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(54) **EMBROIDERY FRAME SUPPORT DEVICE**

(57) In an embroidery sewing machine, an embroidery frame support device (7) for supporting a front end portion of an embroidery frame (6) installed in a cantilevered manner includes: a base member (11) that is a base for attaching the embroidery frame support device (7) to the embroidery sewing machine, and a Y slide rail (12) (support member) having a movable end that can move relatively with the base member (11). The embroidery frame support device (7) supports a front end portion of the embroidery frame (6) from a lower surface thereof through an X slide rail (15) attached to a tip portion of the Y slide rail (12). The embroidery frame support device (7) can be attached to the embroidery sewing machine by screwing a base member (11) to a cylinder bed (3). The screwing of the base member (11) to the cylinder bed (3) can be carried out from the upper side of a sewing machine table (1).

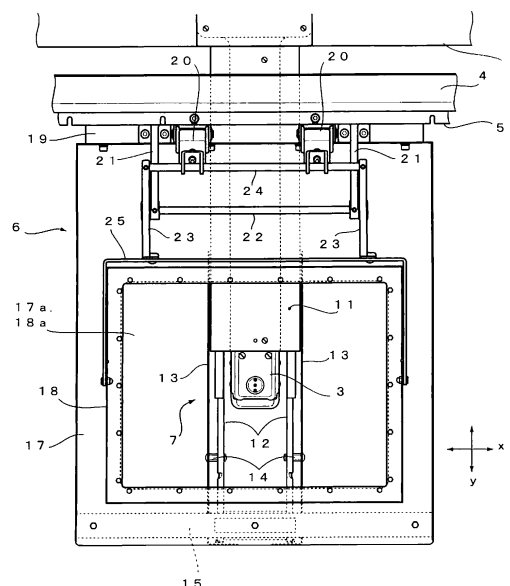


FIG. 2

Description

Technical Field

[0001] The present invention relates to an embroidery frame support device for supporting attachment of an embroidery frame that holds an embroidered object in an embroidery sewing machine, by which an embroidery operation can be carried out against a tubular embroidered object such as a T-shirt and a cap.

Background Art

[0002] Heretofore, in an embroidery sewing machine, when an embroidery operation is carried out against a tubular embroidered object such as a T-shirt and a cap, the embroidery sewing machine is constructed so that an embroidery frame for supporting the embroidered object is supported in a cantilevered manner. For example, when the embroidery operation is carried out against a T-shirt, a sweat shirt or the like, the embroidery frame is supported by a holding arm that protrudes in a cantilevered manner from a frame drive element. In such a configuration, in the case where weight of the embroidered object is great, the cantilevered holding arm is caused to bend downward due to the weight of the embroidered object. This causes the front end portion of the embroidery frame to bend, and defect that a harmful influence is exerted on a sewing operation has occurred. As a technique to prevent this defect, an embroidery frame support device that supplementarily supports the front end portion of the embroidery frame has been known conventionally (for example, see patent document 1 below).

[Patent Document 1] Japanese Patent Application Laid-open Publication No. 2000-303339

[0003] The embroidery frame support device of the above-mentioned patent document 1 includes support arms disposed at both end portions of a cylinder bed in which a hook is embedded, and a support plate fixed at a tip of each of the support arms and functioning as a support member. The support arm is supported to the cylinder bed through a linear guide fixed to a side surface of the cylinder bed so as to be capable of moving in the cross direction. A rear end portion of the embroidery frame support device is fixed on a lower surface of a Y direction drive element (a member for drive in the cross direction with respect to the sewing machine) that causes the embroidery frame to move in the cross direction. This allows the support plate fixed to the tips of the support arms to move in the cross direction integrally with the movement of the embroidery frame in the cross direction. According to the embroidery frame support device of the above mentioned patent document 1, since the support plate configured as described above supports the front end portion of the embroidery frame from the lower surface side, it is possible to prevent the front end portion of the embroidery frame from bending even in the case where weight of the embroidered object is great. This

dissolves the defect that a harmful influence is exerted on a sewing operation.

[0004] In the embroidery sewing machine as described above, that is, the sewing machine that carries out an embroidery operation against a tubular embroidered object such as a T-shirt and a cap, multiple kinds of embroidery frames can be set in accordance with the form of the embroidered object. The multiple kinds of embroidery frames include a bag frame for holding a bag, a cap frame for holding a cap, and a working fabric frame for holding a working fabric, for example.

[0005] In the case where the kind of embroidery frame to be set in the embroidery sewing machine is changed, there is a need to change a support element for supporting the embroidery frame in accordance with the kind of embroidery frame to be used. Namely, since a usable frame is limited to a bag frame in the embroidery frame support device disclosed in the patent document 1 described above, the bag frame is to be removed when other kind of frame such as a cap frame and a working fabric frame is used. A removing operation of the embroidery frame support device is a complicated operation in which the support arm of the embroidery frame support device is released from the Y direction drive element and the linear guide of the support arm is released from the cylinder bed. Further, in an attaching operation of the embroidery frame support device, it requires time to adjust alignment of attachment of the member (such as a support arm or a linear guide) and the like. Namely, since such time is required for replacement of the embroidery frame when the embroidery frame is to be changed, operating efficiency is bad.

[0006] Further, even though the kind is limited to the bag frame, the size is extremely varied. The embroidery frame (bag frame) having a different size is to be changed in accordance with the size of an embroidered object. However, in the configuration of the embroidery frame support device shown in the above-mentioned patent document 1, the support plate attached to the tips of the support arms is to be positioned at the lower surface of the front end portion of the bag frame. Thus, there has been an inconvenience that a plurality of support arms each having a different length are prepared in accordance with the sizes of bag frames and one support arm is to be changed in accordance with the size of the bag frame appropriately.

Disclosure of the Invention

[0007] In view of the foregoing, it is an object of the present invention to provide an embroidery frame support device in which an attaching and releasing operation requires a little work and this makes it possible to heighten convenience thereof.

[0008] According to the present invention, there is provided an embroidery frame support device for supporting a free end of an embroidery frame, movably supported in a cantilevered manner in an embroidery sewing ma-

chine, so as to follow the movement of the embroidery frame, the embroidery frame support device including: a base member fixedly attached to a predetermined portion of the embroidery sewing machine; and a support member supported on the base member so as to be relatively movable with the base member and movably supporting the free end of the embroidery frame.

[0009] Further, in the embroidery frame support device of the present invention, it is preferable that the support member includes a Y slide mechanism constructed so as to be retractable in a Y direction to follow movement of the embroidery frame in the Y direction. Moreover, it is preferable that the support member includes an X slide mechanism supporting the free end of the embroidery frame so as to be slidable in an X direction.

[0010] According to the present invention, the embroidery frame support device is constructed so that the base member is fixedly attached to the predetermined portion of the embroidery sewing machine, the support member is supported on the base member so as to be capable of moving relatively with the base member, and the free end of the embroidery frame is movably supported to the support member. Thus, it is possible to attach the embroidery frame support device to the embroidery sewing machine while the support member and the base member are integrated. In addition, it is possible to release the embroidery frame support device from the embroidery sewing machine. Since the support member and the base member are integrated, the present invention achieves a brilliant effect that it is possible to omit work of alignment when the embroidery frame support device is attached, and the attaching and releasing operation of the embroidery frame support device itself can be carried out easily. Further, in the case where the embroidery frame to be installed in the embroidery sewing machine is exchanged, the structure in which the free end of the embroidery frame is attached to the support member may merely be changed to one fitting the embroidery frame after exchange. Thus, it is possible to carry out an operation for changing a different type of embroidery frame easily without changing the attaching structure of the support member to the base member. Moreover, since the support member includes the Y slide mechanism constructed to be capable of expanding and contracting in the Y direction so as to follow the movement of the embroidery frame in the Y direction, it is possible to freely correspond to the embroidery frames having various sizes. Therefore, the present invention achieves a brilliant effect that it is possible to deal with the embroidery frame support device without seriously changing the configuration of the embroidery frame support device even in the case where a size and/or a type of the embroidery frame to be used are to be changed.

Brief Description of Drawings

[0011]

Fig. 1 is an overall perspective view showing an embroidery sewing machine when viewed from an oblique upper side thereof in an embodiment of the present invention;

Fig. 2 is a plan view showing an embroidery frame portion of the embroidery sewing machine in the embodiment;

Fig. 3 is a perspective view showing an extracted embroidery frame support device in the embodiment;

Fig. 4 is a perspective view explanatory of an attaching structure of the embroidery frame support device shown in Fig. 3 to a cylinder bed;

Fig. 5 is a perspective view showing the cylinder bed in the embodiment to which the embroidery frame support device is not attached;

Fig. 6 is a sectional view showing the embroidery frame support device when viewed from the upper side thereof in the embodiment;

Fig. 7 is a perspective view explanatory of an attaching structure of an X slide rail at a tip portion of the embroidery frame support device in the embodiment;

Fig. 8 is a sectional view taken along the line A-A of Fig. 7;

Fig. 9 is a perspective view showing the embroidery frame in the embodiment when viewed from a top surface in which the state where the embroidery frame is released from the embroidery sewing machine and the embroidery frame support device is shown;

Fig. 10 is a top plan view similar to Fig. 2 showing the state where the embroidery frame is moved; and Fig. 11 is a perspective view showing a working fabric frame to which the embroidery frame support device in the embodiment can be applied.

Best Mode for Carrying Out the Invention

[0012] One embodiment of the present invention will hereinafter be described with reference to the accompanying drawings.

Fig. 1 is an overall perspective view showing a single-head embroidery sewing machine according to the present embodiment when viewed from a forward oblique upper side thereof. In the present embodiment, when the sewing machine is viewed from the front surface thereof, a right-and-left (horizontal) direction thereof is referred to as an "X direction", while a front-and-behind direction thereof is referred to as a "Y direction". In Fig. 1, a reference numeral 1 denotes a sewing machine table, a reference numeral 2 denotes a sewing machine head, and a reference numeral 3 denotes a cylinder bed. A front portion (front table) 1a of the sewing machine table 1 is configured to be capable of displacing upward and downward in a similar manner to this type of sewing machine known in the prior art. By displacing the front table 1a toward a lower position, it is possible to embroider a so-

called tubular embroidered object. A sewing machine head 2 is configured so as to include a sewing needle that moves upward and downward in response to the rotation of a main shaft of the sewing machine, a thread take-up lever, a press foot and the like. The cylinder bed 3 has a shaft rotatively driven in synchronous with the main shaft of the sewing machine. A hook is fixed to a tip of the shaft. As is well known, sewing by the sewing machine is carried out in corporation with the hook and the sewing needle provided in the sewing machine head 2.

[0013] A reference numeral 4 denotes a Y direction drive element. The Y direction drive element 4 is driven only in a Y direction by means of a Y direction drive mechanism (not shown) provided on a lower surface of the sewing machine table 1. Further, a reference numeral 5 denotes an X direction drive element. The X direction drive element 5 is incorporated into the Y direction drive element 4. When the Y direction drive element 4 is moved in the Y direction with respect to the sewing machine table 1, the X direction drive element 5 moves in the Y direction together with the Y direction drive element 4. Moreover, the X direction drive element 5 is driven in an X direction relatively with the Y direction drive element 4 by means of an X direction drive mechanism (not shown) mounted on the Y direction drive element 4. Namely, the X direction drive element 5 is driven not only in the X direction by means of the X direction drive mechanism, but also the X direction drive element 5 moves in the Y direction together with the movement of the Y direction drive element 4 in accordance with the Y direction drive mechanism. In other words, the X direction drive element 5 can be driven in the X and Y directions. A reference numeral 6 denotes an embroidery frame for holding an embroidered object. The embroidery frame 6 is installed in the sewing machine in a cantilevered manner by attaching a rear end portion thereof to the X direction drive element 5. Since the embroidery frame 6 is attached to the X direction drive element 5, the embroidery frame 6 moves in the X and Y directions together with the X direction drive element 5 so as to follow the movement of the X direction drive element 5 in the X and Y directions. The X direction and Y direction drive mechanisms are controlled of drive on the basis of embroidery data according to embroidery contents to be carried out. Thus, the embroidery frame 6 is driven in the X and Y directions on the basis of the embroidery data through the Y direction drive element 4 and the X direction drive element 5.

[0014] A reference numeral 7 denotes an embroidery frame support device. The embroidery frame support device 7 is used for supplementarily supporting the embroidery frame 6 attached in the cantilevered manner. The embroidery frame support device 7 is positioned at a lower surface side of the embroidery frame 6, and supports a front end portion (free end) of the embroidery frame 6 from under the lower side. As will be described in detail later, the embroidery frame support device 7 according to the present embodiment has a feature to facilitate an

attaching and releasing operation of the embroidery frame support device 7 to a sewing machine body, and to be configured to accommodate various sizes of embroidery frames 6.

[0015] Fig. 2 is a plan view of the vicinity of the embroidery frame 6 in the sewing machine of Fig. 1 when viewed from the top thereof. As shown in Fig. 2, the embroidery frame support device 7 is disposed in the same axle as the cylinder bed 3, which extends toward the front of the sewing machine from the sewing machine table 1 in the lower surface side of the embroidery frame 6, that is, disposed so as to extend in the cross direction of the sewing machine. The tip portion of embroidery frame support device 7 is substantially positioned at a front end portion of the embroidery frame 6. Fig. 3 is a perspective view showing the embroidery frame support device 7 so as to be extracted. Fig. 4 is an explanatory drawing for attaching the embroidery frame support device 7.

[0016] In Figs. 2 and 3, the embroidery frame support device 7 is basically constructed from a base member 11 to become an attaching base of the embroidery frame support device 7, a Y direction slide rail (hereinafter, referred to simply as the "Y slide rail") 12 fixed to the base member 11, and a rail cover 13. The base member 11 is a member whose sectional surface is a U-shaped form. Three screw holes, to which three screws N1 are to be inserted to fix the embroidery frame support device 7 to the cylinder bed 3, are respectively formed at predetermined positions of the base member 11. Three screw holes, to which the three screws N1 are to be inserted, are also formed at predetermined positions of the upper surface side of the cylinder bed 3 (see Fig. 4 and the like). By screwing the base member 11 to the cylinder bed 3 by means of the three screws N1, the embroidery frame support device 7 is fixed to the cylinder bed 3, that is, mounted on the sewing machine body. As shown in Fig. 4, it is possible to carry out screw clamp between the base member 11 and the cylinder bed 3 from the upper side of the sewing machine body. Namely, since the screw clamp operation can be carried out from the upper side of the sewing machine table 1 (see Fig. 1), it is easy for an operator to implement the operation. In this regard, the base member 11 may be fixed not only to the cylinder bed 3 but also to an other appropriate portion at the sewing machine body side such as a frame of the sewing machine.

[0017] Fig. 5 is a perspective view showing the cylinder bed 3 to which the embroidery frame support device 7 is not attached. Attachment procedures of the embroidery frame support device 7 will be described with reference to Figs. 4 and 5. In this case, in Fig. 5, a shaft 8 and a hook 9 provided at a tip of the shaft 8 are shown with an imaginary line (dotted line). As shown in Fig. 5, in the state where the embroidery frame support device 7 is not attached, a cover 10 is mounted on the upper surface of the cylinder bed 3 by means of the screw clamp of three positions. The screw clamp positions on the cover 10 may be the same positions at which the base member

11 of the embroidery frame support device 7 is screwed.

[0018] When the embroidery frame support device 7 is attached, the cover 10 is removed, and as shown in Fig. 4, the embroidery frame support device 7 is attached to the cylinder bed 3 by means of the three screws N1. Namely, the embroidery frame support device 7 may be arranged so as to be overlapped above the cylinder bed 3 and the three tapped holes of the base member 11 are caused to correspond with the three tapped holes of the cylinder bed 3. The embroidery frame support device 7 and the cylinder bed 3 may then be secured from the upper side of the base member 11 using the three screws N1. On the contrary, in order to release the embroidery frame support device 7, the three screws N1 on the base member 11 may just be removed to release the fixing of the embroidery frame support device 7.

[0019] The upper surface of the base member 11 is a position to be exposed on the upper surface of the table and the front side of the sewing machine for an operator. Since the embroidery frame support device 7 is configured to be fixed by means of the screw clamp from the upper surface side of the embroidery frame support device 7, the attaching and releasing operation of the embroidery frame support device 7 to the sewing machine becomes simple and easy.

[0020] As shown in Fig. 2, Fig. 3 or Fig. 4, the Y slide rail 12 is constructed from a pair of rail members respectively attached to right and left side surfaces of the base member 11. The tip portion (end portion at the front side of the sewing machine) extends toward the front side of the sewing machine from the base member 11. Fig. 6 is a sectional plan view of the embroidery frame support device 7. As shown in Fig. 6, the Y slide rail 12 is constructed from a three-step type of rail member including an outer channel 12a, a first inner channel 12b provided so as to be slidably moved on the outer channel 12a, and a second inner channel 12c provided so as to be slidably moved on the first inner channel 12b. The Y slide rail 12 is fixed to the base member 11 in the outer channel 12a positioned at an outermost side. Thus, the first and second inner channels 12b, 12c can be moved relatively with the cylinder bed 3 in the Y direction. In this regard, the Y slide rail 12 may be a well-known rail configuration used for a drawer of a chest, for example. The tip portion of the second inner channel 12c becomes a tip portion (movable end) of the whole embroidery frame support device 7. Further, in Fig. 6, illustration and explanation of a coupling member, a stopper and the like of the respective channels constituting the Y slide rail 12 are omitted. In this regard, the structure of the Y slide rail 12 is not limited to one constructed from the channel members 12a to 12c of three-step configuration as shown in the drawings, and may be one constructed from a two-step configuration or a four-step configuration. In addition, the Y slide rail 12 is not limited to one using the channel members 12a to 12c, and may be constructed from any structure so long as the Y slide rail 12 has an expandable and contractible structure.

[0021] The rail cover 13 is a cover member provided at each of the outer sides of both of the side surfaces of the base member 11 and the Y slide rail 12. The rail cover 13 is fixed at four portions in the vicinity of the tip of the second inner channel 12c via studs 14 (see Fig. 6). The rail cover 13 can be moved together with the sliding movement of the Y slide rail 12 in the Y direction,

[0022] Further, as shown with a dashed-two dotted line in Fig. 3, an X slide rail 15 is attached to the tip portion of the Y slide rail 12 (second inner channel 12c) through a bracket 16. A notch 13a that allows the X slide rail 15 to be positioned is formed on the upper surface of the tip portion of the rail cover 13. As shown in Fig. 2, the X slide rail 15 is installed at the lower surface side of the front end portion of the embroidery frame 6. Namely, the embroidery frame support device 7 supports the front end portion (free end) of the embroidery frame 6 on the X slide rail 15a. Fig. 7 is a perspective view showing the bracket 16 and the X slide rail 15 so as to be extracted, and shows an attaching structure of the tip portion of the rail cover 13 to the Y slide rail 12. Further, Fig. 8 is a sectional view taken along the line A-A of the bracket 16 and the X slide rail 15 in Fig. 7.

[0023] As shown in Figs. 7 and 8, the X slide rail 15 is constructed from an outer channel 15a having substantially the same length as the length of the embroidery frame 6 in the right-and-left direction, and an inner channel 15b installed inside the outer channel 15. The inner channel 15b is allowed to slidably move in the right-and-left direction (X direction) of the sewing machine relatively in the outer channel 15a. The X slide rail 15 is fixed to the bracket 16 at the inner channel 15b through a screw N2 as shown in Fig. 8, and is fixed to the front end portion (free end) of the embroidery frame 6 at the outer channel 15a through a screw N4 as shown in Fig. 9. Thus, the outer channel 15a of the X slide rail 15 is allowed to move in the X direction relatively with the bracket 16. The bracket 16 is a member formed in a bridge manner. By respectively fixing right and left legs to respective tip portions of the second inner channels 12c through screws N3, the bracket 16 is laterally bridged between the right and left second inner channels 12c (see Fig. 7). Thus, the outer channel 15a of the X slide rail 15 is movably attached to the cylinder bed 3 relatively in the X direction with the movement of the embroidery frame 6 in the X direction.

[0024] Fig. 9 is a perspective view of the embroidery frame 6 when viewed from an oblique upper side thereof. As shown in Fig. 9, the embroidery frame 6 has a receiving frame 17 constituting an overall outer frame, and a pressing frame 18 for sandwiching an embroidered object between the receiving frame 17 and the pressing frame 18. Window openings 17a, 18a are respectively formed in the receiving frame 17 and the pressing frame 18. The window openings 17a, 18a become an embroidery area for the embroidery frame 6. As is apparent from a position of the tip portion (the position in which the hook 9 is embedded) of the cylinder bed 3 with respect to the window openings 17a, 18a, the position of the embroi-

dery frame 6 when sewing is carried out in the center of the embroidery area is shown in Fig. 2. In Fig. 9, a bracket 19 provided along a rear margin of the embroidery frame 6 is fixed to the X direction drive element 5. Namely, the embroidery frame 6 is fixed to the X direction drive element 5 through the bracket 19. A pair of air cylinders 20 swingably provided through a support shaft fixed on the upper surface of the bracket 19, and a pair of bearing members 21 are disposed. A shaft 22 is laterally bridged between the respective tip portions of the pair of bearing members 21. Rotary arms 23 are respectively pivoted at both ends of the shaft 22. A shaft 24 is laterally bridged between the respective one ends of both of the rotary arms 23 (a rear end portion of the sewing machine). The tip portion of each of the air cylinders 20 is coupled to the shaft 24. Further, a support arm 25 is attached to the other end of each of the rotary arms 23 (a front end portion of the sewing machine). The support arm 25 is formed in a U-shaped manner so as to substantially follow the shape of the rear end portion of the pressing frame 18. The both ends of the support arm 25 pivotably support substantially the center portion of each of right and left sides of the pressing frame 18. According to the above configuration, when the rotary arms 23 are rotated in accordance with the operation of the air cylinders 20, the pressing frame 18 is moved upward and downward in conjunction with the rotary arms 23. Thus, downward movement of the pressing frame 18 according to the operation of the air cylinders 20 allows the embroidered object mounted on the receiving frame 17 to be pressed. The embroidered object is sandwiched and held between the pressing frame 18 and the receiving frame 17 in the embroidery frame 6 in this manner.

[0025] As shown in Fig. 9, the X slide rail 15 provided at a tip of the embroidery frame support device 7 is fixed at the lower surface of the tip portion of the embroidery frame 6 (receiving frame 17) through the outer channel 15a. Namely, the embroidery frame support device 7 supplementarily supports the tip of the embroidery frame 6 mounted on the sewing machine body in a cantilevered manner at the X slide rail 15 provided at the tip of the embroidery frame support device 7 (also see Fig. 2 and the like). Thus, even though weight of an embroidered object to be held on the embroidery frame 6 is greater, it is possible to prevent the tip of the embroidery frame 6 from being weighted down.

[0026] Fig. 10 is a top plan view showing the portion of the embroidery frame 6 similar to Fig. 2 to be extracted, and shows the state where the embroidery frame 6 is forward moved toward the near side of the operator and laterally moved in the left direction with respect to the cylinder bed 3. As is apparent from Fig. 10, since the embroidery frame 6 is fixed to the tip of the embroidery frame support device 7 through the X slide rail 15, the Y slide rail 12 is expanded or contracted with the forward or backward movement of the embroidery frame 6 (movement in the Y direction). Further, since the X slide rail 15 intervenes therebetween, the embroidery frame 6 is lat-

erally moved relatively with the embroidery frame support device 7 with horizontal direction (X direction) movement of the embroidery frame 6. Since the embroidery frame support device 7 is configured so that the embroidery frame 6 is fixed to the tip of the embroidery frame support device 7 through the Y slide rail 12 and the X slide rail 15 in this manner, it is possible to ensure freedom (or movement) of the embroidery frame 6 in the cross and right-and-left directions with respect to the sewing machine body while supporting the embroidery frame 6 by means of the embroidery frame support device 7. Moreover, since the movement in the cross and the right-and-left directions is actively guided through the Y slide rail 12 and the X slide rail 15, the movement of the embroidery frame 6 is carried out smoothly even though weight of an embroidered object is greater.

[0027] Procedures to carry out an embroidery operation in the embroidery sewing machine having the above configuration will now be described briefly. The embroidery frame 6 is mounted on the sewing machine body in a cantilevered manner at the rear end side through the bracket 19, and is supplementarily supported at the lower surface of the front end portion by the embroidery frame support device 7. At an embroidery operation, the air cylinders 20 of the embroidery frame 6 are first operated to move the pressing frame 18 upward. A tubular embroidered object is thereby installed between the receiving frame 17 and the pressing frame 18. The air cylinders 20 are then operated inversely to move the pressing frame 18 downward. The embroidered object is thereby sandwiched between the receiving frame 17 and the pressing frame 18 to be held on the embroidery frame 6. The Y direction drive element 4 and the X direction drive element 5 are driven on the basis of embroidery data corresponding to embroidery contents to be carried out, whereby the embroidery operation is carried out in corporation with the sewing needle and the hook 9 of the sewing machine head 2 while driving the embroidery frame 6 in the X and Y directions. The embroidery to the embroidered object is carried out in this manner. In this case, since the front end of the embroidery frame 6 is supported by the embroidery frame support device 7, it is possible to prevent the tip of the embroidery frame 6 from being weighted down effectively, and this has no harmful influence on the sewing. Further, the movement of the embroidery frame 6 in the X and Y directions with respect to the embroidery frame support device 7 is allowed because of interposition of the Y slide rail 12 and the X slide rail 15.

[0028] Next, the case where the embroidery frame 6 and the embroidery frame support device 7 currently attached to the sewing machine are removed in order to use other type of embroidery frame will be described. The screws N3 that fix the bracket 16 to the Y slide rail 12 are first released (see Fig. 7), and the embroidery frame 6 (the bracket 19) is removed from the X direction drive element 5. As shown in Fig. 9, the removed embroidery frame 6 is released from the embroidery sewing

machine while the X slide rail 15 and the bracket 16 are attached thereto. Subsequently, the three screws N1 that fix the embroidery frame support device 7 to the cylinder bed 3 are released, and the embroidery frame support device 7 is removed from the cylinder bed 3 (see Fig. 4). The cover 10 is then attached to the upper surface of the cylinder bed 3, and other kind of embroidery frame (for example, a cap frame or the like) and a support member for the embroidery frame may be attached to the embroidery sewing machine. In this regard, the operation when the embroidery frame 6 and the embroidery frame support device 7 are attached is carried out in the inverse procedures.

[0029] In the embodiment described above, the example in which the embroidery frame support device 7 according to the present invention is used to supplementarily support the embroidery frame 6 has been described. Hereinafter, the example in which the embroidery frame support device 7 is used to support a working fabric frame for holding a working fabric will now be introduced as another example of use of the embroidery frame support device 7 according to the present invention.

[0030] Fig. 11 is a perspective view showing an example of a working fabric frame 26 for holding a working fabric. As is well known, the working fabric frame 26 is configured to hold a working fabric that is an embroidered subject using an embroidery clip 27. The working fabric frame 26 is fixed to the X direction drive element 5 at the rear end portion thereof by means of screws, whereby the working fabric frame 26 is attached to the embroidery sewing machine so as to be capable of driving in the right-and-left direction (X direction). The X slide rail 15 and the bracket 16 are attached to the lower surface of the front end portion of the working fabric frame 26, whereby the front end portion of the working fabric frame 26 can be supported by means of the embroidery frame support device 7 in the similar manner to the attaching structure of the above-described embroidery frame 6. Namely, the working fabric frame 26 is fixed to the X direction drive element 5 at the rear end portion thereof to be supported in the sewing machine in a cantilevered manner. The working fabric frame 26 is also supported by means of the embroidery frame support device 7 so that the front end portion is not weighted down. Thus, in the embroidery sewing machine provided with the embroidery frame support device 7 according to the present invention, the working fabric frame 26 can be installed therein in the similar support form to that of the embroidery frame 6 supported in a cantilevered manner. This makes it possible to exchange both sides. When the working fabric frame 26 is used in a conventionally known embroidery sewing machine, the position of the front table 1a capable of displacing upward and downward (see Fig. 1) is generally set to an upper position, and the front table 1a supports the overall working fabric frame 26. Thus, when the embroidery frame 6 and the working fabric frame 26 are exchanged, there is a need to change

the position of the front table 1a (see Fig. 1). On this regard, since the front end portion of the working fabric frame 26 is supported by means of the Y slide rail 12 and the X slide rail 15 using the embroidery frame support device 7 according to the present invention, there is no need to displace the position of the front table even when the working fabric frame 26 is used in place of the embroidery frame 6. Therefore, it becomes easier to mutually use the embroidery frame 6 and the working fabric frame 26.

[0031] As explained above, according to the present embodiment, the embroidery frame support device 7 is configured so that the embroidery frame support device 7 can be fixed to the cylinder bed 3 (sewing machine body) by means of the screw clamp using the three screws N1, and the screw clamp operation of the three screws N1 can be carried out from the front upper side of the sewing machine table 1. Thus, the attaching and releasing operation of the embroidery frame support device 7 can be carried out very easily.

[0032] Further, in the embroidery frame support device 7, the Y slide rail 12 (support member) and the base member 11 that is the attaching base of the embroidery frame support device 7 are integrated. Thus, the embroidery frame support device 7 can be attached and released while the Y slide rail 12 (support member) is attached to the base member 11. Therefore, there is no need to carry out an alignment operation of the Y slide rail 12 when the embroidery frame support device 7 is attached to the cylinder bed 3. For this reason, it is possible to carry out the attaching and releasing operation of the embroidery frame support device 7 effectively.

[0033] Moreover, in the removing operation of the embroidery frame 6 from the embroidery frame support device 7, by removing the screws N3 positioned at the front side for the operator, the bracket 16 is removed from the Y slide rail 12, whereby the embroidery frame 6 can be removed together with the X slide rail 15 (see the state of Fig. 9). The embroidery frame 6 can be removed very easily. Furthermore, when the embroidery frame 6 is exchanged, there is no need to remove the Y slide rail 12 from the cylinder bed 3. Thus, the exchange operation is very easy and can be carried out easily.

[0034] Further, according to the embroidery frame support device 7 of the present embodiment, the embroidery frame support device 7 is configured so that the embroidery frame 6 is supported by the tip of the Y slide rail 12 whose length can be varied. Thus, it is possible to freely correspond to embroidery frames having various sizes. Namely, the sliding amount of the Y slide rail 12 is ensured sufficiently so as to correspond to the embroidery frame having the maximum size to be used, whereby it is possible to freely correspond to embroidery frames having various sizes by means of the same embroidery frame support device 7.

[0035] In this regard, in the present embodiment, although it has been described that the screws N3 fixing the Y slide rail 12 to the bracket 16 are released when

the embroidery frame 6 is removed (see Fig. 7), the present invention is not limited thereto. The screw N2 fixing the X slide rail 15 to the bracket 16 may be released (see Fig. 8). When the screw N2 is released, a releasing operation of the screw N2 is carried out from under the embroidery frame support device 7. However, since the screw clamp portion is positioned at the front side of the sewing machine anyway, this operation can be carried out easily.

[0036] Further, in the present embodiment, although the example in which the X slide rail 15 constructed from two-step channel members is provided at the tip portion of the embroidery frame support device 7 as a member for supporting the embroidery frame 6 has been explained, the embroidery frame support device 7 may be configured so that a linear rail (a rail and a slider engaged to the rail) is provided in place of the X slide rail 15, the rail is provided at the lower surface of the tip portion of the embroidery frame 6, and the slider is provided on the bracket 16. In short, the embroidery frame support device 7 may be configured so that the embroidery frame 6 and the bracket 16 are moved in the Y direction together, and the embroidery frame 6 is moved in the X direction relatively with the bracket 16.

[0037] Moreover, a bag frame can be used in place of the embroidery frame 6. In this case, a support member that can mount a front end portion of the bag frame thereon (which is moved in the Y direction together with the bag frame, and allows the mounted bag frame to slide in the X direction) may be attached in place of the X slide rail 15. Thus, since there is no need to exchange the Y slide rail 12, it is very easy to exchange the embroidery frame to a different type of embroidery frame.

[0038] In this regard, in the present invention, supporting the free end of the embroidery frame is not always limited to supporting the free end (tip) itself of the embroidery frame strictly. An appropriate portion near the free end (tip) may be supported in the embroidery frame.

Claims

1. An embroidery frame support device (7) for supporting a free end of an embroidery frame (6), movably supported in a cantilevered manner in an embroidery sewing machine, so as to follow the movement of the embroidery frame (6), the embroidery frame support device (7) comprising:

a base member (11) fixedly attached to a predetermined portion of the embroidery sewing machine; and

a support member (12) supported on the base member (11) so as to be relatively movable with the base member (11) and movably supporting the free end of the embroidery frame (6).

2. The embroidery frame support device as claimed in

claim 1, wherein the support member (12) includes a Y slide mechanism (12a - 12c) constructed so as to be retractable in a Y direction to follow movement of the embroidery frame (6) in the Y direction.

3. The embroidery frame support device as claimed in claim 1 or 2, wherein the support member (12) includes an X slide mechanism (15) supporting the free end of the embroidery frame (6) so as to be slidable in an X direction.
4. The embroidery frame support device as claimed in claim 2, wherein the support member (12) includes an X slide mechanism (15) supporting the free end of the embroidery frame (6) so as to be slidable in an X direction.
5. The embroidery frame support device as claimed in claim 4, wherein the X slide mechanism (15) includes first and second slide members (15a, 15b) each sliding in the X direction relatively with each other, the first slide member (15a) is coupled to the Y slide mechanism (12a - 12c); the second slide member (15b) is coupled to the free end of the embroidery frame (6); and the embroidery frame (6) can be separated from the embroidery frame support device (7) along with the X slide mechanism (15) by releasing the coupling between the first slide member (15a) and the Y slide mechanism (12a-12c).

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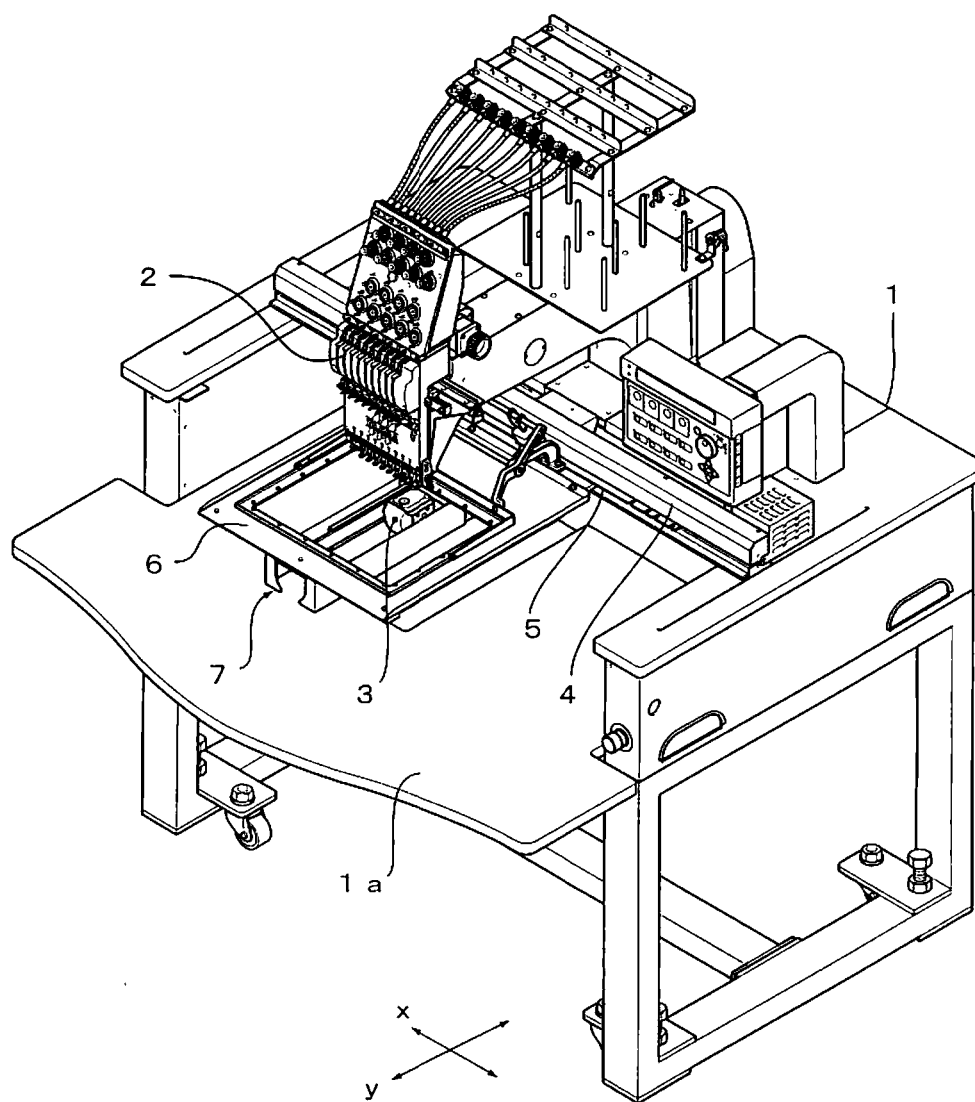


FIG. 1

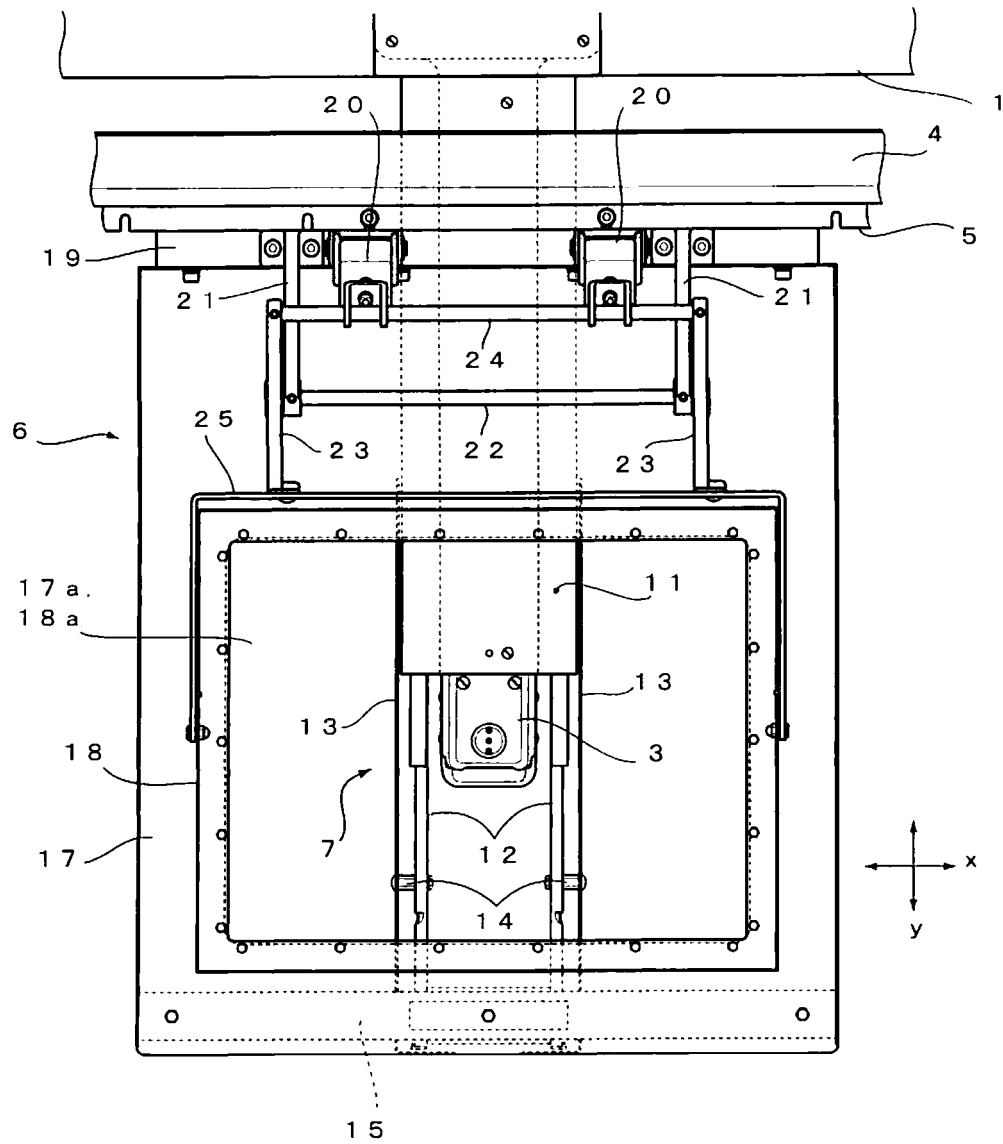


FIG. 2

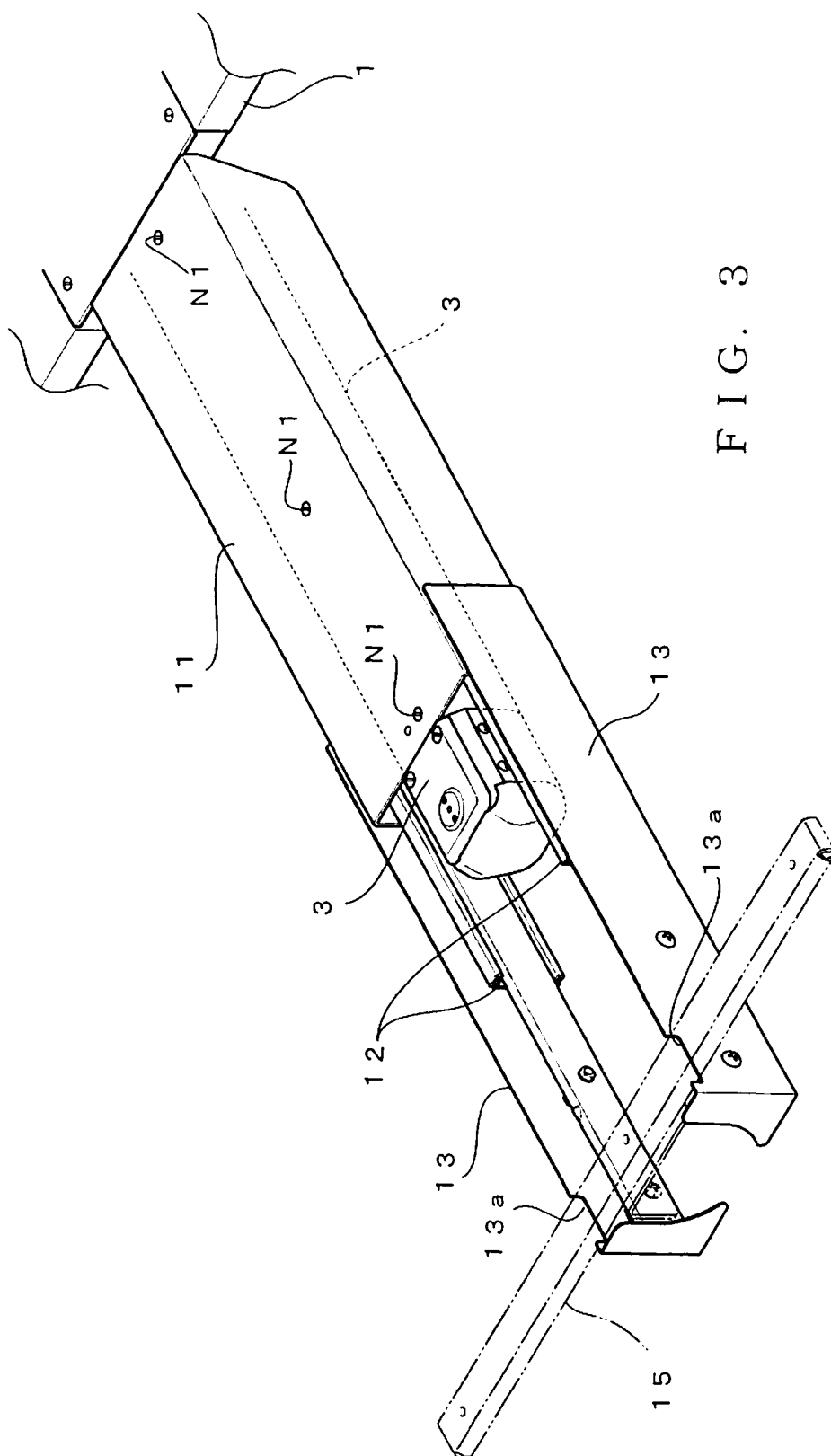
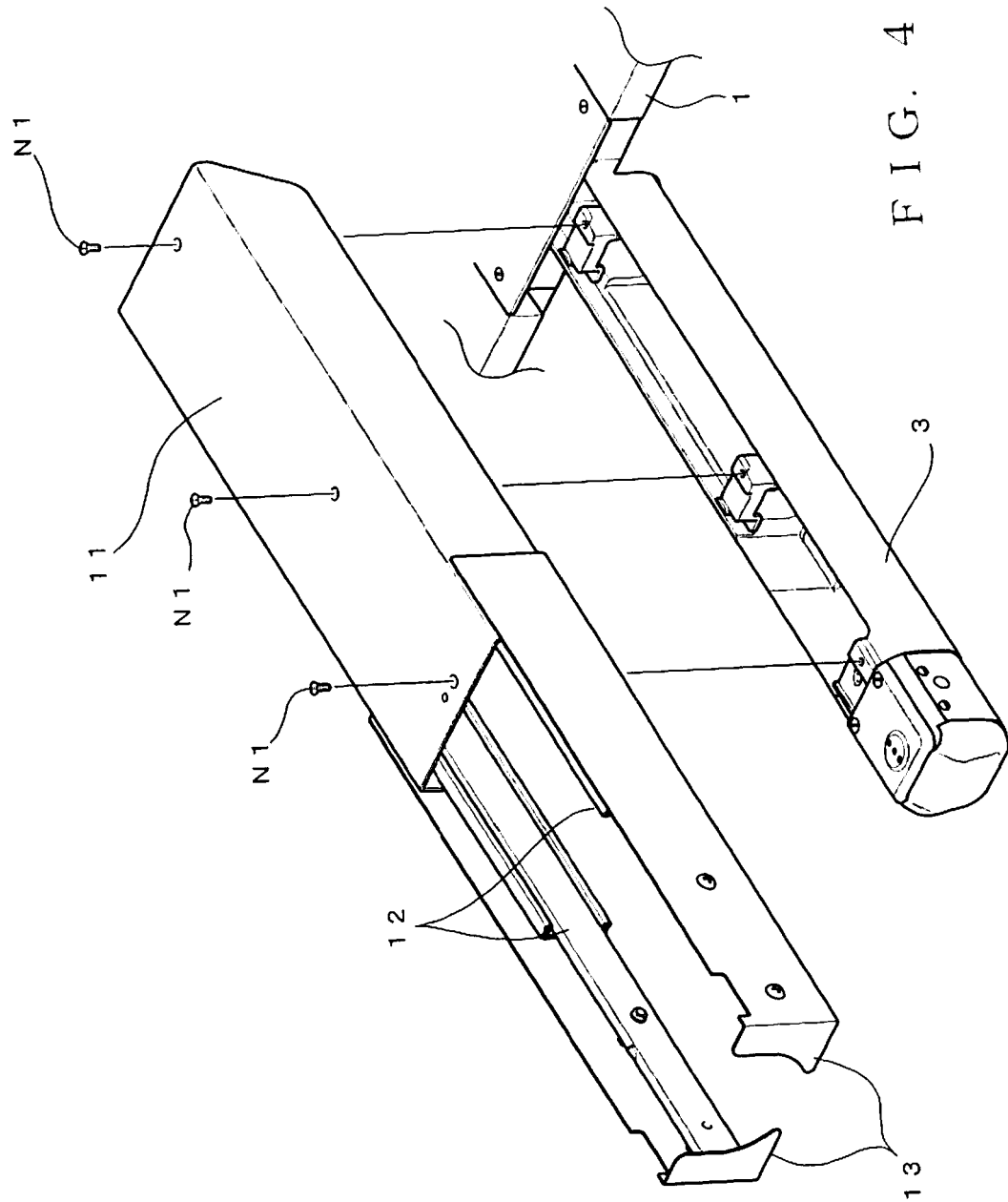
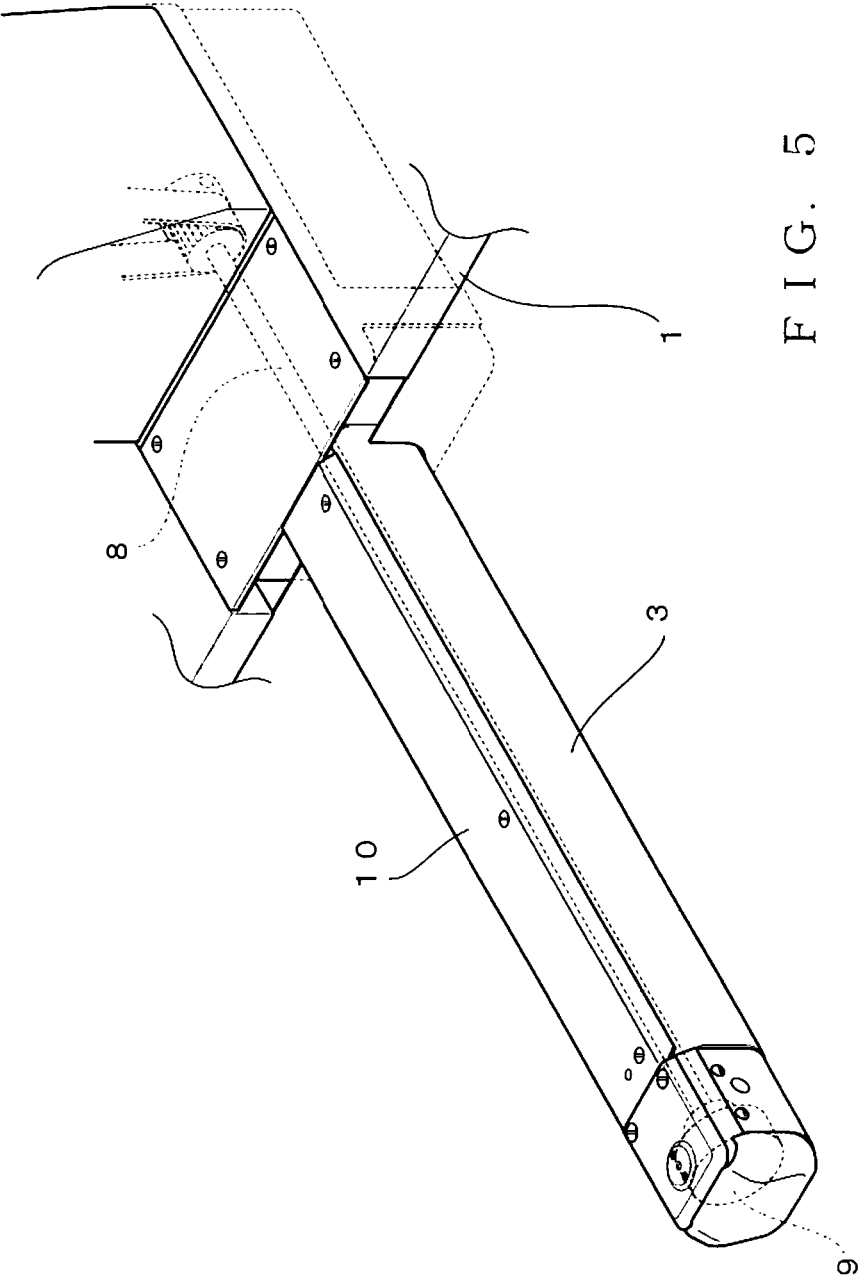


FIG. 3





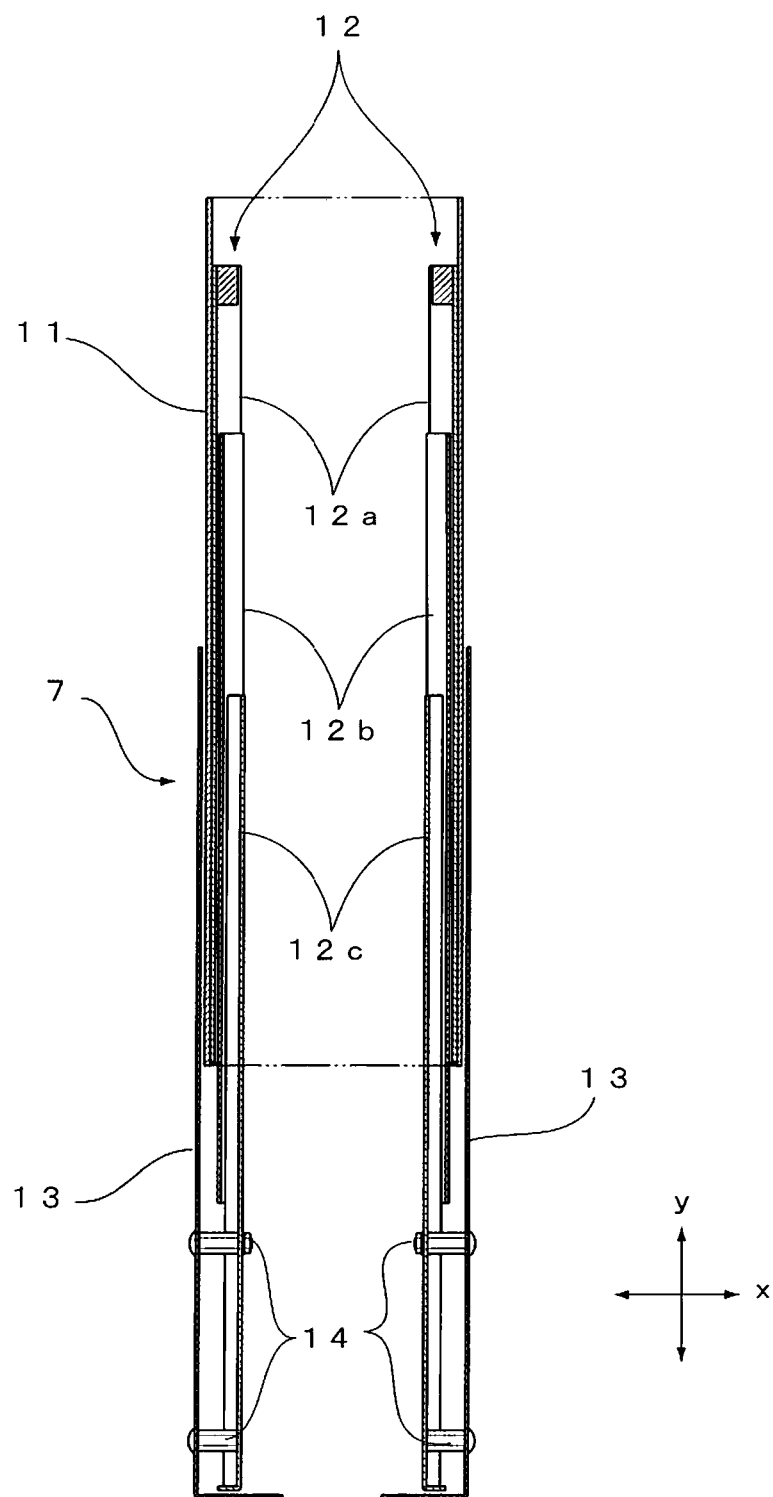


FIG. 6

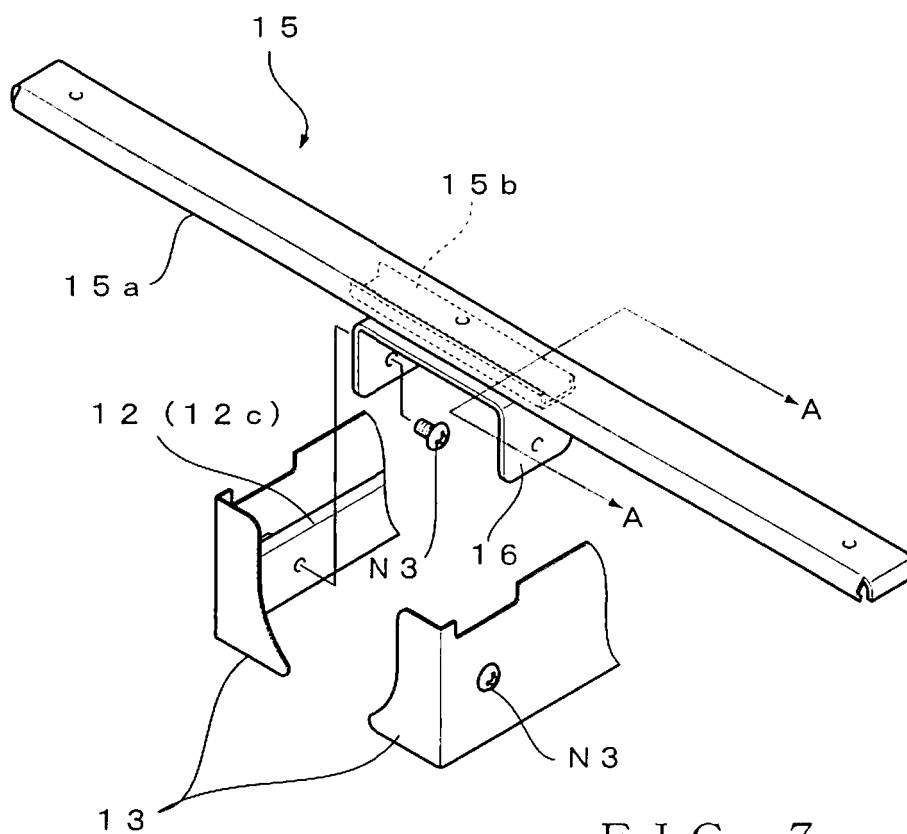


FIG. 7

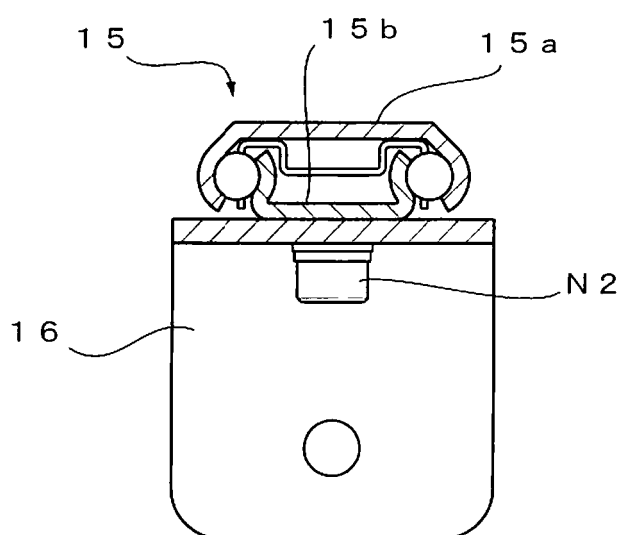


FIG. 8

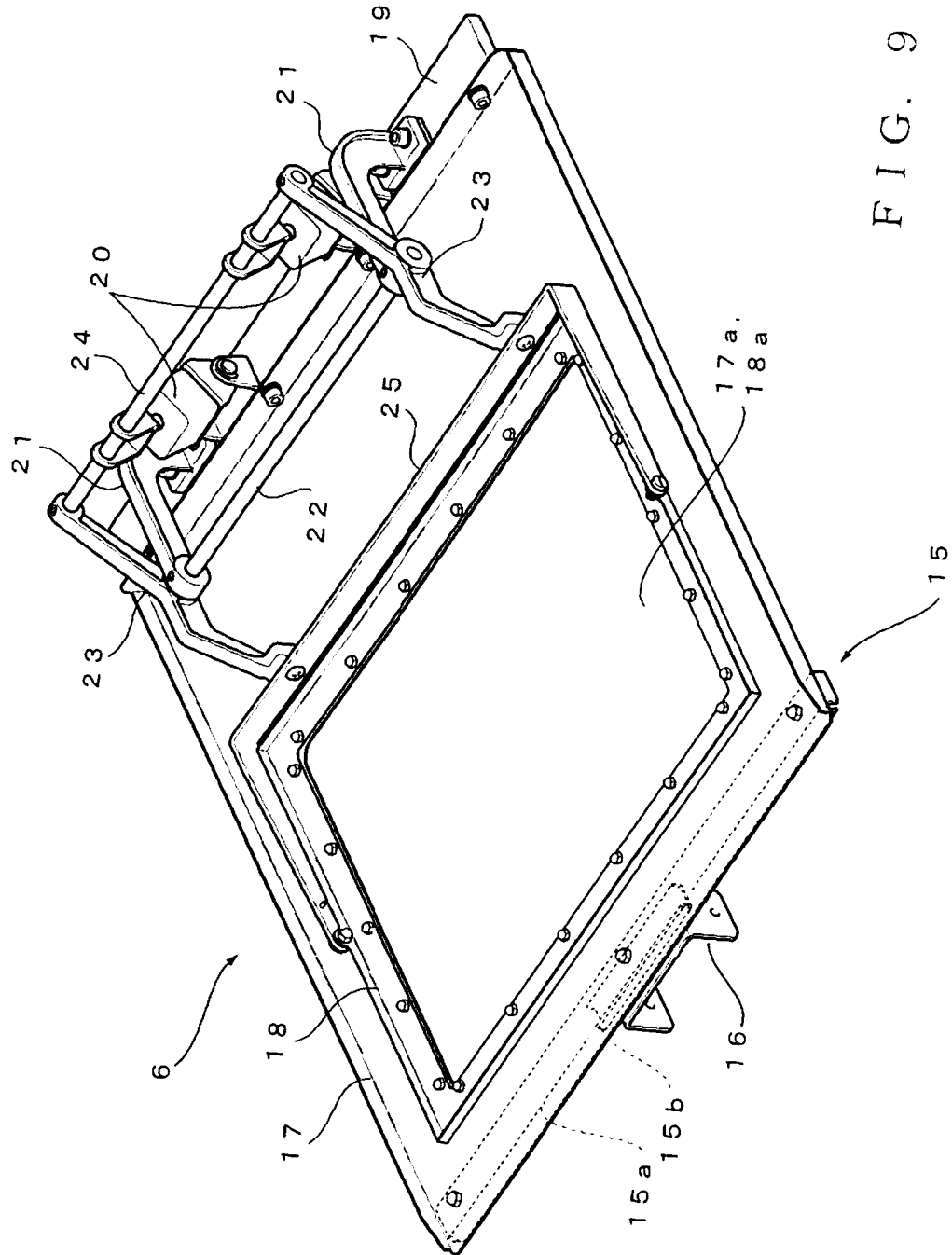
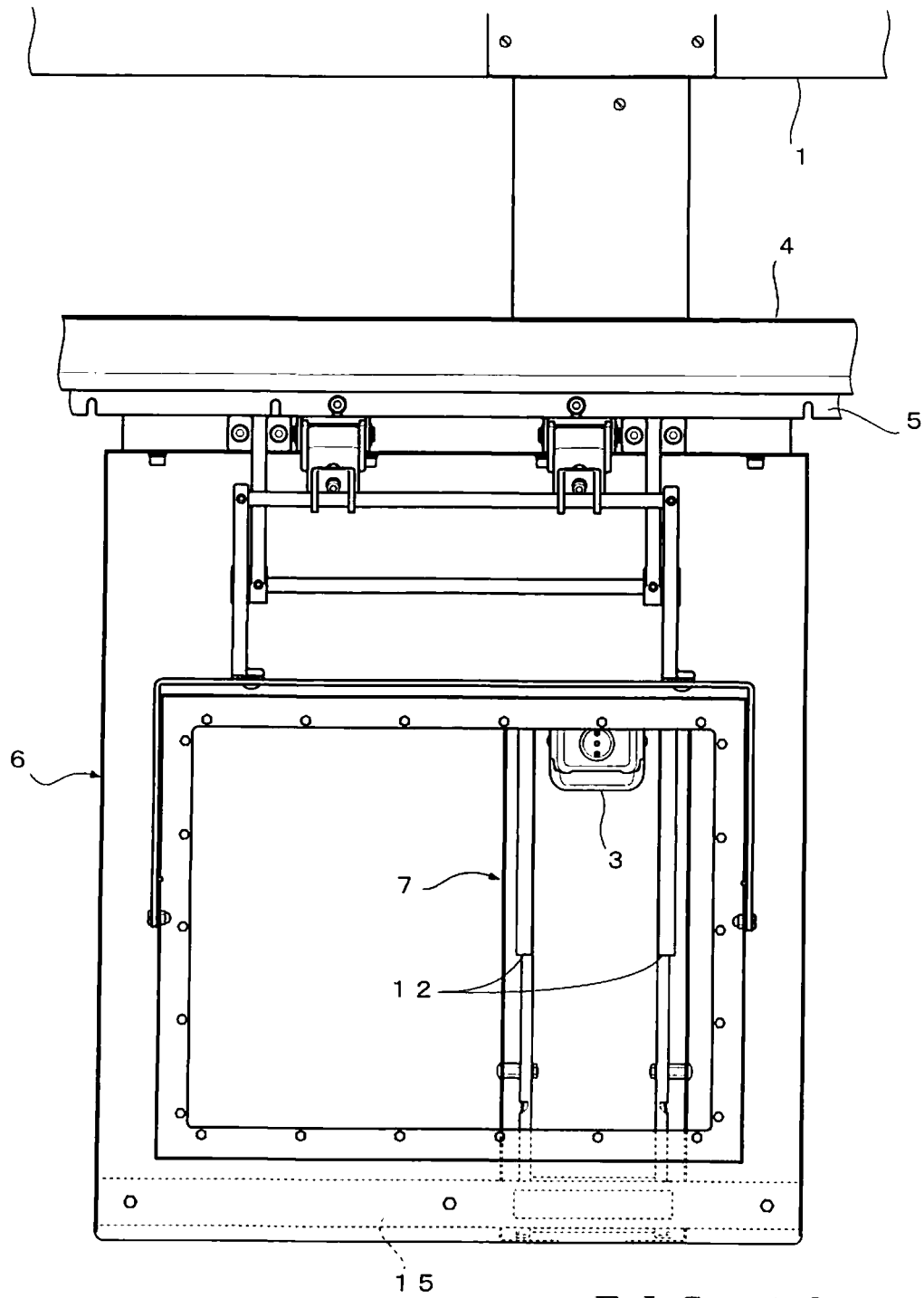


FIG. 9



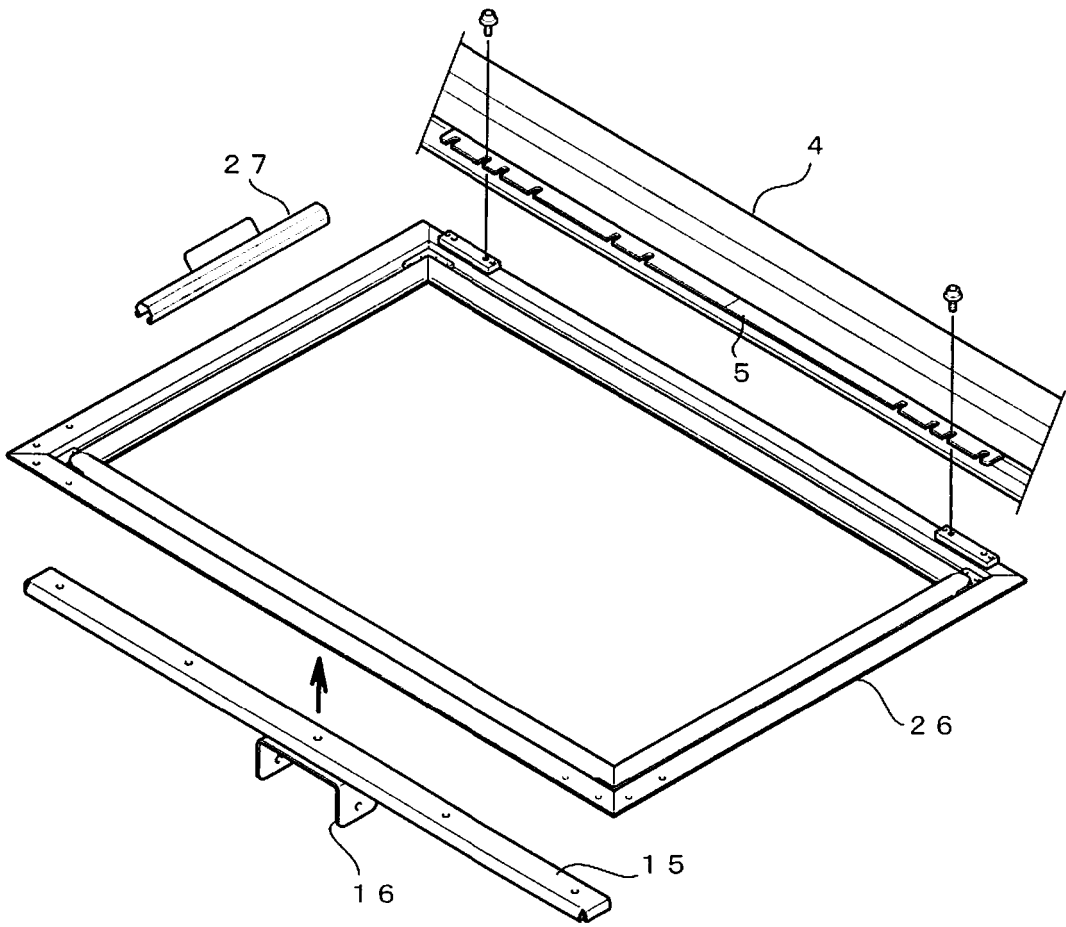


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/310052

A. CLASSIFICATION OF SUBJECT MATTER

D05B39/00 (2006.01), D05C9/06 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D05B39/00, D05C9/04-9/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2000-303339 A (Tokai Kogyo Mishin Kabushiki Kaisha), 31 October, 2000 (31.10.00), (Family: none)	1-4 5
X A	JP 7-189110 A (Tokai Kogyo Mishin Kabushiki Kaisha), 25 July, 1995 (25.07.95), (Family: none)	1-4 5
A	JP 3219809 B2 (Kabushiki Kaisha Barudan), 15 October, 2001 (15.10.01), & US 5249537 A & GB 2257717 A & DE 4223009 A & FR 2679267 A & ES 2120316 A & IT 1255456 B	1-5

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"&" document member of the same patent family

Date of the actual completion of the international search
06 June, 2006 (06.06.06)Date of mailing of the international search report
13 June, 2006 (13.06.06)Name and mailing address of the ISA/
Japanese Patent Office

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Patent documents cited in the description

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