 5, T15, T20 of Fig. 6).

[0033] A loop diagram of the knitted fabric obtained with the knitting method of Fig. 5 and Fig. 6 is shown in Fig. 7. In the knitted fabric shown in Fig. 7 as well, the back stitch θ formed following the stitch at the end in the wale direction of the front side knitted fabric portion 20F and the back stitch ζ formed following the stitch at the end in the wale direction of the back side knitted fabric portion are alternately formed, and the back stitches θ, ζ are arranged on the back side (far side in plane of drawing) of the knitted fabric as bind-off stitches, similar to the knitted fabric obtained in the first embodiment. Furthermore, in the knitted fabric, the knitting yarn (cross-over yarn) that connects the front and back bind-off stitches and crosses between the front and back knitted fabric portions is arranged on the front side of the bind-off stitches when the knitted fabric is viewed from the front side. Thus, the bind-off processed portion that connects the front and back knitted fabric portions is scarcely discriminated.

[Third Embodiment]

[0034] The back stitch to become the bind-off stitch is formed through the knitting of the bind-off direction RS in the first embodiment, and the back stitch to become the bind-off stitch is formed through the knitting of the starting end direction LS in the second embodiment, but the knitting of the bind-off direction RS and the knitting of the starting end direction LS may coexist in the front and back knitted fabric portions.

[0035] For instance, the back stitch to become the bind-off stitch may be formed by the knitting of the bind-off direction RS and the yarn feeder may be returned in the starting end direction LS in the back side knitted fabric portion, and the knitting may not be carried out at the time of the movement of the yarn feeder in the bind-off direction and the back stitch to become the bind-off stitch may be formed by the knitting of the starting end direction LS in the front side knitted fabric portion, so that the bind-off process having the arrangement state of the knitting yarn shown in the loop diagram of Fig. 8(A) is carried out. As opposed to Fig. 8(A), the bind-off process shown in the loop diagram of Fig. 8(B) is carried out by forming the back stitch to become the bind-off stitch of the back side knitted fabric portion in the knitting of the starting end direction LS and forming the back stitch to become the bind-off stitch of the front side knitted fabric portion in the knitting of the bind-off direction RS. In the knitted fabrics shown in Figs. 8(A), 8(B) as well, the bind-off stitch comprising the back stitch is arranged on the back side of the knitted fabric and the cross-over yarn connecting the front and back bind-off stitches is arranged on the front side of the bind-off stitch, similar to the first embodiment and the second embodiment, so that the bind-off processed portion 20X connecting the front and back knitted fabric portions 20F, 20B arranged in the knitted fabric can be scarcely discriminated in appearance.

[0036] The present invention is 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, the knitting method of the knitted fabric of the present invention may be applied to joining the front and back bodies at the shoulder when knitting a sleeveless knitted fabric. In this case, flechage knitting is carried out to sequentially increase the knitting course from the cuff towards the neckline of the knitted fabric before joining the shoulders by the bind-off process, and thereafter, the front and back bodies are to be joined by the knitting method of the knitted fabric according to the present invention.

DESCRIPTION OF REFERENCE NUMERALS

[0037]

1 to 12	knitting needle
FB	front needle bed
BB	back needle bed
RS	bind-off direction
LS	starting end direction
20F	front side knitted fabric portion
20B	back side knitted fabric portion
20X	bind-off processed portion

α, β, ε, η	double stitch
ζ, θ	stitch (back stitch)

Claims

1. A knitting method of a knitted fabric, using a flat knitting machine having at least a pair of front and back needle beds in which at least either of the needle beds is capable of being racked laterally and a stitch is transferable between the needle beds, for connecting stitches at an end in a wale direction of each of knitted fabric portions held on the front and back needle beds by a bind-off process; **characterized in that**
assuming a direction in which bind-off stitches are sequentially formed in a longitudinal direction of the needle bed is a bind-off direction, and a direction opposite to the bind-off direction and towards a portion where the bind-off stitches start to be formed is a starting end direction, the knitting method carries out a process of alternately repeating,
overlapping two adjoining stitches of a knitted fabric portion held on one needle bed such that a stitch on a starting end side of the stitches becomes a bind-off stitch arranged on a back side of the knitted fabric portion, and newly forming a back stitch to become the next bind-off stitch arranged on the back side of the knitted fabric portion following such a double stitch, and
overlapping two adjoining stitches of a knitted fabric portion held on the other needle bed such that a stitch on a starting end side of the stitches becomes a bind-off stitch arranged on a back side of the knitted fabric portion, and newly forming a back stitch to become the next bind-off stitch arranged on the back side of the knitted fabric portion following such a double stitch
using a knitting yarn fed from one yarn feeder; wherein
when alternately forming the back stitch in the above process, the yarn feeder is moved so that a knitting yarn extending to the yarn feeder from the back stitch formed first crosses the front side of the back stitch, and then the next back stitch is formed.

2. The knitting method of a knitted fabric according to claim 1, wherein
assuming a stitch on the starting end direction side is a stitch α and a stitch on the bind-off direction side is a stitch β of the adjoining stitches of the knitted fabric portion held on one needle bed, and a stitch on the starting end direction side is a stitch γ and a stitch on the bind-off direction side is a stitch δ of the adjoining stitches of the knitted fabric portion held on the other needle bed, the knitting method includes,
a step A of transferring the stitch γ to the opposing one needle bed with the yarn feeder arranged on the starting end direction side of the stitch γ,
a step B of forming the double stitch ε by overlapping the stitch γ with the stitch δ,
a step C of feeding yarn to a knitting needle on which the double stitch ε is held while reciprocating the yarn feeder so as to pass the double stitch ε to form a back stitch ζ,
a step D of transferring the back stitch ζ to the other needle bed,
a step E of transferring the stitch α to the opposing other needle bed with the yarn feeder arranged on the starting end direction side of the stitch α,
a step F of forming double stitch η by overlapping the stitch α with the stitch β,
a step G of feeding yarn to a knitting needle on which the double stitch η is held while reciprocating the yarn feeder so as to pass the double stitch η to form a back stitch θ, and
a step H of transferring the back stitch θ to the one needle bed,

the steps A to H being repeated.

3. The knitting method of a knitted fabric according to claim 2, wherein at least one of the formation of the back stitch ζ in the step C and the formation of the back stitch θ in the step G is carried out in a forward movement in the bind-off direction of the reciprocating movement of the yarn feeder.

4. The knitting method of a knitted fabric according to claim 2 or 3, wherein at least one of the formation of the back stitch ζ in the step C and the formation of the back stitch θ in the step G is carried out in a backward movement in the starting end direction of the reciprocating movement of the yarn feeder.

5. A knitted fabric including a front side knitted fabric portion, a back side knitted fabric portion, and a bind-off processed portion for connecting stitches at ends in a wale direction of the front and back knitted fabric portions with bind-off stitches, **characterized in that** when the knitted fabric is seen from a front side, the bind-off processed portion includes an area where,

a first bind-off stitch comprising a back stitch overlapped from a back side of the knitted fabric with the stitch at the end in a wale direction of one knitted fabric portion, and
a second bind-off stitch comprising a back stitch overlapped from a back side of the knitted fabric with the stitch at the end in a wale direction of the other knitted fabric portion, are alternately and sequentially arranged; and

a cross-over yarn that connects the first bind-off stitch and the second bind-off stitch and that crosses between the stitches at the ends in the wale direction of the front and back knitted fabric portions is arranged on the front side of the knitted fabric of the first bind-off stitch and the second bind-off stitch.

Fig. 1

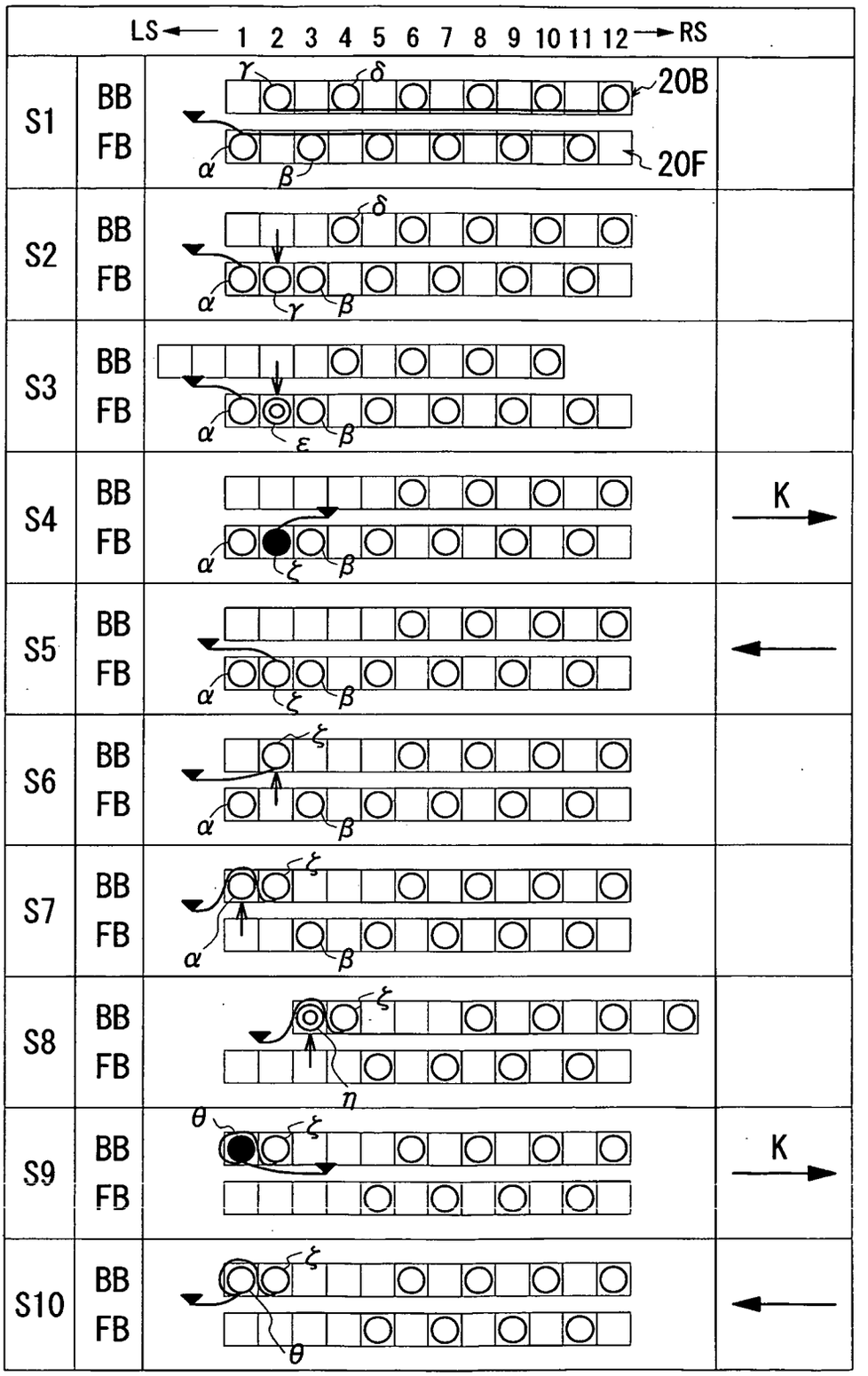

LS
1 2 3 4 5 6 7 8 9 10 11 12
RS
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
BB
FB
20B
20F
K

Fig. 2

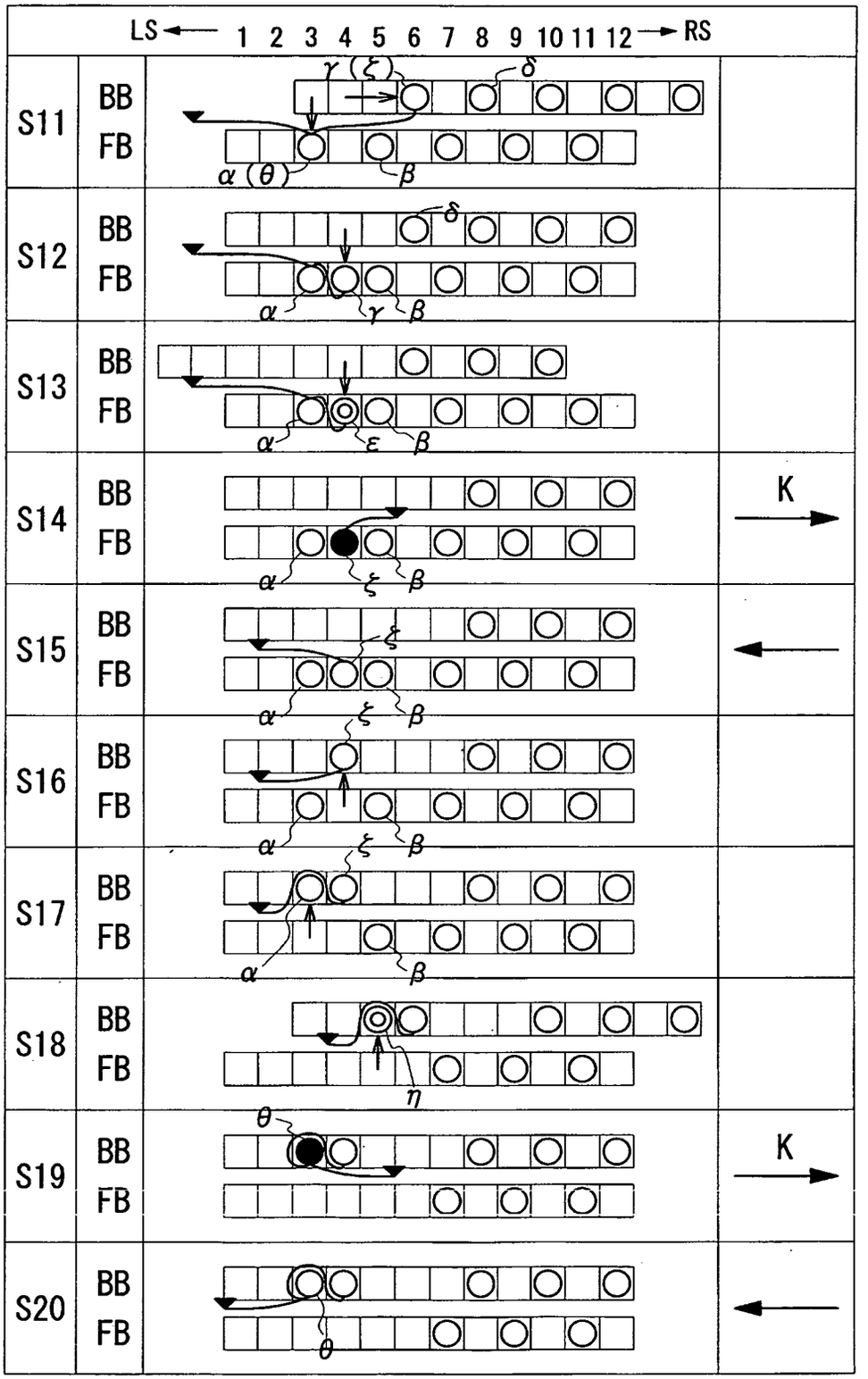

LS ← 1 2 3 4 5 6 7 8 9 10 11 12 → RS
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
BB
FB
K

Fig. 3

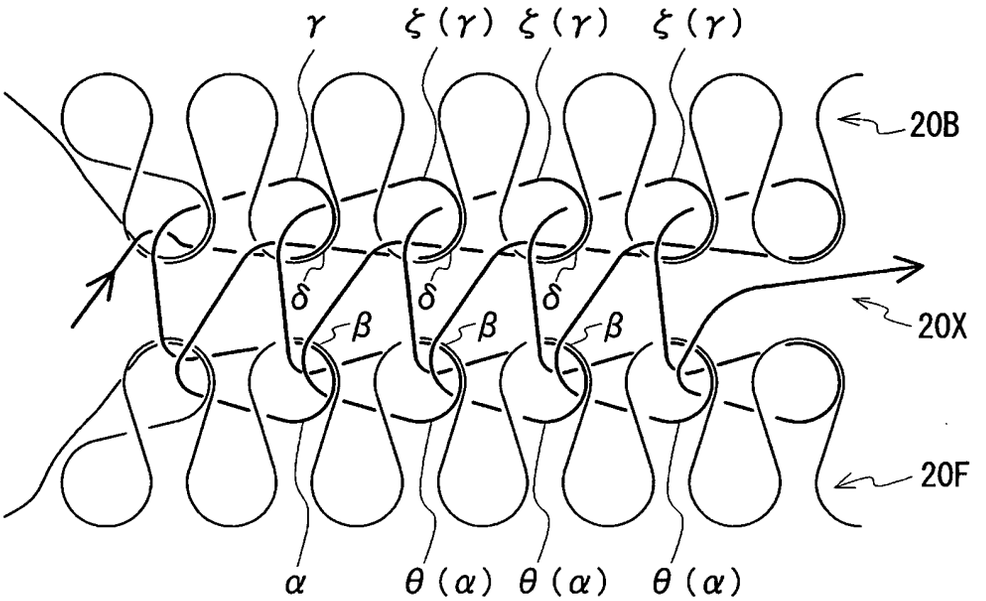


Fig. 4

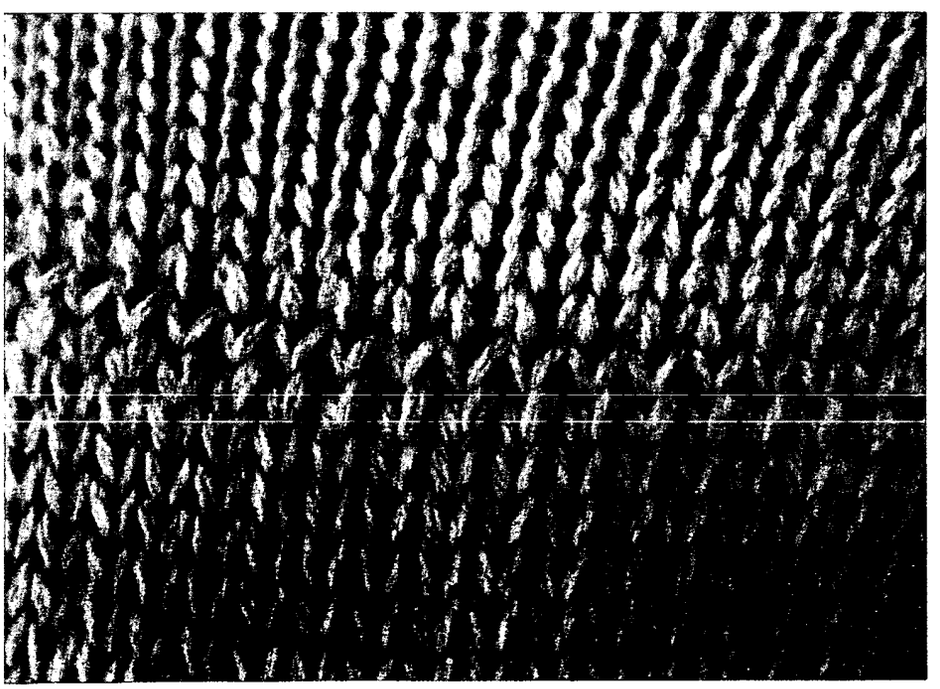


Fig. 5

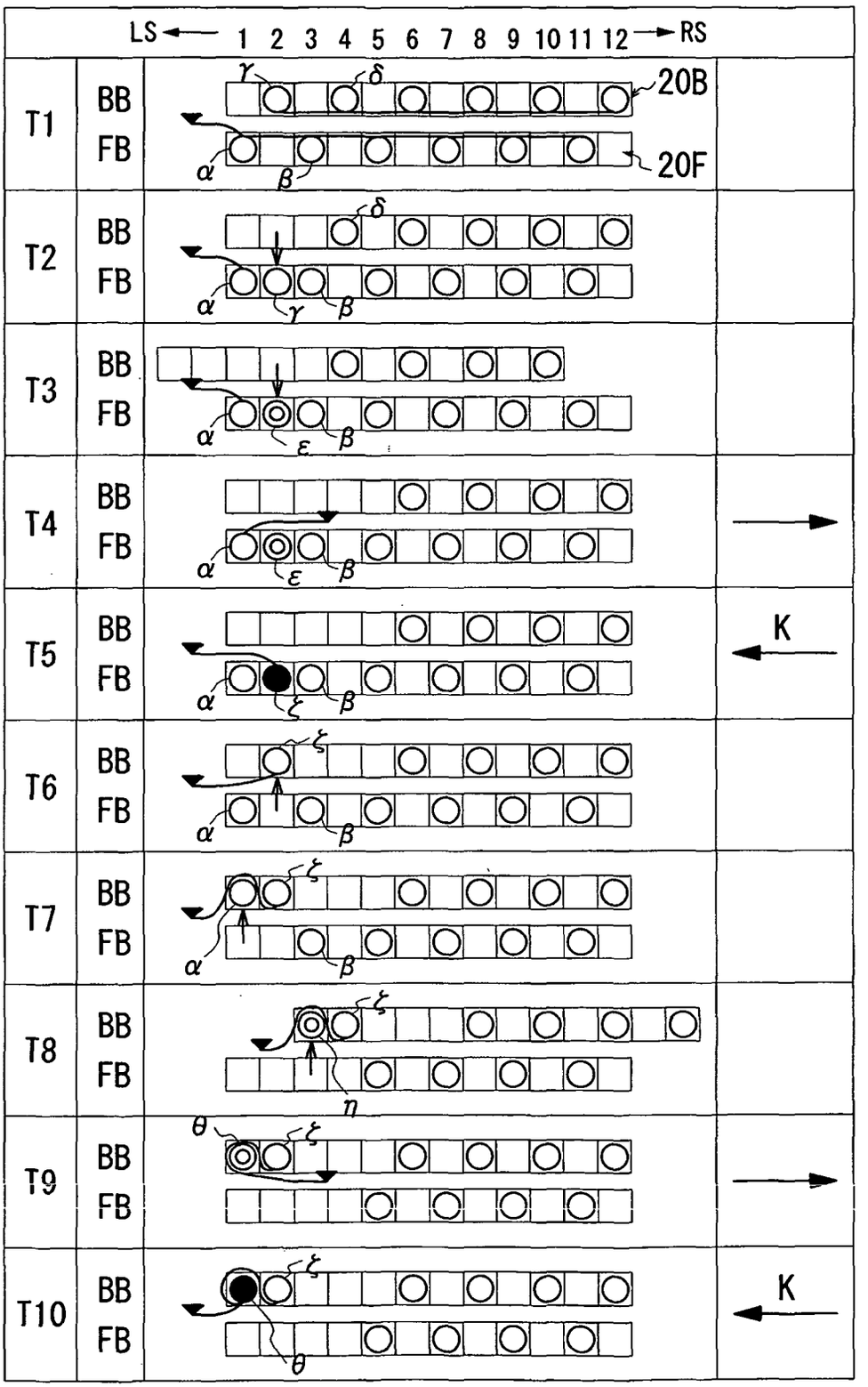

LS
1 2 3 4 5 6 7 8 9 10 11 12
RS
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
BB
FB
20B
20F
K
K

Fig. 6

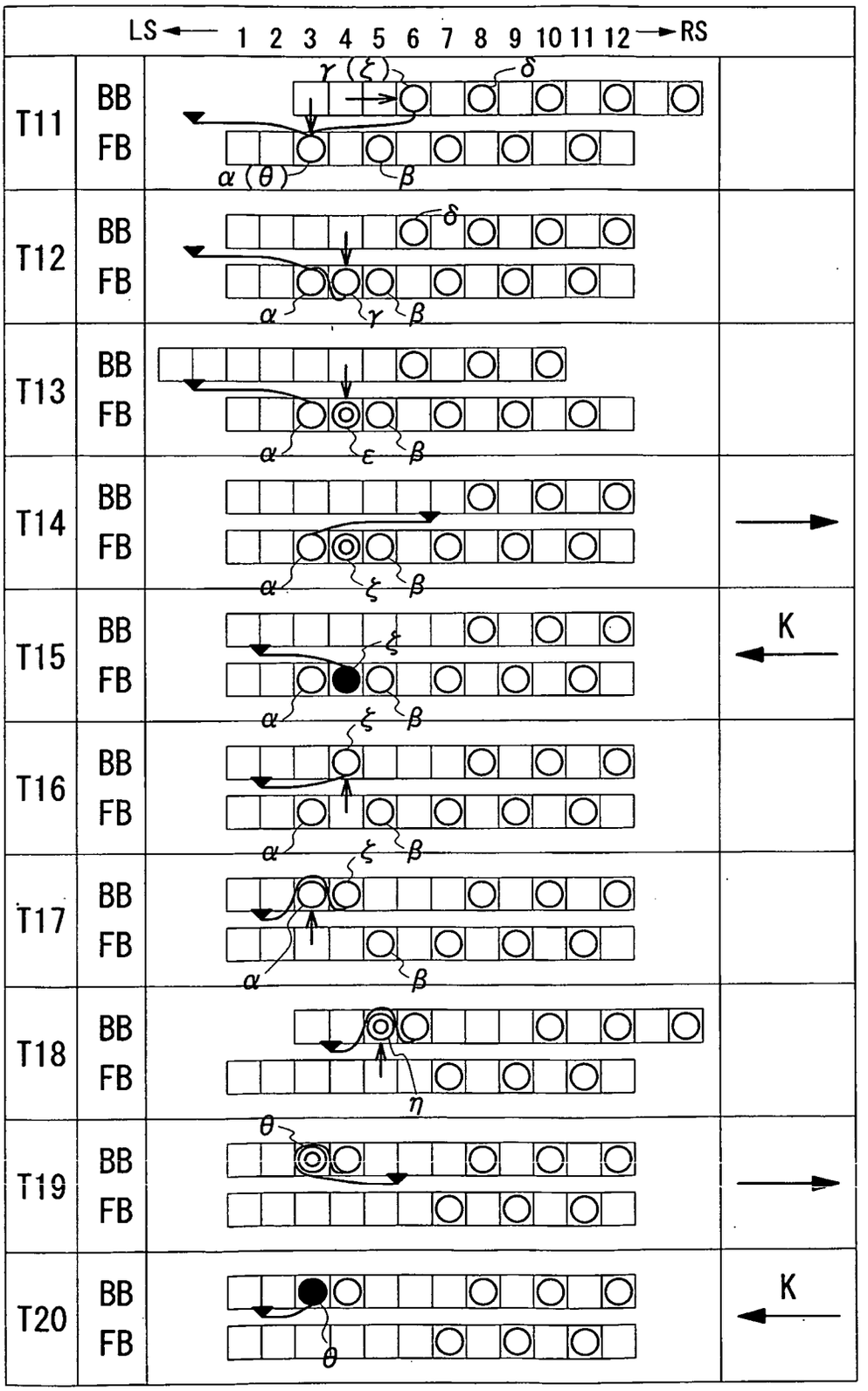

LS
1 2 3 4 5 6 7 8 9 10 11 12
RS
T11
T12
T13
T14
T15
T16
T17
T18
T19
T20
BB
FB
K

Fig. 7

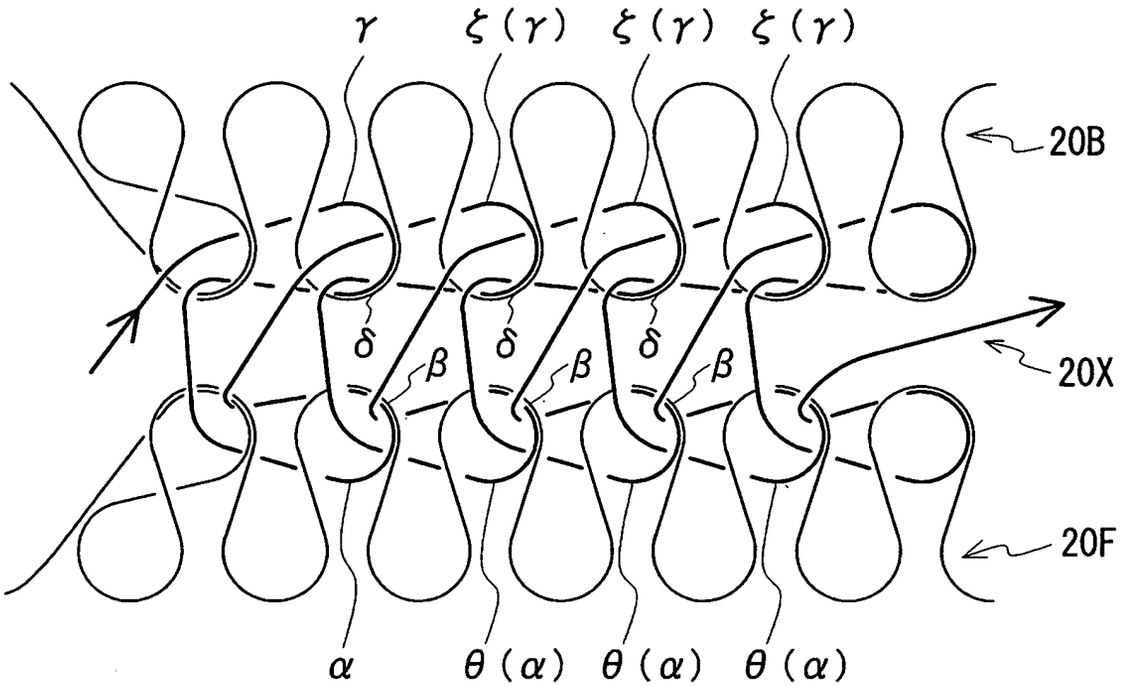


Fig. 8

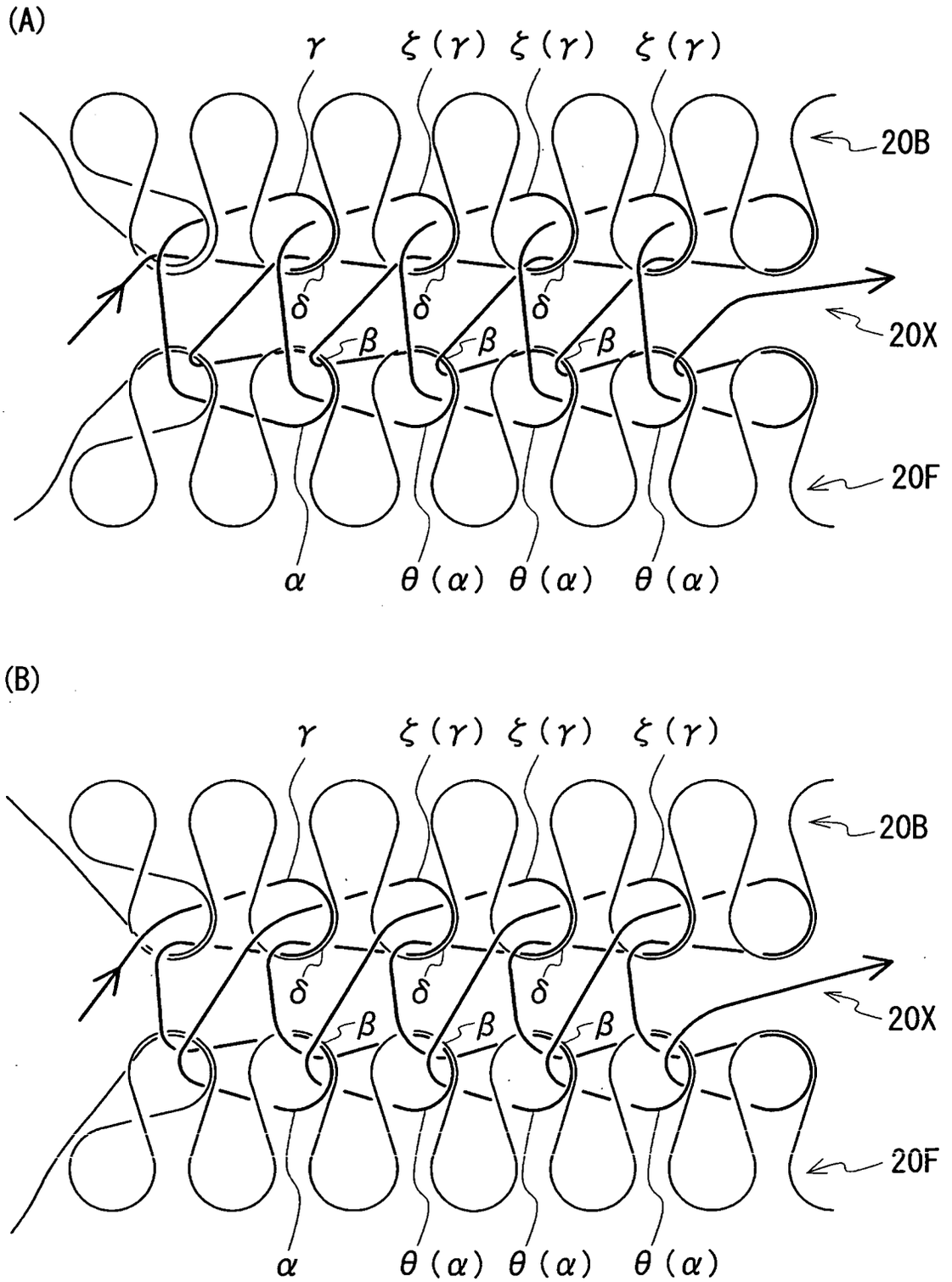
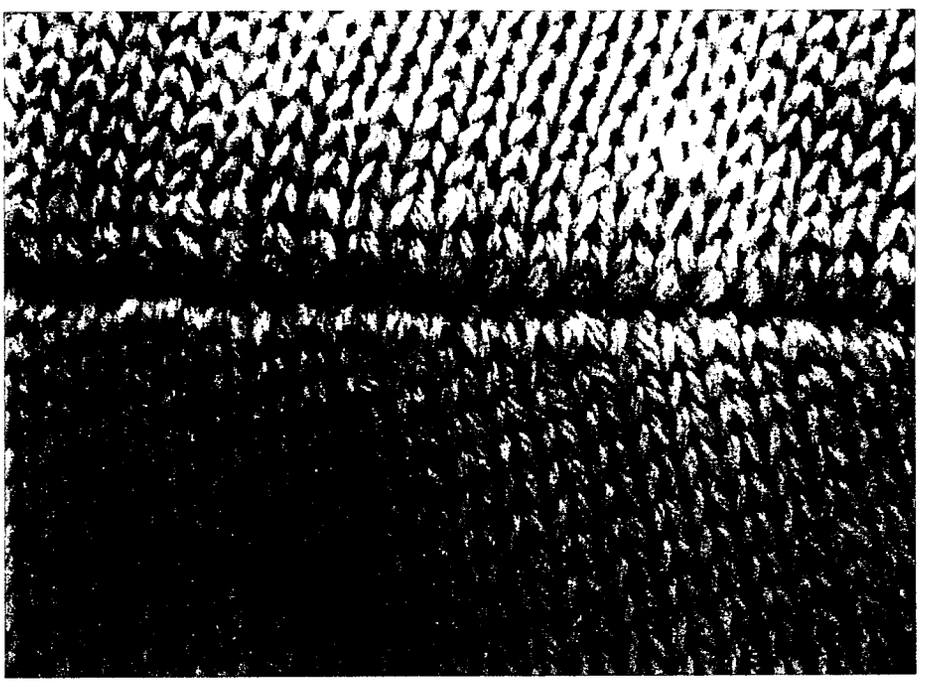

(A)
γ
ζ(γ) ζ(γ) ζ(γ)
20B
δ
δ
δ
β
β
β
20X
20F
α
θ(α) θ(α) θ(α)
(B)
γ
ζ(γ) ζ(γ) ζ(γ)
20B
δ
δ
δ
β
β
β
20X
20F
α
θ(α) θ(α) θ(α)

Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/062004

A. CLASSIFICATION OF SUBJECT MATTER
D04B1/00(2006.01)i, *D04B1/24*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04B1/00-39/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010
Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 3044368 B2 (Shima Seiki Mfg., Ltd.), 22 May 2000 (22.05.2000), entire text & US 6119050 A & EP 781880 A1	1-5
A	JP 3798062 B2 (Shima Seiki Mfg., Ltd.), 19 July 2006 (19.07.2006), entire text & US 5669244 A & EP 737768 A2 & CN 1137582 A	1-5
A	WO 2001/048286 A1 (Shima Seiki Mfg., Ltd.), 05 July 2001 (05.07.2001), entire text & US 6658898 B2 & EP 1253228 A1 & CN 1409779 A	1-5

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 September, 2010 (08.09.10)	21 September, 2010 (21.09.10)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 3044368 B **[0004]**
- JP 3798062 B **[0004]**