(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 739 095 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.11.2020 Bulletin 2020/47

(51) Int Cl.:
D03D 47/48 *(2006.01)*

(21) Application number: **20167257.3**

(22) Date of filing: **31.03.2020**

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **04.04.2019 JP 2019072274**

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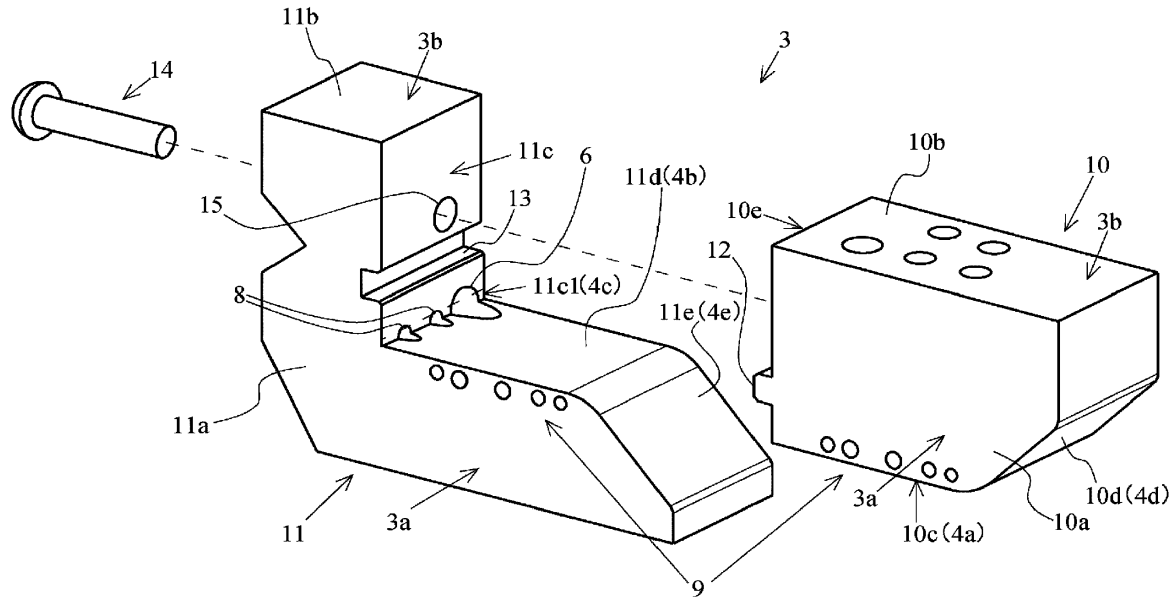
(54) **TUCK-IN HEAD FOR AIR-INJECTION TYPE TUCK-IN DEVICE**

(57) Provided is a tuck-in head (3) for an air-injection type tuck-in device configured to perform tuck-in, in which states of slit (4) surfaces (4a,4b) can be identified during a manufacturing step of the tuck-in head (3). The tuck-in head includes a first member (10) constituting a part including the upper slit surface (4a); and a second member (11) formed separately from the first member (10) and constituting a part including the lower slit surface (4b). The tuck-in head (3) is constructed by combining at least the first member (10) and the second member (11) with each other.

FIG. 3



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Description

TECHNICAL FIELD

[0001] The present invention relates to a tuck-in head for an air-injection type tuck-in device, wherein the tuck-in head has a slit, and the air-injection type tuck-in device is configured to tuck-in an end portion of a weft introduced between opposing upper and lower slit surfaces of the slit by air injected from a tuck-in nozzle.

BACKGROUND ART

[0002] As well known, an air-injection type tuck-in device is mainly constituted of a tuck-in head and is configured to fold back (tuck) an end portion of a weft-inserted weft into an opening of a warp by a compressed air injected from a tuck-in nozzle provided on a tuck-in head. Also, the tuck-in head has a slit defined by opposing upper and lower slit surfaces and is arranged near to a selvage of a woven fabric so that the end portion of the weft-inserted weft is introduced into the slit along with beating. As such an air-injection type tuck-in device (tuck-in head), for example, one disclosed in PTL 1 is known.

[0003] Additionally, such an air-injection type tuck-in device (hereinafter, simply referred to as a "tuck-in device") includes a configuration for holding the end portion of the weft, which has been introduced in the slit, until the tuck-in is performed. For the tuck-in device of PTL 1, a holding hole (weft end gripping hole), which opens in a lower slit surface, and a holding nozzle (weft end gripping nozzle), which is configured to inject a compressed air toward the holding hole, are formed on a tuck-in head. In addition, the tuck-in device includes a configuration for bringing the end portion of the weft, which is held as described above, to a position, on which a compressed air injected from a tuck-in nozzle is acted. For the tuck-in device of PTL 1, a weft release nozzle, which is configured to open in a bottom surface of the slit and to inject a compressed air, is formed on the tuck-in head.

CITATION LIST

PATENT LITERATURE

[0004] PTL 1: Japanese Patent Application Publication No. 2011-111700

SUMMARY OF INVENTION

[0005] However, for general tuck-in devices, a tuck-in head is manufactured as a single member, and a slit thereof is formed by performing machining, such as cutting, on the single member. Also, a distance between upper and lower slit surface of the slit is very small, for example about 1 mm. Meanwhile, a state (surface roughness) of the slit surfaces is likely to influence whether or not tuck-in is successful. Therefore, the machining for forming the slit has to be performed in such an extent that the state of the slit surfaces does not adversely influence tuck-in upon weaving.

[0006] However, some of manufactured tuck-in heads are likely to have an improper surface roughness in slit surfaces due to machining defects or the like. However, since the distance between upper and lower slit surfaces is very small as described above, the state of the slit surfaces cannot be identified from the outside. As a result, such tuck-in heads are also shipped while being mounted on looms or as components.

[0007] Meanwhile, if a tuck-in head, in which a surface roughness of slit surfaces is improper as described above, is employed, there is a risk that a case where tuck-in is not normally performed upon weaving (test weaving) (hereinafter, referred to as a "poor tuck-in") occurs frequently. Additionally, if the poor tuck-in occurs frequently, a worker has to perform work to identify what is the cause. In addition, if it is found that the cause is the state of the slit surfaces, the worker has to perform an additional machining in a weaving factory in order to bring the surface roughness of the slit surfaces to a proper extent. Also, such works are burdensome for the worker. In addition, the additional machining as described above has to be manually performed by the worker. Therefore, in some cases, the surface roughness of the slit surfaces cannot be brought to the proper extent, and thus the tuck-in head has to be replaced.

[0008] Also, in a case where a holding hole is formed in a tuck-in head as in the tuck-in head disclosed in PTL 1, a bur is likely to be left on a part of a slit surface, in which the holding hole opens, due to machining for forming the holding hole. In addition, like the case where the surface roughness of the slit surfaces is improper, such a state where a bur is left also causes the poor tuck-in to occur frequently. Therefore, works or replacement of the tuck-in head as described above is required.

[0009] The present invention has been made keeping in mind the above problems, and an object thereof is to provide a tuck-in head for an air-injection type tuck-in device configured to perform tuck-in, in which states of slit surfaces can be identified during a manufacturing step of the tuck-in head.

[0010] The present invention is directed to a tuck-in head for an air-injection type tuck-in device configured to tuck an end portion of a weft introduced between opposing upper and lower slit surfaces of a slit as described above.

[0011] Also, the tuck-in head according to the present invention includes a first member constituting a part including the upper slit surface; and a second member formed separately from the first member and constituting a part including the lower slit surface. In addition, the tuck-in head is constructed by combining at least the first member and the second member with each other.

[0012] Also, in the tuck-in head according to the present invention, at least one of the first member and the second member may be formed to have a part forming

a bottom surface of the slit.

[0013] Further, in the tuck-in head, a convex portion may be formed on at least one of the first member and the second member and a concave portion may be formed on the other, so that the convex portion is fitted in the concave portion. In addition, when combining the first member and the second member with each other, combining may be performed by fitting the convex portion into the concave portion.

[0014] According to the tuck-in head of the present invention, the tuck-in head is constructed by combining at least the first member and the second member, which is formed separately from the first member. Also, the first member is formed as a member including the upper slit surface of the slit, and the second member is formed as a member including the lower slit surface of the slit. That is, the first and second members are combined in a state respective surfaces thereof functioning as slit surfaces oppose each other. Therefore, the slit surface in each of the members is a part of a surface of each of the members and thus is a surface exposed to the outside. In other words, a state of the slit surface of each of the member can be identified at least at a stage before two members are combined during a manufacturing step of the tuck-in head.

[0015] Accordingly, during a process of manufacturing each of the first and second members, it is possible to perform machining (finishing) while identifying a state of a surface thereof constituting the slit surface. Therefore, it is possible to prevent the two members, in which the slit surface has an improper surface roughness, from being accepted as a finished product as far as possible. As a result, the slit surfaces having a proper surface roughness can be obtained in the tuck-in head formed by combining the two members. Therefore, it is possible to basically prevent a poor tuck-in caused due to an improper surface roughness of the slit surfaces and correspondingly to promote reduction in burdensome of a worker and the like.

[0016] Also, in the tuck-in head according to the present invention, the first and second members are configured such that at least one of the first and second members has a part forming the bottom surface of the slit, namely, such that the bottom surface of the slit in the tuck-in head is formed by a surface continuous to the slit surface of the first and/or second member. Accordingly, the slit is formed by combining the two members. Therefore, it is possible to construct the tuck-in head by only the first and second members. Thus, due to this configuration, it is possible to realize the tuck-in head of the present invention in a simpler configuration.

[0017] Further, in general, a distance between the slit surfaces of the tuck-in head (gap of the slit) is set to have a predetermined value. Thus, when combining the first member and the second member to form the tuck-in head, it is necessary to perform combining in such a manner that a distance between the slit surfaces included in both members has the predetermined value. Therefore, in a case where the first member and the second member are directly combined to form the tuck-in head, a convex portion is formed on one of the two members, a concave portion is formed on the other, and then the two members are combined by fitting the convex portion into the concave portion. Due to this configuration, it is easy to combine the two members in such a manner that the distance between the slit surfaces has the predetermined value.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

Fig. 1 is a schematic plan view showing an example of an air-injection type loom having a tuck-in head for an air-injection type tuck-in device according to the present invention.

Fig. 2 is a side view of the tuck-in head on a yarn supplying side according to an embodiment of the present invention, as viewed from a woven fabric side.

Fig. 3 is an exploded view of the tuck-in head on the yarn supplying side according to the embodiment of the present invention.

Figs. 4A and 4B are side views of the tuck-in head, illustrating a variant of a division position, in which only a second member has a surface constituting a bottom surface of a slit.

Fig. 5A is a side view of the tuck-in head, illustrating a variant of the division position, in which only a first member has a surface constituting the bottom surface of the slit. Fig. 5B is a partially enlarged side view of the tuck-in head, illustrating a variant of a division position, in which a first member and a second member have a portion forming the bottom surface of the slit.

Fig. 6 is a side view showing a variant of the tuck-in head constituted of a first member, a second member and a third member.

DESCRIPTION OF EMBODIMENTS

[0019] Hereinafter, an embodiment of a tuck-in head for an air-injection type tuck-in device according to the present invention will be described with reference to Figs. 1 to 3.

[0020] Fig. 1 is an example of an air-injection type loom. In such an air-injection type loom 1, a weft Y is weft-inserted by a compressed air injected from a main nozzle MN or the like and then is beaten on a cloth fell CF of a woven fabric T by a reed R. Also, the air-injection type loom 1 has a tuck-in device 2 for folding back (tucking) an end portion of the weft-inserted (beaten) weft Y (hereinafter, referred to as a weft end portion) into an opening of a warp W, into which the weft Y is subsequently to be weft-inserted.

[0021] Further, the tuck-in device 2 has, on each of a yarn supplying side (the main nozzle MN side) and an

opposite side thereof, a tuck-in head 3 for performing a series of tuck-in operations, such as air injection, to fold back the weft end portion as described above. That is, the tuck-in device 2 is a so-called air-injection type tuck-in device. Further, the tuck-in device 2 includes a cutter C assigned to each of the tuck-in heads 3. In addition, each tuck-in head 3 is provided between the cutter C and a selvage of the woven fabric T in a weaving width direction.

[0022] The tuck-in head 3 is a block-like member which has a substantially rectangular parallelepiped appearance. Also, each tuck-in head 3 has a slit 4 defined by opposing upper and lower slit surfaces 4a, 4b. Further, the slit 4 has a bottom surface 4c connecting upper and lower slit surfaces 4a, 4b. Further, the tuck-in head 3 has a weft introducing portion 5 constituted of guide surfaces 4d, 4e formed to be continuous to the slit surfaces 4a, 4b, respectively, in order to ensure that introduction of the weft end portion in the slit 4 accompanied with beating operation of the reed R can be more reliably performed. The weft introducing portion 5 is formed such that a distance between the guide surfaces 4d, 4e is increased as it goes away from the slit 4. Therefore, the slit 4 extends from the weft introducing portion 5 to the bottom surface 4c when viewing a side surface 3a of the tuck-in head 3 from a front side thereof. Meanwhile, hereinafter, a direction, in which the slit 4 extends, is referred to as an "extension direction" in the tuck-in head 3.

[0023] Also, the tuck-in head 3 is arranged such that, with respect to a vertical direction, a position of the slit 4 coincides with a warp line WL and, with respect to a warp direction, the extension direction coincides with the warp direction, and also such that the bottom surface 4c of the slit 4 is positioned near to the cloth fell CF with the weft introducing portion 5 oriented toward the reed R.

[0024] Further, the tuck-in head 3 has a holding hole 6 for holding the weft end portion, which has been introduced in the slit 4 by the beating operation, until tuck-in is performed, and a holding nozzle 7 for injecting a compressed air toward the holding hole 6 in order to introduce and hold the weft end portion in the holding hole 6. Meanwhile, in the present embodiment, the holding hole 6 is formed to extend across a border between the lower slit surface 4b and the bottom surface 4c of the slit 4, thereby opening in both surfaces 4b, 4c. In addition, the holding nozzle 7 is formed to open in the upper slit surface 4a, thereby facing the holding hole 6.

[0025] Further, the tuck-in head 3 has a release nozzle 8 for injecting a compressed air to eject the weft end portion, which is held in the holding hole 6, from the holding hole 6, and a tuck-in nozzle 9 for injecting a compressed air to tuck the weft end portion into an opening of the warp W. Meanwhile, like the holding nozzle 7, the release nozzle 8 is formed to open in the lower slit surface 4b and the bottom surface 4c. But, in the shown example, two release nozzles 8 are formed to be positioned closer to the woven fabric T than is the holding hole 6 in a state where the tuck-in head 3 is installed on the loom 1. Therefore, it is possible to cause the weft end portion, which has been ejected from the holding hole 6 by the compressed air injected from the release nozzle 8, to be brought to an injection effect region of the tuck-in nozzle 9.

[0026] Further, the tuck-in nozzle 9 is formed to open in the side surface 3a of the tuck-in head 3 facing the woven fabric T. Meanwhile, in the shown example, a plurality of tuck-in nozzles 9 are formed to open side by side in the extension direction along the slit 4 on each of upper and lower sides of the slit 4. In addition, the weft end portion brought to the injection effect region of the tuck-in nozzle 9 by the compressed air injected from the release nozzle 8 is tucked into an opening of the warp W by an compressed air injected from each of the tuck-in nozzles 9, thereby completion the series of tuck-in operations.

[0027] For each of the tuck-in heads 3 of tuck-in device 2 configured as described above, the tuck-in head according to the present invention is constructed by combining at least two members, including a first member constituting a portion including the upper slit surface and a second member constituting a portion including the lower slit surface. Additionally, in the present embodiment, it is assumed that each of the tuck-in heads 3 is constructed only by a first member 10 and a second member 11. In other words, the tuck-in head 3 is configured to be divisible into the first member 10 and the second member 11. The detailed configuration of the tuck-in head 3 is as follows. Meanwhile, the tuck-in head 3 on the yarn supplying side and the tuck-in head 3 on the opposite side have the same configuration, except that the tuck-in heads 3 are formed to be symmetrical with each other in the weaving width direction. Accordingly, hereinafter, only one tuck-in head (in the shown example, the tuck-in head on the yarn supplying side) will be described and the description of the other will be omitted.

[0028] As shown in Fig. 2, the tuck-in head 3 is configured such that a portion including the upper slit surface 4a can be divided from the other portion at a position of the bottom surface 4c in the extension direction. That is, the tuck-in head 3 is configured such that a member including the upper slit surface 4a and a member including the lower slit surface 4b, which can be divided as described above, are separately formed and then the two members are combined. Also, the member including the upper slit surface 4a is the first member 10, and the member including the lower slit surface 4b is the second member 11.

[0029] As for the first and second members 10, 11, the first member 10 is a block-like member which has a substantially rectangular parallelepiped appearance, considering a shape of the tuck-in head 3 and the division position as described above, and a side surface 10a thereof constitutes a part of the side surface 3a of the tuck-in head 3. Also, a part 10c of a peripheral surface (excluding the side surface 10) of the first member 10 becomes the upper slit surface 4a, and a part 10d of the

peripheral surface, which is continuous to the surface 10c constituting the upper slit surface 4a, is formed to be inclined with respect to the surface 10c, thereby forming the guide surface 4d.

[0030] Further, a surface 10e of the peripheral surface, which is opposite to the surface 10d constituting the guide surface 4d and also continuous to the surface 10c constituting the upper slit surface 4a, is formed to be perpendicular to the surface 10c constituting the upper slit surface 4a. In addition, the surface 10e becomes an attaching surface, which is configured to abut against the second member 11 when the first member 10 is attached to the second member 11.

[0031] Also, a surface 10b of the peripheral surface of the first member 10, which is opposite to the surface 10c constituting the upper slit surface 4a and also continuous to the attaching surface 10e, is formed to be perpendicular to the attaching surface 10e. Meanwhile, in a state where the tuck-in head 3 is installed on the loom 1, the surface 10b is a surface constituting a part of an upper surface 3b of the tuck-in head 3 and also becomes an upper surface of the first member 10.

[0032] Also, the second member 11 is similarly a block-shaped member and is formed to have a substantially L-shape when viewing a side surface 11a thereof from a front side. That is, the second member 11 is a block-shaped member, of which the side surface 11a is formed in a substantially L-shape. In addition, the side surface 11a is a surface constituting a surface of the side surface 3a of the tuck-in head 3, excluding the side surface 10a of the first member 10.

[0033] Further, the second member 11 is formed such that two surfaces 11c, 11d of a peripheral surface thereof (excluding the side surface 11a), which is located on an inner side of the L-shape and also continuous to each other, is perpendicular to each other. Also, in order to form the tuck-in head 3, the first member 10 is attached to one 11c of the two surfaces 11c, 11d of the second member 11. That is, in the second member 11, one surface 11c of the two surfaces thereof perpendicular to each other becomes an attached surface.

[0034] Also, a surface 11b of the peripheral surface of the second member 11, which is opposite to the other surface 11d and also continuous to the attached surface 11c, is formed to be perpendicular to the attached surface 11c. Meanwhile, the surface 11b is a surface constituting a surface of the upper surface 3a of the tuck-in head 3, excluding the upper surface 10b of the first member 10, and also becomes an upper surface of the second member 11.

[0035] Meanwhile, as for the attached surface 11c, the second member 11 is formed such that a dimension of the attached surface 11c, as measured from the other surface 11d of the two surfaces 11c, 11d in an extension direction thereof, is larger than a dimension of the attaching surface 10e, as measured in a direction perpendicular to the upper surface 10b of the first member 10. But, such a difference in dimension is set to be equal to a certain distance (predetermined distance) between the upper and lower slit surfaces 4a, 4b of the tuck-in head 3.

[0036] Additionally, in the tuck-in head 3, attaching of the first member 10 to the second member 11 is performed in a state where the attaching surface 10e of the first member 10 is brought to abut against the attached surface 11c of the second member 11, but in a state where, with respect to the extension direction of the attached surface 11c, a position of the upper surface 10b of the first member 10 coincides with a position of the upper surface 11b of the second member 11. Therefore, after attaching, the upper surface 10b of the first member 10 is flush with the upper surface 11b of the second member 11.

[0037] Also, after attaching, the surface 10c of the first member 10, which constitutes the upper slit surface 4a, is arranged to face the other surface 11d of the second member 11 in parallel to each other and with the predetermined distance interposed therebetween. Therefore, the other surface 11d of the second member 11 is a surface constituting the lower slit surface 4b. Further, the surface 11e of the peripheral surface of the second member 11, which is opposite to the attached surface 11c and also continuous to the surface 11d constituting the lower slit surface 4b, is formed to be inclined with respect to the surface 11d constituting the lower slit surface 4b, thereby forming the guide surface 4e.

[0038] Also, as described above, by attaching the first member 10 to the second member 11 such that the surface 10c constituting the upper slit surface 4a and the surface 11d constituting the lower slit surface 4b face each other with the predetermined distance interposed therebetween, a part 11c1 of the attached surface 11c (a part thereof located toward the surface 11d constituting the lower slit surface 4b in the extension direction thereof) is exposed to a space between two slit surfaces 4a, 4b. In addition, the part 11c1 of the attached surface 11c exposed to the space becomes the bottom surface 4c of the slit 4.

[0039] Also, in the tuck-in head 3 of the present embodiment, the first member 10 has a protrusion 12 formed on the attaching surface 10e and also the second member 11 has a groove 13 formed in the attached surface 11c to allow the protrusion 12 to be fitted therein, thereby easily realizing the attached state as described above.

[0040] More specifically, the attaching surface 10e of the first member 10 has the protrusion 12 formed to protrude in a direction parallel to the side surface 10a and the upper surface 10b. In addition, the protrusion 12 is formed to extend between opposing side surfaces 10a, 10a of the first member 10 in a direction perpendicular to the side surfaces 10a of the first member 10 (in a width direction of the tuck-in head 3). Further, the protrusion 12 is formed to have a substantially square shape as viewed in an extension direction thereof.

[0041] On the other hand, the attached surface 11c of the second member 11 has the groove 13 formed to allow the protrusion 12 of the first member 10 to be fitted there-

in. But, the groove 13 is formed at such a position that, in a state where the protrusion 12 is fitted therein, the upper surface 10b of the first member 10 and the upper surface 11b of the second member 11 are flush with each other as described above.

[0042] Then, when the first member 10 is attached to the second member 11, the protrusion 12 of the first member 10 is fitted into the groove 13 of the second member 11. As a result, the first member 10 and the second member 11 are combined with each other in a state where the upper surface 10b of the first member 10 and the upper surface 11b of the second member 11 are flush with each other as described above. Therefore, in the tuck-in head 3 of the present embodiment, the protrusion 12 functions as a "convex portion" and the groove 13 functions as a "concave portion."

[0043] Also, as the first member 10 and the second member 11 are combined as described above, the upper slit surface 4a and the lower slit surface 4b face each other with the predetermined distance interposed therebetween, and also the slit 4 is defined by both slit surfaces 4a, 4b and the bottom surface 4c, which is formed by the part 11c1 of the attached surface 11c of the second member 11.

[0044] Also, according to the present embodiment, in the combined state of the first member 10 and the second member 11 as described above, fixation of the combined state is performed by a screw member 14. For this reason, the tuck-in head 3 includes the screw member 14 and holes allowing the screw member 14 to be inserted therethrough and screwed therein.

[0045] More specifically, the second member 11 has an insertion hole 15 formed to open at a location on the attached surface 11c, which is located more toward the upper surface 11b than the groove 13, and also to extend through the second member 11 in a direction perpendicular to the attached surface 11c. On the other hand, the first member 10 has a female threaded hole 16 formed to open in the attaching surface 10e. Meanwhile, the female threaded hole 16 is formed at such a position that, when the first member 10 and the second member 11 are combined as described above, the female threaded hole 16 can be communicated with the insertion hole 15 of the second member 11.

[0046] Then, when the first member 10 and the second member 11 are fixed to each other in the combined state as described above, the screw member 14 is inserted through the insertion hole 15 of the second member 11 from the side thereof opposite to the attached surface 11c, and then the screw member 14 is screwed into the female threaded hole 16 of the first member 10. As a result, the combined state of the first member 10 and the second member 11 as described above is fixed, thereby forming the tuck-in head 3.

[0047] On the other hand, in the present embodiment, the fixation is achieved by adhesion using adhesive, in addition to fixation using the screw member 14 (screw fixation). That is, according to the tuck-in head 3 of the present embodiment, the first member 10 and the second member 11 are adhered and fixed to each other by adhesive applied on the attaching surface 10e, thereby complementing the screw fixation. But, if a stably fixed state is achieved only by the screw fixation, such an adhesion fixation may be omitted. In contrast, if the stably fixed state is achieved only by the adhesion fixation, the screw fixation may be omitted. Also, according to the tuck-in head of the present invention, a means for holding the combined state of the first member 10 and the second member 11 is not limited to the screw fixation or the adhesion fixation, and accordingly any other configurations may be employed.

[0048] Also, according to the tuck-in head 3 configured as described above, the first member 10 and the second member 11 constituting the tuck-in head 3 are separately machined (formed) during a step of manufacturing the tuck-in head 3. Therefore, machining of the surfaces 10c, 11d of the members 10, 11 constituting the upper and lower slit surfaces 4a, 4b, respectively, of the tuck-in head 3 can be performed while states of the surfaces can be easily identified. As a result, the surfaces 10c, 11d of the members 10, 11 are prevented from being finished while having a surface roughness, which is improper as the slit surface, as far as possible. Therefore, during the manufacturing step, the tuck-in head 3 can be finished such that the slit surfaces 4a, 4b have a proper surface roughness.

[0049] Further, according to the tuck-in head 3 of the present embodiment, the tuck-in head 3 is constituted of only two first and second members 10, 11, and also in order to enable this, the tuck-in head 3 is configured such that the part 11c1 of the attached surface 11c of the second member 11 constitutes the bottom surface 4c of the slit 4. Therefore, according to this configuration, it is possible to realize the tuck-in head of the present invention in a simpler configuration.

[0050] Further, according to the tuck-in head 3 of the present embodiment, the protrusion (convex portion) 12 provided on the first member 10 is fitted in the groove (concave portion) 13 provided in the second member 11, thereby achieving the combined state of the two members 10, 11 as the tuck-in head 3. According to this configuration, when two members 10, 11, which are separately formed as described above, are combined to construct the tuck-in head 3, operation of combining (attaching) the two members 10, 11 can be easily performed.

[0051] On the other hand, the present invention is not limited to the foregoing embodiment, but can also be embodied as aspects (variants) modified as the followings (1) to (5).

(1) In the foregoing embodiment, the tuck-in head 3 is constituted of only two first and second members 10, 11, and the part 10 including the upper slit surface 4a is configured to be divided from the other part 11 at the position of the bottom surface 4c of the slit 4 in the extension direction thereof. That is, the division

position of the tuck-in head 3 is a location which coincides with the position of the bottom surface 4c of the slit 4 in the extension direction and also allows the part 10 including the upper slit surface 4a to be divided from the other part 11. However, according to the present invention, even in the case where the tuck-in head is constructed by combining two members like the foregoing embodiment, the division position of the tuck-in head (hereinafter, simply referred to as a "division position") is not limited to the position in the foregoing embodiment, but may be the following positions.

Although in the foregoing embodiment, the position of the bottom surface 4c of the slit 4 in the extension direction is the division position, the division position may be at a location gradually away from the bottom surface 4c as it goes away from the slit 4 in a direction (height direction) perpendicular to the slit surface as in an example shown in Fig. 4A. In this case, an attached surface 31c of a peripheral surface of a second member 31 is a surface inclined with respect to a surface 31d constituting the lower slit surface 4b. Also, similarly, an attaching surface 30e in a first member 30 is also a surface inclined with respect to a surface 30c constituting the upper slit surface 4a. But, the inclined angle is an angle allowing the upper slit surface 4a to face the lower slit surface 4b in parallel to each other in a state where the attaching surface 30e is brought to abut against the attached surface 31c.

Further, as shown in Fig. 4B, the division position may be at a location coinciding with a position of the upper slit surface 4a in the height direction. In this case, the entirety of a surface 21c among a peripheral surface of a second member 21, which is perpendicular to a surface 21d thereof constituting the lower slit surface 4b, becomes a surface constituting the bottom surface 4c of the slit 4, and an upper surface 21b thereof becomes the attached surface. On the other hand, among a peripheral surface of a first member 20, a part 20c2, which faces the upper surface 21b of the second member 21, of a surface 20c thereof continuous to a surface 20d thereof constituting the guide surface 4d and also in parallel to an upper surface 20b thereof, becomes the attaching surface, and the other part 20c1 becomes a surface constituting the upper slit surface 4a.

Further, as shown in Fig. 5A, the division position may be at a location which coincides with the position of the bottom surface 4c of the slit 4 in the extension direction and also allows a part (second member) 41 including the lower slit surface 4b to be divided from the other part (first member) 40. In this case, the bottom surface 4c of the slit 4 is formed by a surface 40cl of the first member 40(a part of a peripheral surface thereof).

Further, as shown in Fig. 5B, the division position may be located at the substantially middle between the upper slit surface 4a and the lower slit surface 4b in the height direction. In this case, the bottom surface 4c of the slit 4 is formed by a surface 50f of a first member 50 (among a peripheral surface thereof, a surface perpendicular to a surface 50c thereof constituting the upper slit surface 4a) and a surface 51c of a second member 51 (among a peripheral surface thereof, a surface perpendicular to a surface 51d thereof constituting the lower slit surface 4b). That is, in this example, both the first member 50 and the second member 51 have, on the peripheral surfaces thereof, parts 50f, 51c, respectively, forming the bottom surface 4c of the slit 4.

(2) In the foregoing, the case where the tuck-in head 3 is constituted of only two members (first member and second member) has been described. However, the tuck-in head of the present invention is not limited to being constituted of only two members as described above, but may be constituted of three or more members.

Specifically, for example, as shown in Fig. 6, a first member 60 including a surface 60c constituting the upper slit surface 4a is configured as in the foregoing embodiment, and also a second member 61 including a surface 61d constituting the lower slit surface 4b is configured as in the example shown in Fig. 5A. Additionally, the tuck-in head 3 may include a third member 62 connecting the first member 60 with the second member 61, so that the tuck-in head 3 is constructed by combining these three members 60, 61, 62. In the case of this configuration, the first member 60 and the second member 61 have no part constituting the bottom surface 4c of the slit 4, and a part 62c1 of a peripheral surface of the third member 62, which is exposed to a space between the upper and lower slit surfaces 4a, 4b, becomes the bottom surface 4c of the slit 4.

Further, although not shown, in a case where the tuck-in head is constructed by three members including first and second members as described above, the first member may be configured as in Fig. 4B, and the second member may be similarly configured such that a surface constituting the slit surface 4b and an attaching surface are positioned on the same plane. Additionally, a spacer defining a distance between two slit surfaces 4a, 4b may be employed as a third member, so that the tuck-in head is constructed by combining the first member with the second member via the third member (spacer).

Also, the member 62 as the third member in the example shown in Fig. 6 may be divided into two members, for example, at the substantially middle location thereof in the height direction. In this case, the tuck-in head 3 is constructed by combining four members (the first member 60, the second member 61, and two members constituting the third member 62).

(3) In the foregoing embodiments, the protrusion 12 as the convex portion is formed on the attaching sur-

face 10e of the first member 10 and the groove 13 as the concave portion is formed in the attached surface 11c of the second member 11, so that two members 10, 11 are combined by fitting the convex portion (protrusion 12) into the concave portion (groove 13). In this way, in the tuck-in head according to the present invention, the above effects can be obtained by forming a convex portion on one of two members (the foregoing embodiment: first member 10), which are to be directly combined with each other, and also forming a concave portion, into which the convex portion is to be fitted, on the other (the foregoing embodiment: second member 11). In addition, such a configuration for combining (combining configuration), in which a convex portion is fitted into a concave portion, may naturally be applied to the examples of Figs. 4 to 6.

On the other hand, in the case where the tuck-in head is constructed by combining three or more members, the combining configuration is applied between the first and/or second member and another member, which is to be directly combined therewith (the example of Fig. 6: third member 62). Also, which of one member and the other member, which are to be directly combined with each other, a convex portion or a concave portion is formed on may be arbitrarily set. Further, both a convex portion and a concave portion may be formed on the one member, and also a concave portion, into which the convex portion of the one member is to be fitted, and a convex portion, which is to be fitted into the concave portion of the one member, may be formed on the other member.

(4) As for the convex portion and the concave portion, the protrusion 12 as the convex portion in the foregoing embodiment is formed to have a substantially square shape as viewed in an extension direction thereof (the width direction of the tuck-in head 3), and the groove 13 as the concave portion is formed to have a substantially square shape as viewed in the width direction, thereby allowing the protrusion 12 to be fitted therein. However, when the combining configuration is applied to the tuck-in head according to the present invention, the shape of the convex portion and the concave portion is not limited to the shape in the foregoing embodiment, but may be, for example, a trapezoid shape, a triangle shape or a half circle shape. Further, the concave portion may be formed in a dovetail groove shape and the convex portion may be formed in a shape, which is to be fitted into the dovetail groove.

Also, the convex portion is not limited to being formed between opposing side surfaces 10a, 10a of the first member 10 in the width direction as in the foregoing embodiment, but may be formed partially in the width direction. Also, if the convex portion is formed in such a manner, the concave portion may be formed partially in the width direction like the convex portion, or may be formed between opposing side surfaces (the foregoing embodiment: opposing side surfaces 11a, 11a of the second member 11) in the width direction as in the foregoing embodiment. In addition, the convex portion is not limited to having the shapes as described above, but may be formed in a rod shape. In this case, the concave portion is a hole, into which the rod-shaped convex portion can be fitted.

Also, the convex portion in the examples described above is not limited to being formed by machining a part of a member, on which the convex portion is to be provided (the foregoing embodiment: first member 10), but may be formed by forming a component separate from the member and then attaching and integrating the component to the member. Further, the number of the convex portion provided on the member is not limited to one as in the foregoing embodiment, but may be plural. In addition, if a plurality of convex portions are provided, concave portions on the other member to be combined with the member may be properly formed in accordance with the number and arrangement of the convex portions.

Meanwhile, in the tuck-in head according to the present invention, the combining configuration employing the convex portion and the concave portion as described above is not essential. Accordingly, an attaching surface and an attached surface on two members to be combined with each other may be surfaces, on which no unevenness as described above is formed. In this case, the attaching surface and the attached surface are preferably flat surfaces in consideration of ease of machining, but may be, for example, circular arc surfaces.

(5) The foregoing embodiment corresponds to an example in which the present invention is applied to tuck-in heads 3 on the yarn supplying side and the opposite side. However, the present invention can also be applied to a tuck-in head for forming a center selvedge arranged between woven fabrics in a multiple-tucking loom which simultaneously weaves a plurality of separated woven fabrics.

[0052] Further, the present invention is not limited to the embodiment and variants as described above, and various modifications thereof can be made without departing from the spirit and scope of the present invention.

REFERENCE SIGNS LIST:

[0053]

1: Loom
2: Air-injection type tuck-in device
3: Tuck-in head
3a: Side surface of the tuck-in head
3b: Upper surface of the tuck-in head
4: Slit
4a: Upper slit surface

4b: Lower slit surface
4c: Bottom surface of the slit
4d, 4e: Guide surface
5: Weft introducing portion
6: Holding hole
7: Holding nozzle
8: Release nozzle
9: Tuck-in nozzle
10, 20, 30, 40, 50, 60: First member
10a: Side surface of the first member
10b, 20b: Upper surface of the first member
10c, 20c1, 50c, 60c: Surface constituting the upper slit surface
10d, 20d: Surface constituting the guide surface of the first member
10e, 20c2, 30e: Attaching surface
11, 21, 31, 41, 51, 61: Second member
11a: Side surface of the second member
11b: Upper surface of the second member
11c, 21b: Attached surface
11c1, 21c, 40cl: Surface constituting the bottom surface of the slit
11d, 21d, 31d, 51d, 61d: Surface constituting the lower slit surface
11e: Surface constituting the guide surface of the second member
12: Protrusion (convex portion)
13: Groove (concave portion)
14: Screw member
15: Insertion hole
16: Female threaded hole
50f, 51c: Surface constituting a part of the bottom surface of the slit
62: Third member
Y: Weft
MN: Main nozzle
R: Reed
T: Woven fabric
CF: Cloth fell
W: Warp
C: Cutter
WL: Warp line

Claims

1. A tuck-in head for an air-injection type tuck-in device, wherein the tuck-in head has a slit and the air-injection type tuck-in device is configured to tuck-in an end portion of a weft introduced between opposing upper and lower slit surfaces of the slit, by air injected from a tuck-in nozzle, the tuck-in head comprising:

a first member constituting a part including the upper slit surface; and
a second member formed separately from the first member and constituting a part including the lower slit surface,
wherein the tuck-in head is constructed by combining at least the first member and the second member with each other.

2. The tuck-in head for an air-injection type tuck-in device according to claim 1, wherein at least one of the first member and the second member has a part forming a bottom surface of the slit.

3. The tuck-in head for an air-injection type tuck-in device according to claim 2, wherein a convex portion is formed on at least one of the first member and the second member and a concave portion is formed on the other, wherein the convex portion is fitted in the concave portion,
wherein the first member and the second member are combined with each other in a state where the convex portion is fitted in the concave portion.

FIG. 1

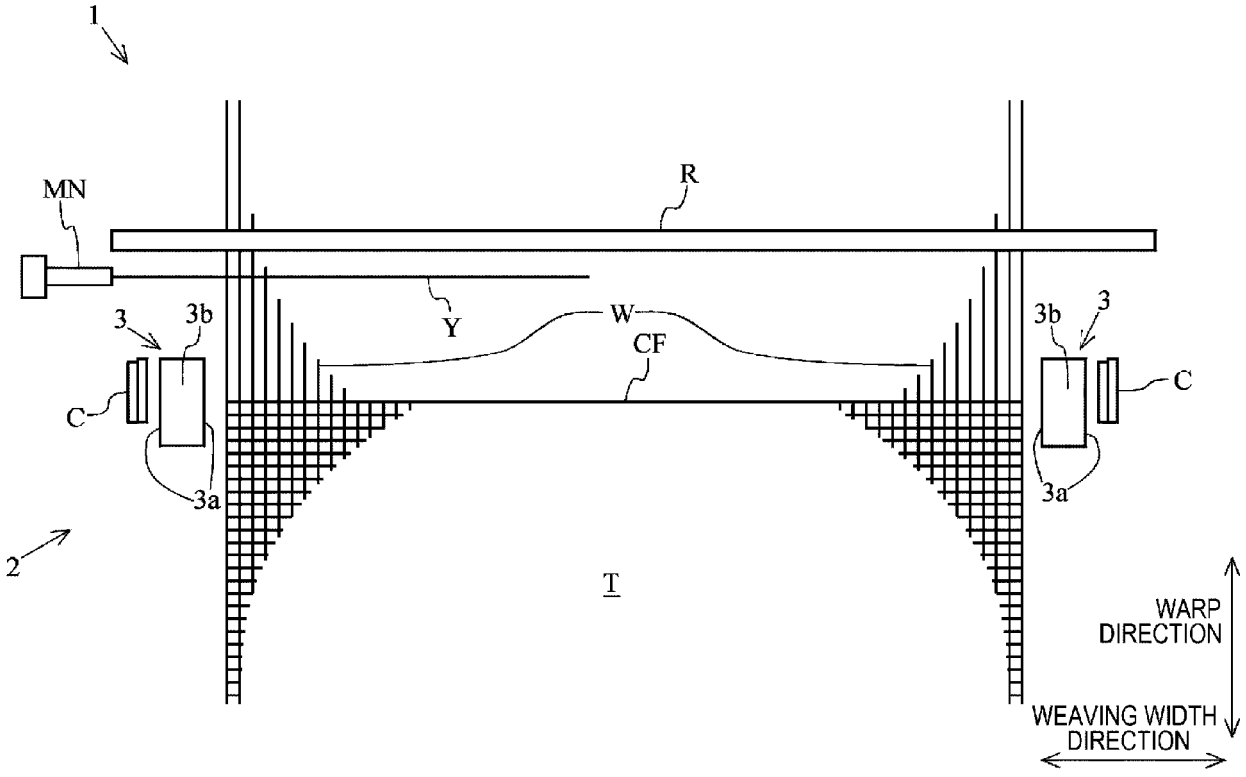

1
MN
R
Y
W
CF
3
3b
C
3a
2
T
WARP DIRECTION
WEAVING WIDTH DIRECTION

FIG. 2

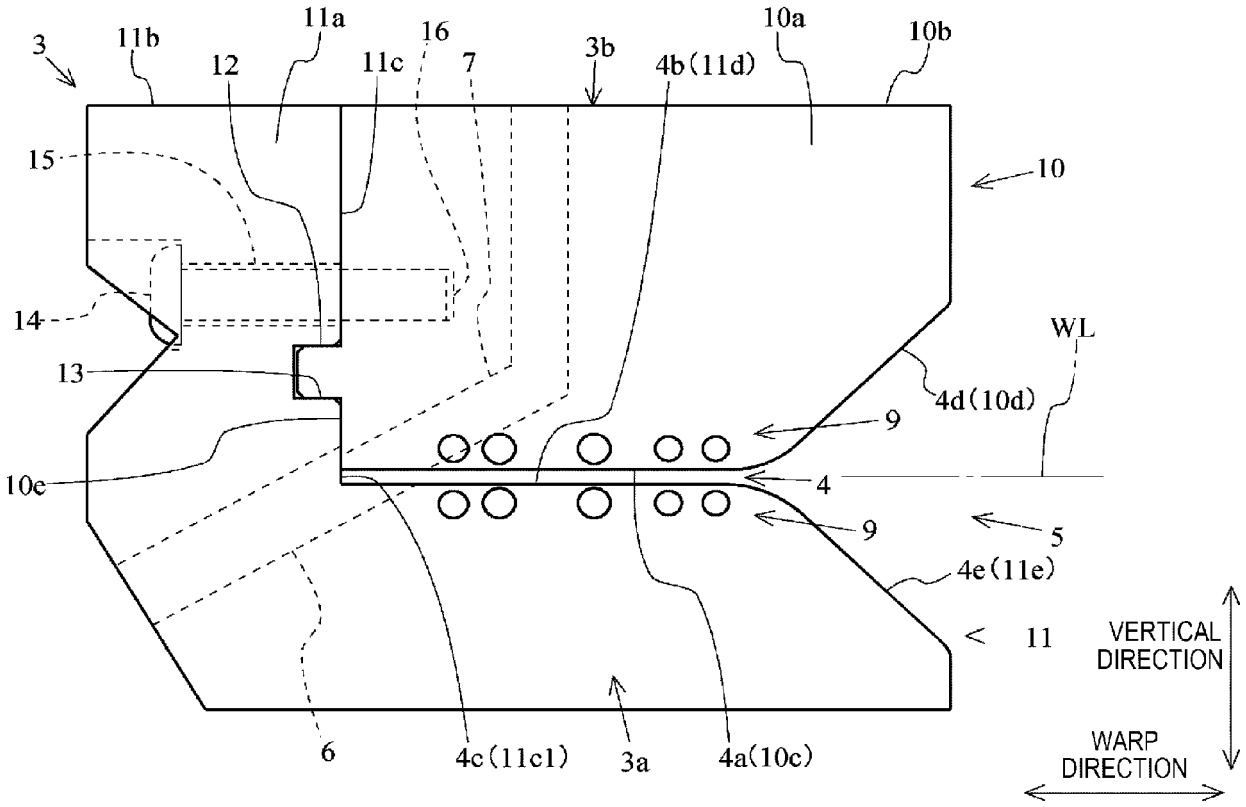

3
11b
12
11a
11c
16
7
3b
4b(11d)
10a
10b
15
10
14
13
WL
4d(10d)
9
10e
4
9
5
4e(11e)
11
VERTICAL DIRECTION
WARP DIRECTION
6
4c(11c1)
3a
4a(10c)

FIG. 3

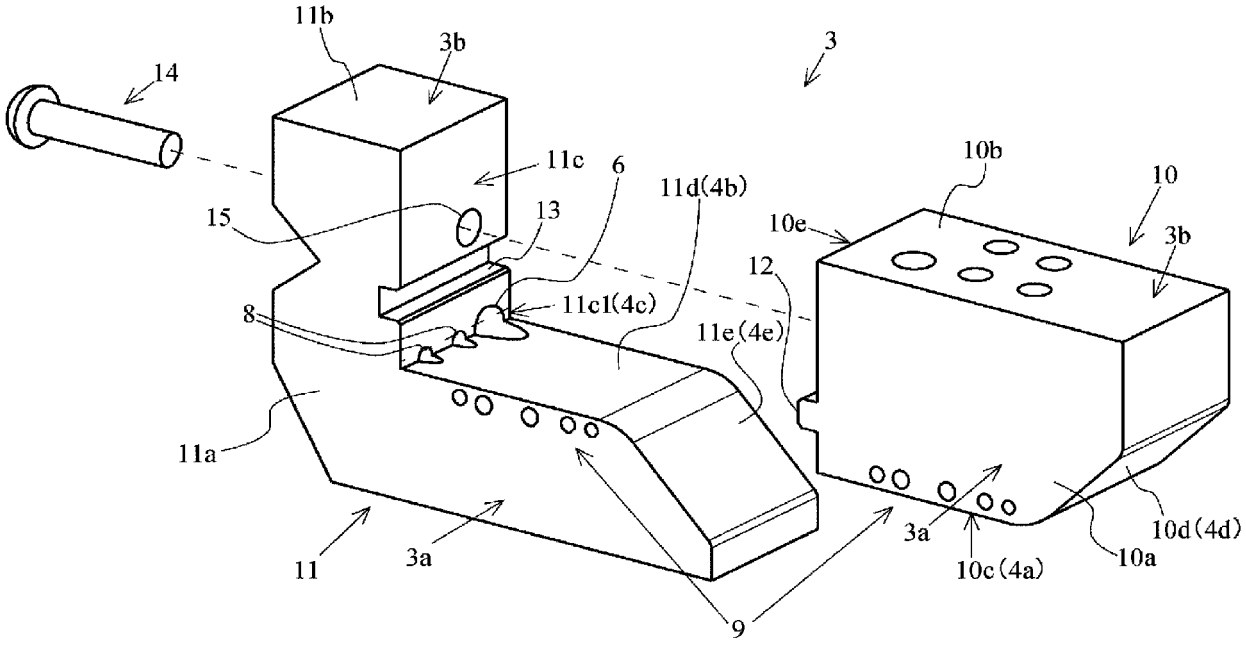

11b
3b
3
14
11c
6
11d(4b)
10b
10
15
13
10e
3b
12
11c1(4c)
8
11e(4e)
11a
3a
10d(4d)
11
3a
10a
10c(4a)
9

FIG. 4A

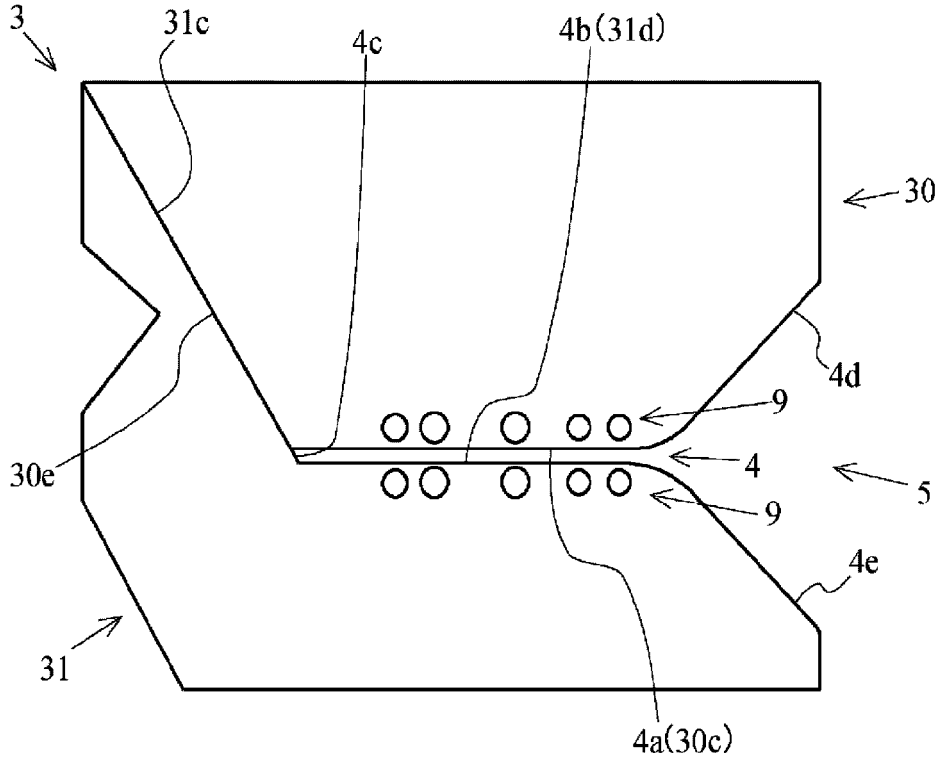

3
31c
4c
4b(31d)
30
4d
9
30e
4
5
9
4e
31
4a(30c)

FIG. 4B

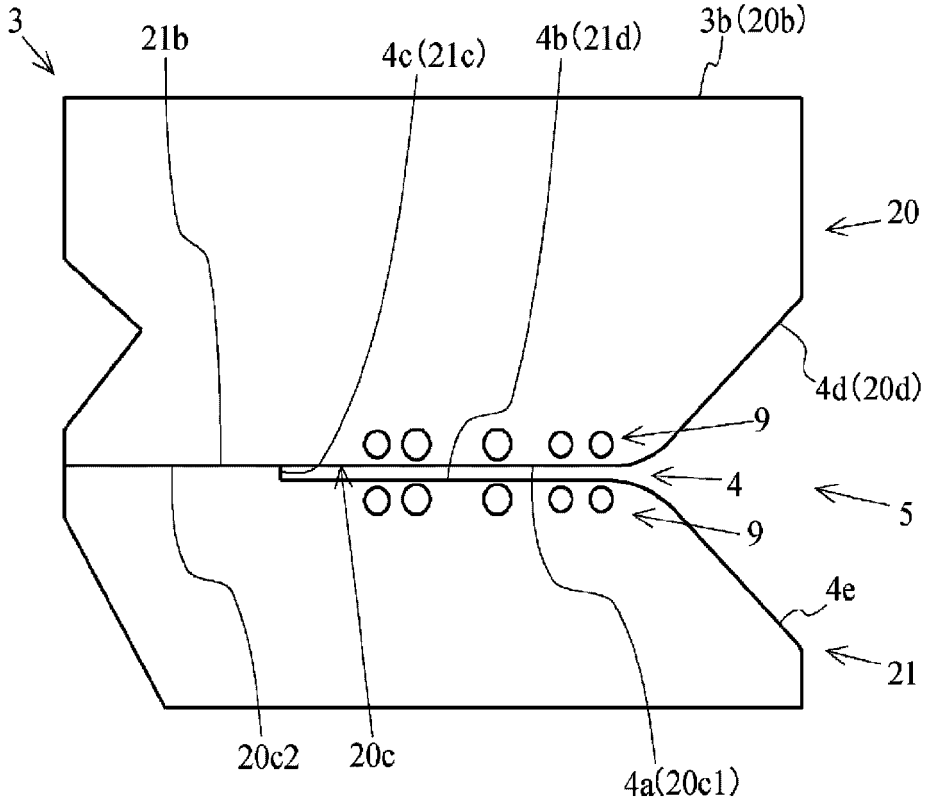

3
21b
4c(21c)
4b(21d)
3b(20b)
20
4d(20d)
9
4
5
9
4e
21
20c2
20c
4a(20c1)

FIG. 5A

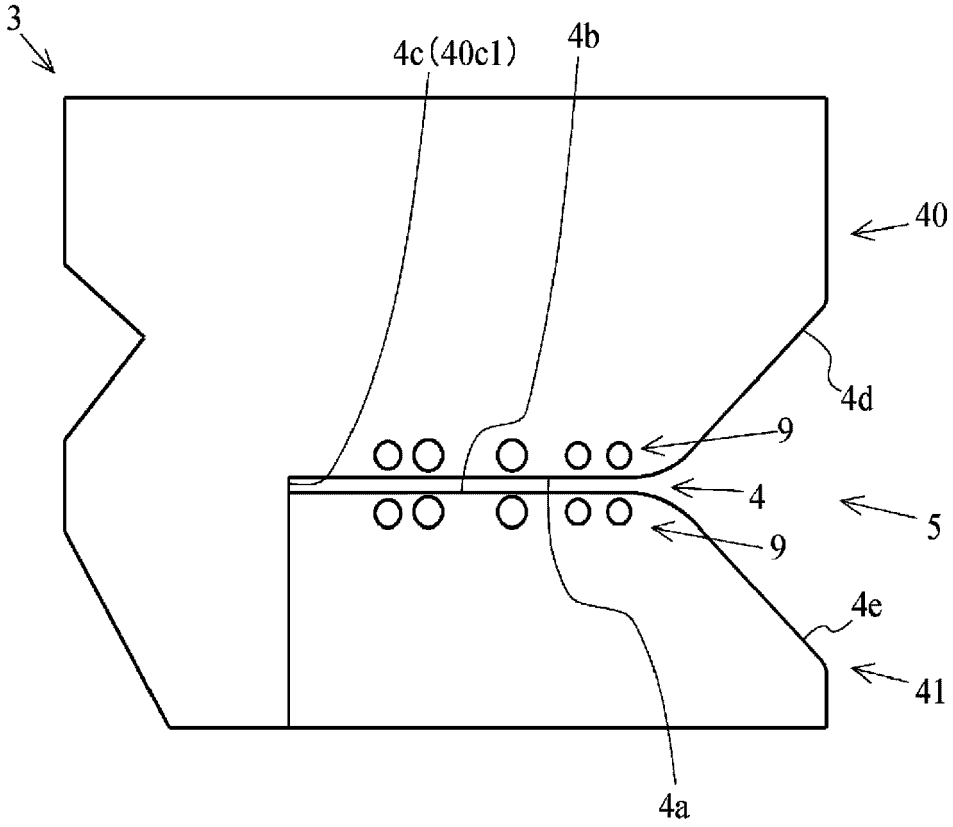


FIG. 5B

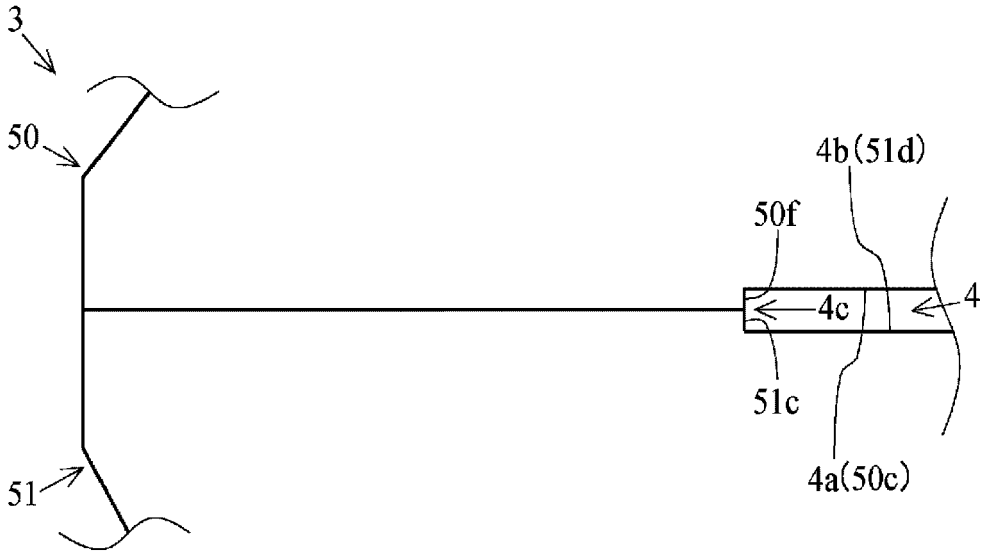
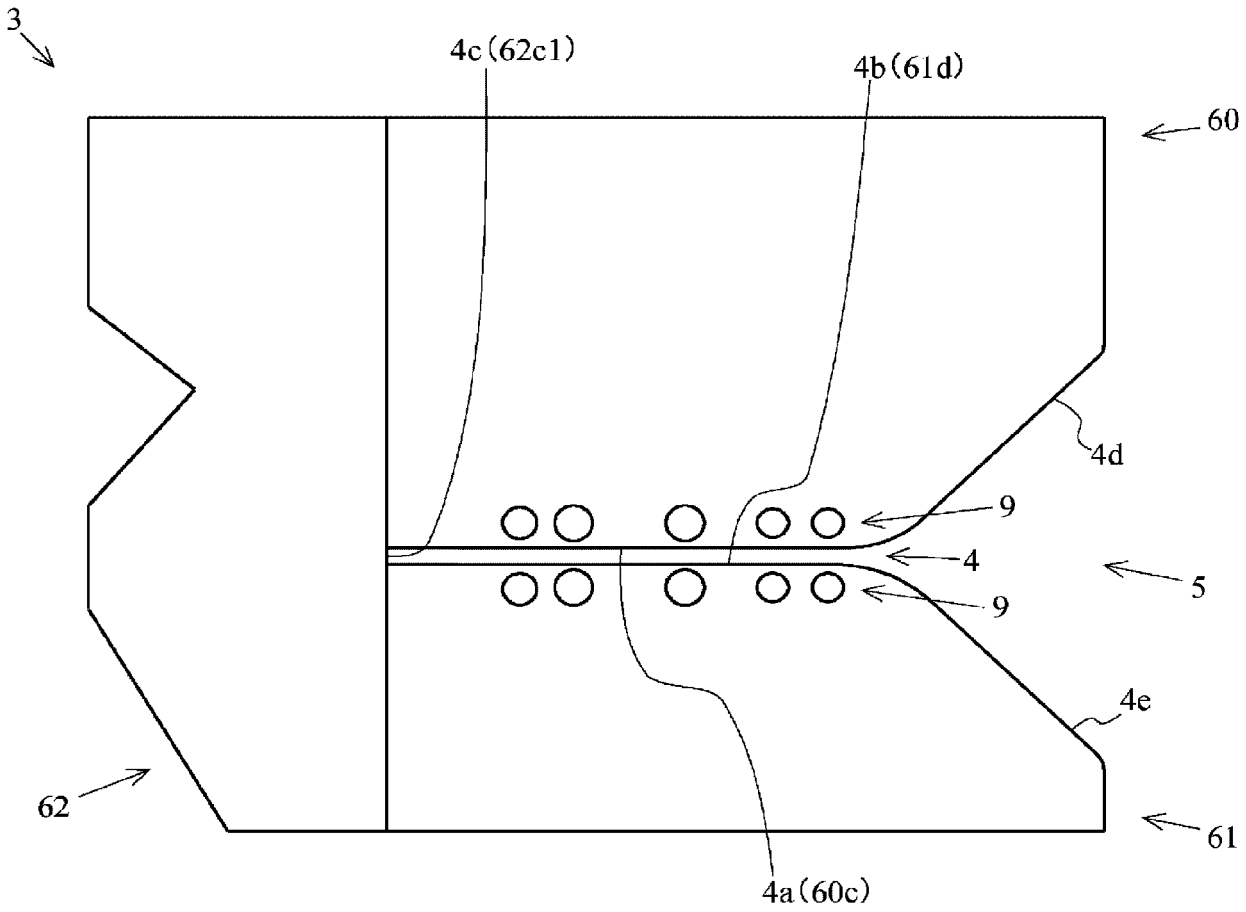


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 20 16 7257

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 1 126 062 A1 (PROMATECH SPA [IT]) 22 August 2001 (2001-08-22) * abstract; figures 1-4 * * paragraph [0010] * -----	1,2 3	INV. D03D47/48

TECHNICAL FIELDS SEARCHED (IPC)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 October 2020	Louter, Petrus

CATEGORY OF CITED DOCUMENTS

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06-10-2020

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		EP 1126062 A1	22-08-2001
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		IT MI20000241 A1	14-08-2001

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