



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.10.2013 Bulletin 2013/43

(51) Int Cl.:
D03J 1/22 (2006.01)

(21) Application number: **13001413.7**

(22) Date of filing: **19.03.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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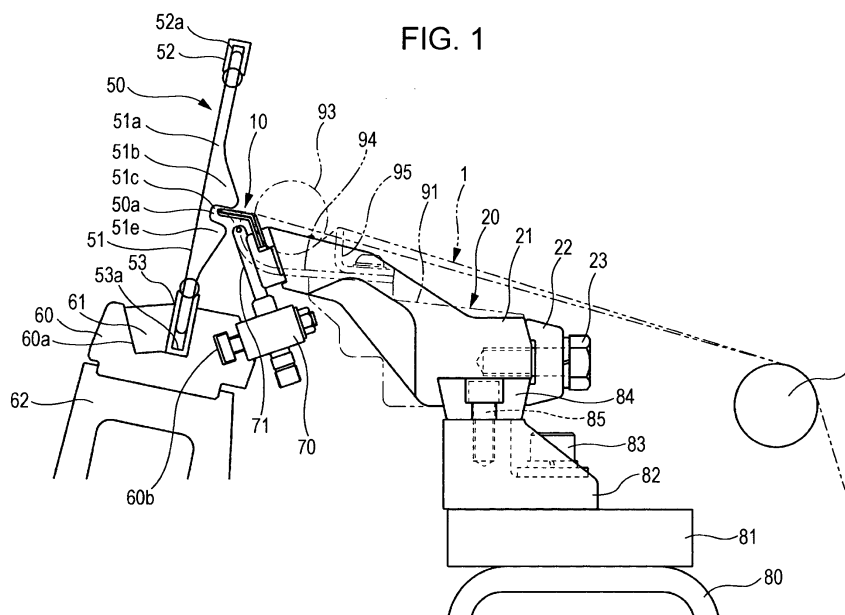
(30) Priority: **17.04.2012 JP 2012094128**

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(54) **Woven cloth supporting apparatus for air jet loom**

(57) A woven cloth supporting apparatus (10) for an air jet loom includes first and second guide members that extend in a weaving-width direction and that are supported by a beam member (80) that extends in the weaving-width direction. The first and second guide members overlap each other in the weaving-width direction at adjacent ends thereof, thereby supporting woven cloth (1) from below at a position near a cloth fell (1a). The first and second guide members each include an attachment base portion including an upwardly extending portion that extends upward and a woven cloth support portion that

extends toward the cloth fell (1a) from the upwardly extending portion and that includes a contact portion that supports the woven cloth. One of the guide members is arranged such that the upwardly extending portion thereof is farther from the cloth fell (1a) than the upwardly extending portion of the other of the guide members and the woven cloth support portion thereof is above the woven cloth support portion of the other of the guide members. The first and second guide members are arranged such that the contact portions thereof are positioned within a range of a weft guide groove (50a) in a reed (50) in the vertical direction at a beating-up time of the reed.



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to woven cloth supporting apparatuses for air jet looms, and more particularly, to a woven cloth supporting apparatus that supports woven cloth by contacting the woven cloth from below at a position near or in the vicinity of a cloth fell of the woven cloth in a warp direction.

2. Description of the Related Art

[0002] Japanese Unexamined Patent Application Publication No. 9-13250 (Patent Document 1) discloses an apparatus that supports woven cloth from below in the vicinity of a cloth fell in a loom (hereinafter referred to as a "known example").

[0003] The woven cloth supporting apparatus of the known example is supported by a beam member (temple bar) that extends in a weaving-width direction over a weaving width of the woven cloth. Cloth guide members are fixed to end portions of the temple bar in the weaving-width direction by support brackets (attachment brackets) that are movable in the weaving-width direction. A guide bar is fixed to a central portion of the temple bar in the weaving-width direction by, for example, attachment brackets. The two cloth guide members and the guide bar extend in the weaving width direction and support the woven cloth from below the woven cloth in the vicinity of the cloth fell.

[0004] According to the above-described known example, a plurality of guide bars having different lengths must be prepared to allow a change in the weaving width of the woven cloth (hereinafter referred to simply as a "change in the weaving width"). Therefore, there is a problem that the cost is high. When the weaving width is changed, the attachment bracket for the cloth guide member at a weft arrival side, which is opposite to a weft insertion side, in the weaving-width direction is moved along the temple bar in the weaving-width direction. Then, the guide bar is removed and a guide bar having a different length is attached to the central portion of the temple bar in the weaving-width direction. Therefore, there is also a problem that the work efficiency is low.

[0005] Japanese Unexamined Patent Application Publication No. 2001-248039 (Patent Document 2) discloses a woven cloth supporting apparatus according to the related art whose setting can be easily changed in accordance with a change in the weaving width.

[0006] The woven cloth supporting apparatus according to the related art is assembled to a guide bar base that extends in the weaving-width direction and mainly includes a pair of cloth end guides and a cloth center guide. The cloth end guides are spaced from each other in the weaving-width direction and support the woven

cloth from below at the ends of the woven cloth. The cloth center guide is arranged between the cloth end guides and supports the woven cloth from below between the cloth end guides. The cloth center guide and the cloth end guides are assembled together such that at least both end portions of the cloth center guide overlap the cloth end guides in the weaving-width direction and that at least one of the pair of cloth end guides and the cloth center guide are movable relative to each other in the weaving-width direction.

[0007] The setting of the above-described structure of the related art can be easily changed in accordance with a change in the weaving width by sliding one of the cloth end guides in the weaving-width direction and changing the amount of overlap between the cloth center guide and the cloth end guide.

[0008] Each of the guides disclosed in Patent Document 2 is L-shaped in cross section and includes an attachment portion (second plate-shaped portion) that is parallel to a horizontal attachment surface and an upwardly extending portion (first plate-shaped portion) that extends upward from the attachment portion. The upwardly extending portion includes a contact portion (top edge of the first plate-shaped portion) that contacts the bottom surface of the woven cloth to support the woven cloth.

[0009] In the case where the above-described structure of the related art is applied to a loom including a so-called flat reed, which is a reed including reed dents whose front surfaces (surfaces facing the woven cloth) are flat, as in the example described in Patent Document 2, the top edges of the guides that serve as the contact portions may be arranged in the vicinity of the cloth fell. Flat reeds are generally used in water jet looms.

[0010] Unlike water jet looms, air jet looms generally include a so-called profile reed, which is a reed including profile reed dents having recesses in front surfaces thereof, the recesses defining a weft guide groove at the front side of the reed. In such a loom, the woven cloth supporting apparatus cannot be arranged such that the contact portions are in the vicinity of the cloth fell. The reason for this will now be described.

[0011] In the case where a profile reed is used, the reed beats weft yarns at the bottom surface of the weft guide groove. Therefore, when the beating is performed, each reed dent is positioned such that an upper jaw (upper corner at the entrance of the recess) and a lower jaw (lower corner at the entrance of the recess) that define the weft guide groove (recess) protrude beyond the cloth fell toward the woven-cloth side.

[0012] In the structure according to the related art, the top edge of the upwardly extending portion that extends vertically upward from the attachment portion serves as the contact portion. Therefore, if the woven cloth supporting apparatus is arranged such that the contact portion is in the vicinity of the cloth fell, the upwardly extending portion interferes with the reed (in particular, with the upper jaw) at the beating-up time. Therefore, in the struc-

ture according to the related art, the contact portion (upwardly extending portion) must be separated from the cloth fell in the warp direction to avoid interference with the reed at the beating-up time.

[0013] When the position at which the woven cloth is supported by the woven cloth supporting apparatus (position of the contact portion) is separated from the cloth fell, the cloth fell cannot be stably positioned. As a result, a bumping phenomenon may occur in which a portion of the woven cloth near the cloth fell undulates at the beating-up time. In such a case, cloth having a desired weft density cannot be woven. In addition, since the cloth fell cannot be stably positioned in the vertical direction, the vertical position of the cloth fell may vary at the beating-up time. As a result, there is a risk that the texture of the woven cloth will be degraded or weaving bars will be generated. When the vertical position of the cloth fell varies, the state of the warp shed cannot be stabilized and shedding failure may occur, which leads to, for example, weft insertion failure.

SUMMARY OF THE INVENTION

[0014] The present invention has been made in light of the above-described circumstances, and an object thereof is to provide a woven cloth supporting apparatus whose setting can be easily changed in accordance with a change in the weaving width of woven cloth and with which the position of the cloth fell can be stabilized.

[0015] The present invention is premised on a woven cloth supporting apparatus for an air jet loom including a reed having a weft guide groove, which is defined by recesses formed in reed dents, in a front surface of the reed, and a beam member that extends in a weaving-width direction over a weaving width of a woven cloth, the woven cloth supporting apparatus including a first guide member and a second guide member that are supported by the beam member and that extend in the weaving-width direction, the first and second guide members overlapping each other in the weaving-width direction at adjacent ends thereof, thereby contacting and supporting the woven cloth from below at a position near a cloth fell of the woven cloth in a warp direction.

[0016] According to the present invention, each of the first and second guide members includes an attachment base portion that is supported by the beam member and that includes an upwardly extending portion that extends at least upward, and a woven cloth support portion that extends toward the cloth fell from the upwardly extending portion of the attachment base portion and that includes a contact portion that contacts and supports the woven cloth at least at a cloth-fell-side end of the woven cloth support portion. Among the first and second guide members, one of the guide members is arranged such that the upwardly extending portion thereof is farther from the cloth fell than the upwardly extending portion of the other of the guide members and the woven cloth support portion thereof is above the woven cloth support portion of

the other of the guide members in the state in which the first and second guide members are supported by the beam member. The first and second guide members are arranged such that the contact portions thereof are positioned within a range of the weft guide groove in the reed in the vertical direction at a beating-up time of the reed.

[0017] Here, the expression "extends at least upward" means that a direction in which each "upwardly extending portion" extends includes at least a vertical component. Therefore, each "upwardly extending portion" is not limited to a vertically extending portion, and may instead be a portion that extends obliquely upward. As long as each "attachment base portion" includes the "upwardly extending portion", a portion that extends, for example, horizontally may be additionally included. Alternatively, the "attachment base portion" may include only the "upwardly extending portion".

[0018] In the woven cloth supporting apparatus according to the present invention, a length of the woven cloth support portion of the other of the guide members may be such that the woven cloth support portion protrudes toward the cloth fell from the woven cloth support portion of the one of the guide members in the warp direction, and the contact portion of the woven cloth support portion of the other of the guide members may extend upward at a cloth-fell-side end of a portion of the woven cloth support portion that protrudes from the woven cloth support portion of the one of the guide members, and be formed so as to support the woven cloth at the same height as a height at which the contact portion of the woven cloth support portion of the one of the guide members supports the woven cloth.

[0019] Here, "the same height" includes both the case in which the heights are precisely the same and the case in which the heights slightly differ from each other under visual observation. When, for example, the travel line of the woven cloth, that is, a line connecting the cloth fell and the most upstream guide roller for the woven cloth is horizontal in side view of the loom, the heights are preferably precisely the same. However, as long as the quality of the woven cloth is not affected, the heights may slightly differ from each other. In the case where the travel line is inclined, the contact portion of the other of the guide members and the contact portion of the one of the guide members are preferably at different heights in the vertical direction so that the contact portions support the woven cloth at the same height along the travel line. However, also in this case, the heights along the travel line may slightly differ from each other as long as the quality of the woven cloth is not affected. Thus, "the same height" according to the present invention includes the case in which the heights in the vertical direction are the same, the case in which the heights with respect to the travel line are the same, and the case in which the heights slightly differ from each other in the each of these cases.

[0020] The woven cloth supporting apparatus according to the present invention may include a guide member

other than the first and second guide members as a guide member that supports the woven cloth. Specifically, in the woven cloth supporting apparatus, the first and second guide members may be arranged such that a bottom surface of the woven cloth support portion of the one of the guide members is in contact with a top surface of the woven cloth support portion of the other of the guide members in a region in which the first and second guide members overlap. In such a case, the woven cloth supporting apparatus may further include a third guide member that extends at least over a part of a region in which the other of the guide members extend in the weaving-width direction, the part excluding the region in which the other of the guide members overlaps the one of the guide members, the third guide member supporting the woven cloth at a position farther from the cloth fell than the one of the guide members in the warp direction and above a portion of the woven cloth support portion of the other of the guide members excluding the contact portion in the vertical direction.

[0021] The woven cloth supporting apparatus according to the present invention may further include a support bracket that supports at least one of the first and second guide members. The support bracket may include a clamping unit at an upper end thereof, the clamping unit including a groove portion that opens upward and in the weaving-width direction, and support the at least one of the first and second guide members by clamping the attachment base portion of the at least one of the first and second guide members in a front-rear direction while the attachment base portion is inserted into the groove portion of the clamping unit from above. The support bracket may be provided with a regulating member that regulates a height of the at least one of the first and second guide members in the groove portion of the clamping unit.

[0022] The woven cloth supporting apparatus according to the present invention includes the first and second guide members that extend in the weaving-width direction and that are arranged so as to overlap each other in the weaving-width direction at the adjacent ends thereof and extend over a weaving width of the woven cloth in the weaving-width direction. Therefore, when the weaving width of the woven cloth is changed, the setting of the woven cloth supporting apparatus can be easily changed in accordance with the change in the weaving width by a simple process without using an additional guide member by sliding at least one of the guide members in the weaving-width direction and changing the amount of overlap between the guide members.

[0023] The first and second guide members of the woven cloth supporting apparatus according to the present invention correspond to members including contact portions (portions that contact the bottom surface of the woven cloth to support the woven cloth) at the top edges of upwardly extending portions in a woven cloth supporting apparatus according to the related art. The first and second guide members differ from the corresponding members according to the related art in that each of the first

and second guide members includes the woven cloth support portion that extends toward the cloth fell from the upwardly extending portion and that includes the contact portion at the cloth-fell-side end thereof. The woven cloth is supported by the contact portion of the woven cloth support portion of each guide member. Therefore, when the woven cloth supporting apparatus is arranged such that the contact portion is located at a height within the weft guide groove in the reed (so-called profile reed) at the beating-up time, the woven cloth can be supported at a position near the cloth fell without causing each guide member to interfere with the reed.

[0024] The woven cloth supporting apparatus according to the present invention is not applied to a case in which a so-called flat reed is used and guide members having substantially the same shape are simply arranged so as to overlap each other at the ends thereof, as in the related art. Instead, the woven cloth supporting apparatus according to the present invention is applied to a case in which a so-called profile reed is used. The other of the guide members, which is near the cloth fell, is formed so that the contact portion of the woven cloth support portion thereof supports the cloth fell at the same height as the height at which the contact portion of the woven cloth support portion of the one of the guide members supports the woven cloth. Therefore, the woven cloth is supported by the guide members at the same height. Accordingly, the cloth fell of the woven cloth is stably supported at the same height over the entire width thereof, and shedding failure and degradation of the texture of the woven cloth that occur when the height of the cloth fell is unstable can be effectively prevented.

[0025] In the case where the woven cloth supporting apparatus according to the present invention includes the third guide member having the above-described structure, the woven cloth can be supported by the contact portion of the other of the guide members and the third guide member in the region in which the one of the guide members is not present. With this structure, a reduction in quality of the woven cloth due to contact between the woven cloth support portion of the other of the guide members (hereinafter referred to also as "the other of the woven cloth support portions" and the woven cloth can be prevented. The reason for this will now be described in detail.

[0026] Here, assume that the first and second guide members are arranged such that the bottom surface of the woven cloth support portion of the one of the guide members that is disposed above the other of the guide members (hereinafter referred to also as "one of the woven cloth support portions") is in contact with the top surface of the other of the woven cloth support portions. In such a case, when the amount of overlap between the guide members is changed in accordance with a change in the weaving width as in the related art, the bottom surface of the one of the woven cloth support portions slides along the top surface of the other of the woven cloth support portions as the guide members are moved

relative to each other in the weaving- width direction to change the amount of overlap therebetween. As a result, scratches (burrs) may be formed on the top surface of the other of the woven cloth support portions. In such a case, if the travel line of the woven cloth is inclined so as to approach the other of the woven cloth support portions as the distance from the cloth fell increases, the woven cloth may come into contact with the part on which the scratches (burrs) are formed. Therefore, there is a risk that the woven cloth will be damaged and the quality of the woven cloth will be reduced.

[0027] In contrast, when the above-described third guide member is provided, the woven cloth is guided by the top edge of the contact portion of the other of the woven cloth support portions and the top edge of the third guide member. Therefore, the woven cloth does not come into contact with a portion of the other of the woven cloth support portions excluding the contact portion. As a result, the woven cloth can be prevented from being damaged.

[0028] Furthermore, the woven cloth supporting apparatus according to the present invention may include the support bracket that supports the guide members by clamping the guide members with the clamping unit and that is provided with the above- described regulating member. In such a case, the heights at which the guide members are disposed can be easily set after the weaving width is changed. This will be described in more detail.

[0029] To support the guide members in an intermediate region in the weaving-width direction (region excluding the regions around the cloth edges), a plurality of support brackets are generally arranged in weaving-width direction, and the guide members are generally supported by the support brackets. Each of the support brackets for supporting the guide members includes the clamping unit including the groove portion into which the guide members are inserted from above. Each support bracket secures and supports the guide members by clamping the guide members that have been inserted into the groove portion. When such a support structure is adopted, the groove portion of the clamping unit may have a depth such that the position at which the woven cloth is supported by each guide member (height of the contact portion) can be adjusted in accordance with, for example, weaving conditions. In other words, the clamping unit may be capable of clamping and supporting the guide members not only in a state in which the bottom ends of the guide members are in contact with the bottom surface of the groove portion but also in a state in which the bottom ends of the guide members are separated from the bottom surface of the groove portion.

[0030] In the case where each support bracket has the above-described support structure, the guide members may be arranged at heights other than the heights at which the bottom ends thereof are in contact with the bottom surface of the groove portion. In such a case, when the clamping unit is loosened, the guide members become movable downward from set heights at which

they have been arranged. In other words, the guide members become movable to any height from the set heights. Therefore, when the guide members are moved in the weaving-width direction in accordance with a change in the weaving width or when the guide members are removed from the support brackets for maintenance or the like and then attached to the support brackets again, a cumbersome process of fine adjustment is required to set the position at which the woven cloth is supported. In the case where the woven cloth supporting apparatus according to the present invention includes a support bracket having the above-described support structure, the above-described regulating member may be provided so as to regulate the positions of the bottom ends of the guide members in the groove portion. In such a case, the regulating member serves to position the guide members to the above-described set heights, and the guide members may be easily returned to the original heights by a simple process.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031]

Fig. 1 is a side view of an air jet loom including a woven cloth supporting apparatus according to an embodiment of the present invention;

Fig. 2 is a plan view of a part of the air jet loom illustrated in Fig. 1 that relates to the woven cloth supporting apparatus;

Fig. 3 is a side view of the woven cloth supporting apparatus according to the embodiment of the present invention;

Figs. 4A and 4B are a side view and a plan view, respectively, of a portion that supports a center guide bar, a side guide bar, and a cloth guide bar;

Figs. 5A and 5B are a side view and a plan view, respectively, of a portion that supports only the side guide bar;

Figs. 6A and 6B are a side view and a plan view, respectively, of a portion that supports the center guide bar and the cloth guide bar in a region where the side guide bar is not present;

Figs. 7A, 7B, and 7C are side views of woven cloth supporting apparatuses according to modifications;

Fig. 8 is a side view of a woven cloth supporting apparatus according to another modification;

Fig. 9 is a side view of a woven cloth supporting apparatus according to another modification;

Fig. 10 is a side view of a woven cloth supporting apparatus according to another modification;

Fig. 11 is a side view of a woven cloth supporting apparatus according to another example; and

Fig. 12 is a plan view of the woven cloth supporting apparatus illustrated in Fig. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] Fig. 1 is a side view of an air jet loom including a woven cloth supporting apparatus 10 according to an embodiment of the present invention. Fig. 1 illustrates the structures of a reed 50, a part to which the reed 50 is fixed, and a part that supports the woven cloth supporting apparatus 10. Fig. 2 is a plan view of a part of the air jet loom. Fig. 2 illustrates the structures of the part that supports the woven cloth supporting apparatus 10 and the woven cloth supporting apparatus 10. Fig. 3 is a side view of the woven cloth supporting apparatus 10. The above-mentioned structures will now be described.

[0033] The reed 50 includes a plurality of reed dents 51 that are arranged with intervals therebetween in a weaving-width direction of woven cloth 1, an upper cap 52, a lower cap 53, and left and right caps (not shown). Each reed dent 51 has the shape of a plate that extends in a vertical direction and has a substantially uniform thickness. Each reed dent 51 mainly includes a reed dent main body 51a that is band shaped and extends in the vertical direction. The reed dent main body 51a includes substantially triangular protrusions 51b and 51e on a front surface thereof that faces the cloth-fell-side surface thereof. The protrusions 51b and 51e are formed in a central area of the reed dent main body 51a in the vertical direction, and a recess 51c is formed therebetween.

[0034] The reed dents 51 are arranged inside a frame formed of the upper cap 52, the lower cap 53, and the left and right caps such that top and bottom end portions thereof are received by grooves 52a and 53a in the upper and lower caps 52 and 53, respectively. The reed dents 51 are arranged next to each other with intervals therebetween in a weft insertion direction such that the thickness direction thereof coincides with the weft insertion direction. The recesses 51c formed in the reed dents 51 define a weft guide groove 50a. The weft guide groove 50a is formed at the front side of the reed 50.

[0035] The reed 50 is supported by a reed holder 60 at the lower cap 53 thereof. Specifically, the air jet loom includes the reed holder 60 that extends in the weaving-width direction below the warp yarns in the vicinity of a cloth fell 1a of the woven cloth 1. The reed holder 60 includes an attachment groove 60a that opens upward. The lower cap 53 is disposed in the attachment groove 60a of the reed holder 60 and is clamped by a reed gripper 61, which is also disposed in the attachment groove 60a, and an inner wall of the attachment groove 60a. Thus, the reed 50 is supported so as to extend upward from the reed holder 60.

[0036] The reed holder 60 is supported on a rocking shaft (not shown) by slay swords 62 arranged with intervals therebetween in the weaving-width direction. The reed holder 60 has an attachment groove 60b used to fix sub-nozzles 71 in a front surface thereof. The attachment groove 60b extends in the weaving-width direction, and the sub-nozzles 71, which are attached to sub-nozzle holders 70, are fixed to the attachment groove 60b with

predetermined intervals therebetween. A weft yarn is inserted into the weft guide groove 50a in the reed 50 from a weft insertion side, and is guided toward a weft arrival side, which is opposite to the weft insertion side, by air ejected from the sub-nozzles 71. During the weft insertion process, the rocking shaft rotates so as to rock the reed holder 60, thereby rocking the reed 50. Accordingly, the reed 50 beats the inserted weft yarn against the cloth fell 1a of the woven cloth 1.

[0037] The air jet loom includes loom frames (not shown) on the left and right sides thereof in the weaving-width direction. A front top stay 80, which serves as a "beam member" according to the present invention, extends between the frames in the weaving-width direction. Slide bar holders 82 are fixed by screw members 83 to the top surface of the front top stay 80 with intervals therebetween in the weaving-width direction. A spacer 81 is interposed between each slide bar holder 82 and the front top stay 80. A slide bar 84, which extends in the weaving-width direction, is fixed to the top surfaces of the slide bar holders 82 with screw members (hexagon socket head cap screws) 85. The slide bar 84 has a trapezoidal shape whose top and bottom sides have different lengths in cross section.

[0038] Temple holders 91 are fixed to the slide bar 84 at both sides of the woven cloth 1 in the weaving-width direction. Temple brackets 92 (not shown in Figs. 1 to 3, see Fig. 11) are fixed to the temple holders 91 at positions outside the woven cloth 1 in the weaving-width direction. Each temple bracket 92 includes a standing portion that is positioned outside the woven cloth 1 in the weaving-width direction and an extending portion that extends from the standing portion above the woven cloth 1 in the weaving-width direction of the woven cloth 1.

[0039] Temples 93 are arranged near cloth edges 1b so as to extend in the weaving-width direction in the vicinity of the cloth fell 1a in the warp direction. In the illustrated example, the temples 93 are of a top-mounted type and are placed on the upper side of the woven cloth 1. Outer and inner ends of each temple 93 in the weaving-width direction are respectively supported by the standing portion and the extending portion of the corresponding temple bracket 92.

[0040] A temple base 94 and a temple guide 95 are fixed to each temple holder 91. The temple base 94 and the temple guide 95 are L-shaped in cross section. A part of the temple guide 95 that is attached to the temple holder 91 includes a standing portion at the cloth-fell-side end thereof, and the standing portion is located farther from the cloth fell than the temple 93. The temple base 94 extends below the temple 93 from a region where the temple base 94 is attached to the temple holder 91 toward the cloth fell, and includes a standing portion at an end thereof. The standing portion extends along an arc curve and is located closer to the cloth fell than the temple 93. The woven cloth 1 is guided so as to wrap around the bottom surface of the temple 93 while being in contact with the ends of the standing portions of the temple base

94 and the temple guide 95. Thus, the woven cloth 1 is prevented from shrinking.

[0041] The woven cloth supporting apparatus 10 according to the embodiment of the present invention is fixed to the slide bar 84. In the present embodiment, the woven cloth supporting apparatus 10 includes a single center guide bar 11, which serves as a first guide member, and two (a pair of) side guide bars 12, which serve as second guide members. The side guide bars 12 are disposed at both edges of the woven cloth 1, and the center guide bar 11 is disposed between the side guide bars 12. In the present embodiment, the side guide bars 12 correspond to "one of the guide members" among the first and second guide members according to the present invention and the center guide bar 11 corresponds to "the other of the guide members" according to the present invention.

[0042] In the present embodiment, the woven cloth supporting apparatus 10 includes a cloth guide bar 13, which serve as a third guide member, in addition to the first guide member (center guide bar 11) and the second guide members (side guide bars 12). In the present embodiment, the cloth guide bar 13 has the same length (dimension in the longitudinal direction) as that of the center guide bar 11, and is located at the same position as the center guide bar 11 in the weaving-width direction. The woven cloth supporting apparatus 10 according to the present embodiment, which includes the guide bars 11, 12, and 13, is arranged between the temple bases 94 at both sides. In the illustrated air jet loom, a travel line along which the woven cloth 1 is guided from the cloth fell 1a to the most upstream guide roller 2 in the woven-cloth movement direction is downwardly inclined.

[0043] The guide bars 11, 12, and 13 are supported by a plurality of support brackets 20 that are fixed to the slide bar 84 at predetermined positions in the weaving-width direction. In other words, the guide bars 11, 12, and 13 are supported by the slide bar 84 through the support brackets 20. Thus, the woven cloth supporting apparatus 10 according to the present embodiment includes the support brackets 20 that form a support structure for the guide bars 11, 12, and 13. As described above, the slide bar 84 is supported by the front top stay 80, which serves as a beam member. Therefore, the support by the slide bar 84 is equivalent to the support by the beam member. The guide bars 11, 12, and 13 are supported by the support brackets 20 at upwardly extending portions 11a, 12a, and 13a, which will be described below, thereof. In the present embodiment, the guide bars 11, 12, and 13 respectively include attachment base portions 11y, 12y, and 13y which are supported by the beam member, and the entireties of the attachment base portions 11y, 12y, and 13y serve as the upwardly extending portions 11a, 12a, and 13a, which will be described below. Each support bracket 20 includes a guide bar holder 21 that is fixed to the slide bar 84 and a clamp holder 30 that is provided at an end (cloth-fell- la- side end) of the guide bar holder 21 and serves

as a clamping member.

[0044] The guide bar holder 21 of each support bracket 20 includes a fixing portion at the rear end thereof, and is fixed to the slide bar 84 by fastening a stopper member 22 to the fixing portion with a screw member 23 and clamping the slide bar 84, which has a trapezoidal shape in cross section, in the front-rear direction. The guide bar holder 21 extends obliquely upward from the fixing portion toward the cloth fell, and has a clamp surface 21a at the front end thereof. The clamp surface 21a and the clamp holder 30 form a clamping unit 24 that clamps the attachment base portions 11y, 12y, and 13y of the guide bars 11, 12, and 13, respectively, in the front-rear direction.

[0045] The clamp holder 30 mainly includes a clamping portion 31 and an attachment portion 32. When viewed in the weaving-width direction, the dimension of the attachment portion 32 in the thickness direction (clamping direction) is greater than that of the clamping portion 31. The attachment portion 32 has front and rear surfaces that extend in the weaving-width direction. A projecting portion 33 that projects in the thickness direction and extends in the weaving-width direction is integrally formed on a lower part of the front surface (surface facing away from the cloth fell) of the attachment portion 32. The clamp holder 30 is arranged such that the front surface of the attachment portion 32 on which the projecting portion 33 is formed faces the clamp surface 21a of the guide bar holder 21.

[0046] The attachment portion 32 of the clamp holder 30 has an internally threaded hole 32a that extends therethrough in the thickness direction at a central position thereof in the vertical direction. A portion of the guide bar holder 21 on which the clamp surface 21a is formed has a through hole 21b that extends therethrough in a direction orthogonal to the clamp surface 21a. The clamp holder 30 is secured such that the end face of the projecting portion 33 is in contact with the clamp surface 21a of the guide bar holder 21 by inserting a screw member 25 through the through hole 21b in the guide bar holder 21 from the guide- bar- holder- 21 side and screwing the screw member 25 into the internally threaded hole 32a.

[0047] In this state, only the projecting portion 33 of the clamp holder 30 is in contact with the clamp surface 21a of the guide bar holder 21, and the screw member 25 is disposed above the position of contact. Therefore, the clamp holder 30 pivots toward the clamp surface 21a of the guide bar holder 21 around the top edge of the projecting portion 33 when the screw member 25 is tightened. As a result, the clamping portion 31, which is positioned above the attachment portion 32, moves toward the clamp surface 21a of the guide bar holder 21.

[0048] The dimension of the clamping portion 31 in the thickness direction is smaller than that of the attachment portion 32. The clamping portion 31 is formed integrally with the attachment portion 32 such that the rear surface (surface facing the reed) thereof is flush with the rear surface of the attachment portion 32. Accordingly, the

clamping portion 31 is formed only on the rear part of the top surface of the attachment portion 32 and is not provided on the front part of the top surface of the attachment portion 32. Accordingly, a step 34 is formed on the front part of the top surface of the attachment portion 32. In the state in which the clamp holder 30 is attached to the guide bar holder 21 (clamp surface 21a) with the screw member 25, a groove portion 24a is defined in the clamping unit 24 by the clamp surface 21a of the guide bar holder 21, the step 34, and a surface (clamp surface 31a) of the clamping portion 31 of the clamp holder 30 that faces the guide bar holder 21. The groove portion 24a opens upward and in the weaving-width direction.

[0049] The guide bars 11, 12, and 13 are inserted into the groove portion 24a through the open top thereof, and are clamped by the clamp surface 21a of the guide bar holder 21 and the clamp surface 31a of the clamp holder 30 in the front-rear direction (thickness direction) when the screw member 25 is fastened as described above. In the illustrated example, a first shim S1 is also inserted into the groove portion 24a, and the guide bars 11, 12, and 13 are secured together with the first shim S1.

[0050] The center guide bar (first guide member) 11 included in the woven cloth supporting apparatus 10 will now be described in detail. In the present embodiment, the center guide bar 11 is located closer to the cloth fell than the other guide bars 12 and 13 in the warp direction. Accordingly, in the present embodiment, the center guide bar 11 corresponds to "the other of the guide members" according to the present invention.

[0051] In the illustrated example, the center guide bar 11 is formed by bending a plate having a predetermined length in the width direction at a position near the middle position of the plate. The center guide bar 11 includes an attachment base portion 11y, which is a portion below the bent portion, and a woven cloth support portion 11x, which extends continuously from the attachment base portion 11y at a predetermined angle (about 120° in the illustrated example) with respect to the attachment base portion 11y when viewed in the width direction.

[0052] The center guide bar 11 is fixed to each support bracket 20 at the attachment base portion 11y thereof. In the illustrated example, the entirety of the attachment base portion 11y is formed as an upwardly extending portion 11a that extends upward, and the attachment base portion 11y does not include a portion other than the upwardly extending portion 11a. Therefore, in the present embodiment, the entirety of the attachment base portion 11y serves as the upwardly extending portion 11a, and it can be said that the woven cloth support portion 11x, which extends from the attachment base portion 11y, extends from the upwardly extending portion 11a of the attachment base portion 11y.

[0053] In the present embodiment, an end portion of the woven cloth support portion 11x at an end opposite the attachment base portion is bent upward at approximately 90° with respect to the direction in which the woven cloth support portion 11x extends. The portion that

is bent so as to extend upward, more particularly, the top edge of that portion, functions as a contact portion 11z.

[0054] The center guide bar 11 is fixed to and supported by each support bracket 20 such that the surface of the attachment base portion 11y that faces the cloth fell is in contact with the clamp holder 30 of the clamping unit 24 of the support bracket 20.

[0055] The distance by which the woven cloth support portion 11x extends from the attachment base portion 11y in the warp direction is set so that the contact portion 11z is in the vicinity of the cloth fell 1a (slightly farther from the warp yarns than the cloth fell 1a) when the center guide bar 11 is in an installed state, in which the center guide bar 11 is fixed to and supported by the support brackets 20, and does not come into contact with the bottom surface of the weft guide groove 50a of the reed 50 at the beating-up time.

[0056] The height at which the center guide bar 11 is located is set so that, when the center guide bar 11 is in the installed state, the end portion (the contact portion 11z) of the woven cloth support portion 11x supports the woven cloth 1 in the weft guide groove 50a of the reed 50 at the beating-up time. The height of the center guide bar 11 (woven cloth support portion 11x) is set by setting the amount by which the attachment base portion 11y is inserted into the groove portion 24a of the clamping unit 24 in each support bracket 20.

[0057] The side guide bars (second guide members) 12 included in the woven cloth supporting apparatus 10 will now be described in detail. In the present embodiment, two (a pair of) side guide bars 12 are provided. The side guide bars 12 are arranged adjacent to the respective temple bases 94, which are provided at both cloth edges in the weaving-width direction.

[0058] In the illustrated example, each side guide bar 12 has substantially the same structure as that of the center guide bar 11 except for the contact portion 11z. Specifically, each side guide bar 12 is formed by bending a plate member at a predetermined angle, and includes only an attachment base portion 12y which is a portion below the bent portion and a woven cloth support portion 12x which extends from the attachment base portion 12y at a predetermined angle with respect to the attachment base portion 12y. The attachment base portion 12y is formed only of an upwardly extending portion 12a that extends upward. In other words, the entirety of the attachment base portion 12y serves as the upwardly extending portion 12a. In each side guide bar 12, the top surface of the woven cloth support portion 12x functions as a contact portion 12z.

[0059] Each side guide bar 12 is arranged so that the attachment base portion 12y thereof is farther from the cloth fell than the attachment base portion 11y of the center guide bar 11 and the woven cloth support portion 12x thereof is above the woven cloth support portion 11x of the center guide bar 11. Accordingly, in the present embodiment, the side guide bars 12 correspond to the "one of the guide members" according to the present

invention.

[0060] The lengths (widths) of the side guide bars 12 and the center guide bar 11 in the weaving-width direction will now be described.

[0061] The side guide bars 12 are arranged adjacent to the respective temple bases 94 as described above, and extend toward the center of the woven cloth 1 in the weaving-width direction. The center guide bar 11 is arranged so as to extend in the weaving-width direction between the side guide bars 12 such that both end portions thereof in the weaving-width direction overlap the side guide bars 12. The width of the woven cloth supporting apparatus 10 is adjusted by changing the amount of overlap between the center guide bar 11 and the side guide bars 12.

[0062] The width of each side guide bar 12 is set so that a desired amount of overlap (amount of adjustment) can be obtained. Since the amount of overlap is limited if the width of each side guide bar 12 is small, the width of each side guide bar 12 is set so that necessary amount of overlap can at least be obtained. The width of the center guide bar 11 is set so that, when the side guide bars 12 are arranged in accordance with the maximum width of cloth that can be woven by the air jet loom, the center guide bar 11 extends between the side guide bars 12 while both end portions thereof overlap the side guide bars 12.

[0063] In the present embodiment, the lengths of the attachment base portions 11y and 12y and the woven cloth support portions 11x and 12x of the center guide bar 11 and each side guide bar 12 are set so that a surface of the attachment base portion 12y that faces the cloth fell is in contact with the attachment base portion 11y of the center guide bar 11 and the bottom surface of the woven cloth support portion 12x is in contact with the top surface of the woven cloth support portion 11x of the center guide bar 11 when the side guide bar 12 is in an installed state, in which the side guide bar 12 is fixed to and supported by the support brackets 20. Therefore, the distance by which the woven cloth support portion 12x extends (length of the woven cloth support portion 12x) from the attachment base portion 12y (upwardly extending portion 12a) in each side guide bar 12 is set so that the end of the woven cloth support portion 12x is farther from the cloth fell than the contact portion 11z of the center guide bar 11 in the installed state in which the attachment base portion 12y is in contact with the attachment base portion 11y of the center guide bar 11. In other words, the distance by which the woven cloth support portion 11x of the center guide bar 11 extends (length of the woven cloth support portion 11x) from the attachment base portion 11y (upwardly extending portion 11a) in the warp direction is set so that the end portion of the woven cloth support portion 11x including the contact portion 11z projects toward the cloth fell beyond the end of the woven cloth support portion 12x of each side guide bar 12 in the installed state.

[0064] The length of the attachment base portion 12y

of each side guide bar 12 is set so that, when the bottom surface of the woven cloth support portion 12x is in contact with the top surface of the woven cloth support portion 11x of the center guide bar 11, the bottom end of the attachment base portion 12y is at the same position as the bottom end of the attachment base portion 11y of the center guide bar 11 in the direction in which the attachment base portion 12y extends. Therefore, in the above-described installed state, the bottom end surfaces of the attachment base portions 11y and 12y of the center guide bar 11 and each side guide bar 12, respectively, are aligned with each other in a direction orthogonal to the direction in which the attachment base portions 11y and 12y extend.

[0065] In the illustrated structure, the relationship between the angle of inclination of the woven cloth support portion 12x with respect to the attachment base portion 12y and the travel line of the woven cloth 1 is such that the woven cloth 1 is supported by the entirety of the top surface of the woven cloth support portion 12x of each side guide bar 12. Therefore, in this case, the entirety of the top surface of the woven cloth support portion 12x serves as the contact portion 12z.

[0066] The cloth guide bar (third guide member) 13 included in the woven cloth supporting apparatus 10 will now be described in detail. In the illustrated example, the cloth guide bar 13 is a plate-shaped member that has the same length (width) as that of the center guide bar 11 in the width direction. The width of the cloth guide bar 13 may instead be the same as that of a portion of the center guide bar 11 excluding the portions that overlap the side guide bars 12 when the side guide bars 12 are arranged in accordance with the maximum width of cloth that can be woven by the air jet loom. In other words, the length of the cloth guide bar 13 is not particularly limited as long as the cloth guide bar 13 is long enough to cover the portion of the center guide bar 11 excluding the portions that overlap the side guide bars 12 in the width direction.

[0067] The cloth guide bar 13 is located at a position farthest from the cloth fell in the warp direction. In regions where the center guide bar 11 overlaps the side guide bars 12 in the width direction, the cloth guide bar 13 is fixed to and supported by the support brackets 20 such that the surface thereof that faces the cloth fell is in contact with the surface of the attachment base portion 12y of each side guide bar 12 that faces away from the cloth fell.

[0068] The dimension of the cloth guide bar 13 in the height direction (extending direction) thereof is set so that, when the bottom end of the cloth guide bar 13 is at the same position as the bottom ends of the center guide bar 11 and each side guide bar 12 in the extending direction, the top end of the cloth guide bar 13 is above a portion of the woven cloth support portion 11x of the center guide bar 11 excluding the contact portion 11z in a direction orthogonal to the direction in which the woven cloth support portion 11x (12x) of the center guide bar

11 (side guide bar 12) extends. In the illustrated example, the length of the cloth guide bar 13 is set so that the top end of the cloth guide bar 13 is at substantially the same height as the top surface of the woven cloth support portion 12x of each side guide bar 12 and the travel line of the woven cloth 1 in the direction orthogonal to the direction in which the woven cloth support portion 11x (12x) extends. The cloth guide bar 13 having such a length includes only an attachment base portion 13y that is formed only of an upwardly extending portion 13a that extends upward.

[0069] A structure for regulating the heights at which the guide bars 11, 12, and 13 are disposed will now be described. In the present embodiment, a regulating member (stopper) 40 is provided to regulate the heights (positions in the depth direction of the groove portion 24a (direction in which the attachment base portions 11y and 12y extend)) of the guide bars 11, 12, and 13 in the groove portion 24a of the clamping unit 24 in each support bracket 20.

[0070] The stopper 40, which serves as a regulating member, is a thin rectangular plate that is attached to a side surface of a portion of the guide bar holder 21 of the support bracket 20 on which the clamp surface 21a is formed. This will be described in more detail.

[0071] The stopper 40 is arranged as such that the top surface thereof in the longitudinal direction extends in a direction orthogonal to the clamp surface 21a, which extends in the depth direction of the groove portion 24a, of the guide bar holder 21. The stopper 40 extends toward the clamp holder 30 from a position at which the stopper 40 is attached to the guide bar holder 21, and partially covers one of the openings at the ends in the width direction of the groove portion 24a of the clamping unit 24 in each support bracket 20.

[0072] The stopper 40 is attached to the guide bar holder 21 by inserting a screw member 42 through a through hole 41 formed in the stopper 40 and screwing the screw member 42 into an internally threaded hole 21c formed in the guide bar holder 21. The through hole 41 formed in the stopper 40 is a long hole that extends in a direction orthogonal to the longitudinal direction, that is, in a short-side direction. Accordingly, the position of the stopper 40 is adjustable in the depth direction of the groove portion 24a.

[0073] Figs. 4A and 4B to 6A and 6B illustrate support structures of the guide bars at different positions in the weaving-width direction. Each support structure will be described in detail with reference to the corresponding figures.

[0074] Figs. 4A and 4B illustrate a region in which the center guide bar 11 and one of the side guide bars 12 overlap each other, that is, a region in which the center guide bar 11, the side guide bar 12, and the cloth guide bar 13 are supported together. In this region, the center guide bar 11 and the side guide bar 12 are arranged such that the attachment base portions 11y and 12y thereof are in contact with each other, and the cloth guide bar

13 is arranged to be in contact with the surface of the attachment base portion 12y of the side guide bar 12 that faces away from the cloth fell. The guide bars 11, 12, and 13 are clamped by the clamping unit 24 of the support bracket 20 while the first shim S1 is interposed between the cloth guide bar 13 and the clamp surface 21a of the guide bar holder 21.

[0075] Figs. 5A and 5B illustrate a region in which only one of the side guide bars 12 is present in the weaving-width direction, that is, a region in which the side guide bar 12 alone is supported. In this region, to compensate for the absence of the cloth guide bar 13, a second shim S2 is interposed between the side guide bar 12 and the clamp surface 21a of the guide bar holder 21, the second shim S2 having a larger thickness than that of the first shim S1 included in the structure illustrated in Figs. 4A and 4B. In addition, to compensate for the absence of the center guide bar 11, a third shim S3 is interposed between the side guide bar 12 and the clamp surface 31a of the clamp holder 30.

[0076] Figs. 6A and 6B illustrate a region in which the side guide bars 12 are not present in the weaving-width direction, that is, a region in which only the center guide bar 11 and the cloth guide bar 13 are supported. In this region, to compensate for the absence of the side guide bars 12, a fourth shim S4 is interposed between the attachment base portion 11y of the center guide bar 11 and the cloth guide bar 13 in addition to the first shim S1 interposed between the cloth guide bar 13 and the clamp surface 21a of the guide bar holder 21 in the structure illustrated in Figs. 4A and 4B.

[0077] The operation of the woven cloth supporting apparatus 10 will now be described. When the weaving width of the woven cloth 1 is changed in accordance with a style change of the air jet loom, the position of the temple base 94 at the weft arrival side or the positions of the temple bases 94 at both sides are changed in the weaving-width direction. Only the position of the temple base 94 at the weft arrival side is changed when a reference based on which the weaving width is changed is at the weft insertion side. The positions of the temple bases 94 at both sides are changed when the reference is at the center of the woven cloth.

[0078] The width of the woven cloth supporting apparatus 10 is changed in accordance with the change in the weaving width. When, for example, the position of the temple base 94 at the weft arrival side is changed, one of the pair of side guide bars 12 that is disposed at the weft arrival side is changed accordingly in the weaving-width direction. Specifically, the following processes 1) to 3) are performed.

1) First, the support brackets 20 that support the side guide bar 12 to be moved are loosened so as to make the side guide bar 12 movable in the weaving-width direction.

In the case where the amount of overlap between the center guide bar 11 and the side guide bar 12 is

to be increased, the support brackets 20 that support the center guide bar 11 in the overlapping area after the change are loosened to unfasten the center guide bar 11 and the cloth guide bar 13. In each of those support brackets 20, the fourth shim S4 is removed from between the center guide bar 11 and the cloth guide bar 13.

2) Then, the side guide bar 12 is moved in the weaving-width direction so as to change the amount of overlap between the side guide bar 12 and the center guide bar 11, thereby changing the width of the woven cloth supporting apparatus 10.

3) After the position of the side guide bar 12 has been changed, the support brackets 20 that have been loosened to allow the movement of the side guide bar 12 are tightened again to secure the guide bars 11, 12, and 13. In the case where the amount of overlap between the center guide bar 11 and the side guide bar 12 is reduced, some support brackets 20 are changed from the state in which the support brackets 20 support both the center guide bar 11 and the side guide bar 12 (Figs. 4A to 4B) to the state in which the support brackets 20 do not support side guide bar 12 (Figs. 6A and 6B). In each of those support brackets 20, the fourth shim S4 is newly interposed between the center guide bar 11 and the cloth guide bar 13 in the clamping unit 24.

[0079] As described above, when the weaving width of the woven cloth 1 is changed in the air jet loom, the setting of the woven cloth supporting apparatus 10 according to the present embodiment can be easily changed in accordance with the change in the weaving width by sliding at least one of the side guide bars 12 in the weaving-width direction and changing the amount of overlap between the center guide bar 11 and the side guide bar 12.

[0080] In the woven cloth supporting apparatus 10 according to the present invention, the first guide member (center guide bar 11) and each second guide member (side guide bar 12) respectively include the woven cloth support portions 11x and 12x that extend toward the cloth fell from the upwardly extending portions 11a and 12a of the attachment base portions 11y and 12y. The ends of the woven cloth support portions 11x and 12x are positioned in the weft guide groove 50a of the reed 50 at the beating-up time. Since the woven cloth 1 is supported by the contact portions 11z and 12z provided at least at the ends (cloth-fell-side ends) of the woven cloth support portions 11x and 12x, respectively, the woven cloth 1 can be supported in the vicinity of the cloth fell 1a.

[0081] In the present embodiment, the woven cloth supporting apparatus 10 includes the third guide member (cloth guide bar 13) in addition to the first guide member (center guide bar 11), which serves as the other of the guide members, and the second guide members (side guide bars 12), which serves as the one of the guide members. With this structure, the following effect can be

obtained when, for example, the travel line of the woven cloth 1 is inclined in a direction away from the cloth fell as described above. That is, in the region illustrated in Figs. 6A and 6B in which the one of the guide members (side guide bars 12) is not present, the woven cloth 1 can be guided (supported) without being brought into contact with the top surface of a portion of the woven cloth support portion 11x excluding the contact portion 11z of the other of the guide members (center guide bar 11). In the case where the woven cloth support portion 11x of the other of the guide members (center guide bar 11) and the woven cloth support portion 12x of the one of the guide members (side guide bar 12) are arranged in contact with each other as in the present embodiment, the top surface of the woven cloth support portion 11x of the other of the guide members (center guide bar 11) may become damaged and burrs may be formed thereon when the width is changed. Even in such a case, the woven cloth 1 can be prevented from coming into contact with the damaged part and the woven cloth 1 can be prevented from being damaged.

[0082] In addition, in the present embodiment, the regulating member (stopper) 40 is provided to regulate the heights of the guide bars 11, 12, and 13 in the groove portion 24a of the clamping unit 24 in each support bracket 20. With this structure, even when the support bracket 20 is loosened in the above-described width-changing process, the guide bars 11, 12, and 13 may be disposed at the same heights as those before the width-changing process by placing the guide bars 11, 12, and 13 on the top surface of the regulating member 40. Therefore, the heights of the contact portions 11z and 12z of the woven cloth support portions 11x and 12x do not change when the guide bars 11, 12, and 13 are moved in the weaving-width direction to change the width of the woven cloth supporting apparatus 10. Accordingly, it is not necessary to perform a cumbersome operation of adjusting the heights before fixing the guide bars 11, 12, and 13 to the support brackets 20.

[0083] The woven cloth supporting apparatus 10 according to the present embodiment may be modified as in, for example, Modifications 1) to 8) described below.

1) In the present embodiment, a pair of (two) second guide members (side guide bars 12) are provided at the cloth edges. However, the woven cloth supporting apparatus 10 may instead include a single second guide member and a single first guide member. In such a case, the first and second guide members may, for example, have substantially the same width. One of the first and second guide members may be arranged adjacent to the temple base 94 at the weft insertion side, and the other of the first and second guide members may be arranged adjacent to the temple base 94 at the weft arrival side. The first and second guide members may be arranged so as to overlap in a central area of the woven cloth.

2) In the present embodiment, the center guide bar

11, which serves as the first guide member, corresponds to the "other of the guide members" according to the present invention, and the side guide bars 12, which serve as the second guide members, correspond to the "one of the guide members" according to the present invention. However, the first guide member (center guide bar 11) may instead correspond to the "one of the guide members" and the second guide members (side guide bars 12) may instead correspond to the "other of the guide members". Specifically, the side guide bars 12 may have the shape of the center guide bar 11 according to the present embodiment, and the center guide bar 11 may have the shape of the side guide bars 12 according to the present embodiment. In this case, the center guide bar 11 is arranged such that the attachment base portion 11y thereof is farther from the cloth fell than the attachment base portion 12y of each side guide bar 12 and the woven cloth support portion 11x thereof is above the woven cloth support portion 12x of each side guide bar 12.

3) Although the cloth guide bar 13 that serves as the third guide member is provided in the present embodiment, the third guide member (cloth guide bar 13) is not essential and may be omitted. In the woven cloth supporting apparatus 10 according to the present embodiment, the relationship between the heights of the contact portion 11z and the portion excluding the contact portion 11z of the woven cloth support portion 11x of the other of the guide members (first guide member (center guide bar 11) in the present embodiment) or the relationship between the angle of inclination of the woven cloth support portion 11x with respect to the attachment base portion 11y and the above-described travel line of the woven cloth 1 may be as follows. That is, these relationships may be such that the woven cloth 1 does not come into contact with the portion of the woven cloth support portion of the other of the guide members excluding the contact portion even when the third guide member is not provided. In such a case, the third guide member may be omitted.

4) In the present embodiment, the woven cloth supporting apparatus 10 includes the regulating member (stopper) 40 that regulates the heights at which the guide bars 11, 12, and 13 are disposed. However, the regulating member 40 may also be omitted. Specifically, in the woven cloth supporting apparatus 10 according to the present embodiment, the guide bars 11, 12, and 13 may be in contact with the bottom surface of the groove portion 24a of the clamping unit 24 in each support bracket 20 so that the heights of the guide bars 11, 12, and 13 are constantly regulated by the bottom surface of the groove portion 24a of the clamping unit 24. In such a case, the regulating member 40 may be omitted.

5) In the present embodiment, the surface of the attachment base portion 12y that faces the cloth fell

and the bottom surface of the woven cloth support portion 12x of the one of the guide members that is far from the cloth fell (each side guide bar 12) are respectively in contact with the attachment base portion 11y and the woven cloth support portion 11x of the other of the guide members that is near the cloth fell (center guide bar 11). However, as illustrated in Figs. 7A to 7C, the one of the guide members and the other of the guide members may be arranged such that the attachment base portions thereof and/or the woven cloth support portions thereof are separated from each other. The structures illustrated in Figs. 7A to 7C will now be described in detail.

[0084] Fig. 7A illustrates a woven cloth supporting apparatus 110 having a structure different from that of the present embodiment in that the bottom surface of a woven cloth support portion 112x of a side guide bar 112, which serves as the one of the guide members, is in contact with the top surface of a woven cloth support portion 111x of a center guide bar 111, which serves as the other of the guide members, only at the cloth-fell-side end thereof and the gap between the bottom and top surfaces of the woven cloth support portions 112x and 111x, respectively, increases as the distance from the cloth fell increases. Accordingly, the side guide bar 112 includes an attachment base portion 112y that is longer than an attachment base portion 111y of the center guide bar 111, and the bending angle between the attachment base portion 112y and the woven cloth support portion 112x of the side guide bar 112 is steeper than that of the center guide bar 111. In this structure, the cloth-fell-side end of the one of the guide members (side guide bar 112) may also be separated from the top surface of the woven cloth support portion of the other of the guide members (center guide bar 111).

[0085] Fig. 7B illustrates a woven cloth supporting apparatus 210 having a structure different from that of the present embodiment in that a side guide bar 212, which serves as the one of the guide members, is supported by each support bracket 20 such that an attachment base portion 212y thereof is separated from an attachment base portion 211y of a center guide bar 211, which serves as the other of the guide members. Accordingly, the side guide bar 212 is curved in a region where a woven cloth support portion 212x thereof continues from the attachment base portion 212y. When the side guide bar 212 is installed, a fifth shim S5 is interposed between the attachment base portion 212y and the attachment base portion 211y of the center guide bar 211.

[0086] Fig. 7C illustrates a woven cloth supporting apparatus 310 in which a side guide bar 312, which serves as the one of the guide members, is curved in a region where a woven cloth support portion 312x continues from an attachment base portion 312y. Only the middle part of the curved portion is in contact with a bent portion between an attachment base portion 311y and a woven cloth support portion 311x of a center guide bar 311,

which serves as the other of the guide members. The woven cloth support portions 311x and 312x of the guide bars 311 and 312, respectively, are separated from each other, and the attachment base portions 311y and 312y of the guide bars 311 and 312, respectively, are separated from each other. Similar to the structure illustrated in Fig. 7B, when the guide bars 311 and 312 are installed, a fifth shim S5 is interposed between the attachment base portions 311y and 312y.

6) In the present embodiment, the attachment base portions 11y, 12y, and 13y of the guide bars 11, 12, and 13, respectively, include only the upwardly extending portions 11a, 12a, and 13a, respectively. However, the guide bars 11, 12, and 13 may instead be supported by each support bracket 20 at portions other than the upwardly extending portions 11a, 12a, and 13a. For example, as illustrated in Fig. 8, a guide member 411, which serves as the other of the guide members that is near the cloth fell, and a guide member 412, which serves as the one of the guide members that is far from the cloth fell, may be structured such that attachment base portions 411y and 412y thereof respectively include attachment portions 411b and 412b which extend from the bottom ends of upwardly extending portions 411a and 412a. In this case, the attachment base portions 411y and 412y are attached to each support bracket 420 at the attachment portions 411b and 412b thereof. In this case, a clamp surface 421a of a guide bar holder 421 and a clamp holder 430 may be arranged so as to form a clamping unit 424 that clamps the attachment base portions 411y and 412y (attachment portions 411b and 412b) in the vertical direction.

7) In the present embodiment, the entirety of the top surface of the woven cloth support portion 12x of each side guide bar 12, which serves as the one of the guide members that is far from the cloth fell, corresponds to the contact portion 12z. However, as illustrated in Figs. 7C and 8, the guide members 312 and 412, which serve as the one of the guide members, may instead be arranged so as to support the woven cloth 1 only at the end portions (cloth-fell-side end portions) of the woven cloth support portions thereof, that is, such that only the end portions (more specifically, top surfaces of the end portions) of the woven cloth support portions 312x and 412x correspond to contact portions 312z and 412z, respectively. This will be described in more detail.

[0087] Fig. 7C illustrates the structure in which, similar to the other of the guide members (center guide bar 311), the end portion of the woven cloth support portion 312x of the one of the guide members (side guide bar 312) at the end opposite the attachment base portion 312y is bent upward with respect to the direction in which the woven cloth support portion 312x extends continuously from the top end of the attachment base portion 312y.

The bent portion (more specifically, the top edge of the bent portion) functions as the contact portion 312z.

[0088] Fig. 8 illustrates a woven cloth supporting apparatus 410 in which, owing to the relationship between the travel line of the woven cloth 1 and the angle of inclination of the woven cloth support portion 412x with respect to the attachment base portion 412y of the guide member 412, which is the one of the guide members, the woven cloth support portion 412x is in contact with the woven cloth 1 only at the end portion thereof. The woven cloth support portion 412x is below the travel line and the gap therebetween increases as the distance to the attachment base portion 412y decreases. Thus, only the end portion of the woven cloth support portion 412x functions as the contact portion 412z.

8) In the present embodiment, the length of the woven cloth support portion 11x of the center guide bar 11, which serves as the other of the guide members that is near the cloth fell, is such that the end portion of the woven cloth support portion 11x protrudes toward the cloth fell beyond the end of the woven cloth support portion 12x of each side guide bar 12, which serves as the one of the guide members that is far from the cloth fell, in the installed state. In addition, the protruding end portion (protruding portion) is bent upward with respect to the direction in which the woven cloth support portion 11x extends to form the contact portion 11z. However, as illustrated in Fig. 9, a guide member 511 that serves as the other of the guide members may be structured such that a woven cloth support portion 511x thereof does not include the protruding portion. Alternatively, as illustrated in Fig. 10, a guide member 611 that serves as the other of the guide members may be structured such that a woven cloth support portion 611x thereof does not include the contact portion 11z formed by bending the protruding end portion. The structures illustrated in Figs. 9 and 10 will now be described in detail.

[0089] Fig. 9 illustrates a woven cloth supporting apparatus 510 in which the distance by which the woven cloth support portion 511x of the guide member 511, which serves as the other of the guide members that is near the cloth fell, extends (length of the woven cloth support portion 511x) from an attachment base portion 511y (upwardly extending portion 511a) is set so that the end of the woven cloth support portion 511x is at the same position as the end of a guide member 512, which serves as the one of the guide members, in the direction in which the woven cloth support portion 511x extends. In this structure, the woven cloth 1 is supported only by the guide member 512 that serves as the one of the guide members in a region where the guide member 512 is present in the weaving-width direction. In this case, contact portions 511z and 512z of the woven cloth support portions 511x and 512x of the guide members 511 and

512 that serve as the other of the guide members and the one of the guide members, respectively, are at different heights. Therefore, the woven cloth 1 is at different heights in the regions on both sides of the boundary between the guide members 511 and 512 in the weaving-width direction. The structure illustrated in Fig. 9 is applicable as long as the quality of the woven cloth 1 is not affected by the difference in height (step). In this structure, the step is preferably made as small as possible by making the thickness of the woven cloth support portion 512x of the guide member 512, which serves as the one of the guide members that is far from the cloth fell, as small as possible within the range in which sufficient strength can be ensured.

[0090] Fig. 10 illustrates a woven cloth supporting apparatus 610 in which an end portion of the woven cloth support portion 611x of the guide member 611, which serves as the other of the guide members that is near the cloth fell, protrudes from the end of a woven cloth support portion 612x of the guide member 612, which serves as the one of the guide members, in the direction in which the woven cloth support portion 611x extends. The distance by which the woven cloth support portion 611x extends (length of the woven cloth support portion 611x) from an attachment base portion 611y (upwardly extending portion 611a) is set so that the ends of the woven cloth support portions 611x and 612x are at substantially the same height with respect to the travel line of the woven cloth 1 in association with the relationship between the travel line of the woven cloth 1 and the extending direction (angle of inclination) of the woven cloth support portion 611x. With this structure, the guide member 612 that serves as the one of the guide members and the guide member 611 that serves as the other of the guide members support the woven cloth 1 at the ends of the woven cloth support portions 612x and 611x, respectively, which extend only in a single direction (which do not include the contact portion 11z formed by bending the end portion).

[0091] In the above-described embodiment and modifications thereof, the woven cloth supporting apparatus 10, 110, 210, 310, 410, 510, or 610 is arranged between the pair of temple bases 94 that are disposed at both edges of the woven cloth 1. However, the woven cloth supporting apparatus according to the present invention is not limited to this. For example, as illustrated in Figs. 11 and 12, a woven cloth supporting apparatus 710 may include a pair of side guide bars 712 (second guide members) that are provided at the cloth edges as in the above-described embodiment and that serve also as woven cloth supporting portions (portions that extend upward and support the woven cloth 1 at the top ends thereof) of the temple bases 94 according to the above-described embodiment. The structure illustrated in Figs. 11 and 12 will be described in more detail.

[0092] The side guide bars 712 are arranged such that end portions thereof near the cloth edges 1b of the woven cloth 1 protrude outward beyond the cloth edges 1b, and

extend toward the center of the woven cloth 1. The side guide bars 712 are supported by the temple holders 91, which support the temple bases 94 in the above-described embodiment, in regions where the temples 93 are present in the weaving-width direction, that is, in regions where the temple bases 94 are present in the above-described embodiment and the related art. These regions are hereinafter referred to as "temple regions".

[0093] Portions of the side guide bars 712 disposed in the temple regions function as the woven cloth supporting portions of the temple bases 94 according to the above-described embodiment. In the regions closer to the center of the woven cloth 1 than the temple holders 91 in the weaving-width direction, the side guide bars 712 are supported by guide bar holders 721 as in the above-described embodiment.

[0094] In the illustrated structure, side-guide-bar brackets 26 having substantially the same dimension as that of the side guide bars 712 in the longitudinal direction (weaving-width direction) are provided. The side guide bars 712 are supported by the temple holders 91 through the side-guide-bar brackets 26 in the temple regions, and are supported by the guide bar holders 721 through the side-guide-bar brackets 26 in the regions closer to the center of the woven cloth 1 than the temple regions.

[0095] Specifically, each side-guide-bar bracket 26 includes an attachment surface 26a that faces the reed, and the corresponding side guide bar 712 is fixed with a screw member 26b or the like to the attachment surface 26a at a lower portion of an attachment base portion 712y that extends upward. The side-guide-bar brackets 26 are fixed to the respective temple holders 91 in the temple regions near the cloth edges, and are fixed to the guide bar holders 721 in the regions closer to the center of the woven cloth than the temple holders 91. As illustrated in Fig. 11, each side-guide-bar bracket 26 is fixed to the corresponding temple holder 91 by inserting a screw member 26c through the side-guide-bar bracket 26 from above and screwing the screw member 26c into the temple holder 91. A temple guide 95 is fixed to each side-guide-bar bracket 26 with a spacer 794 interposed therebetween. The spacer 794 corresponds to a portion of each temple base 94 according to the above-described embodiment that is attached to the temple holder 91. The side-guide-bar brackets 26 are fixed to the guide bar holders 721 in a similar manner.

[0096] The side guide bars 712, which are secured in the above-described manner, extend in the weaving-width direction, and are therefore arranged so as not to interfere with sub-nozzles 71. Specifically, as illustrated in Fig. 11, each side guide bar 712 is fixed to the corresponding side-guide-bar bracket 26 such that, when a reed 50 is at the beating position, the attachment base portion 712y and an upwardly extending portion 712a of the attachment base portion 712y, which extends upward from the portion fixed to the side-guide-bar bracket 26, are farther from the cloth fell than the sub-nozzles 71 and a woven cloth support portion 712x that extends toward

the cloth fell from the upwardly extending portion 712a is above the top ends of the sub-nozzles 71. In other words, the attachment surface 26a of the side-guide-bar bracket 26 is positioned so that the side guide bar 712 can be arranged in such a manner. The distance by which the woven cloth support portion 712x of the side guide bar 712 extends toward the cloth fell is set so that the woven cloth 1 can be supported in the vicinity of the cloth fell 1a when the upwardly extending portion 712a is arranged as described above.

[0097] In the case where the temple bases 94 according to the related art are used as in the above-described embodiment, the woven cloth supporting portion of each temple base 94 has cut portions 94a (see Fig. 2) to avoid interference with the sub-nozzles 71. In such a case, it is necessary to adjust the positions of the sub-nozzles 71 in accordance with the positions of the cut portions 94a in each temple base 94 when the weaving width is changed.

[0098] In contrast, according to the example illustrated in Figs. 11 and 12, the side guide bars 712 support the woven cloth 1 also in the temple regions, and are configured (arranged) so as to avoid interference with the sub-nozzles 71 as described above. Therefore, the positions of the temple regions in the weaving-width direction can be adjusted without affecting the positions of the sub-nozzles 71 when the weaving width is changed.

[0099] In the illustrated example, a center guide bar 711 is supported by center-guide-bar brackets 27 that are fixed to slide bar holders 82. The support structure of the center guide bar 711 will now be described in detail.

[0100] The slide bar holders 82 are fixed to a front top stay 80, which functions as a beam member, with intervals therebetween. A support bar 28, to which the center-guide-bar brackets 27 are attached, is fixed to surfaces of the slide bar holders 82 that face the cloth fell. The dimension of the support bar 28 in the longitudinal direction (weaving-width direction) is substantially equal to that of the center guide bar 711. The support bar 28 extends over the entire region in which the center guide bar 711 is present in the weaving-width direction. The center-guide-bar brackets 27 are fixed to the surface of the support bar 28 that faces the cloth fell with predetermined intervals (for example, intervals corresponding to the pitch of the sub-nozzles 71) therebetween. The support bar 28 is not essential, and the center-guide-bar brackets 27 may instead be fixed directly to the slide bar holders 82.

[0101] Each center-guide-bar bracket 27 extends upward from the position at which the center-guide-bar bracket 27 is fixed to the support bar 28, and is shaped such that a top end portion thereof is closer to the cloth fell than the attachment surface 26a of each side-guide-bar bracket 26 to which the corresponding side guide bar 712 is fixed. The top end portion of the center-guide-bar bracket 27 has an attachment surface 27a that faces the attachment surface 26a of each side-guide-bar bracket 26 with an interval therebetween in side view. The at-

tachment surface 27a actually faces the attachment surface 26a in a region in which the center guide bar 711 overlaps each side guide bars 712.

[0102] The center guide bar 711 is fixed to the attachment surface 27a of the center-guide-bar bracket 27 at a lower portion of an attachment base portion 711y which extends upward. In the illustrated example, the entirety of the attachment base portion 711y serves as an upwardly extending portion 711a. The upwardly extending portion 711a of the center guide bar 711 is closer to the cloth fell than the upwardly extending portion 712a of each side guide bar 712. Since the guide bars 711 and 712 overlap in the weaving-width direction, the woven cloth support portion 711x of the center guide bar 711 is located below the woven cloth support portion 712x of each side guide bar 712. Accordingly, also in this case, the center guide bar 711 corresponds to the "other of the guide members" and the side guide bars 712 correspond to the "one of the guide members", as in the above-described embodiment. The center guide bar 711 is, of course, also configured to avoid interference with the sub-nozzles 71 when the reed 50 is at the beating position.

[0103] The operation of the woven cloth supporting apparatus 710 illustrated in Figs. 11 and 12 will now be described. In this example, when the positions of the temple holders 91 are changed to change the positions of the temples 93 in the loom in accordance with a change in the weaving width of the woven cloth 1, the positions of the side guide bars 712 (amount of overlap between the center guide bar 711 and the side guide bars 712) are changed accordingly. Thus, the process is simplified compared to that of the above-described embodiment in which the positions of the side guide bars 12 and the temple bases 94 (temple holders 91 and temples 93) are changed individually. In addition, as described above, the positions of the temple holders 91 (temples 93) can be changed without affecting the positions of the sub-nozzles 71.

[0104] The woven cloth supporting apparatus according to the example illustrated in Figs. 11 and 12 of the present invention may also be modified as in, for example, Modifications 1) and 3) described below.

1) Similar to Modification 1) of the above-described embodiment, in the case where only the amount of overlap between the second guide member (side guide bar 712) at the weft arrival side and the first guide member (center guide bar 711) is changed in accordance with a change in the weaving width of the woven cloth 1, the second guide member at the weft insertion side may be omitted. In such a case, the woven cloth 1 is supported by the first guide member in the temple region at the weft insertion side.

2) The first and second guide members are not necessarily arranged such that the woven cloth support portions 711x and 712x and portions of the upwardly

extending portions 711a and 712a are in contact with each other, as illustrated in Fig. 11, in the regions in which the first and second guide members overlap. Similar to Modification 5) of the above-described embodiment, the guide members may instead be arranged such that the woven cloth support portions 711x and 712x and/or the upwardly extending portions 711a and 712a are separated from each other. 3) The relationships between the attachment base portions 711y and 712y and the upwardly extending portions 711a and 712a and the structures of the woven cloth support portions 711x and 712x (contact portions 711z and 712z) may also be modified as in Modification 6) of the above-described embodiment.

[0105] The present invention is not limited to the above-described embodiment and examples, and various modifications are possible within the scope of the present invention.

Claims

1. A woven cloth supporting apparatus (10) for an air jet loom including a reed (50) having a weft guide groove (50a), which is defined by recesses (51c) formed in reed dents (51), in a front surface of the reed (50), and a beam member (80) that extends in a weaving-width direction over a weaving width of a woven cloth (1), the woven cloth supporting apparatus (10) comprising:

a first guide member and a second guide member that are supported by the beam member (80) and that extend in the weaving-width direction, the first and second guide members overlapping each other in the weaving-width direction at adjacent ends thereof, thereby contacting and supporting the woven cloth (1) from below at a position near a cloth fell (1a) of the woven cloth (1) in a warp direction, wherein each of the first and second guide members includes an attachment base portion that is supported by the beam member (80) and that includes an upwardly extending portion that extends at least upward, and a woven cloth support portion that extends toward the cloth fell (1a) from the upwardly extending portion of the attachment base portion and that includes a contact portion that contacts and supports the woven cloth (1) at least at a cloth-fell-side end of the woven cloth support portion, wherein, among the first and second guide members, one of the guide members is arranged such that the upwardly extending portion thereof is farther from the cloth fell (1a) than the upward-

ly extending portion of the other of the guide members and the woven cloth support portion thereof is above the woven cloth support portion of the other of the guide members in the state in which the first and second guide members are supported by the beam member (80), and wherein the first and second guide members are arranged such that the contact portions thereof are positioned within a range of the weft guide groove (50a) in the reed (50) in the vertical direction at a beating-up time of the reed (50).

2. The woven cloth supporting apparatus (10) according to Claim 1, wherein a length of the woven cloth support portion of the other of the guide members is such that the woven cloth support portion protrudes toward the cloth fell (1a) from the woven cloth support portion of the one of the guide members in the warp direction, and wherein the contact portion of the woven cloth support portion of the other of the guide members extends upward at a cloth-fell-side end of a portion of the woven cloth support portion that protrudes from the woven cloth support portion of the one of the guide members, and is formed so as to support the woven cloth (1) at the same height as a height at which the contact portion of the woven cloth support portion of the one of the guide members supports the woven cloth (1).
3. The woven cloth supporting apparatus (10) according to Claim 1 or 2, wherein the first and second guide members are arranged such that a bottom surface of the woven cloth support portion of the one of the guide members is in contact with a top surface of the woven cloth support portion of the other of the guide members in a region in which the first and second guide members overlap, and wherein the woven cloth supporting apparatus (10) further comprises a third guide member (13) that extends at least over a part of a region in which the other of the guide members extend in the weaving-width direction, the part excluding the region in which the other of the guide members overlaps the one of the guide members, the third guide member (13) supporting the woven cloth (1) at a position farther from the cloth fell (1a) than the one of the guide members in the warp direction and above a portion of the woven cloth support portion of the other of the guide members excluding the contact portion in the vertical direction.
4. The woven cloth supporting apparatus (10) according to Claim 1 or 2, further comprising:

a support bracket (20) that supports at least one

of the first and second guide members,
wherein the support bracket (20) includes a
clamping unit (24) at an upper end thereof, the
clamping unit (24) including a groove portion
(24a) that opens upward and in the weaving- 5
width direction, and supports the at least one of
the first and second guide members by clamping
the attachment base portion of the at least one
of the first and second guide members in a front- 10
rear direction while the attachment base portion
is inserted into the groove portion (24a) of the
clamping unit (24) from above, and
wherein the support bracket (20) is provided with
a regulating member (40) that regulates a height 15
of the at least one of the first and second guide
members in the groove portion (24a) of the
clamping unit (24).

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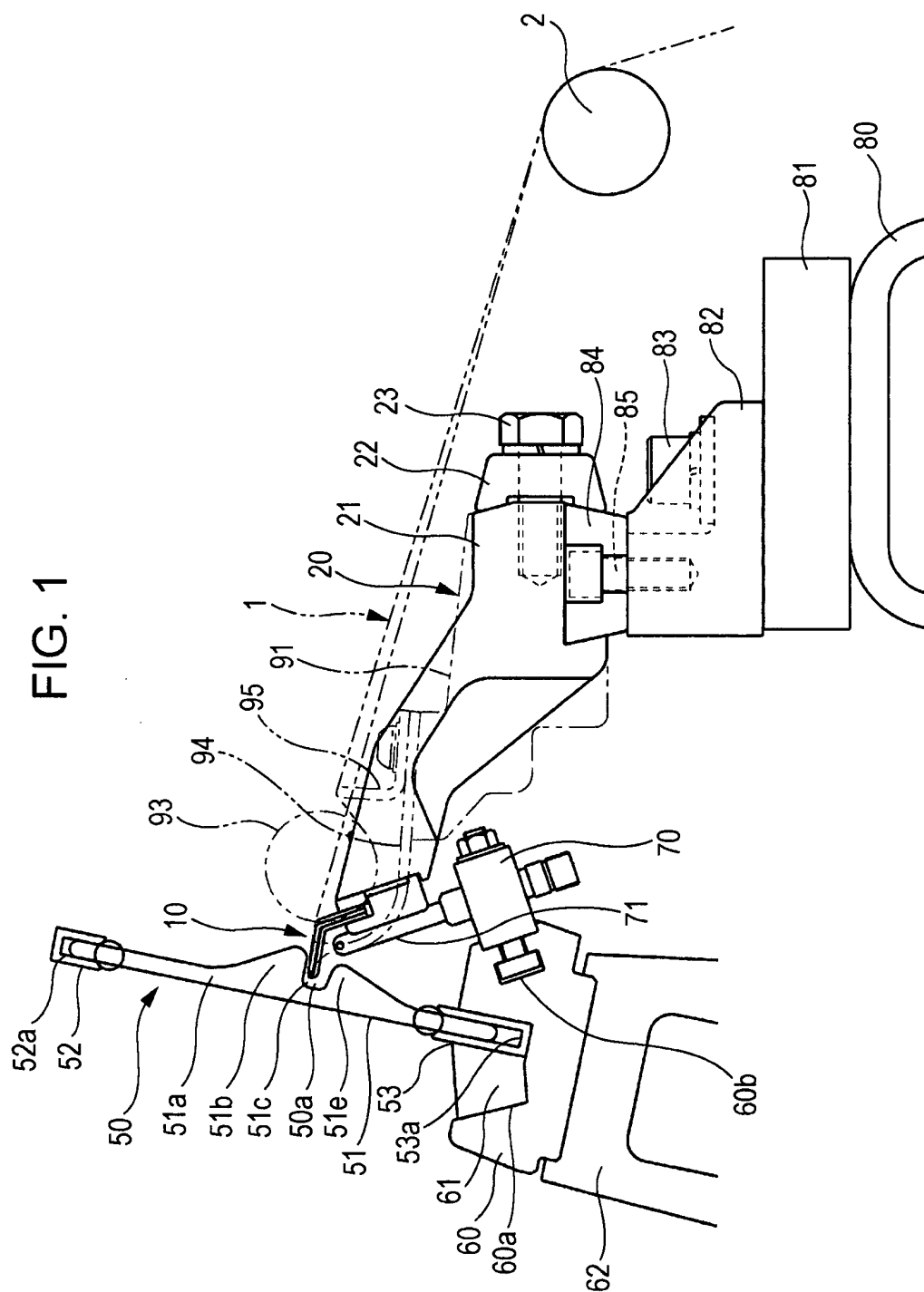


FIG. 2

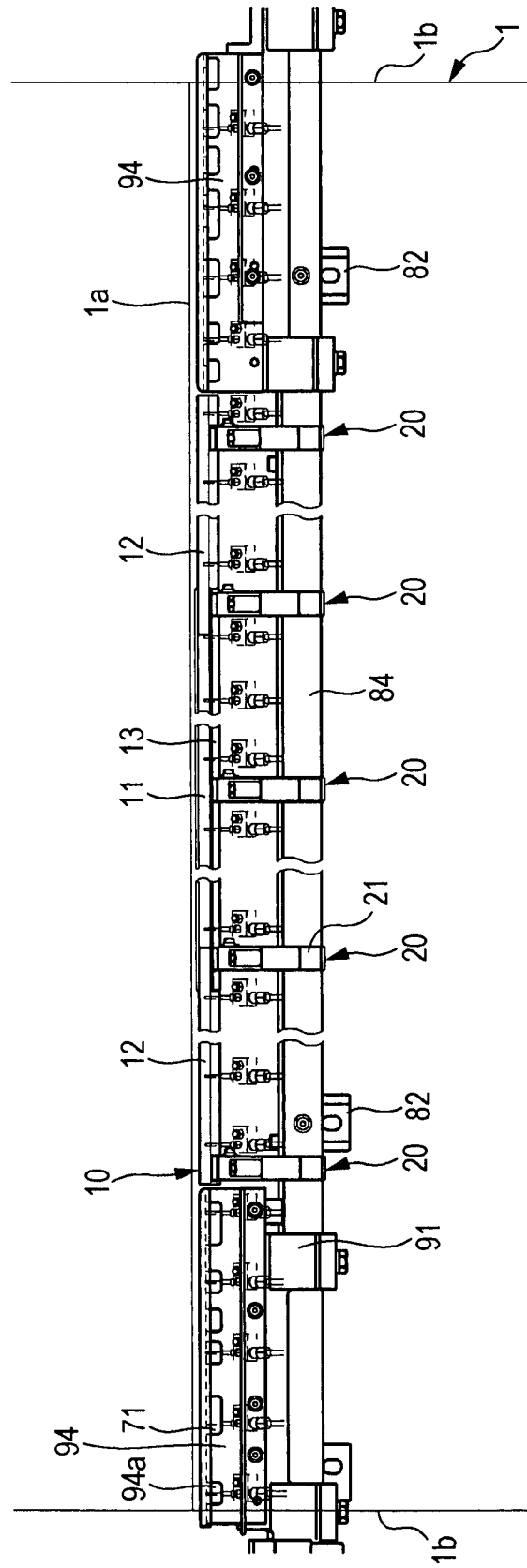


FIG. 3

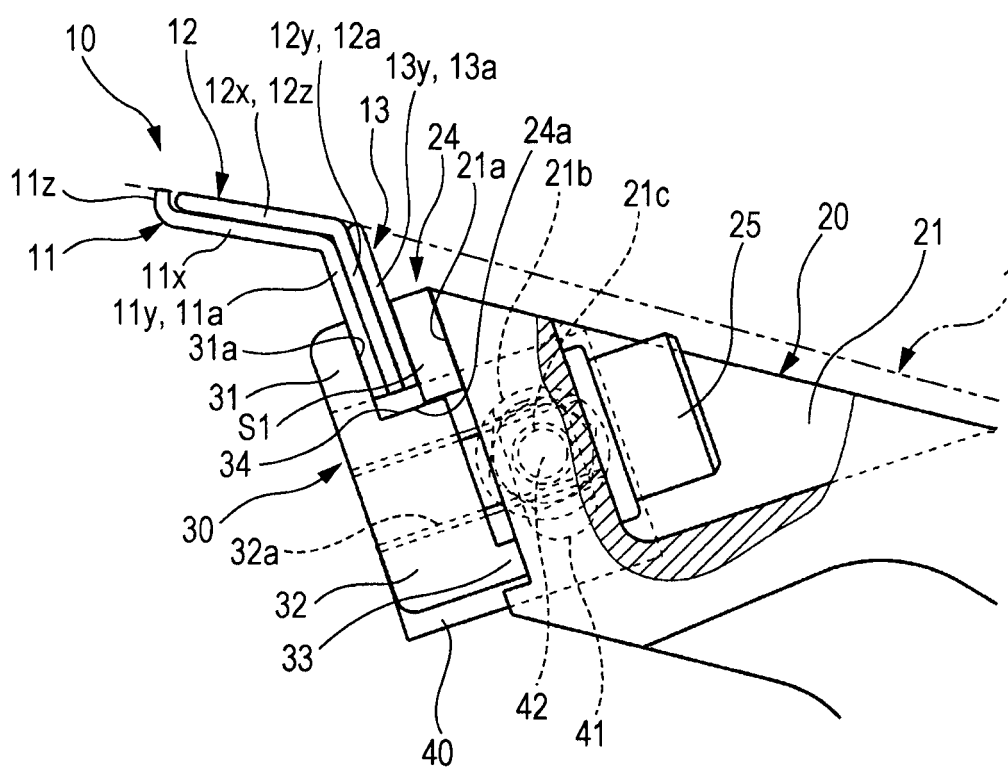


FIG. 4A

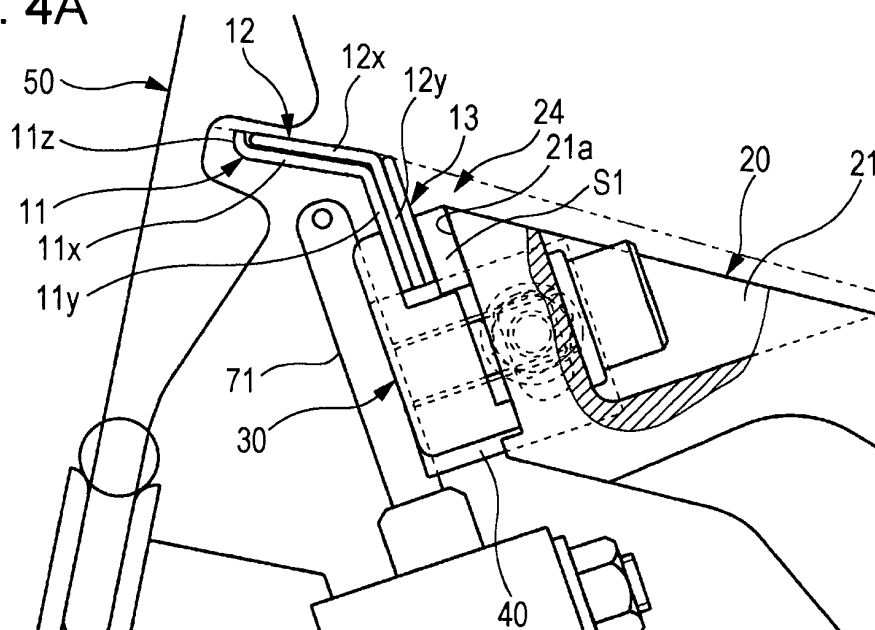


FIG. 4B

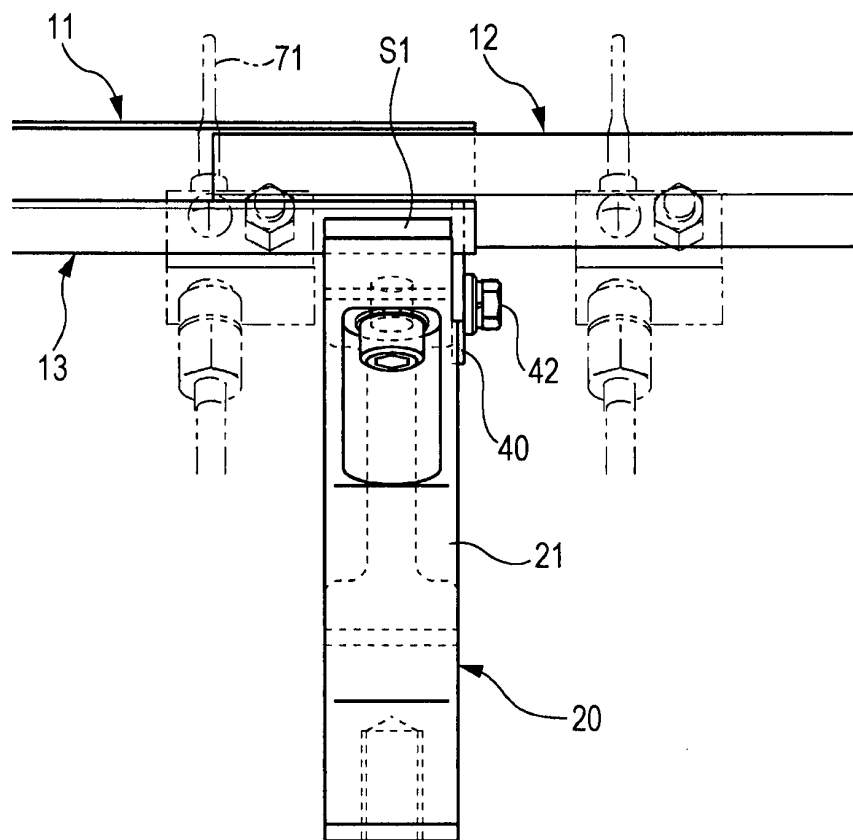


FIG. 5A

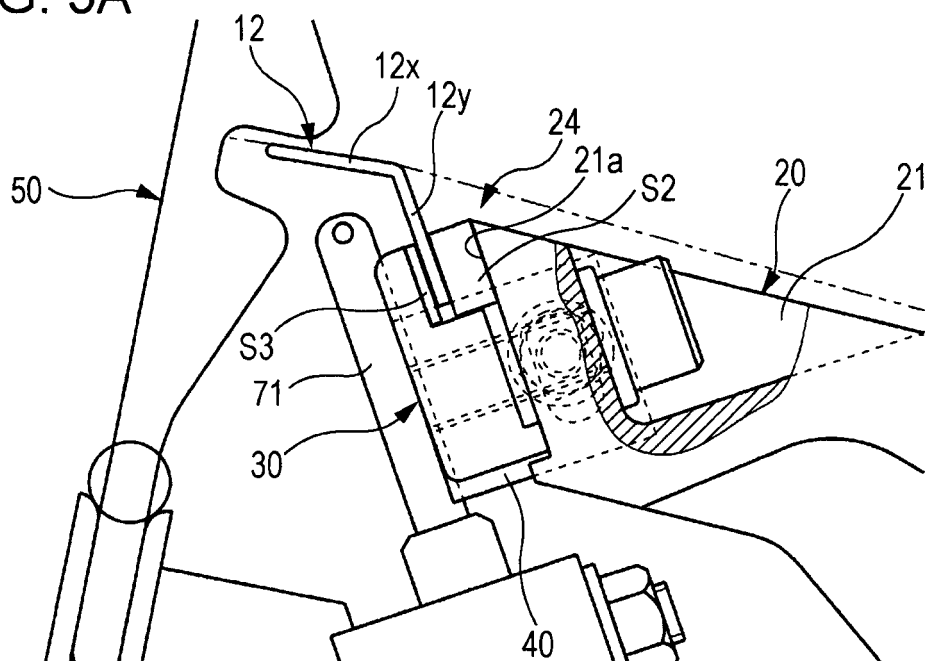


FIG. 5B

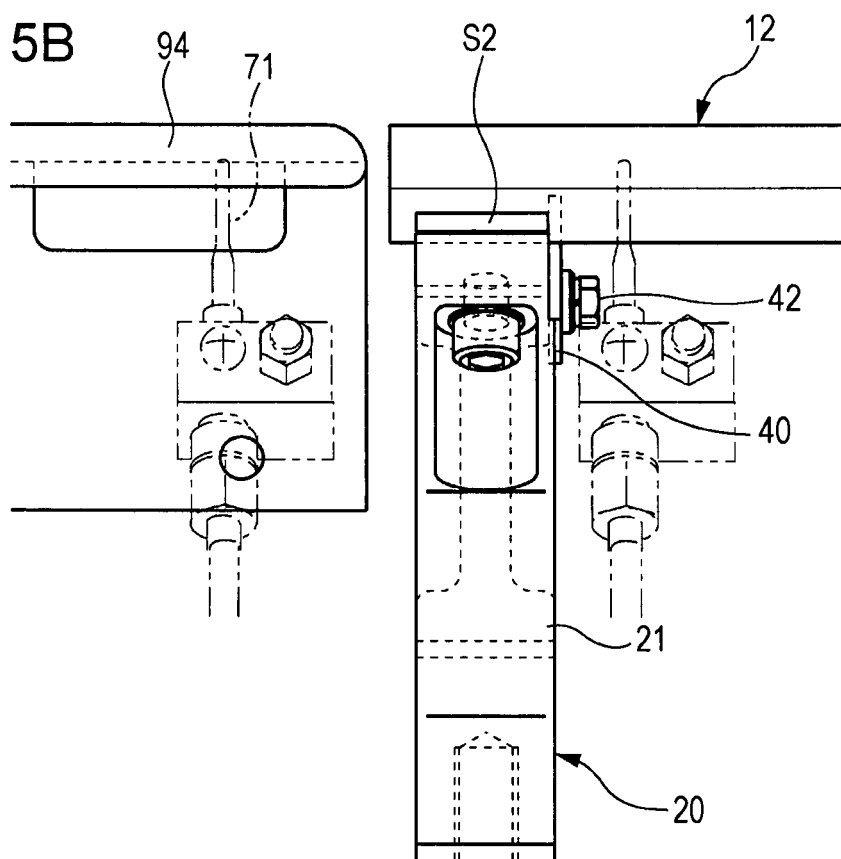


FIG. 6A

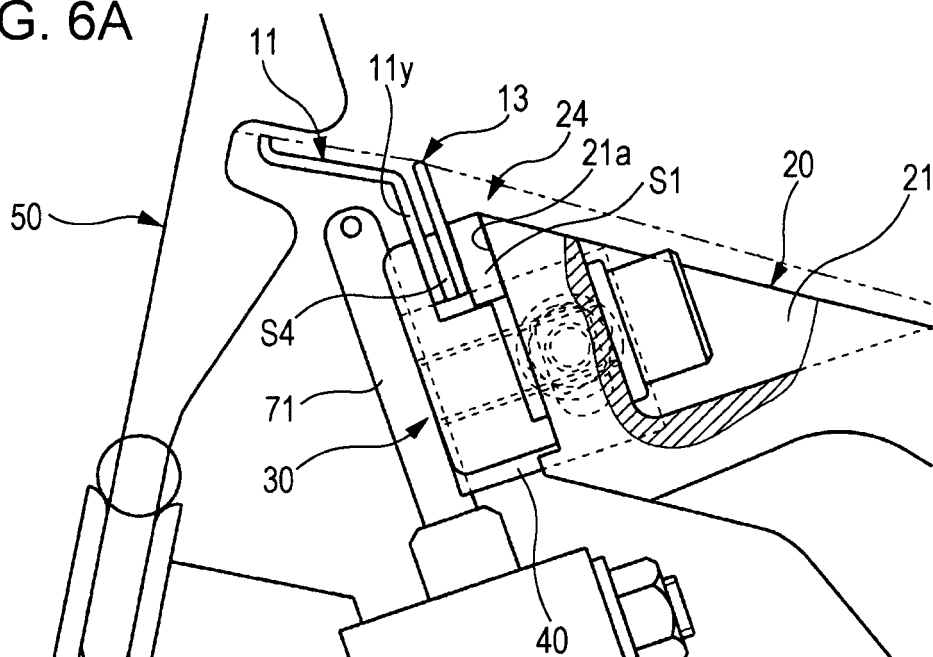


FIG. 6B

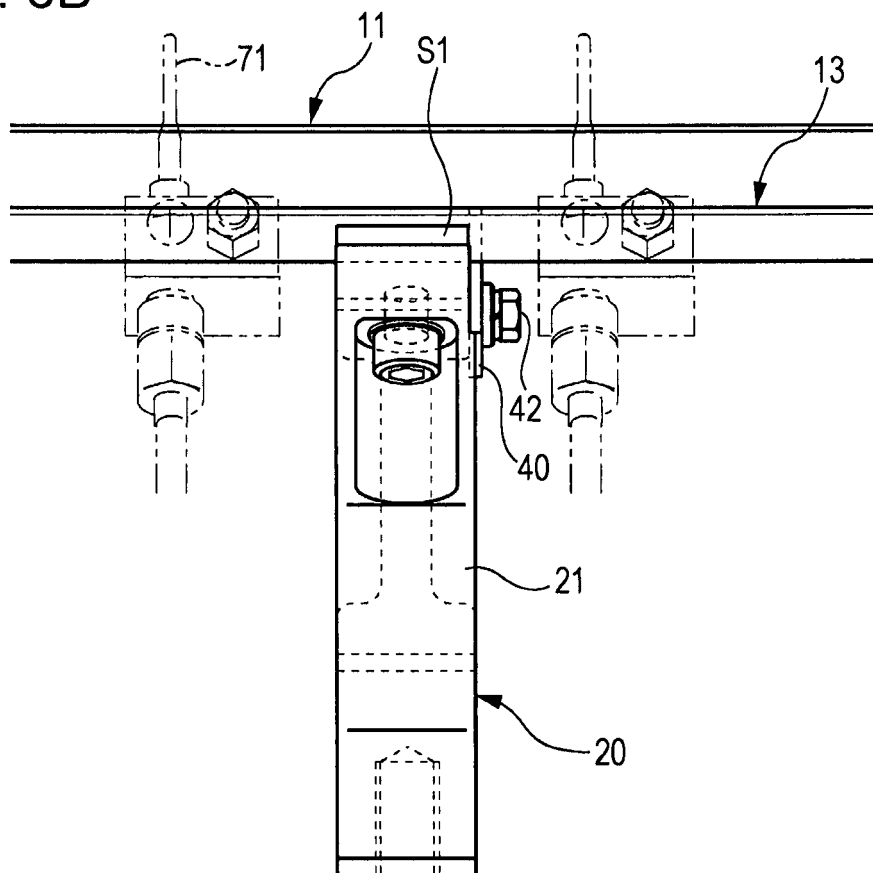


FIG. 7A

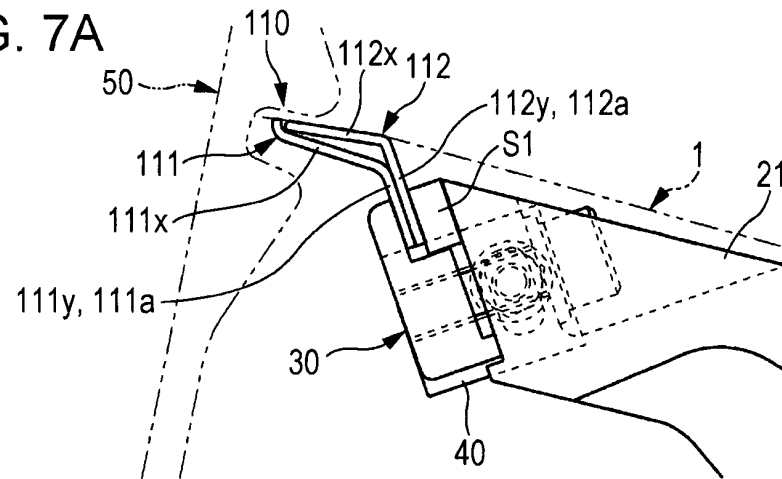


FIG. 7B

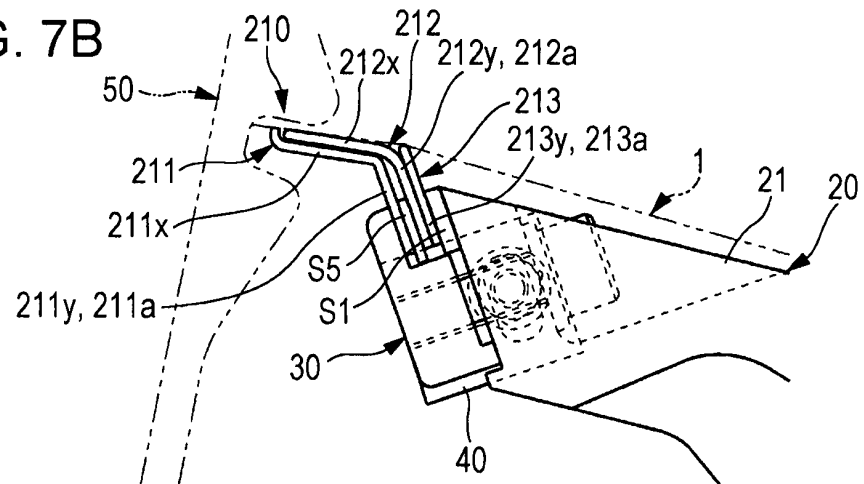


FIG. 7C

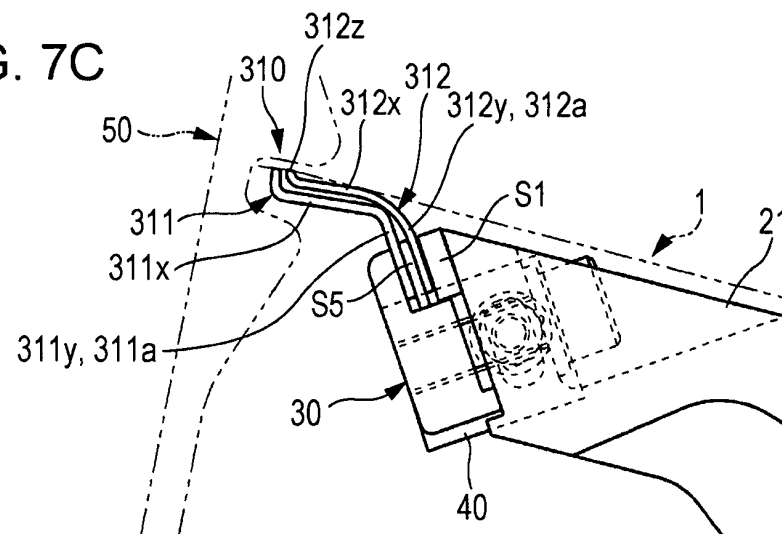


FIG. 8

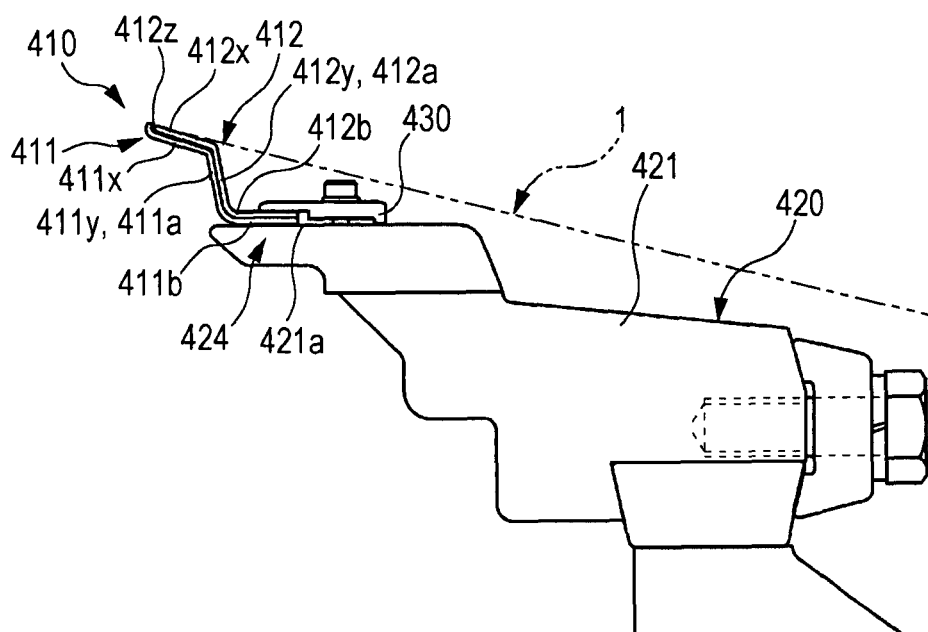


FIG. 9

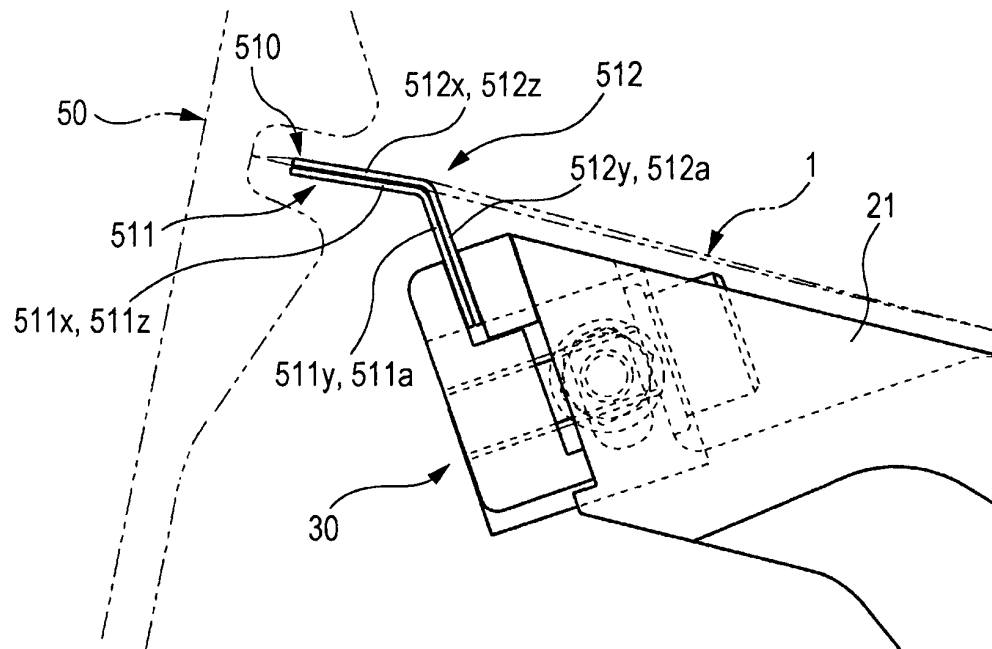


FIG. 10

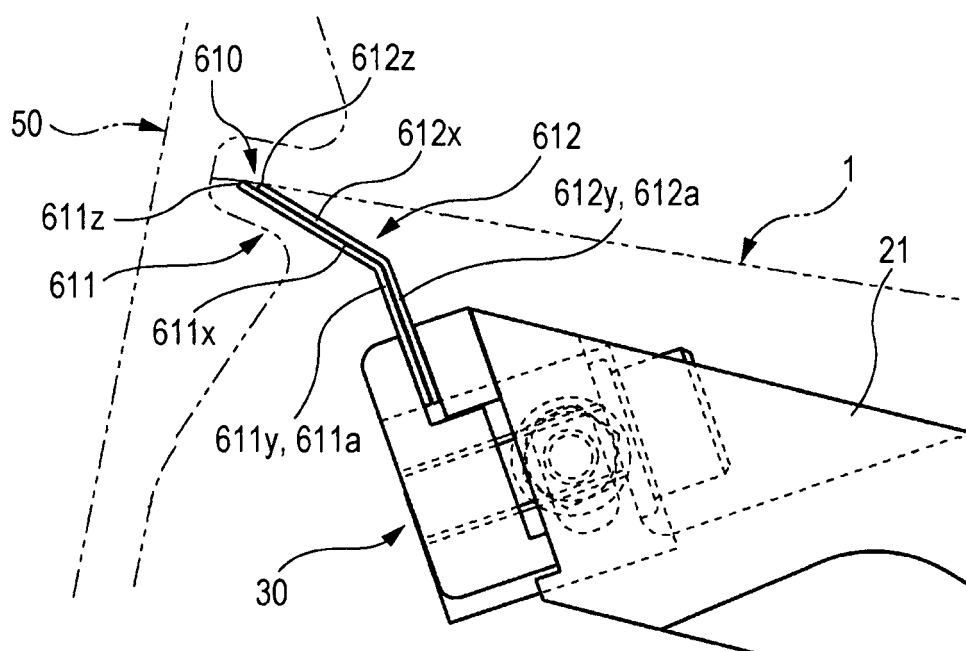


FIG. 11

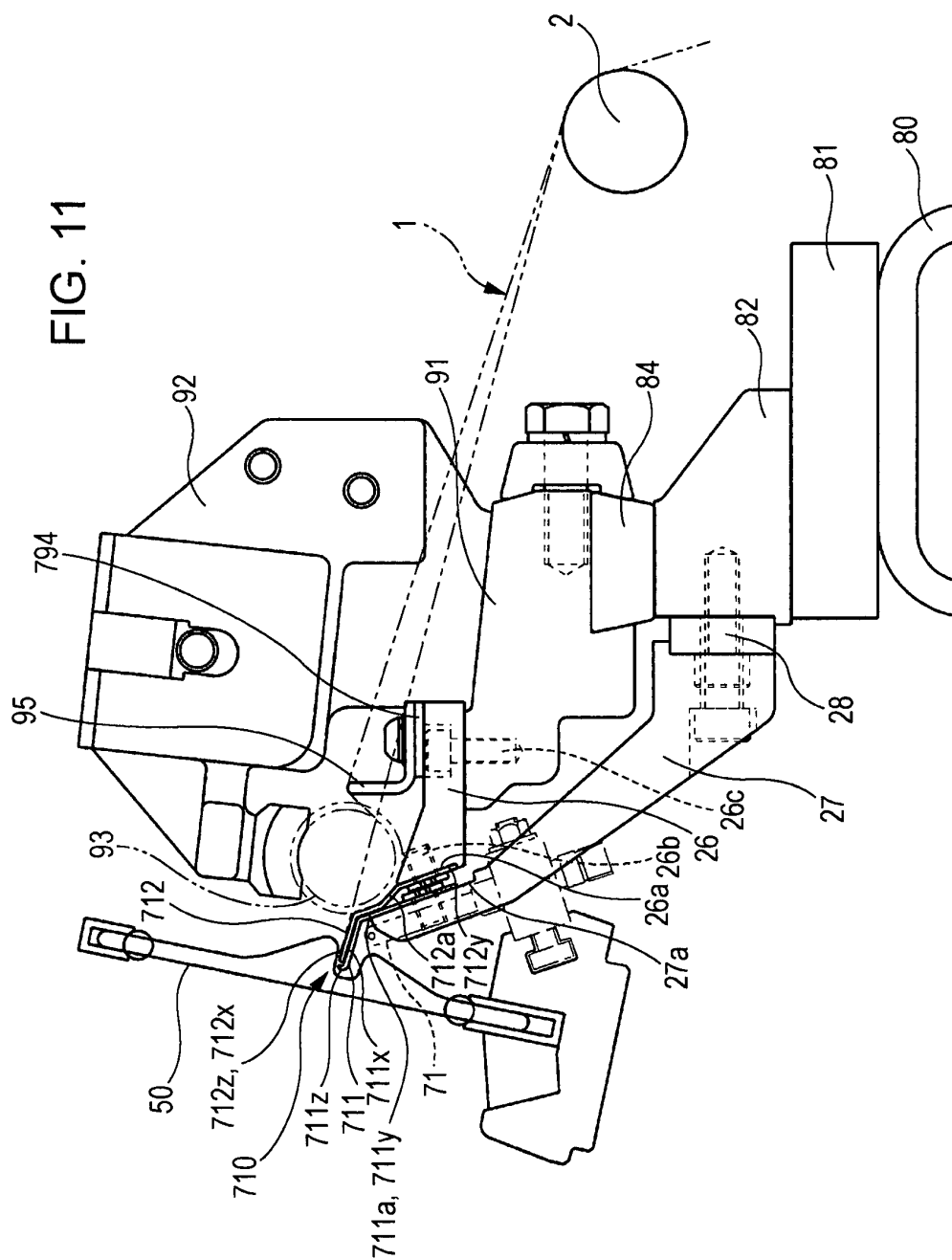
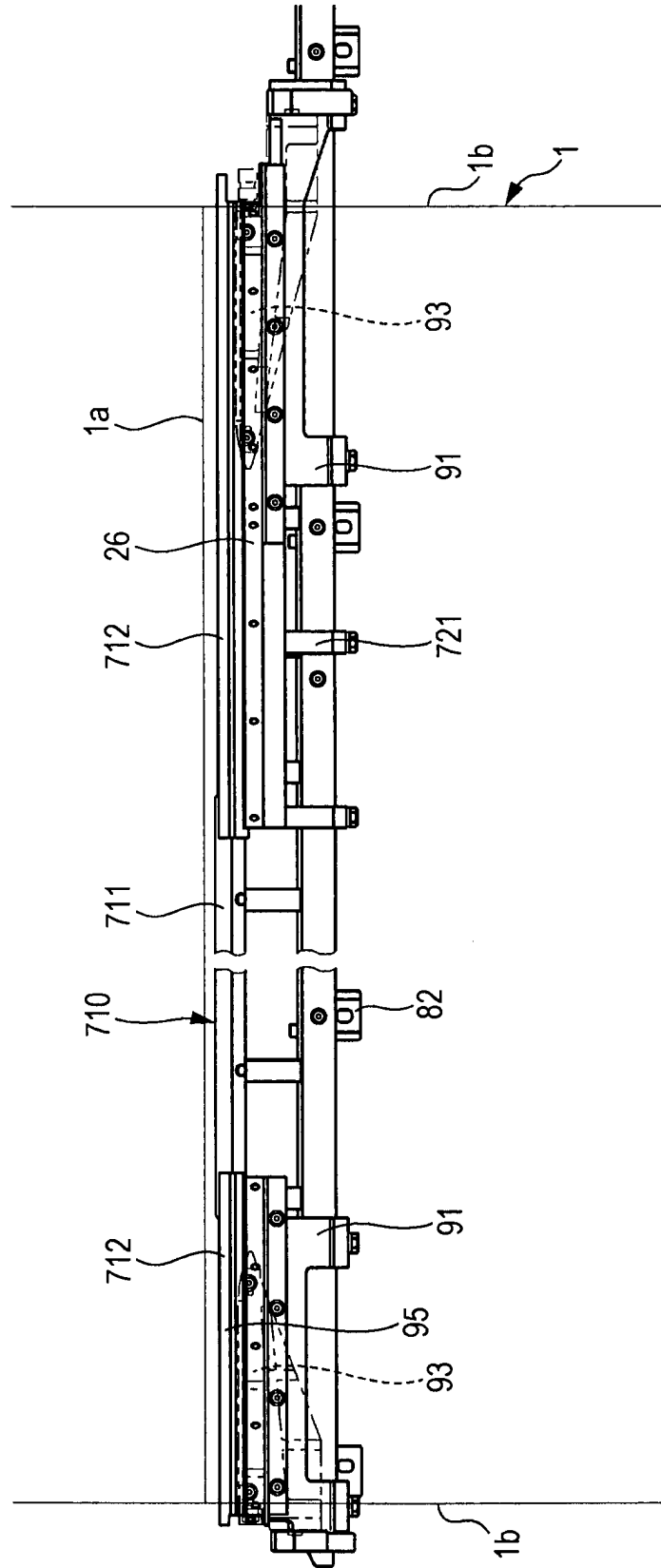


FIG. 12





EUROPEAN SEARCH REPORT

Application Number
EP 13 00 1413

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A	WO 2008/031519 A1 (PICANOL NV [BE]; BAMELIS JEAN-MARIE [BE]; PEETERS JOZEF [BE]) 20 March 2008 (2008-03-20) * paragraph [0010] - paragraph [0013] * * figures 1-2 *	1-4	INV. D03J1/22
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A	EP 0 368 799 A1 (SULZER AG [CH]) 16 May 1990 (1990-05-16) * column 3, line 19 - column 3, line 38 * * figure 3 *	1-4	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 June 2013	Examiner Hausding, Jan
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