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(54) **Hammer position adjustment mechanism for buttonhole cutting device of buttonholing machine**

Hammerpositionierungseinstellungsmechanik für Knopflochschneidevorrichtung einer
Knopflochstichnähmaschine

Mécanisme de réglage de position de marteau pour dispositif de coupe de boutonnières d'une machine
pour boutonnières

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(56) References cited:
**EP-A1- 1 722 021 EP-A1- 2 166 142
EP-A2- 0 887 454 CN-U- 203 403 257
US-A- 4 727 817**

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a buttonholing machine for forming buttonholes on a fabric to be sewn, and more particularly to a hammer position adjustment mechanism for a buttonhole cutting device of a buttonholing machine. The hammer position adjustment mechanism includes fewer parts and occupies less operational space while enables convenient cutting of buttonholes of different lengths by adjusting a relative position between a hammer and a knife.

BACKGROUND OF THE INVENTION

[0002] Fig. 1A schematically shows a conventional buttonhole cutting device of a buttonholing machine includes a vertically movable shaft 10, a locating block 11 connected to a lower end of the shaft 10, an air cylinder 12 enclosed in the locating block 11, a sliding mechanism 13 coupled to and driven by the air cylinder 12 to automatically slide in y-axis direction, and a hammer 14 fixedly connected to a lower end of the sliding mechanism 13. Fig. 1B shows a stitched buttonhole 16 completed with the conventional buttonhole cutting device of the buttonholing machine of Fig. 1A.

[0003] To use the buttonholing machine of Fig. 1A to form a buttonhole on a fabric, first horizontally move the hammer 14 rightward to a first position a1, and then lower the hammer 14 to contact with a knife 15 located below a fabric feeding table of the buttonholing machine, so that the hammer 14 cooperates with the knife 15 to cut a buttonhole 16 on a fabric that is placed on the fabric feeding table between the hammer 14 and the knife 15. In the case an intended overall length L2 of the buttonhole 16 to be formed on the fabric is larger than a length L1 of the hammer 14, it is necessary to horizontally move the hammer 14 leftward to a second position a2, and then lower the hammer 14 again in order to increase the length of the initially formed buttonhole 16. In the case the total length of the buttonhole 16 formed through the first two times of cutting is still shorter than the required overall length L2, it is necessary to horizontally move the fabric feeding table in a direction indicated by the arrow a and then lower the hammer 14 again to cut the fabric a third time for forming the buttonhole 16 with a desired overall length L2.

[0004] With the buttonholing machine of Fig. 1A, it is able to form buttonholes of different lengths on fabrics without the need of replacing any part on the machine. However, in the case of forming a relatively long buttonhole, the hammer must be horizontally moved and repeatedly lowered two to three times and the whole buttonholing operation requires prolonged time to complete. That is, the buttonholing operation could not be completed quickly.

[0005] Fig. 2 schematically shows another convention-

al buttonhole cutting device of a buttonholing machine that includes a knife 20 located on a bed portion of the buttonholing machine, a cutting block 21 cooperatively working with the knife 20, a driving shaft 22 driving the cutting block 21 to move vertically relative to the knife 20, a horizontally slidable plate 23 connected to the cutting block 21 and having a guide rod 24 movably fitted in a slide rail 26 that is fixedly connected to a supporting plate 25, which is in turn mounted on a body portion 27 of the buttonholing machine, and a step motor 28 mounted to the supporting plate 25 and having a screw rod 29 connected to the horizontally slidable plate 23 to serve as a driving member. By regulating the step motor 28, the horizontally slidable plate 23 can bring the cutting block 21 to move horizontally and accordingly change its horizontal position relative to the knife 20, enabling the buttonholing machine of Fig. 2 to form buttonholes of different lengths with one single cutting operation.

[0006] However, the buttonholing machine of Fig. 2 has the disadvantage that the whole mechanism for driving the cutting block to move horizontally is bulky in volume and includes a large number of parts. In addition, the driving mechanism also occupies a large part of the operational space on the buttonholing machine between a head portion and a bed portion thereof. That is, the conventional buttonhole cutting device for the buttonholing machine of Fig. 2 not only increases the manufacturing cost of the buttonholing machine, but also causes inconvenience in operating the machine.

[0007] The European patent EP1722021, filed on April 12, 2006, discloses a buttonhole sewing machine comprising an upper arm connected to a base plate by a stand, a movable needle and sewn article clamp(s) movable in the y-direction. The cutter unit has two parallel knives and a drive for displacing the knives in the x-direction (transverse to the y- and z-directions) between two end mountings, at each of which only one of the knives is contacted with the counter-surface of the anvil.

SUMMARY OF THE INVENTION

[0008] A primary object of the present invention is to provide a hammer position adjustment mechanism for buttonhole cutting device of buttonholing machine that has a simplified design and occupies less operational space on a buttonholing machine, and can be automatically or manually operable in different embodiments to satisfy different requirements in use.

[0009] To achieve the above and other objects, the hammer position adjustment mechanism of the present invention is mounted on a buttonholing machine, which includes a head portion, a bed portion and a body portion located between the head and the bed portion. The head portion has an upward and downward reciprocatingly movable needle bar mounted thereto, and the bed portion has a fabric feeding table arranged thereon to be horizontally movable in x-axis and y-axis directions. The buttonholing machine includes a buttonhole cutting device

that is located behind the needle bar and includes an upper unit assembled to the head portion and a lower unit mounted on the bed portion.

[0010] The hammer position adjustment mechanism includes a hammer connected to the upper unit to cooperatively work with the lower unit for forming a buttonhole; a driving unit for driving the hammer to move vertically in z-axis direction; and a hammer position adjustment unit for horizontally moving the hammer in y-axis direction. The hammer position adjustment unit includes a locating block connected to the driving unit, a slidable hammer holder connected to the hammer and slidably assembled to the locating block, and a driving source for driving the slidable hammer holder and accordingly the hammer to move laterally in y-axis direction. The locating block defines a slide channel and the slidable hammer holder defines a slide rail. The slidable hammer holder is slidably assembled to the locating block with the slide rail received in the slide channel.

[0011] The hammer position adjustment mechanism of the present invention is characterized by that a rack is provided on the slidable hammer holder and a gear toothed shaft is connected to the driving source and meshes with the rack, so that the slidable hammer holder can be driven by the driving source to move horizontally. In an embodiment of the present invention, the driving source is a step motor located in the head portion of the buttonholing machine. In another embodiment of the present invention, the driving source is a manually operated adjustment dial partially located outside the head portion of the buttonholing machine.

[0012] Another object of the present invention is to provide a hammer position adjustment mechanism for buttonhole cutting device of buttonholing machine that includes a manually operable hammer position adjustment unit capable of displaying a length by which a hammer has been horizontally moved on the buttonholing machine, and sending a warning signal when the moved length of the hammer is inconsistent with a buttonhole stitching length preset on the buttonholing machine.

[0013] To achieve the above and other objects, the manually operable hammer position adjustment unit has a driving source in the form of a manually operated adjustment dial and further includes an encoding disc mounted on the gear toothed shaft and an encoder provided in the head portion of the buttonholing machine to locate adjacent to the encoding disc for reading rotation scales on the encoding disk. The encoder is connected to a controller having a display provided thereon for showing a length by which the hammer is moved laterally in y-axis direction. The controller is also able to send a warning signal when a buttonhole stitching length set in the controller is inconsistent with the adjusted position of the hammer, so that a user is reminded to make necessary correction.

[0014] In brief, the present invention is characterized in that the hammer position adjustment unit thereof includes fewer parts and occupies less space compared

to the conventional buttonhole cutting device for buttonholing machine, and can therefore reduce the overall manufacturing cost of the buttonholing machine. Further, the hammer position adjustment unit according to the present invention can be differently configured to be automatically or manually operable to satisfy different requirements in use.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein

Fig. 1A schematically shows the manner in which a conventional buttonhole cutting device of a buttonholing machine with one single knife forms a buttonhole on a fabric through multiple times of cutting operation;

Fig. 1B is a plan view showing a stitched buttonhole completed with the conventional buttonhole cutting device of Fig. 1A;

Fig. 2 shows another conventional buttonhole cutting device of a buttonholing machine that includes a step motor for driving a cutting block to move;

Fig. 3 is a side perspective view of a buttonholing machine on which the hammer position adjustment mechanism for a buttonhole cutting device according to the present invention is mounted;

Fig. 4 is a fragmentary sectional view showing an upper unit of the buttonhole cutting device shown in Fig. 3;

Fig. 5 is a perspective view of an automatically operable hammer position adjustment device according to a first embodiment of the present invention; and

Fig. 6 is a perspective view of a manually operable hammer position adjustment device according to a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] The present invention will now be described with some preferred embodiments thereof and with reference to the accompanying drawings. For the purpose of easy to understand, elements that are the same in the preferred embodiments are denoted by the same reference numerals.

[0017] Please refer to Fig. 3. A buttonholing machine,

on which a hammer position adjustment mechanism for a buttonhole cutting device according to the present invention is mounted, includes a head portion 30, a bed portion 31, and a body portion 32 located between the head portion 30 and the bed portion 31. The head portion 30 includes an upper shaft 33, which has an end connected to and driven by a driving motor (not shown) to rotate, so that a needle bar 34 connected to another end of the upper shaft 33 is brought to move upward and downward in a reciprocating motion. The needle bar 34 has a needle 35 mounted to a leading end thereof. On the bed portion 31, there is arranged a fabric feeding table 36 that is horizontally movable in x-axis and y-axis directions. Two fabric pressers 37 are provided on the fabric feeding table 36, and each of the fabric pressers 37 has a needle plate 38 provided thereon.

[0018] The buttonhole cutting device is located behind the needle bar 34, and includes an upper unit 40 and a lower unit 50 that cooperatively works with the upper unit 40. The upper unit 40 is connected to a hammer 41, which is located at the head portion 30 and driven by a driving unit 42 to move vertically in z-axis direction. The downward moved hammer 41 is able to contact with a knife 51 of the lower unit 50.

[0019] The hammer 41 is connected to the driving unit 42 via a hammer position adjustment unit 43. The hammer position adjustment unit 43 brings the hammer 41 to horizontally move in y-axis direction, so as to adjust a relative position between the hammer 41 and the knife 51 for changing an overall length of a buttonhole being cut.

[0020] In the illustrated embodiment, the driving unit 42 includes a driving cylinder 421, such as an air cylinder, which is actuated when buttonholes are to be cut on a fabric. The driving cylinder 421 is fixedly connected at an end to the bed portion 31 via a first supporting shaft 422, and movably connected at another end to an end of a linking arm 424 via an extension arm 423. The linking arm 424 is freely turnable about a second supporting shaft 425, which is fixedly mounted on the head portion 30, and is connected at another end to an up-down movable shaft 427 via a third supporting shaft 426. The up-down movable shaft 427 is fitted in a guide member 428, which is fixedly mounted to the head portion 30 to limit a vertical range within which the up-down movable shaft 427 can be driven by the driving cylinder 421 to move upward and downward.

[0021] Please refer to Figs. 4 and 5. According to a first embodiment of the present invention, the hammer position adjustment unit 43 is configured to be automatically operable, and includes a locating block 431 connected to a bottom of the up-down movable shaft 427, a slidable hammer holder 432 movably assembled to the locating block 431, and a driving source 433 engaged with the slidable hammer holder 432 for driving the latter to move laterally in y-axis direction. The hammer 41 is connected to the slidable hammer holder 432.

[0022] The locating block 431 has a lower side defining

a slide channel 431a. The slidable hammer holder 432 has a top defining a slide rail 432a, which is slidably received in the slide channel 431a with a predetermined length extended beyond an end of the slide channel 431a, and has a lateral surface having a hammer presser 432b mounted thereon to enable convenient replacement of the hammer 41 by a user. The slide rail 432a is provided on a lateral surface with a rack 432c for meshing with a vertical gear toothed shaft 434 that has a predetermined length. The gear toothed shaft 434 has an end connected to the driving source 433, which can be a step motor 435 located in the head portion 30. The step motor 435 brings the gear toothed shaft 434 to rotate, so as to change a relative position between the gear toothed shaft 434 and the rack 432c, bringing the slidable hammer holder 432 to horizontally move relative to the locating block 431.

[0023] When the driving unit 42 drives the locating block 431, the slidable hammer holder 432 and the hammer 41 to synchronously move upward and downward, the gear toothed shaft 434 with the predetermined length is long enough to always mesh with the rack 432c. Therefore, the vertical movement and the horizontal movement of the hammer 41 respectively controlled by the driving unit 42 and the driving source 433 do not interfere with one another.

[0024] Please refer to Fig. 6 that shows the hammer position adjustment unit 43 according to a second embodiment of the present invention. While the hammer position adjustment unit 43 in the second embodiment is generally structurally similar to the first embodiment, it is configured for manual operation. For this purpose, the hammer position adjustment unit 43 in the second embodiment omits the step motor 435 to include a manually operated adjustment dial 436, which has a dial end 436a located outside the head portion 30 and a bevel gear end 436b located in the head portion 30. In the illustrated second embodiment, the gear toothed shaft 434 has an upper end configured as a bevel gear 434a for correspondingly meshing with the bevel gear end 436b of the manually operated adjustment dial 436. Further, the gear toothed shaft 434 has an encoding disk 437 mounted thereon to synchronously rotate with the gear toothed shaft 434. An encoder 438 is provided to locate adjacent to the encoding disk 437 for reading rotation scales on the encoding disk 437. The encoder 438 is connected to a controller 439, on which a display is provided to show a length by which the slide rail 432c has been horizontally moved. Moreover, the controller 439 is able to send a warning signal when a sewing length set in the controller 439 is inconsistent with an actual length of movement of the hammer 41 along with the slidable hammer holder 432, so that the user is reminded to make necessary correction.

[0025] The present invention has been described with some preferred embodiments thereof and it is understood that many changes and modifications in the described embodiments can be carried out without departing from the scope of the invention that is intended to be

limited only by the appended claims.

Claims

1. A hammer position adjustment mechanism for a buttonhole cutting device of a buttonholing machine; the buttonholing machine including a head portion (30), a bed portion (31) and a body portion (32) located between the head portion (30) and the bed portion (31), the head portion (30) having an upward and downward reciprocatingly movable needle bar (35) mounted thereto, and the bed portion (31) having a fabric feeding table (36) arranged thereon to be horizontally movable in x-axis and y-axis directions; the buttonhole cutting device being located behind the needle bar (34), and including an upper unit (40) assembled to the head portion (30) and a lower unit (50) mounted on the bed portion (31); the hammer position adjustment mechanism comprising:

a hammer (41) connected to the upper unit (40) to cooperatively work with the lower unit (50) for forming a buttonhole;
a driving unit (42) for driving the hammer (41) to move vertically in z-axis direction; and
a hammer position adjustment unit (43) for horizontally moving the hammer (41) in y-axis direction and including:

a locating block (431) connected to the driving unit (42);
a slidable hammer holder (432) connected to the hammer (41) and slidably assembled to the locating block (431), and having a rack (432c) provided thereon;
a driving source (433) for driving the slidable hammer holder (432) and accordingly the hammer (41) to move laterally in y-axis direction; and
a gear toothed shaft (434) connected at an end to the driving source (433) and meshing with the rack (432c);

characterized by the fact that when the driving source (433) drives the gear toothed shaft (434) to rotate, the slidable hammer holder (432) having the rack (432c) meshed with the gear toothed shaft (434) is brought to move in y-axis direction, and the driving source (433) is a step motor which drives the gear toothed shaft (434) to rotate to change a relative position between the locating block (431) and the rack (432c) to form a movement which is bringing the slidable hammer holder (432) to horizontally move in y-axis direction relative to the locating block (431).

2. A hammer position adjustment mechanism for a buttonhole cutting device of a buttonholing machine; the

buttonholing machine including a head portion (30), a bed portion (31) and a body portion (32) located between the head portion (30) and the bed portion (31), the head portion (30) having an upward and downward reciprocatingly movable needle bar (35) mounted thereto, and the bed portion (31) having a fabric feeding table (36) arranged thereon to be horizontally movable in x-axis and y-axis directions; the buttonhole cutting device being located behind the needle bar (34), and including an upper unit (40) assembled to the head portion (30) and a lower unit (50) mounted on the bed portion (31); the hammer position adjustment mechanism comprising:

a hammer (41) connected to the upper unit (40) to cooperatively work with the lower unit (50) for forming a buttonhole;
a driving unit (42) for driving the hammer (41) to move vertically in z-axis direction; and
a hammer position adjustment unit (43) for horizontally moving the hammer (41) in y-axis direction and including:

a locating block (431) connected to the driving unit (42);
a slidable hammer holder (432) connected to the hammer (41) and slidably assembled to the locating block (431), and having a rack (432c) provided thereon;
a driving source (433) for driving the slidable hammer holder (432) and accordingly the hammer (41) to move laterally in y-axis direction; and
a gear toothed shaft (434) connected at an end to the driving source (433) and meshing with the rack (432c);

characterized by the fact that when the driving source (433) drives the gear toothed shaft (434) to rotate, the slidable hammer holder (432) having the rack (432c) meshed with the gear toothed shaft (434) is brought to move in y-axis direction, and the driving source (433) is a manually operated adjustment dial (436) which drives the gear toothed shaft (434) to rotate to change a relative position between the locating block (431) and the rack (432c) to form a movement which is bringing the slidable hammer holder (432) to horizontally move in y-axis direction relative to the locating block (431).

3. The hammer position adjustment mechanism for a buttonhole cutting device of a buttonholing machine as claimed in claim 2, wherein the hammer position adjustment unit (43) further includes an encoding disc (437) mounted on the gear toothed shaft (434) and an encoder (438) located adjacent to the encoding disc (437) for reading rotation scales on the encoding disc (437).

4. The hammer position adjustment mechanism for a buttonhole cutting device of a buttonholing machine as claimed in claim 3, wherein the encoder (438) is connected to a controller (439) having a display provided thereon for showing a length by which the hammer (41) is moved laterally in y-axis direction. 5
5. The hammer position adjustment mechanism for a buttonhole cutting device of a buttonholing machine as claimed in claim 1 or in claim 2, wherein the locating block (431) defines a slide channel (431a) and the slidable hammer holder (532) defines a slide rail (432a), and the slidable hammer holder (432) being slidably assembled to the locating block (431) with the slide rail (432a) received in the slide channel (431a). 10 15

Patentansprüche

1. Hammerpositionierungseinstellungsmechanik für eine Knopflochschnidevorrichtung einer Knopflochstichnähmaschine; wobei die Knopflochstichnähmaschine ein Kopfteil (30), ein Bettteil (31) und ein Körperteil (32) zwischen dem Kopfteil (30) und dem Bettteil (31) umfasst, wobei das Kopfteil (30) eine sich gegenseitig auf und ab bewegende Nadelstange (35) umfasst, die daran montiert ist, und das Bettteil (31) umfasst einen Stoffzuführtisch (36), der darauf angeordnet ist, um horizontal beweglich in Richtung X-Achse und Y-Achse zu sein; wobei die Knopflochschnidevorrichtung hinter der Nadelstange (34) positioniert ist und eine obere Einheit (40) umfasst, die an das Kopfteil (30) montiert ist, und eine untere Einheit (50), die auf das Bettteil (31) montiert ist; wobei die Hammerpositionierungseinstellungsmechanik folgendes umfasst:
- einen Hammer (41), der mit der oberen Einheit (40) verbunden ist, um mit der unteren Einheit (50) zusammenzuwirken, um ein Knopfloch zu bilden; 40
- eine Antriebseinheit (42), um den Hammer (41) senkrecht in Z-Achsen-Richtung zu bewegen; und 45
- eine Hammerpositionierungseinstellungseinheit (43), um den Hammer (41) horizontal in Richtung der Y-Achse zu bewegen, mit:
- einem Fixierblock (431), der mit der Antriebseinheit (42) verbunden ist; 50
- einem gleitenden Hammerhalter (432), der mit dem Hammer (41) verbunden und gleitend an den Fixierblock (431) montiert ist, mit einer Zahnstange (432c) darauf; 55
- einer Antriebsquelle (433), um den gleitenden Hammerhalter (432) und dementsprechend den Hammer (41) seitlich in Richtung

der Y-Achse zu bewegen; und
einem verzahnten Schaft (434), der an einem Ende mit der Antriebsquelle (433) verbunden ist und in die Zahnstange (432c) eingreift;

gekennzeichnet durch die Tatsache dass, wenn die Antriebsquelle (433) den verzahnten Schaft (434) rotieren lässt, der gleitende Hammerhalter (432) mit der Zahnstange (432c), in die der verzahnte Schaft (434) eingreift, dazu gebracht wird, sich in Y-Achsen-Richtung zu bewegen, und die Antriebsquelle (433) ist ein Phasenmotor, der den verzahnten Schaft (434) rotieren lässt, um eine relative Position zwischen dem Fixierblock (431) und der Zahnstange (432c) zu verändern, um eine Bewegung zu bilden die den gleitenden Hammerhalter (432) dazu bringt, sich horizontal in Y-Achsen-Richtung relativ zu dem Fixierblock (431) zu bewegen.

2. Hammerpositionierungseinstellungsmechanik für eine Knopflochschnidevorrichtung einer Knopflochstichnähmaschine; wobei die Knopflochstichnähmaschine ein Kopfteil (30), ein Bettteil (31) und ein Körperteil (32) zwischen dem Kopfteil (30) und dem Bettteil (31) umfasst, wobei das Kopfteil (30) eine sich gegenseitig auf und ab bewegende Nadelstange (35) umfasst, die daran montiert ist, und das Bettteil (31) umfasst einen Stoffzuführtisch (36), der darauf angeordnet ist, um horizontal beweglich in Richtung X-Achse und Y-Achse zu sein; wobei die Knopflochschnidevorrichtung hinter der Nadelstange (34) positioniert ist und eine obere Einheit (40) umfasst, die an das Kopfteil (30) montiert ist, und eine untere Einheit (50), die auf das Bettteil (31) montiert ist; wobei die Hammerpositionierungseinstellungsmechanik folgendes umfasst:

einen Hammer (41), der mit der oberen Einheit (40) verbunden ist, um mit der unteren Einheit (50) zusammenzuwirken, um ein Knopfloch zu bilden;

eine Antriebseinheit (42), um den Hammer (41) senkrecht in Z-Achsen-Richtung zu bewegen; und

eine Hammerpositionierungseinstellungseinheit (43), um den Hammer (41) horizontal in Richtung der Y-Achse zu bewegen, mit:

einem Fixierblock (431), der mit der Antriebseinheit (42) verbunden ist;

einem gleitenden Hammerhalter (432), der mit dem Hammer (41) verbunden und gleitend an den Fixierblock (431) montiert ist, mit einer Zahnstange (432c) darauf;

einer Antriebsquelle (433), um den gleitenden Hammerhalter (432) und dementsprechend den Hammer (41) seitlich in Richtung

der Y-Achse zu bewegen; und einem verzahnten Schaft (434), der an einem Ende mit der Antriebsquelle (433) verbunden ist und in die Zahnstange (432c) eingreift;

gekennzeichnet durch die Tatsache, dass, wenn die Antriebsquelle (433) den verzahnten Schaft (434) rotieren lässt, der gleitende Hammerhalter (432) mit der Zahnstange (432c), in die der verzahnte Schaft (434) eingreift, dazu gebracht wird, sich in Y-Achsen-Richtung z bewegen, und die Antriebsquelle (433) ist ein manuell betriebenes Einstellrad (436), das den verzahnten Schaft (434) rotieren lässt, um eine relative Position zwischen dem Fixierblock (431) und der Zahnstange (432c) zu verändern, um eine Bewegung zu bilden, die den gleitenden Hammerhalter (432) dazu bringt, sich horizontal in Y-Achsen-Richtung relativ zu dem Fixierblock (431) zu bewegen.

3. Hammerpositionierungseinstellungsmechanik für eine Knopflochschneidevorrichtung einer Knopflochstichnähmaschine nach Anspruch 2, wobei die Hammerpositions-Einstellungseinheit (43) des weiteren eine Kodierscheibe (437) umfasst, die auf den verzahnten Schaft (434) montiert ist, und einen Kodierer (438) angrenzend an die Kodierscheibe (437) zum Ablesen von Rotationsskalen auf der Kodierscheibe (437).
4. Hammerpositionierungseinstellungsmechanik für eine Knopflochschneidevorrichtung einer Knopflochstichnähmaschine wie in Anspruch 3 beansprucht, wobei der Kodierer (438) mit einem Steuergerät (439) mit einer Anzeige verbunden ist, um eine Länge anzuzeigen, um die der Hammer (41) seitlich in Y-Achsen-Richtung bewegt wird.
5. Hammerpositionierungseinstellungsmechanik für eine Knopflochschneidevorrichtung einer Knopflochstichnähmaschine nach Anspruch 1 oder 2, wobei der Fixierblock (431) einen Gleitkanal (431a) definiert und der gleitende Hammerhalter (532) eine Gleitschiene (432a) definiert, und der gleitende Hammerhalter (432) ist gleitend auf den Fixierblock (431) montiert, wobei die Gleitschiene (432a) in dem Gleitkanal (431a) untergebracht ist.

Revendications

1. Mécanisme d'ajustement de position de marteau pour un dispositif de coupe de boutonnière d'une machine à boutonnières ; la machine à boutonnières comprenant une partie tête (30), une partie lit (31) et une partie corps (32) située entre la partie tête (30) et la partie lit (31), la partie tête (30) ayant une

barre à aiguilles mobile en va-et-vient vers le haut et vers le bas (35) montée sur celle-ci, et la partie lit (31) ayant une table d'avance de tissu (36) disposée sur celle-ci pour être mobile horizontalement dans des directions d'axe x et d'axe y ; le dispositif de coupe de boutonnière étant situé derrière la barre à aiguilles (34), et comprenant une unité supérieure (40) assemblée à la partie tête (30) et une unité inférieure (50) montée sur la partie lit (31) ; le mécanisme d'ajustement de position de marteau comprenant :

un marteau (41) relié à l'unité supérieure (40) pour travailler en coopération avec l'unité inférieure (50) pour former une boutonnière ; une unité d'entraînement (42) pour amener le marteau (41) à se déplacer verticalement dans une direction d'axe z ; et une unité d'ajustement de position de marteau (43) pour déplacer horizontalement le marteau (41) dans la direction d'axe y et comprenant :

un bloc de positionnement (431) relié à l'unité d'entraînement (42) ; un support de marteau coulissant (432) relié au marteau (41) et assemblé de façon coulissante au bloc de positionnement (431), et ayant une crémaillère (432c) située sur celui-ci ; une source d'entraînement (433) pour amener le support de marteau coulissant (432) et, par conséquent, le marteau (41), à se déplacer latéralement dans la direction d'axe y ; et un arbre denté (434) relié au niveau d'une extrémité à la source d'entraînement (433) et engrenant la crémaillère (432c) ;

caractérisé par le fait que, lorsque la source d'entraînement (433) entraîne l'arbre denté (434) en rotation, le support de marteau coulissant (432) ayant la crémaillère (432c) engrenant l'arbre denté (434) est amené à se déplacer dans la direction d'axe y, et la source d'entraînement (433) est un moteur pas-à-pas qui entraîne l'arbre denté (434) en rotation pour changer une position relative entre le bloc de positionnement (431) et la crémaillère (432c) pour former un mouvement qui amène le support de marteau coulissant (432) à se déplacer horizontalement dans la direction d'axe y par rapport au bloc de positionnement (431).

2. Mécanisme d'ajustement de position de marteau pour un dispositif de coupe de boutonnière d'une machine à boutonnières ; la machine à boutonnières comprenant une partie tête (30), une partie lit (31) et une partie corps (32) située entre la partie tête (30) et la partie lit (31), la partie tête (30) ayant une

barre à aiguilles mobile en va-et-vient vers le haut et vers le bas (35) montée sur celle-ci, et la partie lit (31) ayant une table d'avance de tissu (36) disposée sur celle-ci pour être mobile horizontalement dans des directions d'axe x et d'axe y ; le dispositif de coupe de boutonnière étant situé derrière la barre à aiguilles (34), et comprenant une unité supérieure (40) assemblée à la partie tête (30) et une unité inférieure (50) montée sur la partie lit (31) ; le mécanisme d'ajustement de position de marteau comprenant :

un marteau (41) relié à l'unité supérieure (40) pour travailler en coopération avec l'unité inférieure (50) pour former une boutonnière ; une unité d'entraînement (42) pour amener le marteau (41) à se déplacer verticalement dans une direction d'axe z ; et une unité d'ajustement de position de marteau (43) pour déplacer horizontalement le marteau (41) dans la direction d'axe y et comprenant :

un bloc de positionnement (431) relié à l'unité d'entraînement (42) ;

un support de marteau coulissant (432) relié au marteau (41) et assemblé de façon coulissante au bloc de positionnement (431), et ayant une crémaillère (432c) située sur celui-ci ;

une source d'entraînement (433) pour amener le support de marteau coulissant (432) et, par conséquent, le marteau (41), à se déplacer latéralement dans la direction d'axe y ; et

un arbre denté (434) relié au niveau d'une extrémité à la source d'entraînement (433) et engrenant la crémaillère (432c) ;

caractérisé par le fait que, lorsque la source d'entraînement (433) entraîne l'arbre denté (434) en rotation, le support de marteau coulissant (432) ayant la crémaillère (432c) engrenant l'arbre denté (434) est amené à se déplacer dans la direction d'axe y, et la source d'entraînement (433) est un cadran d'ajustement actionné manuellement (436) qui entraîne l'arbre denté (434) en rotation pour changer une position relative entre le bloc de positionnement (431) et la crémaillère (432c) pour former un mouvement qui amène le support de marteau coulissant (432) à se déplacer horizontalement dans la direction d'axe y par rapport au bloc de positionnement (431).

3. Mécanisme d'ajustement de position de marteau pour un dispositif de coupe de boutonnière d'une machine à boutonnières selon la revendication 2, dans lequel l'unité d'ajustement de position de marteau (43) comprend en outre un disque de codage

(437) monté sur l'arbre denté (434) et un codeur (438) situé adjacent au disque de codage (437) pour lire des échelles de rotation sur le disque de codage (437).

4. Mécanisme d'ajustement de position de marteau pour un dispositif de coupe de boutonnière d'une machine à boutonnières selon la revendication 3, dans lequel le codeur (438) est relié à une unité de commande (439) ayant un dispositif d'affichage disposé sur celle-ci pour montrer une longueur de laquelle le marteau (41) est déplacé latéralement dans la direction d'axe y.

5. Mécanisme d'ajustement de position de marteau pour un dispositif de coupe de boutonnière d'une machine à boutonnières selon la revendication 1 ou la revendication 2, dans lequel le bloc de positionnement (431) définit un canal de coulissement (431a) et le support de marteau coulissant (532) définit une barre de coulissement (432a), et le support de marteau coulissant (432) étant assemblé de façon coulissante au bloc de positionnement (431) avec la barre de coulissement (432a) reçue dans le canal de coulissement (431a).

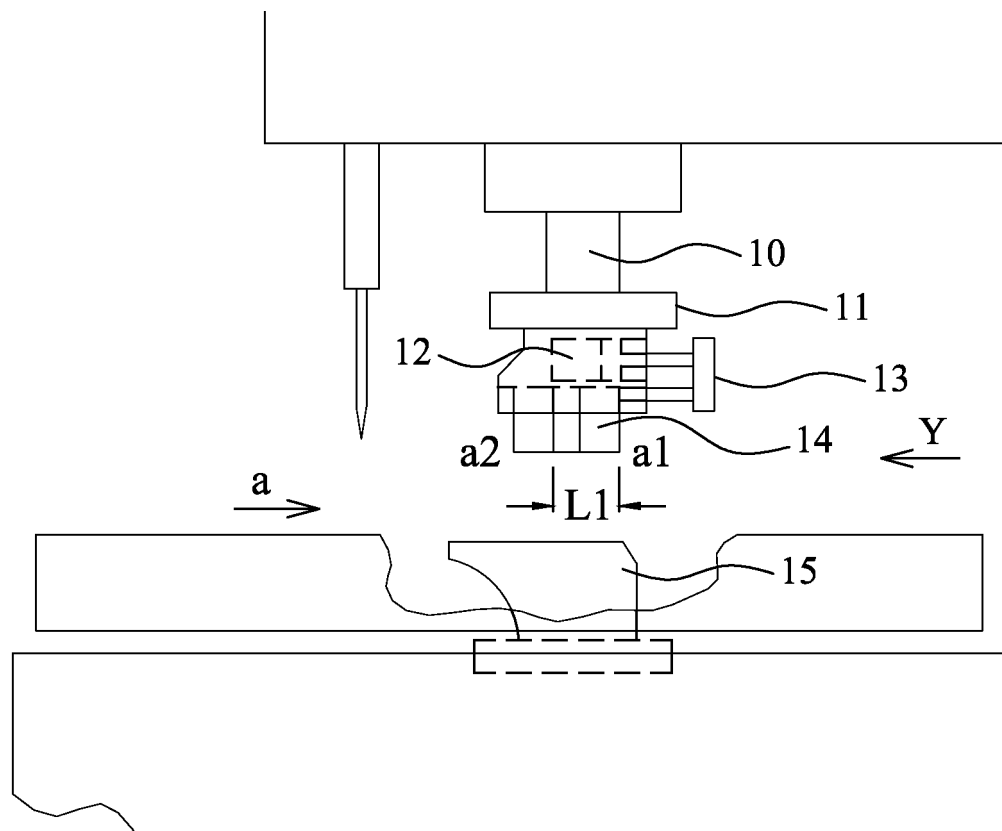


FIG. 1A
(Prior Art)

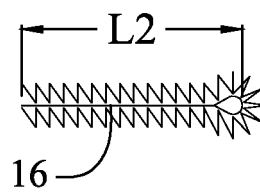


FIG. 1B

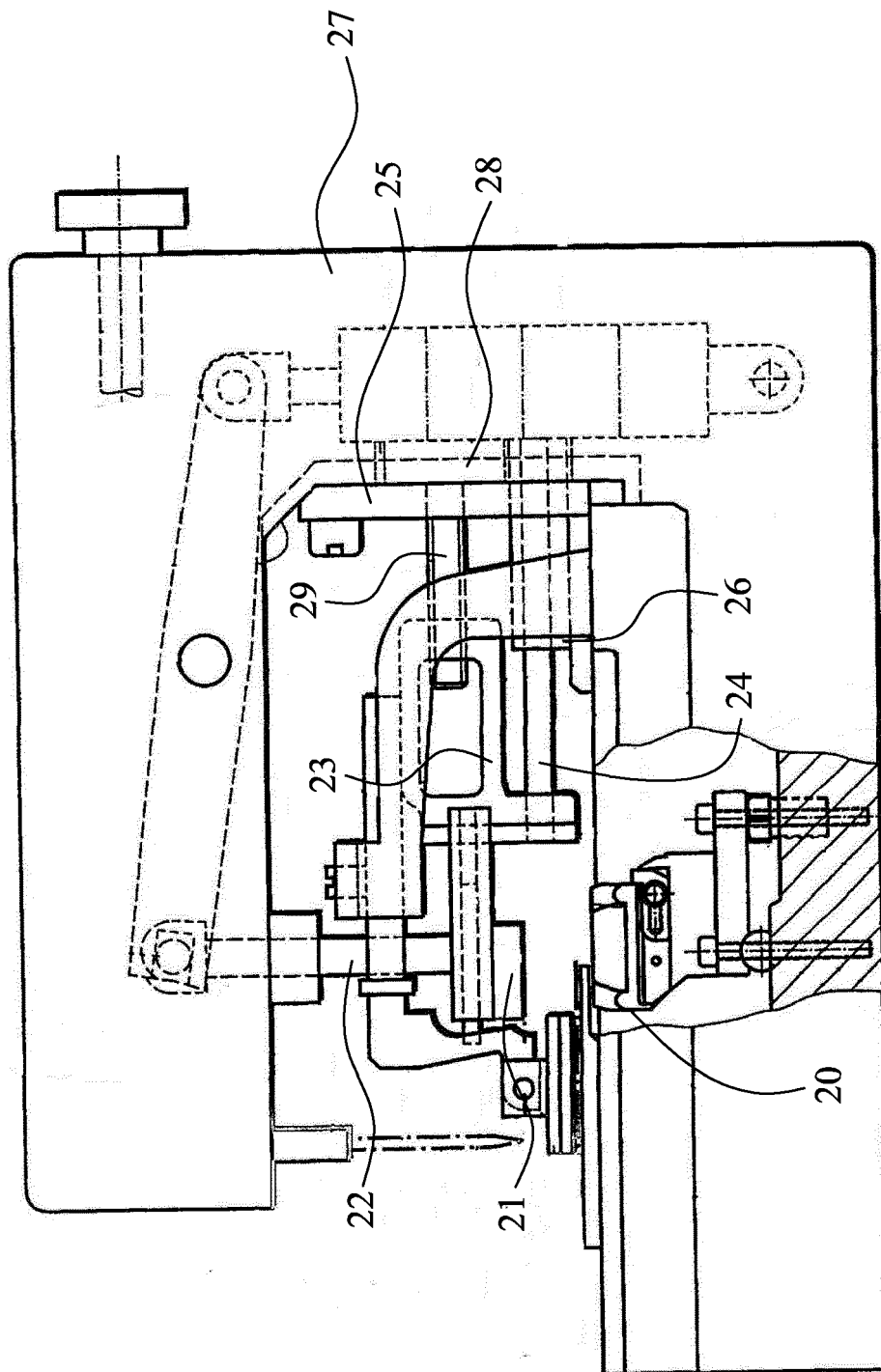


FIG. 2

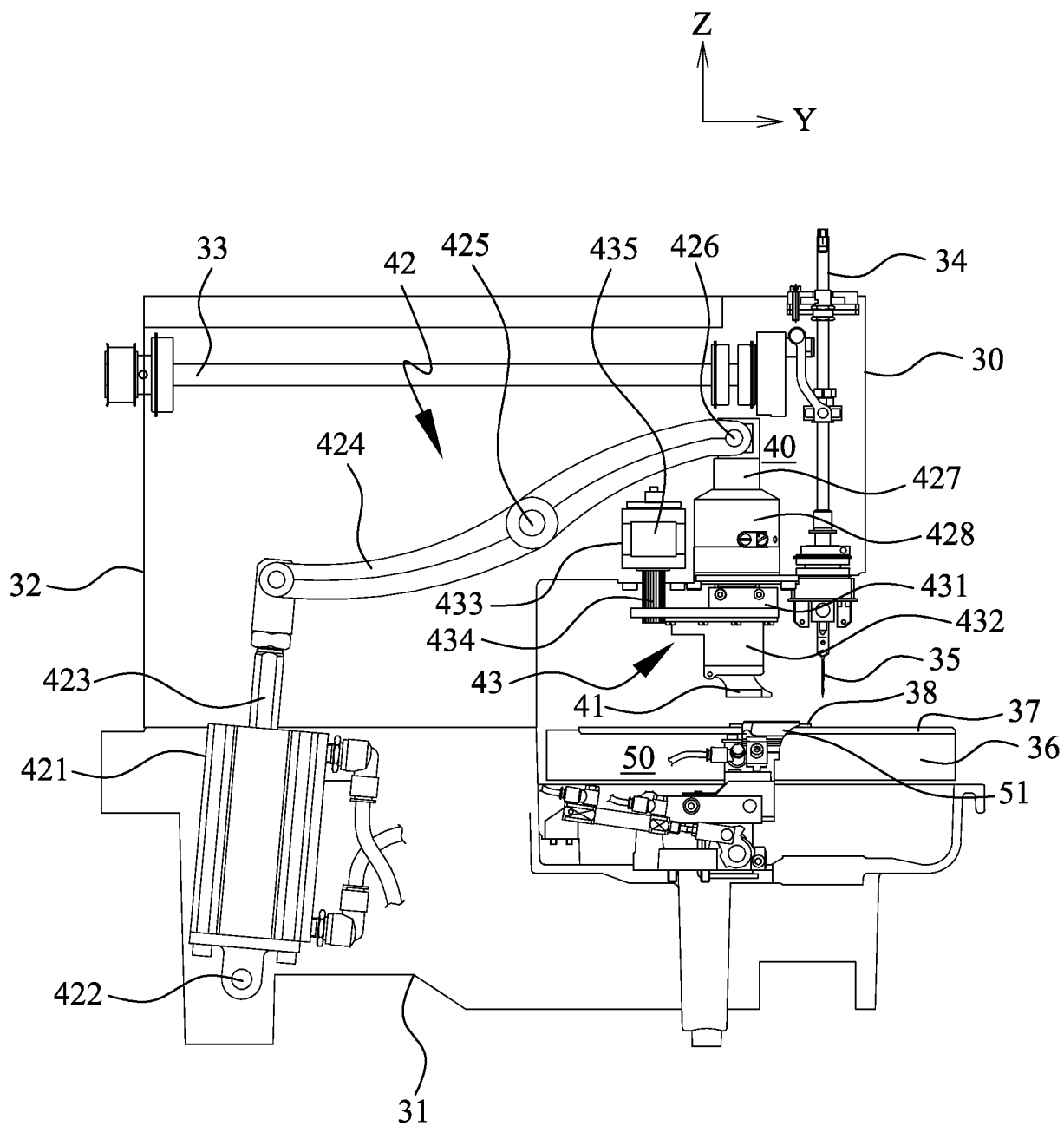


FIG. 3

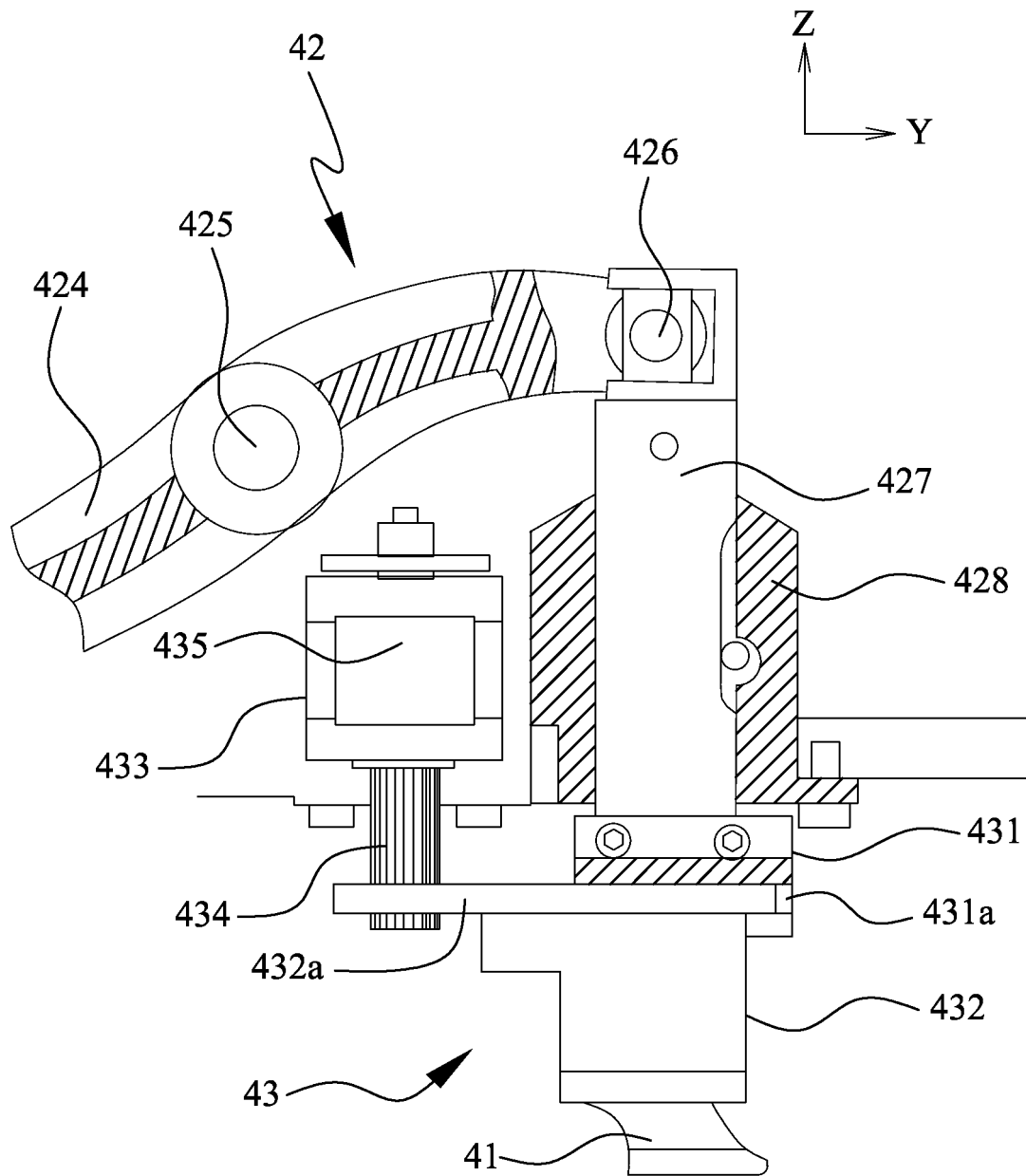


FIG. 4

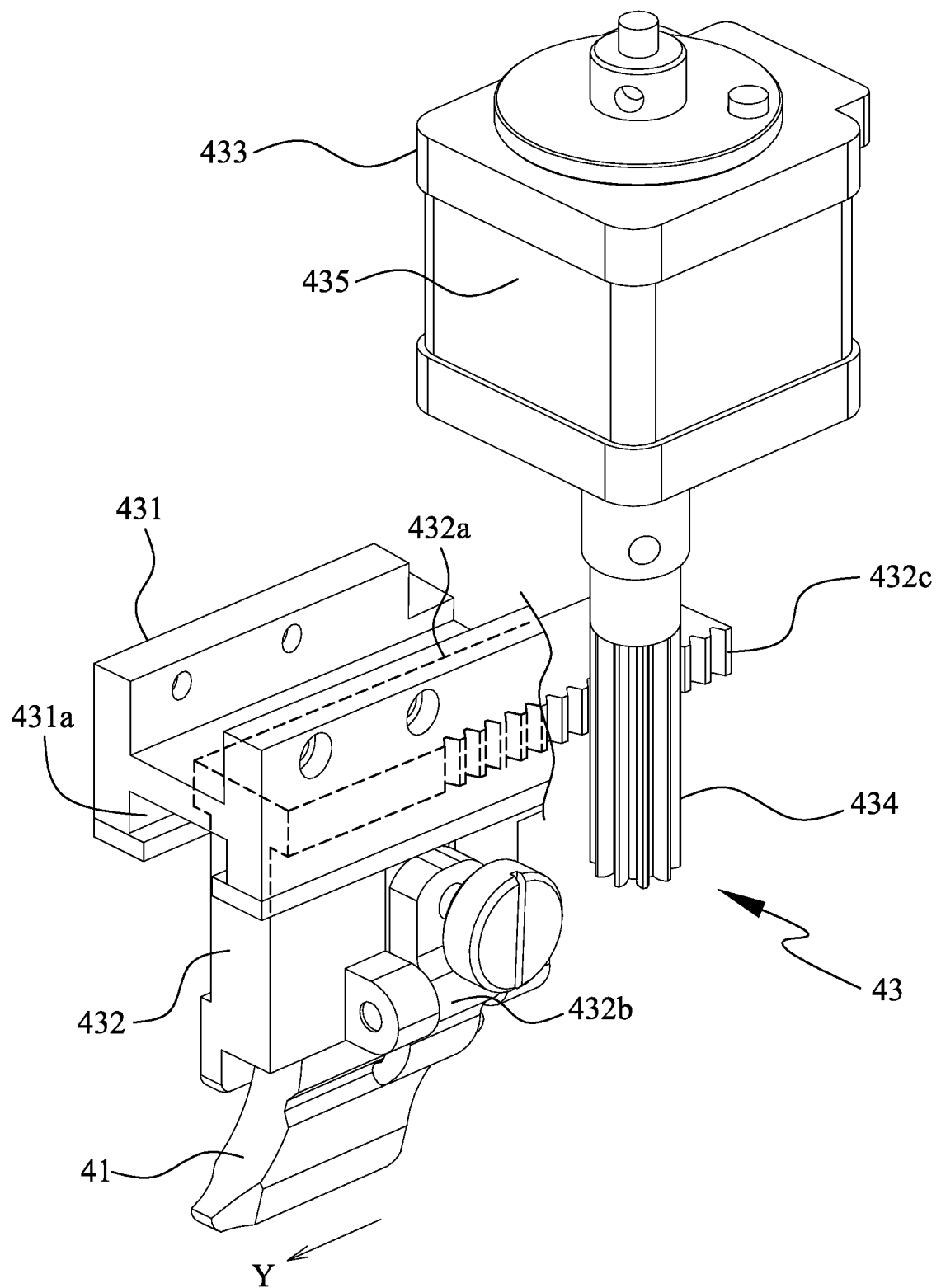


FIG. 5

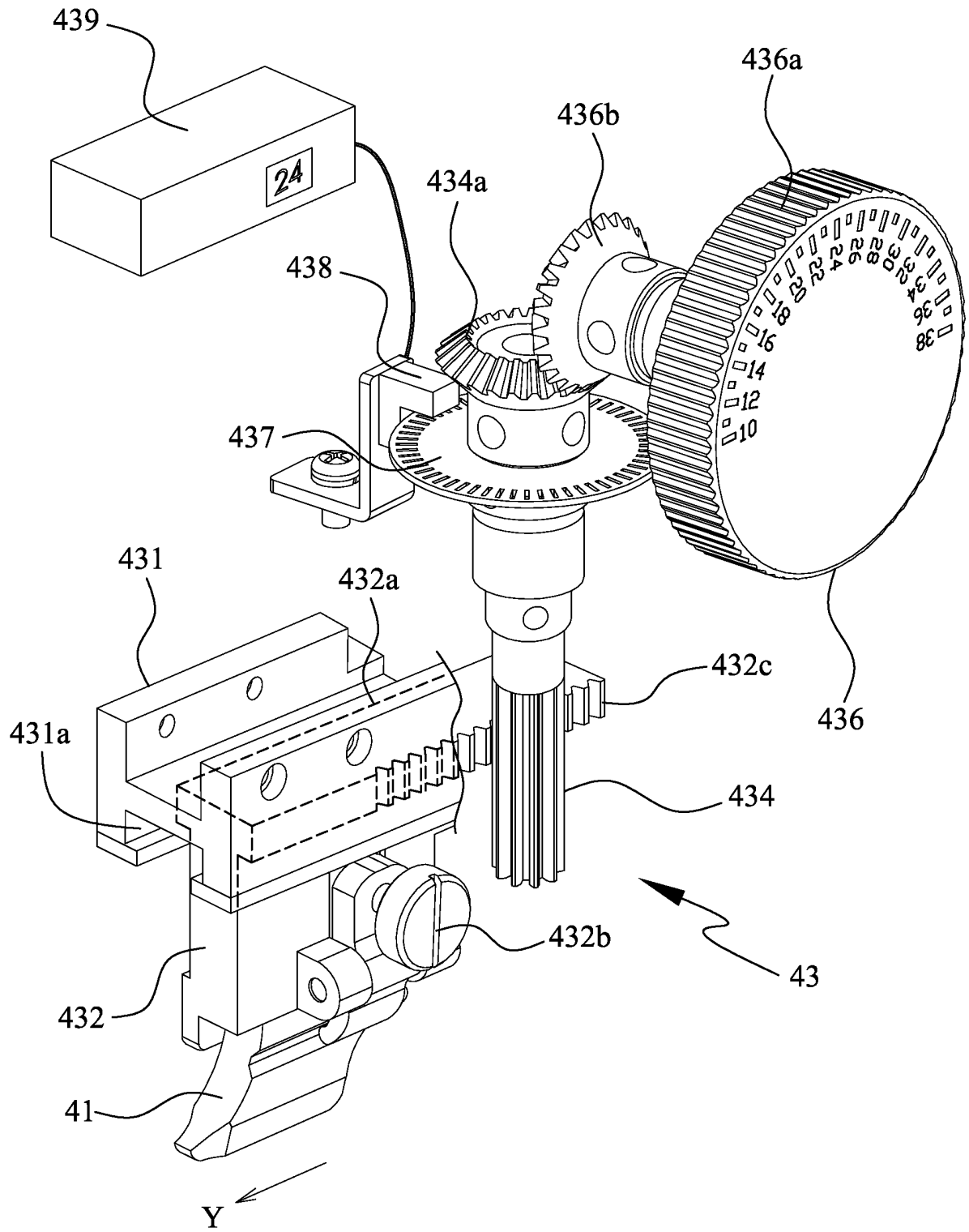


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1722021 A [0007]