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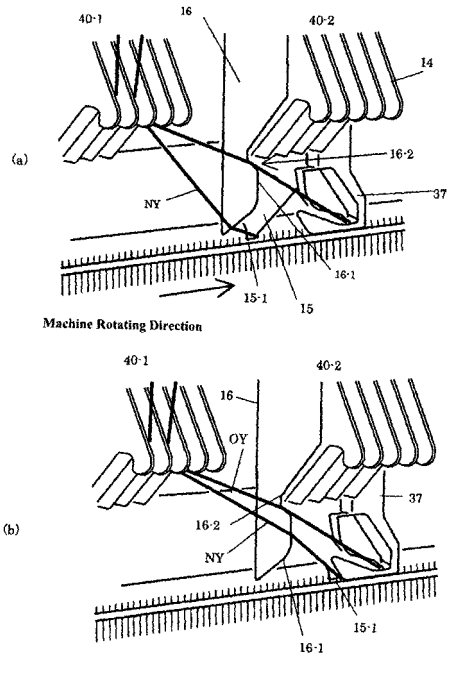
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(54) STRIPE PATTERN KNITTING DEVICE IN FEED CHANGER, AND METHOD THEREFOR

(57) [Object] To eliminate the defects of the prior art in a technique for manufacturing a fabric of a stripe pattern using a number of knitting yarns (color yarns) exceeding the number of yarn feed fingers arranged in a yarn feed changer.

[Means] The object is achieved by a stripe pattern knitting method in which a first feeder having a first yarn feed changer and a second feeder having a second yarn feed changer are used to knit one course. The first feeder performs welt needle selection. When a knitting yarn is newly fed to a knitting needle from the first yarn feed changer, the angle at which the yarn trapped by a trapper enters a yarn carrier is stably retained. After new yarns are fed to the knitting needles from the first and second yarn feed changers and formed into loops, old knitting yarns that cease to be fed are retained and cut at the same position.

FIG. 5



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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a mechanism and a method for knitting stripe patterns using a circular knitting machine equipped with a yarn feed changer capable of knitting stripe patterns.

BACKGROUND OF THE INVENTION

[0002] Typically, as described in Patent Document 1 below, in order to knit a stripe pattern using a circular knitting machine, yarns that are selectively fed by a yarn feed changer installed on the circular knitting machine are fed to knitting needles and formed into a fabric. The invention according to Patent Document 1 below is not capable of changing a number of yarns exceeding the number of fingers arranged in a yarn feed changer, whereas the invention according to Patent Document 2 is capable of doing that.

Patent Document 1: JP-A-2005-42260
Patent Document 2: JP-A-2006-16747

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0003] Patent Document 2 describes a circular knitting machine in which a engaging member 81 equipped with a clamping organ 81 a that automatically tightens yarn is allocated to a stripe patterning attachment, and an opening organ 85 is fastened on the back of a yarn guide. These components 81 a and 85 are made of spring wire.
[0004] Because of this arrangement, when this machine starts to knit a fabric, or when a hole is made on the fabric, the fabric or the end of the yarn can twine around these components, causing a major trouble to the knitting machine itself.
[0005] Furthermore, when the knitting machine is in operation, protrusions such as the aforementioned made of wire can cause an injury to the operator at work.
[0006] It is an object of the present invention to manufacture stripe pattern fabrics using a number of knitting yarns (color yarns) exceeding the number of yarn feed fingers arranged in a yarn feed changer. Other objects of the present invention are to feed a knitting yarn to a yarn carrier without fail when changing yarns, thereby preventing malfunction of the knitting machine when knitting a fabric, and to ensure the safety of the operator by eliminating protrusions.

MEANS FOR ACHIEVING THE OBJECTS

[0007] The present invention is a mechanism for knitting stripe patterns in a yarn feed changer in a circular knitting machine having yarn feed changers that change at least two knitting yarns, comprising: a first yarn feed changer established in a first feeder and having a plurality of yarn feed fingers that are selectively moved; a second yarn feed changer established in a second feeder and having a plurality of yarn feed fingers that are selectively moved; a yarn cutter and a yarn catcher for retaining and cutting an old knitting yarn that ceases to be fed after a new knitting yarn is fed to a knitting needle from the first and second yarn feed changers and formed into a loop; a yarn carrier that is established opposite the second feeder and feeds a yarn to a knitting needle; and a trapper that moves in the circumferential direction along with the rotation of the knitting machine and catches the yarn that is at the feed position and feeds the same to the knitting needle; **characterized in that** when any of the yarn feed fingers of the first yarn feed changer moves to the yarn feed position for newly feeding a yarn to the knitting needle, the newly fed yarn is caught by said trapper and pushed up to the normal angle at which it enters the yarn carrier by a yarn guide, which is established between the first and second yarn feed changers and has a retaining part, and retained by said retaining part; and the yarn cutter and a yarn catcher are established in such a way that the yarn fed from either of the first yarn feed changer and the second yarn feed changer is retained and cut at approximately the same position as it ceases to be fed and becomes an old yarn.
The present invention is also a method for knitting stripe patterns in a circular knitting machine having yarn feed changers that change at least two knitting yarns, in which a first feeder having a first yarn feed changer and a second feeder having a second yarn feed changer are used to knit one course, comprising: a step in which welt needle selection is performed by the first feeder;
a step in which, when a knitting yarn is newly fed to a knitting needle from the first yarn feed changer, the knitting yarn caught by a trapper stably retains the angle at which it enters the yarn carrier; and a step in which, after new knitting yarns are fed to the knitting needles from the first and second yarn feed changers and formed into loops, old
knitting yarns that cease to be fed are retained and cut at approximately the same position.

EFFECTS OF THE INVENTION

[0008] According to the present invention, when the manufacture of fabrics using a number of knitting yarns (color yarns) that exceeds the number of yarn feed fingers arranged in a yarn feed changer is desired using a circular knitting machine equipped with such a yarn feed changer, it is possible to manufacture stripe pattern fabrics by using two or more yarn feed changers and changing the multiple color knitting yarns. Moreover, when changing the yarns, it is possible to feed the knitting yarn to the yarn carrier without fail, thereby preventing malfunction of the knitting machine during the knitting process. According to the present invention it is also possible to en-

sure the safety of the operator by eliminating protrusions.

[0009] The present invention can be achieved, while using a circular knitting machine equipped with a conventional yarn feed changer, by simply modifying a part of the yarn feed changer. There is no need to newly install a special device.

BEST MODE OF CARRYING OUT THE INVENTION

[0010] For the yarn feed changer of the present invention, the one that is described in JP-A-2005-42260 can be used. This yarn feed changer can be used in either a double knit circular knitting machine or a single knit circular knitting machine.

[0011] In the present invention, a first feeder and a second feeder are used to knit one course. So for example, if a yarn feed changer equipped with three yarn feed fingers is used (for each feeder), it is possible to knit a multiple color stripe pattern with six color knitting yarns.

[0012] In the present invention, the first feeder performs welt needle selection. For this reason, this part of yarn carrier is removed.

[0013] In the present invention, a yarn guide is provided between the first yarn feed changer established in the first feeder and the second yarn feed changer established in the second feeder. The yarn guide is preferably provided with a guide plane and a retaining part When a knitting yarn is newly fed to a knitting needle from the first yarn feed changer, the guide plane helps the knitting yarn caught by the trapper that moves in sync with the rotation of the knitting machine to go up. The retaining part stably retains the angle at which this knitting yarn enters the yarn carrier. For the same purpose, it is preferable that said trapper has a protrusion at its lower end.

[0014] The device of the present invention is equipped with sets of yarn cutters and a yarn catcher that retain and cut old yarns that cease to be fed after new knitting yarns are fed to the knitting needles from the first and second yarn feed changers and formed into loops. Switch cams for opening and closing these have protrusions at different positions in the first yarn feed changer and the second yarn feed changer. Two kinds of cutter cams are provided, one for the first yarn feed changer and the other for the second yarn feed changer, each corresponding to the respective protrusion positions of the switch cams.

[0015] The positions of the first cutter cam for the first yarn feed changer and the second cutter cam for the second yarn feed changer are set so that after new knitting yarns are fed to the knitting needles from the first and second yarn feed changers and formed into loops, old knitting yarns that cease to be fed are retained and cut at the same position.

[0016] For this purpose, it is preferable that the distance between the first cutter cam and the second cutter cam equals the distance between each feeder, and the lower surfaces of the cutter cams have angles that correspond to the inclinations of the switch cams.

[0017] According to the present invention, knitting yarns are not knit at the first feeder that is in welt needle selection. For this reason, the knitting yarn fed from the first yarn feed changer of the first feeder is fed to the knitting needle that is in knit needle selection or tuck needle selection in the second feeder. Therefore, the position of the first cutter cam is shifted so that the (old) knitting yarn that was being fed from the first yarn feed changer is retained by the yarn catcher for the yarn feed fingers of the yarn feed changer and cut by a moving blade after a new knitting yarn passes the stitch point of the second feeder and overlaps the old knitting yarn at the yarn changing part of the fabric.

[0018] Embodiments of the present invention will now be described by reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a cross section showing a knitting head of a double knit circular knitting machine used in the present invention.

FIG. 2 is an enlarged view of the upper part of a yarn feed changer used in the present invention.

FIG. 3 is a cross section of a yarn feed changer used in the present invention.

FIG. 4 is a cross section showing a knitting head of a single knit circular knitting machine used in the present invention.

FIG. 5 shows the way knitting yarns are changed in a knitting head in which a yarn feed changer and a yarn guide used in the present invention are arranged.

FIG. 6 shows a knitting head of the present invention (a) and a conventional knitting head (b).

EXAMPLE 1

<Overview of the Knitting Head>

[0020] FIG. 1 is a cross section of the core part of a knitting head of a double knit knitting machine, in which the knitting head 31 is established above a bed 30 supported by a plurality of legs (not shown). In this drawing, code 33 refers to a needle cylinder. In the upper part of a needle groove (not shown) formed in the periphery of the needle cylinder 33, a vertically slidable cylinder needle (not shown) is housed. The cylinder needle is activated by a cam (not shown) housed in a cam holder 34 and moves up and down.

[0021] Because the machine shown in FIG. 1 is a double knit circular knitting machine, it is further equipped with a needle dial 35 and a dial cam holder 36. Along needle grooves formed on the upper surface of the needle dial 35, dial needles (not shown) are slidably housed in the horizontal direction. The dial needles are activated by cams (not shown) housed in the dial cam holder 36

and move back and forth horizontally. A yarn carrier 37 is installed on the dial cam holder 36, and this yarn carrier 37 feeds yarn to the knitting needles.

[0022] Below the needle cylinder 33 is a driving gear 38 integrally mounted thereto. The driving gear 38 rotates at the same speed as the needle cylinder 33 when driven by the driving source installed in the knitting machine.

[0023] Above the dial cam holder 36, a yarn feed changer 40 is installed.

[0024] The yarn feed changer 40 is provided with a plurality of yarn feed fingers for guiding a plurality of individual knitting yarns. The yarn feed fingers operate in two steps: first moving downwards, then retreating upwards. Moving selectively between the low position, i.e., the yarn changing position, and the high position, i.e., the normal position, the yarn feed fingers feed the knitting yarns to the knitting needles.

<Structure of the Striper (Yarn feed changer)>

[0025] Except for the improvement of the present invention, the same apparatus described in Japanese Patent Laid-Open No. 42260/2005 is basically used for the yarn feed changer 40. This striper will now be described referring to FIG. 3. Detailed description of its operation is omitted here as it is disclosed in paragraphs [0031] to [0059] of the same gazette.

[0026] At the uppermost part of the striper, an actuator 1 rotating at the same speed as the knitting machine is established. The actuator 1 has a peg 1-1 using a piezoelectric element having a number of steps equaling the total of the number of steps corresponding to the number of yarns used for one yarn feed outlet and one special step for putting all yarns into a non yarn feeding condition.

[0027] Acting in response to the movement of the peg 1-1 is a selector unit 21. The selector unit 21 is made up of a select lever 21-1, a rocking bar 21-2, a slider 21-3, a switch plate 21-4 and a switch cam 21-5.

[0028] The select lever 21-1 is engaged and pushed in when the peg 1-1 moves in response to the signal for either yarn feeding or non yarn feeding.

[0029] The rocking lever 21-2 is positioned in the same space as the select lever 21-1 and is pushed in by the select lever 21-1 to rock around an engaging part 21-2b.

[0030] The slider 21-3 is positioned in the same space as the rocking bar 21-2, engages with the rocking bar 21-2 at said engaging part 21-2b, and moves together with the rocking bar 21-2. The slider 21-3 is provided with a long hole 21-3a. Inside the long hole, a pin 21-3b is fastened, so that the slider 21-3 can move horizontally over the distance of this long hole.

[0031] The switch plate 21-4 is positioned in the same space as the slider 21-3, engages with the slider 21-3 via a joint 21-4a, and moves together with the slider 21-3.

[0032] When any switch plate 21-4 moves to the yarn feed position, the switch cam 21-5 is raised by that switch plate 21-4.

[0033] Four cams that act on the selector unit 21 are provided on a rotary ring 23 and rotate at the same speed as the knitting machine. A first cam 2 and a second cam 3 engage with a butt 21-2a and a butt 21-2b, which are at the left end and the right end of the rocking bar 21-2 respectively, and move the rocking bar 21-2 to the yarn feed position or the non yarn feed position. A third cam 4 (hereinafter referred to as "cutter cam 4") pushes in the switch cam 21-5 that is raised. A fourth cam 22 pushes down the butt 21-2a, which is at the left end of the rocking bar 21-2.

[0034] Pushed down by the cutter cam 4 ("third cam") via the switch cam 21-5 and the switch plate 21-4 are a switch lever cam 5, a first link plate 6 that is linked to the switch lever cam 5, and a second link plate 7 that is linked to the first link plate 6.

[0035] A switch lever 8 is linked to the first link plate 6 and the second link plate 7. A third link plate 9 is linked to the switch lever 8. Because the switch lever 8 is rotatable around a fulcrum 8-1, the third link plate 9 moves in the opposite direction from the second link plate 7. A long hole 24-1 provided in a housing plate 24 functions as the rotation guide.

[0036] Code 10 is a spring for returning the components moved by the cutter cam 4 ("third cam") to their original positions.

[0037] In the space other than that for the select lever 21 corresponding to the peg 1-1 in the special step for putting all yarns into a non yarn feeding condition, a fourth link plate 11 is positioned in the same space as the slider 21-3, engages with the slider 21-3 via a joint 11-1, and swings together with the slider 21-3. The fourth link plate 11 is rotatable around a fulcrum 11-2.

[0038] A fifth link plate 12, which engages with the fourth link plate 11 via a joint 11-3 and swings, and a sixth link plate 13, which engages with the fifth link plate 12 via a joint 12-2 and swings, are provided respectively. The fifth link plate 12 is rotatable around a fulcrum 12-1. Connected to the sixth link plate 13 is a finger unit 14. The finger unit 14 is made up of a fixed blade 14-1 for cutting the yarn that has been fed, a yarn catcher 14-3 for retaining the end of the yarn, a moving blade 14-2 for cutting the yarn that is retained in contact with the fixed blade 14-1, and a case 14-4 for retaining the yarn catcher 14-3 and the moving blade 14-2 while at the same time opening and closing them repeatedly.

[0039] Connected to the tip of the second link plate 7 is a first pin 19, which pushes down a protrusion 14-4a of the case 14-4 and closes the yarn catcher 14-3 and the moving blade 14-2 together with the case 14-4, thereby retaining and cutting the yarn. Connected to the tip of the third link plate 9 is a second pin 20, which pulls up a protrusion 14-4b of the case 14-4 and opens the yarn catcher 14-3 and the moving blade 14-2 together with the case 14-4, thereby releasing the retained yarn.

[0040] Other components include a trapper 15 and a yarn guide 16 such as those shown in FIG. 5. In the present invention, it is preferable to provide a protrusion 15-1 at the tip of the trapper.

[0041] The trapper 15 moves in the circumferential direction along with the rotation of the knitting machine, catches the yarn at the yarn feed position, and feeds the yarn to the knitting needle without fail.

[0042] The yarn guide 16 separates a plurality of yarns and stabilizes their positions. The yarn guide 16 used in this example is a long and narrow plate provided with an indentation and a protrusion on the side facing the outside of the knitting machine. As shown in FIG. 5, the indentation and protrusion includes a guide plane 16-1 made up of an upward slope and an elevated part, and a retaining part 16-2, which is an indentation provided above said guide plane.

<The Changing Mechanism and the Method of the Present Invention>

[0043] FIG 6 (b) shows how yarns are changed in a conventional changing method. In this drawing, yarn feed changers 40 each having three yarn feed fingers 14 are installed on a first feeder F1 and a second feeder F2 respectively. FIG. 6 (a), on the other hand, shows how yarns are changed using the changing method of the present invention. As in the prior art, yarn feed changers 40-1 and 40-2 are installed on a first feeder F1 and a second feeder F2 respectively. Between the first yarn feed changer 40-1 and the second yarn feed changer 40-2, however, is a yarn guide 16, while the yarn carrier for the first feeder is removed to allow welt needle selection, making this method different from that of the prior art.

[0044] As shown in FIG. 6 (a), the knitting yarn that is fed from the first yarn feed changer 40-1, is fed to the second feeder F2 without being knit at the first feeder F1, which is in welt needle selection. For this reason, when a newly fed knitting yarn reaches position A, the yarn is not changed satisfactorily at the normal position at which the cutter operates because timing is too early. It should be arranged so that yarn change takes place when a newly fed knitting yarn reaches position B.

[0045] The opening and closing motions of the yarn cutter 14-1, 4-2 and the yarn catcher 14-3 are effected by the actions of the switch cams 21-5 and the cutter cams 4. In the present invention, the positions of the protrusions of the switch cams 21-5 for opening and closing these are different in the first yarn feed changer 40-1 and the second yarn feed changer 40-2. Also, two kinds of cutter cams 4-- cutter cam 4-1 and cutter cam 4-2--are provided for the first yarn feed changer 40-1 and the second yarn feed changer 40-2, corresponding to each protruding position of the switch cams 21-5. In the present invention, the arrangement of the two kinds of switch cams, 21-5a and 21-5b, and two kinds of cutter cams, 4-1 and 4-2, is important.

[0046] As shown in FIG. 2 (a) and (b), the first switch cam 21-5a and the second switch cam 21-5b are arranged in the upper parts of the first and second yarn feed changers 40-1 and 40-2.

[0047] FIGs. 2 (d) and (e) are arrow views of FIGs. 2 (a) and (c) respectively, showing the arrangement of the cutter cams 4-1, 4-2 and the standard cutter cam 4. The arrows in FIGs. 2 (d) and (e) indicate the rotational directions of the circular knitting machine. The distance between the first cutter cam 4-1 and the second cutter cam 4-2 in FIG. 2 (a) is the distance between each feeder, which is the same as the distance between A and B in FIG. 6 (a) or the distance between X and X in FIG. 6 (b). The first cutter cam 4-1 and the second cutter cam 4-2 are mounted on the knitting machine in such a way that the distance between them is adjustable. The lower surfaces of the cutter cams 4-1 and 4-2 have angles that correspond to the inclinations of the switch cams 21-5a and 21-5b.

[0048] After a new knitting yarn is formed into a loop at the second feeder F2 (after the new and old yarns overlap at the switch part), the knitting yarn that was fed from either of the first and second yarn feed changers 40-1 and 40-2, i.e., old yarn, is retained and cut at position B in FIG. 6 (a).

[0049] At this time, the yarn needs to be carried to the innermost part of the yarn carrier groove by the trapper 15, but the feeding angle of the yarn in the first feeder F1 is too shallow with respect to the yarn carrier 37 of the second feeder F2, so it is hard for the yarn to reach the innermost recess. In the present invention, as described in the following paragraphs, this problem is solved by changing the shapes of the trapper 15 and the yarn guide 16.

[0050] FIG. 5 (a) shows how a knitting yarn fed from the first yarn feed changer 40-1 to the yarn carrier 37 is changed. When a selectively moved yarn feed finger 14 of the yarn feed changer is moved to the yarn feed position where the yarn is fed to a knitting needle (in other words, after the yarn feed finger 14 moved from the normal position to the yarn changing position), a tip of the trapper 15 rotating at the same speed as the knitting machine catches the knitting yarn retained by the yarn catcher 14-3. The newly fed knitting yarn NY, caught by the trapper 15, is located between the first yarn feed changer 40-1 and the second yarn feed changer 40-2 and passes under the bottom of the yarn guide 16.

[0051] Furthermore, as shown in FIG 5 (b), as the trapper 15 moves, the knitting yarn rises along the upward sloping guide plane 16-1 of the yarn guide 16, at a point approximately at the middle between the yarn feed changer and the yarn carrier 37, until it reaches the concave retaining part 16-2. At this time, the end of the knitting yarn NY caught by the protrusion 15-1 of the trapper 15 is caught by the hook of the knitting needle after being led by the yarn carrier 37. After that, the end of the yarn held by the yarn catcher 14-3 is released as the yarn catcher 14-3 opens. At the same time, the old yarn OY that was being knit is retained and cut, allowing the knitting yarn to enter the opening of the yarn catcher 14-3, and as shown in FIG. 2, the cutter cams 4-1 and 4-2, moving at the same speed as the knitting machine in the circumferential direction, push down the switch cams

21-5a and 21-5b, thereby closing the yarn catcher 14-3 and the moving blade 14-2 via link parts 6, 7, 8 and 9.

[0052] The present invention can be carried out in a conventional circular knitting machine by modifying part of it, and it is also possible to revert the machine of the present invention to a conventional machine.

[0053] To revert the machine of the present invention to a conventional machine such as that shown in FIG. 6 (b), the standard cutter cam 4 (See FIG. 2 (c)) is arranged so that it acts on the first switch cam 21-5a and the second switch cam 21-5b at the same timing when the knitting yarn reaches position X shown in FIG. 6 (b). The standard cutter cam 4 is desirably designed wide enough so that it acts on the protrusions of both the first switch cam 21-5a and the second switch cam 21-5b. Although FIG. 2 (c) shows both the first switch cam 21-5a and the second switch cam 21-5b for convenience, in fact, the first switch cam 21-5a is built into the first yarn feed changer 40-1 and the second switch cam 21-5b is built into the second yarn feed changer 40-2.

EXAMPLE 2

<Single Knit Machine>

[0054] The stripe pattern knitting apparatus of the present invention can also be installed on a single knit machine.

[0055] FIG. 4 is a cross section of the core part of a knitting head of a single knit machine, in which the knitting head 32A is established above a bed 31A supported by a plurality of legs (not shown). In this drawing, code 33A refers to a needle cylinder. Housed in a needle groove (not shown) formed in the periphery of the needle cylinder 33A is a vertically slidable cylinder needle (not shown).

[0056] Because the machine shown in FIG. 4 is a single knit machine, it is further equipped with a sinker dial 41 and a sinker cap 42. A sinker 43, which cooperates with the cylinder needle (not shown), is provided so that it is radially slidable on the sinker dial 41, which is arranged horizontally. The sinker 43 is controlled by a sinker cam 44, which is attached to the sinker cap 42.

[0057] The sinker cap 42 is supported by an annular sinker cap ring 45, which is supported by an intermediate ring 47 via a support 46.

[0058] Above the sinker cap ring 45 a yarn carrier holder 48 for mounting a yarn carrier 37A that feeds yarn to the knitting needle is established and attached to a yarn carrier ring 47.

[0059] Below the needle cylinder 33A is a driving gear 38A integrally attached thereto. The driving gear 38A rotates at the same speed as the needle cylinder 33A when driven by the driving source installed in the circular knitting machine.

[0060] Above the sinker cap 42, a yarn feed changer 40A is installed.

[0061] The yarn feed changer 40A is provided with a plurality of yarn feed fingers 14A for guiding a plurality of individual knitting yarns. The yarn feed fingers operate in two steps: first moving downwards, then retreating upwards. Moving selectively between the low position, i.e., the yarn changing position, and the high position, i.e., the normal position, the yarn feed fingers feed the knitting yarns to the knitting needles.

[0062] Because the structure and the operation of the yarn feed changer 40A of Example 2 are about the same as those of the yarn feed changer 40 (40-1, 40-2) of Example 1, the explanation thereof is omitted here.

Claims

1. In a circular knitting machine having yarn feed changers (40, 40A) that change at least two knitting yarns, a mechanism for knitting stripe patterns in a yarn feed changer comprising: a first yarn feed changer (40-1) established in a first feeder (F1) and having a plurality of yarn feed fingers (14) that are selectively moved;
a second yarn feed changer (40-2) established in a second feeder (F2) and having a plurality of yarn feed fingers (14) that are selectively moved;
yarn cutters (14-1), 14-2) and a yarn catcher (14-3) for retaining and cutting an old knitting yarn that ceases to be fed after a new knitting yarn is fed to a knitting needle from the first and second yarn feed changers (40-1, 40-2) and formed into a loop;
a yarn carrier (37) that is established opposite the second feeder (F2) and feeds a yarn to a knitting needle; and
a trapper (15) that moves in the circumferential direction along with the rotation of the knitting machine and catches the yarn that is at the feed position and feeds the same to the knitting needle; **characterized in that** when any of the yarn feed fingers (14) of the first yarn feed changer (40-1) moves to the yarn feed position for newly feeding a yarn to the knitting needle, the newly fed yarn is caught by said trapper (15) and pushed up to the normal angle at which it enters the yarn carrier (37) by a yarn guide (16), which is established between the first and second yarn feed changers (40-1, 40-2), and retained; and
the yarn cutter (14-1, 14-2) and the yarn catcher (14-3) are established in such a way that the yarn fed from either of the first yarn feed changer and the second yarn feed changer is retained and cut at approximately the same position as it ceases to be fed and becomes an old yarn.

2. A mechanism described in Claim 1, in which the yarn guide (16) has a guide plane (16-1) that helps the knitting yarn caught by the trapper (15) that moves in sync with the rotation of the knitting machine to go up when a knitting yarn is newly fed to a knitting needle from the first yarn feed changer (40-1).

3. A mechanism described in Claim 1 or 2, in which the yarn guide (16) has a retaining part (16-2) that stably retains the angle at which the knitting yarn caught by the trapper (15) that moves in sync with the rotation of the knitting machine enters the yarn carrier (37) when a knitting yarn is newly fed to a knitting needle from the first yarn feed changer (40-1).

4. A mechanism described in any of Claims 1 to 3, in which the switch cams for opening and closing the yarn cutters (14-2) and the yarn catcher (14-3) have protrusions at different positions in the first yarn feed changer (40-1) and the second yarn feed changer (40-2), and two kinds of cutter cams (4-1, 4-2) are provided, one for the first yarn feed changer and the other for the second yarn feed changer, each corresponding to the respective protrusion positions of the switch cams (21-5a, 21-1b).

5. A mechanism described in Claim 4, in which the positions of the first cutter cam (4-1) for the first yarn feed changer and the second cutter cam (4-2) for the second yarn feed changer are set so that after new knitting yarns are fed to the knitting needles from the first and second yarn feed changers (40-1, 40-2) and formed into loops, old knitting yarns that cease to be fed are retained and cut at the same position.

6. A mechanism described in Claim 4 or 5, in which the distance between the first cutter cam (4-1) and the second cutter cam (4-2) equals the distance between each feeder, and the lower surfaces of the cutter cams (4-1, 4-2) have angles that correspond to the inclinations of the switch cams (21-5a, 21-5b).

7. A mechanism described in any of Claims 1 to 6, in which the trapper (15) has a protrusion (15-1) at its lower end.

8. A method for knitting stripe patterns in a circular knitting machine having yarn feed changers that change at least two knitting yarns, in which a first feeder (F1) having a first yarn feed changer (40-1) and a second feeder (F2) having a second yarn feed changer (40-2) are used to knit one course, comprising:

a step in which welt needle selection is performed by the first feeder (F1):
a step in which, when a knitting yarn is newly fed to a knitting needle from the first yarn feed changer (40-1), the knitting yarn caught by a trapper (15) stably retains the angle at which it enters the yarn carrier (37); and
a step in which, after new knitting yarns are fed to the knitting needles from the first and second yarn feed changers (40-1, 40-2) and formed into loops, old knitting yarns that cease to be fed are retained and cut at approximately the same position.

9. A method described in Claim 8, in which the knitting yarn that was being fed from the first yarn feed changer (40-1) is retained by a yarn catcher (14-3) for yarn feed fingers of the yarn feed changer and cut by cutters (14-1, 14-2) after a new knitting yarn passes the stitch point of the second feeder and overlaps the old knitting yarn at the yarn changing part of the fabric.

FIG. 1

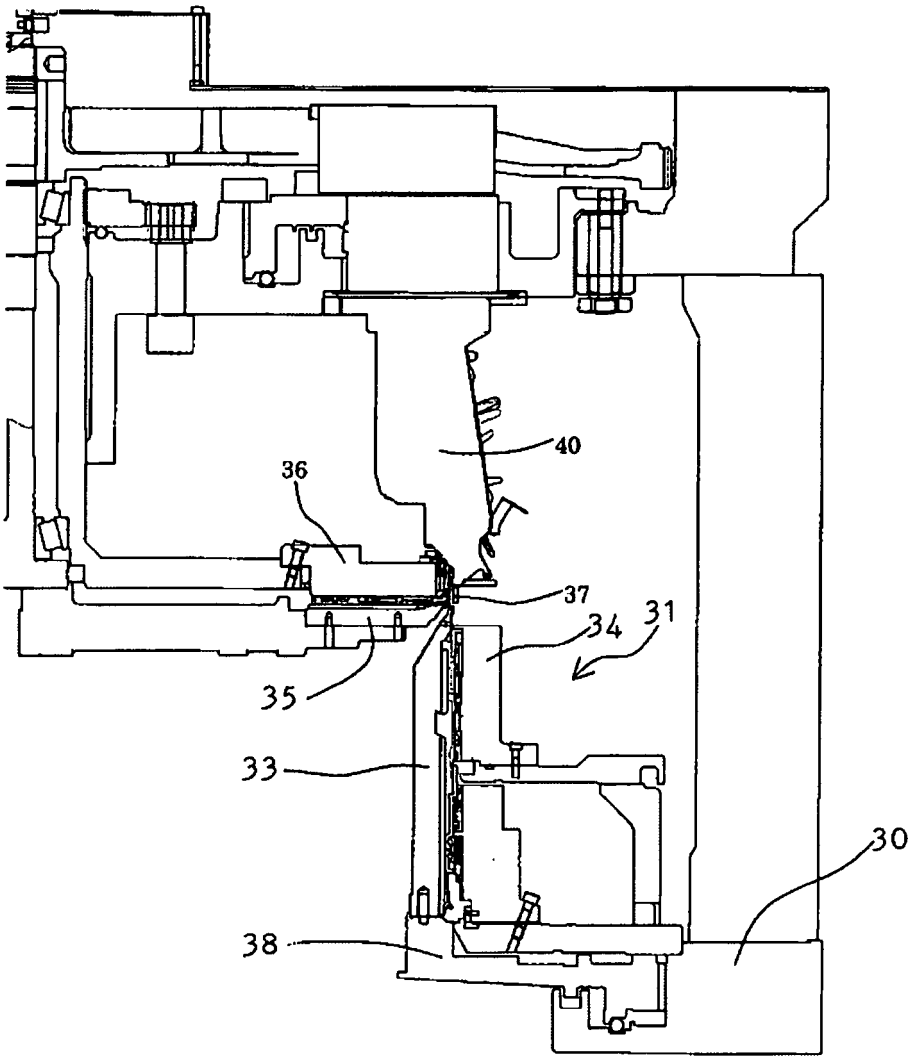


FIG. 2

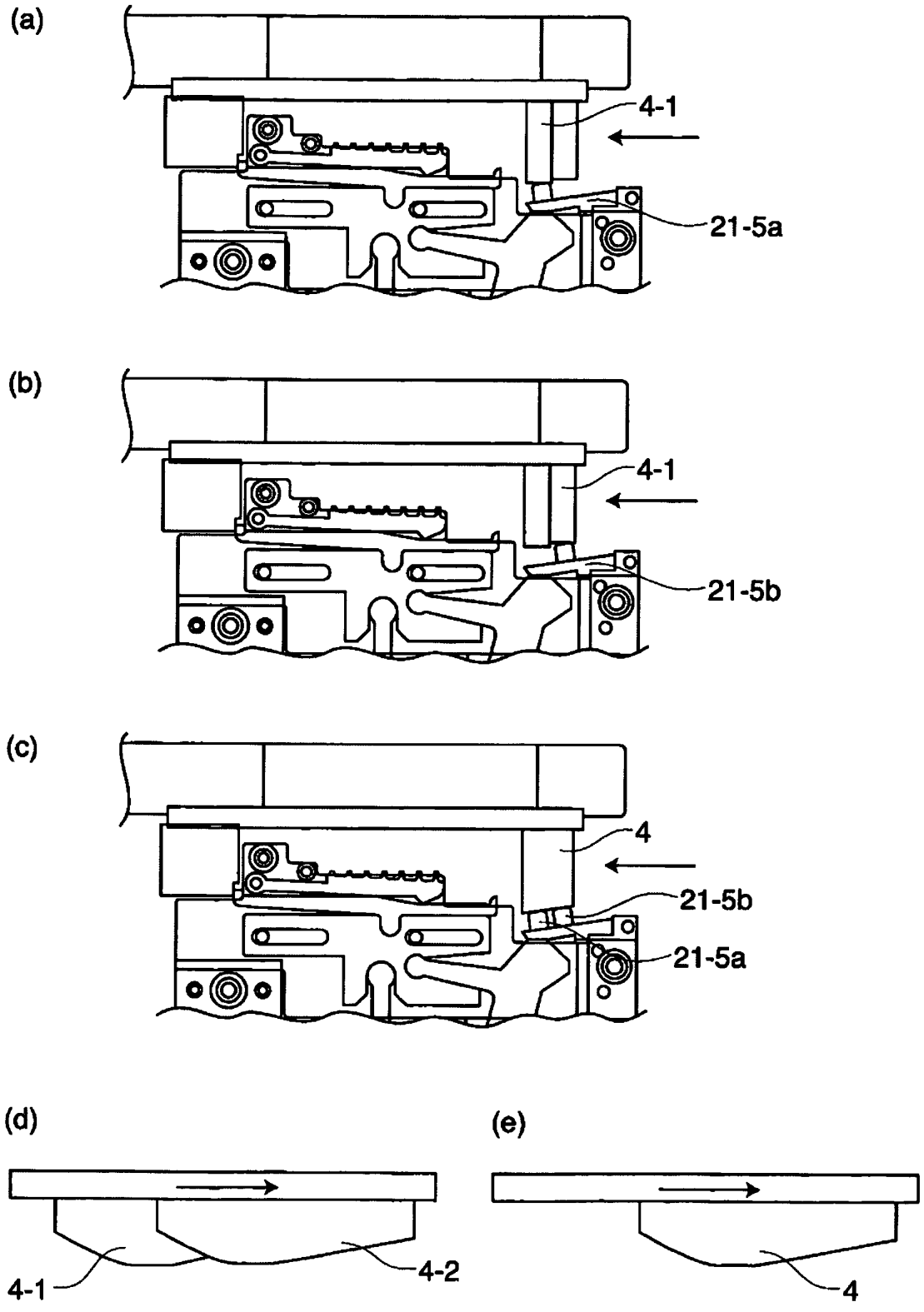


FIG. 3

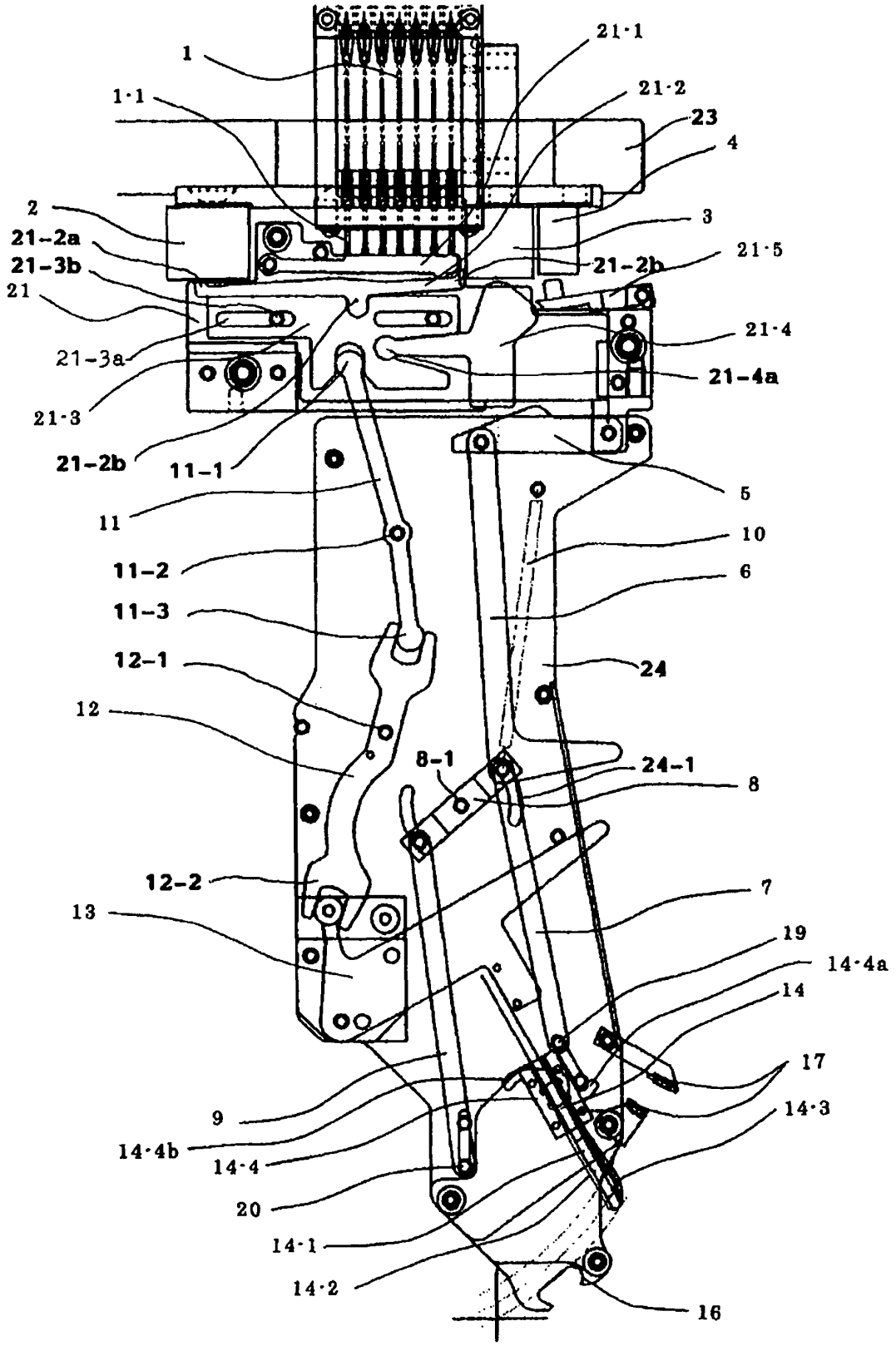

1
1-1
21-1
21-2
23
4
2
3
21-2a
21-3b
21-2b
21-5
21
21-4
21-3a
21-4a
21-3
21-2b
11-1
5
11
10
11-2
6
11-3
12-1
24
12
8-1
24-1
8
12-2
7
13
19
14-4a
14
17
9
14-3
14-4b
14-4
20
14-1
14-2
16

FIG. 4

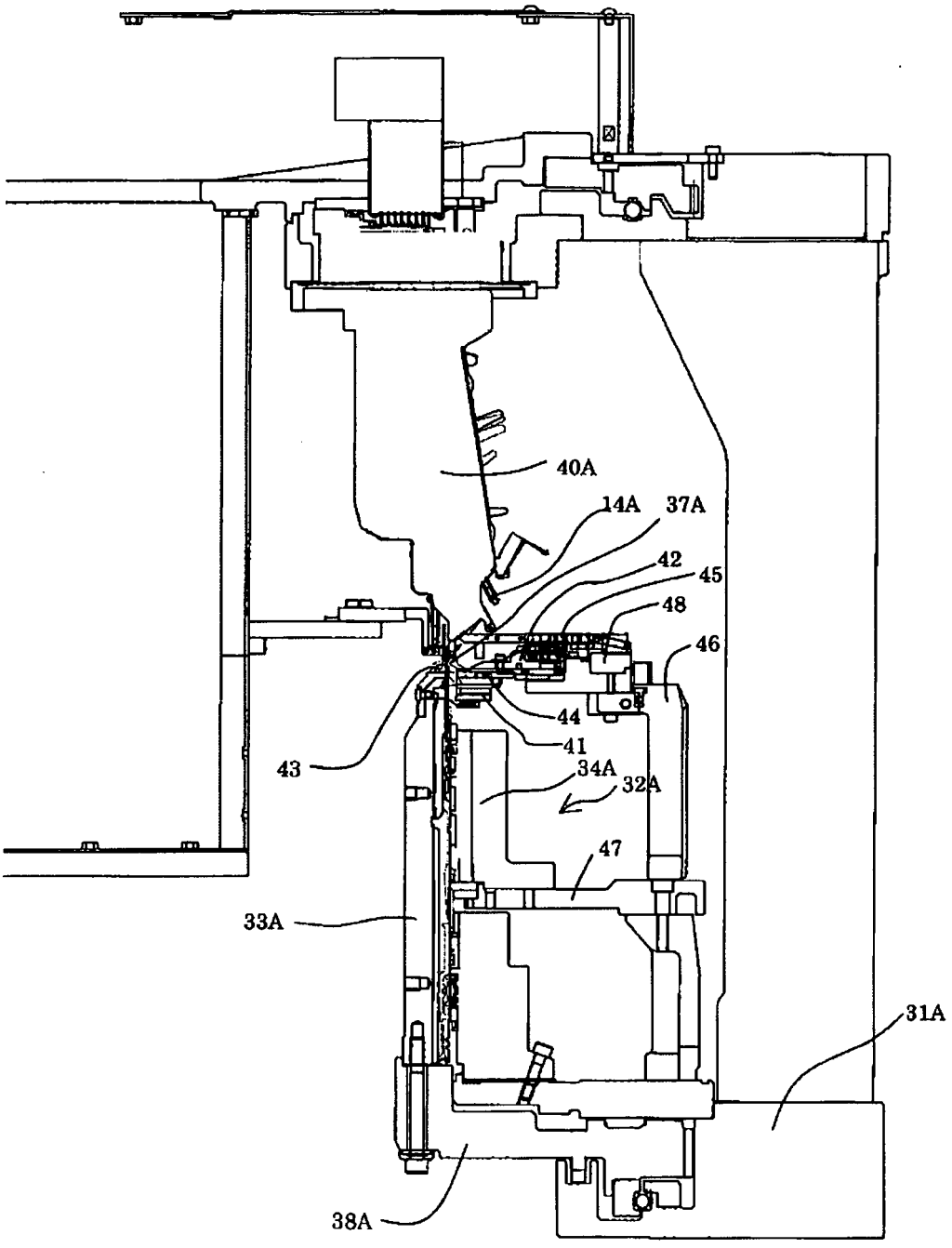
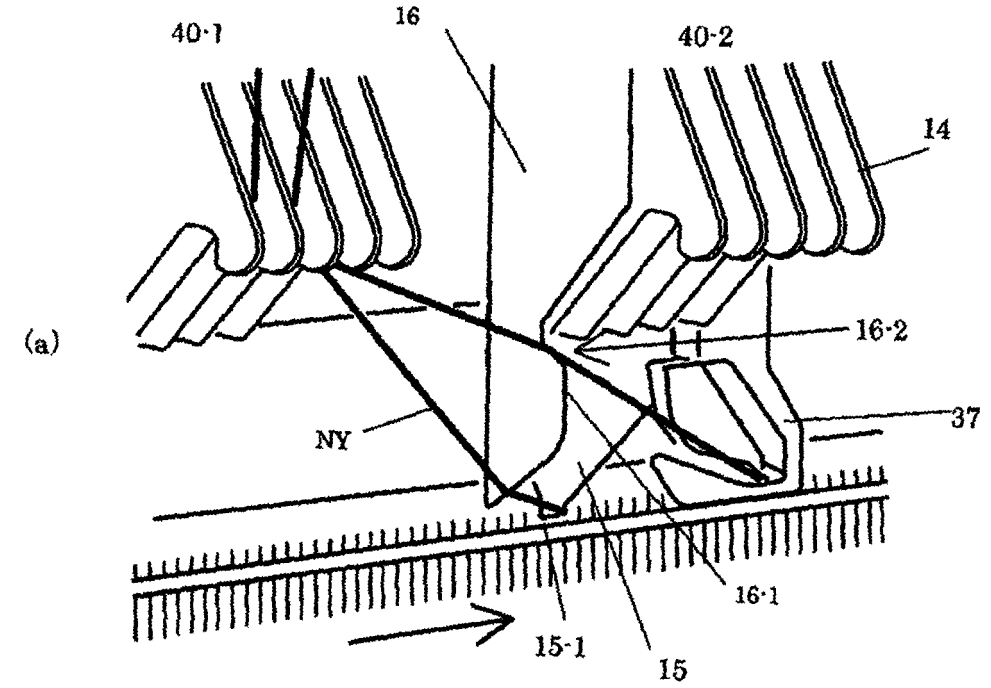


FIG. 5


(a)
40-1
16
40-2
14
16-2
37
NY
16-1
15-1
15
Machine Rotating Direction

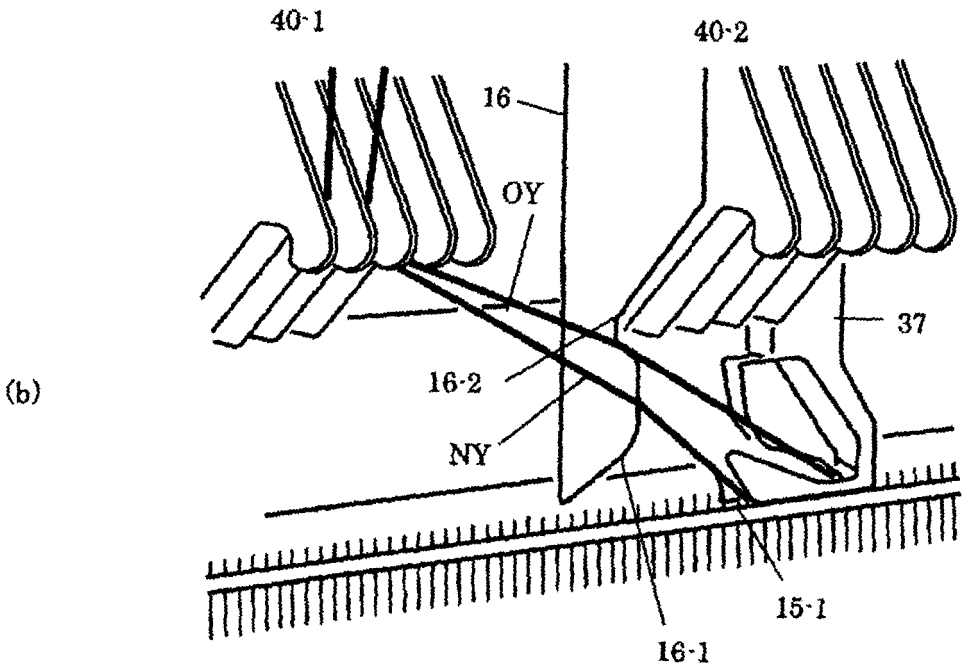
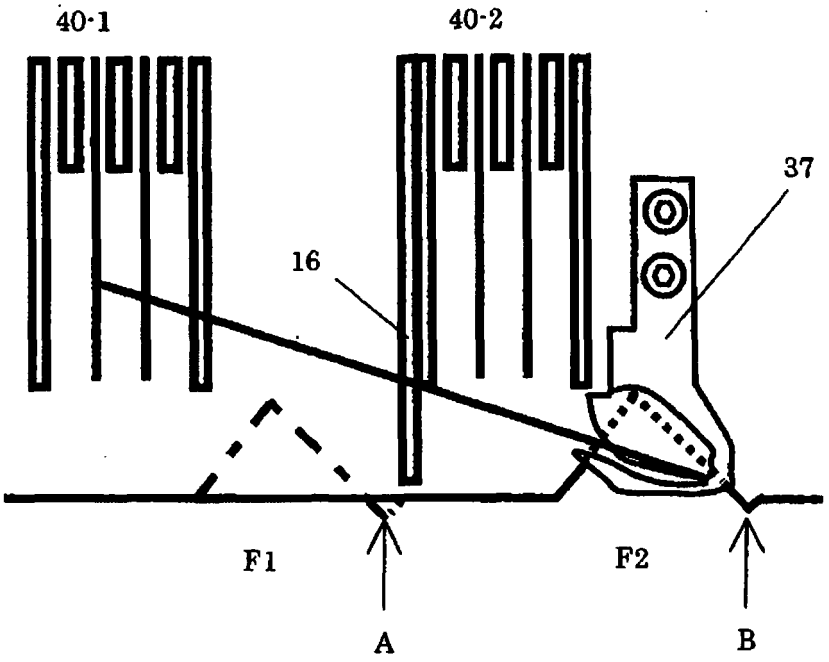
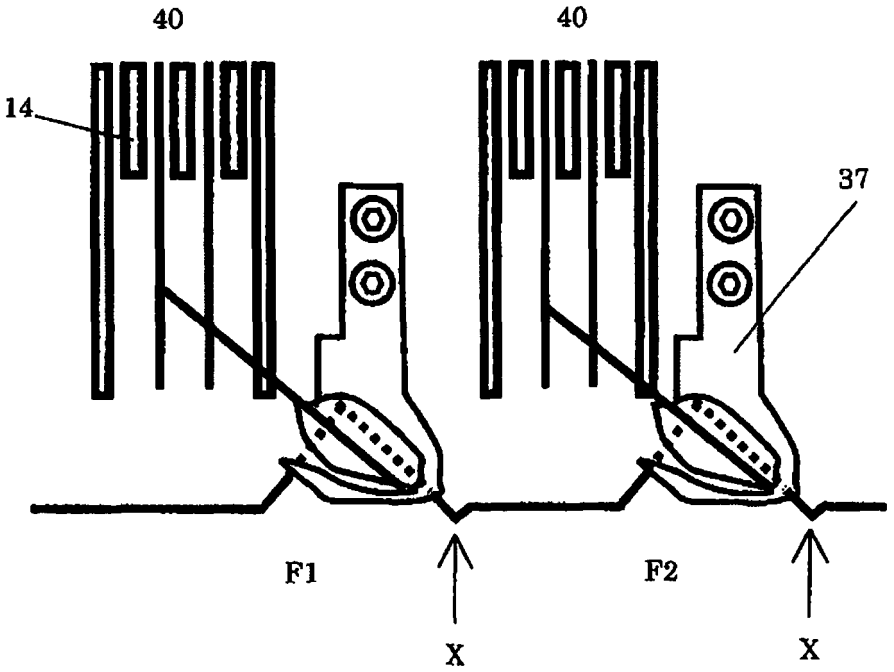

(b)
40-1
40-2
16
OY
37
16-2
NY
15-1
16-1

FIG. 6

(a)



(b)



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/001114

A. CLASSIFICATION OF SUBJECT MATTER
D04B15/60(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)
D04B9/30-9/32, 15/58-15/60

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 1996-2008
Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008

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.
X A	JP 2006-16747 A (SIPRA Patententwicklungs-und Beteilungsgesellschaft mbH), 19 January, 2006 (19.01.06), & US 2006/0010928 A1 & EP 1612311 A1 & DE 102004032270 A & KR 10-2006-0048536 A & CN 1721602 A	8,9 1-7
A	JP 2005-42260 A (Precision Fukuhara Works, Ltd.), 17 February, 2005 (17.02.05), & DE 102004033655 A & CN 1576425 A	1-9

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 July, 2008 (02.07.08)	15 July, 2008 (15.07.08)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

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Patent documents cited in the description

- JP 2005042260 A **[0002] [0010] [0025]**
- JP 2006016747 A **[0002]**