



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
07.12.2011 Bulletin 2011/49

(51) Int Cl.:
D04B 1/00 (2006.01) D04B 7/10 (2006.01)

(21) Application number: **09834309.8**

(86) International application number:
PCT/JP2009/006496

(22) Date of filing: **01.12.2009**

(87) International publication number:
WO 2010/073494 (01.07.2010 Gazette 2010/26)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR

(72) Inventor: **ASAI, Shigenori**
Wakayama-shi
Wakayama 641-8511 (JP)

(30) Priority: **26.12.2008 JP 2008333392**

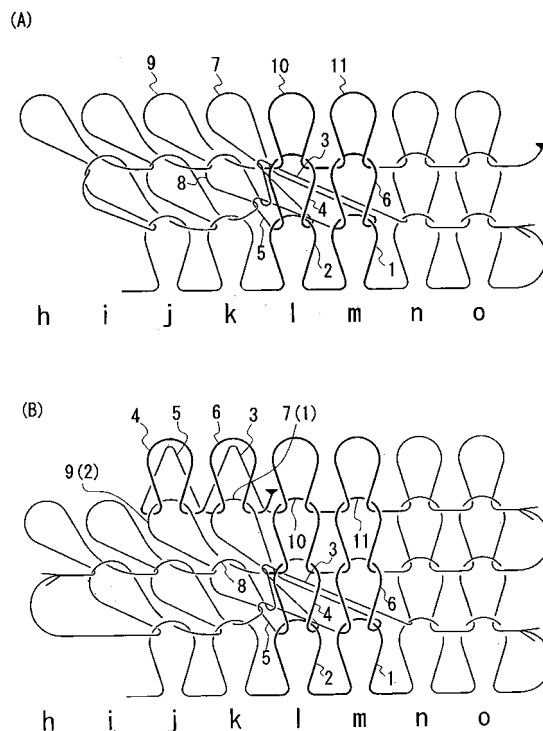
(74) Representative: **Wagner, Karl H. et al**
Wagner & Geyer Partnerschaft
Patent- und Rechtsanwälte
Gewürzmühlstrasse 5
80538 München (DE)

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

(54) **METHOD OF INCREASING THE NUMBER OF INTERNAL STITCHES, AND KNITTED FABRIC**

(57) The invention provides an inside widening method capable of reducing a difference in appearance between front and back while preventing a hole from being formed at a forming area of a widening stitch using a flat knitting machine, and a knitted fabric knitted by applying the inside widening method. A starting point stitch 1 and a terminating point stitch 2 are set, and steps (1) to (3) are performed. (1) A preparation step of forming stitches 4, 6 on the starting point stitch 1 and the terminating point stitch 2, and forming pick-up stitches 3, 5 on a knitting needle at a position substantially facing the knitting needle on which the starting point stitch 1 and the terminating point stitch 2 are held. (2) A widening stitch formation step of forming new stitches 7, 9 (widening stitch) on the pick-up stitches 3, 5. (3) A widening stitch arraying step of allocating the widening stitches 7, 9 formed in the widening stitch formation step and the stitches 4, 6 (10, 11) formed in the preparation step such that positions do not overlap in the longitudinal direction of the needle beds by racking of the needle beds and the transfer of stitches.

Fig. 4



Description

TECHNICAL FIELD

[0001] The present invention relates to an inside widening method for forming a widening stitch on an inner side than an end in a knitting width direction of a knitted fabric when knitting a knitted fabric using a flat knitting machine, and a knitted fabric knitted by applying the method.

BACKGROUND ART

[0002] Conventionally, a widening stitch is formed to knit a knitted fabric to a desired shape in a process of knitting the knitted fabric with a flat knitting machine. As a method for forming the widening stitch, there is known an inside widening method for increasing a knitting width by moving a plurality of stitches at the end in the knitting width direction to the outer side in the knitting width direction to make an empty needle in a knitting region of the knitted fabric, and forming a pick-up stitch on the empty needle.

[0003] In such an inside widening method, however, the widening stitch formed from the pick-up stitch is formed by feeding a yarn to the empty needle on which stitches of a previous course do not exist, and hence a hole is likely to form at an area where the widening stitch is formed. In particular, if the widening stitches are lined in the knitting width direction, the hole becomes large thereby affecting the outer appearance of the knitted fabric. Therefore, normally, two or more widening stitches that adjoin each other are not formed except for the case of forming a hole in the knitted fabric as a pattern.

[0004] In a knitted fabric including a rib structure, however, when carrying out, for example, the knitting of once reducing the knitting width and then increasing the knitting width, a difference is made in an inclination angle of the rib line between an area where the knitting width is reduced and an area where the knitting width is increased in the conventional inside widening method which increase the stitch one by one. As a result, the knitted fabric may have a different design for the area where the knitting width is increased and the area where the knitting width is reduced. This is because a plurality of adjoining stitches can be reduced at once when reducing the knitting width, but a plurality of adjoining widening stitches is hard to form due to the reasons described above when increasing the knitting width.

[0005] The present applicant has thus proposed an inside widening method in which a hole is not formed at the area where the widening stitch is formed even if a plurality of stitches are increased at once (see Patent Document 1). In such an inside widening method, two widening stitch forming areas are set with one stitch in between, the knitting yarn is extended from one side of the knitting width to form a widening stitch consisting of a pick-up stitch at the widening stitch forming area on the

other side and then continuously forming a widening stitch consisting of a pick-up stitch at the widening stitch forming area on the one side (see particularly steps 3 to 5 shown in Figs. 2 and 3 of Patent Document 1). The formation of the hole is suppressed by the knitting yarn bridged so as to reciprocate both forming areas.

PRIOR ART DOCUMENT

10 PATENT DOCUMENT

[0006]

15 Patent Document 1: Japanese Unexamined Patent Publication No. 2003-3352

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

20 **[0007]** However, in the knitted fabric applied with the inside widening method of Patent Document 1, the appearance of the widening stitch forming area greatly differs when the knitted fabric is viewed from the front side and when the knitted fabric is viewed from the back side. For example, Fig. 6 shows partially enlarged photographs of the knitted fabric in which the widening stitch is formed by the inside widening method of Patent Document 1 with respect to the 2×2 rib structure, where (A) is a photograph of the knitted fabric viewed from the front side and (B) is a photograph of the knitted fabric viewed from the back side. As is apparent from Fig. 6, the appearance of the back side of the knitted fabric is not as beautiful as the front side. The appearance of the back side of the knitted fabric is not particularly important in the normal use, but the appearance of the back side of the knitted fabric is an essential element in reversible use. Although a novel inside widening method for solving the above problems is desired, such an inside widening method is not yet proposed.

35 **[0008]** The present invention has been made in view of the above circumstances, and an object thereof is to provide an inside widening method for reducing a difference in appearance between the front and the back of the knitted fabric while preventing a hole from being formed at a forming area of the widening stitch, and a knitted fabric knitted by applying such an inside widening method. Another object of the present invention is to provide an inside widening method in which inclinations of a rib line at the area where the knitting width is reduced and a rib line at the area where the knitting width is increased are made similar as much as possible when performing the knitting of once reducing the knitting width and then increasing the knitting width, and a knitted fabric
45
50
55 knitted by applying such an inside widening method.

MEANS FOR SOLVING THE PROBLEMS

[0009] An inside widening method of the present invention is an inside widening method for forming a widening stitch on an inner side than an end in a knitting width direction of a knitted fabric, using a flat knitting machine having at least a pair of front and back needle beds 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. In the inside widening method of the present invention, the knitting including the following steps is carried out when a stitch that is held in the needle bed and that becomes a reference of a position to start formation of a widening stitch in the knitting width direction is set as a starting point stitch, and a stitch that is held in the same needle bed as the starting point stitch and that becomes a reference of a position to terminate the formation of the widening stitch is set as a terminating point stitch.

(1) A preparation step of forming a new stitch on the starting point stitch and the terminating point stitch, and forming a pick-up stitch on a knitting needle at a position substantially facing the knitting needle on which the starting point stitch and the terminating point stitch are held.

(2) A widening stitch formation step of forming a stitch to become a widening stitch on the pick-up stitch.

(3) A widening stitch arraying step of allocating the stitch formed in the preparation step and the stitch formed in the widening stitch formation step by racking the needle beds and transferring the stitches such that positions do not overlap in a longitudinal direction of the needle beds.

The allocation of the stitch formed in the preparation step and the stitch formed in the widening stitch formation step such that positions do not overlap in the longitudinal direction of the needle beds may be carried out by directly transferring such stitches, or may be carried out by forming a new stitch on such stitches and transferring the new stitch.

[0010] A single widening stitch or a plurality of widening stitches may be formed in the inside widening method of the present invention. If a single widening stitch is formed, one stitch may be defined as the starting point stitch as well as the terminating point stitch. In this case, a pick-up stitch is preferably formed first and then a stitch is preferably formed thereafter in the preparation step.

[0011] According to one aspect of the inside widening method of the present invention, when two widening stitches are to be formed, a pick-up stitch on the starting point stitch side, a stitch on the terminating point stitch side, a pick-up stitch on the terminating point stitch side, and a stitch on the starting point stitch side are preferably formed in continuation in this order in the preparation step.

[0012] According to another aspect of the inside widening

method of the present invention, when moving the widening stitch toward the terminating point stitch side in the knitting width direction in the widening stitch arraying step, a step of forming a new stitch on the stitch at the terminating point stitch side formed in the widening stitch formation step and having the new stitch as the widening stitch is preferably carried out before the widening stitch arraying step.

[0013] Although the inside widening stitch of the present invention described above can be applied to any portion of the knitted fabric to be knitted, there exist suitable knitting conditions particularly when carrying out inside widening in a 2×2 rib structure. Specifically, when adding a new back stitch column and a front stitch column in the course of knitting the 2×2 rib structure in which the front stitch and the back stitch are alternately arrayed by two stitches, two stitches that become the starting end of the new front stitch column are increased, and thereafter, two stitches that become the starting end of the new back stitch column are increased. The stitches are preferably increased based on the following conditions.

<When increasing two stitches that become starting end of new front stitch column>

[0014] A stitch arranged on one side in the knitting width direction in one needle bed is defined as the starting point stitch and an adjoining stitch on the other side in the knitting width direction with respect to the starting point stitch is defined as the terminating point stitch in the preparation step, and widening stitches to become the starting end of the front stitch column are formed in the widening stitch formation step. In the widening stitch arraying step, the position of the widening stitches to become the starting end of the front stitch column is moved toward the terminating point stitch side in the knitting width direction in the one needle bed.

<When increasing two stitches that become starting end of new back stitch column>

[0015] Widening stitches to become the starting end of the back stitch column are formed in the widening stitch formation step with the widening stitch arranged on one side in the knitting width direction of the widening stitches transferred in the process of forming the starting end of the front stitch column defined as the starting point stitch and the widening stitch arranged on the other side defined as the terminating point stitch. In the widening stitch arraying step, the position of the widening stitches to become the starting end of the back stitch column is moved toward the terminating point stitch side in the knitting width direction in the other needle bed and the position of the widening stitches to become the starting end of the front stitch column is moved to the one needle bed.

[0016] A knitted fabric of the present invention is a knitted fabric in which a widening stitch is formed on an inner side than an end in a knitting width direction and knitted

using a flat knitting machine having at least a pair of front and back needle beds 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. The knitted fabric of the present invention includes a base stitch, a proximate stitch proximate to the base stitch in the knitting width direction, and a widening stitch formed on a cross-over yarn that directly connects the base stitch and the proximate stitch.

EFFECTS OF THE INVENTION

[0017] According to the inside widening method of the present invention, a knitted fabric of the present invention including a base stitch, a proximate stitch, and a widening stitch formed on a cross-over yarn directly connecting such stitches can be knitted. In the inside widening method of the present invention, when forming a widening stitch, a pick-up stitch is first formed and then a widening stitch is formed as a new stitch on the pick-up stitch, where this pick-up stitch becomes the cross-over yarn in the knitted fabric of the present invention. If the widening stitch is formed through the cross-over yarn, holes are not formed at the widening stitch forming area, and the front and back appearance of the relevant area also becomes equal.

[0018] When there are two widening stitches to be formed, a state in which the pick-up stitches where each widening stitch is to be formed are not directly connected is obtained by limiting the formation procedure of the pick-up stitch and the stitch in the preparation step. As a result, the widening stitch and the stitch can be easily allocated in the widening stitch arraying step.

[0019] If a new stitch is formed on the stitch at the terminating point stitch side formed in the widening stitch formation step and this new stitch is provided as the widening stitch, a movement margin when moving the widening stitch in the knitting width direction becomes large and thus the movement of the widening stitch is facilitated.

[0020] Moreover, a rib line can be beautifully finished by limiting the formation conditions of the widening stitch in the 2×2 rib structure (see embodiment to be described later). In particular, the rib line at the area where the widening stitch is formed can be made to have an appearance similar to the rib line at the area where a narrowing stitch is formed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a first knitting step diagram of an inside widening method according to an embodiment.

Fig. 2 is a second knitting step diagram of the inside widening method according to the embodiment.

Fig. 3(A) is a loop diagram at a time point S3 of Fig.

1 is finished, and Fig. 3(B) is a loop diagram at a time point S6 of Fig. 1 is finished.

Fig. 4(A) is a loop diagram at a time point S10 of Fig. 1 is finished, and Fig. 4(B) is a loop diagram at a time point S13 of Fig. 2 is finished.

Fig. 5 shows partially enlarged photographs of a knitted fabric including a 2×2 rib structure knitted with the embodiment, where (A) shows a case in which the knitted fabric is viewed from the front side and (B) shows a case in which the knitted fabric is viewed from the back side.

Fig. 6 shows partially enlarged photographs of a knitted fabric including a 2×2 rib structure knitted with a conventional inside widening method, where (A) shows a case in which the knitted fabric is viewed from the front side and (B) shows a case in which the knitted fabric is viewed from the back side.

MODE FOR CARRYING OUT THE INVENTION

[0022] Hereinafter, an inside widening method of the present invention will be described based on the drawings. The inside widening method uses a two-bed flat knitting machine in which at least one of a front and back needle beds is capable of being 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, of course, be a four-bed flat knitting machine.

[0023] Fig. 1 and Fig. 2 are knitting step diagrams showing the knitting procedure of inside widening according to the present embodiment, where FB in the figures indicates a front needle bed, BB indicates a back needle bed, a to t indicate the positions of the knitting needles, • indicates the stitch newly knitted in each knitting step, O indicates the old stitch held on the knitting needle, and ▼ indicates a yarn feeder. In Fig. 1, the number of knitting needles is displayed to be less than the number in the actual knitting for the sake of convenience of the explanation.

[0024] Fig. 3 and Fig. 4 are loop diagrams showing the state of the stitches at essential area in the knitting step diagram. The alphabets in the figures correspond to the positions of the knitting needles in Fig. 1 and Fig. 2. Furthermore, in the figures, the pick-up stitch is shown in V-shape, the stitches knitted with the FB are shown with a thick line, and the stitches knitted with the BB are shown with a thin line.

[0025] First, S0 of Fig. 1 shows a state in which a 2×2 rib structure is formed using the knitting needles f, g, j, k, n, o, r, s of the BB and the knitting needles e, h, i, l, m, p, q, t of the FB. In the knitted fabric including the 2×2 rib structure, a starting end of a new front stitch column and a starting end of a back stitch column are formed, and the knitting width of the knitted fabric is widened.

[0026] In S1, the yarn feeder is moved toward the left in the plane of drawing from the state of S0, and the rib

structure is knitted from the knitting needle t of the FB to the knitting needle n of the BB. The widening stitch starts to be formed in the steps after S2 following S1. Upon forming the widening stitch, the widening stitch that becomes the starting end of the front stitch column is first formed as shown in Fig. 1, and thereafter, the widening stitch that becomes the starting end of the back stitch column is formed as shown in Fig. 2.

[0027] The stitch (front stitch) held on the knitting needle m of the FB in S1 is set as a starting point stitch 1 that defines the position that becomes the reference to start the formation of the widening stitch, and the stitch (front stitch) held on the knitting needle l of the FB is set as a terminating point stitch 2 that defines the position that becomes the reference to end the formation of the widening stitch. The front stitch and the back stitch in this embodiment indicate the state of the stitches in the knitted fabric viewed from the FB side.

[0028] In S2, the yarn feeder is once turned back toward the right, and then moved toward the left, where a pick-up stitch 3 is formed on the knitting needle m of the BB and a stitch 4 is formed on the knitting needle l of the FB in the movement toward the left. In S3, a pick-up stitch 5 is formed on the knitting needle l of the BB and a stitch 6 is formed on the knitting needle m of the FB when the yarn feeder is inverted to be moved toward the right. The loop diagram of the knitted fabric when the knitting of S3 is finished is shown in Fig. 3(A).

[0029] In S4, the yarn feeder is moved toward the left to form a new stitch 7 (widening stitch) following the pick-up stitch 3 formed on the knitting needle m of the BB and a new stitch 8 (widening stitch) on the pick-up stitch 5 formed on the knitting needle l of the BB, and form a new stitch on the existing stitches (stitches of the knitting needles k, j, g, f of the BB and the knitting needles i, h, e of the FB).

[0030] In S5, the yarn feeder is moved toward the right to form stitches on the knitting needles e, h, i of the FB and the knitting needles f, g, j, k, l of the BB. The stitch 9 formed on the knitting needle l of the BB is a stitch (widening stitch) newly formed on the stitch 8. The stitch 9 formed in S5 and the stitch 7 formed in S4 described above are back stitches knitted with the BB but are referred to as stitches of the starting ends of the front stitch column. This is because, the stitches 7, 9 are ultimately transferred to the FB and a stitch newly formed on the stitches 7, 9 is a front stitch, as shown in S10, to be described later. That is, the stitches 7, 9 are stitches that exceptionally become back stitches in the newly formed front stitch column.

[0031] In S6, the yarn feeder is once turned back toward the left, and then moved toward the right, where a new stitch 10 on the stitch 4 and a new stitch 11 on the stitch 6 are formed in the movement toward the right, and then stitches are formed on the knitting needles n, o, r, s of the BB and the knitting needles p, q, t of the FB. The loop diagram of the knitted fabric when the knitting of S6 is finished is shown in Fig. 3(B).

[0032] In S7 to S10, the transfer of stitches and the racking of the BB are combined to move the stitches held on the knitting needles e, h, i of the FB and the stitches held on the knitting needles f, g, j, k of the BB in S6 by two stitches to the outer side (left side in the plane of drawing) in the knitting width direction. Furthermore, in S7 to S10, the widening stitches 9, 7 formed in the BB in S6 are moved to the knitting needles j, k of the FB, respectively. Through S7 to S10, the stitches are allocated so as not to overlap in the longitudinal direction of the needle beds. The loop diagram of the knitted fabric when the knitting of S10 is finished is shown in Fig. 4(A).

[0033] In the present embodiment, the pick-up stitch 3 formed in S2 and the pick-up stitch 5 are not directly connected and do not restrict the respective movement, and hence the widening stitches 7, 9 continuing in the wale direction of the pick-up stitches 3, 5 can be easily moved. The widening stitch 9 continues to the pick-up stitch 5 through the widening stitch 8 in the wale direction, and thus is not stretched tight at the time of movement since the movement margin in the knitting width direction is large.

[0034] The two stitches that become the starting end of the back stitch column are then formed according to the knitting step diagram of Fig. 2. Upon increasing the stitch that becomes the starting end of the back stitch column, the widening stitch 7 and the widening stitch 9 formed as starting ends of the front stitch column are respectively set as a starting point stitch 1 and a terminating point stitch 2, as shown in S11 of Fig. 2, preparations for forming the widening stitches are made in S11 to S13 and the widening stitches 7, 8 are formed in S14. The loop diagram of the knitted fabric when the knitting of S13 is finished is shown in Fig. 4 (B) by reference. After forming the widening stitches 7, 8, the formation of the stitches and the arraying of the formed stitches are carried out in S15 to S20. According to such arraying, the position of the starting end of the front stitch column and the position of the starting end of the back stitch column are allocated so as not to overlap.

[0035] After the knitting steps of S11 to S20 shown in Fig. 2 are finished, the 2×2 rib structure in which a new front stitch column is added to the positions of the knitting needles h, i of the FB and a new back stitch column is added to the positions of the knitting needles j, k of the BB is knitted, as shown in S20. The stitches held on the knitting needles h, i are new stitches formed in continuation to the widening stitch that becomes the starting end of the front stitch column, and are not widening stitches themselves. Similarly, the stitches held on the knitting needles j, k are not the widening stitches that become the starting end of the back stitch column.

[0036] If the widening stitch is formed through the inside widening method described above, it can be seen that the widening stitch 7 is formed on a cross-over yarn (pick-up stitch 3) directly connecting the stitch (base stitch) adjacent on the right of the stitch 6 and the stitch 4 proximate to this stitch, as shown in Fig. 4(B). Further-

more, the widening stitch 8 is formed on a cross-over yarn (pick-up stitch 5) directly connecting the stitch 6 (base stitch) and the stitch 4 proximate to the stitch 6.

[0037] Fig. 5 shows partially enlarged photographs of the area where the widening stitch is formed in the knitted fabric knitted with the inside widening method described in the embodiment. Fig. 5(A) is a photograph in which the knitted fabric is viewed from the front side (i.e., side of FB of Fig. 1), and Fig. 5(B) is a photograph in which the knitted fabric is viewed from the back side. As is apparent from Figs. 5 (A) and 5(B), in the 2×2 rib structure knitted with the inside widening method of the present embodiment the appearance of the knitted fabric on the back side is no inferior to that of the front side. The satisfactory appearance is apparent when compared with Figs. 6 (A) and 6 (B) showing the photographs of the 2×2 rib structure knitted with the conventional inside widening method.

[0038] The above embodiment describes the example in which the inside widening method of the present invention is applied to the knitted fabric having the 2×2 rib structure, but the method may also be applied to the knitted fabric having other rib structures (e.g., 1×1 rib structure, 2×1 rib structure), or a plain knitted fabric. In this case as well, the knitted fabric having satisfactory appearance on the front and the back can be knitted.

DESCRIPTION OF REFERENCE NUMERALS

[0039]

- | | | |
|---------|--|--|
| 1 | starting point stitch | |
| 2 | terminating point stitch | |
| 3, 5 | pick-up stitch | |
| 4, 6 | stitch (stitch formed in preparation step) | |
| 7, 8, 9 | stitch (widening stitch) | |
| 10, 11 | stitch | |

Claims

1. An inside widening method for forming a widening stitch on an inner side than an end in a knitting width direction of a knitted fabric, using a flat knitting machine having at least a pair of front and back needle beds 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, the method comprising:

when a stitch that is held in the needle bed and that becomes a reference of a position to start formation of a widening stitch in the knitting width direction is set as a starting point stitch, and a stitch that is held in the same needle bed as the starting point stitch and that becomes a reference of a position to terminate the formation of

the widening stitch is set as a terminating point stitch,

a preparation step of forming a new stitch on the starting point stitch and the terminating point stitch, and forming a pick-up stitch on a knitting needle at a position substantially facing the knitting needle on which the starting point stitch and the terminating point stitch are held;

a widening stitch formation step of forming a stitch to become a widening stitch on the pick-up stitch; and

a widening stitch arraying step of allocating the stitch formed in the preparation step and the stitch formed in the widening stitch formation step by racking the needle beds and transferring the stitches such that positions do not overlap in a longitudinal direction of the needle beds.

2. The inside widening method according to claim 1, wherein
when two widening stitches are to be formed,
a pick-up stitch on the starting point stitch side, a stitch on the terminating point stitch side, a pick-up stitch on the terminating point stitch side, and a stitch on the starting point stitch side are formed in continuation in this order in the preparation step.

3. The inside widening method according to claim 1 or 2, wherein
when moving the widening stitch toward the terminating point stitch side in the knitting width direction in the widening stitch arraying step,
a step of forming a new stitch on the stitch at the terminating point stitch side formed in the widening stitch formation step and having the new stitch as the widening stitch is carried out before the widening stitch arraying step.

4. The inside widening method according to any one of claims 1 to 3, wherein
when adding a new back stitch column and a front stitch column in course of knitting a 2×2 rib structure in which a front stitch and a back stitch are alternately arrayed by two stitches, two stitches that become a starting end of the new front stitch column are increased, and thereafter, the two stitches that become a starting end of the new back stitch column are increased under the following conditions:

when increasing the two stitches that become the starting end of the new front stitch column, a stitch arranged on one side in the knitting width direction in one of the needle beds is defined as the starting point stitch and an adjoining stitch on the other side in the knitting width direction with respect to the starting point stitch is defined as the terminating point stitch in the preparation step,

widening stitches to become the starting end of the front stitch column are formed in the widening stitch formation step, and the position of the widening stitches to become the starting end of the front stitch column is moved toward the terminating point stitch side in the knitting width direction in the one needle bed in the widening stitch arraying step; and

when increasing two stitches that become the starting end of the new back stitch column, one of the transferred widening stitches which is arranged on one side in the knitting width direction is defined as the starting point stitch and the other one of the transferred widening stitches which is arranged on the other side is defined as the terminating point stitch, widening stitches to become the starting end of the back stitch column are formed in the widening stitch formation step, and the position of the widening stitches to become the starting end of the back stitch column is moved toward the terminating point stitch side in the knitting width direction in the other needle bed and the position of the widening stitches to become the starting end of the front stitch column is moved to the one needle bed in the widening stitch arraying step.

5. A knitted fabric in which a widening stitch is formed on an inner side than an end in a knitting width direction and knitted using a flat knitting machine having at least a pair of front and back needle beds in which at least one 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, the knitted fabric comprising:

a base stitch;
a proximate stitch proximate to the base stitch in the knitting width direction; and
a widening stitch formed on a cross-over yarn that directly connects the base stitch and the proximate stitch.

Fig. 1

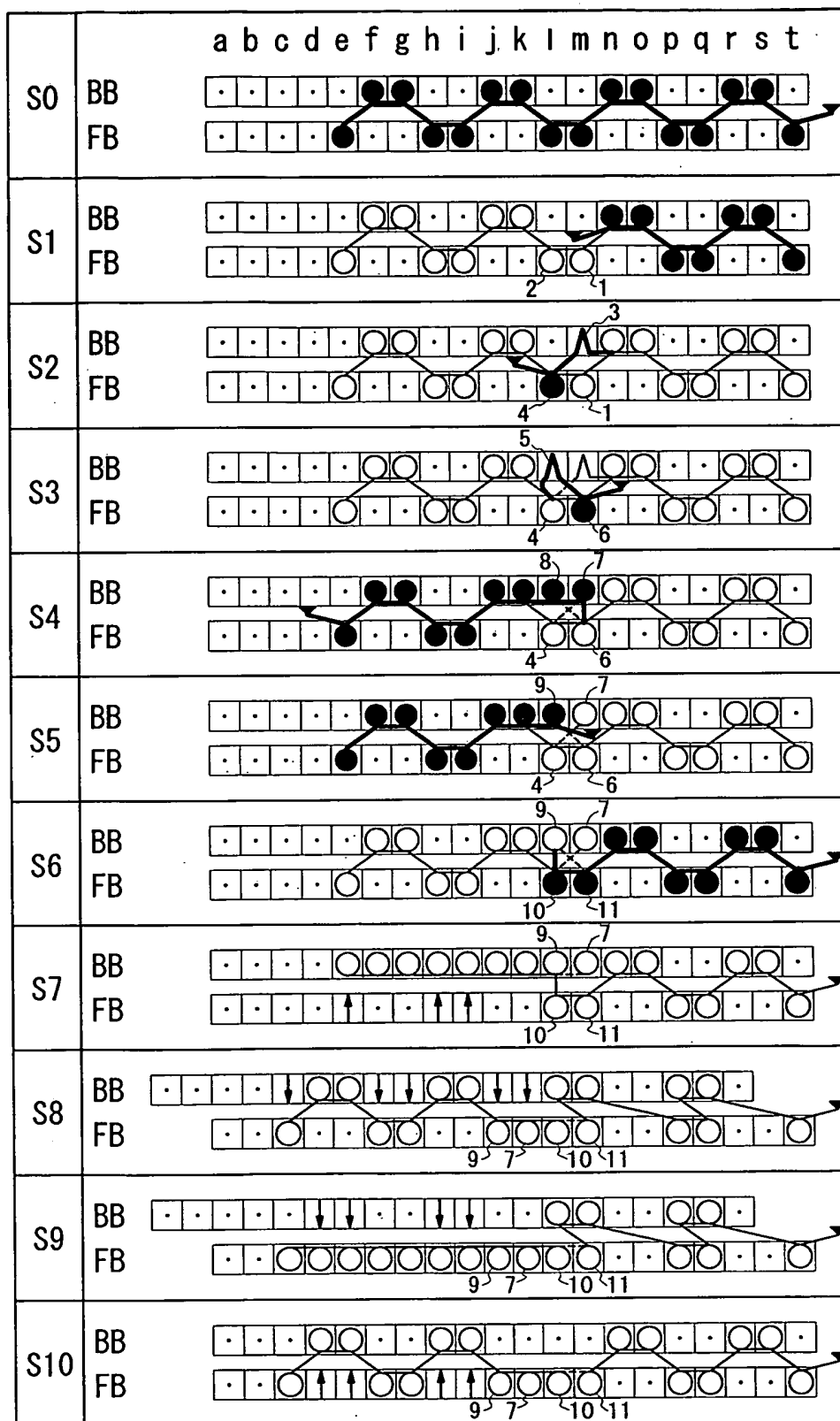


Fig. 2

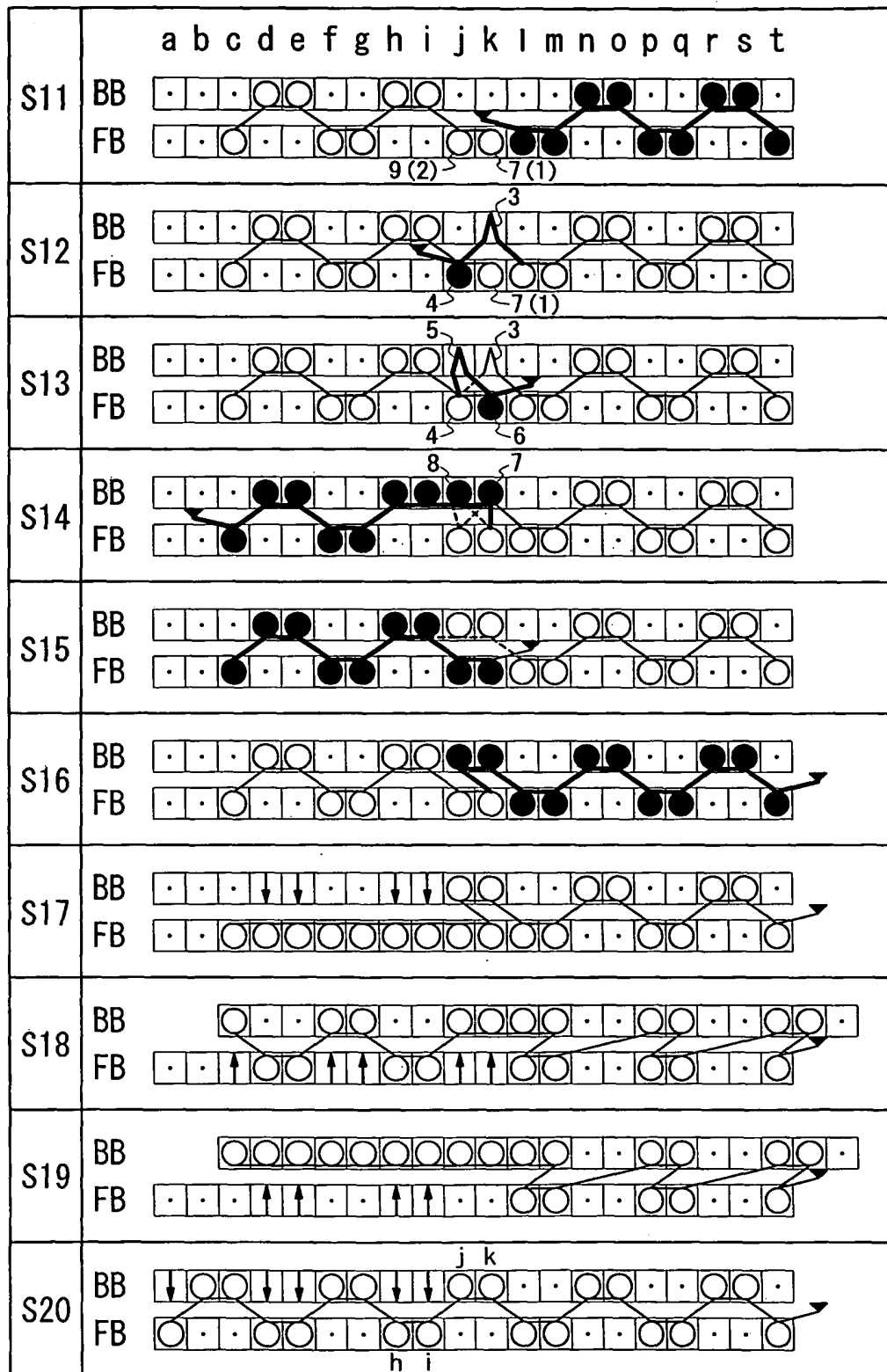
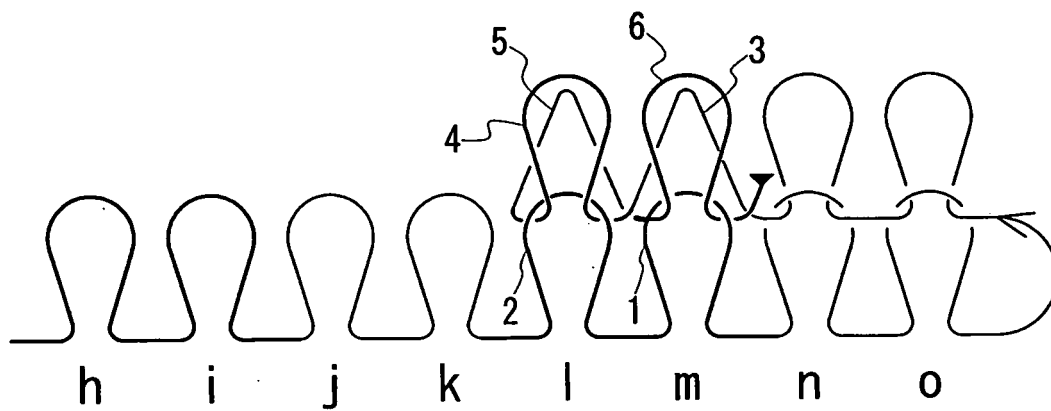


Fig. 3

(A)



(B)

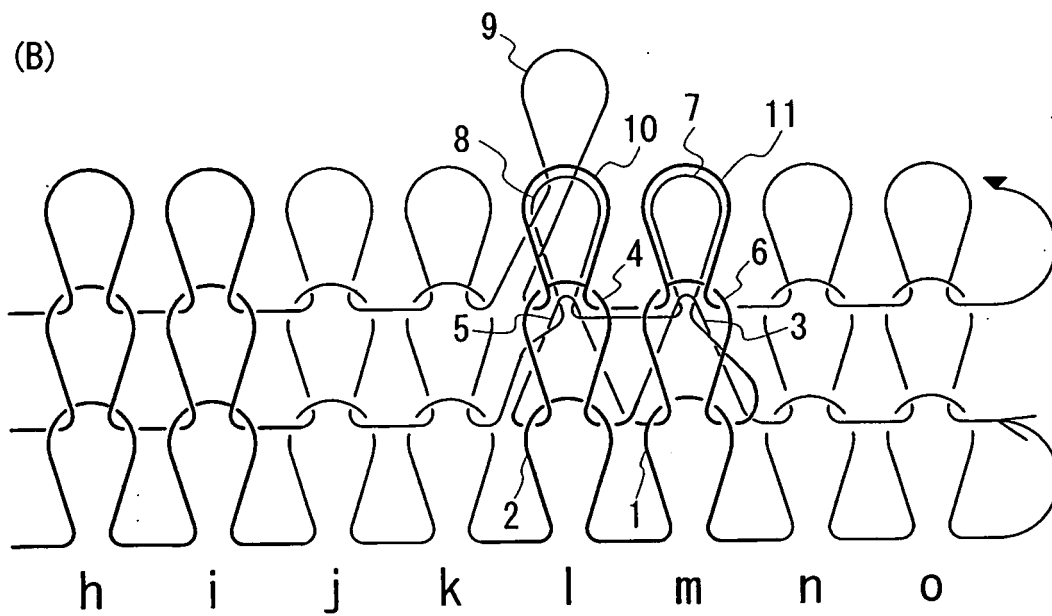
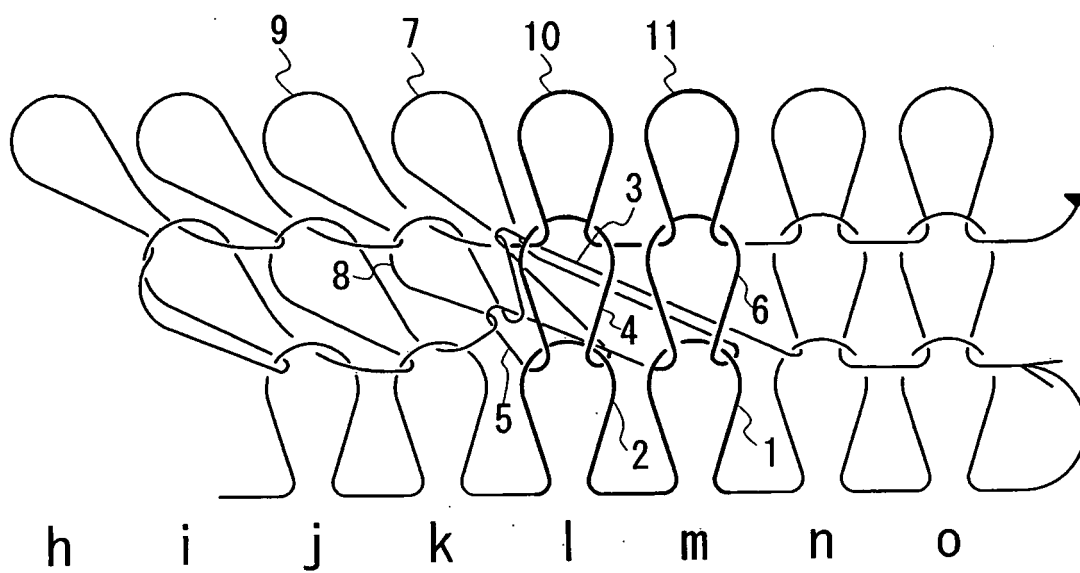


Fig. 4

(A)



(B)

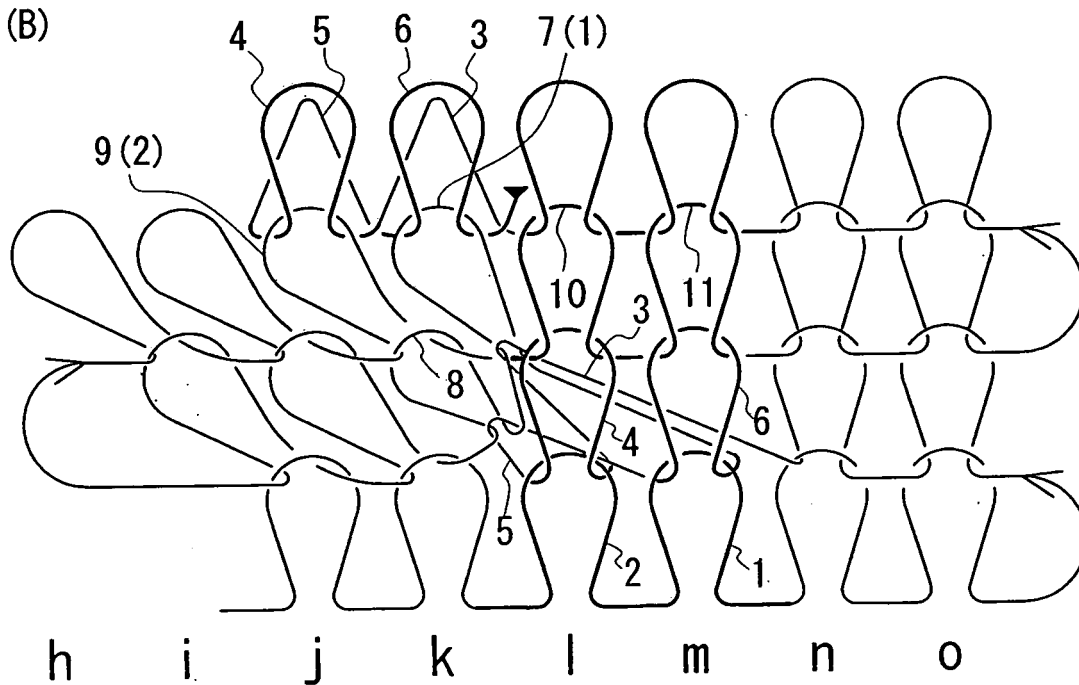


Fig. 5

(A)



(B)

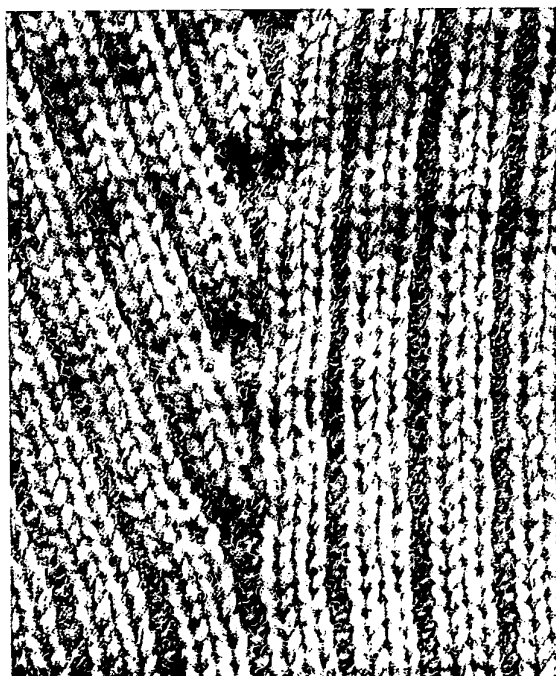
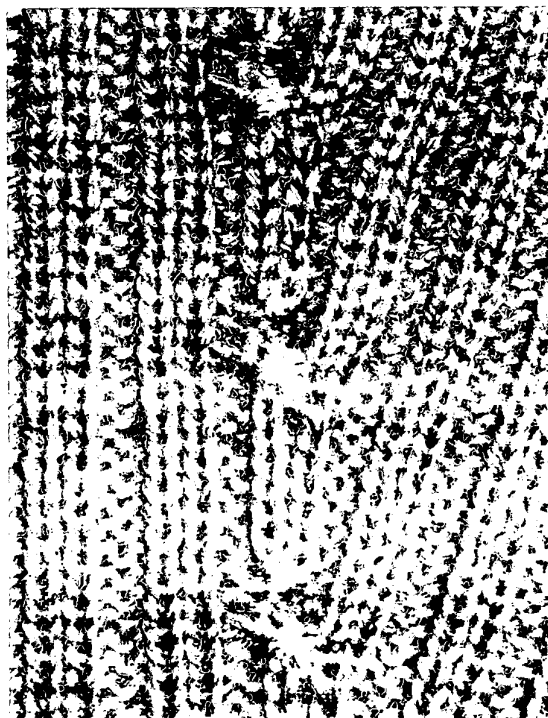


Fig. 6

(A)



(B)



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/006496

A. CLASSIFICATION OF SUBJECT MATTER

D04B1/00(2006.01) i, D04B7/10(2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D04B1/00, D04B7/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010

Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 59-53749 A (Masahiro SHIMA), 28 March 1984 (28.03.1984), claims; fig. 16, 17 (Family: none)	1-5
A	JP 3-279448 A (Shima Seiki Mfg., Ltd.), 10 December 1991 (10.12.1991), claims; fig. 10, 12, 14, 16 (Family: none)	1-5
A	EP 449549 A2 (SHIMA SEIKI MFG), 02 October 1991 (02.10.1991), claims; fig. 10, 12, 14, 16 & US 5305619 A & CN 1058437 A & MX 173917 B	1-5

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 March, 2010 (10.03.10)

Date of mailing of the international search report

23 March, 2010 (23.03.10)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2003003352 A [0006]