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(54) FLATBED KNITTING MACHINE

FLACHBETTSTRICKMASCHINE

TRICOTEUSE RECTILIGNE

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Description

[Technical Field]

[0001] The present invention relates to a flatbed knitting machine for use in half gauge knitting.

[Background Art]

[0002] Conventionally, a flatbed knitting machine knits a fabric with knitting needles arranged in parallel in a longitudinal direction of a needle bed. Each of the knitting needles is driven so as to make a hook, disposed at the tip thereof in a side of a needle bed gap, advance into and retreat from the needle bed gap, and forms stitches of the fabric by making the hook advance into the needle bed gap and pulling the hook having received knitting yarn into the needle bed. The flatbed knitting machine including a pair of the needle beds disposed in front and back positions so as to interpose the needle bed gap is capable of, in all needle knitting, knitting a bag-shape or cylindrical fabric such as a glove, by connecting the both ends of fabrics in the knitting width direction and knitting the fabrics alternately by one and the other of the front and back needle beads, and is also capable of knitting a single layer fabric in a mixed structure pattern of front stitches and back stitches.

[0003] The two-bed type flatbed knitting machine having a pair of the needle beds disposed in front and back positions is capable of, with half gauge knitting, knitting a bag-shape fabric, by knitting fabric to have front stitches and back stitches such a rib knitted fabric, as the fabric attached to the front and back needle beds respectively, and connecting the both ends in the knitting width (refer to, for example, Patent Citation 1). Also, in knitting a cylindrical fabric in plain knitting with the knitting width increased or decreased, the half gauge knitting needs to be performed in order to ensure free needles in the opposed needle bed for transfer. In the half gauge knitting, every other knitting needles are attached to a fabric belonging to each of the needle beds, and the knitting needles not attached to the fabric belonging to the target needle bed are attached to the fabric belonging to the opposed needle bed, so that free needles are ensured for transfer, or used to form back stitches.

[0004] A sinker is disposed between knitting needles in the needle bed, and a working edge part of the tip of the sinker in the side of the needle bed gap forms a sinker loop of a stitch in the step of forming a needle loop of a stitch by pull-in of a hook into the needle bed. In the half gauge knitting using the needle bed in which the knitting needles and the sinkers are arranged alternately, a too-long sinker loop may be formed, so that the present applicants propose a flatbed knitting machine having fewer sinkers arranged between knitting needles (refer to, for example, Patent Citation 2).

[Citation List]

[Patent Literature]

[0005]

Patent Citation 1: JPS60-194154A

Patent Citation 2: JPH07-258945A

[Summary of Invention]

[Technical Problem]

[0006] In the flatbed knitting machine according to Patent Citation 2, knitting needles and sinkers are not alternately arranged, where knitting needles are arranged adjacently in some parts, and accordingly the sinker loop formed in half gauge knitting is not too long. However, even in the half gauge knitting, when a pull-in amount of knitting yarn is large in the step of forming a needle loop at a portion where a knitting needle to be used in knitting and a knitting needle not to be used are arranged adjacent to each other without any sinker therebetween, the knitting yarn may be captured by a hook of the unused knitting needle.

Prior art document EP 1 167 602 A2 discloses a flatbed knitting machine comprising at least two opposing needle beds provided with stitch formers and/or comb gap plates. For changing the comb gap width, the stitch formers and/or the comb gap plates of at least one needle bed, in which a wire which forms the casting off base for the stitches is fixed, are jointly adjustably provided on the needle bed.

From EP 0 897 027 A2 a flatbed knitting machine with movable loop forming plates is known. Grooves for receiving a movable loop forming plate are made in both front and back needle beds at the top ends thereof on the trick gap side, and movable loop forming plates are mounted in the grooves. A loop forming edge is provided at the top end of each movable loop forming plate, and the plate is energized by a spring in a direction that the plate moves away from the trick gap, and the plate is made to move forward or backward by a movable loop forming plate control means, around a fulcrum that is provided on the needle bed in the bottom of the trick gap.

[0007] An object of the present invention is to provide a flatbed knitting machine capable of forming a not-too-long sinker loop in the half gauge knitting, and not allowing knitting yarn to be captured by a hook of an unused knitting needle.

[Technical Solution]

[0008] This and other objects are achieved by a flatbed knitting machine having the features of claim 1. Preferred embodiments of the flatbed knitting machine are stated in claims 2 to 5.

[0009] Thus, the present invention is a flatbed knitting machine having knitting needles and sinkers alternately arranged along a longitudinal direction of a needle bed in a side of a needle bed gap, the flatbed knitting machine configured to perform half gauge knitting by alternately using and not using the knitting needles disposed adjacently, the sinkers having working edge parts at tip sides in the side of the needle bed gap, and including basic sinkers and concave sinkers arranged alternately, wherein

the working edge part of each basic sinker is capable of working on knitting yarn upon contact with the knitting yarn in forming a stitch, and is set at a basic position facing the needle bed gap, and forms a sinker loop in forming the stitch,
the working edge part of each concave sinker is set at a concave position further away from the needle bed gap than the basic position, and
at the concave position, each of the working edge parts of the concave sinkers functions as a wall in the side position of the hook of the unused knitting needle which covers at least a tip and a bottom part of the hook and does not cover a vicinity of a top part of the hook so as to protrude into the needle bed gap over the working edge part.

[0010] In the present invention,

said knitting needles are latch needles each configured to open and close said hook by a latch, and
each of said working edge parts of said concave sinkers covers the hook at a position closer to said needle bed gap than a tip of the latch closing the hook of the unused knitting needle.

[0011] In the present invention,

said needle bed includes sinker grooves at positions of said sinkers, and
said basic sinkers and said concave sinkers are interchangeable and close the sinker grooves when in use.

[0012] In the present invention,

each of said basic sinkers is a movable sinker capable of pressing a formed stitch down below said needle bed gap by advancing to and retreating from the needle bed gap, and further forming a sinker loop by use of said working edge part, and
each of said concave sinkers is a fixed sinker to be fixed so that the working edge part is set to fix at said concave position.

[0013] In the present invention,
each of said working edge parts of said concave sinkers includes an inclined part for guiding a knitting yarn down below said needle bed gap upon contact with the knitting yarn when said knitting needle forms said stitch.

[Advantageous Effects of Invention]

[0014] According to the present invention, a basic sinker configured to form a sinker loop while forming a stitch is arranged immediately adjacent to a knitting needle to be used in half gauge knitting in one side of a longitudinal direction of a needle bed, and is arranged adjacent to another knitting needle through a concave sinker and an unused knitting needle in the other side. This allows to form, in the other side of the longitudinal direction, a sinker loop with a shorter route passing through the basic sinker and the concave sinker disposed in the other side of the unused knitting needle, as compared with the case where the concave sinker is interchanged with the basic sinker, resulting in enabling to form a not-too-long sinker loop in the half gauge knitting. A working edge part of the concave sinker serves as a side wall for at least a tip and a bottom part of a hook of the unused knitting needle, thereby enabling to, at the time when the knitting needle to be used pulls in knitting yarn in order to form a needle loop, prevent the knitting yarn from being captured by the hook of the unused knitting needle upon contact therewith at any height in a range from the tip to the bottom part.

[0015] According to the present invention, in the half gauge knitting using a latch needle, the concave sinker covers the hook at a position closer to the needle bed gap than a tip of a latch closing the hook of the unused knitting needle, and thus the working edge part prevents the knitting yarn from being captured by the hook with the latch opened, thereby enabling to reduce failure in knitting.

[0016] According to the present invention, the basic sinker and the concave sinker are interchangeable, and the flatbed knitting machine including the basic sinkers serving as all the sinkers is available as the one corresponding to all needle knitting, while the flatbed knitting machine including the basic sinkers and the concave sinkers arranged alternately is available as the one corresponding to the half gauge knitting. Each of the basic sinkers and the concave sinkers closes a sinker groove, and this serves to prevent the knitting yarn from falling into the sinker groove.

[0017] According to the present invention, the working edge part of the basic sinker is set at the basic position faced the needle bed gap, and a movable sinker is used as the basic sinker, thereby enabling to effectively form a sinker loop and press a stitch. The concave sinker is set at the concave position away from the needle bed gap, thereby eliminating the need of pressing a stitch. A fixed sinker is used as the concave sinker, thereby achieving a simple configuration.

[0018] According to the present invention, the working edge part of the concave sinker has an inclined part configured to guide the contacted knitting yarn down below

the needle bed gap, thereby enabling to move the knitting yarn away from the tip of the hook of the unused knitting needle, resulting in enabling to prevent the knitting yarn from being captured by the hook.

[Brief Description of Drawings]

[0019]

[Fig.1] Fig. 1 is a simplified plan view partially showing half gauge knitting by a flatbed knitting machine 1 as an embodiment of the present invention, in comparison with half gauge knitting by a flatbed knitting machine 9 corresponding to all needle knitting.
[Fig.2] Fig. 2 is a plan view partially showing a configuration of a needle bed 2 of the flatbed knitting machine 1 shown in Fig. 1.
[Fig.3] Fig. 3 is a sectional side view of the needle bed 2 shown in Fig. 2, viewed from the direction of a cutting line III-III.
[Fig.4] Fig. 4 is a sectional side view of the needle bed 2 shown in Fig. 2, viewed from the direction of a cutting line IV-IV.
[Fig.5] Fig. 5 is a side view of a basic sinker 5 shown in Fig. 2.
[Fig.6] Fig. 6 is a side view of a concave sinker 6 shown in Fig. 2.

[Description of Embodiments]

[0020] Hereinafter, Fig. 1 to Fig. 6 relate to the configuration and the use state of the flatbed knitting machine 1 as an embodiment of the present invention. The corresponding parts in respective drawings are indicated with the same reference sign, and the description thereof may be omitted. For the sake of convenience of explanation, a part which is not shown in the drawing to be described may be described by use of a reference sign shown in another drawing.

[Example]

[0021] Fig. 1 shows the half gauge knitting by the flatbed knitting machine 1 as an embodiment of the present invention, in comparison with the one by the flatbed knitting machine 9 corresponding to the all needle knitting. The half gauge knitting by the flatbed knitting machine 9 is carried out in the same manner as that in Patent Citation 1. Each of the flatbed knitting machines 1, 9 knits fabric with knitting needles 3 which are disposed in parallel in the longitudinal direction of the needle bed 2. Each of the knitting needles 3 is housed in a needle groove formed perpendicular to the longitudinal direction between needle plates 4, so as to be slidable in the needle groove. The knitting needles 3 are driven to slide by a cam mounted on a carriage configured to move in the longitudinal direction of the needle bed 2. In the flatbed knitting machine 1, the basic sinkers 5 and the concave sinkers 6 respectively having working edge parts 5e, 6e are alternately mounted, in the tip side of the needle plates 4. Each of the basic sinkers 5 is arranged so that the working edge part 5e thereof is positioned at the basic position faced a needle bed gap 8, and the working edge part 5e forms a sinker loop 7b in the step of forming a stitch. Each of the concave sinkers 6 is arranged so that the working edge part 6e thereof is at the concave position further away from the needle bed gap 8 than the basic position. A stitch 7 includes a needle loop 7a and the sinker loop 7b. The needle loop 7a is formed in the manner that the sliding of the knitting needle 3 causes a hook 3a to advance into the needle bed gap 8 and pulls the hook 3a having received knitting yarn into the needle bed 2.

[0022] When the positions of the knitting needles 3 in Fig. 1 are indicated with reference signs a, b, c, d, e, f from the left to the right therein, in the half gauge knitting, the stitch 7 is formed by every other needle of the knitting needles 3, such that the knitting needles 3 positioned at a, c, e are not used, and the knitting needles 3 positioned at b, d, f are used, as an example. In an example, the stitch 7 by the knitting needle 3 positioned at b includes the needle loop 7a formed by the pull-in of the hook 3a, and the right and left sinker loops 7b adjacent to the needle loop 7a. The left sinker loop 7b is formed by the working edge part 5e of the basic sinker 5, through the concave sinker 6. Although the knitting yarn of the sinker loop 7b is in contact with the working edge part 6e of the concave sinker 6 in the drawing, it may not be in contact therewith in some pull-in conditions of the hook 3a. The right sinker loop 7b is formed directly by the working edge part 5e of the basic sinker 5. An old loop 7c having been knocked over from the hook 3a and transferred in the needle bed gap 8 is hooked between the needle loop 7a and the sinker loops 7b.

[0023] In the flatbed knitting machine 1 of the present embodiment, the basic sinkers 5 and the concave sinkers 6 are interchangeable, when the flatbed knitting machine 1 is arranged to equip with only the basic sinkers 5, it is available to be used as the flatbed knitting machine 9 for all needle knitting. As for the stitch 7 in the half gauge knitting by the flatbed knitting machine 9, the sinker loop 7b is formed by the working edge parts 5e of the two basic sinkers 5 positioned on each of the both sides of the knitting needle 3. In an example, the sinker loop 7b between the knitting needle 3 positioned at b and the knitting needle 3 positioned at d is formed by the working edge parts 5e of the two basic sinkers 5 interposing the unused knitting needle 3 positioned at c. Similarly, in the left side of the knitting needle 3 positioned at b, another loop is formed by the working edge parts 5e of the two basic sinkers 5 interposing the unused knitting needle 3 positioned at a.

[0024] By comparing the flatbed knitting machine 1 and the flatbed knitting machine 9, for example, the sinker loop 7b formed between the knitting needles 3 positioned at b, d in the flatbed knitting machine 1 is shorter than

the one in the flatbed knitting machine 9. The sinker loop 7b in the flatbed knitting machine 9 is formed in the manner that the knitting yarn is hooked in parallel to the longitudinal direction between the working edge parts 5e of the two adjacent basic sinkers 5 on the both right and left sides of the needle loop 7a, and is pulled in by the hook 3a of the knitting needle 3. The sinker loop 7b in the flatbed knitting machine 1 passes by the basic sinker 5 and the concave sinker 6 in one of the left and right positions to the needle loop 7a, and is pulled in by the hook 3a of the knitting needle 3. The length of the sinker loop 7b in the step of knitting the stitch 7 reflects the stitch 7 which has become the old loop 7c by being knocked over in the step of forming the stitch 7 in the next knitting course. In particular, in the case where the pull-in amount of the hook 3a is controlled so that the loop length of the stitch 7 corresponding to the sum of the needle loop 7a and the sinker loop 7b is kept constant, the needle loop 7a is shortened when the sinker loop 7b is lengthened as with the case of the flatbed knitting machine 9. It is noted that, in the case where the stitch 7 is formed as a back stitch of the fabric corresponding to the opposed needle bed 2, when the stitch is transferred to the knitting needle 3 of the opposed needle bed 2 for holding, the short needle loop 7a may be pulled and lengthened while the sinker loop 7b may be shortened.

[0025] Fig. 2 partially shows the configuration of the needle bed 2 of the flatbed knitting machine 1 shown in Fig. 1. Fig. 3 and Fig. 4 show the sectional side configuration of the needle bed 2 shown in Fig. 2, respectively viewed from the directions of the cutting line III-III and the cutting line IV-IV. Although the needle beds 2 are opposed to each other and interpose the needle bed gap 8, and inclined such that the edge thereof in the side of the needle bed gap 8 is set high and height of a part further away from the needle bed gap 8 is decreased correspondingly, Fig. 3 and Fig. 4 respectively show the needle bed 2 under a horizontal posture formed by inclining a virtual center surface 8a perpendicular to the needle bed gap 8 at the center thereof. Fig. 5 and Fig. 6 show the side shapes of the basic sinker 5 and the concave sinker 6, respectively.

[0026] As shown in Fig. 3, in the flatbed knitting machine 1, a movable sinker is used as the basic sinker 5. The movable sinker has, in the order from the side of the needle bed gap 8, a working arm 5a, a supporting convex part 5b, and a control part 5c. The needle bed 2 has a sinker groove 2a at the tip thereof in the side of the needle bed gap 8, so as to house the working arm 5a. Each of the needle plates 4 is formed of a plate material, and includes a thin wall part 4a formed thinner at the tip thereof in the side of the needle bed gap 8, allowing to house the movable sinker. Each of the needle plates 4 includes a supporting concave part 4b below the thin wall part 4a, so as to house and support the supporting convex part 5b of the movable sinker so that the working arm 5a is slid substantially upward and downward in the needle bed gap 8. The movable sinker is pressed in the clockwise direction in the drawing by a spring 5d housed in the thin wall part 4a, so that the working arm 5a is energized downward in the needle bed gap 8. As shown in Fig. 5, the working edge part 5e corresponding to the side part of the working arm 5a in the side of the needle bed gap 8 serves as a working part in the step of knitting the stitch 7. A stitch pressing part 5f to press the stitch 7 is formed below the working arm 5a. The control part 5c is capable of elevating the stitch pressing part 5f against the energizing by the spring 5d, upon the pressing by the cam mounted on the carriage.

[0027] As shown in Fig. 4, in the flatbed knitting machine 1, a fixed sinker is used as the concave sinker 6. The fixed sinker, in place of a movable sinker, is allowed to be housed in the thin wall part 4a, and has a working arm 6a, a supporting convex part 6b, a fixing part 6c, and a spring part 6d, respectively corresponding to the working arm 5a, the supporting convex part 5b, the control part 5c and the spring 5d of the movable sinker. The spring part 6d presses the fixing part 6c, the supporting convex part 6b, and the portion between the supporting convex part 6b and the working arm 6a, to the upper part of the needle plate 4, so as to make the fixed sinker still. The side part of the fixed sinker in the side of the needle bed gap 8 serves as the working edge part 6e functioning as a working part in the step of knitting the stitch 7. It is noted that the working edge part 6e of the fixed sinker, which is at the concave position, possibly and partially participates the formation of the sinker loop 7b as shown in Fig. 1, or may not be brought into contact with the sinker loop 7b. By regarding the position of the working edge part 5e of the movable sinker shown in Fig. 3 as a basic position, the concave position is further away from the needle bed gap 8 in the needle bed 2 than the basic position.

[0028] Each of Fig. 2, Fig. 3 and Fig. 4 shows the state where all of the knitting needles 3 are set to the stitch value zero where the pull-in amount of the knitting yarn is 0. The concave position of the working edge part 6e of the concave sinker 6 is further away from the needle bed gap 8 in the side of the needle bed 2 than the position of a top part 3d of the hook 3a of the knitting needle 3 set to the stitch value zero. However, as shown in Fig. 1, as for the concave sinker 6, even when knitting yarn is pulled in to form the needle loop 7a, the working edge part 6e serving as a working part effectively functions as a side wall which stops the movement of the knitting yarn, so as to prevent the knitting yarn from being captured by the hook 3a of the unused knitting needle 3. The function as a wall is strengthened in the manner that the working edge part 6e of the concave sinker 6 is inclined so as to go down upon contact with the knitting yarn and advance into the needle bed gap 8, thereby facilitating the guidance of the knitting yarn downward away from a tip 3c of the hook 3a in the step of forming the stitch 7. In Fig. 4, the working edge part 6e covers at least the tip 3c and the bottom part as a wall in the side position of the hook 3a of the unused knitting needle 3. It is noted that a part

in the vicinity of the top part 3d of the hook 3a projects toward the needle bed gap 8 over the working edge part 6e. Even when the knitting yarn is guided to the side of the tip 3c of the hook 3a upon contact of the knitting yarn with the curve surface in the vicinity of the top part 3d of the hook 3a, the working edge part 6e of the concave sinker 6 functions as the wall of stopping the movement of the knitting yarn. The working edge part 6e functioning as the wall covers a tip 3e of a latch 3b which closes the hook 3a of the unused knitting needle 3, and the working edge part 6e positioned below guides the knitting yarn downward, and this allows to prevent the knitting yarn from being captured by the hook 3a.

[0029] The upper part of the thin wall part 4a is closed by a pressing plate 10 of a metal belt extending in the longitudinal direction. When the pressing plate 10 is pulled out, the basic sinkers 5 and the concave sinkers 6 are interchangeable. Since the concave sinker 6 is a fixed sinker, the concave sinker 6 is not to be slid in the sinker groove 2a. By making the plate of the concave sinker 6 thicker than that of the movable sinker, it allows to reliably close the sinker groove 2a. It is noted that a fixed sinker which is attached and detached from below the needle bed 2 may be used. However, as in the present embodiment, a fixed sinker is more easily interchanged with a movable sinker, from above the needle bed 2. The usage of a movable sinker as the basic sinker 5 makes it also possible to press fabric.

[0030] Each of the knitting needles 3 includes a transfer clip 11 for use in the step of transferring, on one side part of a needle shank in the side further away from the needle bed gap 8 than the hook 3a. The transfer clip 11 of the knitting needle 3, which holds the stitch 7 for transferring by the hook 3a thereof, is able to receive the relatively moving stitch 7 from the hook 3a, when the knitting needle 3 is made to advance to the position for transferring into the needle bed gap 8. The stitch 7 is transferred in such manner that the hook 3a of the target knitting needle 3 made to advance from the opposed needle bed 2 is inserted in the transfer clip 11, and thereafter the target knitting needle 3 is returned to the opposed needle bed 2. As the knitting needle 3, a slide needle is also available, which is capable of opening and closing the hook 3a by a slider, making the slider holding stitch advance into the needle bed gap 8, and transferring the stitch to the hook 3a of the knitting needle 3 of the opposed needle bed 2.

[0031] Also, in the case of formation of a stitch connecting two needle beds 2 opposed to each other in the front and the back direction by use of the flatbed knitting machines 1, 9 shown in Fig. 1, a difference occurs in the half gauge knitting. In the case of knitting of a bag-shape or cylindrical fabric, the knitting yarn corresponding to the edge stitch of the front/back boundary connecting two front and back needle beds 2 directly connects knitting needles 3. The half gauge knitting by the flatbed knitting machine 9 has the long sinker loop 7b of the edge stitch, and this may subtly reflect the texture of the fabric. The flatbed knitting machine 1 of the present embodiment forms the shorter sinker loop 7b of the edge stitch and forms the longer needle loop 7a, as compared with the ones by the flatbed knitting machine 9, and this improves the texture of the fabric.

[0032] As described above, in the present embodiment, the movable sinkers and the fixed sinkers are interchangeable and are used respectively as the basic sinkers 5 and the concave sinkers 6, and the sinker groove 2a for the movable sinker is closed also in the case of the concave sinker 6. The basic sinkers 5 and the concave sinkers 6 may be all the movable sinkers or the fixed sinkers. Even in the case where all are the fixed sinkers, a sinker groove may be arranged, and at least the fixed sinkers serving as the concave sinkers may close the sinker groove. The fixed sinker for forming the sinker loop 7b serves as the basic sinker 5 may be used in combination with the movable sinker for stitch pressing. The fixed sinker may have a part corresponding to the working edge part, by extension of the tip part of the needle plate 4 in the side of the needle bed gap 8, or by machining of the needle plate 4. The working part may be made to advance into and retreat from the needle bed gap 8, and the advancing and retreating position may be changed, whereby the basic sinkers 5 and the concave sinkers 6 are switched therebetween, instead of being interchanged. Alternatively, the concave sinker 6 further with a member added in the side of the needle bed gap 8 may serve as the basic sinker 5. Further alternatively, the basic sinker 5 or the concave sinker 6 may be used in combination with a yarn guide which faces the needle bed gap 8 and has a tip part for guiding knitting yarn to the hook 3a in the step of forming the stitch 7.

[Explanation of Reference]

[0033]

1, 9	Flatbed knitting machine
2	Needle bed
3	Knitting needle
3a	Hook
4	Needle plate
4a	Thin wall part
5	Basic sinker
5e, 6e	Working edge part
6	Concave sinker
7	Stitch
7a	Needle loop
7b	Sinker loop
8	Needle bed gap

Claims

1. A flatbed knitting machine (1) having knitting needles (3) and sinkers (5,6) alternately arranged along a longitudinal direction of a needle bed (2) in a side of

a needle bed gap (8), the flatbed knitting machine (1) configured to perform half gauge knitting by alternately using and not using the knitting needles (3) disposed adjacently, the sinkers (5,6) having working edge parts (5e,6e) at tip sides in the side of the needle bed gap (8), and including basic sinkers (5) and concave sinkers (6) arranged alternately, wherein

the working edge part (5e) of each basic sinker (5) is capable of working on knitting yarn upon contact with the knitting yarn in forming a stitch (7), and is set at a basic position facing the needle bed gap (8), and forms a sinker loop (7b) in forming the stitch (7),
the working edge part (6e) of each concave sinker (6) is set at a concave position further away from the needle bed gap (8) than the basic position, and **characterized in that** at the concave position each of the working edge parts (6e) of the concave sinkers (6) functions as a wall in the side position of the hook (3a) of the unused knitting needle (3) which covers at least a tip (3c) and a bottom part of the hook (3a) and does not cover a vicinity of a top part (3d) of the hook (3a) so as to protrude into the needle bed gap (8) over the working edge part (6e).

2. The flatbed knitting machine (1) according to claim 1, wherein

said knitting needles (3) are latch needles each configured to open and close said hook (3a) by a latch (3b), and
each of said working edge parts (6e) of said concave sinkers (6) covers the hook (3a) at a position closer to said needle bed gap (8) than a tip (3c) of the latch (3b) closing the hook (3a) of the unused knitting needle (3).

3. The flatbed knitting machine (1) according to claim 1 or 2, wherein

said needle bed (2) includes sinker grooves (2a) at positions of said sinkers (5,6), and
said basic sinkers (5) and said concave sinkers (6) are interchangeable and close the sinker grooves (2a) when in use.

4. The flatbed knitting machine (1) according to any one of claims 1 to 3, wherein

each of said basic sinkers (5) is a movable sinker capable of pressing a formed stitch (7) down below said needle bed gap (8) by advancing to and retreating from the needle bed gap (8), and further forming a sinker loop (7b) by use of said working edge part (5e), and
each of said concave sinkers (6) is a fixed sinker to be fixed so that the working edge part (6e) is set to fix at said concave position.

5. The flatbed knitting machine (1) according to any one of claims 1 to 4, wherein
each of said working edge parts (6e) of said concave sinkers (6) includes an inclined part for guiding a knitting yarn down below said needle bed gap (8) upon contact with the knitting yarn when said knitting needle (3) forms said stitch (7).

Patentansprüche

1. Flachbettstrickmaschine (1), mit Stricknadeln (3) und Platinen (5, 6), die alternierend entlang einer Längsrichtung eines Nadelbetts (2) in einer Seite eines Nadelbettspalts (8) angeordnet sind, wobei die Flachbettstrickmaschine (1) konfiguriert ist zum Durchführen eines Halbteilungsstrickens durch das alternierende Verwenden und nicht-Verwenden der zueinander benachbarten Stricknadeln (3), wobei die Platinen (5, 6) Arbeitskantenteile (5e, 6e) an Endseiten in der Seite des Nadelbettspalts (8) aufweisen und Basisplatinen (5) und alternierend damit angeordnete konkave Platinen (6) umfassen,

wobei der Arbeitskantenteil (5e) jeder Basisplatine (5) befähigt ist zum Arbeiten auf einem Strickfaden bei einem Kontakt mit dem Strickfaden beim Ausbilden einer Masche (7), an einer dem Nadelbettspalt (8) zugewandten Basisposition vorgesehen ist und einen Platinenhenkel (7b) beim Bilden der Masche (7) bildet,
wobei der Arbeitskantenteil (6e) jeder konkaven Platine (6) an einer konkaven Position vorgesehen ist, die weiter von dem Nadelbettspalt (8) als die Basisposition entfernt ist,
dadurch gekennzeichnet, dass an der konkaven Position jeder der Arbeitskantenteile (6e) der konkaven Platinen (6) als eine Wand in der Seitenposition des Hakens (3a) der nicht-verwendeten Stricknadel (3) funktioniert, die wenigstens ein Ende (3c) und einen unteren Teil der Hakens (3a) bedeckt und eine Nachbarschaft eines oberen Teils (3d) des Hakens (3a) nicht bedeckt, um in den Nadelbettspalt (8) über dem Arbeitskantenteil (6e) vorzustehen.

2. Flachbettstrickmaschine (1) nach Anspruch 1, wobei:

die Stricknadeln (3) Zungennadeln sind, die jeweils konfiguriert sind zum Öffnen und Schließen des Hakens (3a) mittels einer Zunge (3b), und
jeder der Arbeitskantenteile (6e) der konkaven

Platinen (6) den Haken (3a) an einer Position näher an dem Nadelbettspalt (8) als ein den Haken (3a) der nichtverwendeten Stricknadel (3) schließendes Ende (3c) der Zunge (3b) bedeckt.

3. Flachbettstrickmaschine (1) nach Anspruch 1 oder 2, wobei:

das Nadelbett (3) Platinennuten (2a) an Positionen der Platinen (5, 6) aufweist, und
die Basisplatinen (5) und die konkaven Platinen (6) austauschbar sind und in der Verwendung die Platinennuten (2a) schließen.

4. Flachbettstrickmaschine (1) nach einem der Ansprüche 1 bis 3, wobei:

jede der Basisplatinen (5) eine bewegliche Platine ist, die befähigt ist zum Drücken einer gebildeten Masche (7) nach unten unter den Nadelbettspalt (8) durch das Vorschieben zu und Zurückziehen von dem Nadelbettspalt (8) und weiterhin zum Bilden eines Platinenhenkels (7b) unter Verwendung des Arbeitskantenteils (5e), und
jede der konkaven Platinen (6) eine fixe Platine ist, die zu fixieren ist, damit der Arbeitskantenteil (6e) für eine Fixierung an der konkaven Position gesetzt wird.

5. Flachbettstrickmaschine (1) nach einem der Ansprüche 1 bis 4, wobei:
jeder der Arbeitskantenteile (6e) der konkaven Platinen (6) einen geneigten Teil für das Führen eines Strickfadens nach unten unter den Nadelbettspalt (8) bei einem Kontakt mit dem Strickfaden, wenn die Stricknadel (3) die Masche (7) bildet, umfasst.

Revendications

1. Machine à tricoter à plat (1) ayant des aiguilles à tricoter (3) et des platines (5, 6) agencées en alternance le long d'une direction longitudinale d'un lit d'aiguilles (2) dans un côté d'un espace du lit d'aiguilles (8), la machine à tricoter à plat (1) étant configurée pour effectuer un tricotage demi-jauge en utilisant alternativement ou pas les aiguilles à tricoter (3) disposées de façon adjacente, les platines (5, 6) ayant des parties de bord de travail (5e, 6e) au niveau de côtés de pointe du côté de l'espace du lit d'aiguilles (8), et comportant des platines de base (5) et des platines concaves (6) agencées en alternance, dans laquelle

la partie de bord de travail (5e) de chaque platine de base (5) est capable de travailler sur du fil à tricoter au moment d'un contact avec le fil à tricoter pendant la formation d'une maille (7), et est placée à une position de base face à l'espace de lit d'aiguilles (8), et forme une boucle d'entremailles (7b) pendant la formation de la maille (7), la partie de bord de travail (6e) de chaque platine concave (6) est placée dans une position concave plus éloignée de l'espace du lit d'aiguilles (8) que la position de base, et **caractérisée en ce que**, au niveau de la position concave, chacune des parties de bord de travail (6e) des platines concaves (6) fonctionne comme une paroi dans la position latérale du crochet (3a) de l'aiguille à tricoter non-utilisée (3) qui recouvre au moins une pointe (3c) et une partie inférieure du crochet (3a) et ne recouvre un voisinage d'une partie supérieure (3d) du crochet (3a) de sorte à saillir dans l'espace du lit d'aiguilles (8) au-dessus de la partie de bord de travail (6e).

2. Machine à tricoter à plat (1) selon la revendication 1, dans laquelle

lesdites aiguilles à tricoter (3) sont des aiguilles à clapet configurées chacune pour ouvrir et fermer ledit crochet (3a) par un clapet (3b), et
chacune desdites parties de bord de travail (6e) desdites platines concaves (6) recouvre le crochet (3a) au niveau d'une position plus proche dudit espace de lit d'aiguilles (8) qu'une pointe (3c) du clapet (3b) fermant le crochet (3a) de l'aiguille à tricoter inutilisée (3).

3. Machine à tricoter à plat (1) selon la revendication 1 ou 2, dans laquelle

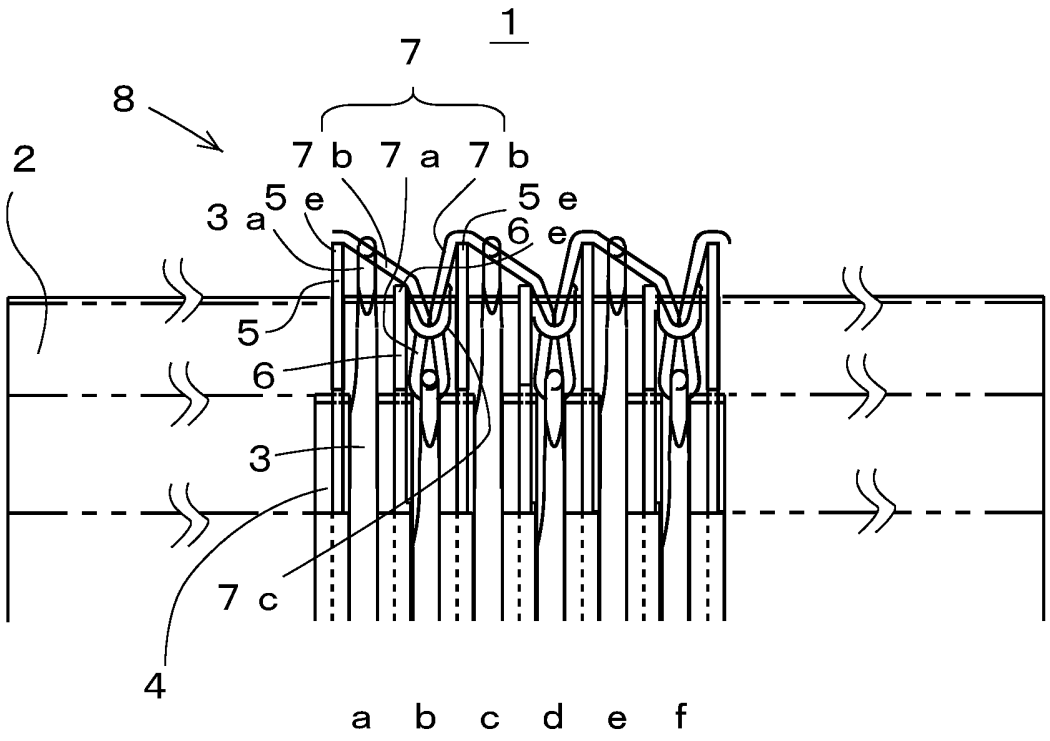
ledit lit d'aiguille (2) comporte des rainures de platine (2a) au niveau des positions desdites platines (5, 6), et
lesdites platines de base (5) et lesdites platines concaves (6) sont interchangeables et obturent les rainures des platines (2a) lorsqu'elles sont utilisées.

4. Machine à tricoter à plat (1) selon l'une quelconque des revendications 1 à 3, dans laquelle

chacune desdites platines de base (5) est une platine mobile capable de presser une maille formée (7) vers le bas sous ledit espace du lit d'aiguilles (8) en avançant vers et en se retirant hors de l'espace du lit d'aiguilles (8), et de former en outre une boucle d'entre-mailles (7b) en utilisant ladite partie de bord de travail (5e), et
chacune desdites platines concaves (6) est une platine fixe à fixer de sorte que la partie de bord de travail (6e) soit réglée pour se fixer à ladite position concave.

5. Machine à tricoter à plat (1) selon l'une quelconque des revendications 1 à 4, dans laquelle chacune desdites parties de bord de travail (6e) desdites platines concaves (6) comporte une partie inclinée pour guider un fil à tricoter vers le bas sous ledit espace du lit d'aiguilles (8) au moment du contact avec le fil à tricoter lorsque ladite aiguille à tricoter (3) forme ladite maille (7).

Fig. 1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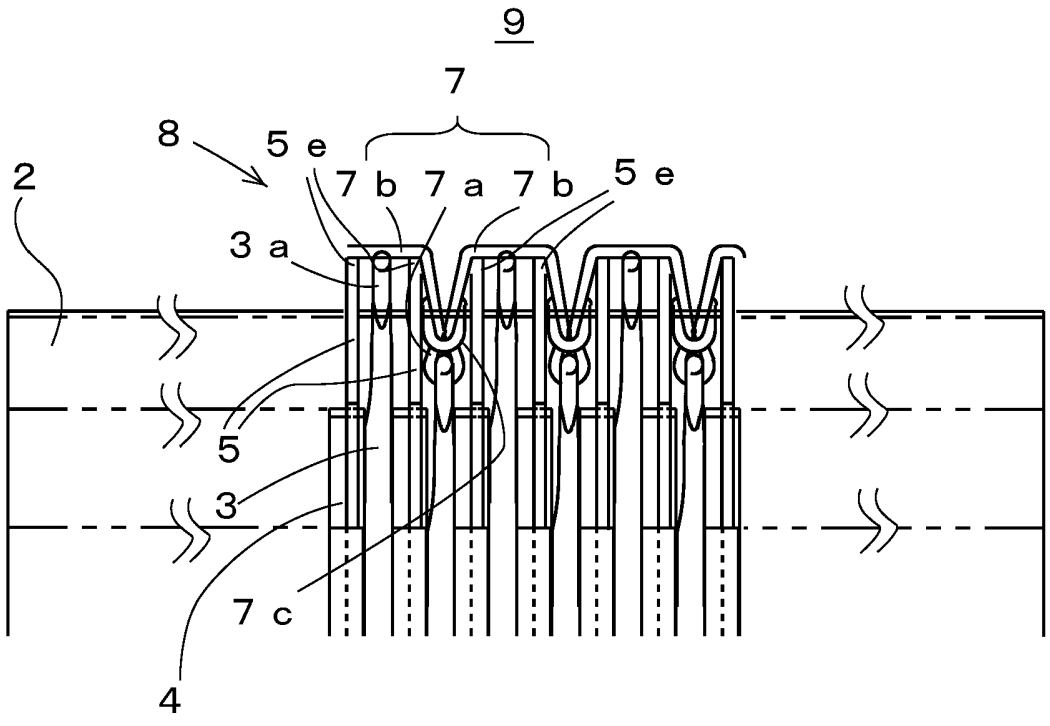
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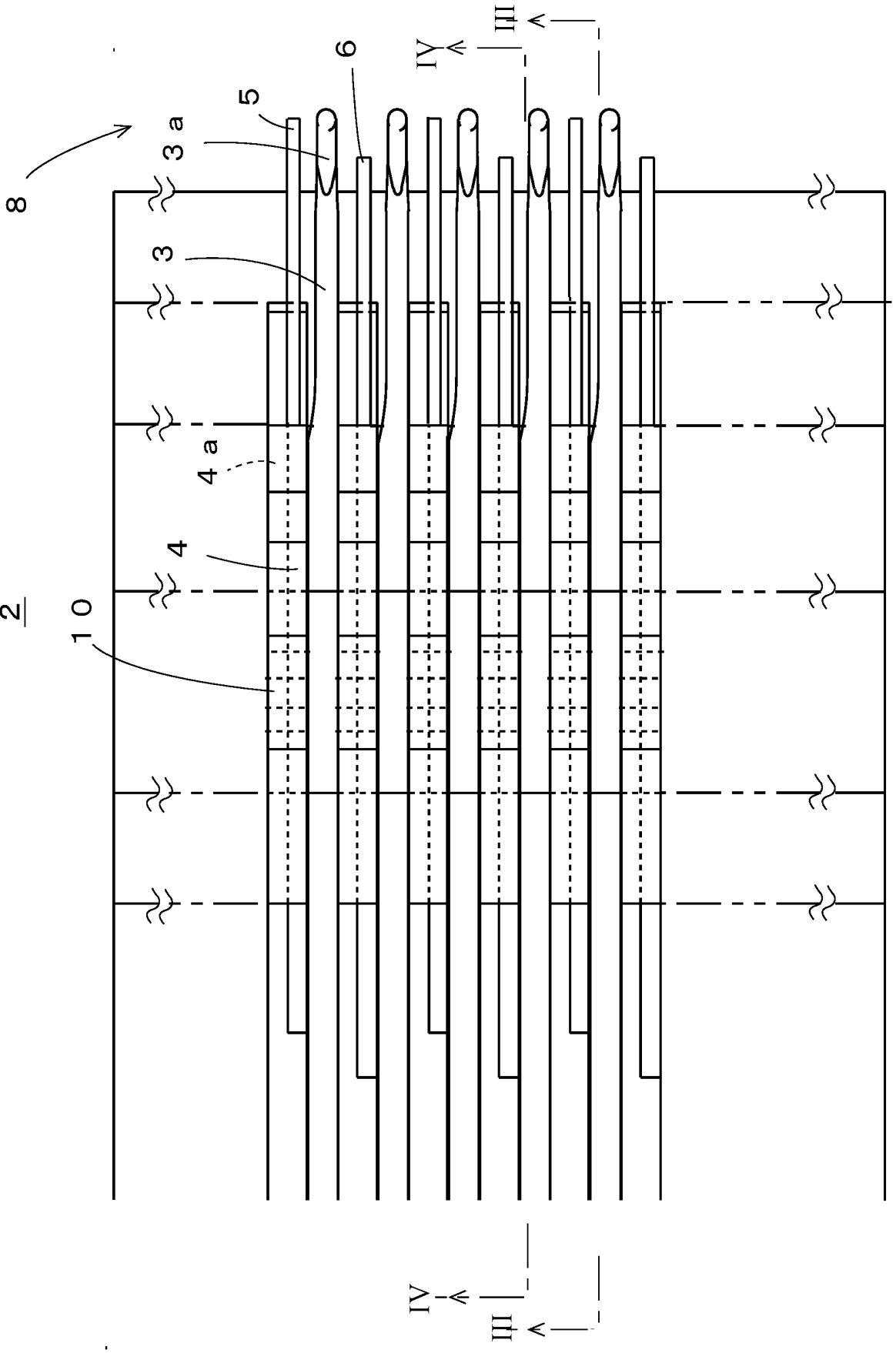


Fig. 2

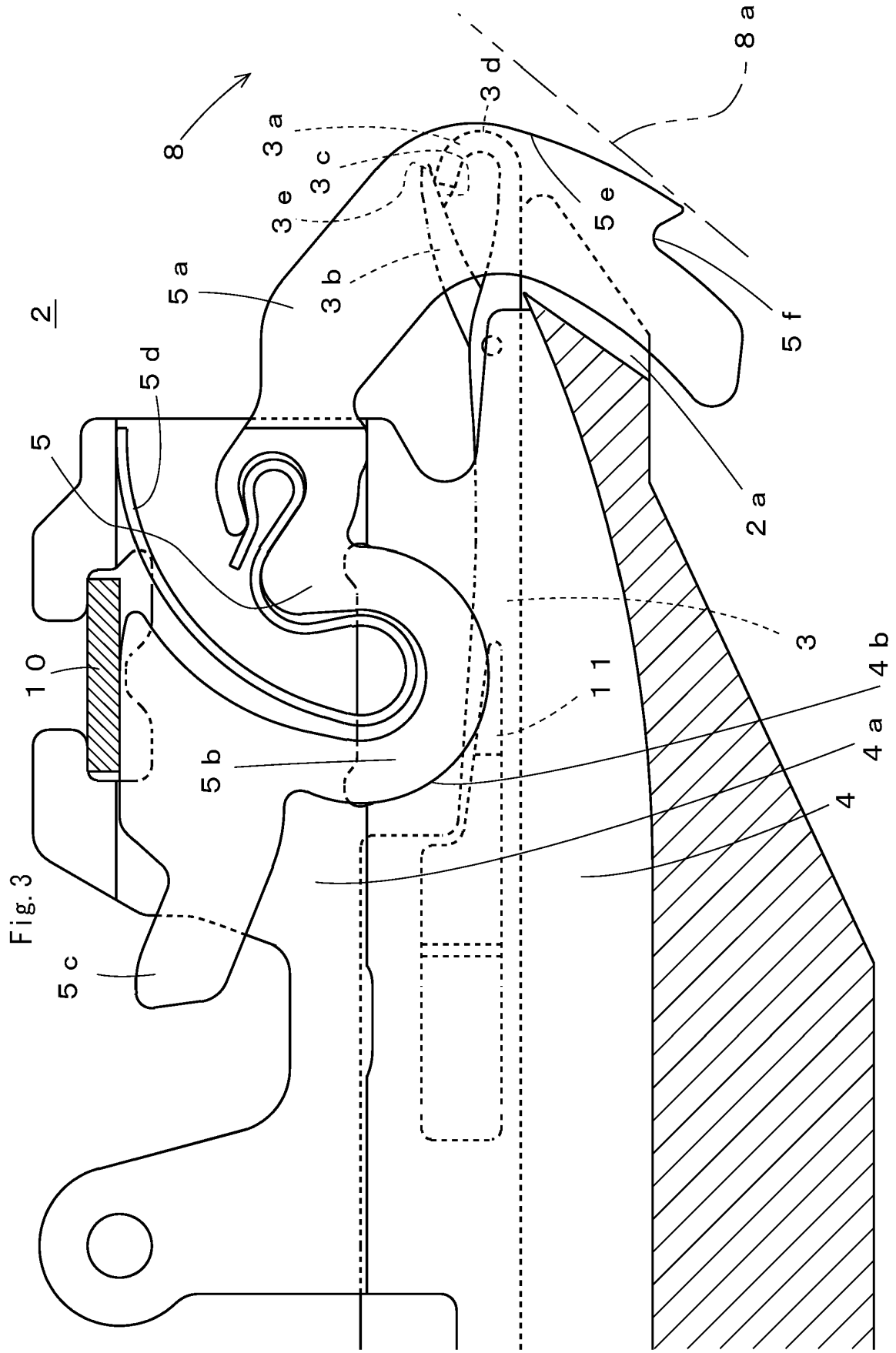


Fig. 3

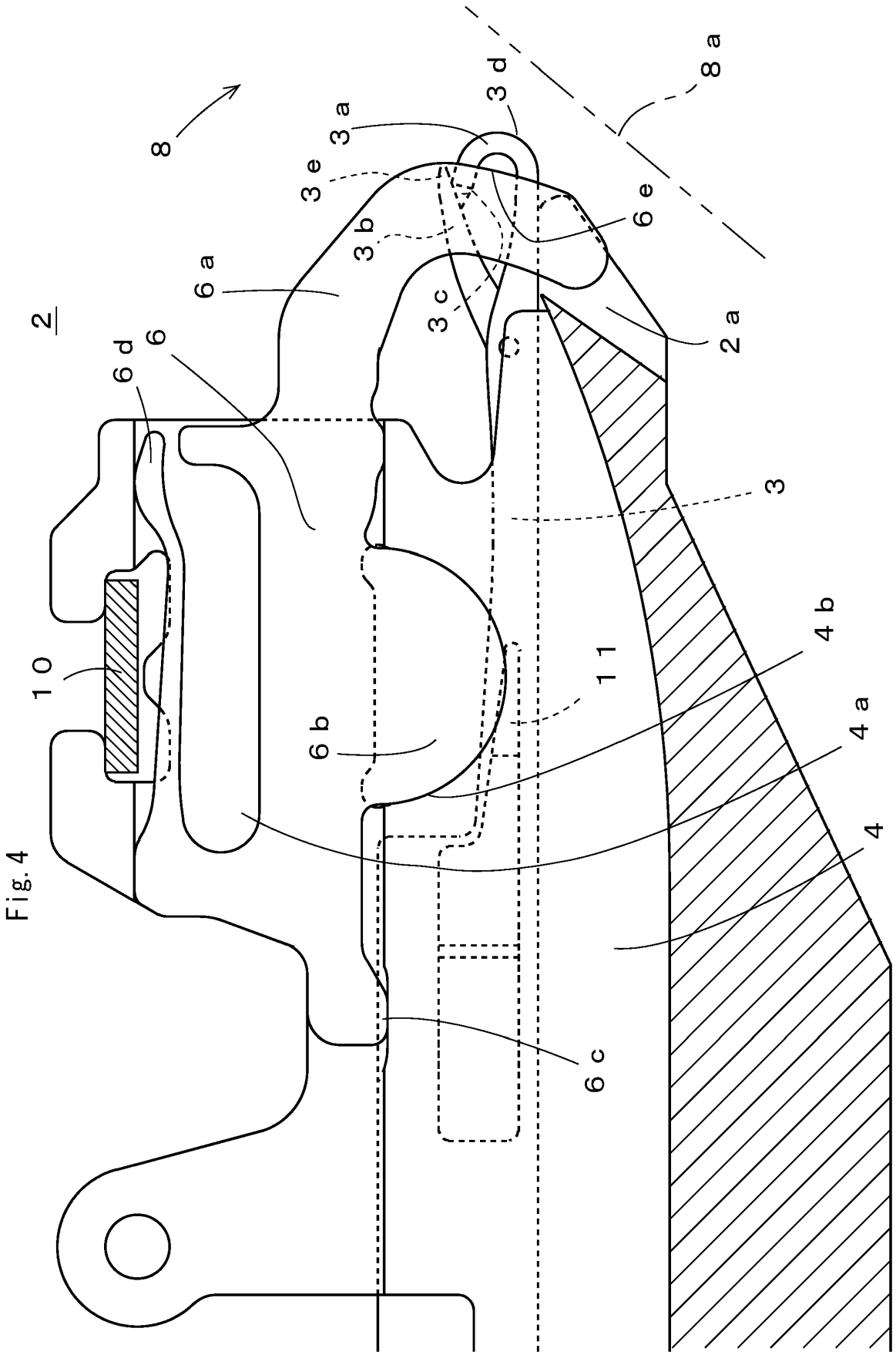


Fig.4

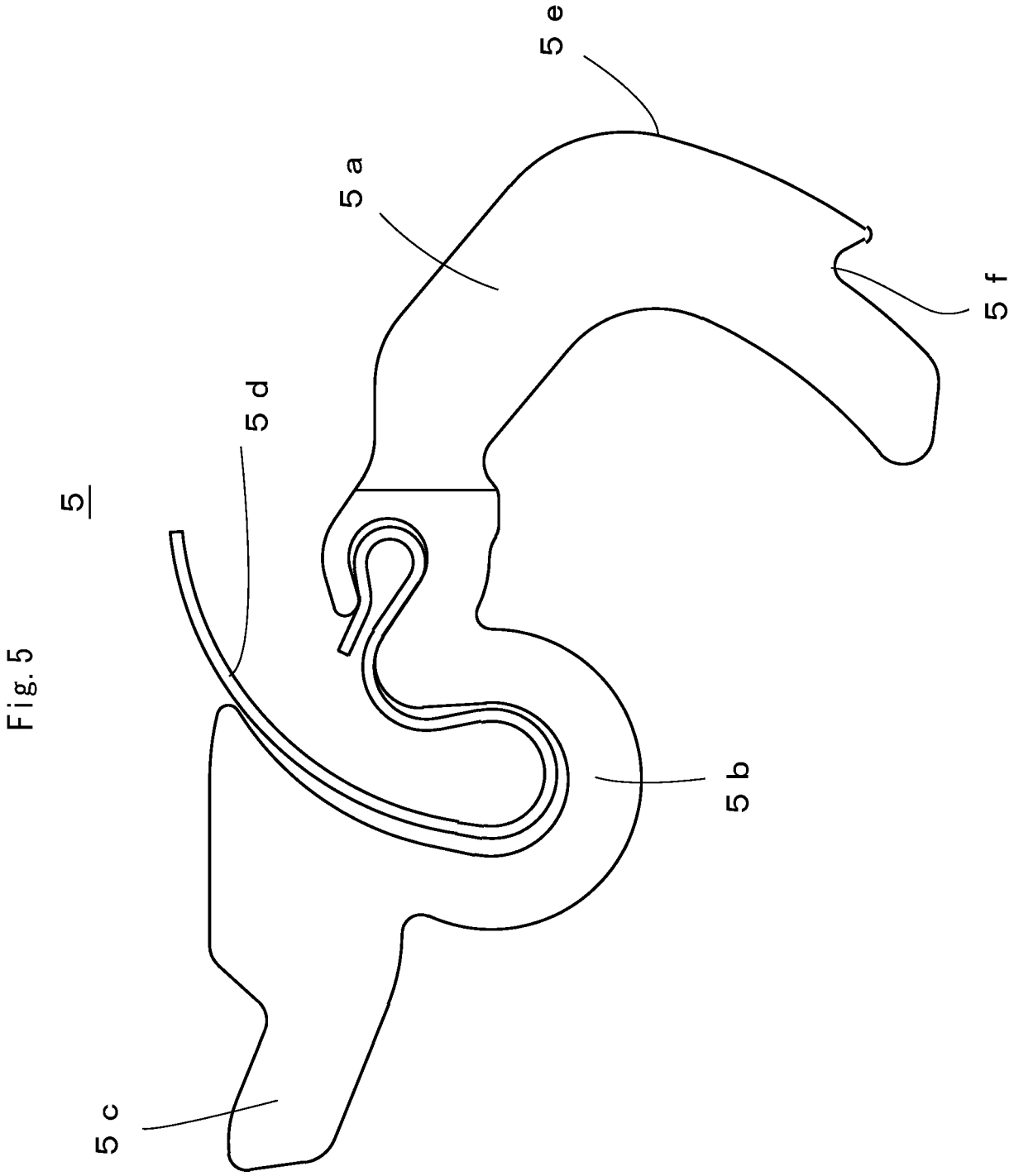
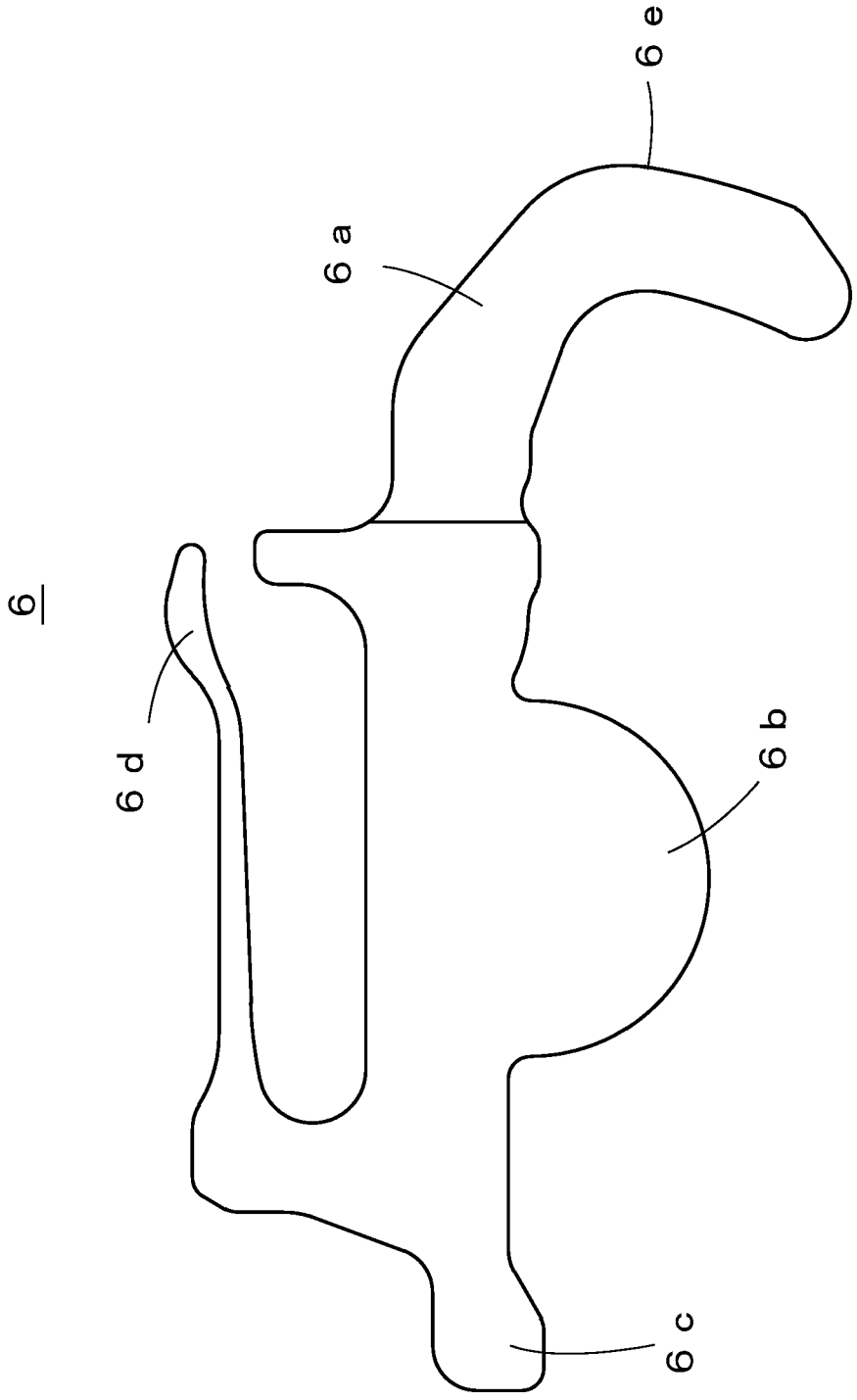


Fig. 5

Fig. 6



REFERENCES CITED IN THE DESCRIPTION

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