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

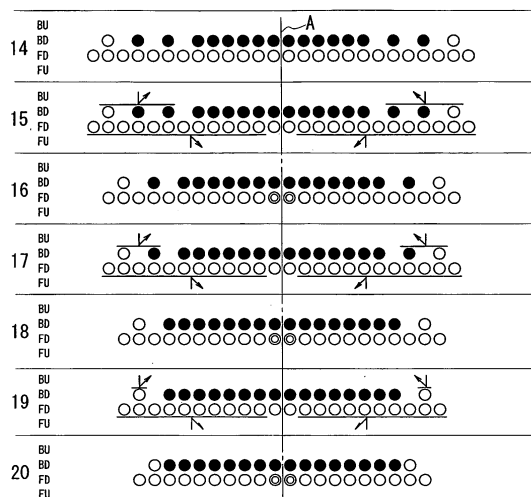
(72) Inventor: **OKAMOTO, Kazuyoshi**
Wakayama-shi Wakayama 6418511 (JP)

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

(54) **METHOD OF KNITTING KNIT WEAR WITH COLLAR**

(57) A method of knitting a knitwear capable of widening the opening angle of a V-neck collar without forming twisted stitches is provided. A knitwear with a collar is knitted using a flat knitting machine wherein a body is knitted and shoulder parts are joined while holding stitches for forming a neckline part on a needle bed in a resting state, the stitches for the front neckline part are transferred so that the stitches are held in the needle extracted status with empty needles of at least a number of widening stitches, and the stitches for the back neckline part are transferred so that the stitches are held in the needle extracted status with empty needles in at least one part so that a length in the knitting width direction of a knitted fabrics held on the needles of the front and back needle beds becomes substantially the same, widening stitches are formed on some or all of the empty needles on the needle bed holding the stitches for the front neckline part to increase a peripheral length of the front neckline part, and stitches are formed on the stitches including the widening stitches at the front and back needle beds to knit the collar.

Fig. 3



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Description

TECHNICAL FIELD

[0001] The present invention relates to a method of knitting a knitwear with a collar knitted in a seamless manner using a flat knitting machine. In particular, the present invention relates to a method of knitting a knitwear with a V-neck collar.

BACKGROUND ART

[0002] The knitwear having a neckline part in the body is easier to wear and has a better outer appearance if the neckline diameter is formed large.

[0003] Patent document 1 discloses a knitting method for forming a neckline part with a large front cut. In the knitting method disclosed in patent document 1, the knitting of the body is first completed, and the stitches for forming the neckline part are held on the needles at the point where the shoulder parts are joined. Of the stitches for the neckline part, the stitches for the neckline part of the front body are transferred so that empty needles are arranged between the stitches. A widening stitch is then formed on the respective empty needles, and thereafter, stitches are formed on the stitches for the neckline part including the widening stitches, and the knitting of the collar is started, whereby the collar is formed with a widened neckline diameter.

[0004] Patent document 1: WO01/055492A1

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005] When widening the neckline diameter through the above described knitting method, the stitches for the neckline part of the front body are increased. In this case, the yarn may break when circling-knitting the collar unless the stitches for the neckline part of the front body are rotated to the needle bed on which the stitches for the neckline part of the back body are held so that the knitting width becomes substantially the same at the front and the back needle beds.

[0006] Furthermore, when knitting the V-neck collar with the neckline diameter in a widened state, the stitches for the collar of the front body are transferred towards the center in the knitting width direction to overlap the stitches at the center in the knitting width direction, thereby forming a pointed tip of the V-neck collar. Therefore, the stitches held on the needles of the needle bed on the front body side decrease when the stitches for the collar of the front body are sequentially transferred towards the center. As a result, yarn breakage may occur since the number of the stitches held on the knitting needles of the front needle bed becomes less than the number of stitches held on the knitting needles of the back needle bed. In order to prevent yarn breakage, the stitches positioned

at the ends in the knitting width direction of the collar of the back body must be rotated to the needle bed on the front body side each time the stitches are overlapped to form the pointed tip of the V-neck.

[0007] Since the rotated stitches are twisted by the rotation, some twisted stitches remain in the knitted fabric forming the collar when succeeding stitches are formed on the twisted stitches.

[0008] To prevent the formation of a twisted stitch, there is a method of twisting the stitches to be rotated in advance before transferring them so that the twist is resolved when the stitches are transferred. In the case of twisting the stitches before transferring, the stitches must be twisted in such a direction that the twist will be resolved when the stitch is transferred, and thus the yarn feeding direction is limited. Furthermore, when rotating the stitches at both ends in the knitting width direction, the twisting direction becomes opposite to each other, and thus the collar must be return-knitted to form the twisted stitch at both ends in the knitting width direction. Consequently, the stitches at both ends cannot be twisted in the opposite direction unless two-course knitting is carried out.

[0009] In the case where the twisted stitch is formed at both ends through return-knitting, the stitches can only be overlapped at the pointed tip for every two courses, whereby the number of occasions for overlapping the stitches decreases compared to the case where the stitches are overlapped for every course, and the opening angle of the V-neck collar becomes larger.

[0010] It is an object of the present invention to provide a method of knitting a knitwear capable of forming a large neckline diameter of the neckline part of the body and knitting the collar continuing from the neckline part without forming a twisted stitch, and furthermore, a method of knitting a knitwear capable of narrowing the opening angle of the collar in the case of the V-neck collar.

MEANS FOR SOLVING THE PROBLEMS

[0011] The present applicant reviewed various methods of knitting a collar with a large front cut without forming twisted stitches, and as a result, found a simple method of knitting a knitwear capable of forming a large neckline diameter of the neckline part of the body and knitting the collar continuing to the neckline part without forming twisted stitches. Furthermore, in the case of a V-neck collar, a method of knitting a knitwear capable of narrowing the opening angle of the collar has been obtained.

[0012] The method of knitting the knitwear with a collar according to the present invention knits a knitwear with a collar using a flat knitting machine having at least a pair of front and back needle beds extending in a transverse direction and disposed opposite to each other in a cross direction, at least one of the front and the back needle beds capable of being racked in the transverse direction so that stitches can be transferred between the front and back needle beds.

[0013] In the knitting method according to the present

invention, a body is knitted and shoulder parts are joined while holding stitches for forming a neckline part on needles of the needle beds in a resting state. With the joining of the shoulder parts, the stitches for forming the neckline part of the body remain held on the needles of the needle beds in a resting state. The stitches for the neckline part of a front body held on the needle bed are transferred so that there is obtained a status where the stitches are held on selected needles while being arranged with empty needles of at least the number of widening the stitches, at the needle bed holding the stitches for the neckline part of the front body. The stitches for the neckline part of a back body are transferred so that there is obtained a status where the stitches are held on selected needles while being arranged with empty needles in at least one part, at the needle bed holding the stitches for the neckline part of the back body so that the length in the knitting width direction of a knitted fabric held on the needles of the back needle bed becomes substantially the same as the length in the knitting width direction of a knitted fabric held on the needles of the front needle bed. Furthermore, at the needle bed holding the stitches for the neckline part of the front body, widening stitches are formed on some of or all of the empty needles to increase the peripheral length of the front neckline, and at the front and back needle beds, stitches are formed on the stitches including the widening stitches to knit the collar.

[0014] When widening stitches are formed on all the empty needles at the needle bed holding the stitches for the neckline part of the front body, the stitches for the neckline part of the front body are all held in a status where the stitches are on every needle without empty needles arranged therein, and the front collar continuing from the stitches for the neckline part are knitted in such a status. When widening stitches are formed on some of the empty needles, the stitches for the neckline part of the front body are held on the needle bed in such a status that parts of the neckline part are in the every-needle status where the stitches are held on every needle without being arranged with empty needles and parts of the neckline part are in the needle extracted status where the stitches are held on selected needles while being arranged with empty needles, and the front collar continuing from the stitches for the neckline part in such a status is similarly knitted for the every-needle status and the needle extracted status

[0015] According to the present invention, a V-neck collar in the knitwear may be formed by carrying out knitting including the following steps:

- a) holding stitches for forming a neckline part of a body including a front body and a back body on needles of needle beds in a resting state after knitting the body in which the front body is divided and separately knitted for a front right body and a front left body at an upper part and joining shoulder parts of the front and back bodies;
- b) transferring the stitches for the neckline part of

the front body held on the needle bed so that there is obtained a status where the stitches are held on selected needles while being arranged with empty needles of at least the number of widening stitches at the needle bed holding the stitches for the neckline part of the front body, and transferring the stitches for the neckline part of the back body so that there is obtained the status where the stitches are held on selected needles while being arranged with empty needles in at least one part of the neckline part, at the needle bed holding the stitches for the neckline part of the back body so that a length in the knitting width direction of a knitted fabric held on the needles of the back needle bed becomes substantially the same as a length in the knitting width direction of a knitted fabric held on the needles of the front needle bed;

c) starting to knit a collar by forming stitches on the stitches held on the needles of the needle bed holding the stitches for the neckline part of the front body after forming widening stitches on some of or all of the empty needles to increase a peripheral length of the front neckline part, and forming stitches on the stitches held on the needles of the needle bed holding the stitches for the neckline part of the back body;

d) transferring the stitches towards the center in the knitting width direction and overlapping the stitches at the center of the knitting width direction to form a pointed tip with respect to the stitches of the front collar formed in the front body while transferring the stitches positioned between the empty needles to the adjacent empty needle on the body center side at the needle bed holding the stitches for a back collar formed in the back body;

e) knitting the collar by forming stitches on the stitches held on the front and back needle beds; and

f) performing a bind-off process after repeating step (d) and step (e) a predetermined number of times.

[0016] Furthermore, the process may proceed to step (c) after, the following transfer of the stitches is completed in step (b). In step (b), the stitches for the neckline part of the back body are transferred so that empty needles of at least the number of the stitches to be double-stitched for forming the pointed tip of the front collar are contained in the needle extracted status at the needle bed holding the stitches for the neckline part of the back body. According to such a knitting method, the sizes of the stitches for the collar formed in the back body and in the front body can be made equal other than at the ends in the knitting width.

[0017] In knitting the collar, it is preferable to knit stitches tight for the stitches held on the selected needles having empty needles on both sides. By carrying out the tight stitch knitting, the size of the stitches formed with the selected needles between the empty needles at the collar can be made the same as much as possible as the size of the stitches formed in the every-needle status in other

parts of the collar. Furthermore, when the needle extracted status is applied to the neckline part, the portion of the neckline part in the needle extracted status is preferably positioned near the boundary of the front body and the back body at the neckline part, that is, near the ends in the knitting width direction of the front neckline part or the back neckline part. By setting the position in this manner, tight stitch knitting is carried out near the boundary of the front and back bodies of the collar when knitting the collar. Therefore, the stitch status in a completed sweater will be more unnoticeable on wearing.

[0018] In the case of knitting the V-neck collar, the opening angle of the V-neck collar can be narrowed maximally by repeating step (d) and step (e). However, step (e) of circling-knitting can be performed two or more times after step (d) of overlapping the stitches, and step (d) can again be performed thereafter. Therefore, the opening angle of the collar can be freely designed by freely setting the timing of overlapping the stitches for forming the pointed tip of V-neck.

[0019] According to the present invention, the knitwear can be knitted using a two-bed flat knitting machine including a front needle bed and a back needle bed, or can be knitted using a four-bed flat knitting machine including a lower front needle bed and a lower back needle bed, and an upper front needle bed and an upper back needle bed arranged on the lower needle beds.

[0020] When using the two-bed flat knitting machine, the knitted fabric of the body is knitted with every other needle, and when further arranging an empty needle to enlarge the neckline part, the stitches for forming the neckline part are held on selected needles of every two needles with empty needles arranged in between before widening the stitches.

[0021] When using the four-bed flat knitting machine, the front body is knitted at the lower front needle bed in a status where the empty needle is not arranged, and the stitches for forming the neckline part are held on the needles in an every-needle status, that is, a status in which the empty needle is not arranged, for example. Furthermore, the back body is knitted at the lower back needle bed in a status where the stitches are held on every needle and an empty needle is not arranged, and the stitches for forming the neckline part are similarly held on every needle without being arranged with an empty needle. When arranging an empty needle to enlarge the neckline part, the stitches for forming the neckline part are held on the selected needles so that every other needle is not holding the stitch. When using the four-bed flat knitting machine, the needles of the upper front needle bed are used to transfer stitches while knitting the body. The stitches may also be transferred between the lower front needle bed and the lower back needle bed.

EFFECTS OF THE INVENTION

[0022] In the method of knitting the knitwear according to the present invention, the stitches for the neckline part

of the front body are transferred so that there is obtained a status where the stitches are held on selected needles while being arranged with empty needles of at least the number of widening stitches, at the needle bed holding the stitches for the neckline part of the front body. The stitches for the neckline part of the back body are transferred so that there is obtained a status where the stitches are held on selected needles while being arranged with empty needles in at least one part of the neckline part, at the needle bed holding the stitches for the neckline part of the back body so that a length in the knitting width direction of a knitted fabric held on the needles of the back needle bed becomes substantially the same as a length in the knitting width direction of a knitted fabric held on the needles of the front needle bed. Holding the neckline part so that the lengths in the knitting width direction at the front and back needle beds are substantially the same length, widening stitches are formed on the empty needles to increase the peripheral length of the front neckline part, at the needle bed holding the stitches for the neckline part of the front body. Thereafter, stitches are formed on the stitches held on the needles of the front and back needle beds to knit the collar, whereby a collar with a large neckline can be knitted.

[0023] According to the present invention, the stitches need not be rotated to the other needle bed while knitting the collar even if a widening stitch is formed at the needle bed holding the stitches for the neckline part of the front body. This is because the empty needles are arranged in correspondence to the number of stitches for the widening stitch at the needle bed holding the stitches for the neckline part of the back body. Accordingly, the twisted stitch is not formed since such rotation is not necessary.

[0024] According to the knitting method of the present invention, when forming a V-neck collar in the knitwear, a widening stitch is formed on the respective empty needles to increase the peripheral length of the neckline part and stitches are formed on the stitches including the widening stitches to start knitting the collar with respect to the neckline part of the front body. Subsequently, the stitches are overlapped at the center in the knitting width direction of the front collar to form a pointed tip of V-neck, while the respective stitches of the back collar held on the selected needles positioned between the empty needles are transferred to the adjacent empty needle located on the center side of the body at the needle bed holding the stitches for the back collar by the number of the stitches overlapped at the front collar. Thereafter, the stitches are formed on the stitches held on the needles, which processes are repeated to knit the collar.

[0025] In the case of knitting the collar with a pointed tip of V-shape in this manner, the length of the knitted fabrics in the knitting width direction on the front and back needle beds is always equal to each other when the collar is knitted, thus the stitches need not be rotated. Since the stitches need not be rotated while knitting the collar, a twisted stitch is less likely to be formed at the collar. Furthermore, since the double stitches for forming the

pointed tip of V-shape can be formed overlapped for each one-course knitting, a V-neck collar having a large front cut and a narrow opening angle can be formed.

BEST MODE FOR CARRYING OUT THE INVENTION

[0026] Preferred embodiments of the present invention will be described in detail below with reference to the drawings. In the present embodiments, a V-neck sweater is formed using a so-called four-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 section, the back needle bed capable of being racked in the transverse direction, and stitches capable of being transferred between the front and back needle beds.

[0027] In the present embodiments, description will only be made on the method of knitting the neckline part of the V-neck sweater, but obviously, sweaters with a large neckline such as U-neck as well as V-neck or U-neck vests can also be knitted.

[0028] The four-bed flat knitting machine includes, on a lower front needle bed FD and a lower back needle bed BD, an upper front needle bed FU and an upper back needle bed BU arranged with a great number of knitting needles at the same pitch as the lower needle beds.

[0029] A sweater 1 knitted in the present embodiments is a long sleeve type sweater with a V-neck collar that includes a body 2, a right sleeve 3, and a left sleeve 4. Fig. 1 is a front view of the sweater. Fig. 2 and Fig. 3 are knitting process diagrams for the method of knitting the collar part of the knitwear according to the present invention.

[0030] In the present embodiments, the front body and the front knitted fabric parts of the right and left sleeves are knitted with the lower front needle bed FD of the four-bed flat knitting machine, and the back body and the back knitted fabric parts of the right and left sleeves are knitted with the lower back needle bed BD. The needles of the upper back needle bed BU are used to transfer the stitches of the front body and the front knitted fabric parts of the sleeves. The needles of the upper front needle bed FU are used to transfer the stitches of the back body and the back knitted fabric parts of the sleeves.

[0031] Through the use of empty needles of the upper front bed FU and the upper back needle bed BU, structure patterns of mixed front-and-back stitches, such as links, purl stitches, and ribs, can be knitted, stitches can be rotated, and the stitches can be overlapped.

[0032] Regarding the sweater 1 knitted in the present embodiments, the body 2 is knitted into a tubular form with the front body and the back body continuing to each other, the left and right sleeves 3, 4 are also knitted into a tubular form. Thereafter, the body 2 and the sleeves 3, 4 are knitted and joined so as to form one continuing tubular form at the joining portions of the body 2 and the sleeves 3, 4. As shown in Fig. 1, the body 2 includes a hem part 21, side parts 22, armhole parts 23, and a neck-

line part 24. A collar 5 is continuously formed at the neckline part 24 in a seamless manner.

[0033] In the present embodiments, when referring to left and right of the body and the sleeves, such as right and left of the right sleeve 3 and the left sleeve 4, the terms are used based on a person wearing the sweater 1.

[0034] The knitting processes of the sweater 1 according to the present embodiment will now be described. In the present embodiment, the back body of the body 2 and the back knitted fabric parts of the right and left sleeves 3, 4 are knitted primarily with the needles of the lower back needle bed BD with the stitches held on every needle without including an empty needle. The front body of the body 2 and the front knitted fabric parts of the right and left sleeves 3, 4 are knitted primarily with the needles of the lower front needle bed FD with the stitches held on every needle without including an empty needle.

[0035] For the sake of convenience of description, the knitting pattern of the body 2, and the sleeves 3, 4 in the sweater 1 is presented in the form of a plain knit structure with no pattern, and the knitting pattern of the hem part 21 of the body 2 and the cuff portions 31, 41 of the sleeves 3, 4 are presented in the form of a rib knit structure. The body 2, the right sleeve 3, and the left sleeve 4 may have other knitting patterns such as jacquard and rib.

[0036] As shown in Fig. 1, first, the body 2 is knitted into a tubular form from the hem part 21, and the right sleeve 3 and the left sleeve 4 are also knitted into a tubular form from the respective cuff portions up to the joining start positions with the body 2. When the body 2 and the sleeves 3, 4 start to be joined from the lower ends of the armhole parts 23, the body 2 and the right sleeve 3 as well as the left sleeve 4 become into one tubular form.

[0037] In the present embodiment, the front body is knitted separately for a right front body 25 and a left front body 26 at the point of starting the formation of the neckline part 24. Since the front body is divided into the right and the left, the knitted fabric forming the neckline part 24 is knitted with return-knitting, returning at the neckline part 24. While performing the return-knitting, the body 2 and the sleeves 3, 4 are knitted with the stitches for the neckline part 24 held in a resting state on the needles of the lower front needle bed FD and the lower back needle bed BD.

[0038] The joining of the body 2 and the right and left sleeves 3, 4 is completed when the knitted fabric is knitted to the upper ends of the armhole parts 23. Furthermore, the shoulder part of the front body and the shoulder part of the back body are joined after knitting the shoulder drop portions in the body. With the joining of the shoulder parts, the stitches forming the neckline part 24 remain held in a resting state on the needles of the lower front needle bed FD and the lower back needle bed BD.

[0039] The collar is knitted from the status in which the stitches for the neckline part 24 are held on the needles of the lower front needle bed FD and the lower back needle bed BD. Subsequent knitting will be described based on the knitting process diagrams of Figs. 2 and 3. For

the sake of convenience of description, only a few stitches of the neckline part are illustrated in the knitting process diagrams of Figs. 2 and 3.

[0040] Figs. 2 and 3 show process diagrams for knitting the collar from the status in which the stitches for the neckline part 24 of the front body and the stitches for the neckline part 24 of the back body are the same in number, or are respectively sixteen stitches, at the point where the joining of the shoulder parts of the body is terminated. Ten widening stitches are formed at the neckline part 24 of the front body in such a state, and the collar is formed with the number of stitches to form the pointed tip of V-neck in one course as two stitches. In this case, the double stitches for forming the pointed tip are formed for every one-course knitting in order to have a narrow opening angle of the collar and a large collar cut, and such formation of double stitches is performed over three courses to form the collar.

[0041] In Figs. 2 and 3, the numbers on the left end indicate the step number, FU refers to the upper front needle bed, FD refers to the lower front needle bed, BD refers to the lower back needle bed, and BU refers to the upper back needle bed. The chain line at the center indicates a center line A on the needle beds of the neckline part of the front body held on the front needle beds. Furthermore, the stitches for the neckline part of the front body and the front collar are shown with a white circle, and the stitches for the neckline part of the back body and the back collar are shown with a black circle.

[0042] Step 1 shown in Fig. 2 shows a status in which the stitches for the neckline part of the body immediately after the shoulder parts are joined are held on the needle beds. As described above, sixteen stitches of the neckline part are held on each of the front and back needle beds. From step 1, of the stitches for the neckline part of the front and back neckline parts, the stitches on the right half of the neckline part of the front body excluding one stitch from the center line A are transferred to the upper back needle bed BU. Similarly, the stitches on the left half of the neckline part of the back body excluding one stitch from the center line A are transferred to the upper front needle bed FU (step 2).

[0043] From step 2, the back needle beds are racked towards the right by one pitch, the stitch at the left end of the stitches for the neckline part of the front body held on the needles of the upper back needle bed BU is transferred to the needle of the opposing lower front needle bed FD, and the stitch at the right end of the stitches for the neckline part of the back body held on the needles of the upper front needle bed FU is transferred to the needle of the opposing lower back needle bed BD (step 3). The process of step 3 is performed six more times to obtain a status in which the back needle beds are racked towards the right by seven pitches from the status of step 1, whereby the stitches are no longer held on the upper front needle bed FU and the upper back needle bed BU, and the status of step 4 is obtained.

[0044] From step 4, with respect to the stitches for the

neckline part of the front body out of the stitches for the front and back neckline parts, the stitches on the left half excluding one stitch from the center line A are transferred to the upper back needle bed BU. With respect to the stitches for the neckline part of the back body, seven stitches held on every needle without including an empty needle on the right end of the neckline part are transferred to the upper front needle bed FU (step 5).

[0045] From step 5, the back needle beds are racked towards the left by one pitch, the stitch at the right end of the stitches for the neckline part of the front body held on the needles of the upper back needle bed BU is transferred to the needle of the opposing lower front needle bed FD, and the stitch at the left end of the stitches for the neckline part of the back body held on the needles of the upper front needle bed FU is transferred to the needle of the opposing lower back needle bed BD (step 6). The process of step 6 is performed six more times to return the back needle beds to the status of step 1, whereby the stitches are no longer held on the upper front needle bed FU and the upper back needle bed BU, and the status of step 7 is obtained. In step 7, a needle extracted status in which the stitches excluding the two stitches at the center of the body with the center line A in between are held on every other needle at the front and back needle beds.

[0046] From step 7, with respect to the stitches for the neckline part of the back body, the stitches on the right half excluding one stitch from the center line A are transferred to the upper front needle bed FU (step 8). From step 8, the back needle beds are racked towards the right by one pitch, and the stitch at the left end of the stitches for the neckline part of the back body held on the needles of the upper front needle bed FU is transferred to the needle of the opposing lower back needle bed BD (step 9). The process of step 9 is performed four more times to return the remaining stitches held on the upper front needle bed FU to the lower back needle bed BU with the back needle beds racked towards the right by five pitches from the status of step 1, whereby the status of step 10 is obtained. When the process of step 9 is carried out for the second time, the stitch at the left end of the stitches for the neckline part of the front body held on the lower front needle bed FD is transferred to the needle of the opposing lower back needle bed BD to prevent yarn breakage. In this case, the transferred stitch may not be twisted or may be twisted.

[0047] From step 10, of the stitches for the neckline part of the back body held on the needles of the lower back needle bed BD, all the stitches held in the needle-extracted status located on the left side of the stitches held in the every-needle status are transferred to the needles of the opposing upper front needle bed FU. Further, one stitch of the neckline part of the front body on the lower back needle bed BD is similarly transferred to the upper front needle bed FU (step 11).

[0048] From step 11, the back needle beds are racked towards the left by one pitch, and the stitch at the right

end of the stitches for the neckline part of the back body held on the needles of the upper front needle bed FU is transferred to the needle of the opposing lower back needle bed BD (step 12). The process of step 12 is performed four more times to return the back needle beds to the status of step 1 by racking, and to return the remaining stitches held on the upper front needle bed FU to the lower back needle bed BD, whereby a status of step 13 is obtained. When the process of step 12 is carried out for the second time, the stitch at the right end of the stitches for the neckline part of the front body held on the lower front needle bed FD is transferred to the needle of the opposing lower back needle bed BD to prevent yarn breakage. In this case, the transferred stitch may not be twisted or may be twisted. If a twisted stitch is formed during the knitting processes of steps 9 and 12, the twisted stitch will not be noticeable as it is formed only at the neckline part, which is the boundary of the body and the collar.

[0049] In step 13, the stitches for the neckline part are held on the needles symmetrically with respect to the center line A at the front and back needle beds, where twelve stitches at the center portion in the knitting width direction are held on every needle without including empty needles at the lower back needle bed BD. Furthermore, in the status of step 13, of the stitches for the neckline part, one stitch of the neckline part of the front body located at each boundary with respect to the back body are rotated to the back needle bed.

[0050] From the status of step 13, a yarn is hung over the empty needles (twelve needles) of the lower front needle bed FD and widening stitches are formed thereon, and after the peripheral length of the front neckline part is increased, stitches formed on the stitches already held on the needles including the widening stitches are circling-knitted for one course at the lower front needle bed FD and the lower back needle bed BD (step 14). Due to the formation of the widening stitches, the number of stitches for the neckline part of the front body is increased by twelve stitches, knitting is performed for one course with the stitches for the neckline part increased, whereby the knitting of the V-neck collar is started.

[0051] From step 14, the stitches held on the lower front needle bed FD are transferred towards the center of the body. Further, of the stitches held on the lower back needle bed BD, only the stitches having an empty needle on the body center side (three stitches at each end in step 15) are transferred by one needle towards the center of the body, as shown in step 15.

[0052] Through the transfer at the lower front needle bed FD, the two stitches at the center of the body are overlapped with the stitches on their outer side and accordingly, the pointed tip of the V-neck collar is formed at the collar of the front body (step 16). In knitting the collar of the back body, even if the number of stitches decreases through knitting of the front collar with transferring the stitches, the knitting width at the lower back needle bed BD can be narrowed in correspondence to

the knitting width of the front collar where the stitches decrease gradually, since the stitches of the back collar can be transferred to the adjacent empty needles on the lower back needle bed BD. As a result, the knitting width can be maintained without rotating the stitches held on the lower back needle bed BD to the lower front needle bed FD.

[0053] As shown in steps 17 to 20, after one course for the front and back knitted fabrics of the collar is knitted, the stitches held on the lower front needle bed FD are transferred towards the center of the body to form double stitches, and at the lower back needle bed BD, only the stitches having an empty needle on the body center side are transferred at both ends in the knitting width direction. This series of process is repeated. In the present embodiment, this process is repeated three times, so that the empty needle no longer exists at the lower back needle bed BD. The bind-off process is lastly performed and the knitting of the collar is terminated. In the present embodiment, the doubles stitches are formed for every one course to have a small V-shaped angle of the collar.

[0054] In the present embodiment, when knitting the collar into a V-neck shape, the pointed tip is formed as follows. Two stitches, which are to become pointed tip of V-shape, located at the center of the front body are respectively double-stitched by the adjacent stitches on their outer side with respect to the knitting width direction in every one course of circling-knitting for forming the collar. Thus, the stitches forming the collar decrease by the number of double stitches for forming the pointed tip, whereby the process of step 9 and the process of step 12 are repeated until the number of empty needles arranged at the lower back needle bed BD become the same number as the double stitches. In the present embodiment, the double stitches are formed three times with respect to each of the two stitches to become the pointed tip, and thus three empty needles are arranged at the left and right ends in the knitting width direction of the neckline part respectively when the neckline part is formed.

[0055] Furthermore, in steps 14 to 20, when knitting the stitches on the selected needles having an empty needle on both sides out of the all stitches held on the lower back needle bed BD, the stitches are knitted tighter than the stitches held on every needle without including an empty needle on the center side. Through such tight stitch knitting, the stitches for the collar knitted with the lower back needle bed BD can be the same in size as much as possible with respect to the stitches formed in the needle extracted status and the stitches formed in the every-needle status. Accordingly, a satisfactory outer appearance can be obtained.

[0056] In the present embodiment, one stitch at each end in the knitting width direction of the neckline part of the front body is rotated to the back needle bed in step 13. However, in the subsequent knitting of the collar, the collar is knitted while maintaining the knitting width without rotating the stitches from the back needle bed to the front needle bed, and accordingly, a twisted stitch does

not form and a V-neck collar having a satisfactory outer appearance can be obtained. Furthermore, since the twisted stitch is not formed, the knitting for resolving the twisted stitch need not be performed, whereby the double stitches for forming the pointed tip of V-neck are formed for every one-course knitting, and a collar having a large front cut and a small V opening can be formed.

[0057] In the embodiment described above, the needle extracting status where the stitches are held on selected needles with empty needles arranged of the neckline part of the back body is applied near the end portions in the knitting width direction of the body, so that the stitches of the collar formed at the portions are positioned near the ends in the knitting width of the back collar. By setting a needle extracted portion in this manner, the outer appearance of the collar on wearing is made as beautiful as possible since the stitches of the back collar knitted at the portion arranged with empty needles are positioned near the ends in the knitting width of the back collar where the stitches are less likely to be noticed. However, the needle extracted status of the neckline part may be arranged at the center part or other portions.

[0058] Furthermore, the number of empty needles in the needle extracted portion on the needle bed holding the stitches of the collar of the back body is equal to the number of double stitches forming the pointed tip of V-neck in the present embodiment, that is, the number of the empty needles is preset so that the empty needles will no longer exist at the completion of forming the double stitches. However, the collar may be knitted with all the stitches for the neckline part of the back body held on selected needles with empty needles arranged therein as shown in Fig. 4. Step 7 of Fig. 4 is the same status as step 7 shown in Fig. 2, and the same knitting as steps 1 to 7 of Fig. 2 is performed up to step 7. In Fig. 4, after the yarn is hung over on all the empty needles at the lower front needle bed FD to form widening stitches from step 7, circling-knitting is carried out for one course (step 8). From step 8, the stitches on both end sides of the knitted fabric are transferred towards the center excluding two stitches at the center of the body at the lower front needle bed FD, and the stitches on both end sides are transferred towards the center excluding two stitches at the center of the body at the lower back needle bed BD, as shown in step 9, whereby the status of step 10 is obtained. Similarly, from step 11 to step 14, after circling-knitting for one course with the front and back needle beds, the stitches are transferred so as to form double stitches on the two stitches at the center of the body at the lower front needle bed FD, and only the stitches on the selected needles having empty needles on both sides are transferred towards the center of the body at the lower back needle bed BD. The bind-off process is lastly performed to complete the formation of the collar.

[0059] In the case shown in Fig. 4 as well, the back collar can be knitted while forming the pointed tip at the front collar without rotating the stitches for forming the back collar to the lower front needle bed FD. In Fig. 4,

when knitting the stitches on the selected needles having empty needles on both sides, the stitches are knitted tighter than the stitches in a status held on every needle without including empty needles.

[0060] As shown in Fig. 5, the neckline part may be knitted with the number of empty needles to be arranged at the lower back needle bed BD slightly greater than the number of double stitches in knitting the front collar when increasing the stitches of the neckline part. In Fig. 5, the double stitches for forming the pointed tip of the front collar are in total six stitches, three stitches each in left and right, and ten empty needles are arranged at the lower back needle bed BD. Step 7 of Fig. 5 is also the same status as step 7 shown in Fig. 2, and the same knitting as steps 1 to 7 of Fig. 2 is carried out up to step 7. In Fig. 5, from step 7, the transfer process of step 9 and the transfer process of step 12 to reduce the number of empty needles arranged at the lower back needle bed BD are respectively performed three times. From step 14, after circling-knitting for one course on the front and back needle beds, the stitches are transferred to form the double stitches on the two stitches at the center of the body at the lower front needle bed FD, and only the stitches on the selected needles having an empty needle on both sides are transferred towards the center of the body at the lower back needle bed BD. This series of process is repeated for three times, in a similar manner to the formation of the pointed tip of V-neck shown in Fig. 3, whereby a status of step 15 is obtained.

[0061] As shown in step 14 of Fig. 6, the neckline part may be formed in such a manner that the widening stitches are formed so that an empty needle remains near the end in the knitting width at the lower front needle bed FD, and the number of the empty needles at the lower back needle bed BD are greater than the number of double stitches formed in knitting the front collar, when increasing the stitches for the neckline part. In Fig. 6 as well, the double stitches for forming the pointed tip of the front collar are in total six stitches, three stitches each in left and right, the number of empty needles to be arranged at the lower front needle bed FD is four, and the number of empty needles to be arranged at the lower back needle bed BD is ten. In Fig. 6, the same knitting as Fig. 5 is carried out from step 7 to step 13, where step 7 is the same status as step 7 shown in Fig. 2, and the same knitting as steps 1 to 7 of Fig. 2 is carried out up to step 7.

[0062] From the status of step 13, the widening stitches are formed on the empty needles excluding two empty needles located at each end in the knitting direction at the lower front needle bed FD, whereby the status of step 14 is obtained. From step 14, after circling-knitting for one course on the front and back needle beds, the stitches are transferred to form the double stitches on the two stitches at the center of the body at the lower front needle bed FD, and only the stitches on the selected needles having an empty needle on both sides are transferred towards the center of the body at the lower back needle bed BD. This series of process is repeated for three times,

in a similar manner to the formation of the pointed tip shown in Fig. 3, whereby a status of step 15 is obtained.

[0063] As with the knitting method shown in Figs. 4 to 6, when the every-needle status and the needle extracted status coexist at the needle beds when the collar is knitted up to a point right before the bind-off process, with respect to the stitches in the needle extracted status, the succeeding bind-off process may be performed after transferring the stitches towards the center of the body so that the empty needle no longer exists, or may be performed with the stitches in the needle extracted status. If all stitches of the front needle beds are in the every-needle status, and some stitches of a back needle bed are in the needle extracted status, the bind-off process is performed on the stitches on the front needle beds, and thereafter, the bind-off process may be performed after gathering the stitches toward the center of the body at the back needle bed.

[0064] As described above, in the present embodiments, the front cut of the neckline of the front body is made large and the neckline opening diameter is widened by forming the widening stitches with the entire neckline part of the front body in the needle extracted status, and the opening angle (angle α of Fig. 7) of the collar is narrowed by forming the pointed tip for every circling-knitting of one course in the knitting of the collar, as shown in a collar 51 of Fig. 7. Furthermore, according to the knitting method of the present invention, knitting may be carried out so that the neckline opening diameter becomes smaller than the collar 51 and the opening angle of the collar becomes wider than the collar 51, as in a collar 52 of Fig. 7. In that case, the widening stitches of the neckline part of the front body are set and the timing (the number of circling-knitting courses) for overlapping the stitches is set to form the pointed tip, according to the size of a desired neckline.

INDUSTRIAL APPLICABILITY

[0065] The knitting method according to the present invention is suitable for knitting a knitwear with a collar knitted in a seamless manner using a flat knitting machine, in particular, for knitting a sweater or a vest with a V-neck collar.

BRIEF DESCRIPTION OF THE DRAWINGS

[0066]

Fig. 1 is a front view of a sweater in an embodiment of a method of knitting a sweater according to the present invention.

Fig. 2 is a knitting process diagram for a collar of the sweater according to the embodiment.

Fig. 3 is a knitting process diagram for a collar of the sweater according to the embodiment.

Fig. 4 shows another embodiment of the knitting process diagram of a collar of a sweater according

to the embodiment.

Fig. 5 shows another embodiment of the knitting process diagram of a collar of a sweater according to the embodiment.

Fig. 6 shows another embodiment of the knitting process diagram of a collar of a sweater according to the embodiment.

Fig. 7 is an explanatory view showing different states of an opening angle of the collar according to the present invention.

EXPLANATIONS OF LETTERS OR NUMERALS

[0067]

1	sweater
2	body
21	hem part
22	side part
23	armhole part
24	neckline part
25	right front body
26	left front body
3	left sleeve
31	cuff portion
4	right sleeve
41	cuff portion
5, 51, 52	collar

Claims

1. A method of knitting knitwear with a collar using a flat knitting machine having at least a pair of front and back needle beds extending in a transverse direction and disposed opposite to each other in a cross direction, at least one of the front and the back needle beds capable of being racked in the transverse direction so that a stitch can be transferred between the front and back needle beds, the method comprising the steps of:

knitting a body and joining shoulder parts while holding stitches for forming a neckline part on needles of the needle beds in a resting state; transferring the stitches for the neckline part of a front body held on any of the needle beds so that there is obtained a status in which the stitches are held on selected needles while being arranged with empty needles of at least a number of widening stitches at the needle bed holding the stitches for the neckline part of the front body, and transferring the stitches for the neckline part of a back body so that there is obtained a status in which the stitches are held on selected needles while being arranged with empty needles in at least one part of the neckline part of the back body at the needle bed holding the stitches

- for the neckline part of the back body, so that a length in a knitting width direction of a knitted fabric held on the needles of the back needle bed becomes substantially the same as a length in a knitting width direction of a knitted fabric held on the needles of the front needle bed; and forming widening stitches on some of or all of the empty needles to increase a peripheral length of the front neckline part at the needle bed holding the stitches for the neckline part of the front body, and forming stitches on the stitches including the widening stitches at the front and back needle beds to knit the collar.
2. The method of knitting the knitwear with the collar according to claim 1 for forming a V-neck collar in the knitwear, the method comprising the steps of:
- a) holding the stitches for forming the neckline part of the body on needles of the needle beds in a resting state after knitting the body separately for a front right body and a front left body at an upper part of the front body and joining the shoulder parts of the front and back bodies;
 - b) transferring the stitches for the neckline part of the front body held on any of the needle beds so that there is obtained a status in which the stitches are held on selected needles while being arranged with empty needles of at least a number of widening stitches at the needle bed holding the stitches for the neckline part of the front body, and transferring the stitches for the neckline part of the back body so that there is obtained a status in which the stitches are held on selected needles while being arranged with empty needles in at least one part of the neckline part of the back body at the needle bed holding the stitches for the neckline part of the back body, so that a length in a knitting width direction of a knitted fabric held on the needles of the back needle bed becomes substantially the same as a length in a knitting width direction of a knitted fabric held on the needles of the front needle bed;
 - c) forming widening stitches on some of or all of the empty needles to increase a peripheral length of the front neckline part and forming stitches on the stitches held on the needles of the needle bed holding the stitches for the neckline part of the front body, and forming stitches on the stitches held on the needles of the needle bed holding the stitches for the neckline part of the back body, to start knitting the collar;
 - d) transferring the stitches towards the center in the knitting width direction and overlapping the stitches at the center of the knitting width direction to form a pointed tip of V-neck collar with respect to the stitches of the front collar formed in the front body, and transferring the stitches held on selected needles positioned between the empty needles to the adjacent empty needle on the body center side at the needle bed holding the stitches of the back collar formed in the back body;
 - e) knitting the collar by forming stitches on the stitches held on the front and back needle beds; and
 - f) performing a bind-off process after repeating step (d) and step (e) a predetermined number of times.
3. The method of knitting the knitwear with the collar according to claim 2, wherein the process proceeds to step (c) after completion of the following process in step (b):
- transferring the stitches for the neckline part of the back body so that empty needles of at least a number of stitches to be double-stitched for forming the pointed tip of the front collar are contained in the status in which the stitches are held on selected needles while being arranged with empty needles at the needle bed holding the stitches for the neckline part of the back body.
4. The method of knitting the knitwear with the collar according to any one of claims 1 to 3, wherein in knitting the collar, tight stitch knitting is carried out on the stitches held on selected needles positioned between empty needles.

Fig. 1

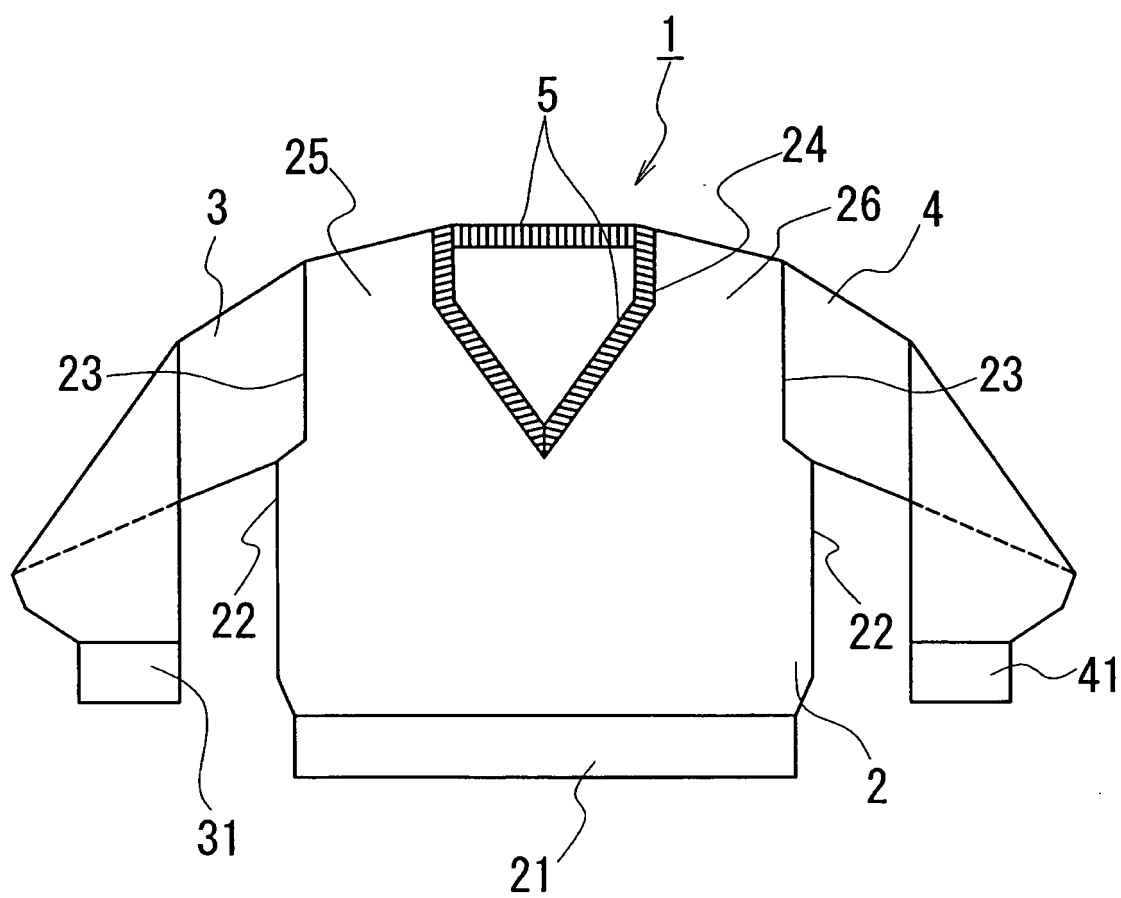


Fig. 2

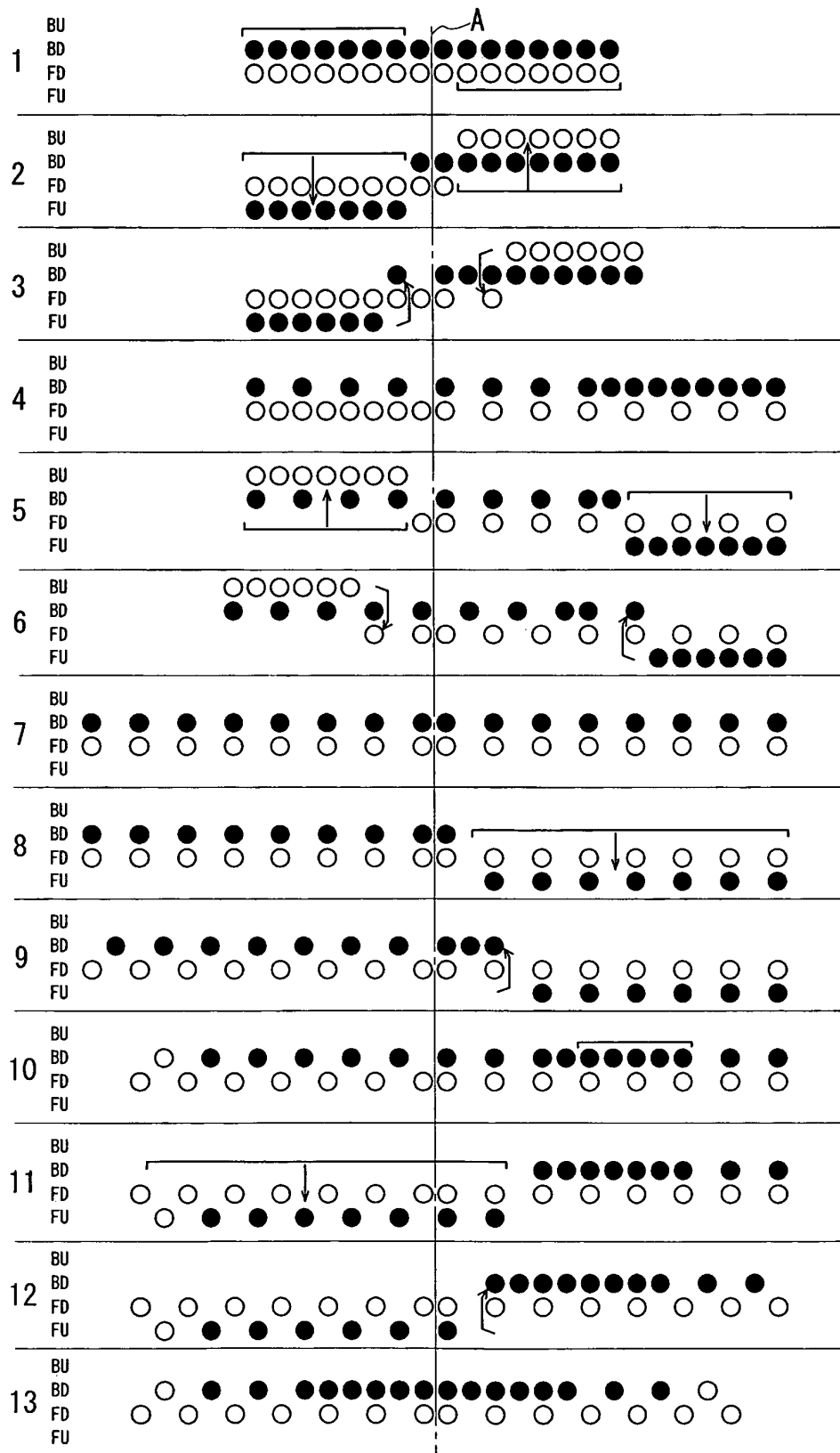


Fig. 3

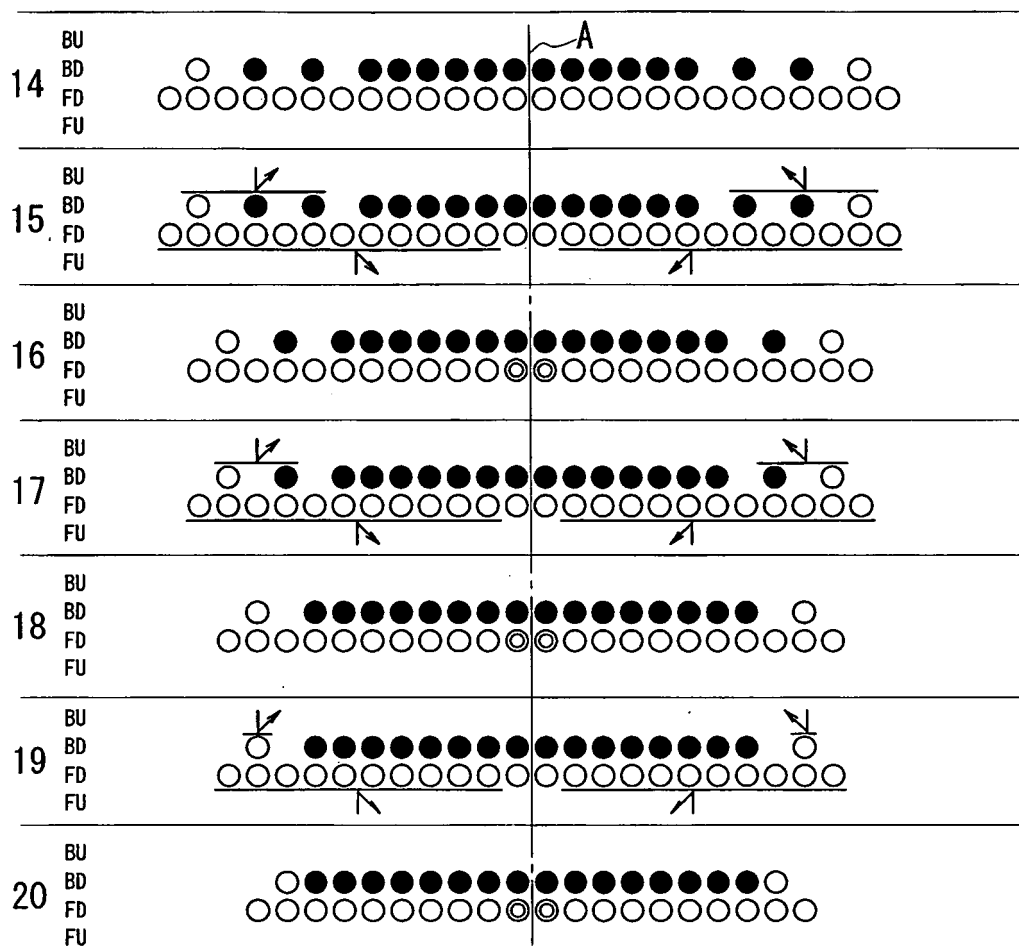


Fig. 4

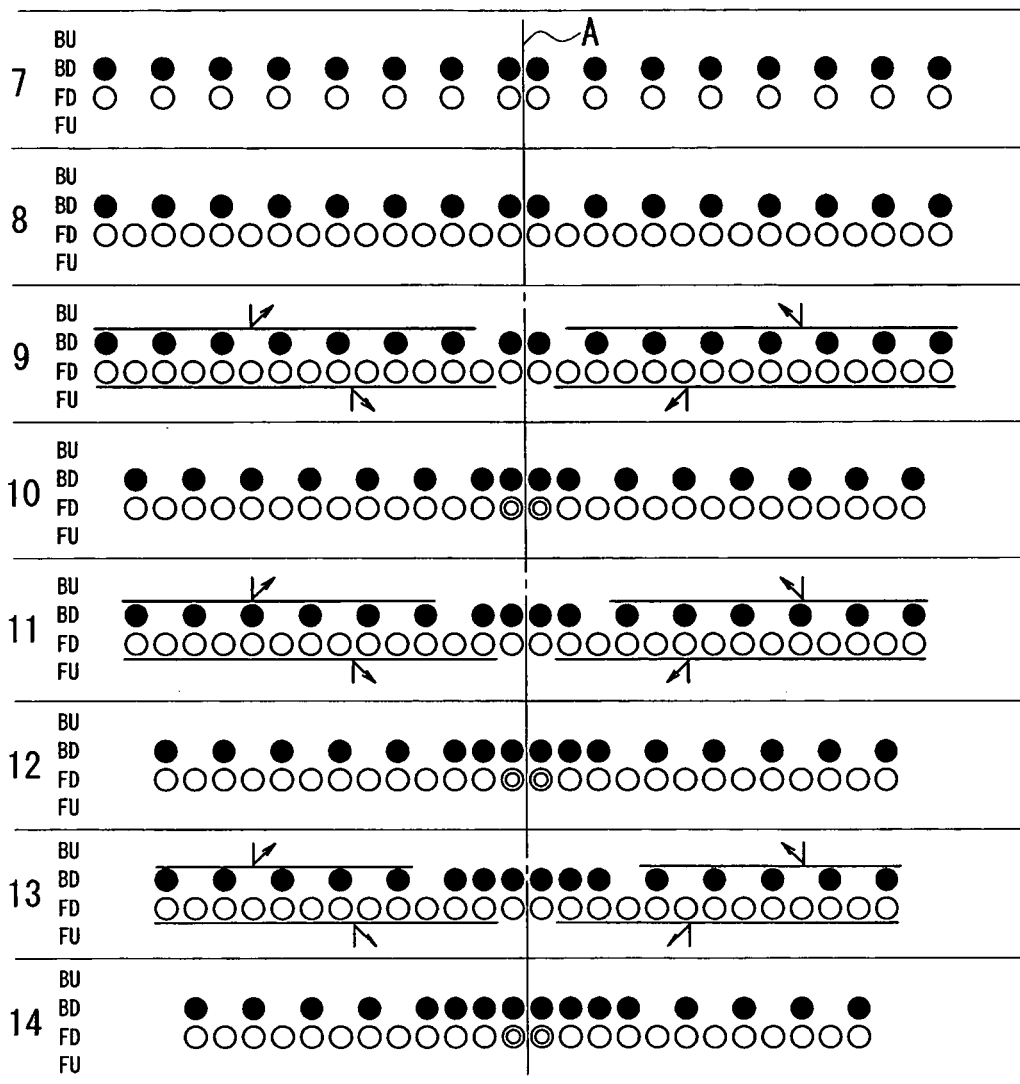


Fig. 5

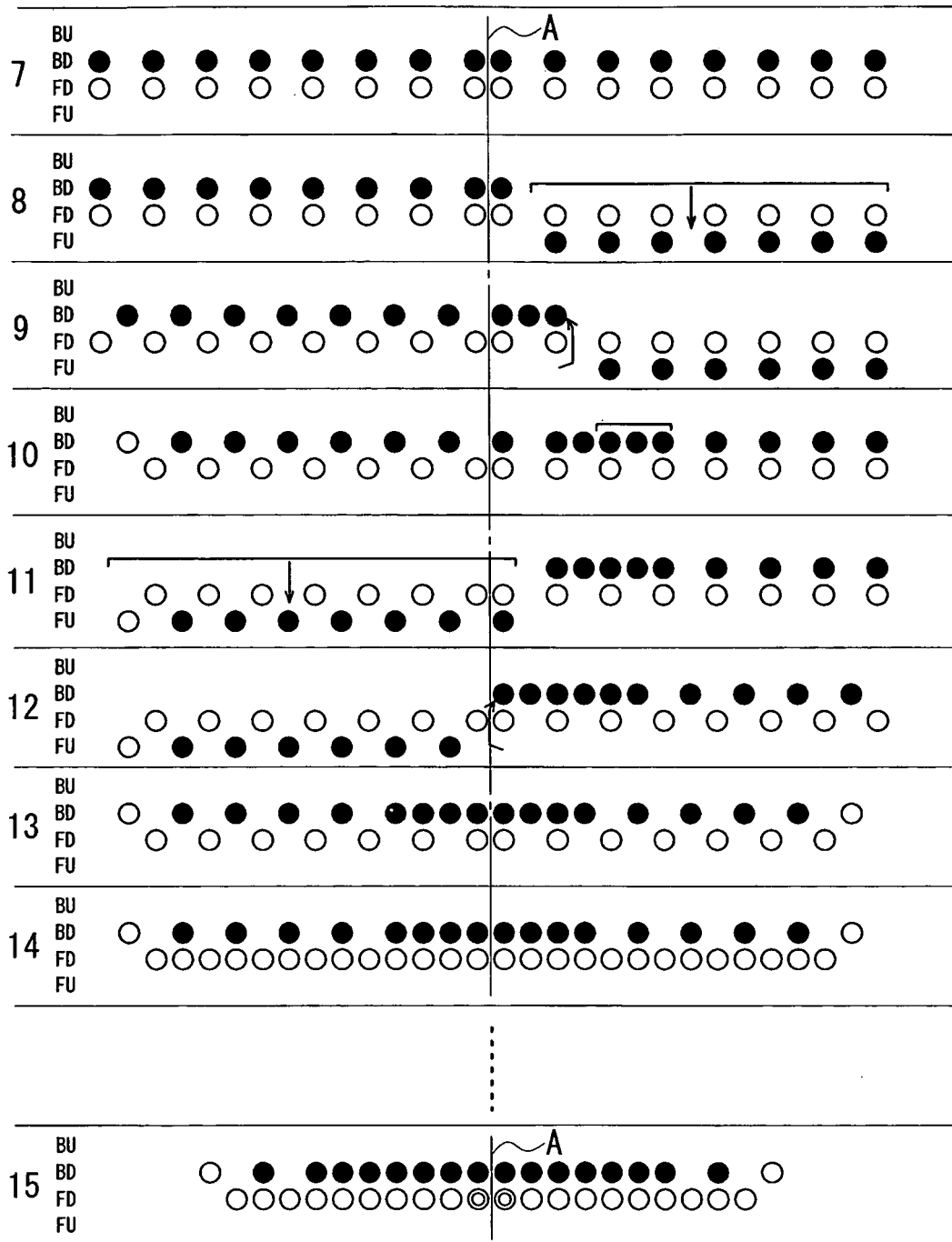


Fig. 6

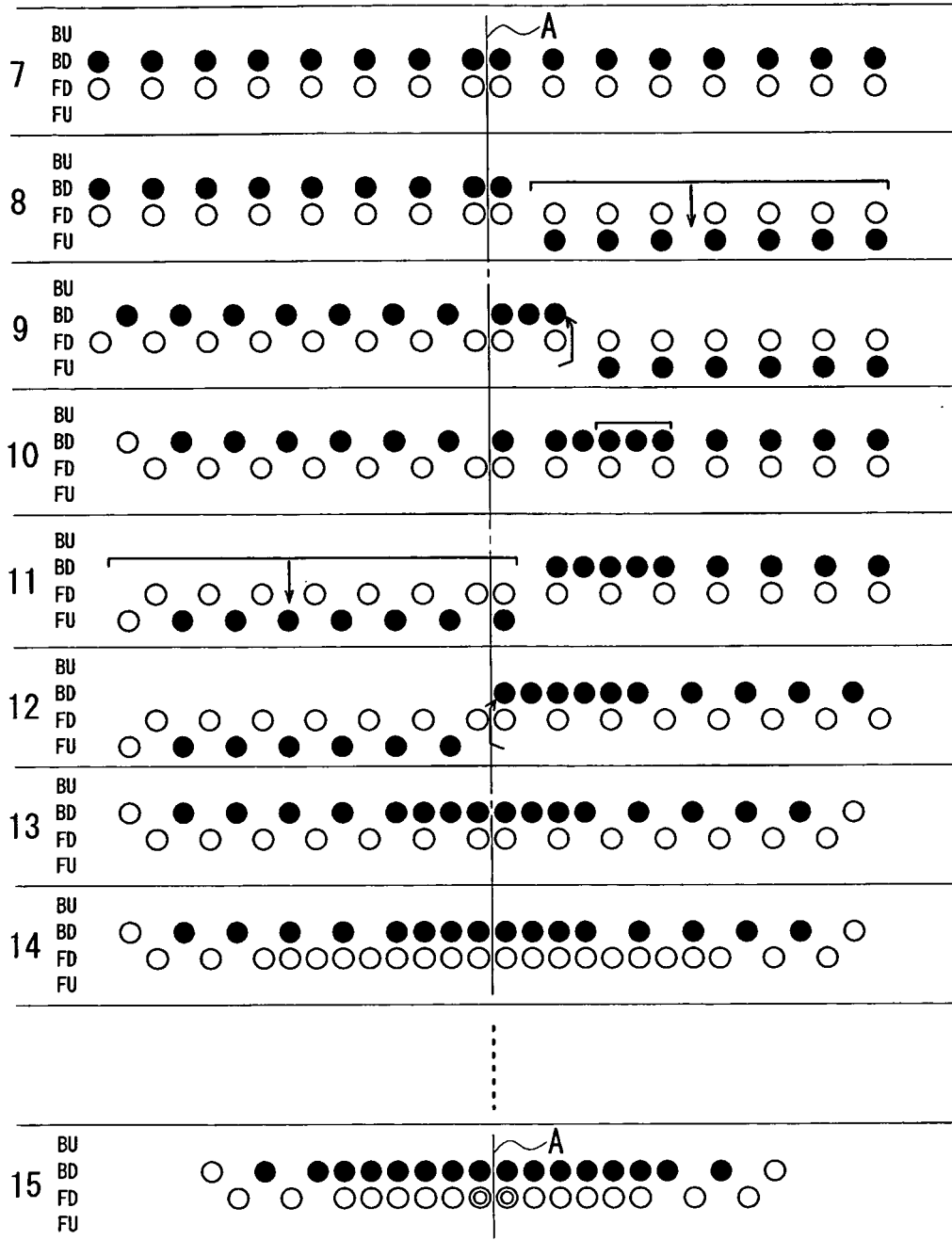
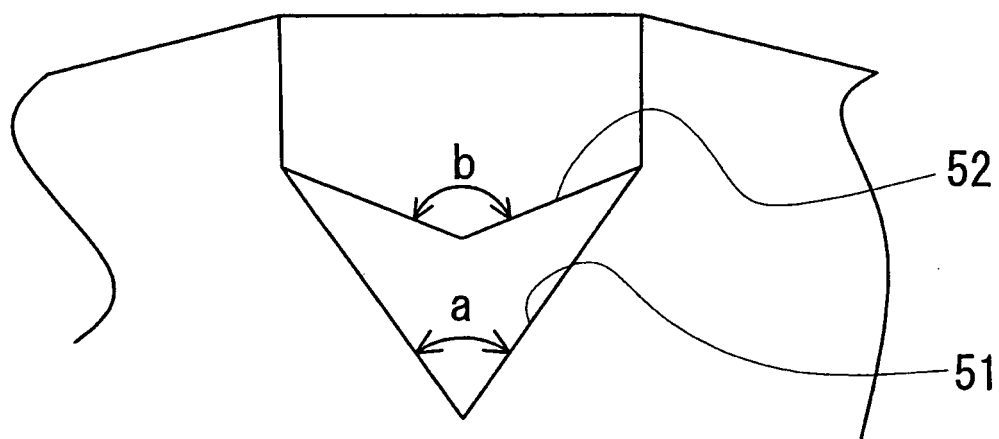


Fig. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/317544

A. CLASSIFICATION OF SUBJECT MATTER

D04B7/10(2006.01)i, A41D1/04(2006.01)i, A41D27/18(2006.01)i, D04B1/24(2006.01)i, D04B7/30(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)

D04B1/24, 7/00-7/34;A41D1/04, 27/18

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	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

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	WO 2001/055492 A1 (Shima Seiki Mfg., Ltd.), 02 August, 2001 (02.08.01), & US 6672113 B2 & EP 1264922 A1 & CN 1396968 A & TW 491917 B	1-4
A	WO 2002/92895 A1 (Shima Seiki Mfg., Ltd.), 21 November, 2002 (21.11.02), & US 6988384 B2 & EP 1386989 A1 & KR 2004012775 A & CN 1514896 A	1-4
A	WO 01/63030 A1 (Shima Seiki Mfg., Ltd.), 30 August, 2001 (30.08.01), & US 6668593 B2 & EP 1258552 A1 & KR 2002075924 A & TW 485189 A & CN 1418270 A	1-4

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search
24 October, 2006 (24.10.06)

Date of mailing of the international search report
07 November, 2006 (07.11.06)

Name and mailing address of the ISA/
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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