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(54) **CAM DEVICE FOR TRANSFER RECEIVING NEEDLE**

NOCKENVORRICHTUNG FÜR TRANSFERAUFNAHMENADEL

DISPOSITIF DE CAME POUR AIGUILLE DE RÉCEPTION DE TRANSFERT

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Description

Technical Field

[0001] The present invention relates to a cam device for a transfer receiving needle mounted to a carriage that runs back and forth along a needle bed of a flatbed knitting machine and that drives a transfer receiving needle, and in particular to a cam device according to the preamble of claim 1 and as known from patent citation 1.

Background Art

[0002] Hitherto, in a flatbed knitting machine which has needle beds on both sides that holds a needle bed gap in-between, by selectively driving a large number of knitting needles equipped to each needle bed for knitting stitches and at the same time, by using stitch transfer between needle beds, knitted fabrics of a wide variety of structures have been able to be knitted. In each needle bed, needle grooves are installed side by side for housing the knitting needle capable of slide displacement in the direction for moving to and from the needle bed gap. From a knitting needle housed in each needle groove, a butt protrudes to the surface of the needle bed, a cam device mounted to a carriage that runs back and forth along the direction in which needle grooves are arranged works on the butt and knitting needles are driven. In the cam device mounted to the carriage, together with knitting motion of knitted stitches, stitch transfer motion is also enabled, to achieve downsizing (for example, see patent citation 1 and patent citation 2).

[0003] Fig. 4 shows a structure of a knitting needle 1 that can make stitch transfer motion together with knitting motion. The knitting needle 1 is a latch needle and is equipped with a hook 3 that latches a knitted stitch and a latch 4 that opens and closes the hook 3 to the needle body 2 on the head end side that fronts on the needle bed gap. To the needle body 2, a needle jack 5 is linked on the base end side, and to one side, a stitch transfer piece 6 is added. Incidentally, in the following description, the front and the back are shown with the direction in which the needle advances to the needle bed gap designated as the front and the direction in which the needle retracts from the needle bed gap designated as the back. In addition, the round mark shows the wire installed to the needle bed in such a manner as to pass through the needle groove.

[0004] On the needle jack 5, the rear butt 7 and the front butt 8 are installed with space provided. The needle jack 5 is generally in an arc shape, is energized in such a manner that the tail end comes in contact with the bottom of the needle groove and the intermediate portion is lifted up from the needle groove elastically. With the needle jack 5 lifted up, the rear butt 7 has the upper end side protruded from the needle groove and is subject to the motion of the cam device mounted to the carriage. The front butt 8 has the upper end side constantly protruded from the needle groove. Floating and sinking of the needle jack 5 in the needle groove is changed over by the state for the pressing state of the select jack 9 against the selection butt 10. The pressing state of the selection butt 10 is varied in accordance with a presser disposed on the trajectory of the select jack 9 which is changed over the selector 11. To the selector 11, together with a lowering butt 12 for retraction and a raising butt 13 for advance, a needle selection butt 14 is installed. The needle selection butt 14 is installed selectively to one of a plurality of locations in such a manner that the location of the needle selection butt 14 is different from that of the adjacent knitting needle 1.

[0005] Fig. 5 shows a structure of a principal portion of a cam device 20 that works on the rear butt 7 and the front butt 8 of the knitting needle 1 and makes them perform knitting motion and stitch transfer motion with the carriage running direction set as the lateral direction. The cam device 20 is able to make the knitting needle 1 perform the equivalent motion whether the running direction is right or left, and one or a plurality of cam devices is mounted to the surface of the bottom board on the side in which the carriage faces on the needle bed. In the event that the plural cam devices 20 are mounted, they are aligned in the lateral direction of the figure. To one cam device 20, a transfer cam for both sending and receiving 21, a fixed raising cam 22, and movable raising cam 23 are mounted at the center portion, and stitch cams 24 are mounted on both sides in the running direction. The transfer cam for both sending and receiving 21 and movable raising cam 23 are movable type cams that rise and sink from the surface of the carriage bottom board, the movable raising cam 23 and the transfer cam for both sending and receiving 21 are changed over, respectively, in such a manner that the movable raising cam protrudes in the knitting motion and the transfer cam for both sending and receiving 21 protrudes in the stitch transfer motion. One cam protrudes, and then the other cam sinks.

[0006] At the center portion of the fixed raising cam 22, a cam device for a transfer receiving needle 26 that has a recess 25 nearly as high as that of the carriage bottom board surface is formed. In the cam device for the transfer receiving needle 26, a chevron shaped full-height cam 27 is included, which has the height from the carriage bottom board surface equivalent to that of the fixed raising cam 22. On both sides of the top portion of the full-height cam 27, half-height cams 28 whose height from the bottom board surface is shorter than that of the full-height cam 27 are installed. From the vicinity of the carriage bottom board surface to the half-height cam 28, a slope 29 is formed and the height continuously changes. This kind of cam device for the transfer receiving needle 26 works on the rear butt 7 of the knitting needle 1 and forces the rear butt 7 to perform stitch transfer motion on the receiving needle side.

[0007] The stitch transfer cam for both sending and receiving 21 works on the front butt 8 of the knitting needle

1 under the protruded state, and at the front edge 21a, forces the stitch transfer needle side to perform the forward motion and on the rear edge 21b, forces the stitch receiving needle side to perform retracting motion. The motions of stitch transfer needle and the stitch receiving needle are changed over in accordance with the trajectory in which the selection butt 10 of the select jack 9 passes. At the front edge 21a of the transfer cam for both sending and receiving 21, a fixed guide cam 30 is installed to force the stitch transfer needle side to perform retract motion.

[0008] In the needle selecting motion for the selector 11 in the needle selection mechanism whose illustration is omitted, the selection butt 10 is changed over to any of the A-position 10a where the butt advances, the H-position 10h where the butt is located at the intermediate, or B-position 10b, where the butt is at the base. At the A-position 10a, no presser is disposed. At the H-position 10h, a tuck presser 31 and a half presser 32 are disposed. The tuck presser 31 and the half presser 32 are movable type pressers that can control rise and sink. At the B-position 10b, the fixed presser 33 is disposed. At the time of stitch transfer, the tuck presser 31 is allowed to sink and the half presser 32 is held protruded.

[0009] When the knitting needle 1 is chosen for the A-position 10a at the time of stitch transfer, for example, when the carriage runs to the left, the rear butt 7 is guided to pass the trajectory 7a that advances along the cam face 22a on the side of the fixed raising cam 22. When the rear butt 7 advances to reach the top of the cam face 22a of the fixed raising cam 22, the front butt 8 reaches the base portion of the front edge 21a of the transfer cam for both sending and receiving 21, the knitting needle 1 further advances through the trajectory 8a and performs motion as a stitch transfer needle. Because the movable raising cam 23 is in the sunken state, the trajectory 7a of the rear butt 7 can pass the position of the movable raising cam 23. The knitted stitch locked to a hook 3 of the knitting needle 1, which serves as a transfer sending needle, retracts to the position of the stitch transfer piece 6 along the needle shank in accordance with the advance of the needle body 2 to the needle bed gap. In the event that the knitting needle 1 that serves as a receiving needle advances from the opposing needle bed to the needle bed gap, the hook 3 of the receiving needle enters into the stitch transfer piece 6 of the transfer sending needle, and the transfer sending needle retracts from the needle bed gap, the knitted stitch is able to be transferred to the hook 3 of the receiving needle.

[0010] Fig. 6 shows a structure of an enlarged vicinity portion of the cam device for the transfer receiving needle 26 and side structure 26a as viewed from front. Referring to Fig. 5 and Fig. 6, when the knitting needle 1 is selected to the H-position 10h, the selection butt 10 is pressurized by the half presser 32, and therefore, the trajectory 7h of the rear butt 7 passes the cam face 22a on the side of the fixed raising cam 22, passes the slope 29, and reaches to the surface of the half-height cam 28 whose height from the bottom board 35 is H. The rear end of the rear butt 7 comes in contact with the cam face 27a on the front edge of the full-height cam 27, whose height from the bottom board 35 is F, on the surface of the half-height cam 28. The rear butt 7 advances in the trajectory 7h along the slope of the cam face 27a and reaches the top of the chevron shaped full-height cam 27. In the vicinity of the top of the full-height cam 27, any half-height cam 28 is not installed, and therefore, the rear butt 7 advances from the surface of the half-height cam 28 to the recess 25, and the rear end of the rear butt 7 comes in contact with the cam face 28a of the front edge of the half-height cam 28, and advances as to pass trajectory 7h. As shown as the trajectory 8h of the front butt 8 when the knitting needle 1 serves as a receiving needle, the retracting motion as a receiving needle is performed when the front end of the front butt 8 is guided by the rear edge 21b of the stitch transfer cam for both sending and receiving 21. Incidentally, to the fixed raising cam 22, no recess 25 is provided and the cam face 28a of the half height cam 28 may be formed up to the bottom board 35.

Patent Citation 1: Japanese Examined Patent Application Publication No. Sho 62-37142

Patent Citation 2: International Publication No. 07/074944 Pamphlet

Disclosure of the Invention

Technical Problem

[0011] As shown as the side structure 26a of Fig. 6, in the receiving needle, on the preceding side, with the upper end of the rear butt 7 being brought in contact with the surface of the half height cam 28, the rear end of the rear butt 7 is guided by the cam face 27a of the full-height cam 27. The front edge of the full-height cam 27 approximately has a chevron shape, and the cam face 27a formed in the front edge has the center portion tilted as to protrude forwards, and the receiving needle therefore advances. The route of the rear butt 7 along the trajectory 7h has the height from the bottom board 35 varied stepwise from the surface of the half-height cam 28 to the bottom surface of the recess 25 in the vicinity of the top of the full-height cam 27 and a level difference D is generated. In the event that the rear butt 7 passes the portion of the level difference D, since the pressing force to the top end of the rear butt 7 is released, the needle jack 5 therefore is lifted up inside the needle groove by the elastic force, and the rear butt 7 further protrudes from the needle groove surface. The rear butt 7 enters into the recess 25 and then protrudes until the head end comes closer to the surface of the bottom board 35 surface rather than to the surface of the half-height cam 28. After protruding inside the recess 25, the rear butt 7 advances with the rear end guided by the cam face 28a of the half-height cam 28. This kind of level difference D is provided in such a manner that the rear butt 7 passes the surface

at the half-height cam 28 on the preceding side and is guided by the cam face 28a of the front edge at the half-height cam 28 on the following side when the carriage runs both back and forth ways. However, since the level difference D is provided inside the full height F, hanging margins 27b, 28b of the rear butt 7 with respect to the cam faces 27a, 28a are decreased. When the hanging margins 27b, 28b are small, the cam faces 27a, 28a are susceptible to fatigue or possibly cause damage or seizure because the force exerted on the rear butt 7 is concentrated to generate excessive stress.

[0012] In particular, where the carriage running speed is increased in order to increase the productivity, the rear end of the rear butt 7 comes in contact with the cam face 28a of the half-height cam 28 before the protrusion based on the elastic force of the needle jack 5 does not satisfactorily take place at the portion of the level difference D, and the practical hanging margin is still more reduced. In addition, the protrusion of the rear butt 7 may not take place in time, and the rear butt 7 may deviate from the original trajectory 7h, possibly overrides the cam face 28a, and may pass the cam face.

[0013] It is an object of the present invention to-provide a cam device for a transfer receiving needle, which enables a rear butt to smoothly pass a level difference portion, sufficiently secures a hanging margin at a cam face after the rear butt passes, and can perform a reliable guidance.

Technical Solution

[0014] The present invention relates to a cam device for a transfer receiving needle,
mounted to a bottom board of a carriage which runs back and forth along needle beds of a flatbed knitting machine, as part of a knitting cam device including an approximately chevron shaped raising cam, having a cam surface of a full-height from the carriage bottom board on an outside front edge, for knitting needles which are provided in parallel on the needle bed and have two butts spaced in front-rear direction respectively, to advance them in the front of the needle bed gap and to retreat in the rear of the needle bed gap, under the action of the cam surface to the rear butt so as to make the knitting needle to do knitting motion and to do transfer sending motion, and disposed inside the raising cam, for working on the rear butt to be guided by the fun-height cam face as the upper end of the rear butt coming in contact with a half-height surface, to make the knitting needle to do transfer receiving motion, comprising:

an intermediate cam, having a chevron shape its front end becomes a cam face and comes in contact with the rear edge of the rear butt to advance. and a height as high as that of the raising cam;
a pair of transfer receiving cams, disposed on both side of the vicinity of the top part of the intermediate cam, having a cam face formed on the front edge side, and having a base end and an idle end, the idle end side rises and sinks with respect to the bottom board by a swing displacement around a swing shaft parallel to the surface of the bottom board on the base end side, and on the idle end side, a surface becomes as high as that of the surface of the raising cam when the idle side protrudes from the bottom board, and slopes linked to the surface are provided; and
a spring mounted to each transfer receiving cam respectively, and energizing in such a manner that the idle end side of each transfer receiving cam is brought into the protruded state with respect to the bottom board ;
wherein on the rear surface of the raising cam, provided with a recess having a bottom surface, and support elongated holes to house and to support the swing shafts in a state capable of swing displacement provided at intervals in the running direction,
the transfer receiving cam provided with a contact surface to come in contact with the bottom surface of the recess of the raising cam in a protruded state, the contact surface disposed on the surface side from an intermediate section between the base end and the idle end to the idle end side.

[0015] In this invention, said support elongated holes (42d) are formed so as to the base end side and the idle end side of said transfer receiving cam (46) are disposed along the running direction of said carriage.

Advantageous Effects

[0016] According to the present invention, a pair of transfer receiving cams are mounted separately on one side and on the other side in the carriage running direction. The transfer receiving cam that serves as the preceding side sinks when the surface is pressurized by the rear butt, and therefore, the rear butt is allowed to advance by a chevron-shaped intermediate cam, and a level difference is decreased or cancelled at the portion in which the state is shifted to that guided by the cam face of the transfer receiving cam on the following side where the protruded state is maintained by a spring energizing, and the rear butt is able to be smoothly passed. According to the present invention, a hanging margin on the cam face of the transfer receiving cam on the following side that comes in contact with the rear end of the rear butt and drives is sufficiently secured and reliable guidance is able to be performed. Rising and sinking of the transfer receiving cam are performed by the spring energizing and pressurization by the rear butt after the butt passes, and the mechanism is able to be simplified and is able to be compactly installed on the carriage bottom board. The transfer receiving cam has a contact surface from an intermediate section between the base end and the idle end to the idle end side and the contact surface comes in contact with the bottom surface of the recess

of the raising cam in a protruded state, so that the protruded state is able to be restricted not to protrude too high.

[0017] In addition, according to the present invention, the transfer receiving cam, because the base end an idle en transfer receiving cam are disposed along the running direction of the carriage, securely supports the base end side, and the idle end side is able to be reliably raised and sunk by a swing displacement.

[0018] In addition, according to the present invention, the transfer receiving cam on the preceding side is pressurized by the passage of the rear butt from the base end side which is supported in a state capable of a swing displacement even if the rear butt is protruded before it first passes, and the rear butt is able to be definitely sunk before the rear butt passes the idle end side.

Brief Description of Drawings

[0019]

[Fig. 1] Fig. 1 is a plan view and a side view showing a schematic structure of a cam device for a transfer receiving needle 40 as one embodiment of the present invention;

[Fig. 2] Fig. 2 is a plan view, front view, and right side view of the left side transfer receiving cam 46 of Fig. 1;

[Fig. 3] Fig. 3 is a plan view, side cross-sectional view and back view of the fixed raising cam 42 of Fig. 1;

[Fig. 4] Fig. 4 is a side view showing a structure of a conventional knitting needle 1 which can carry out stitch transfer motion together with knitting motion;

[Fig. 5] Fig. 5 is a plan view showing a structure of a essential part of a conventional cam device 20 which works on the rear butt 7 and the front butt 8 of the knitting needle 1 to carry out knitting motion and stitch transfer motion;

[Fig. 6] Fig. 6 is a plan view and a side view showing a schematic structure of the cam device 20 for the transfer receiving needle of Fig. 5.

Explanation of Reference

[0020]

1. Knitting needle
7. Rear butt
8. Front butt
40. Cam device for a transfer receiving needle
42. Fixed raising cam
42a, 42b. Cam face
42c. Intermediate cam
42d. Support elongated hole
46. Transfer receiving needle cam
46a. Cam face
46b. Swing shaft
46c. Surface
46d, 46e. Slope
46f. Spring-receiving hole
47. Compression spring

Best Mode for Carrying Out the Invention

[0021] Fig. 1 shows a schematic structure of a cam device for a transfer receiving needle 40 as one embodiment of the present invention. The cam device for the transfer receiving needle 40 is substituted for the cam device for the transfer receiving needle 26 shown in Fig. 5 and Fig. 6 and is able to be used in the cam device 20 of Fig. 5 and is able to drive the knitting needle 1 as shown in Fig. 4. In Fig. 1, same as Fig. 6, the structure of the main part of the cam device for the transfer receiving needle 40 is shown in correspondence to the side structure 40a as viewed from the front.

[0022] The cam device for the transfer receiving needle 40 is assembled into inside of a fixed raising cam 42 mounted on the carriage bottom board 35. To the front edge of the outside of the fixed raising cam 42, a cam face 42a is installed. To the portion in the vicinity of the center of the fixed raising cam 42, there formed is an intermediate cam 42c whose front edge serves as a cam face 42b and has a chevron shape, and comes in contact with the rear end of the rear butt 7 and advances the rear butt 7. On both sides of the vicinity of the top part of the intermediate cam 42c, one pair of transfer receiving cams 46 are disposed. The transfer receiving cam 46 has a cam face 46a formed on the front edge side, swing shaft 46b on the base end side fitted to support elongated hole 42d formed on the rear side of fixed raising cam 42, and the idle end side is supported in a state capable of swing in which the idle side rises and sinks with respect to the bottom board 35 around the swing shaft 46b parallel to the surface of the bottom board 35. On the idle end side of the transfer receiving cam 46, surface 46c which becomes as high as that of the surface of the fixed raising cam 42 when the cam protrudes from the bottom board 35 of the carriage by a swing displacement, is provided as well as slopes 46d, 46e linked to the surface 46c. In a spring receiving hole 46f formed on the rear side of the idle end side of the transfer receiving cam 46 to which the surface 46c and the slope 46d are installed, a compression spring 47 is inserted between the bottom board 35 of the carriage and energizes in such a manner that the idle end side protrudes from the bottom board 35. Incidentally, to the bottom board 35, a recess 35a which houses the transfer receiving cam 46 is formed.

[0023] At the time of stitch transfer, for example, if the carriage runs to the left, the rear butt 7 of the knitting needle 1 which serves as a receiving needle moves relative to the cam device for the transfer receiving needle 40 as shown as a trajectory 7H. For the left-side transfer receiving cam 46 which becomes on the preceding side, the front end of the upper end of the rear butt 7 hangs on the slope 46d and the rear end of the rear butt 7 is

driven to advance by the guidance at the cam face 42b of the front edge of the intermediate cam 42c. Incidentally, the position where the rear butt 7 hangs on the transfer receiving cam 46 may become ahead from the position shown in the figure. In this event, the rear butt 7 comes close to the cam face 42b not from the slope 46d but in the passage that passes from the slope 46e to the surface 46c. By the advance of the rear butt 7, slopes 46d, 46e are pressed in opposition to the energizing force of the compression spring 47, and the idle end side of the transfer receiving cam 46 is sunk and the upper end of the rear butt 7 comes in contact with the surface 46c of the transfer receiving cam 46. In the vicinity of the top portion of the intermediate cam 42c, the surface 46c of the transfer receiving cam 46 is pressurized by the upper end of the rear butt 7 and sinks on the carriage bottom board 35 side. When the rear butt 7 moves to the idle end side of the transfer receiving cam 46 on the following side, the rear butt 7 advances from the cam face 46a and the upper end faces on the bottom board 35. Since the surface 46c on the idle end side of the transfer receiving cam 46 on the preceding side sinks, the level difference may be decreased or cancelled when the rear butt 7 passes the vicinity of the top portion of the intermediate cam 42c. Since the level difference becomes small, even when the carriage runs at a high speed, smooth passage is enabled.

[0024] Furthermore, when the rear butt 7 passes the top portion of the intermediate cam 42c as the rear butt 7 runs along the trajectory 7H, the rear end of the rear butt 7 comes in contact with the cam face 46a of the right-side transfer receiving cam 46 and is guided by the cam face 46a. The right-side transfer receiving cam 46 which serves as the following side has the idle end side protruded from the bottom board 35 by energizing of the compression spring 47. The height of the cam face 46a from the bottom board 35 becomes equivalent to the height of the surface of the fixed raising cam 42, that is, the height of the cam face 42b formed on the front edge of the intermediate cam 42c. Since the level difference during the period when the rear butt 7 moves from the cam face 42b of the intermediate cam 42c to the cam face 46a of the transfer receiving cam 46 on the following side is reduced, even when the carriage runs at high speed, the rear butt is allowed to smoothly move.

[0025] Fig. 2 shows the shape of the left-side transfer receiving cam 46 of Fig. 1 as viewed from the plane, front, and right surface side. The right-side transfer receiving cam 46 also has a similar shape basically symmetrical. On the rear surface side on the idle end side of the transfer receiving cam 46, a spring receiving hole 46f which houses the head end of the compression spring 47 is provided, and at the head end, a flat contact surface 46g that comes in contact with the bottom surface of the recess 35a of the bottom board 35 is provided in the sunk state shown in the left side of Fig. 1. On the surface side of the transfer receiving cam 46, from the intermediate section to the idle end side, a flat contact surface 46h is also provided, in the protruded state with respect to the rear surface side of the fixed raising cam 22. The contact surface 46g tilts against the contact surface 46h as to come in contact with the bottom surface of the flat recess 35a when the contact surface 46g sinks on the bottom board 35 side by swing displacement.

[0026] Fig. 3 shows the shape of the fixed raising cam 42 of Fig. 1 as viewed from the plane, side cross-section, and back surface. On the upper side the planar shape, and on the lower side the back surface shape are shown, respectively. The side cross-sectional view at the middle is shown in the state as viewed from cutting-plane line C-C shown in the planar shape. The fixed raising cam 42 is approximately in the form of plates and the cam face 42a on the outside and the cam face 42b of the intermediate cam 42c have the equivalent height. On the rear surface side, support elongated holes 42d that house and supports in a state capable of swing displacement the swing shaft 46b on the base end side of the transfer receiving cam 46 are provided at intervals in the running direction. In addition, when the transfer receiving cam 46 is in the protruded state, a recess 42e that has the bottom surface which comes in contact with the contact surface 46h, is installed on the rear surface side of the fixed raising cam 42.

[0027] Of the pair of the transfer receiving cams 46, the transfer receiving cam 46 on the preceding side is protruded from the bottom board 85 by energizing of the compression spring 47 before the rear butt 7 passes for the first time. By the passage of the rear butt 7 from the base end side where the swing shaft 46b is supported in a state capable of swing displacement by the support elongated hole 42d, first of all, the slope 46d is subject to pressurization and swing displacement and the idle end side sinks on the bottom board 35 side. Furthermore, at the upper end of the rear butt 7, the surface 46c is pressurized and is definitely sunk when the rear butt 7 passes on the idle end side of the transfer receiving cam 46. By supporting the swing shaft 46b which serves as the base end side of the pair of transfer receiving cams 46 at intervals in the carriage running direction and bringing the idle end side close to each other, changeover from the state of pressurizing the preceding side by the rear butt 7 to the state in which the rear butt 7 comes in contact with the cam face 46a on the following side in the protruded state and is guided is able to take place smoothly.

[0028] Incidentally, the intermediate cam 42c is installed to part of the fixed raising cam 42, but the cam corresponding to the intermediate cam 42c may be installed independently from the fixed raising cam 42. Furthermore, in the transfer receiving cam 46, the base end side and the idle end side are disposed in the running direction, but even if they are disposed in the direction that intersects with the running direction, adjusting the directions of slopes 46d, 46e and the like can make the idle end side rise and sink in the state nearly equivalent to that of the transfer receiving cam 46. Furthermore, for

example, a cam corresponding to the half-height cam 28 shown in Fig 5 and Fig. 6 may be translated in the height direction from the bottom board 35 of the carriage not in the-swing displacement but in the elevate displacement, and may be allowed to rise and sink.

Claims

1. A cam device for a transfer receiving needle (40), which is mounted to a bottom board of a carriage which runs back and forth along needle beds of a flatbed knitting machine, as part of a knitting cam device including an approximately chevron shaped raising cam (42), having a cam surface (42a, 42b) of a full-height from the carriage bottom board on an outside front edge, for knitting needles (1), which are provided in parallel on the needle bed and have two butts (7, 8) spaced in a front-rear direction respectively, to advance them in the front of the needle bed gap and to retreat in the rear of the needle bed gap, under the action of the cam surface (42a, 42b) on the rear butt (7) so as to make the knitting needle (1) to do knitting motion and to do transfer sending motion, and
is disposed inside the raising cam (42), for working on the rear butt (7) which is to be guided by the full-height cam face (42b) as the upper end of the rear butt (7) comes in contact with a half height surface, to make the knitting needle (1) to do transfer receiving motion, comprising:

an intermediate cam (42c), having a chevron shape whose front end serves as a cam face and comes in contact with the rear edge of the rear butt (7) to advance it, having a height as high as that of the raising cam (42);
a pair of transfer receiving cams (46), disposed on both side of the vicinity of the top part of the intermediate cam (42c), having a cam face (46a) formed on the front edge side, and having a base end side and an idle end side, whereby the idle end siderises and sinks with respect to the bottom board (35) by a swing displacement around a swing shaft (46b) parallel to the surface of the bottom board (35) on the base end side, and whereby on the idle end side, a surface (46c) becomes as high as that of the surface of the raising cam (42) when the cam protrudes from the bottom board (35), and slopes (46d, 46e) linked to the surface (46c) are provided; and
a spring (47) mounted to each transfer receiving cam (46) respectively, and energizing in such a manner that the idle end side of each transfer receiving cam (46) is brought into the protruded state with respect to the bottom board (35);
wherein the rear surface of the raising cam (42) is provided with a recess (42e) having a bottom surface, and support elongated holes (42d) to house and to support the swing shafts (46b) in a state capable of swing displacement provided at intervals in the running direction,
and the transfer receiving cam (46) is provided with a contact surface (46h) to come in contact with the bottom surface of the recess (42e) of the raising cam (42) in a protrudes state, the contact surface (46h) being disposed on the surface side of an intermediate section between the base end and the idle end to the idle end side.

2. The cam device for the transfer receiving needle (40) according to claim 1, wherein said support elongated holes (42d) are formed so as to the base end side and the idle end side of said transfer receiving cam (46) are disposed along the running direction of said carriage.

Patentansprüche

1. Schloss für eine Umhänge-Empfangsnadel (40), die an einer unteren Platte eines Schlittens, der entlang von Nadelbetten einer Flachbettstrickmaschine hin und her läuft, als ein Teil eines Strickschlosses, das eine annähernd winkelförmigen Hub-Schlossteil (42) enthält, der eine Schlossteil-Fläche (42a, 42b) mit einer vollen Höhe von der unteren Platte des Schlittens an einer äußeren, vorderen Kante aufweist, für Stricknadeln (1), die parallel auf dem Nadelbett vorgesehen sind und zwei jeweils in einer Vorne-Hinten-Richtung beabstandete Zapfen (7, 8) aufweisen, montiert ist, um diese vor dem Nadelbettabstand vorzuschieben und hinter dem Nadelbettabstand zurückzuziehen, indem die Schlossteil-Fläche (42a, 42b) an dem hinteren Zapfen (7) wirkt, sodass die Stricknadel (1) zu einer Strickbewegung und zu einer Umhänge-Sendebewegung veranlasst wird, und
die in dem Hub-Schlossteil (42) angeordnet ist, um an dem hinteren Zapfen (7) zu wirken, der durch die Schlossteil-Fläche (42b) mit einer vollen Höhe zu führen ist, wenn das obere Ende des hinteren Zapfens (7) in Kontakt mit einer Fläche mit einer halben Höhe kommt, damit die Stricknadel (1) die Umhänge-Empfangsbewegung vollzieht, umfassend:

ein Zwischen-Schlossteil (42c) das eine Winkelform aufweist, deren vorderes Ende als eine Schlossteil-Fläche dient und in Kontakt mit der hinteren Kante des hinteren Zapfens (7) kommt, um diesen vorzuschieben, und eine Höhe gleich derjenigen des Hub-Schlossteil (42) aufweist,
ein Paar von Umhänge-Empfangs-Schlossteil (46), die auf beiden Seiten in Nachbarschaft zu dem oberen Teil des Zwischen-Schlossteils (42c) angeordnet sind, eine Schlossteil-Fläche

(46a) auf der Seite der vorderen Kante aufweisen und weiterhin eine Basisendseite und eine freie Endseite aufweisen, wobei die freie Endseite in Bezug auf die untere Platte (35) steigt und sinkt, indem sie eine Schwenkbewegung um eine Schwenkwelle (46b) parallel zu der Fläche der unteren Platte (35) auf der Basisendseite vollzieht, und wobei auf der freien Endseite eine Fläche (46c), die gleich hoch wie die Fläche des Hub-Schlossteils (42) wird, wenn das Schlossteil von der unteren Platte (35) vorsteht, und mit der Fläche (46c) verbundene Schrägen (46d, 46e) vorgesehen sind, und

eine Feder (47), die an jedem Umhänge-Empfangs-Schlossteil (46) montiert ist und eine derartige Vorspannung vorsieht, dass die freie Endseite jedes Umhänge-Empfangs-Schlossteils (46) zu dem vorstehenden Zustand in Bezug auf die untere Platte (35) gebracht wird,

wobei die Rückfläche des Hub-Schlossteils (42) mit einer Vertiefung (42e), die eine untere Fläche aufweist, und mit länglichen Haltelöchern (42d) zum Aufnehmen und Haften der Schwenkwellen (46b) in einem für eine Schwenkbewegung fähigen Zustand an Intervallen in der Laufrichtung versehen ist, und

das Umhänge-Empfangs-Schlossteil (46) mit einer Kontaktfläche (46h) für einen Kontakt mit der unteren Fläche der Vertiefung (42e) des sich in einem vorstehenden Zustand befindlichen Hub-Schlossteil (42) versehen ist, wobei die Kontaktfläche (46h) auf der Flächenseite eines Zwischenabschnitts zwischen dem Basisende und dem freien Ende zu der freien Endseite hin angeordnet ist.

2. Schloss für eine Umhänge-Empfangsnadel (40) nach Anspruch 1, wobei die länglichen Haltelöcher (42d) derart ausgebildet sind, dass die Basisendseite und die freie Endseite des Umhänge-Empfangs-Schlossteil (46) entlang der Laufrichtung des Schlittens angeordnet sind.

Revendications

1. Dispositif de cames pour une aiguille de réception de transfert (40),

qui est monté sur une de plaque de fond d'un chariot qui se déplace en va-et-vient le long de fontures d'une machine à tricoter à plat, en tant que partie d'un dispositif de cames de tricotage comprenant une came d'élévation approximativement en forme de chevron (42), ayant une surface de came (42a, 42b) et une pleine hauteur par rapport à la plaque de fond du chariot sur un bord avant extérieur, pour des aiguilles à tricoter (1) qui sont prévues parallèles sur la fonture et comportent deux talons (7, 8) espacés dans la direction avant-arrière respectivement, pour les faire avancer vers l'avant de l'intervalle entre fontures et pour les faire reculer vers l'arrière de l'intervalle entre fontures, sous l'action de la surface de came (42a, 42b) sur le talon arrière (7) de façon à faire en sorte que l'aiguille à tricoter (1) réalise un mouvement de tricotage et réalise un mouvement d'envoi de transfert, et

qui est disposé à l'intérieur de la came d'élévation (42), pour travailler sur le talon arrière (7) qui doit être guidé par la face de came à pleine hauteur (42b) lorsque l'extrémité supérieure du talon arrière (7) vient en contact avec une surface à demi hauteur, pour faire en sorte que l'aiguille à tricoter (1) réalise un mouvement de réception de transfert, comprenant :

une came intermédiaire (42c), ayant une forme de chevron dont l'extrémité avant sert de face de came et vient en contact avec le bord arrière du talon arrière (7) pour le faire avancer, et ayant une hauteur aussi élevée que celle de la came d'élévation (42) ;

une paire de cames de réception de transfert (46), disposées sur les deux côtés du voisinage de la partie supérieure de la came intermédiaire (42c), ayant une face de came (46a) formée sur le côté du bord avant, et ayant un côté d'extrémité de base et un côté d'extrémité de repos, d'où il résulte que le côté d'extrémité de repos s'élève et s'abaisse par rapport à la plaque de fond (35) par un déplacement oscillant autour d'un arbre d'oscillation (46b) parallèle à la surface de la plaque de fond (35) sur le côté de l'extrémité de base, et d'où il résulte que sur le côté d'extrémité de repos, une surface (46c) vient à la même hauteur que la surface de la came d'élévation (42) lorsque la came sort de la plaque de fond (35), et suit la pente (46d, 46e) reliée à la surface (46c) ; et

un ressort (47) monté sur chaque came de réception de transfert (46) respectivement, et agissant de telle sorte que le côté d'extrémité de repos de chaque came de réception de transfert (46) est amené dans l'état saillant par rapport à la plaque de fond (35) ;

dans lequel la surface arrière de la came d'élévation (42) est munie d'une cavité (42e) ayant une surface de fond, et supporte des trous allongés (42d) pour abriter et supporter les arbres d'oscillation (46b) dans un état apte à un déplacement oscillant prévu à un certain intervalle dans la direction de déplacement,

et la came de réception de transfert (46) est munie d'une surface de contact (46h) pour venir en contact avec la surface de fond de la cavité (42e) de la came d'élévation (42) dans un état saillant, la surface de contact (46h) étant disposée sur

le côté de la surface d'une section intermédiaire entre l'extrémité de base et l'extrémité de repos jusqu'au côté d'extrémité de repos.

2. Dispositif de cames pour l'aiguille de réception de transfert (40) selon la revendication 1, dans lequel les trous de support allongés (42d) sont formés de façon à ce que le côté d'extrémité de base et le côté d'extrémité de repos de la came de réception de transfert (46) soit disposés suivant la direction de déplacement du chariot.

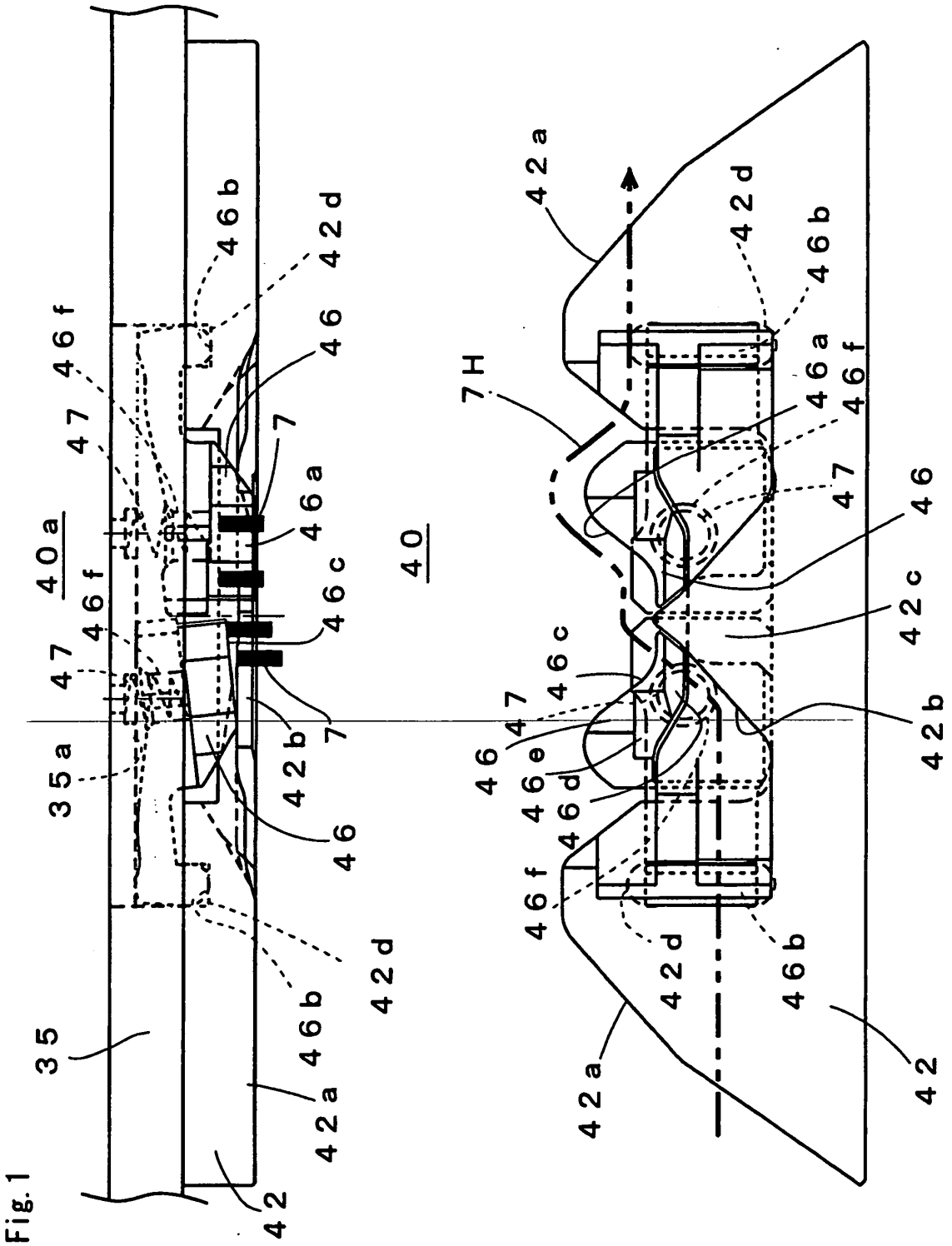

Fig. 1

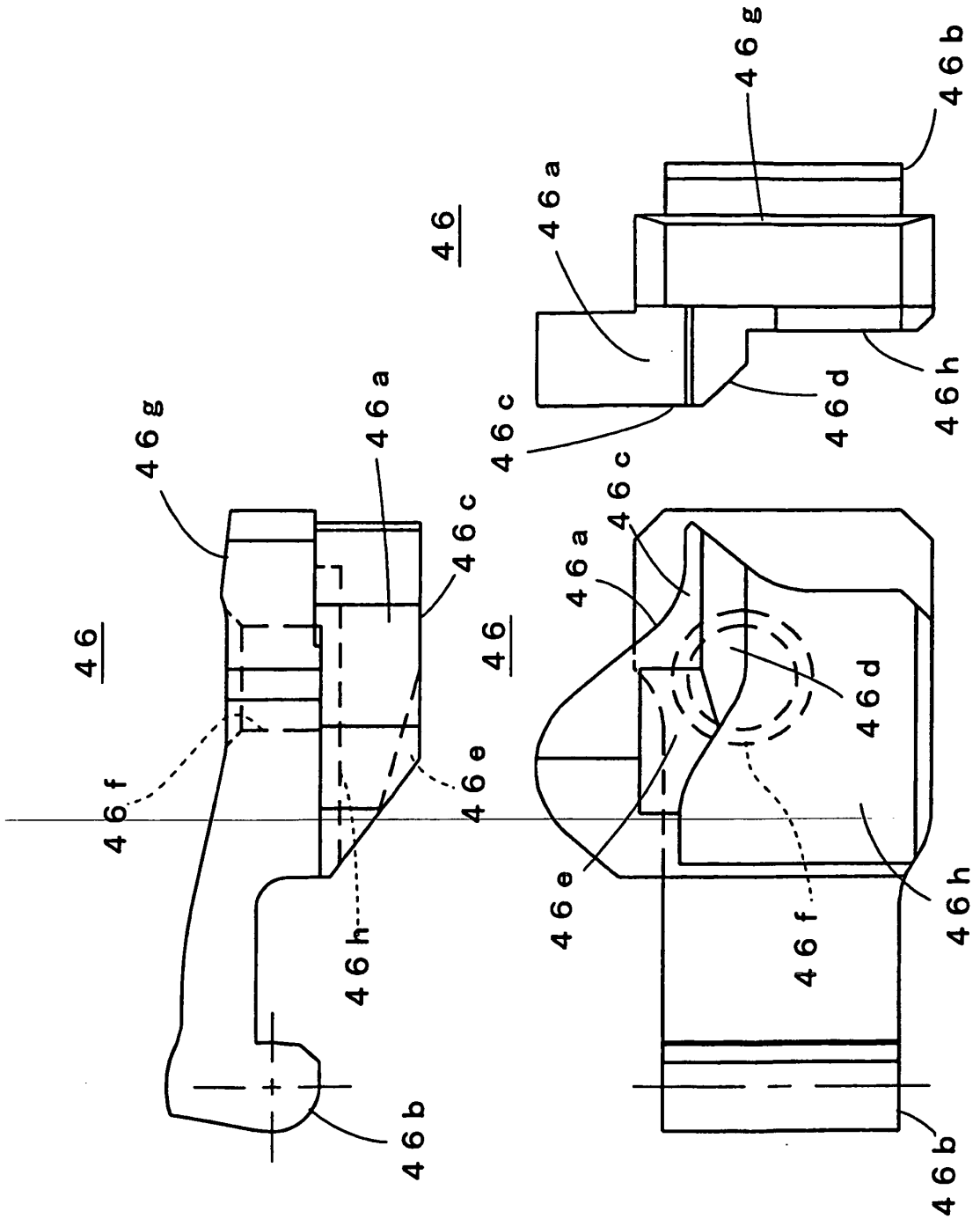
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Fig.2

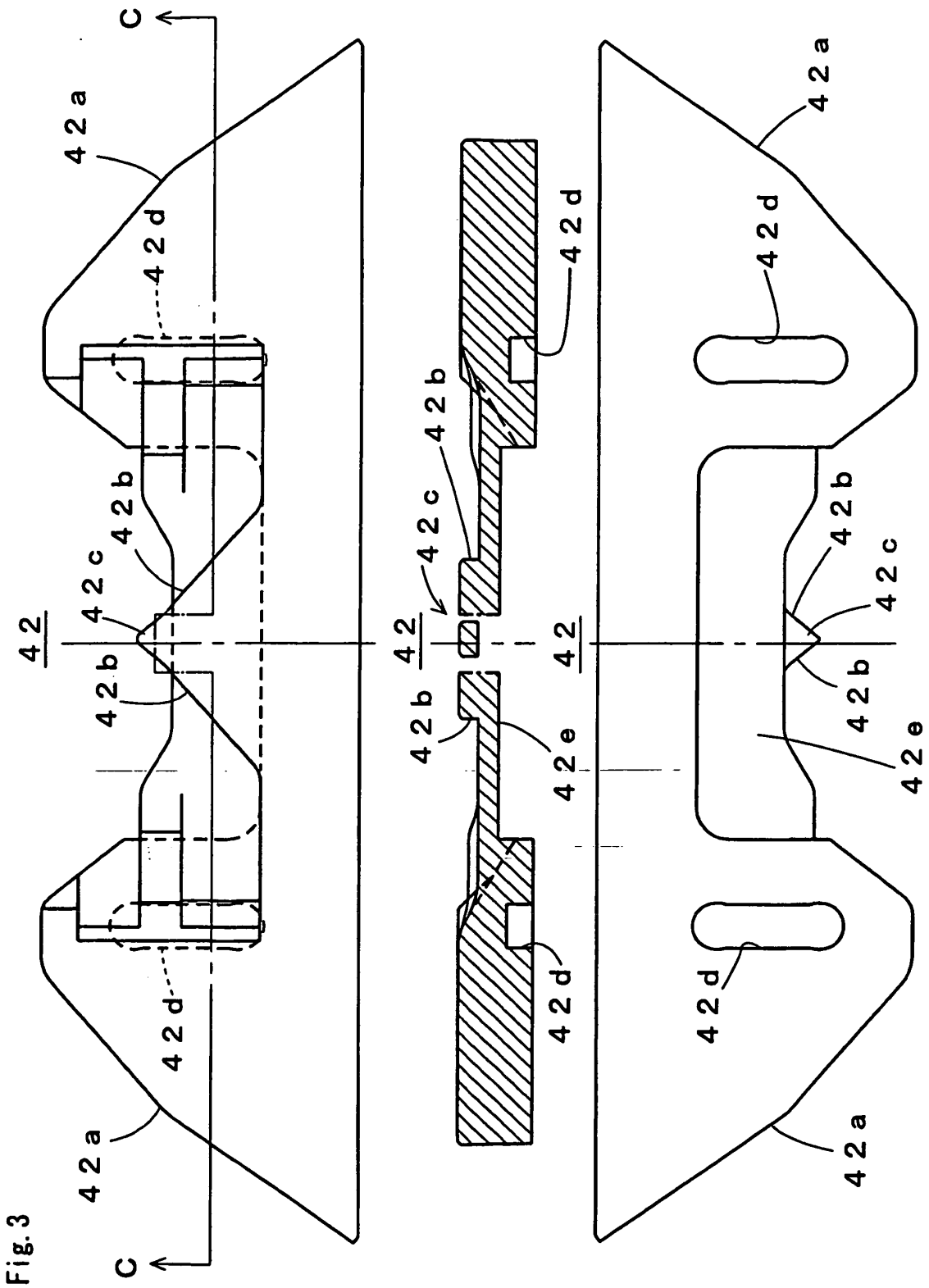
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Fig.3

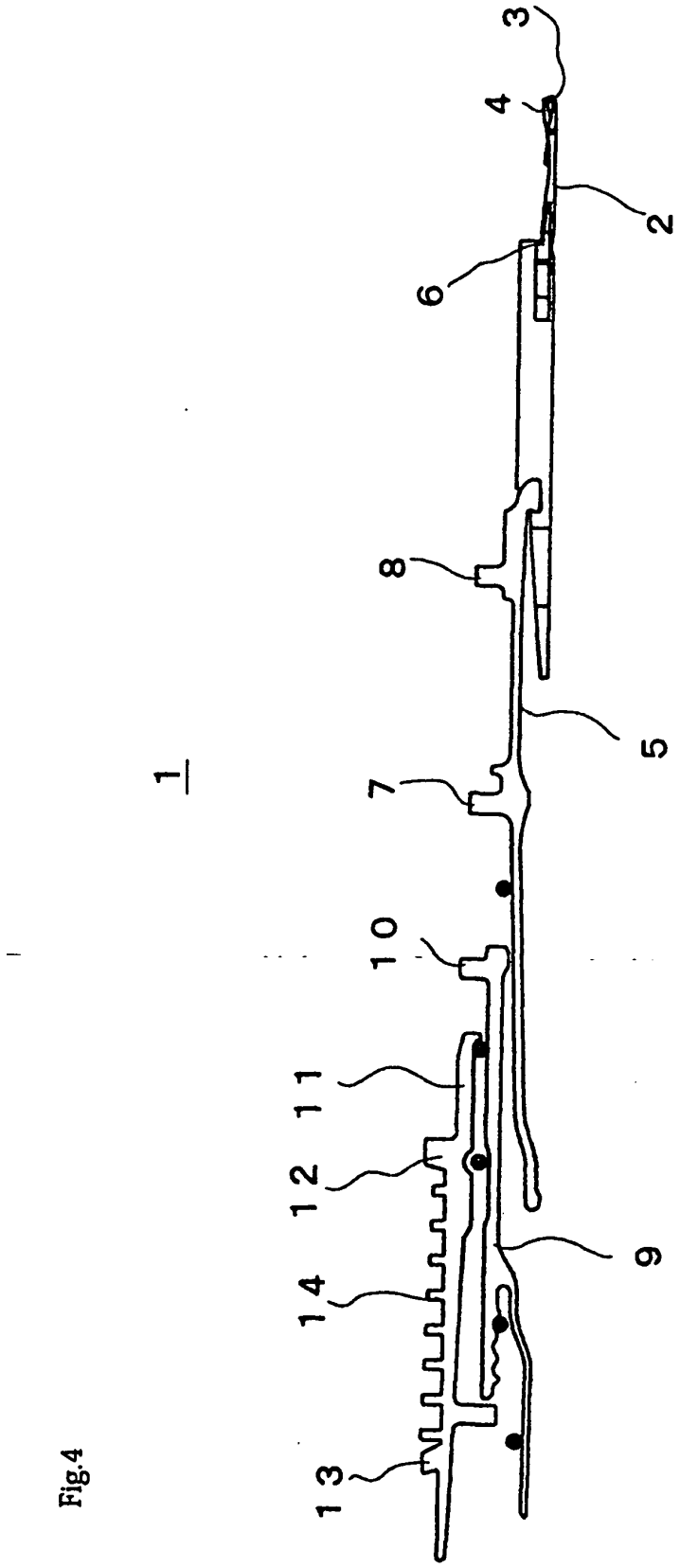
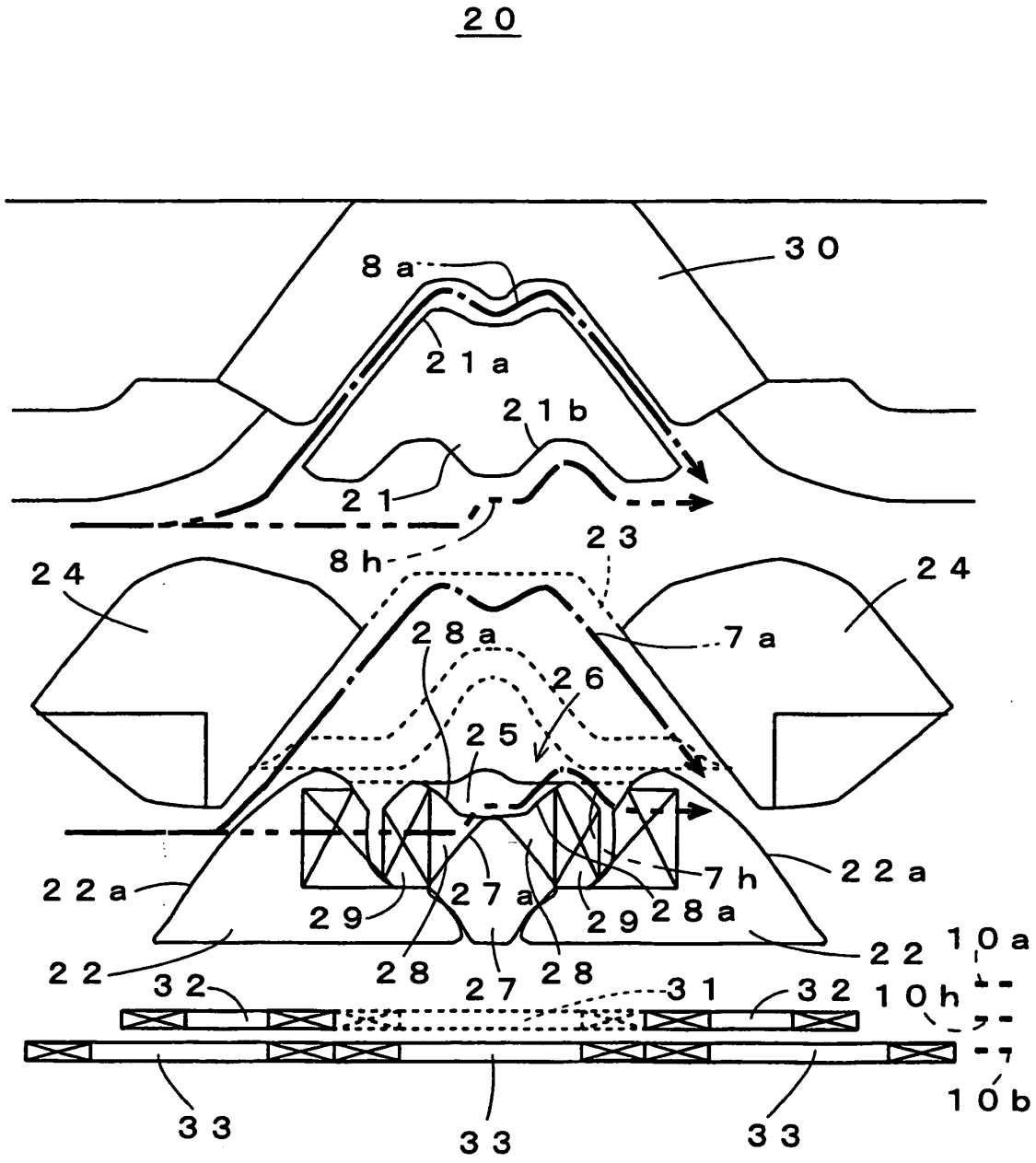


Fig.4

Fig. 5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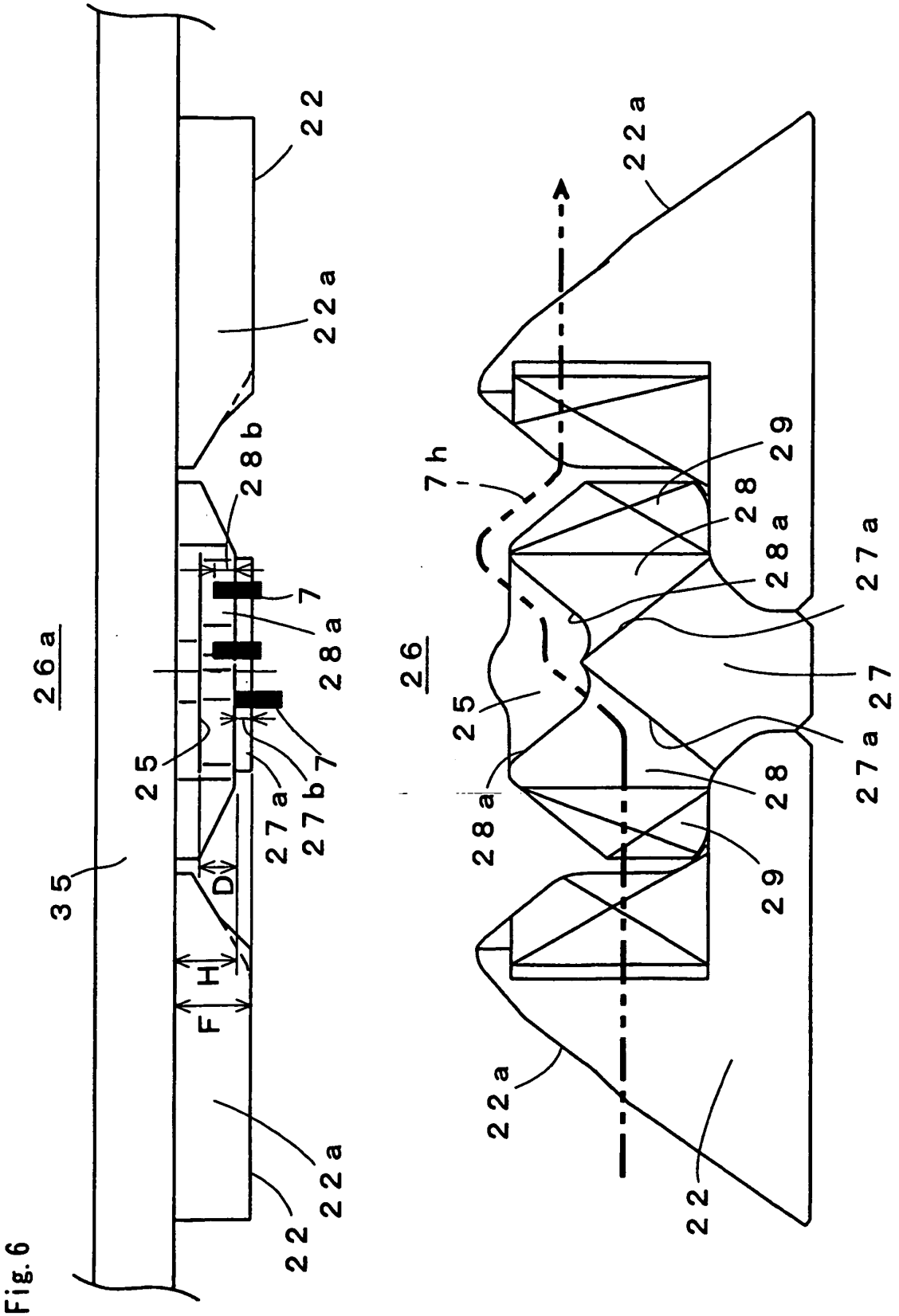

Fig.6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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