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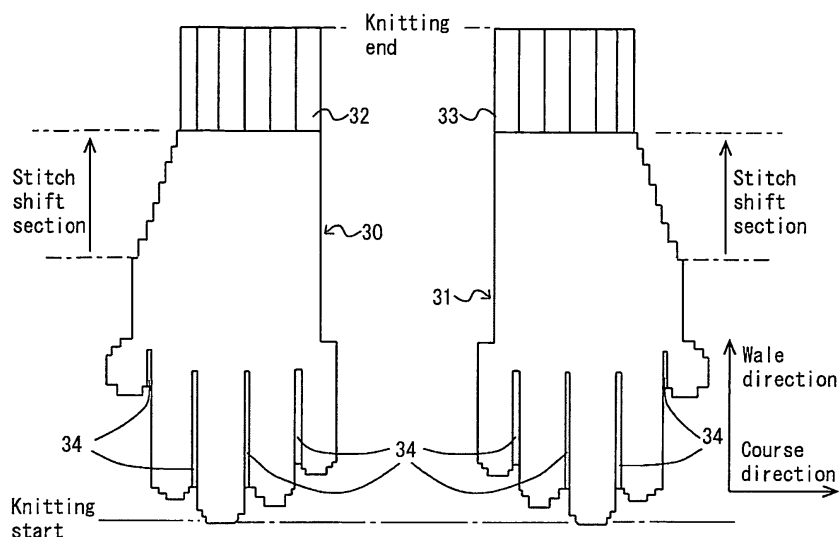
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(54) **KNIT DESIGNING DEVICE, DESIGNING METHOD, AND DESIGNING PROGRAM**

(57) A knitted fabric is designed in which knitting widths of a part for a front knitted fabric and a part for a rear knitted fabric become different from each other by stitch shift from a point during knitting. Display in which

pattern data has been applied to the shape of a part and display in which the shape of a part has been modified according to stitch shift and pattern data has been applied thereto can be freely switched. The area where a pattern can be designed can be clearly displayed.

FIG. 3



Description

Technical Field

[0001] The present invention relates to designs of knitted fabrics such as gloves in which a front knitted fabric and a rear knitted fabric are asymmetrical.

Background Art

[0002] 3D gloves are known in which the knitting widths on a back side and a palm side of the hand become different from each other from a point during knitting. In a 3D glove, a thumb pocket is moved to the palm side by narrowing stitches on the palm side, and shifting stitches in the vicinity of the base of the thumb pocket from the back side of the hand to the palm side. Accordingly, a completed glove has a 3D shape. In the design of a 3D glove, a part on the palm side and a part on the back side of the hand are displayed as shown in FIG. 4, and pattern data is input. Here, since stitch shift is not displayed, for example, the range in which pattern data can be input is not clear. If the range in which input is possible is erroneously recognized, the design becomes erroneous or different from expectations as shown in the lower half of FIGS. 5 and 6.

[0003] Hereinafter, related conventional techniques will be described. Patent Literature 1 (JP3983764B) discloses a design of a knitted fabric extending across front and back parts. Since this technique does not assume 3D knitting, only display based on the shapes of parts is shown. Patent Literature 2 (JP4237753B) discloses a design of a gore used for providing a skirt and the like with a 3D shape. This technique enables a perfect circle to be input as a perfect circle by solving a problem in which a perfect circle in pattern data has to be input as a distorted shape due to narrowing and the like at the gore.

Citation List

Patent Literature

[0004]

Patent Literature 1: JP3983764B
Patent Literature 2: JP4237753B

Summary of the Invention

Problems to be Solved by the Invention

[0005] Objects of the present invention are, in a knitted fabric such as a 3D glove in which the knitting widths of front and back parts become asymmetrical from a point during knitting:

- to clearly display the range in which pattern data can be input and how stitches are linked in a completed

knitted fabric; and

- to display the shapes of parts, and to make it easy to recognize what 3D shape a completed knitted fabric will take.

Means for Solving the Problem

[0006] The present invention is directed to a knit designing device for designing a knitted fabric in which knitting widths of a part for a front knitted fabric and a part for a rear knitted fabric become different from each other by stitch shift from a point during knitting, characterized by including:

means for storing a part-based image representing shapes of the parts;
means for storing a bed-based image obtained by modifying the part-based image according to stitch shift;
display switching means for switching display between the part-based image and the bed-based image; and
design input means for accepting input of pattern data to at least the bed-based image, and applying the pattern data to both of the part-based image and the bed-based image.

[0007] Also, the present invention is directed to a knit designing method using a knit designing device for designing a knitted fabric in which knitting widths of a part for a front knitted fabric and a part for a rear knitted fabric become different from each other by stitch shift between beds of a knitting machine from a point during knitting, characterized by including:

causing the knit designing device to perform the steps of
storing a part-based image representing shapes of the parts,
storing a bed-based image obtained by modifying the part-based image according to stitch shift,
switching display between the part-based image and the bed-based image, and
accepting input of pattern data to at least the bed-based image, and
applying the pattern data to both of the part-based image and the bed-based image.

[0008] Also, the present invention is directed to a knit designing program using a knit designing device for designing a knitted fabric in which knitting widths of a part for a front knitted fabric and a part for a rear knitted fabric become different from each other by stitch shift between beds of a knitting machine from a point during knitting, characterized in that:

the program causes the knit designing device to execute

a step of storing a part-based image representing shapes of the parts,
 a step of storing a bed-based image obtained by modifying the part-based image according to stitch shift,
 a step of switching display between the part-based image and the bed-based image, and
 a step of accepting input of pattern data to at least the bed-based image, and applying the pattern data to both of the part-based image and the bed-based image.

[0009] In this specification, the description concerning a knit designing device is directly applicable to a designing method and a designing program, and the description concerning a knit designing method is directly applicable to a designing device and a designing program. The knit designing device is a computer, and the designing program is stored in a storage medium such as a CD-ROM. In the present invention, the part-based image makes it possible to recognize the shapes of front and back parts, and to recognize the 3D shape of a knitted fabric according to the extent to which the front and the back parts are asymmetrical in the knitting width direction. Furthermore, the bed-based image makes it possible to recognize the position in a completed knitted fabric at which a stitch at a pattern data input point is located, and the relationship that the stitch has with its surrounding patterns. Moreover, the bed-based image collectively displays stitches on the same needle bed, and, thus, the range in which pattern data can be input can be easily recognized. Accordingly, problems decrease in which a pattern is erroneously input or a pattern different from expectations is input. Moreover, the range in which pattern data can be input can be checked while inputting pattern data, without performing loop simulation after completion of the knitting data. Also, when the bed-based image and the part-based image are displayed in a switchable manner, the shapes of parts and the like can be easily checked, and the range in which pattern data can be input can be easily recognized. The input pattern data is applied to both of the part-based image and the bed-based image, and, thus, the part-based image and the bed-based image represent the design of a common knitted fabric. The part-based image and the bed-based image are different from each other in whether or not the shape of a part has been modified according to the stitch shift between beds, and one of the images can be created from the other image.

[0010] It is preferable that the knit designing device further includes means for creating the bed-based image by moving stitches between the parts in a direction of the stitch shift, the stitches being as many as stitches that are to be shifted, at a stitch shift position and in a following course thereof. Accordingly, the bed-based image can be automatically created.

Furthermore, it is preferable that the design input means is configured to accept input of pattern data from any one

of the part-based image and the bed-based image. Accordingly, the pattern data can be input from any image, which provides convenience.

[0011] It is preferable that the knitted fabric is a 3D glove, and stitches are narrowed on a palm side and stitches on a back of hand side are shifted toward the palm side in order to move a thumb pocket toward the palm side. Accordingly, the pattern data for a 3D glove can be easily created.

Brief Description of Drawings

[0012]

FIG. 1 is a block diagram of a knit designing device according to an embodiment.

FIG. 2 is a flowchart showing a knit designing method and a designing program according to an embodiment.

FIG. 3 is a view showing bed-based images according to an embodiment.

FIG. 4 is a view showing part-based images.

FIG. 5 is a view showing a problem in part-based images.

FIG. 6 is a view showing a problem in part-based images.

FIG. 7 is a view showing bed-based images according to an embodiment.

FIG. 8 is a view showing part-based images.

FIG. 9 is a view showing a part-based image and a bed-based image.

FIG. 10 is a view showing a stitch shifting process.

[0013] Hereinafter, an optimal embodiment for carrying out the present invention will be described. The scope of the invention should be construed in view of the description of the claims together with the possibility of change according to well known techniques.

Embodiment

[0014] FIGS. 1 to 10 illustrate a knit designing device 2, a designing method, and a designing program according to an embodiment. In FIG. 1, 4 denotes a user input device that is a keyboard, a mouse, a stylus, a joystick, a track ball, or the like, 6 denotes a monitor that is a color monitor or the like, 8 denotes a network interface that connects the knit designing device 2 to a network such as a LAN or the Internet, and 10 denotes an external memory that is a USB memory, a CD-ROM, or the like. The designing program of this embodiment is provided from the network interface 8 or the external memory 10 and stored in the knit designing device 2. Also, 12 denotes a CPU, 14 denotes a memory, and 16 denotes a bus. The CPU 12 and the memory 14 constitute design data storage means 18 to pattern input processing means 26.

[0015] The design data storage means 18 stores de-

sign data of a knitted fabric. A knitted fabric that is to be designed is a knitted fabric provided with a part for a front knitted fabric and a part for a rear knitted fabric, in which the knitting widths of the front knitted fabric and the rear knitted fabric become different from each other from a point during knitting by stitch shift during the knitting. The number of front and back parts can be freely selected, and, for example, a flat knitting machine provided with two to six needle beds in the front and the rear is used for knitting. Knitting data includes the shape of a part, such as knitting width and knitting height, and also includes data regarding narrowing, widening, and the like, and data regarding stitch shift, that is, data indicating how many stitches are to be shifted, at which position, and in which direction. In addition to the above, the design data includes pattern data such as pattern by knit structure, intarsia, or jacquard.

[0016] Part-based image storage means 20 stores a part-based image representing the shape of a part. Bed-based image storage means 22 stores an image based on a bed, that is, an image obtained by modifying the part-based image according to stitch shift. Here, both of the part-based image and the bed-based image include input pattern data, and also include data indicating narrowing, widening, and the like. The phrase "image includes pattern data and the like" indicates that, for example, color codes of the image represent pattern data and the like. Display switching means 24 switches images displayed on the monitor 6 between the part-based image and the bed-based image. Here, it is also possible to provide a mode that displays both of the part-based image and the bed-based image, instead of merely switching these images.

[0017] If pattern data is input from the user input device 4 or the like on the part-based image or the bed-based image displayed on the monitor 6, the pattern input processing means 26 processes the data. More specifically, whether or not there is an error in the input pattern data is checked, and, if there is an error, a warning is given. If there is no error, the input pattern data is applied to both of the part-based image and the bed-based image. That is to say, the pattern data is used in common for the part-based image and the bed-based image. The part-based image and the bed-based image are different from each other in that modification of a part according to stitch shift is reflected on the bed-based image. Both images represent the same data as design data of a knitted fabric.

[0018] FIG. 2 illustrates a designing method and a designing program of a knitted fabric. In Step 1, the shapes of parts for front and rear knitted fabrics are input, and the shapes of the parts are stored as part-based images. Input of the shapes of the parts may be performed by inputting size data such as knitting width and knitting height, or by rendering the shapes of the parts on the monitor 6 using the user input device 4. In Step 2, stitch shift data is input or generated. When causing a knitting machine such as a flat knitting machine to knit front and

back parts having different knitting widths, the numbers of stitches on front and rear needle beds have to be substantially the same, for example, a difference between the numbers of stitches has to be one or less, in order to prevent excessive force from being applied to a yarn at end portions of the knitted fabric. Since the shapes of parts have been input in Step 1, the designing device 2 can automatically determine how many stitches are to be shifted, at which position, and in which direction, without input by the user. Thus, in Step 2, the stitch shift data may be input by the user or may be automatically generated by the designing device 2.

[0019] In Step 3, whether or not stitch shift is to be performed, the position in the wale direction from the knitting start, how many stitches are to be shifted, and the stitch shift direction are obtained and stored for each course from the knitting start to the knitting end. Then, in Step 4, an image is created in which a wale having vertically linked stitches that are as many as stitches to be shifted has been moved from the stitch shift source to the stitch shift destination area at the stitch shift position and in its following courses. This image is a bed-based image, and stored in Step 5. In Step 6, the part-based image or the bed-based image is displayed on the monitor in response to a request from the user.

[0020] Pattern input (input of pattern data) by the user on the displayed image is accepted (Step 7), and both the part-based image and the bed-based image are modified according to the pattern input. Then, in Step 8, whether or not there is an error in the pattern input is checked, and, if there is an error, a warning is given. If the stitch shift data is modified during the process (Step 9), the procedure returns from the connector A to Step 2. If the stitch shift data is not modified and the designing process ends (Step 10), the knitting data is output, and the procedure ends. If the designing process does not end, the procedure returns to a designated process (Step 11). For example, if the pattern data is to be modified, the procedure returns to Step 6.

[0021] FIGS. 3 to 6 illustrate processes of an embodiment using 3D gloves as an example. FIG. 4 shows display of design data of a 3D glove according to a conventional technique (part-based image), and FIG. 3 shows display according to an embodiment (bed-based image). In FIG. 3, 30 denotes an image on the back side of the hand as a bed-based image, and 31 denotes an image on the palm side as a bed-based image. Further, 40 denotes an image on the back side of the hand as a part-based image, and 41 denotes an image on the palm side. In the embodiment, the display in FIG. 4 and the display in FIG. 3 can be freely switched. In the drawings, 32, 33, 42, and 43 denote ribbed portions for the wrist, and knitting of the gloves is started from the middle finger portion, and four finger portions are knitted in the shape of pockets and put together into one tubular form. Then, a thumb pocket is knitted and linked to the tubular form, forming one large tubular form. Narrowing is performed on the palm side of this tubular form, and stitches on the thumb

side are shifted from the back side to the palm side of the hand, and, thus, the knitting width is decreased. Accordingly, the thumb pocket is moved toward the palm side, and a 3D glove is obtained. Here, a section where stitch shift is performed is between the thumb portion and the wrist portion, and no stitch shift is performed on the little finger side. Areas 34 between finger pockets represent stitches allocated in the depth direction of the finger pockets. In this specification, the direction in which stitches are simultaneously formed is a course direction, and the direction from the knitting start to the knitting end is a wale direction.

[0022] In FIG. 4, 45 denotes a stitch shift source area, and 46 denotes a stitch shift destination area. In principle, the presence of the areas 45 and 46 is not displayed. Accordingly, the knitting widths on the palm side and the back side of the hand are different from each other, and, in a similar manner, the knitting widths of the ribbed portion 42 and the ribbed portion 43 are different from each other. The part-based images 40 and 41 place an emphasis on displaying the shapes of the part 40 for the front knitted fabric and the part 41 for the rear knitted fabric, and a large difference between the knitting widths of these parts indicates that the thumb pocket is moved by a large distance to the palm side.

[0023] However, in the display in FIG. 4, the range in which pattern data can be input on the back side or the palm side of the hand or the ribbed portion 42 or 43 is not clear. For example, if pattern data is input to the area 45, the pattern appears on the palm side in a completed glove. Furthermore, the stitches in the area 45 are knitted on the bed opposite the bed for the other stitches on the back side of the hand, and, thus, if pattern data is input without considering the area 45, pattern data that cannot be knitted may be input. The stitch shift destination area 46 is knitted on the same bed as the other portions in the knitted fabric on the palm side, and this portion can be designed as in the case of the palm side. However, in the display in FIG. 4, the area 46 is not displayed, and, thus, the design is not performed on the area 46, but has to be performed while taking it into consideration that the area 45 appears on the palm side.

[0024] The display in FIG. 4 and the display in FIG. 3 can be switched by the display switching means. In the display in FIG. 3, stitches that have been shifted are displayed as those belonging to the knitted fabric at the stitch shift destination. As a result, the knitting widths of the front knitted fabric and the rear knitted fabric are substantially the same, and, a difference therebetween is, for example, approximately one stitch, so that no excessive load is applied to a yarn extended between the front bed and the rear bed. Furthermore, in the display in FIG. 3, the stitch shift source area 45 has been eliminated from the image 30. Then, in the display in FIG. 3, stitches in the same displayed image are knitted on the same bed, and, thus, input of pattern data becomes easy.

[0025] A difference that appears between the display in FIG. 4 and the display in FIG. 3 when inputting pattern

data is shown in FIGS. 5 and 6. FIG. 5 shows an example in which a cable pattern is provided on the back side of the hand. In this case, part of the cable pattern is in the stitch shift source area, and, thus, part of the cable pattern is shifted to the palm side. Data for the stitches in "front knit + crossing" that have been shifted to the stitch shift destination area 46 is error data because there is no stitch that crosses over these stitches.

[0026] FIG. 6 shows an example of a mesh pattern. Neither the stitch shift destination nor the stitch shift source is considered in the display in FIG. 4, and, thus, part of the mesh pattern has been moved from the back side to the palm side of the hand. This design is not problematic if a mesh pattern is to be provided on the palm side, but is different from user's expectations if mesh that the user wants to provide on the back side of the hand has appeared on the palm side.

[0027] In the embodiment, the display in FIG. 3 is used to make input of pattern data easy. Furthermore, the display in FIG. 4 is also necessary to recognize the shape of the front knitted fabric and the shape of the rear knitted fabric, and to recognize what 3D shape the glove will take. In the case of a glove, the stitch shift position is between the thumb pocket and the wrist portion, and the stitch shift direction is, on the thumb pocket side, from the back side to the palm side of the hand. This position and direction is already known.

[0028] This embodiment can be applied also to a knitted fabric in which stitches are shifted from both left and right directions. FIGS. 7 and 8 show this sort of example. The type of a knitted fabric is, for example, a skirt. In the drawings, 80 denotes a part-based image, 70 denotes a bed-based image, 71 and 81 denote a front knitted fabric, and 72 and 82 denote a rear knitted fabric. The rear knitted fabrics 72 and 82 have darts 73, stitches are narrowed at these portions, and stitches in stitch shift source areas 85 are accordingly moved to stitch shift destination areas 86. Here, the areas 85 and 86 may not be displayed. Furthermore, regarding display of the darts 73, both of display as closed darts as indicated by the dashed dotted lines in the right half of FIG. 8 and display as opened darts as indicated by the solid lines are possible.

[0029] The display in FIG. 8 is appropriate for recognizing the shapes of parts, but is not appropriate for recognizing the boundary position of the pattern data. On the other hand, the display in FIG. 7 shows the areas 85 as having been moved to the areas 86, and, thus, the range of stitches that are present on the same bed is clear, and the range in which pattern data can be input is clear. In the displays in FIGS. 7 and 8, the darts 73 are arranged symmetrically on either side of a center line 74, and, thus, the stitch shift directions can be interpreted as being bilaterally symmetrical with respect to the center line 74. Instead of such interpretation, the stitch shift directions in the areas 85 and 86 may be obtained from the knitting data and stored.

[0030] FIG. 9 schematically shows the relationship between a bed-based image 90 and a part-based image

91. In the drawing, for example, F refers to a front bed, and R refers to a rear bed. In the part-based image 91, on which bed stitches are actually caught is not considered, and the shapes of parts are displayed. On the other hand, in the bed-based image 90, display is performed based on which stitch is caught on which bed. In the drawing, 92 denotes a front knitted fabric, 94 denotes a rear knitted fabric, and 96 denotes a stitch shift destination area.

[0031] FIG. 10 shows a stitch shifting process in which, for example, when stitches A, B, and C caught on the front bed F are shifted toward the rear bed R by transferring stitches and racking the needle bed, the stitches are shifted in order from the outer stitch A to the inner stitch C.

DESCRIPTION OF REFERENCE NUMERALS

[0032]

2	Knit designing device
4	User input device
6	Monitor
8	Network interface
10	External memory
12	CPU
14	Memory
16	Bus
18	Design data storage means
20	Part-based image storage means
22	Bed-based image storage means
24	Display switching means
26	Pattern input processing means
30, 31	Bed-based image
40, 41	Part-based image
32, 33, 42, 43	Ribbed portion
34	Area
45	Stitch shift source area
46	Stitch shift destination area

70	Bed-based image
71, 81	Front knitted fabric
72, 82	Rear knitted fabric
73	Dart
74	Center line
80	Part-based image
85	Stitch shift source area
86	Stitch shift destination area
90	Bed-based image
91	Part-based image
92	Front knitted fabric
94	Rear knitted fabric
96	Stitch shift destination area

Claims

1. A knit designing device (2) for designing a knitted fabric in which knitting widths of a part for a front knitted fabric (71, 81, 92) and a part for a rear knitted fabric (72, 82, 94) become different from each other by stitch shift between beds of a knitting machine from a point during knitting, **characterized by**:
 - means (20) for storing a part-based image (40, 41, 80, 91) representing shapes of the parts;
 - means (22) for storing a bed-based image (30, 31, 70, 90) obtained by modifying the part-based image (40, 41, 80, 91) according to the stitch shift;
 - display switching means (24) for switching display between the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90);
 - and
 - design input means (26) for accepting input of pattern data to at least the bed-based image (30, 31, 70, 90), and applying the pattern data to both of the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90).
2. The knit designing device (2) according to claim 1, **characterized by** further comprising: means for creating the bed-based image (30, 31, 70, 90) by moving stitches between the parts in a direction of the stitch shift, the stitches being as many as stitches that are to be shifted, at a stitch shift position and in a follow-

ing course thereof.

3. The knit designing device (2) according to claim 1 or 2, **characterized in that:**

the design input means (26) is configured to accept input of pattern data via any one of the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90).

4. A knit designing method using a knit designing device (2) for designing a knitted fabric in which knitting widths of a part for a front knitted fabric (71, 81, 92) and a part for a rear knitted fabric (72, 82, 94) become different from each other by stitch shift between beds of a knitting machine from a point during knitting, **characterized by:**

causing the knit designing device (2) to perform the steps of
storing a part-based image (40, 41, 80, 91) representing shapes of the parts,
storing a bed-based image (30, 31, 70, 90) obtained by modifying the part-based image (40, 41, 80, 91) according to stitch shift,
switching display between the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90), and
accepting input of pattern data to at least the bed-based image (30, 31, 70, 90), and applying the pattern data to both of the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90).

5. The knit designing method according to claim 4, **characterized in that:** the bed-based image (30, 31, 70, 90) is created by moving stitches between the parts in a direction of the stitch shift, the stitches being as many as stitches that are to be shifted, at a stitch shift position and in a following course thereof.

6. The knit designing method according to claim 4 or 5, **characterized in that:** the knitted fabric is a 3D glove; and stitches are narrowed on a palm side and stitches on a back of hand side are shifted toward the palm side in order to move a thumb pocket toward the palm side.

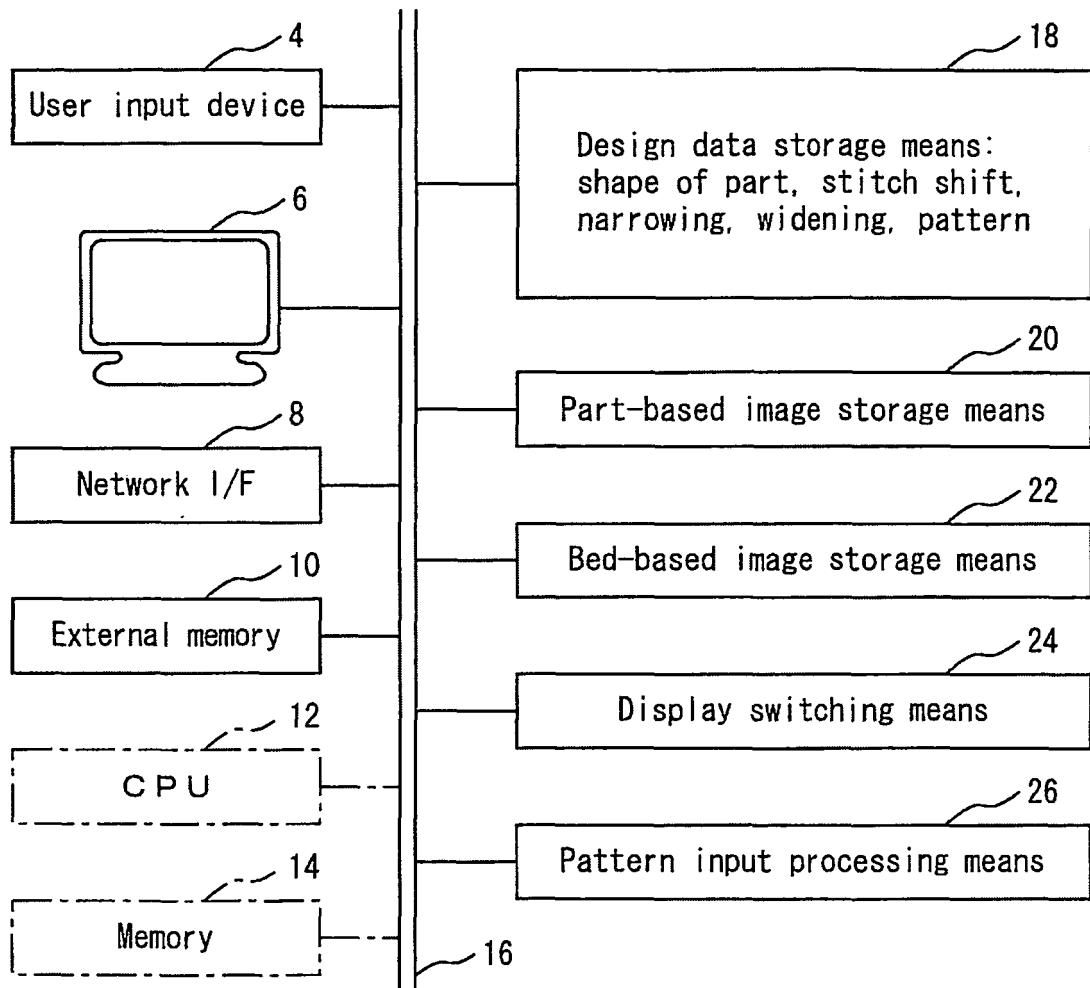
7. A knit designing program using a knit designing device (2) for designing a knitted fabric in which knitting widths of a part for a front knitted fabric (71, 81, 92) and a part for a rear knitted fabric (72, 82, 94) become different from each other by stitch shift between beds of a knitting machine from a point during knitting, **characterized in that:**

the program causes the knit designing device

(2) to execute

a step of storing a part-based image (40, 41, 80, 91) representing shapes of the parts,
a step of storing a bed-based image (30, 31, 70, 90) obtained by modifying the part-based image (40, 41, 80, 91) according to stitch shift,
a step of switching display between the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90), and
a step of accepting input of pattern data to at least the bed-based image (30, 31, 70, 90), and applying the pattern data to both of the part-based image (40, 41, 80, 91) and the bed-based image (30, 31, 70, 90).

FIG. 1



F I. G. 2

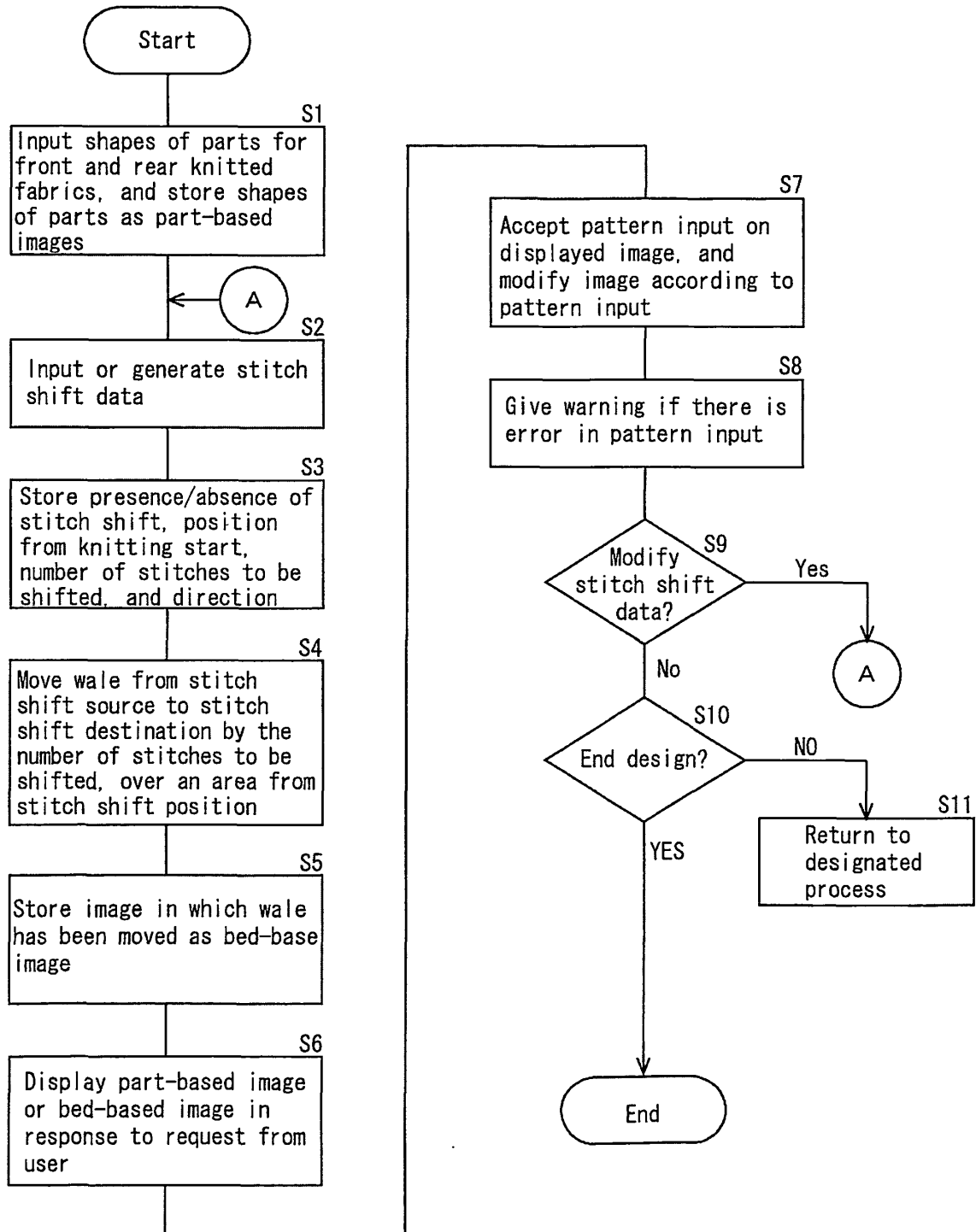


FIG. 3

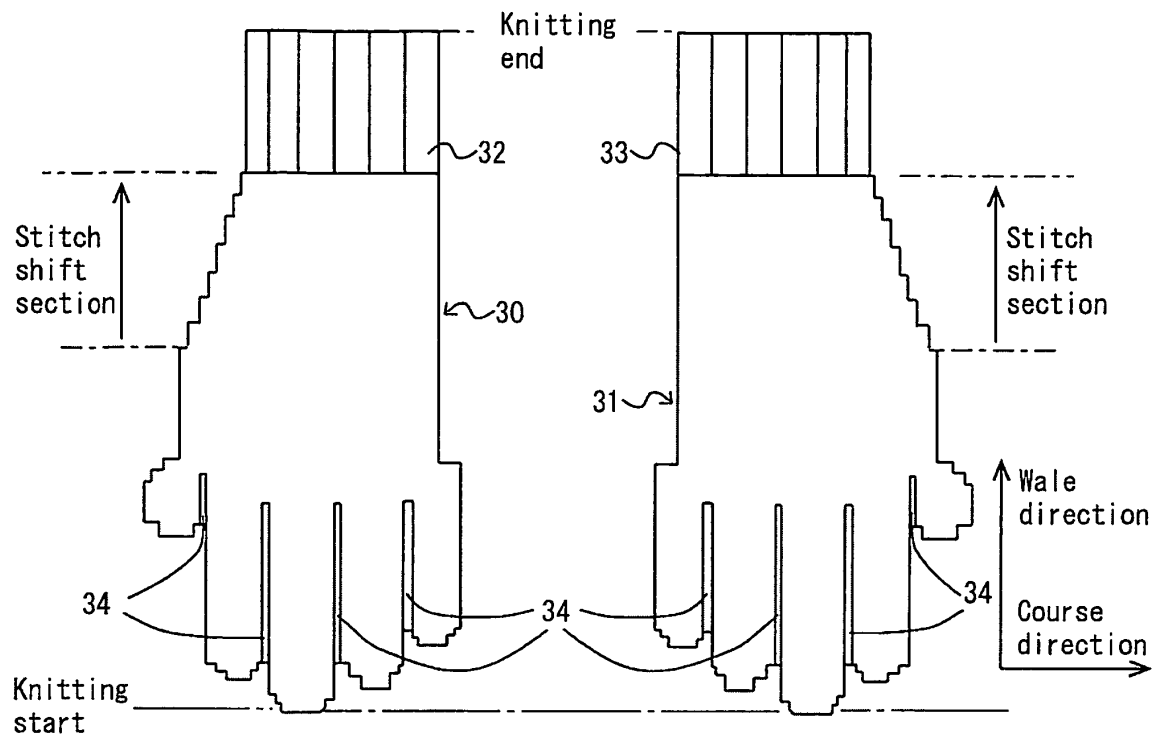


FIG. 4

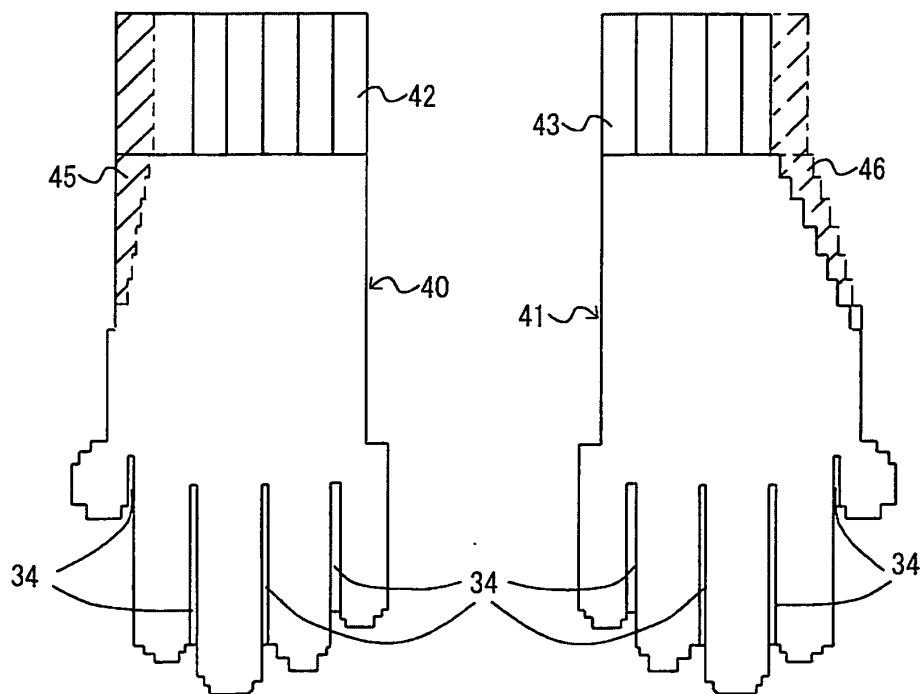


FIG. 5

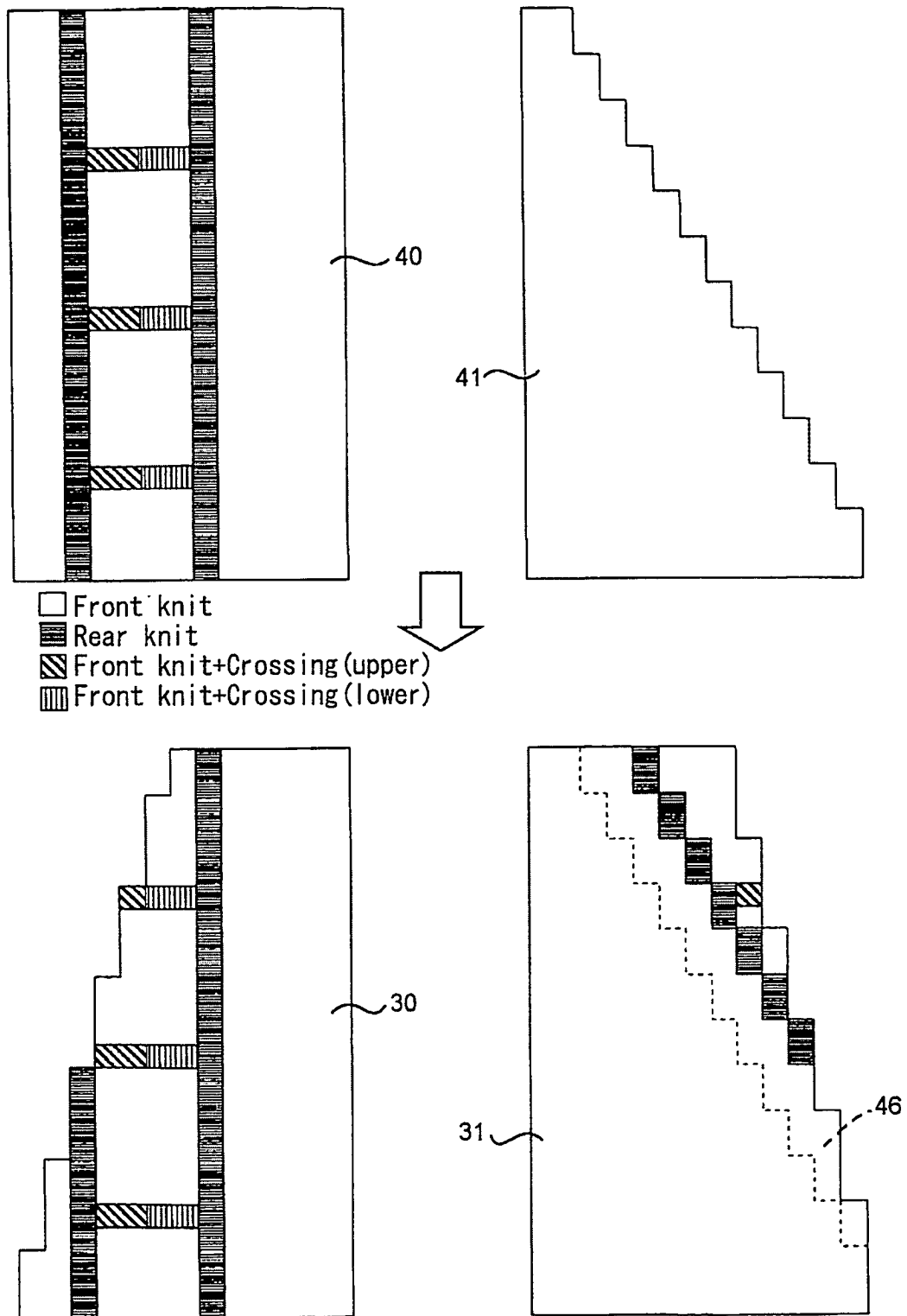


FIG. 6

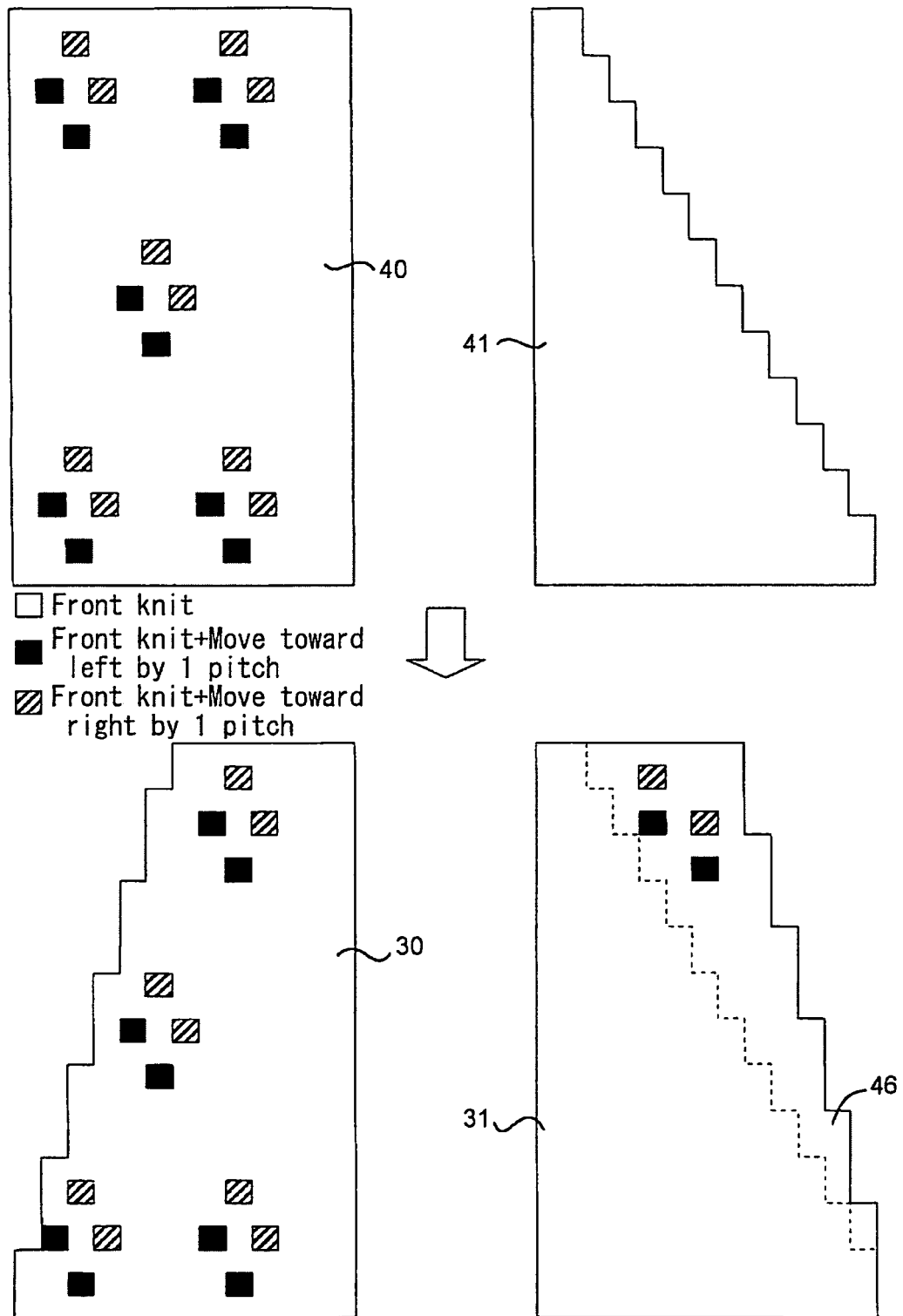


FIG. 7

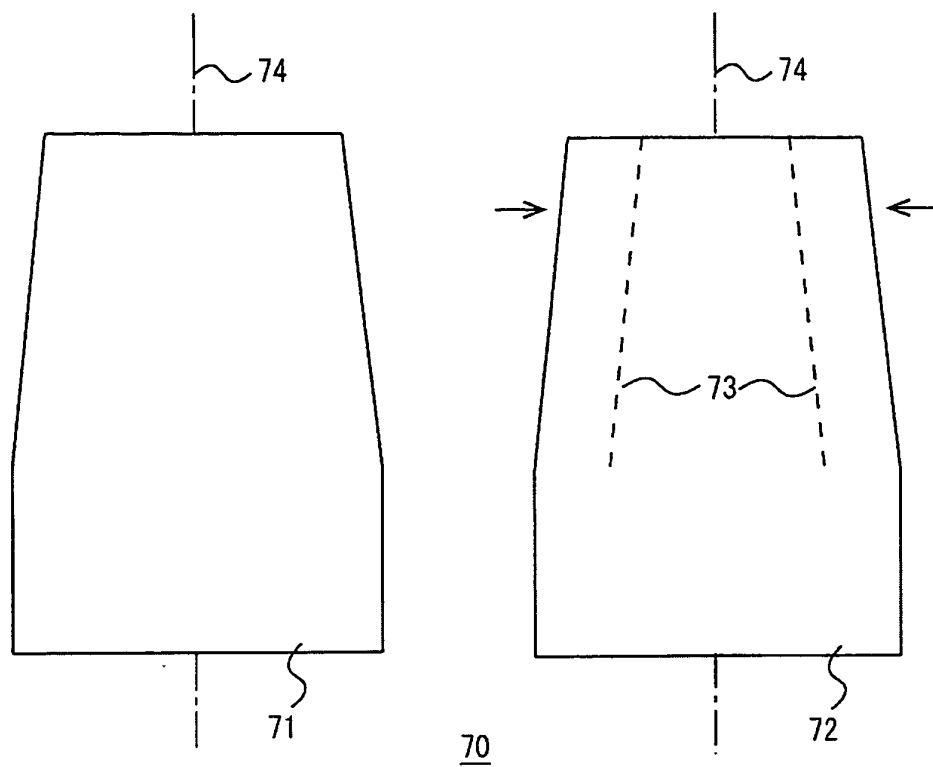


FIG. 8

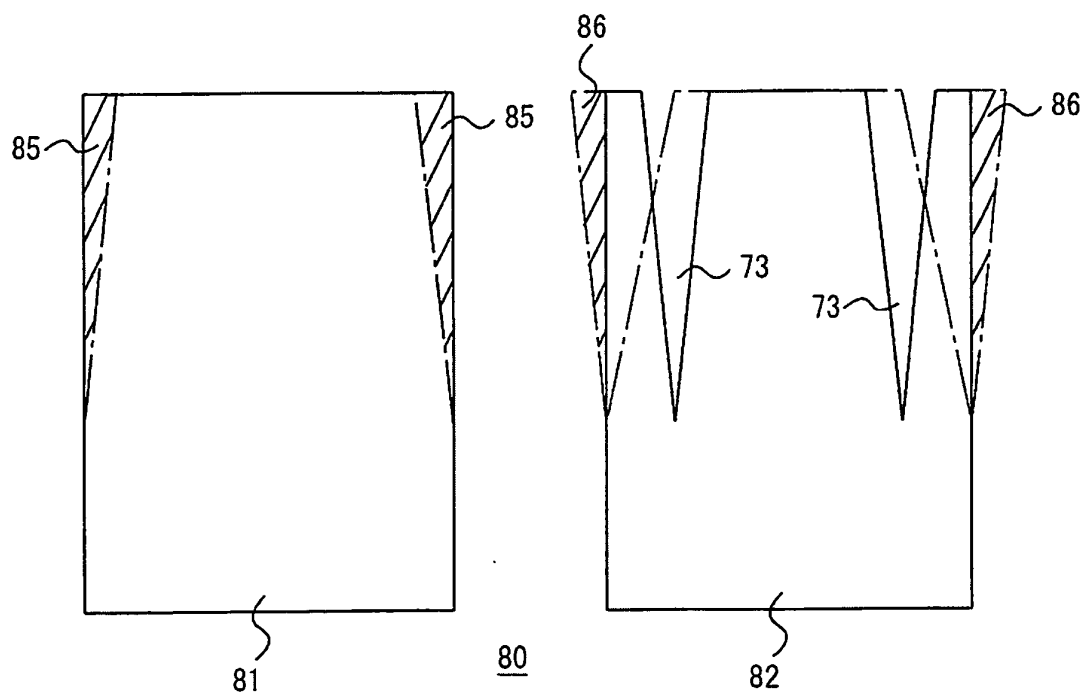


FIG. 9

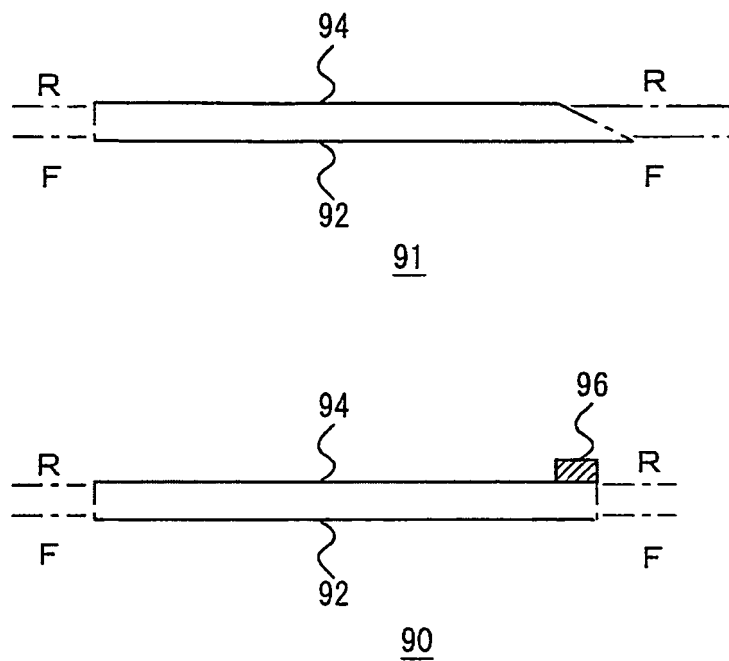
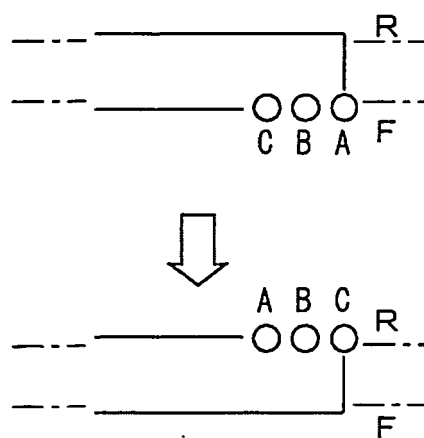


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/067436

A. CLASSIFICATION OF SUBJECT MATTER

D04B35/00 (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)

D04B35/00

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 3983764 B2 (Shima Seiki Mfg., Ltd.), 26 September 2007 (26.09.2007), entire text; all drawings (Family: none)	1-7
A	JP 4237753 B2 (Shima Seiki Mfg., Ltd.), 11 March 2009 (11.03.2009), entire text; all drawings (Family: none)	1-7
A	JP 9-78412 A (Shima Seiki Mfg., Ltd.), 25 March 1997 (25.03.1997), entire text; all drawings & US 5754431 A & EP 763615 A1	1-7

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

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Date of the actual completion of the international search
02 November, 2010 (02.11.10)Date of mailing of the international search report
16 November, 2010 (16.11.10)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2004/088022 A1 (Shima Seiki Mfg., Ltd.), 14 October 2004 (14.10.2004), entire text; all drawings & JP 4192177 B & US 2006/0179894 A1 & EP 1614787 A1 & KR 10-2005-0119150 A & CN 1768177 A	1-7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 3983764 B [0003] [0004]
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