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(54) **Weft knitting machine**

(57) A weft knitting machine includes a needle bed (1) having a plurality of plate grooves (12) arranged in parallel, needle plates (3) provided upright from the respective plate grooves (12), and knitting needles (2) placed between the respective needle plates (3) adjacent to each other. Each of the needle plate (3) has first to fourth projections (51) to (54) which project to positions

coming substantially into contact with the needle plate (3) adjacent thereto on one side thereof and prevent each of the needle plate (3) from falling over. The respective projections (51) to (54) are provided at the mounting positions of wires of the related art that have been used to position the needle jack (22), the select jack (23), and the selector (24) with respect to the respective needle plates (3).

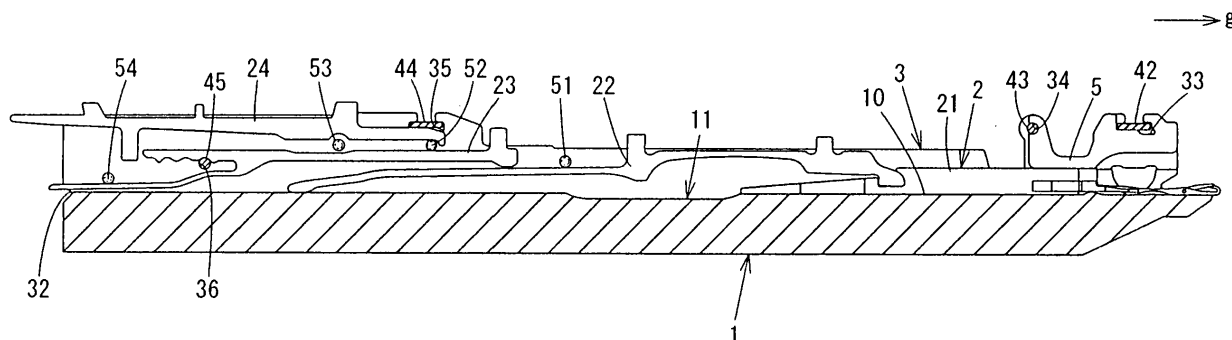


Fig. 1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a weft knitting machine having needle plates provided upright in a plurality of plate grooves arranged in parallel on a needle bed and knitting needles placed between the respective adjacent needle plates and, more specifically, to a weft knitting machine having a structure which prevents the respective needle plates from falling over.

2. Description of the Related Art

[0002] In the weft knitting machine of this type, since the pitch between knitting needles adjacent to each other becomes finer with an increase in the number of knitting needles, the needle plates are reduced in thickness and hence are liable to fall over in the lateral direction (direction of arrangement).

[0003] In Japanese Unexamined Patent Application Publication No. 2009-161870, an elongated plate fixing member is engaged in a plate fixing groove extending in the direction orthogonal to the plate grooves on the rear side of the needle bed (the opposite side from the tooth ports), and fixing depressions configured to engage the plate fixing member is formed on lower surfaces of the respective needle plates. By applying a pressing force directed toward a bottom portion of the plate fixing groove to the fixing depressions as the plate fixing member is fixed from below with bolts, the needle plates are attracted to the plate grooves and firmly fixed.

SUMMARY OF THE INVENTION

[0004] Incidentally, even though there is no problem when used in normal conditions, a load in the lateral direction (the direction orthogonal to the direction of reciprocately action of the knitting needles) applied to the needle plates via operation control members such as needle jacks, select jacks, selectors, and the like is increased with increase in knitting speed (traveling speed of a carriage).

[0005] In such a case, even though the device of the related art is capable of acting against the load in the lateral direction applied to the needle plates, such a load is applied to the upper portions of the needle plates (at the side opposite to the plate grooves). Therefore, the needle plates are subject to deflection, and may be fallen over due to an excessive load, and hence a method of acting against the load in the lateral direction effectively has been desired.

[0006] In view of such circumstances, it is an object of the present invention to provide a weft knitting machine which is capable of effectively acting against the load applied in the lateral direction on the upper sides of the

needle plates.

[0007] In order to achieve the above-described object, the invention provides a weft knitting machine including: a needle bed having a plurality of plate grooves arranged in parallel; needle plates provided upright from the respective plate grooves; and knitting needles placed between the respective needle plates adjacent to each other. Then, each of the needle plates has a projection on one side surface thereof, which projects to a position coming substantially into contact with a needle plate adjacent thereto on one side thereof and prevents each of the needle plates from falling over.

[0008] Preferably, the projection is provided at a position away from a trajectory generated during an operation of an operation control member that controls the operation of the respective knitting needles.

[0009] Preferably, the projection is also used as a positioning member configured to position the operation control member in needle grooves placed between the needle plates adjacent to each other, with respect to the respective needle plates.

[0010] Further, the projection is preferably integrally formed by pressing so as to protrude from a surface of the needle plates.

[0011] According to the weft knitting machine of the invention, each of the needle plates is formed on one side surface thereof with the projection which projects to the position coming substantially into contact with the needle plate adjacent thereto on one side of each and prevents the needle plates from falling over. Accordingly, the load in the lateral direction applied to the upper portion of the needle plates is released in sequence to the needle plate adjacent thereto via the projection, so that occurrence of deflection and falling over is prevented, and the needle plates are capable of acting against the load in the lateral direction effectively. In addition, only a simple structure such as providing the projection on one side surface of each of the needle plates is required.

[0012] Also, by providing the projection at a position away from the trajectory of the operation control member moving at the time of operation, the projection and the operation control member are prevented from colliding and the operation of the respective knitting needles by the operation control member may be performed smoothly.

[0013] Also, by using the projection as a positioning member which positions the operation control member with respect to each of the needle plates, the positioning member may be eliminated so that the reduction of the number of components is achieved.

[0014] Furthermore, by forming the projections so as to protrude integrally from the one side surface of each of the needle plates by pressing, the projections can be obtained without using new components, so that the reduction of the number of components may be achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a vertical cross-sectional side view of a needle bed of a weft knitting machine according to an embodiment of the invention, taken along a plane between plate grooves adjacent to each other in a direction of arrangement of plate grooves;

Fig. 2 is a vertical cross-sectional side view of the needle bed in Fig. 1, taken along one of the plate grooves arranged in the direction of arrangement; and

Fig. 3 is a cross-sectional view taken along the line A-A in Fig. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Subsequently, a preferred embodiment of a weft knitting machine according to the present invention will be described in detail with reference to the drawings.

[0017] Fig. 1 is a vertical cross-sectional side view of a needle bed of a weft knitting machine according to the invention, taken along a plane between plate grooves adjacent to each other in a direction of arrangement of plate grooves. Fig. 2 is a vertical cross-sectional side view of the needle bed, taken along one of the plate grooves arranged in the direction of arrangement.

[0018] The weft knitting machine according to the invention includes a plurality of plate grooves 12 arranged in parallel in a longitudinal direction of the needle bed 1 (the depth direction of the paper plane), needle plates 3 provided upright in the respective plate grooves 12, and knitting needles 2 arranged between the needle plates 3, 3 adjacent to each other. The knitting needles 2 are arranged in respective needle grooves 11 formed between the needle plates 3, 3 of the needle bed 1. The needle grooves 11 are positioned in spaces defined by the needle plates 3, 3 adjacent to each other and an upper surface 10 of the needle bed 1. In Fig. 1 and Fig. 2, a movable sinker provided on the side of a tooth port g (the distal end) of the needle plates 3 is omitted.

[0019] Provided on the side of the tooth port g of the needle bed 1 is a distal-end locking groove 13 extending in the direction orthogonal to the respective plate grooves 12 as shown in Fig. 2, and a wire 41 is arranged in the interior of the distal-end locking groove 13. Provided on the side of the tooth port g of each of the needle plates 3 is a distal-end locking depression 31 configured to lock the wire 41. The respective needle plates 3 are coated with an adhesive agent on the bottom surface thereof and are fitted into the plate grooves 12 so as to come into abutment with a deepest portion thereof in a state in which the wire 41 is locked with the interior of the distal-end locking depression 31. Formed on the side of each of the needle plates 3 opposite to the tooth port g side (the rear side) is a V-shaped notch 32. The needle plates 3 are fixed to the needle bed 1 by hitting and caulking

the V-shaped notch 32 with a pointed member (not shown) by a wedge effect. In other words, each of the needle plates 3 is pressed into the tooth port g side.

[0020] Each of the needle plates 3 is provided with an engaging groove 33 and an engaging hole 34 on the tooth port g side. Each of the needle plates 3 is positioned by a steel band 42 and a wire 43 extending in the direction of arrangement of the needle plates 3 being fitted respectively in the engaging groove 33 and the engaging hole 34, so that the heights are aligned.

[0021] The knitting needles 2 each include a needle body 21. The knitting needles 2 each also include a needle jack 22, a select jack 23, and a selector 24 as operation control members which control the operation of the needle body 21. Members 22 to 24 other than the needle body 21 are configured to sink into the interior of the needle groove 11 when a pressing force caused by a cam, a pressure, or the like is applied to butts provided on the respective members 22 to 24. The upper surface of the needle body 21 of the knitting needle 2 is configured to come substantially into contact with the lower surface of the spacer 5 so as not to come apart from the needle groove 11 when performing a reciprocal knitting operation in the direction of the tooth port g. The spacer 5 is positioned by engaging the steel band 42 and the wire 43.

[0022] Provided on one side surface (side surface on the near side of the paper plane in Fig. 1 and Fig. 2) of each of the needle plates 3 opposite to the tooth port g (left side in Fig. 1 and Fig. 2) are first to fourth projections 51 to 54 in sequence from the distal end.

[0023] Fig. 3 is a cross-sectional view taken along the line A-A in Fig. 2. As shown in Fig. 3, the projections 51 to 54 (only the third projection 53 is shown in Fig. 3) project to positions coming substantially in contact with the adjacent needle plates 3 on one side of each (the right side in Fig. 3) to prevent each of the needle plates 3 from falling over.

[0024] The respective projections 51 to 54 are provided at positions apart from trajectories of predetermined actions of the needle jack 22, the select jack 23 and the selector 24 (advancement and retraction, and ups and downs) to avoid collision at the time of movements of the members 22 to 24. More specifically, the projections 51 to 54 are provided at the mounting positions of wires of the related art that have been used to position the needle jack 22, the select jack 23, and the selector 24 with respect to the respective needle plates 3 so as not to come apart from the needle grooves. In conclusion, the projections 51 to 54 are also used as positioning members configured to position the needle jack 22, the select jack 23, and the selector 24 with respect to the respective needle plates 3 instead of the wires of the related art.

[0025] The projections 51 to 54 are integrally formed by pressing so as to protrude from one side surface of each of the needle plates 3. The projections 51 to 54 are formed to have a diameter s on one side surface, which is the protruding side, larger than the diameter t of the depression end edge depressed on the other side (the

left side in Fig. 3), so that the load in the lateral direction applied to the upper portions of the needle plates 3 when the knitting speed (the traveling speed of a carriage) is increased is released in sequence to the adjacent needle plates 3 by the projections 51 to 54. In this case, formation of the projections 51 to 54 by pressing is performed at the same time as the punching of the respective needle plates 3 or after the punching thereof. For reference, the projecting portions may be formed by mounting pin members or the like projecting from the corresponding surfaces on the respective needle plates 3.

[0026] Provided on each of the needle plates 3 above the second projection 52 is an engaging groove 35. Provided between the third projection 53 and the fourth projection 54 of each of the needle plates 3 is an engaging hole 36. The needle plates 3 are positioned by a steel band 44 and a wire 45 extending in the direction of arrangement of the needle plates 3 being fitted respectively in the engaging grooves 35 and the engaging holes 36, so that the heights are aligned. It is also applicable to form the projection at a position corresponding to the engaging hole 36 of each of the needle plates 3 instead of the wire.

[0027] In this embodiment, the load in the lateral direction applied to the upper portion of each of the needle plates 3 is released in sequence to the needle plates 3 adjacent thereto via the projections 51 to 54 with a simple configuration that the first to fourth projections 51 to 54 are provided simply on one side surface of each of the needle plates 3, so that occurrence of deflection and falling over is prevented, and the needle plates are capable of acting against the load in the lateral direction effectively.

[0028] Also, by providing the projections 51 to 54 at the mounting position of the wire of the related art, control of the operation of the needle body 21 by the needle jack 22, the select jack 23, and the selector 24 can be performed smoothly without collision with the projections 51 to 54. Furthermore, by using the first to fourth projections 51 to 54 as the positioning member of the needle jack 22, the select jack 23, and the selector 24, the positioning member can be eliminated to achieve reduction of the number of components.

[0029] Furthermore, by forming the first to fourth projections 51 to 54 so as to protrude integrally from the one side surface of each of the needle plates 3 by the pressing, the projections 51 to 54 can be obtained without using new components, so that the reduction of the number of components may be achieved.

[0030] The present invention is not limited to the embodiment described above. For example, in the embodiment described above, the projections 51 to 54 are provided at the mounting position of the wire configured to position the needle jack 22, the select jack 23, and the selector 24. However, the projections may be provided at any position as long as they are deviated from the trajectories of the members 22 to 24 at the time of operation.

[0031] Also, in the embodiment described above, the four projections 51 to 54 are provided on one side surface of each of the needle plates 3. However, the number of the projections is not limited thereto, and two or three, or five or more projections may also be provided.

Claims

1. A weft knitting machine comprising:
 - a needle bed (1) having a plurality of plate grooves (12) arranged in parallel;
 - needle plates (3) provided upright from the respective plate grooves (12); and
 - knitting needles (2) placed between the respective needle plates (3) adjacent to each other, wherein
 - each of the needle plates (3) has a projection on one side surface thereof, which projects to a position coming substantially into contact with a needle plate (3) adjacent thereto on one side thereof and prevents each of the needle plate (3) from falling over.
2. The weft knitting machine according to Claim 1, wherein the projection is provided at a position away from a trajectory generated during an operation of an operation control member that controls the operation of the respective knitting needles (2).
3. The weft knitting machine according to Claim 2, wherein the projection is used as a positioning member configured to position the operation control member in needle grooves (11) placed between the needle plates adjacent to each other, with respect to the respective needle plates (3).
4. The weft knitting machine according to any one of Claims 1 to 3, wherein the projection is integrally formed by pressing so as to protrude from one surface of the needle plate (3).

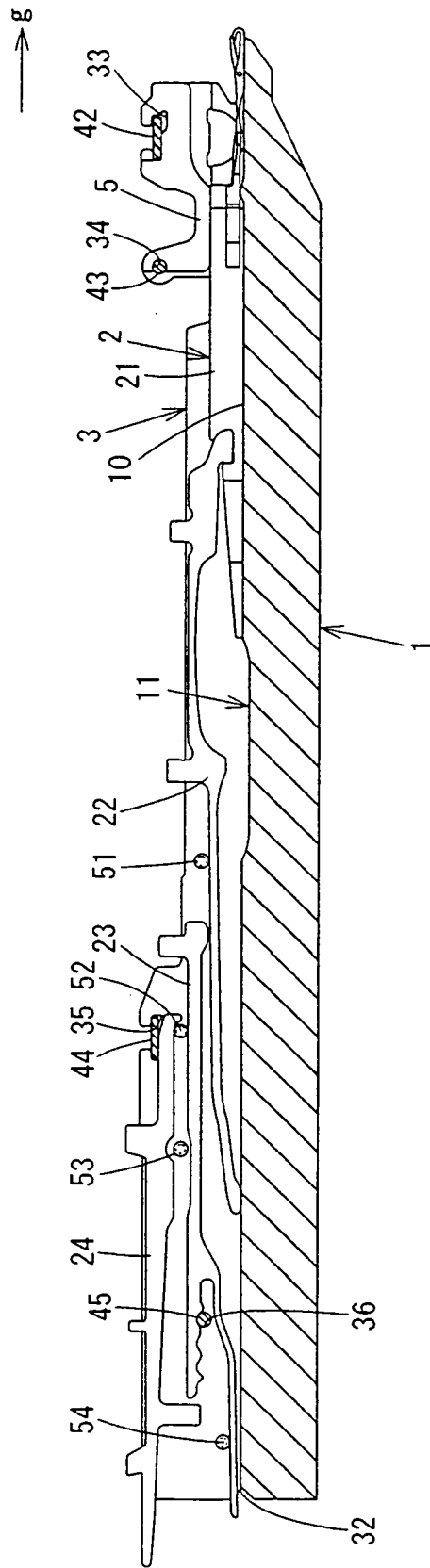


Fig. 1

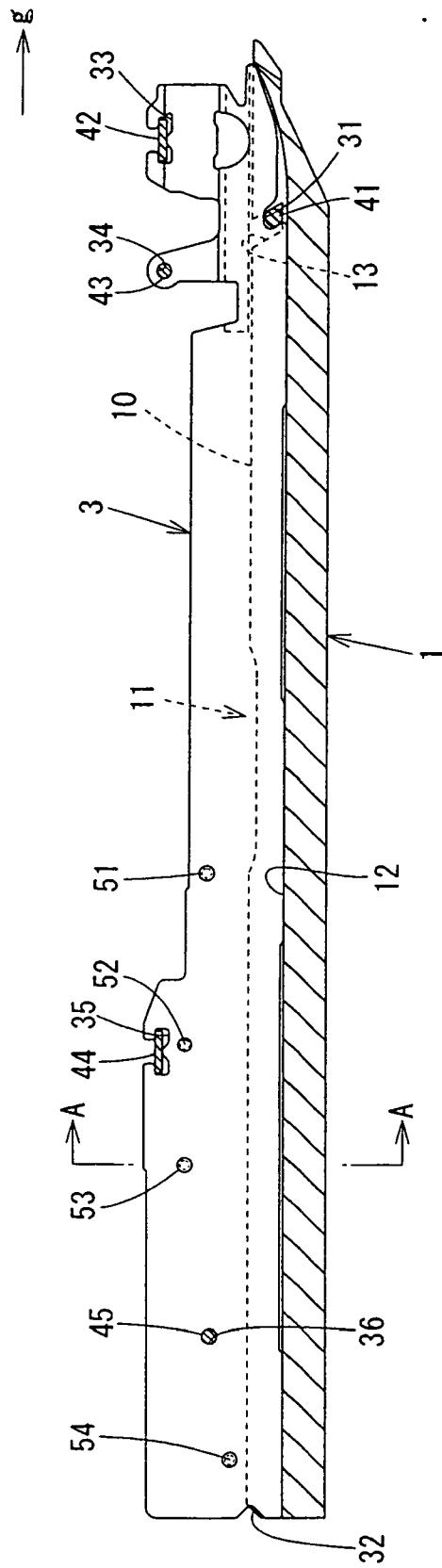


Fig. 2

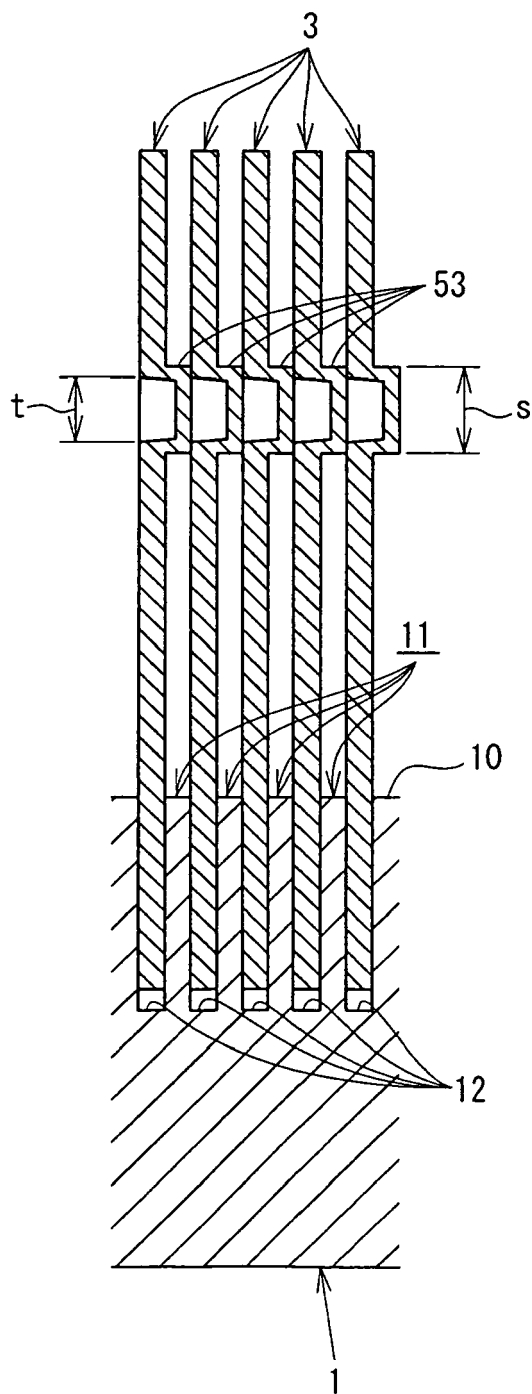


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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