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(72) Inventor: **Uemichi, Kazuya**  
**Wakayama-shi**  
**Wakayama 641-8511 (JP)**

(74) Representative: **Wagner, Karl H.**  
**Wagner & Geyer**  
**Gewürzmühlstrasse 5**  
**80538 Munich (DE)**

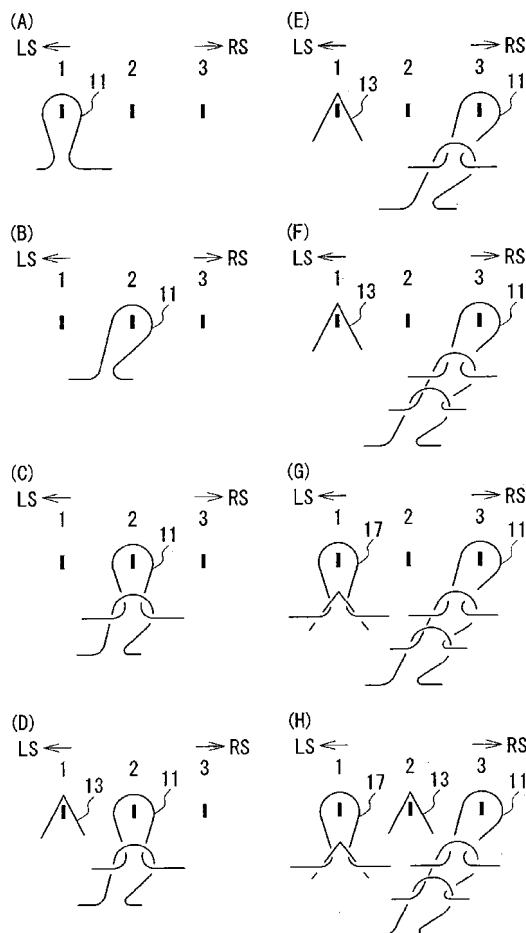
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(71) Applicant: **Shima Seiki Manufacturing., Ltd.**  
**Wakayama 641-8511 (JP)**

(54) **Knitting method of knitted fabric and knitted fabric**

(57) To provide a knitting method of a knitted fabric for knitting a set-up portion in which stretchability is moderately suppressed. The following steps  $\alpha$  to  $\delta$  are repeated to form the set-up portion. A step  $\alpha$  of transferring a one side stitch 11 held on one needle bed (BB) to a knitting needle in a forming direction RS, and forming a new one side stitch 11 following in a wale direction of the moved one side stitch 11; a step  $\beta$  of forming a one side widening stitch 13 on an empty needle on the starting end direction LS side of the new one side stitch 11 formed in the step  $\alpha$ ; a step  $\gamma$  of transferring an other side stitch 12 held on an other needle bed (FB) to a knitting needle in the forming direction RS, and forming a new other side stitch 12 following in a wale direction of the moved other side stitch 12 after the step  $\beta$ ; and a step  $\delta$  of forming an other side widening stitch 14 on an empty needle on the starting end direction LS side of the new other side stitch 12 formed in the step  $\gamma$ .

**Fig. 1**



## Description

### BACKGROUND OF THE INVENTION

#### Field of the Invention

**[0001]** The present invention relates to a knitting method of a knitted fabric, using a flat knitting machine, for knitting a set-up portion diverged to one side knitted fabric portion, which is mainly knitted on one needle bed, and the other side knitted fabric portion, which is mainly knitted on an other needle bed, and a knitted fabric including the set-up portion obtained by the knitting method.

#### Description of the Related Art

**[0002]** It has been conventionally carried out to form a set-up portion using a flat knitting machine and to form one side knitted fabric portion and the other side knitted fabric portion which are diverged from the set-up portion. Such a set-up portion is generally formed by alternately hanging a knitting yarn on a knitting needle of a front needle bed and a knitting needle of a back needle bed of the flat knitting machine. For example, Patent Document 1 discloses a technique of forming a twisted stitch on each knitting needle when alternately hanging the knitting yarn on the front and the back to make a tight set-up portion.

#### PRIOR ART DOCUMENT

#### PATENT DOCUMENT

**[0003]** [Patent Document 1] Japanese Patent No. 4203414

### SUMMARY OF THE INVENTION

**[0004]** Upon knitting a skirt (knitted fabric) 100 shown in Fig. 8, knitting may be started from one side end and finished at the other side end. In this case, a set-up portion 101 is first formed, and a front side knitted fabric portion 20F and a back side knitted fabric portion 20B which are diverged from the set-up portion 101 are knitted. The front side knitted fabric portion 20F and the back side knitted fabric portion 20B are joined through a bind-off process at a position to become the other side end of the skirt 100 to obtain a knitting-finish portion 102 of the skirt 100. The set-up portion is formed by alternately feeding the knitting yarn to the front and back needle beds and hence excels in stretchability than the one side knitted fabric portion and the other side knitted fabric portion formed following the set-up portion. On the contrary, a double stitch is formed in the bind-off process of the knitting-finish portion 102 and such double stitch restricts the stretchability of the knitted fabric, and hence the stretchability of the knitting-finish portion 102 tends to be inferior to the stretchability of the set-up portion 101.

**[0005]** Means to correct the imbalance in stretchability between the set-up portion 101 and the knitting-finish portion 102 include using the knitting method capable of enhancing the stretchability of the knitting-finish portion 102 or the knitting method capable of suppressing the stretchability of the set-up portion 101. However, the latter knitting method is not sufficiently reviewed at the present time.

**[0006]** The present invention has been devised in view of the above problem, and an object thereof is to provide a knitting method of a knitted fabric for knitting a set-up portion in which stretchability is moderately suppressed, and a knitted fabric including the set-up portion knitted by applying such a method.

**[0007]** A knitting method of a knitted fabric according to the present invention is a knitting method of a knitted fabric for knitting a set-up portion diverged to one side knitted fabric portion, which is mainly knitted on one needle bed, and the other side knitted fabric portion, which is mainly knitted on an other needle bed, using a flat knitting machine including at least one front needle bed and one back needle bed, in which at least one of the front and back needle beds can be racked in a transverse direction and stitches can be transferred between the front and back needle beds. Assuming a direction in which the set-up portion is sequentially formed in a longitudinal direction of the needle beds is a forming direction and an opposite direction is a starting end direction, the knitting method of a knitted fabric according to the present invention repeats the following steps  $\alpha$  to  $\delta$  to form the set-up portion.

[Step  $\alpha$ ] transferring a one side stitch held on one needle bed to a knitting needle in the forming direction, and forming a new one side stitch following in a wale direction of the moved one side stitch.

[Step  $\beta$ ] forming a one side widening stitch on an empty needle on the starting end direction side of the new one side stitch formed in the step  $\alpha$ .

{Step  $\gamma$ } transferring an other side stitch held on the other needle bed to a knitting needle in the forming direction and forming a new other side stitch following in a wale direction of the moved other side stitch after the step  $\beta$ .

[Step  $\delta$ ] forming an other side widening stitch on an empty needle on the starting end direction side of the new other side stitch formed in the step  $\gamma$ .

**[0008]** A specific procedure of the steps  $\alpha$ ,  $\beta$  in the knitting method of the knitted fabric according to the present invention will be briefly described with reference to Figs. 1A to 1D. A short line in Figs. 1A to 1H indicate the knitting needles 1 to 3 of one needle bed. The procedures of the steps  $\gamma$ ,  $\delta$  are similar to the procedures of the steps  $\alpha$ ,  $\beta$ , and hence the description thereof will be omitted.

**[0009]** First, as shown in Fig. 1A, one side stitch 11 is held on the knitting needle 1 of one needle bed. The one side stitch 11 is moved to the knitting needle 2 (not limited to knitting needle 2) in the forming direction RS (see Fig. 1B), and a new one side stitch 11 following in the wale

direction of the moved one side stitch 11 is formed (see Fig. 1C). This series of knitting is the step  $\alpha$ . One side widening stitch 13 is then formed on the empty needle (in the figure, empty needle (knitting needle 1) formed when the existing one side stitch 11 is moved in the step  $\alpha$ ) on the starting end direction LS side of the new one side stitch 11 formed in Fig. 1C (see Fig. 1D). This knitting is the step  $\beta$ .

**[0010]** The one side stitch 11 newly formed in the step  $\alpha$  and the one side widening stitch 13 (similarly the other side stitch and the other side widening stitch not shown in Figs. 1A to 1H) may be stitches pulled out from the far side to the near side in the plane of drawing or may be twisted stitches, different from Fig. 1D. The one side stitch 11 formed in the step  $\alpha$  and the one side widening stitch 13 formed in the step  $\beta$  may be formed while moving a yarn feeder in the forming direction RS, or may be formed while moving the yarn feeder in the opposite direction. Furthermore, the connection of the knitting yarn between the one side stitch 11 of the step  $\alpha$  and the one side widening stitch 13 is not particularly limited. However, the appearance of the finished knitted fabric can be improved by suitably selecting these.

**[0011]** According to one aspect of the knitting method of the knitted fabric according to the present invention, the knitting method preferably includes a step  $\alpha'$  and a step  $\gamma'$ .

[Step  $\alpha'$ ] forming a one side additional stitch following in a wale direction of the one side widening stitch formed in an  $n-1^{\text{th}}$  step  $\beta$  between the  $n^{\text{th}}$  step  $\alpha$  and step  $\beta$  or after the  $n^{\text{th}}$  step  $\beta$ .

[Step  $\gamma'$ ] forming an other side additional stitch following in a wale direction of the other side widening stitch formed in an  $n-1^{\text{th}}$  step  $\delta$  between the  $n^{\text{th}}$  step  $\gamma$  and step  $\delta$  or after the  $n^{\text{th}}$  step  $\delta$ .

Needless to say,  $n$  is a natural number of 2 or more.

**[0012]** The step  $\alpha'$  will be briefly described with reference to Figs. 1E to 1G (description will be omitted, but the step  $\gamma'$  is carried out in a manner similar to the step  $\alpha'$ ). First, the second step  $\alpha$  is carried out from the state of Fig. 1D. Specifically, the one side stitch 11 is moved in the forming direction RS (Fig. 1E), and a new one side stitch 11 following in the wale direction of the moved one side stitch 11 is formed (Fig. 1F). Then, for the step  $\alpha'$ , an one side additional stitch 17 following in the wale direction of the one side widening stitch 13 formed in the first step  $\beta$  is formed (Fig. 1G). Lastly, for the second step  $\beta$ , an one side widening stitch 13 is formed on the empty needle (knitting needle 2) formed by the movement of the one side stitch 11 in Fig. 1E (Fig. 1H). This step  $\alpha'$  may be carried out after the second step  $\beta$ .

**[0013]** In one aspect of the knitting method of the knitted fabric according to the present invention, when forming the new one side stitch (other side stitch) following in the wale direction of the existing one side stitch (other side stitch) in the step  $\alpha$  (step  $\gamma$ ), a yarn feeder for feeding a knitting yarn to the needle bed is preferably moved to a position passing the existing one side stitch (other side

stitch) so that the knitting yarn extending from the yarn feeder crosses the existing one side stitch (other side stitch). The yarn feeder is then preferably inverted so that the knitting yarn is pulled out from a side opposite to the side the knitting yarn crosses the existing one side stitch (other side stitch) to the side the knitting yarn crosses to form the new one side stitch (other side stitch).

**[0014]** A knitted fabric according to the present invention is a knitted fabric including a set-up portion, and one side knitted fabric portion and the other side knitted fabric portion which are diverged in different directions to each other from the set-up portion, the knitted fabric being knitted using a flat knitting machine including at least one front needle bed and one back needle bed, in which at least one of the front and back needle beds can be racked in a transverse direction and stitches can be transferred between the front and back needle beds. The set-up portion comprises a plurality of units continuously knitted with a single knitting yarn or a plurality of aligned knitting yarns. Each unit includes a one side stitch inclined to a stitch of the one side knitted fabric portion, a one side widening stitch knitted after the one side stitch and arranged on a side opposite to the direction to which the one side stitch is inclined of the one side stitch, an other side stitch knitted after the one side widening stitch and inclined to a stitch of the other side knitted fabric portion, and an other side widening stitch knitted after the other side stitch and arranged on a side opposite to the direction to which the other side stitch is inclined of the other side stitch. The  $n^{\text{th}}$  one side stitch (other side stitch) is formed on the  $n-1^{\text{th}}$  one side stitch (other side stitch). Furthermore, the stitch of the one side knitted fabric portion (other side knitted fabric portion) is formed in the wale direction of the one side widening stitch (other side widening stitch).

Needless to say,  $n$  is a natural number of 2 or more.

**[0015]** In one aspect of the knitted fabric according to the present invention, each unit further preferably includes a one side additional stitch formed between the one side widening stitch and the stitch of the one side knitted fabric portion; and an other side additional stitch formed between the other side widening stitch and the stitch of the other side knitted fabric portion.

**[0016]** According to the knitting method of the knitted fabric of the present invention, the knitted fabric of the present invention including the set-up portion in which the stretchability is suppressed compared to the prior art can be knitted. The stretchability of the set-up portion can be moderately suppressed because the one side stitch, the one side widening stitch, the other side stitch, and the other side widening stitch configuring the unit of the set-up portion are formed in a predetermined order and moderately restrict the respective movement with respect to each other. Furthermore, a cross-over yarn crossed between the one side knitted fabric portion and the other side knitted fabric portion appears as if a stitch by forming each stitch and the widening stitch in a predetermined order, and hence the appearance of the set-

up portion can be improved. Furthermore, a hole is less likely to form in the set-up portion by the cross-over yarn.

**[0017]** According to the knitting method of the knitted fabric according to the present invention for forming the one side additional stitch (other side additional stitch) following in the wale direction of the one side widening stitch (other side widening stitch), the tight set-up portion can be formed compared to when the one side widening stitch and the other side widening stitch are merely formed. This is because the movement of each stitch is more restricted by forming the additional stitch, and a space between the one side knitted fabric portion and the other side knitted fabric portion is less likely to widen.

**[0018]** According to the knitting method of the knitted fabric according to the present invention for crossing the knitting yarn to the existing one side stitch (other side stitch) and then knitting a new one side stitch (other side stitch) following the existing one side stitch (other side stitch), the knitting yarn can be arranged as if it winds around the one side stitch (other side stitch). The wound knitting yarn causes the one side stitch (other side stitch) to be rotated a half turn to the inner side of the knitted fabric so that it is less likely to be seen from the outer side of the knitted fabric. Even if the present configuration is not adopted and the one side stitch and the other side stitch are arranged on the outer side of the knitted fabric, the one side stitch and the other side stitch do not impair the appearance of the knitted fabric by adjusting the overall design of the knitted fabric such that the one side stitch and the other side stitch can be seen as the design of the knitted fabric.

## BRIEF DESCRIPTION OF THE DRAWINGS

### [0019]

Figs. 1A to 1D are explanatory views showing the concept of a knitting method of a knitted fabric described in claim 1, and Figs. 1E to 1G are explanatory views showing the concept of the knitting method of the knitted fabric described in claim 2;

Fig. 2 is a knitting step diagram of a skirt (knitted fabric) knitted in a first embodiment;

Fig. 3 is a knitting step diagram of the knitted fabric described in the first embodiment following Fig. 2;

Fig. 4 is a knitting step diagram of the knitted fabric described in the first embodiment following Fig. 3;

Fig. 5 is a loop diagram of a set-up portion of the skirt knitted in the first embodiment;

Fig. 6 is a view showing an enlarged photograph of the set-up portion of the skirt knitted in the first embodiment, where (A) is a view seen from the outer side of the skirt and (B) is a view seen from the inner side of the skirt;

Fig. 7 is a schematic view of a tubular knitted fabric knitted by applying the knitting method of the knitted fabric of the present invention; and

Fig. 8 is a schematic configuration diagram of a skirt

(knitted fabric) set up from the side.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0020]** First to fourth embodiments to which a knitting method of a knitted fabric according to the present invention is applied will be hereinafter described with reference to the drawings. A flat knitting machine used in the embodiments is a two-bed flat knitting machine including one front needle bed and one back needle bed extending in a transverse direction and disposed opposite to each other in a cross direction, in which the back needle can be racked in the transverse direction and stitches can be transferred between the front and back needle beds. The flat knitting machine to be used may be a two-bed flat knitting machine including a bed for transfer or may be a four-bed flat knitting machine.

<First embodiment>

**[0021]** In the first embodiment, a case of knitting a set-up portion 101 of a skirt (knitted fabric) 100 set-up from a side described with reference to Fig. 8 in the section of Summary of the Invention using the knitting method of the knitted fabric according to the present invention will be described by way of example.

**[0022]** Figs. 2 to 4 are knitting step diagrams for forming the set-up portion 101 with a series of knitting yarn fed from one yarn feeder. "S + number" in the left column of Figs. 2 to 4 indicates the number of the knitting step, an arrow in right and left direction with "K" in the right column indicates moving the yarn feeder in the direction of the arrow to perform knit knitting, and an arrow in up and down or diagonal direction indicates transfer in the relevant direction. Moreover, ○ in the middle column showing the actual knitting state indicates an old stitch held on the needle bed, • indicates a stitch newly knitted in each knitting step, ⊙ (double circle) indicates a double stitch, a V-letter indicates a widening stitch, ▽ indicates a yarn feeder, and a portion where knitting is actually carried out in each knitting step is shown with a thick line. Furthermore, in Figs. 2 to 4, the set-up portion 101 is formed from the left side in the plane of drawing toward the right side in the plane of drawing, and hence the rightward direction in the plane of drawing is referred to as a "forming direction RS" and the leftward direction in the plane of drawing is referred to as a "starting end direction LS".

**[0023]** In Fig. 2, S0 shows a state in which stitches formed with a draw thread are held on the knitting needles 2 to 7 of the front needle bed (hereinafter, FB) as stitches of a terminating portion of a waste knitting for facilitating the knitting, and stitches formed with the draw thread are held on the knitting needles 2 to 7 of the back needle bed (hereinafter, BB). As a preparation for applying the knitting method of the knitted fabric according to the present invention shown in Fig. 3 and thereafter from the state

of S0, an end processing shown in S1 to S10 of Fig. 2 is carried out. The draw thread is removed from the skirt 100 at a time point the skirt 100 is completed.

**[0024]** In S1, the stitch formed with the draw thread held on the knitting needle 2 of the BB is transferred to the knitting needle 1 of the opposing FB. In S2, the stitch held on the knitting needle 3 of the BB is overlapped with the stitch transferred to the knitting needle 1 of the FB in S1. Furthermore, in S3, the yarn feeder is moved in the forming direction RS to form a one side starting end stitch 9, which is a new stitch, following the double stitch of the knitting needle 1 of the FB, and in S4, the yarn feeder is moved toward the starting end direction LS side of the one side starting end stitch 9. In S5, the one side starting end stitch 9 is transferred to the knitting needle 2 of the BB.

**[0025]** In S6, the stitch formed with the draw thread held on the knitting needle 2 of the FB is transferred to the knitting needle 3 of the opposing BB. In S7, the stitch held on the knitting needle 3 of the FB is overlapped with the stitch transferred to the knitting needle 3 of the BB in S6. Furthermore, in S8, the yarn feeder is moved in the forming direction RS to form an other side starting end stitch 10, which is a new stitch, following the double stitch of the knitting needle 3 of the BB, and in S9, the yarn feeder is moved toward the starting end direction LS side of the other side starting end stitch 10. In S10, the other side starting end stitch 10 is transferred to the knitting needle 2 of the FB.

**[0026]** After the end processing shown in the knitting steps of Fig. 2 is finished, the knitting method of the knitted fabric according to the present invention shown in the knitting steps of Figs. 3 and 4 is performed.

**[0027]** First, in S11 of Fig. 3, the yarn feeder is moved toward the forming direction RS up to a position beyond the knitting needle 3. In S12, the one side stitch 11 held on the knitting needle 2 of the BB is transferred to the knitting needle 3 (empty needle) of the FB (the first half of the step  $\alpha$  of the present invention). In S13, the stitch 21 (the knitting needle 4 of the BB) formed with the draw thread adjacent in the forming direction RS side of the one side stitch 11 in S11 is transferred to the knitting needle 3 of the FB. As a result, one side double stitch 15 is formed on the knitting needle 3 of the FB.

**[0028]** In S14, the yarn feeder is moved toward the starting end direction LS to form a new one side stitch 11 following in a wale direction of the one side double stitch 15 formed in S13 (the second half of the step  $\alpha$  of the present invention), and a one side widening stitch 13 in form of a pickup stitch is formed on the knitting needle 2 of the BB (the step  $\beta$  of the present invention). The one side double stitch 15 includes the one side stitch 11 of S11, and hence the new one side stitch 11 formed in S14 is a front stitch following in the wale direction of the existing one side stitch 11 in S11. The knitting needle on which the one side widening stitch 13 is formed is a knitting needle that became an empty needle after moving the one side stitch 11 in the forming direction RS in S12.

**[0029]** As the new one side stitch 11 is formed as shown in S12 to S14 after moving the yarn feeder to the position beyond the knitting needle 3 in S11, the knitting yarn extending from the yarn feeder crosses the FB side of the one side stitch 11 in S12, and the new one side stitch 11 formed in S14 is pulled out from the BB side to the FB side (configuration of claim 3). The effects involved in such arrangement of the knitting yarn will be described later.

**[0030]** In the next S15, the yarn feeder is moved toward the forming direction RS up to the position beyond the knitting needle 4. The new one side stitch 11 formed in S14 is transferred to the knitting needle 3 of the BB in S16.

**[0031]** In S17, the other side stitch 12 held on the knitting needle 2 of the FB is transferred to the knitting needle 4 (empty needle) of the BB (the first half of the step  $\gamma$  of the present invention). In S18, the stitch 22 (the knitting needle 4 of the FB) formed with the draw thread adjacent in the forming direction RS of the other side stitch 12 in S16 is transferred to the knitting needle 4 of the BB. As a result, other side double stitch 16 is formed on the knitting needle 4 of the BB.

**[0032]** In S19, the yarn feeder is moved toward the starting end direction LS to form a new other side stitch 12 following in the wale direction of the other side double stitch 16 formed in S18 (the second half of the step  $\gamma$  of the present invention), and then an other side widening stitch 14 in form of a pickup stitch is formed on the knitting needle 2 of the FB (the step  $\delta$  of the present invention). The other side double stitch 16 includes the other side stitch 12 of S16, and hence the new other side stitch 12 formed in S19 is a front stitch following in the wale direction of the existing other side stitch 12 in S16. The knitting needle on which the other side widening stitch 14 is formed is a knitting needle that became an empty needle after moving the other side stitch 12 in S17.

**[0033]** As the new other side stitch 12 is formed as shown in S17 to S19 after moving the yarn feeder to the position beyond the knitting needle 4 in S15, the knitting yarn extending from the yarn feeder crosses the BB side of the other side stitch 12 in S17, and the new other side stitch 12 formed in S19 is pulled out from the FB side to the BB side (configuration of claim 3). The effects involved in such an arrangement of the knitting yarn will be described later.

**[0034]** In the next S20, the yarn feeder is moved toward the forming direction RS to a position beyond the knitting needle 4. In S21, the new other side stitch 12 formed in S19 is transferred to the knitting needle 3 of the FB.

**[0035]** In S22 and S23 of Fig. 4, one side double stitch 15 in which the one side stitch 11 and the stitch 21 formed with the draw thread are overlapped is formed with the knitting needle 4 (empty needle) of the FB, in a manner similar to S12 and S13 of Fig. 3.

**[0036]** In the next S24 and S25, knitting different from S14 and S15 of Fig. 3 is performed. First, in S24, the yarn feeder is moved toward the starting end direction LS to form a new one side stitch 11 following in the wale

direction of the one side double stitch 15 held on the knitting needle 4 of the FB (the second half of the step  $\alpha$  of the present invention). Furthermore, in S24, a one side additional stitch 17 following in the wale direction of the one side widening stitch 13 formed on the knitting needle 2 of the BB in S14 of Fig. 3 is formed (the step  $\alpha'$  of the present invention).

**[0037]** In S25, the yarn feeder is moved toward the forming direction RS to form an one side widening stitch 13 on the knitting needle 3 of the BB (the step  $\beta$  of the present invention), and in S26, the new one side stitch 11 formed in S24 is transferred from the knitting needle 4 of the FB to the knitting needle 4 of the BB. In S25, the yarn feeder is moved to a position beyond the knitting needle 5.

**[0038]** In S27 and S28, other side double stitch 16 in which the other side stitch 12 and the stitch 22 formed with the draw thread are overlapped is formed with the knitting needle 5 (empty needle) of the BB (the first half of the step  $\gamma$  of the present invention). In S29, the yarn feeder is moved toward the starting end direction LS to form a new other side stitch 12 following in the wale direction of the other side double stitch 16 (the second half of the step  $\gamma$  of the present invention). Furthermore, in S29, an other side additional stitch 18 following in the wale direction of the other side widening stitch 14 formed on the knitting needle 2 of the FB in S19 of Fig. 3 is formed (the step  $\gamma'$  of the present invention).

**[0039]** In S30, the yarn feeder is moved toward the forming direction RS to form an other side widening stitch 14 on the knitting needle 3 of the FB (the step  $\delta$  of the present invention), and in S31, the new other side stitch 12 formed in S29 is transferred from the knitting needle 5 of the BB to the knitting needle 4 of the FB. In S30, the yarn feeder is moved to the position beyond the knitting needle 5.

**[0040]** After S31, the knitting similar to S21 to S31 is to be repeated. The set-up portion 101 shown in the loop diagram of Fig. 5 and in the photograph of Fig. 6 can be knitted as a result. The near side in the plane of drawing of Fig. 5 corresponds to the inner side of the skirt 100 (Fig. 8), the far side in the plane of drawing corresponds to the outer side of the skirt 100, and the stitches formed with the draw thread are omitted. The state of the stitches shown in the loop diagram of Fig. 5 traces back the path of the knitting yarn, and is slightly different from the state of the stitches in the actual knitted fabric.

**[0041]** As shown in the loop diagram of Fig. 5, the set-up portion 101 is formed by a series of units  $\omega$  respectively formed in the order of one side stitch 11  $\rightarrow$  one side additional stitch 17  $\rightarrow$  one side widening stitch 13  $\rightarrow$  other side stitch 12  $\rightarrow$  other side additional stitch 18  $\rightarrow$  other side widening stitch 14. The adjoining units  $\omega$  are connected by forming the one side stitch 11 and the other side stitch 13 of the  $n^{\text{th}}$  (second or higher) units  $\omega$  with respect to the one side stitch 11 and the other side stitch 13 of the  $n-1^{\text{th}}$  unit  $\omega$ . The stitches 11, 17, 13, 12, 18, 14 formed in a predetermined order moderately restrict the

respective movement, and thus the stretchability of the set-up portion 101 of the first embodiment is suppressed compared to the conventional set-up portion. Therefore, when knitting a tubular knitted fabric including the set-up portion 101 and the knitting-finish portion 102 as in the skirt 100 described with reference to Fig. 8, if the set-up portion 101 is knitted with the knitting method of the knitted fabric according to the present invention, the stretchability of the set-up portion 101 and the knitting-finish portion 102 can be made to the same extent and shape can be prevented from becoming lost when the knitted fabric is worn.

**[0042]** As shown with an outlined arrow in Fig. 5, in the set-up portion 101 of the first embodiment, the knitting yarn connecting the  $n^{\text{th}}$  one side stitch 11 and the  $n-1^{\text{th}}$  other side widening stitch 14 crosses the far side in the plane of drawing of the  $n-1^{\text{th}}$  one side stitch 11, and the  $n^{\text{th}}$  one side stitch 11 is pulled out from the near side to the far side in the plane of drawing. That is, the knitting yarn winds around the  $n-1^{\text{th}}$  one side stitch 11, and the knitting yarn causes the  $n-1^{\text{th}}$  one side stitch 11 to be rotated a half turn in the direction of a dotted line arrow. As a result, the one side stitch 11 inclined to the stitch of the one side knitted fabric portion 20B is drawn to the near side in the plane of drawing (i.e., the inner side of the skirt 100) so as to be invisible from the outer side of the skirt 100 (see Fig. 6A). The one side stitch 11 drawn to the inner side of the skirt 100 lines in the forming direction of the set-up portion 101 (see Fig. 6B).

**[0043]** As shown in the loop diagram of Fig. 5, a cross-over yarn of the set-up portion 101 crossed between the one side knitted fabric portion 20B and the other side knitted fabric portion 20F is arranged as if it is a stitch, so that the set-up portion 101 is less likely to stand out and a hole is less likely to form in the set-up portion 101, as shown in Fig. 6A.

<Second embodiment>

**[0044]** Unlike in the first embodiment, the set-up portion 101 may be knitted without forming the one side additional stitch 17 and the other side additional stitch 18 shown in the knitting step diagram of Fig. 4 and the loop diagram of Fig. 5. For example, the knitting same as Figs. 2 and 3 of the first embodiment may be performed, and the knitting similar to S11 to S21 may be repeated after S21 of Fig. 3.

**[0045]** The set-up portion 101 in which the stretchability is suppressed compared to the conventional set-up portion can also be knitted with the knitting method of the knitted fabric of the second embodiment.

<Third embodiment>

**[0046]** Unlike in the first and second embodiments, the set-up portion may be formed with the knitting method of the knitted fabric according to the present invention from a state in which the knitting yarn is not hanged on the

needle beds at all (i.e., a state in which there is no stitch formed with the draw thread in S0 of Fig. 2). In this case, two widening stitches to become the one side stitch and the other side stitch are formed on an arbitrary knitting needle of the FB and the knitting needle of the BB at the position substantially facing the knitting needle of the FB. The widening stitch of the FB is moved toward the forming direction RS and then a new one side stitch following in the wale direction of the widening stitch is formed. A new widening stitch is then formed on the knitting needle that became an empty needle as a result of the movement of the widening stitch. Similar knitting is carried out with the BB as well. Thereafter, the knitting with "moving the stitch in the forming direction" → "forming the stitch following in the wale direction of the moved stitch" → "forming the widening stitch on the empty needle obtained as a result of the movement of the stitch" as one set is alternately carried out with the FB and the BB to form the set-up portion from the state without the stitch formed with the draw thread.

<Fourth embodiment>

[0047] The knitted fabric to which the knitting method of the knitted fabric according to the present invention is applied is not limited to the skirt set-up from the side end shown in the first embodiment. For example, the set-up portion may be knitted according to the knitting steps shown in the first embodiment and the circling knitting may be carried out with respect to the set-up portion to knit a tubular knitted fabric as shown in Fig. 7. In this case, the set-up portion 101 is arranged at the bottom portion of the tubular knitted fabric. As the stretchability of the set-up portion 101 can be suppressed compared to the prior art, the knitted fabric is less likely to lose shape even if small objects are placed in the knitted fabric. In addition, the knitting method of the knitted fabric according to the present invention can also be applied to the knitting of a sweater or the like set up from the side.

## Claims

1. A knitting method of a knitted fabric for knitting a set-up portion diverged to one side knitted fabric portion 20B, which is mainly knitted on one needle bed, and the other side knitted fabric portion 20F, which is mainly knitted on an other needle bed, using a flat knitting machine including at least one front needle bed and one back needle bed, in which at least one of the front and back needle beds can be racked in a transverse direction and stitches can be transferred between the front and back needle beds; assuming a direction in which the set-up portion is sequentially formed in a longitudinal direction of the needle beds is a forming direction RS and an opposite direction is a starting end direction LS, the knitting method **characterized by** forming the set-up

portion by repeating:

a step  $\alpha$  of transferring a one side stitch 11 held on one needle bed to a knitting needle in the forming direction RS, and forming a new one side stitch 11 following in a wale direction of the moved one side stitch 11;  
a step  $\beta$  of forming a one side widening stitch 13 on an empty needle on the starting end direction LS side of the new one side stitch 11 formed in the step  $\alpha$ ;  
a step  $\gamma$  of transferring an other side stitch 12 held on the other needle bed to a knitting needle in the forming direction RS and forming a new other side stitch 12 following in a wale direction of the moved other side stitch 12 after the step  $\beta$ ; and  
a step  $\delta$  of forming an other side widening stitch 14 on an empty needle on the starting end direction LS side of the new other side stitch 12 formed in the step  $\gamma$ .

2. The knitting method of a knitted fabric according to claim 1, **characterized by**:

a step  $\alpha'$  of forming a one side additional stitch 17 following in a wale direction of the one side widening stitch 13 formed in an  $n-1^{\text{th}}$  step  $\beta$  between the  $n^{\text{th}}$  step  $\alpha$  and step  $\beta$  or after the  $n^{\text{th}}$  step  $\beta$ ; and  
a step  $\gamma'$  of forming an other side additional stitch 18 following in a wale direction of the other side widening stitch 14 formed in an  $n-1^{\text{th}}$  step  $\delta$  between the  $n^{\text{th}}$  step  $\gamma$  and step  $\delta$  or after the  $n^{\text{th}}$  step  $\delta$ .

3. The knitting method of a knitted fabric according to claim 1 or 2, **characterized in that**, when forming the new one side stitch 11 following in the wale direction of the existing one side stitch 11 in the step  $\alpha$ , a yarn feeder for feeding a knitting yarn to the needle bed is moved to a position passing the existing one side stitch 11 so that the knitting yarn extending from the yarn feeder crosses the existing one side stitch 11, and then the yarn feeder is inverted so that the knitting yarn is pulled out from a side opposite to the side the knitting yarn crosses the existing one side stitch 11 to the side the knitting yarn crosses to form the new one side stitch 11; and when forming the new other side stitch 12 following in the wale direction of the existing other side stitch 12 in the step  $\gamma$ , the yarn feeder is moved to a position passing the existing other side stitch 12 so that the knitting yarn extending from the yarn feeder crosses the existing other side stitch 12, and then the yarn feeder is inverted so that the knitting yarn is pulled out from a side opposite to the side the knitting yarn crosses the existing other side stitch 12 to the side

the knitting yarn crosses to form the new other side stitch 12.

4. A knitted fabric including a set-up portion 101, and one side knitted fabric portion 20B and an other side knitted fabric portion 20F diverged in different directions to each other from the set-up portion 101, the knitted fabric being knitted using a flat knitting machine including at least one front needle bed and one back needle bed, in which at least one of the front and back needle beds is capable of being racked in a transverse direction and stitches can be transferred between the front and back needle beds; **characterized in that**, the set-up portion 101 comprises a plurality of units  $\omega$  continuously knitted with a single knitting yarn or a plurality of aligned knitting yarns, each unit  $\omega$  including,
  - a one side stitch 11 inclined to a stitch of the one side knitted fabric portion 20B,
  - a one side widening stitch 13 knitted after the one side stitch 11 and arranged on a side opposite to the direction to which the one side stitch 11 is inclined of the one side stitch 11,
  - an other side stitch 12 knitted after the one side widening stitch 13 and inclined to a stitch of the other side knitted fabric portion 20F, and
  - an other side widening stitch 14 knitted after the other side stitch 12 and arranged on a side opposite to the direction to which the other side stitch 12 is inclined of the other side stitch 12; wherein
  - the one side stitch 11 of the  $n^{\text{th}}$  unit  $\omega$  is formed with respect to the one side stitch 11 of the  $n-1^{\text{th}}$  unit  $\omega$ ;
  - the other side stitch 12 of the  $n^{\text{th}}$  unit  $\omega$  is formed with respect to the other side stitch 12 of the  $n-1^{\text{th}}$  unit  $\omega$ ;
  - the stitch of the one side knitted fabric portion 20B is formed in the wale direction of the one side widening stitch 13; and
  - the stitch of the other side knitted fabric portion 20F is formed in the wale direction of the other side widening stitch 14.
5. The knitted fabric according to claim 4, **characterized in that** the unit  $\omega$  further includes,
  - a one side additional stitch 17 formed between the one side widening stitch 13 and the stitch of the one side knitted fabric portion 20B; and
  - an other side additional stitch 18 formed between the other side widening stitch 14 and the stitch of the other side knitted fabric portion 20F.

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**Fig. 1**

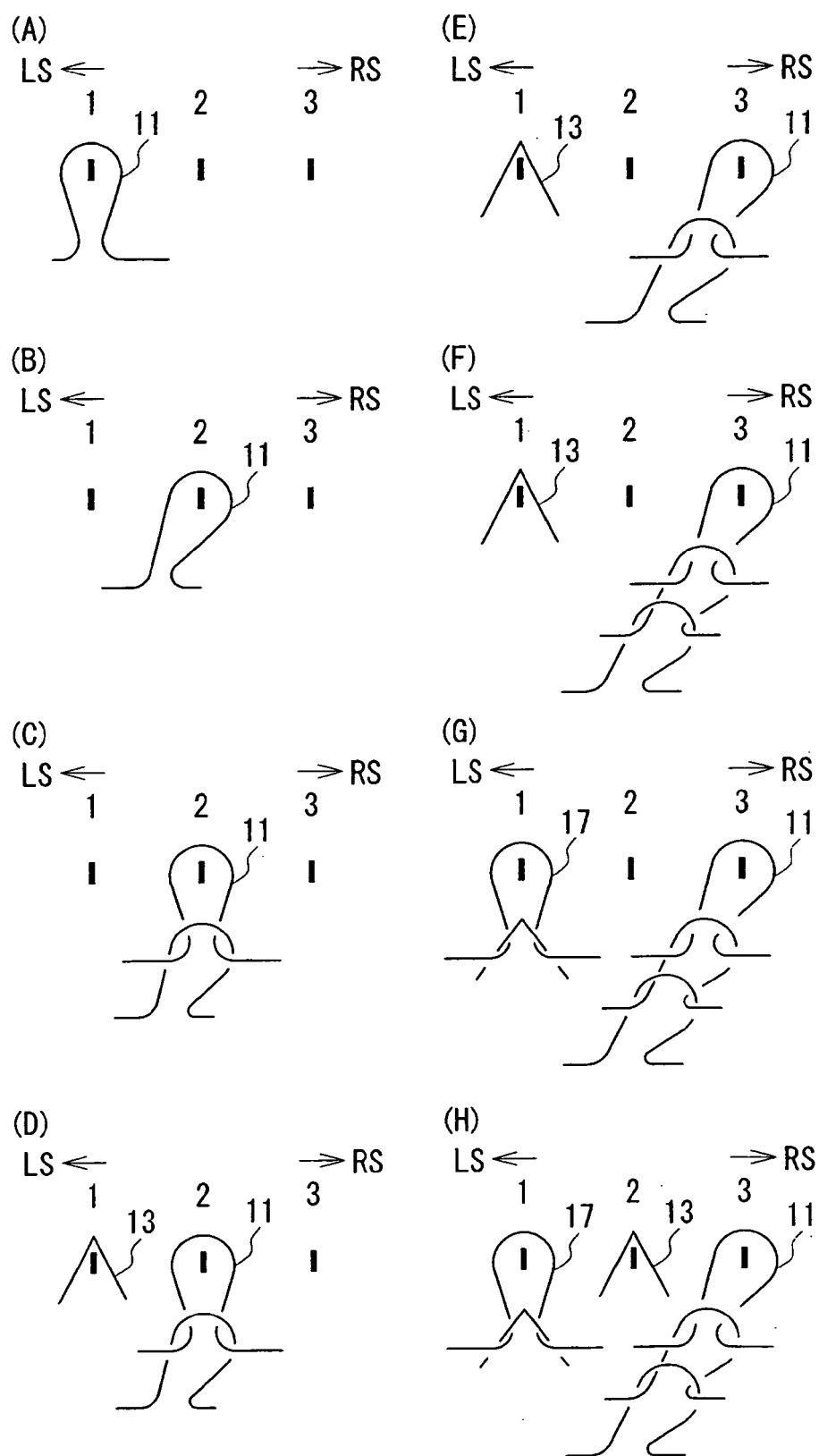


Fig. 2

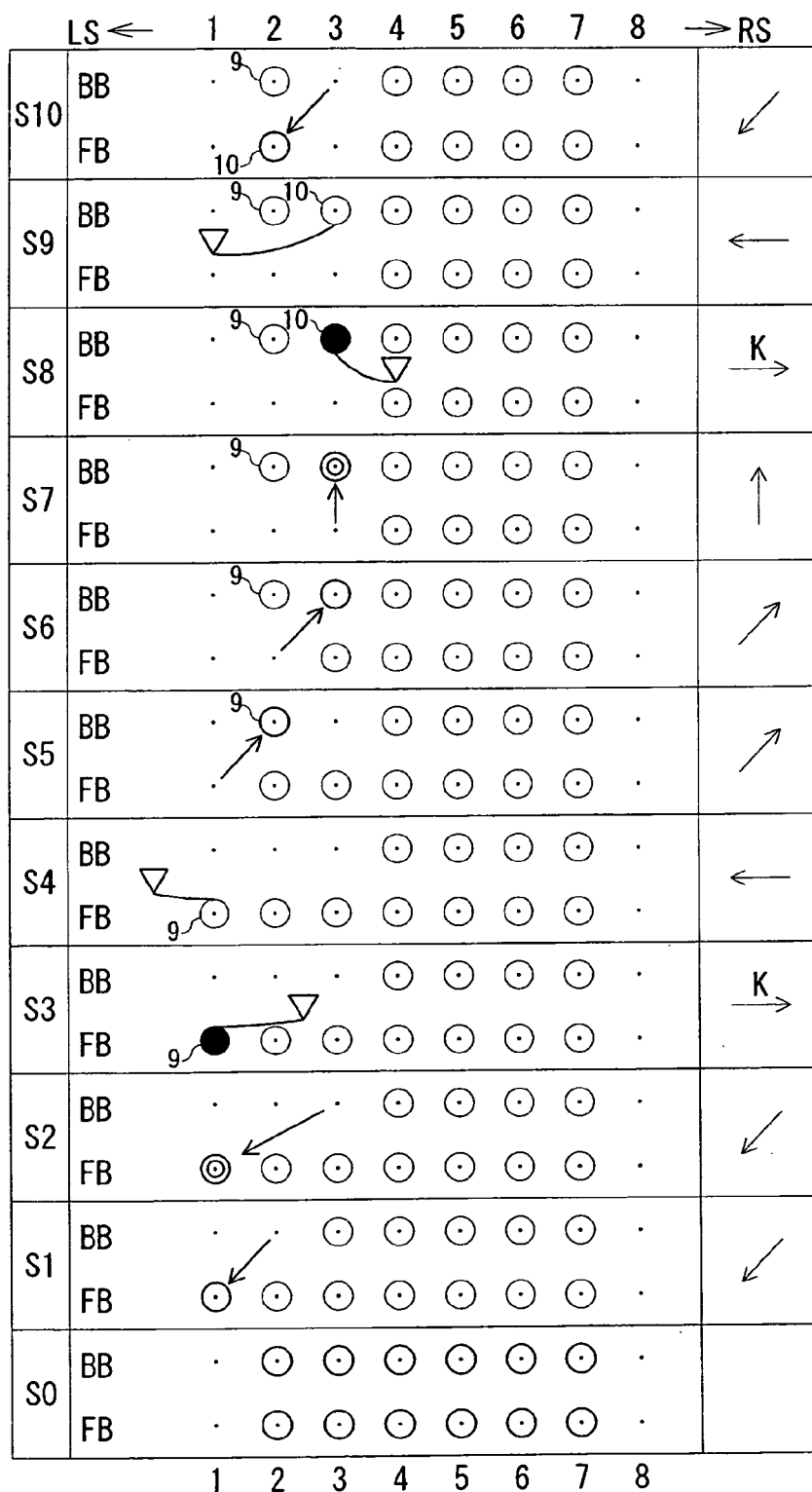


Fig. 3

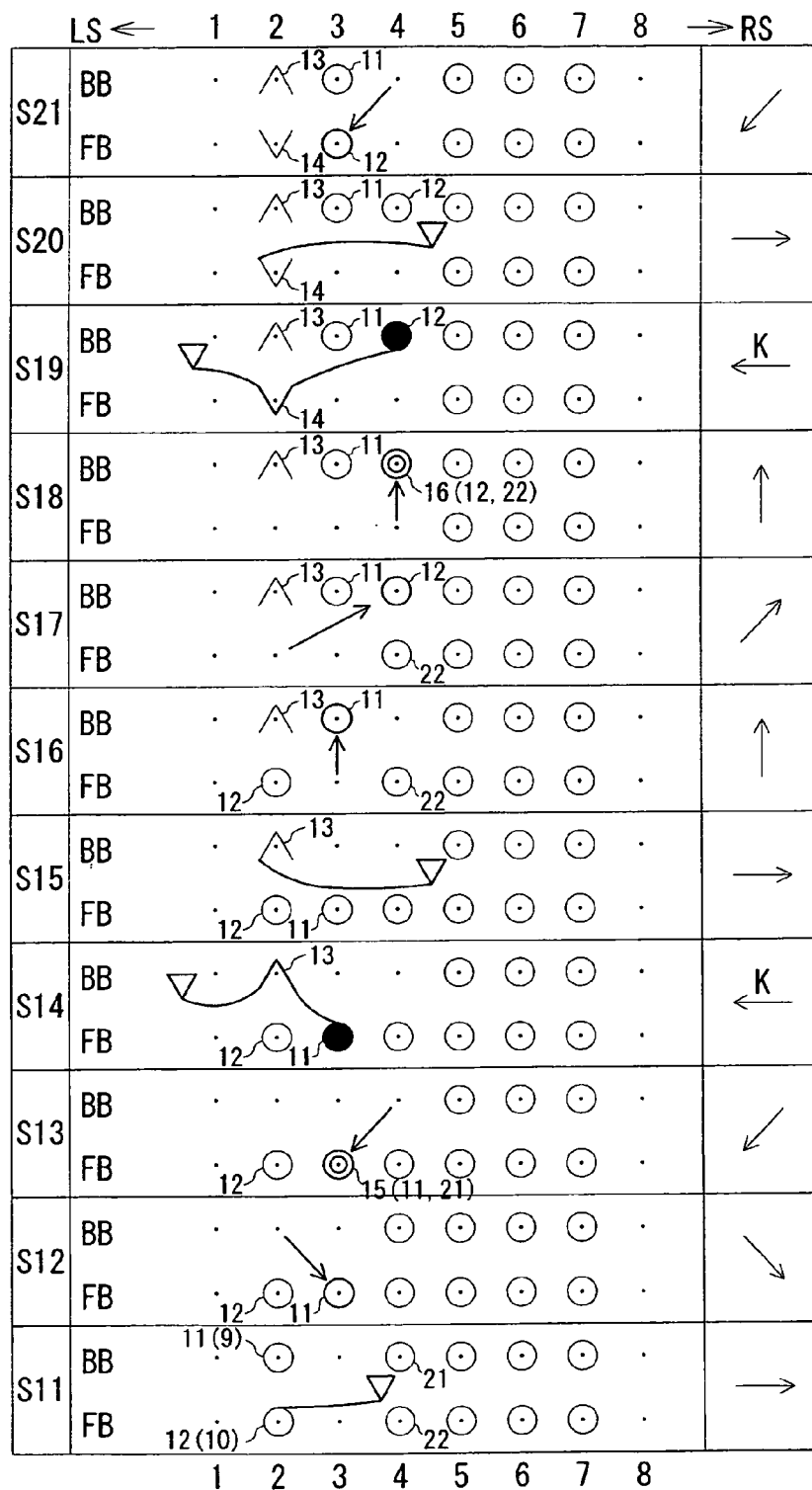


Fig. 4

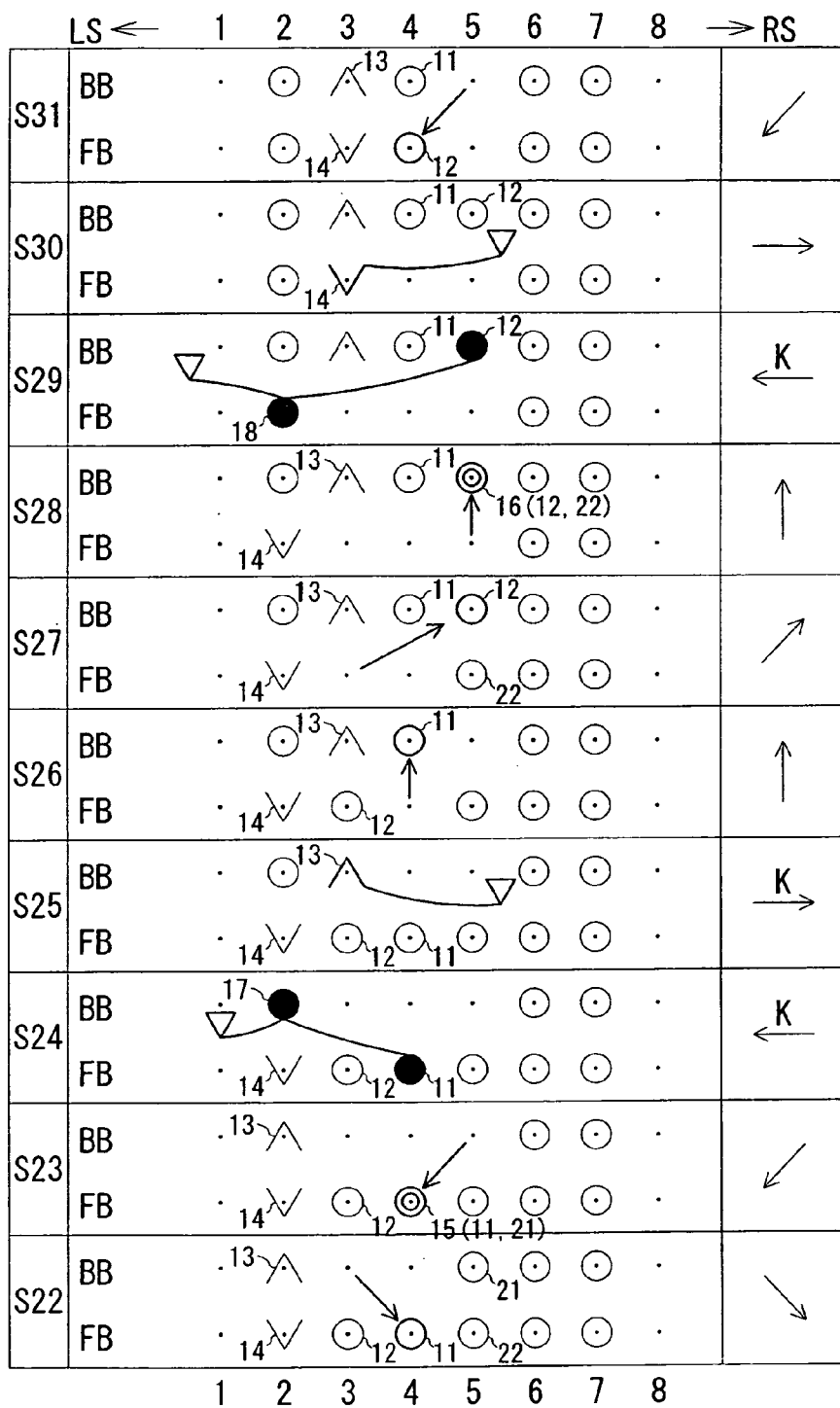
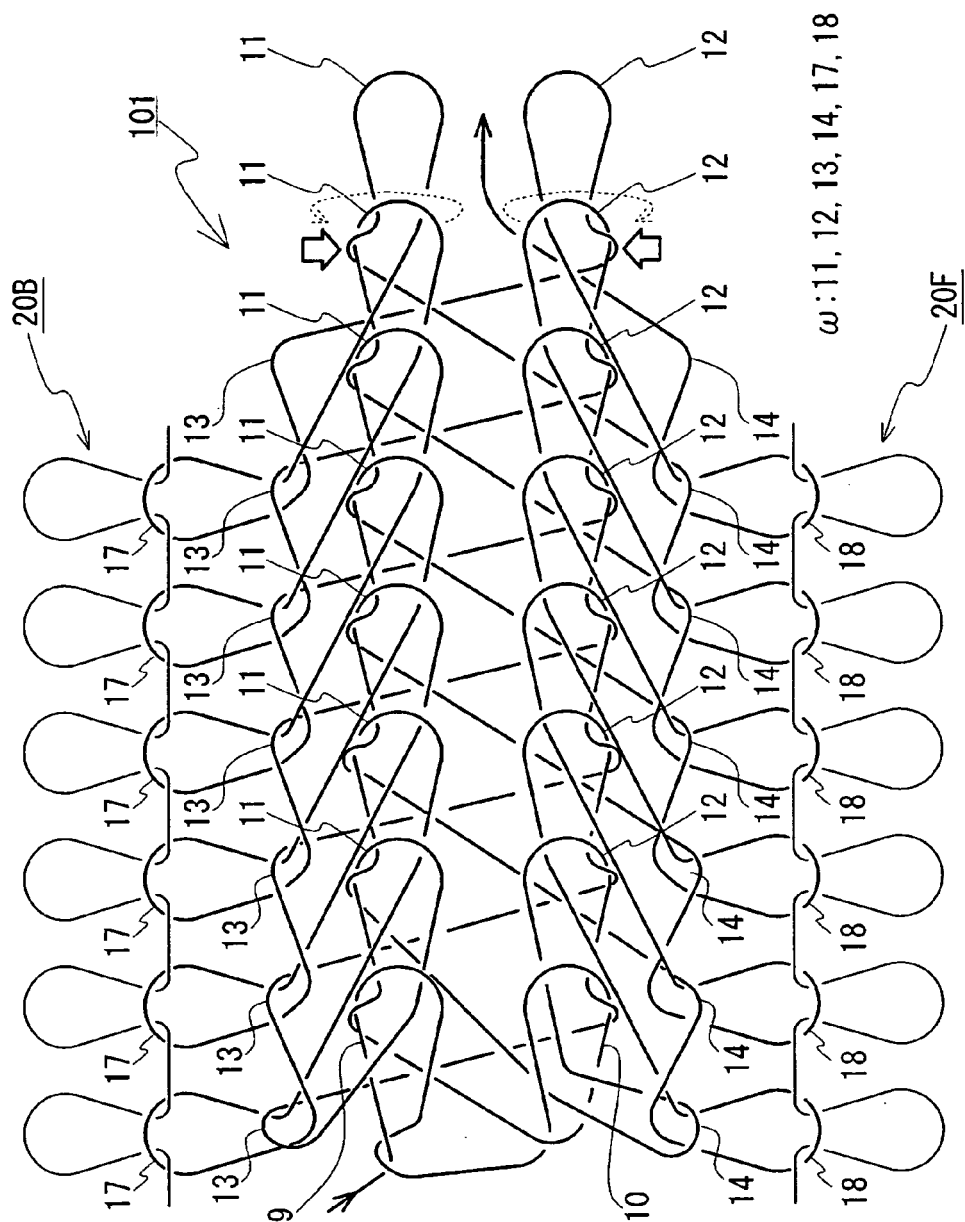
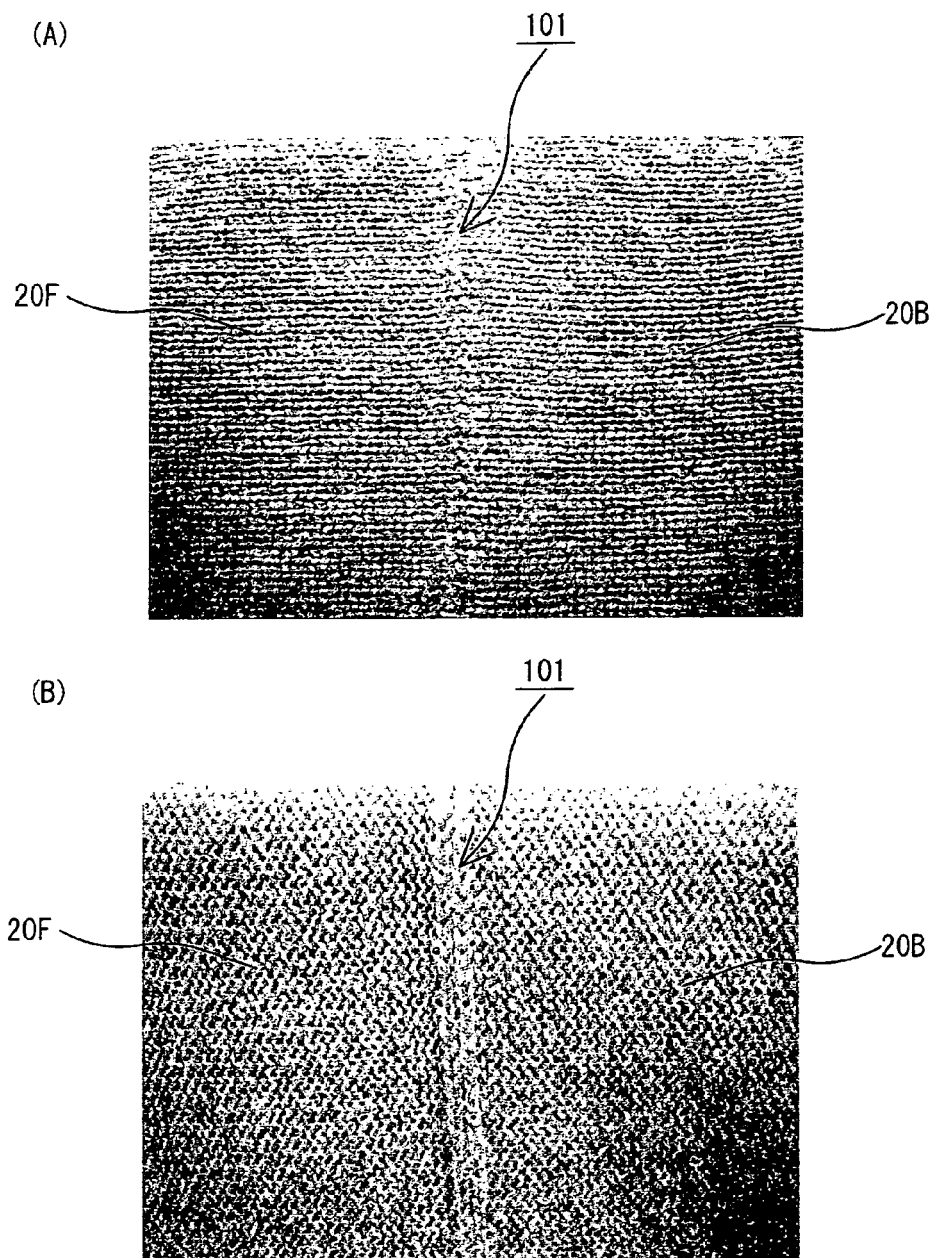


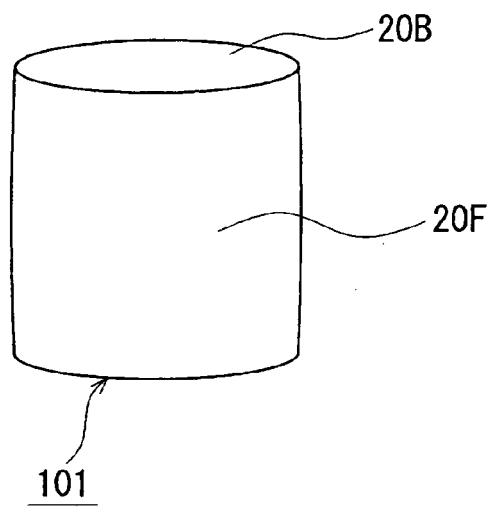
Fig. 5



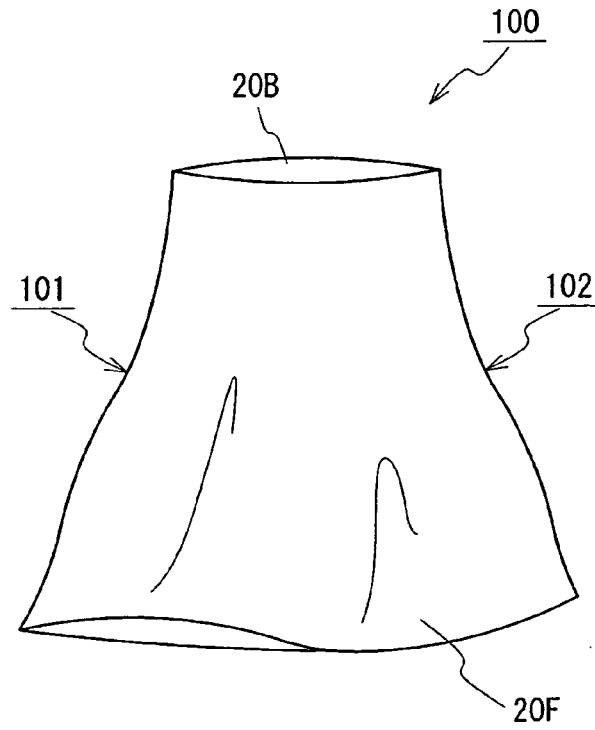
**Fig. 6**



**Fig. 7**



**Fig. 8**



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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