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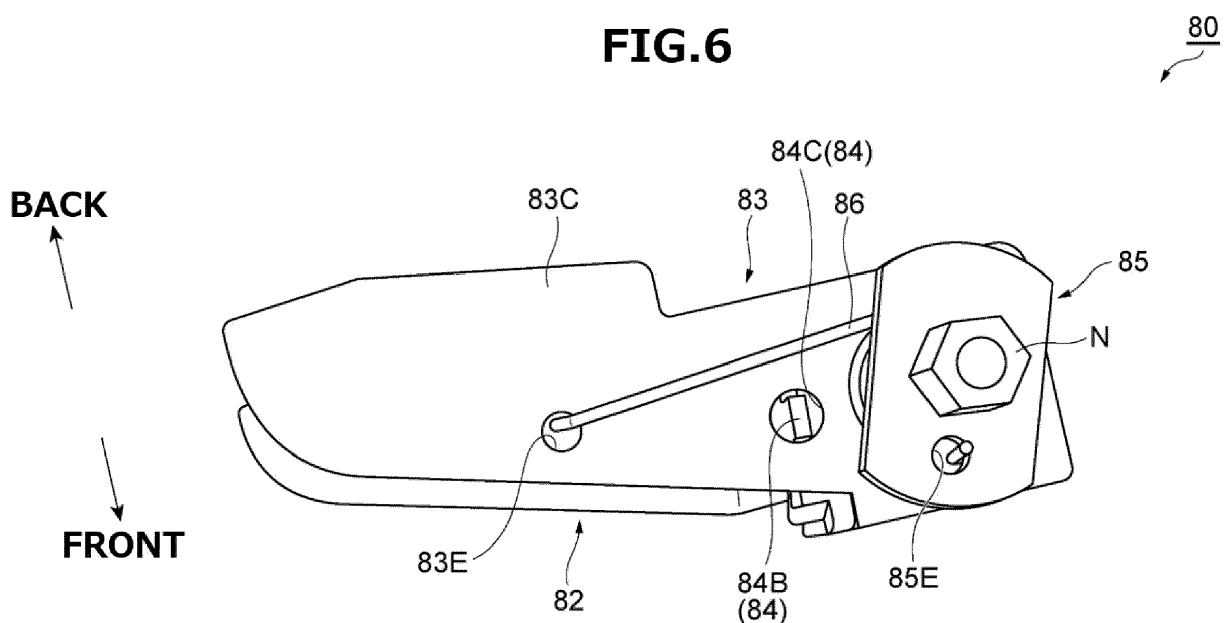
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(54) **YARN PRESSING MECHANISM OF YARN JOINING DEVICE, YARN JOINING DEVICE, AND YARN WINDING DEVICE**

(57) A yarn pressing mechanism (100) used in a yarn joining device (26) to press a first yarn end and a second yarn end includes a front plate (90) and a yarn pressing member (80). The yarn pressing member (80) includes a first pressing lever (82) that presses the first yarn end in cooperation with a contact surface (90a), a second pressing lever (83) that presses the second yarn end in

cooperation with the contact surface (90a), a linking section 84 that links the second pressing lever (83) to the first pressing lever (82) such that the second pressing lever (83) can approach and separate from the contact surface (90a), and a coil spring (86) that biases the second pressing lever (83) toward the contact surface (90a).

FIG.6



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a yarn pressing mechanism of a yarn joining device, a yarn joining device, and a yarn winding device.

2. Description of the Related Art

[0002] A yarn joining device in which a first yarn end and a second yarn end are joined by the action of compressed air is known in the art.

[0003] As disclosed in Japanese Patent No. 6478687, such a yarn joining device includes a yarn shifting device that is rotatably supported around a pivoting axis and can be rotated by a separate driving device. The yarn shifting device pulls both the yarns till the yarn ends thereof are positioned inside the yarn joining path of the yarn joining device and have an appropriate overlapping length.

[0004] However, the yarn joining device explained above in some cases may include a yarn pressing member that presses the first yarn end and the second yarn end. In such a configuration, the yarn pressing member cannot press the first yarn end and the second yarn end in the same manner and shape of the yarn joint can become unstable.

SUMMARY OF THE INVENTION

[0005] The present invention has been made in view of the above circumstances. It is an object of the present invention to provide a yarn pressing mechanism of a yarn joining device capable of improving the shape of a yarn joint, a yarn joining device, and a yarn winding device.

[0006] A yarn pressing mechanism used in a yarn joining device to press a first yarn end and a second yarn end when joining the first yarn end and the second yarn end by the action of compressed air according to one aspect of the present invention includes a contact member having a contact surface that extends horizontally in a yarn running direction; and a yarn pressing member that is arranged movably so as to approach and separate from the contact surface, and presses the first yarn end and the second yarn end in cooperation with the contact surface by contacting the contact surface. The yarn pressing member includes a first pressing lever that presses the first yarn end in cooperation with the contact surface; a second pressing lever that presses the second yarn end in cooperation with the contact surface; a linking section that links the second pressing lever to the first pressing lever so as to be movable; and a biasing member that biases the second pressing lever with respect to the first pressing lever such that the second pressing lever approaches and separates from the contact surface side.

[0007] A yarn joining device according to another aspect of the present invention includes the above yarn pressing mechanism of the yarn joining device.

[0008] A winding device according to still another aspect of the present invention includes the above yarn joining device and further includes a yarn supplying device that supports a yarn supplying bobbin at a predetermined position; a winding section; an untwisting assisting device; a tension applying device; and a yarn monitoring device.

[0009] The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is a front view of an automatic winder.

FIG. 2 is a side view of a winder unit shown in FIG. 1.

FIG. 3 is a front view of a yarn joining device shown in FIG. 2.

FIG. 4 is a perspective view of a yarn pressing member shown in FIG. 3.

FIG. 5 is another perspective view of the yarn pressing member shown in FIG. 3.

FIG. 6 is still another perspective view of the yarn pressing member shown in FIG. 3.

FIG. 7A is a plan view of a first pressing lever shown in FIG. 4, FIG. 7B is a front view of the first pressing lever shown in FIG. 4, and FIG. 7C is a bottom view of the first pressing lever shown in FIG. 4.

FIG. 8A is a plan view of a second pressing lever shown in FIG. 4, and FIG. 8B is a side view of the second pressing lever shown in FIG. 4.

FIG. 9A is a perspective view of a plate-shaped member shown in FIG. 4, and FIG. 9B is a perspective view of a coil spring shown in FIG. 4.

FIG. 10 is a diagram for explaining a case in which a first yarn end and a second yarn end are pressed by the yarn pressing member shown in FIG. 3 in cooperation with a contact surface, and is a horizontal sectional view showing a part of the yarn joining device in an enlarged manner.

DETAILED DESCRIPTION

[0011] Exemplary embodiments of the present invention are explained below with reference to the accompanying drawings. Identical elements or corresponding elements are indicated by the same reference symbols in the drawings and redundant explanation thereof is omitted.

[0012] As shown in FIG. 1, an automatic winder 1 includes a plurality of winder units (yarn winding device) 3

arranged side-by-side, a main control device 5, and a doffing device 7. The main control device 5 is capable of communicating with each of the plurality of the winder units 3. An operator of the automatic winder 1 can collectively control the plurality of the winder units 3 by appropriately operating the main control device 5. Each winder unit 3 unwinds a yarn Y from a yarn supplying bobbin SB and winds the yarn Y onto a winding bobbin WB while traversing the yarn Y to form a package P. When the package P in a certain winder unit 3 is fully wound (a state in which a specific amount of the yarn Y is wound), the doffing device 7 travels to a position of this winder unit 3, removes the fully wound package P, and sets an empty winding bobbin WB in the winder unit 3.

[0013] As shown in FIG. 2, the winder unit 3 includes a unit controller 10, a yarn supplying device 12, and a winding section 14. The unit controller 10 includes, for example, a CPU (Central Processing Unit) and a ROM (Read Only Memory). A computer program to control various components of the winder unit 3 is stored in the ROM. The CPU executes the computer program stored in the ROM.

[0014] The yarn supplying device 12 supports the yarn supplying bobbin SB, which has been set in a not-shown transport tray, at a certain position. The yarn supplying device 12 unwinds draws the yarn Y from the yarn supplying bobbin SB and pulls the yarn Y from the yarn supplying bobbin SB. The yarn supplying device 12 supplies the yarn Y to the winding section 14. The yarn supplying device 12 is not limited to a transport tray-type device and can be, for example, a magazine-type device.

[0015] The winding section 14 includes a cradle 16 and a winding drum 18. The cradle 16 rotatably supports the winding bobbin WB (or package P) by pinching the winding bobbin WB. The winding drum 18 causes the package P to rotate while causing the yarn Y to traverse on the surface of the package P. The winding drum 18 is caused to drive rotatably by a not-shown drum driving motor. The package P is driven and rotated when an outer periphery of the package P is in contact with the rotating winding drum 18. A helical-shaped traverse groove is formed on the outer peripheral surface of the winding drum 18. The yarn Y unwound from the yarn supplying bobbin SB is wound onto the surface of the package P at a fixed width while being traversed via the traverse groove. Accordingly, the package P having a fixed winding width can be formed.

[0016] Each winder unit 3 includes, sequentially from the yarn supplying device 12, a yarn unwinding assisting device 20, a tension applying device 22, a tension detecting device 24, a yarn joining device 26, and a yarn monitoring device 28 on a yarn path between the yarn supplying device 12 and the winding section 14. A first catching and guiding device 30 and a second catching and guiding device 32 are arranged near the yarn joining device 26.

[0017] The yarn unwinding assisting device 20 prevents excessive swinging by the centrifugal force of the

yarn Y that is being unwound from the yarn supplying bobbin SB and appropriately unwinds the yarn Y from the yarn supplying bobbin SB. The tension applying device 22 applies a predetermined tension to the running yarn Y. In the present embodiment, the tension applying device 22 is a gate-type device in which movable comb teeth are arranged against fixed comb teeth.

[0018] The tension detecting device 24 detects the tension applied to the yarn Y running between the yarn supplying device 12 and the winding section 14. When the yarn Y positioned between the yarn supplying device 12 and the winding section 14 is disconnected due to some reason, the yarn joining device 26 joins the yarn Y on the yarn supplying device 12 side and the yarn Y on the winding section 14 side.

[0019] The yarn monitoring device 28 monitors the state of the yarn Y running on the yarn path, and detects presence of yarn defects based on the monitored information. The yarn defects include, for example, thickness defects of the yarn Y, foreign matter stuck to the yarn Y, and / or yarn breakage and the like.

[0020] The first catching and guiding device 30 is pivotable from a waiting position on the yarn supplying device 12 side to a catching position on the winding section 14 side. The first catching and guiding device 30 catches the yarn Y at the catching position and guides the yarn Y to the yarn joining device 26. The second catching and guiding device 32 is pivotable from a waiting position on the yarn supplying device 12 side to the catching position on the winding section 14 side. The second catching and guiding device 32 catches the yarn Y at the catching position and guides the yarn Y to the yarn joining device 26.

[0021] Next, the yarn joining device 26 will be explained in detail.

[0022] FIG. 3 is a front view of the yarn joining device 26. In the following explanation, for the sake of convenience, the winding section 14 side is referred to as an upper side, the yarn supplying device 12 side is referred to as a lower side, the running path of the yarn Y (yarn path) side with respect to the yarn joining device 26 is referred to as a front side, and an opposite side thereof is called a back side. Moreover, a yarn end of the yarn Y positioned on the winding section 14 side is referred to as a first yarn end and a yarn end of the yarn Y positioned on the yarn supplying device 12 side is referred to as a second yarn end.

[0023] As shown in FIG. 3, the yarn joining device 26 includes a front plate (contact member) 90, an untwisting section 40 that includes a first untwisting pipe member 41A and a second untwisting pipe member 41B, a yarn joining section 50 that performs yarn joining by injecting compressed air, a not-shown pair of yarn shifting levers capable of pivoting so as to pinch the untwisting section 40, a yarn pressing member 80 that includes a first pressing lever 82 and a second pressing lever 83 capable of pivoting so as to pinch the yarn joining section 50, and an air guide 94.

[0024] The front plate 90 is a plate-shaped member

having a thickness direction thereof in the front-back direction. A front surface (contact surface) 90a of the front plate 90 is flat and extends in a direction parallel to a yarn running direction. The yarn joining section 50 is provided on the front surface 90a of the front plate 90. On the front surface 90a of the front plate 90, a first yarn end introducing port, which is an opening port of the first untwisting pipe member 41A, is provided above the yarn joining section 50, and a second yarn end introducing port, which is an opening port of the second untwisting pipe member 41B, is provided below the yarn joining section 50.

[0025] On the front surface 90a of the front plate 90, a first guide member 45A is provided above the first untwisting pipe member 41A, and a second guide member 45B is provided below the second untwisting pipe member 41B. The first guide member 45A and the second guide member 45B are arranged so as to face each other with the yarn joining section 50 interposed therebetween. The first guide member 45A guides the yarn Y guided by the first catching and guiding device 30 and the second guide member 45B guides the yarn Y guided by the second catching and guiding device 32.

[0026] The first untwisting pipe member 41A untwists the first yarn end by the action of the compressed air. The second untwisting pipe member 41B untwists the second yarn end by the action of the compressed air. The yarn joining section 50 twists and joins the first yarn end untwisted in the first untwisting pipe member 41A and the second yarn end untwisted in the second untwisting pipe member 41B by the action of the compressed air. When twisting the yarn ends in the yarn joining section 50, the first yarn end and the second yarn end are pulled, while being held by a not-shown clamp, from the first untwisting pipe member 41A and the second untwisting pipe member 41B by a not-shown yarn shifting lever and pressed near the yarn joining section 50 by the first pressing lever 82 and the second pressing lever 83.

[0027] The yarn pressing member 80 is connected to, for example, a not-shown stepping motor and the like via a cam-link mechanism 95. The yarn pressing member 80 is arranged movable so as to approach and separate from the front surface 90a of the front plate 90 by a driving force of a driving source. In other words, the first pressing lever 82 and the second pressing lever 83 of the yarn pressing member 80 are pivoted (rotated) by the driving force of the driving source such that tip end sides thereof approach and separate from the front surface 90a of the front plate 90. The yarn pressing member 80 presses the first yarn end and the second yarn end in cooperation with the front surface 90a when in contact with the front surface 90a of the front plate 90. The tip ends of the first pressing lever 82 and the second pressing lever 83 can be biased to the side that approaches the front plate 90 by, for example, a not-shown helical torsion coil spring. The air guide 94 is a member that guides the compressed air injected in the yarn joining section 50. The air guide 94 is arranged so as to cover a part of opening ports positioned above and below a yarn joining chamber of

the yarn joining section 50 to which the first yarn end and the second yarn end are guided.

[0028] In the yarn joining device 26 having such a configuration, first, the not-shown first yarn shifting lever and the second yarn shifting lever, the first pressing lever 82, and the second pressing lever 83 pivot to the front plate 90 side. Accordingly, the yarn Y on the upper side and the yarn Y on the lower side caught by the first catching and guiding device 30 and the second catching and guiding device 32 are pulled to the untwisting section 40 side. Subsequently, the yarn Y on the upper side and the yarn Y on the lower side are held by the clamp and then cut in this state by a cutter. The first yarn end is fed to the inside of the first untwisting pipe member 41A and the second yarn end is fed to the inside of the second untwisting pipe member 41B. When the compressed air is injected in the first untwisting pipe member 41A and the second untwisting pipe member 41B, the first yarn end and the second yarn end are untwisted by the action of the compressed air.

[0029] Subsequently, the not-shown first yarn shifting lever and the second yarn shifting lever are further pivoted. Accordingly, the first yarn end and the second yarn end are pressed near the yarn joining section 50 by the first pressing lever 82 and the second pressing lever 83 while being pulled from the first untwisting pipe member 41A and the second untwisting pipe member 41B. After this, injection of the compressed air is started in the yarn joining section 50, whereby the untwisted first yarn end and the second yarn end are twisted by the action of the compressed air. Then, the first pressing lever 82 and the second pressing lever 83 along with the not-shown first yarn shifting lever and the second yarn shifting lever are pivoted in the opposite direction. Accordingly, the yarn Y on the upper side and the yarn Y on the lower side held by the clamp are released. As a result, the connected yarn Y returns to the running path on the front side of the yarn joining device 26. The yarn pressing member 80 and the front plate 90 constitute a yarn pressing mechanism 100 that presses the first yarn end and the second yarn end in the yarn joining device 26.

[0030] Next, configuration of the yarn pressing member 80 will be explained in detail.

[0031] As shown in one or more of FIGS. 4, 5, and 6, the yarn pressing member 80 includes the first pressing lever 82, the second pressing lever 83, a linking section 84, a plate-shaped member 85, and a coil spring 86.

[0032] As shown in one or more of FIGS. 4, 5, 6, and 7A to 7C, the first pressing lever 82 is a member that presses down the first yarn end. The first pressing lever 82 is a plate-shaped lever. The first pressing lever 82 includes a first lever main body 82A that is capable of contacting the front plate 90, and a fixed portion 82B that is continuous with the base end side of the first lever main body 82A and to which the cam-link mechanism 95 is fixed (see FIG. 3). The first lever main body 82A is plate shaped having the thickness direction thereof in the yarn running direction. A contact portion 82C that is capable

of contacting the front plate 90 is provided on a tip end side of the first lever main body 82A. The fixed portion 82B is continuous with the front side of the base end side of the first lever main body 82A, bends at 90 degrees from the first lever main body 82A, then extends upward, again bends at 90 degrees, and then extends to the back side.

[0033] As shown in one or more of FIGS. 4, 5, 6, and 8A and 8B, the second pressing lever 83 is a member that presses down the second yarn end. The second pressing lever 83 is parallel to the first pressing lever 82 with a predetermined distance therebetween along the yarn running direction. The second pressing lever 83 is plate shaped having the thickness direction thereof in the yarn running direction. A contact portion 83C that is capable of contacting the front plate 90 is provided at a tip end side of the second pressing lever 83.

[0034] The linking section 84 movably links the second pressing lever 83 with the first pressing lever 82 such that the second pressing lever 83 can approach and separate from the front surface 90a of the front plate 90. The linking section 84 includes a shaft portion 84A, a protruding portion 84B, and a hole portion 84C.

[0035] The shaft portion 84A is provided on the first pressing lever 82 and pivotably supports the second pressing lever 83 with respect to the first pressing lever 82 such that the second pressing lever 83 can approach and separate from the front surface 90a. The shaft portion 84A is a cross-sectional circular shaft body that is arranged orthogonally on an upper surface of the fixed portion 82B of the first pressing lever 82 and has a shaft direction in the yarn running direction. A not-shown hole is formed inside the shaft portion 84A along the shaft direction of the shaft portion 84A. The shaft portion 84A is inserted into a hole 83D formed on a base end side of the second pressing lever 83 so as to protrude through the hole 83D.

[0036] The protruding portion 84B is provided on the first pressing lever 82. The protruding portion 84B is arranged on an upper surface of an upright plate portion 82D that is continuous with the upper surface of the fixed portion 82B of the first pressing lever 82, bends at 90 degrees, and then extends upward so as to protrude upward in a cross-sectional rectangular shape.

[0037] The hole portion 84C is a circular hole formed on the second pressing lever 83 through which the protruding portion 84B is inserted. In an example shown in the figure, the hole portion 84C is provided on a side of the hole 83D in the second pressing lever 83. When the protruding portion 84B is inserted in the hole portion 84C, a certain gap is formed between an internal surface of the hole portion 84C and the protruding portion 84B. In other words, the protruding portion 84B is movably inserted in the hole portion 84C so as to move by a certain amount to approach and separate from the front surface 90a of the front plate 90.

[0038] The first pressing lever 82 and the second pressing lever 83 are linked by such linking section 84.

Moreover, the tip end side of the second pressing lever 83 is pivotable by a certain amount (within a scope in which the protruding portion 84B can move inside the hole portion 84C) around the base end side thereof with respect to the first pressing lever 82.

[0039] As shown in FIGS. 6 and 9A, the plate-shaped member 85 is a plate-shaped piece member having the thickness direction thereof in the yarn running direction. A hole 85D through which a screw N is inserted is formed in the plate-shaped member 85. The plate-shaped member 85 is fastened to an upper end portion of the shaft portion 84A and is thereby integrated with the first pressing lever 82.

[0040] As shown in FIGS. 6 and 9B, the coil spring 86 is an elastic member (biasing member) that biases the second pressing lever 83 so as to approach the front surface 90a. The coil spring 86 is mounted between the second pressing lever 83 and the plate-shaped member 85 around the periphery of the shaft portion 84A. An end of the coil spring 86 is engaged with an engagement hole 83E formed in the second pressing lever 83. Other end of the coil spring 86 is engaged with an engagement hole 85E formed on the plate-shaped member 85. With such coil spring 86, the second pressing lever 83 is biased with respect to the first pressing lever 82 such that the tip end side of the second pressing lever 83 is biased toward the front surface 90a.

[0041] As shown in FIGS. 3 to 6, the yarn pressing member 80 is driven via the cam-link mechanism 95 by a not-shown driving source such as a stepping motor, and the first pressing lever 82 and the second pressing lever 83 are pivoted integrally such that the contact portion 82C and the contact portion 83C on the tip end sides of the first pressing lever 82 and the second pressing lever 83 approach the front surface 90a of the front plate 90. The contact portion 82C of the first pressing lever 82 and the contact portion 83C of the second pressing lever 83 contact the front surface 90a, and the first yarn end and the second yarn end are pinched between the contact portions 82C and 83C and the front surface 90a. The first yarn end and the second yarn end are regulated by a wedge-shaped small gaps K (see FIG. 10). Accordingly, the first yarn end and the second yarn end are pressed down by the yarn pressing member 80 in cooperation with the front surface 90a. In this state, even when the contact portion 82C of the first pressing lever 82 and the contact portion 83C of the second pressing lever 83 cannot contact the front surface 90a at the same time, because the first pressing lever 82 and the second pressing lever 83 are separated from each other and are connected elastically, the first pressing lever 82 and the second pressing lever 83 contact the front surface 90a in a like manner.

[0042] In the yarn pressing mechanism 100 explained above, when the first yarn end and the second yarn end are pressed by the yarn pressing member 80 in cooperation with the front surface 90a, the first pressing lever 82 and the second pressing lever 83 can be caused to

contact the front surface 90a in the like manner and the first yarn end and the second yarn end can be pressed in the like manner. Consequently, a proper joint of the yarn Y can be formed and the shape of the joint of the yarn Y can be improved. Also, the strength of the joint of the yarn Y can be improved.

[0043] The yarn pressing mechanism 100 includes the coil spring 86, which is an elastic member, as a biasing member. In such a configuration, by using the elastic force of the coil spring 86, which is an elastic member, the second pressing lever 83 can be biased toward the front surface 90a.

[0044] In the yarn pressing mechanism 100, the first pressing lever 82 and the second pressing lever 83 regulate the first yarn end and the second yarn end with the wedge-shaped gap K. Accordingly, instead of firmly pressing the first yarn end and the second yarn end in cooperation with the front surface 90a, the first pressing lever 82 and the second pressing lever 83 can regulate the first yarn end and the second yarn end with the wedge-shaped gap K. As a result, the yarn Y can be prevented from escaping from the working range of the yarn joining device 26 due to self contracting force, and furthermore, when it is necessary to guide (move) the yarn Y for yarn joining, the yarn Y can be caused to move by applying a strong force to a certain extent to the yarn Y, without releasing the contact by the first pressing lever 82 and the second pressing lever 83. Accordingly, because a driving frequency of the first pressing lever 82 and the second pressing lever 83 can be set to a minimum necessary frequency, an operation frequency of the first pressing lever 82 and the second pressing lever 83 is reduced, thus suppressing the fatigue deterioration, and furthermore, by suppressing the number of movements of members involved in the yarn joining, improvement in work efficiency can be expected.

[0045] In the yarn pressing mechanism 100, the linking section 84 includes the shaft portion 84A, the protruding portion 84B, and the hole portion 84C. With such a configuration, the linking section 84 that links the second pressing lever 83 to the first pressing lever 82 so as to be movable can be realized with a simple configuration, without using another stopper member and the like.

[0046] In the yarn pressing mechanism 100, one end of the coil spring 86 is engaged with the second pressing lever 83 and the other end thereof is engaged with the plate-shaped member 85. With such a configuration, a biasing member that biases the second pressing lever 83 toward the front surface 90a can be concretely realized.

[0047] The yarn joining device 26 includes the yarn pressing mechanism 100. Therefore, the yarn joining device 26 can achieve the effects and advantages explained above such as improvement in the shape of the joint of the yarn Y.

[0048] The winder unit 3 includes the yarn joining device 26. Therefore, the winder unit 3 can achieve the effects and advantages explained above such as im-

provement in the shape of the joint of the yarn Y.

[0049] Embodiments of the present invention are explained above; however, an aspect of the present invention is not limited thereto.

[0050] In the embodiments explained above, the yarn pressing mechanism 100 is applied to the yarn joining device 26 of the winder unit 3; however, the yarn pressing mechanism 100 can be applied to the yarn joining device of a winding unit of a spinning machine. Alternatively, the yarn pressing mechanism 100 can be applied to a yarn joining machine of a work carrier that moves among a plurality of the winding units. In the embodiments explained above, a magnet can be used as a biasing member. In a configuration in which the magnet is used as a biasing member, the second pressing lever 83 can be biased toward the front surface 90a by using the magnetic force.

[0051] A yarn pressing mechanism used in a yarn joining device to press a first yarn end and a second yarn end when joining the first yarn end and the second yarn end by the action of compressed air according to one aspect of the present invention includes a contact member having a contact surface that extends horizontally in a yarn running direction; and a yarn pressing member that is arranged movably so as to approach and separate from the contact surface, and presses the first yarn end and the second yarn end in cooperation with the contact surface by contacting the contact surface. The yarn pressing member includes a first pressing lever that presses the first yarn end in cooperation with the contact surface; a second pressing lever that presses the second yarn end in cooperation with the contact surface; a linking section that links the second pressing lever to the first pressing lever so as to be movable; and a biasing member that biases the second pressing lever with respect to the first pressing lever such that the second pressing lever is biased toward the contact surface. Moreover, the second pressing lever is biased by the biasing member such that the second pressing lever is arranged closer to the contact surface than the first pressing lever.

[0052] In the yarn pressing mechanism of such a yarn joining device, the second pressing lever is linked movably with respect to the first pressing lever, and the second pressing lever is biased toward the contact portion. Accordingly, both the first pressing lever and the second pressing lever can be caused to contact the front surface in the like manner and both the first yarn end and the second yarn end can be pressed in the like manner in cooperation with the contact surface. Consequently, an appropriate yarn joint can be formed, and the shape of the yarn joint can be improved.

[0053] In the above yarn pressing mechanism of the yarn joining device according to the present invention, the biasing member can be an elastic member. In such a configuration, the second pressing lever can be biased so as to approach the contact surface by using the elastic force of the elastic member.

[0054] In the above yarn pressing mechanism of the

yarn joining device according to the present invention, the elastic member can be a coil spring. With such a configuration, the second pressing lever can be biased so as to approach the contact surface by using the elastic force of the coil spring.

[0055] In the above yarn pressing mechanism of the yarn joining device according to the present invention, the biasing member can be a magnet. With such a configuration, the second pressing lever can be biased so as to approach the contact surface by using the magnetic force.

[0056] In the above yarn pressing mechanism of the yarn joining device according to the present invention, the first pressing lever can regulate the first yarn end by using a wedge-shaped gap formed between the first pressing lever and the contact surface when a tip end side of the first pressing lever contacts the contact surface, and the second pressing lever can regulate the second yarn end by using a wedge-shaped gap formed between the second pressing lever and the contact surface when a tip end side of the second pressing lever contacts the contact surface. With such a configuration, instead of firmly pressing the first yarn end and the second yarn end in cooperation with the contact portion, the first yarn end and the second yarn end can be regulated by using the wedge-shaped gap. As a result, the yarn can be prevented from escaping from the working range of the yarn joining device due to own contracting force, and furthermore, when it is necessary to guide (move) the yarn for yarn joining, the yarn can be caused to move by applying a strong force to a certain extent to the yarn, without releasing the contact by the first pressing lever and the second pressing lever. Accordingly, because the driving frequency of the first pressing lever and the second pressing lever can be set to a minimum necessary frequency, fatigue deterioration of the first pressing lever and the second pressing lever can be suppressed, and by suppressing the number of movements of members involved in the yarn joining, improvement in work efficiency can be expected.

[0057] In the above yarn pressing mechanism of the yarn joining device according to the present invention, the linking section includes a shaft portion that pivotably supports the second pressing lever with respect to the first pressing lever such that the second pressing lever can approach and separate from the contact surface; a protruding portion formed in the first pressing lever; and a hole portion that is formed in the second pressing lever and through which the protruding portion is inserted so as to move by a certain amount to approach and separate from the contact surface. With such a configuration, the linking portion that links the second pressing lever to the first pressing lever so as to be movable can be realized with a simple configuration, without using another stopper member and the like.

[0058] In the above yarn pressing mechanism of the yarn joining device according to the present invention, the biasing member can be a coil spring, and one end of

the coil spring is engaged with the second pressing lever and other end of the coil spring is engaged with a plate-shaped member that is arranged fixedly on the shaft portion. With such a configuration, a biasing member that biases the second pressing lever so as to approach the contact portion can be concretely realized.

[0059] A yarn joining device according to another aspect of the present invention includes the above yarn pressing mechanism of the yarn joining device. In such a yarn joining device, effects and advantages explained above such as improvement in the shape of the joint of the yarn can be achieved.

[0060] A yarn winding device according to still another aspect of the present invention includes the above yarn joining device and further includes a yarn supplying device that supports a yarn supplying bobbin at a predetermined position; a winding section; an untwisting assisting device; a tension applying device; and a yarn monitoring device. In such a winding device, effects and advantages explained above such as improvement in the shape of the joint of the yarn can be achieved.

[0061] According to the present invention, the yarn pressing mechanism of the yarn joining device capable of improving the shape of the yarn joint, the yarn joining device, and the yarn winding device can be provided.

[0062] In the above explanation, the meaning of "a plurality of" also includes "a predetermined number of".

[0063] Although the invention has been explained with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the scope of the claims.

Claims

1. A yarn pressing mechanism (100) used in a yarn joining device (26) to press a first yarn end and a second yarn end when joining the first yarn end and the second yarn end by the action of compressed air, comprising:

a contact member (90) having a contact surface (90a) that extends horizontally in a yarn running direction; and

a yarn pressing member (80) that is arranged movably so as to approach and separate from the contact surface (90a), and presses the first yarn end and the second yarn end in cooperation with the contact surface (90a) by contacting the contact surface (90a), wherein the yarn pressing member (80) includes

a first pressing lever (82) that presses the first yarn end in cooperation with the contact surface (90a);

- a second pressing lever (83) that presses the second yarn end in cooperation with the contact surface (90a);
a linking section (84) that links the second pressing lever (83) to the first pressing lever (82) so as to be movable; and
a biasing member (86) that biases the second pressing lever (83) with respect to the first pressing lever (82) such that the second pressing lever (83) is biased toward the contact surface (90a) side.
2. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in Claim 1, wherein the second pressing lever (83) is biased by the biasing member (86) such that the second pressing lever (83) is arranged closer to the contact surface (90a) than the first pressing lever (82).
 3. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in Claim 2, wherein the biasing member (86) is an elastic member.
 4. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in Claim 3, wherein the elastic member (86) is a coil spring (86).
 5. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in Claim 2, wherein the biasing member (86) is a magnet.
 6. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in any one of Claims 1 to 5, wherein
the first pressing lever (82) regulates the first yarn end by using a wedge-shaped gap formed between the first pressing lever (82) and the contact surface (90a) when a tip end side of the first pressing lever (82) contacts the contact surface (90a), and
the second pressing lever (83) regulates the second yarn end by using a wedge-shaped gap formed between the second pressing lever (83) and the contact surface (90a) when a tip end side of the second pressing lever (83) contacts the contact surface (90a).
 7. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in any one of Claims 1 to 6, wherein the linking section (84) includes
a shaft portion (84A) formed in the first pressing lever (82) and that pivotably supports the second pressing lever (83) with respect to the first pressing lever (82) such that the second pressing lever (83) can approach and separate from the contact surface (90a);
a protruding portion (84B) formed in the first pressing lever (82); and
a hole portion (84C) that is formed in the second pressing lever (83) and through which the protruding portion (84B) is inserted so as to move by a certain amount to approach and separate from the contact surface (90a).
 8. The yarn pressing mechanism (100) of the yarn joining device (26) as claimed in Claim 7, wherein the biasing member (86) is a coil spring, and one end of the coil spring (86) is engaged with the second pressing lever (83) and other end of the coil spring (86) is engaged with a plate-shaped member (85) that is arranged fixedly on the shaft portion (84A).
 9. A yarn joining device (26) that includes the yarn pressing mechanism (100) as claimed in any one of Claims 1 to 8.
 10. A yarn winding device (3) that includes the yarn joining device (26) as claimed in Claim 9, and comprising:
a yarn supplying device (12) that supports a yarn supplying bobbin (SB) at a predetermined position;
a winding section (14);
an untwisting assisting device (20);
a tension applying device (22); and
a yarn monitoring device (28).

FIG.1

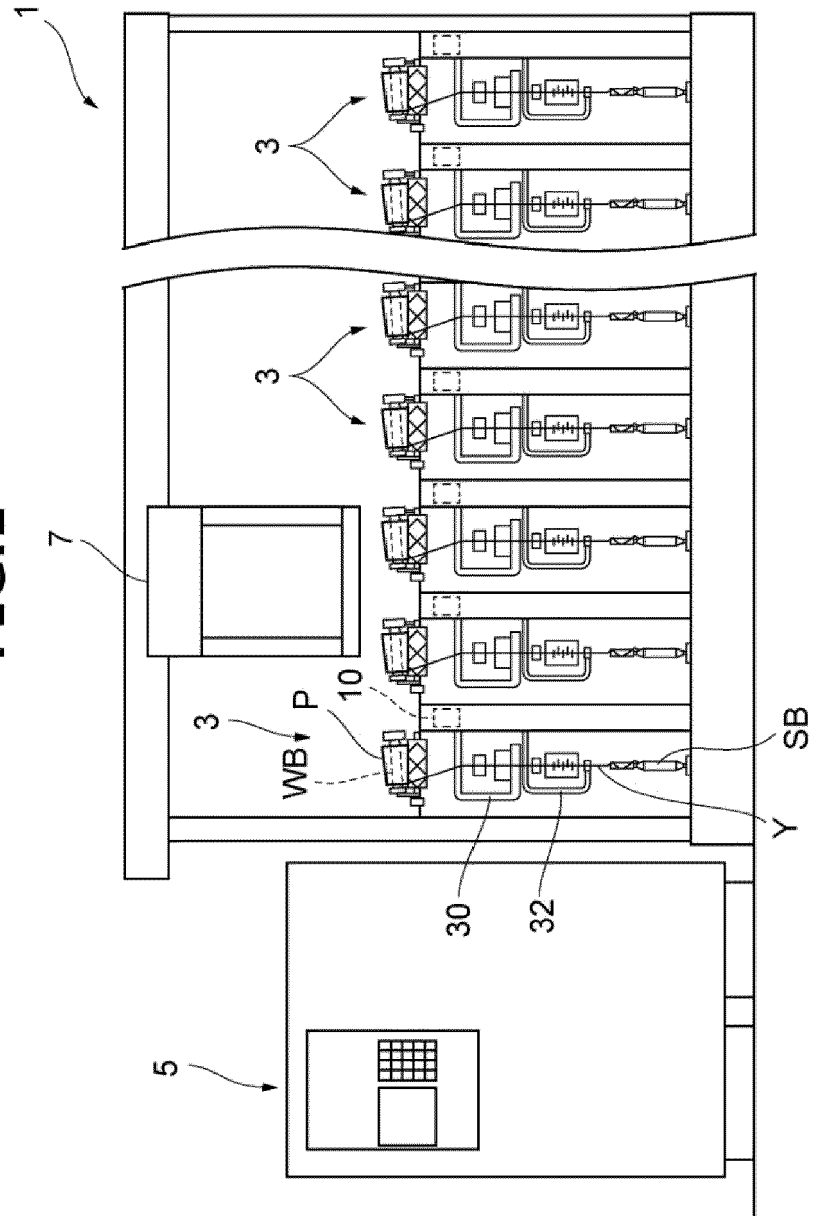
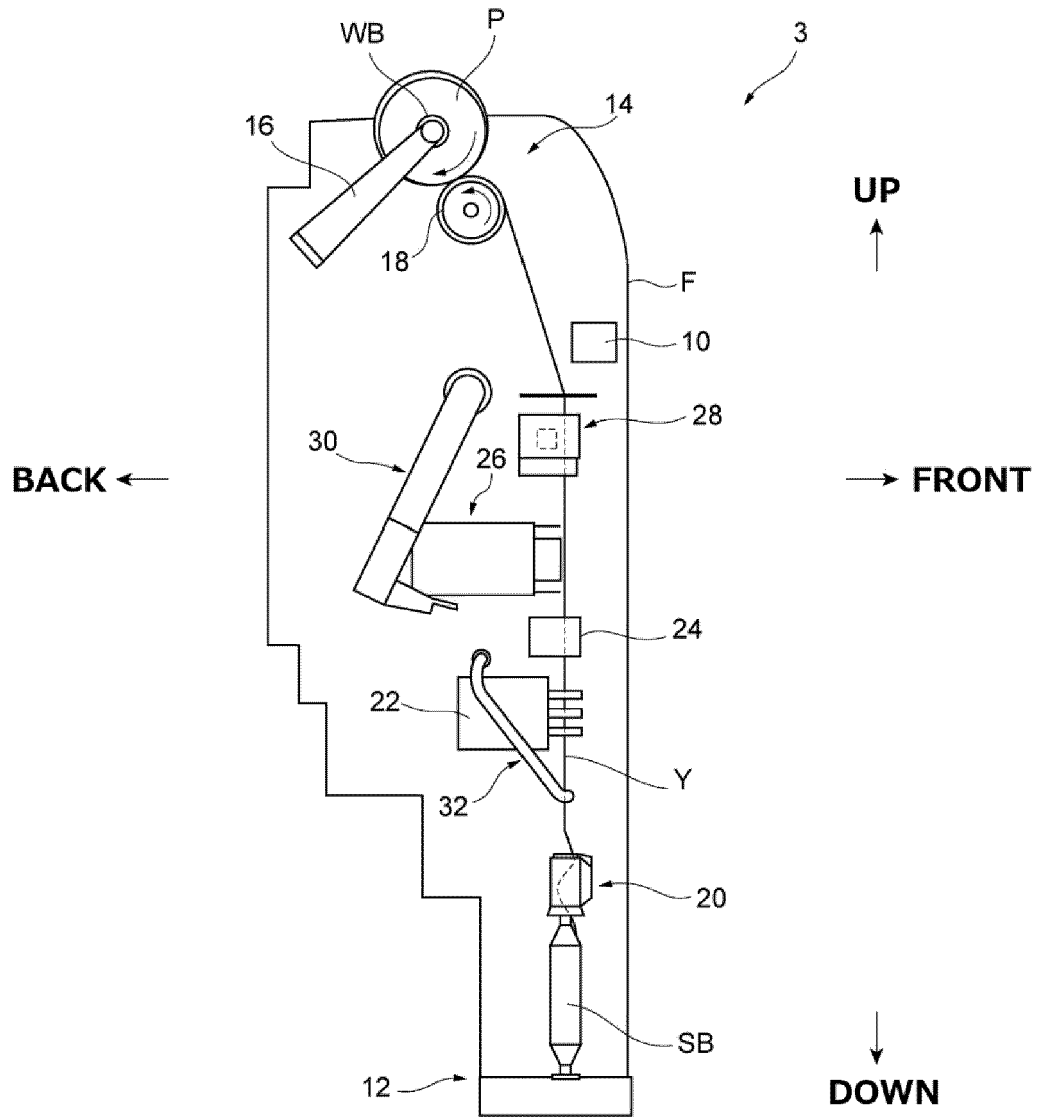
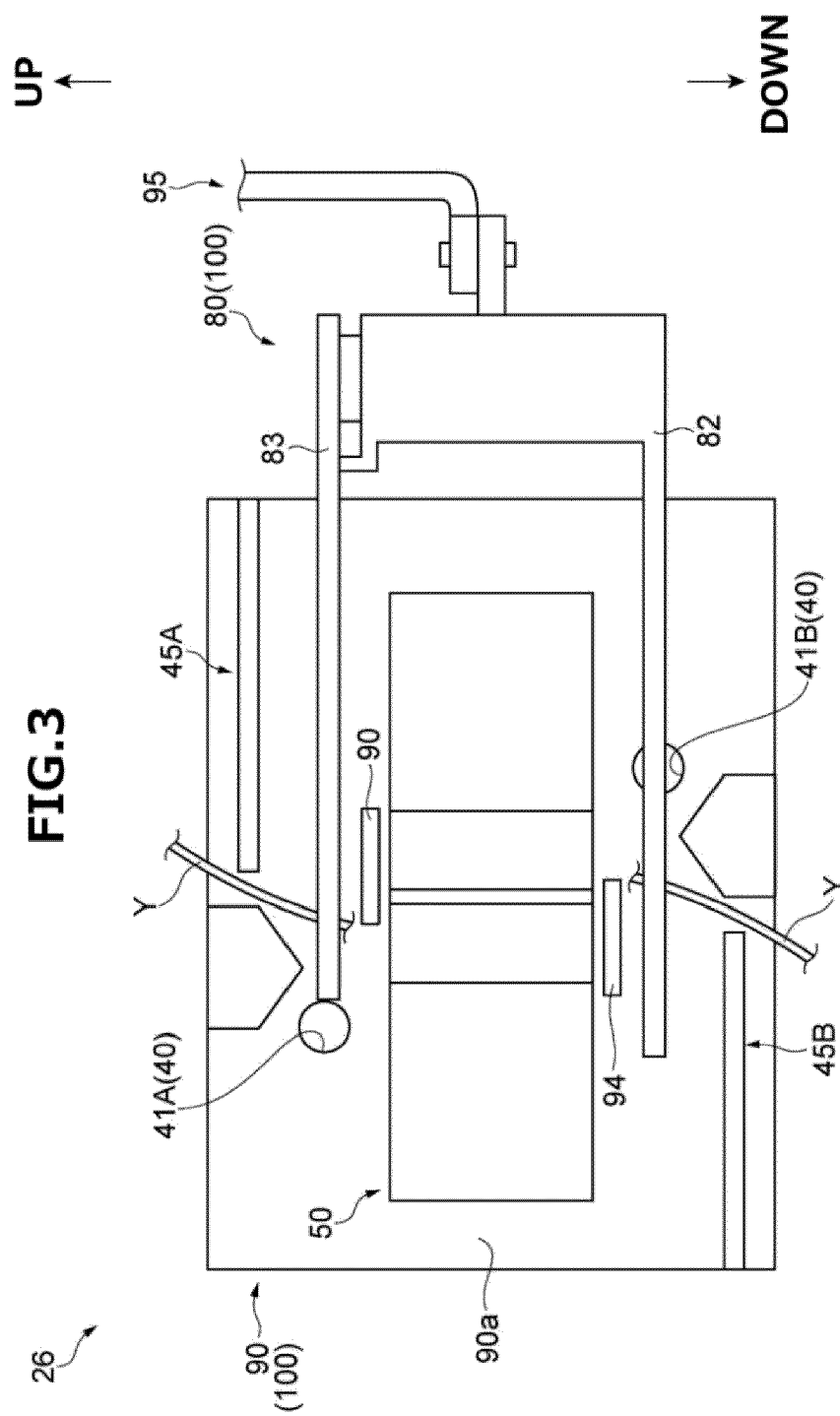


FIG.2





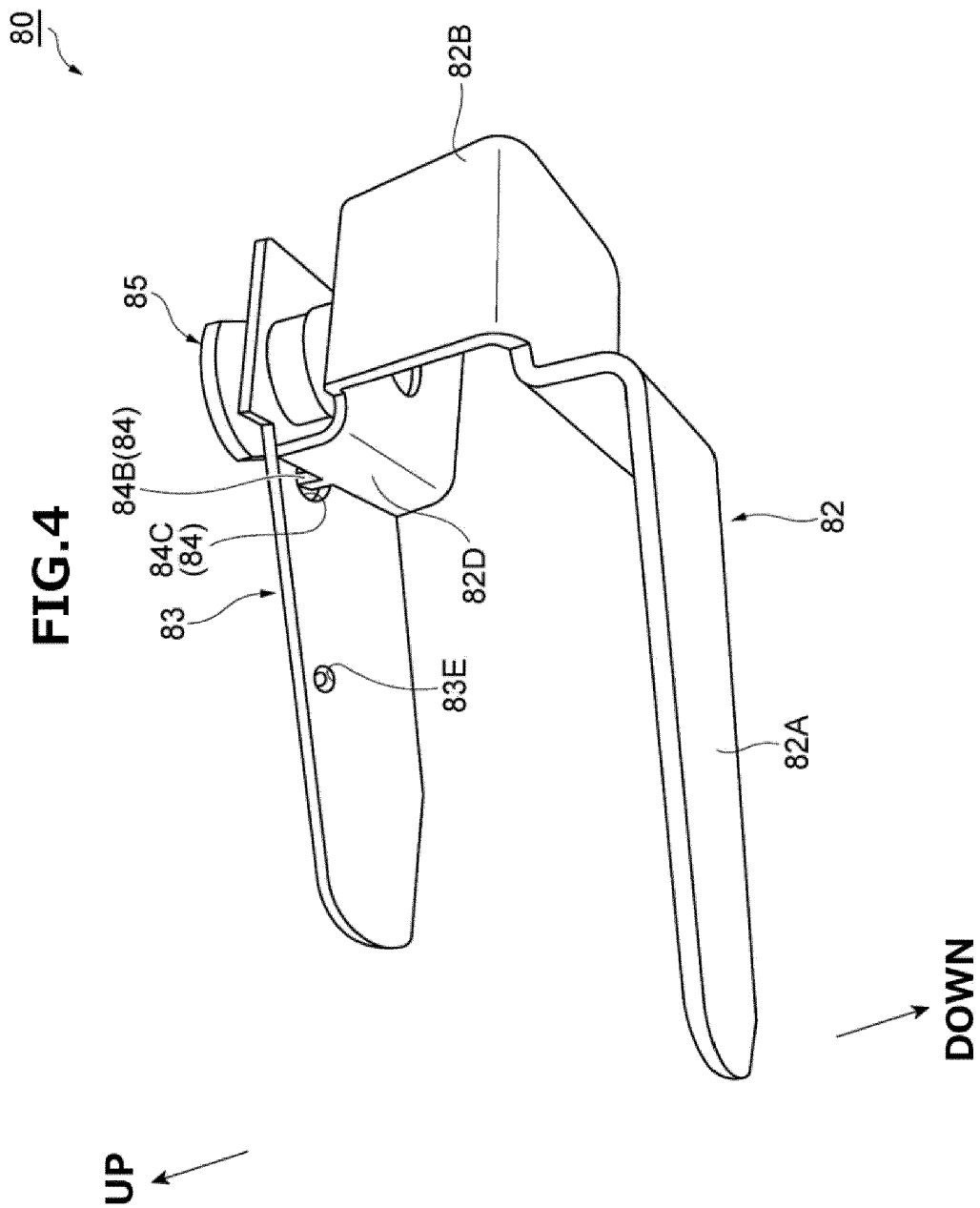
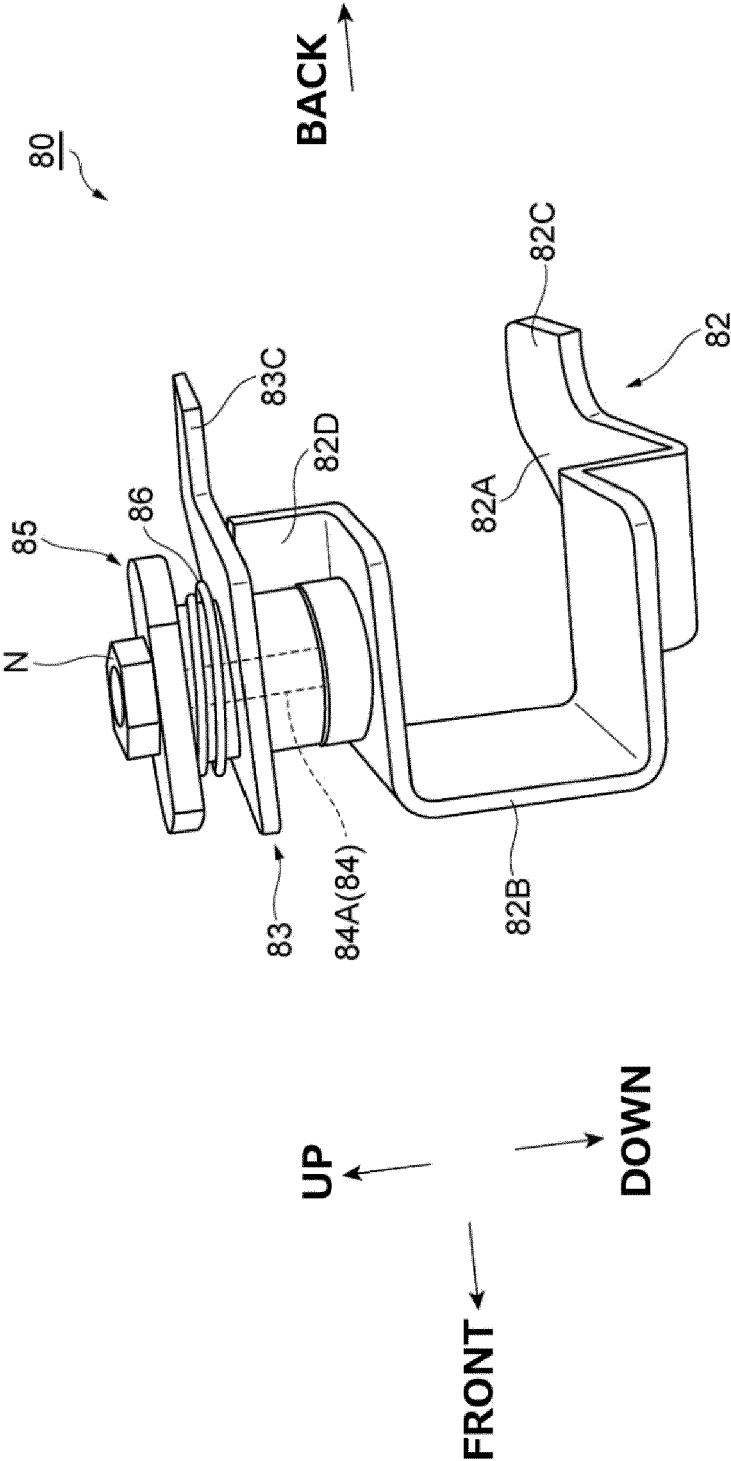


FIG.5



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FIG.6

BACK

FRONT

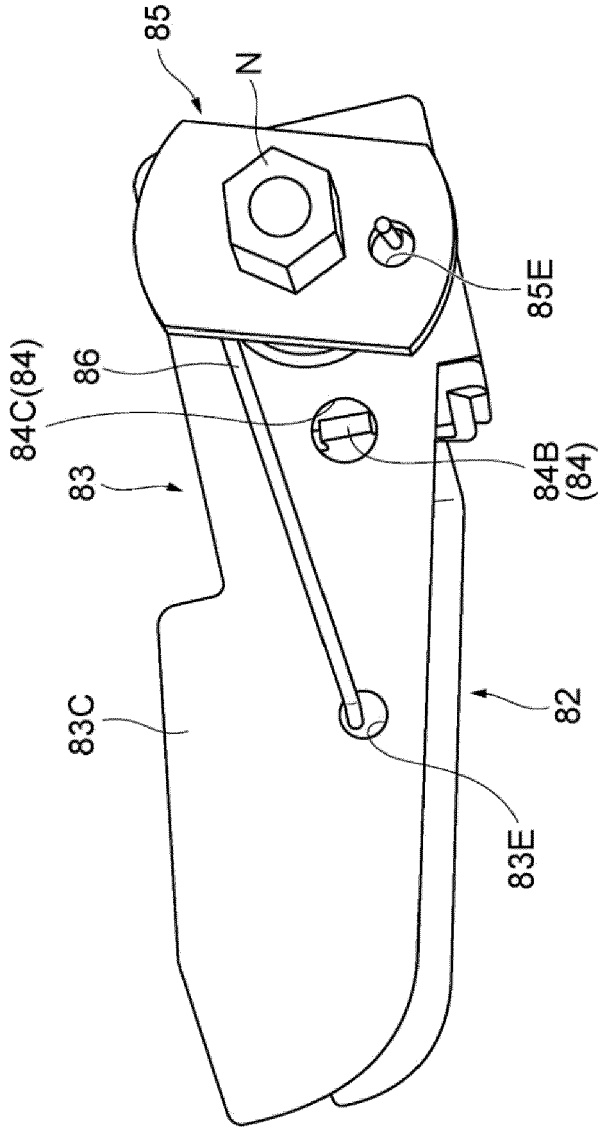


FIG.7A

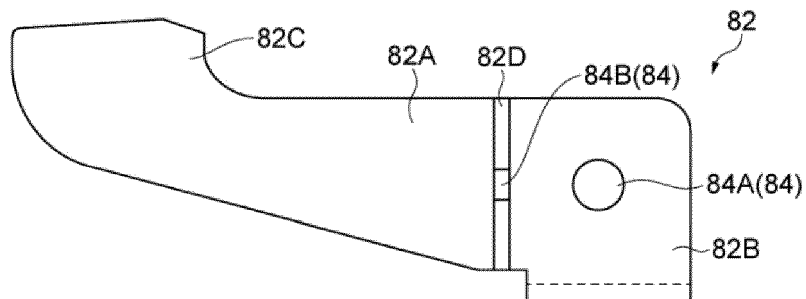


FIG.7B

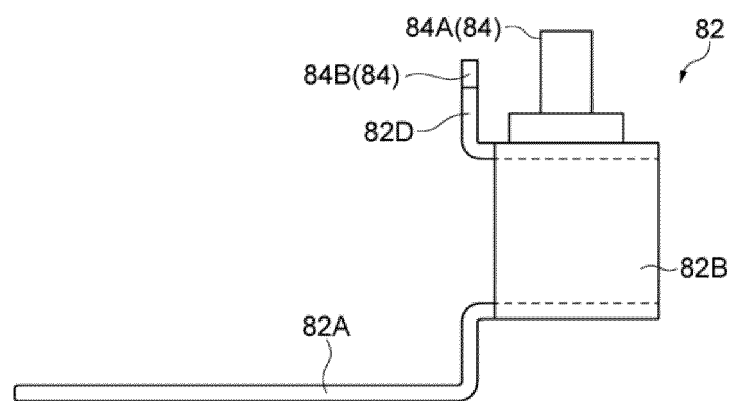


FIG.7C

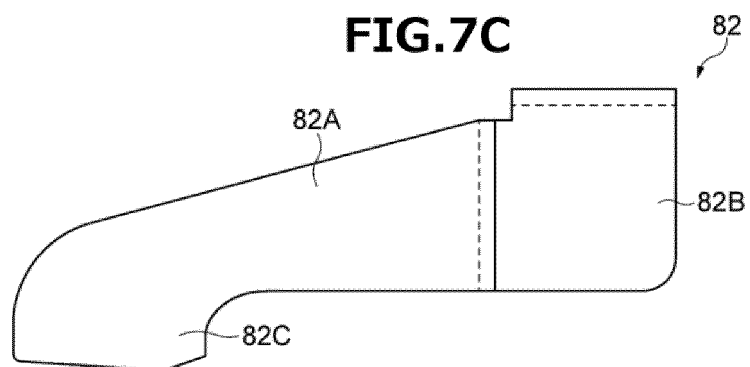


FIG.8A

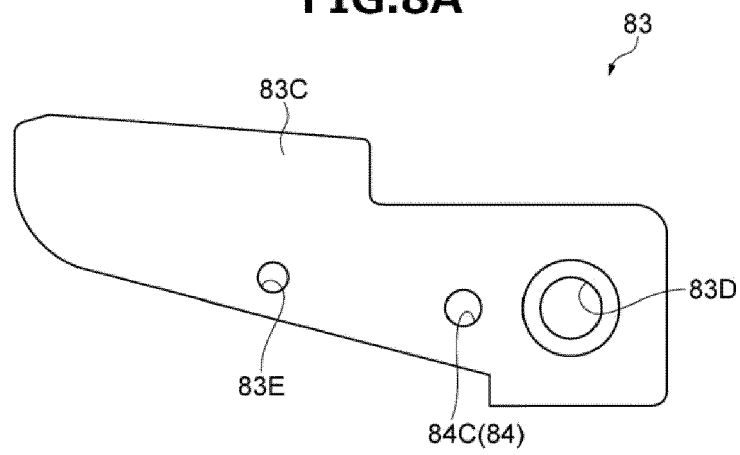


FIG.8B

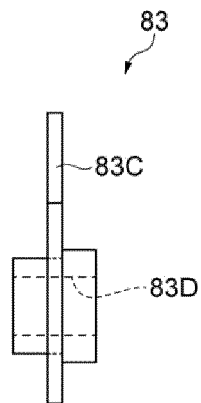


FIG.9A

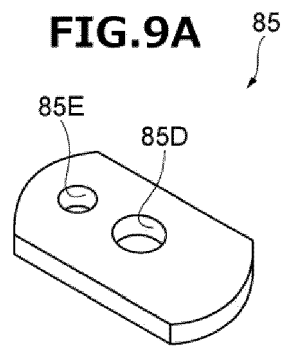
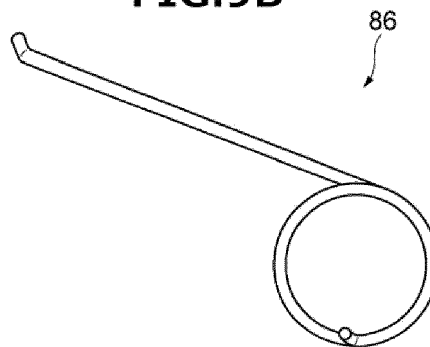
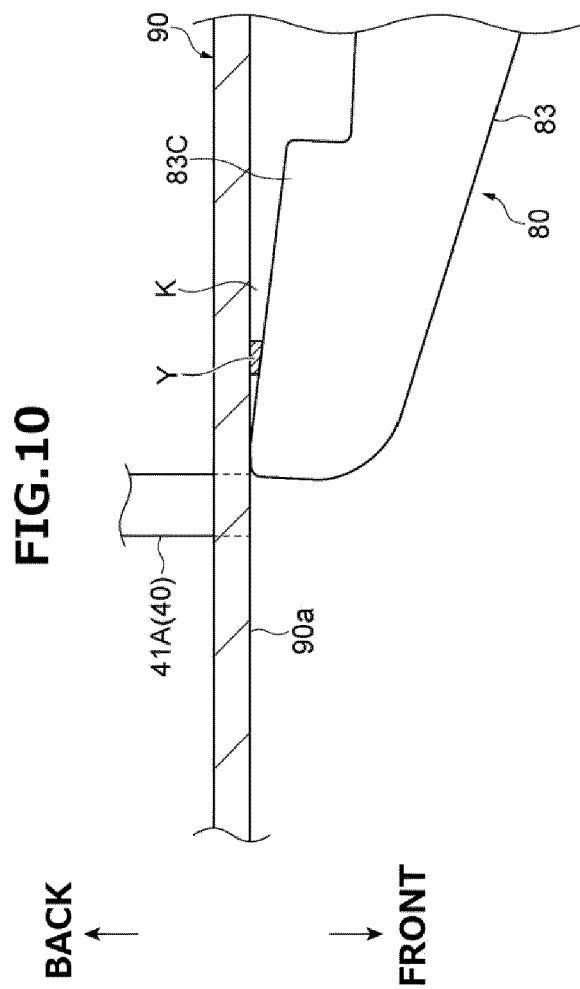


FIG.9B







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Application Number
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			B65H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 March 2021	Examiner Pussemier, Bart
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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