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(54) **A striping apparatus of a circular knitting machine**

Ringelapparat für eine Rundstrickmaschine

Dispositif de changement en fils pour un métier à tricoter circulaire

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(73) Proprietor: **Pai Lung Machinery Mill Co., Ltd.
Taipei Hsien (TW)**

(72) Inventor: **Wei, Chih-Liang
Jui-Fang Town, Taipei Hsien (TW)**

(74) Representative: **Kewitz, Ansgar et al
2K Patentanwälte Blasberg, Kewitz & Reichel
Partnerschaft
Corneliusstrasse 18
60325 Frankfurt am Main (DE)**

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a striping apparatus of a knitting machine, particularly to a striping apparatus of a circular knitting machine.

BACKGROUND OF THE INVENTION

[0002] There are striping apparatus technologies of circular knitting machines well known to people, such as US Patent No.6655176 "Striping Apparatus For Circular Knitting Machines" and US Patent No.5070709 (corresponding to EP 0 319 444 A2) "Striping System For Circular Knitting Machine", which respectively disclose striping apparatuses feeding different yarn into the knitting needle of a knitting machine. Besides, US Patent No. 5218845 "Circular Knitting Machine Striper Control System" discloses a controller for a striping apparatus.

[0003] As shown in from Fig.1A to Fig.1D, the striper structure of the abovementioned US Patent No.5218845 comprises: yarn-changing plates 10; movable blades 11; and drive elements (not shown in the drawings), used to drive the yarn-changing plates 10 and the movable blades 11. In normal state, the yarn-changing plate 10 is at a non-enable normal position, and the movable blade 11 also withdraws back to the main body 12, and a hook 110 clips the yarn to position at the front edge 120 of the main body 12. As shown in Fig.1B, when the machine begins to feed yarns, the drive element pushes the yarn-changing plate 10, and then, the front end of the yarn-changing plate 10 extends outward. Simultaneously, the rear end 101 of the yarn-changing plate 10 touches a first pin 111 of the movable blade 11 to drive the movable blade 11 toward the left side of the Fig.1C until the yarn-changing plate 10 reaches an external yarn-feed position, and then, the hook 110 of the movable blade 11 releases a yarn Y, as shown in Fig.1C. Naturally, before the hook 110 releases the yarn Y, the yarn-changing plate 10 has transferred the yarn Y to the yarn-feed position, and a knitting needle 13 hooks the yarn Y to perform knitting operation.

[0004] Lastly, when yarn is intended to change, the yarn-changing plate 10, which has reached the external yarn-feed position beforehand, will be pulled by the drive element back to the normal position, as shown in Fig.1A. During the process that the yarn-changing plate 10 moves to the right side of Fig.1D, a nose 102 of the yarn-changing plate 10 will touch a second pin 112 of the movable blade 11 and actuate the movable blade 11 to move rightward and back to the normal position, and then, the hook 110 of the movable blade 11 will cut off the yarn Y and clip the tail of the yarn Y at the front edge 120 of the main body 12.

[0005] In general, such a striping apparatus can provide multiple different colors of yarns; for example, the four-color striping apparatus has four sets of parallel-ar-

anged yarn-changing plates 10 and movable blades 11 to change four kinds of yarns respectively, and it is the same for the six-color striping apparatus; the more the number of yarns, the greater the width of the striping apparatus. In the striping apparatus disclosed in the abovementioned US Patent No.5218845, as the movable blade 11 is driven by the yarn-changing plate 10, the time that the yarn-changing plate 10 touches the second pin 112 of the movable blade 11 is later than the time that the drive element begins pushing the yarn-changing plate 10 toward the normal position. Such a design that both the yarn-changing plate 10 and the movable blade 11 are driven by an identical drive element will bring about the delay of the time that the movable plate 11 cuts off the yarn Y. In such a design that both the yarn-changing plate 10 and the movable blade 11 are driven by an identical drive element, when an old yarn and a new yarn, e.g. a yarn 1 and a yarn 6, are spaced farther, the time difference between two actions increases because of the larger spacing therebetween, and the time of releasing the yarn Y is too late so that the yarn will be torn off when the tail of the yarn is still clipped by the movable blade 11 and a yarnlet Y1 will still remain clipped, as shown in Fig.1B; then, the yarnlet Y1 will be released and tangled with fabric; therefore, fabric quality is degraded.

[0006] EP 0 863 239 A2 discloses a yarn feeding and changing mechanism for a circular knitting machine according to the preamble of claim 1, comprising a plurality of yarn feed fingers selectively movable between operative and inoperative positions to feed yarn to the needles only when in operative position. A first rocking jack is connected to each yarn feed finger for moving the yarn feed fingers between operative and inoperative positions, and a slider member is connected to each first rocking jack. A second rocking jack is connected to each slider member and a plurality of pivotably selection members are provided for imparting rocking movement to the second rocking jacks in a predetermined pattern. The yarn feed fingers are thus moved from the operative to the inoperative position while a yarn catcher and cutter catches the yarn and cuts the yarn to form a free end which is held while the yarn feed finger is moved to the inoperative position, is in the inoperative position and is moved to the operative position by way of an extended position to present the held free end portion of the yarn to the needles for knitting into the fabric instead of being cut into waste. A separate control of the yarn feed fingers and a movable blade of the yarn feed unit is established via linked elements, whereby the jack is cam driven.

SUMMARY OF THE INVENTION

[0007] It is an object of the present invention to provide an improved striping apparatus of a circular knitting machine in order to avoid the appearance of yarnlets and improve fabric quality.

[0008] The above object is achieved by a striping apparatus of a circular knitting machine according to claim

1. Further advantageous embodiments are the subject-matter of the dependent claims.

[0009] According to the present invention, different cams are separately used to drive the yarn-changing plate and the movable blade, and even though a new yarn and an old yarn are farther spaced, the timings of the cams can be adjusted to rapidly withdraw the old yarn and cut it off and to release the tail of the new yarn from the movable blade before it is torn off. Thereby, the present invention can prevent a yarn from being torn off lest yarnlets appear, so that fabric quality can be improved.

[0010] The technical contents and preferred embodiments of the present invention are to be described below in detail in cooperation with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig.1A to Fig.1D are schematic views showing the structure of a conventional striping apparatus and the operation of the yarn-changing plate and the movable blade.

Fig.2 is a schematic view showing a preferred embodiment of the striping apparatus of the present invention.

Fig.3 is a schematic view showing a preferred embodiment of the drive unit of the present invention.

Fig.4A is a schematic view showing the first portion of the yarn-feed unit at the normal position.

Fig.4B is a schematic view showing the second portion of the yarn-feed unit at the normal holding position.

Fig.5A, Fig.5C, Fig.5E and Fig.5G are schematic views showing the sequential operational steps of the yarn-changing plate of the striping apparatus of the present invention.

Fig.5B, Fig.5D, Fig.5F and Fig.5H are schematic views showing the sequential operational steps of the movable blade of the striping apparatus of the present invention.

Fig.6 is a schematic view showing the relative positions of old yarn, new yarn and the yarn-entering point of the knitting needle when yarn is changed.

Fig.7 is a schematic view showing a preferred embodiment of the forward cam of the second cam set of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] As shown in Fig.2, according to one preferred embodiment, the striping apparatus of a circular knitting machine of the present invention comprises: a controller 20, a yarn-feed unit and a drive unit. The controller 20 is driven by a selector 30, which rotates around the knitting portion of the circular knitting machine. The selector 30

is a kind of electronic device functioning like cams and having multiple movable elements 31, which are normally non-enabling. Under the control of a control circuit or a central computer, the movable elements 31 can move to a triggering position. When the selector 30 passes nearby the controller 20, the movable elements 30 at the triggering position will actuate corresponding triggers 21 of the controller 20 to move to an enable position.

[0013] The controller 20 further comprises: triggers 21, first safety levers 22 and second safety levers 23. One end of the first safety lever 22 and one end of the second safety lever 23 are installed to a sideboard 24 with a first pivotal shaft 221. The trigger 21 has a first end 210 and a second end 211; the first end 210 of the trigger 21 has a protrudent return nose 212; the portion between the first end 210 and the second end 211 has a second pivotal shaft 213, and the triggers 21 are installed to the sideboard 24 with the second pivotal shaft 213; and the second end 211 of the triggers 21 also has a protrudent second nose 214. Refer to Fig.4A and Fig.4B. When in normal state, the trigger 21, the first safety lever 22, and the second safety lever 23 are all at a lock position; the second end 211 of the trigger 21 presses against the first safety lever 22 and the second safety lever 23. When the first end 210 of the trigger 21 is moved by an external force, it will rotate around the second pivotal shaft 213 to the enable position, and the second end 211 of the trigger 21 will slide into a notch 220 at the top side of the first lever 22 and a notch 230 at the top side of the second lever 23, which enables the first lever 22 and the second lever 23 to swing around the first pivotal shaft 221 upward to an unlock position. The entire controller 20 comprises multiple units, and each unit is formed of one trigger 21, one first safety lever 22, and one second safety lever 23; those units are parallel arranged into the entire controller 20. When in normal state, the relationship between the trigger 21 and the first safety lever 22 of the same unit is shown in Fig.4A, and the relationship between the trigger 21 and the second safety lever 23 of the same unit is shown in Fig. 4B.

[0014] The yarn-feed unit is fixedly installed in the perimeter of the circular knitting machine and comprises two portions. The first portion further comprises: yarn-changing plates 40, first connecting rods 41, and second connecting rods 42. The first portion functions to feed a yarn Y to a yarn-entering position. The second portion further comprises: movable blades 50 and a driving link 51. The second portion functions to clip the tail of the yarn Y when standby and to cut off an old yarn, so that the old yarn can be released from fabric and the operation can restore the standby state. The abovementioned controller 20 is fixedly installed above the yarn-feed unit, and the preferred embodiments of them are described below.

[0015] The yarn-changing plates 40, first connecting rods 41, and second connecting rods 42 of the first portion interconnect head to tail to form a kind of three-bar linkage. Multiple different colors of yarns Y separately pass different yarn-guiding rings 25 and then pass the through-

holes 401 at the front ends of the yam-changing plates 40. When in normal state, the first connecting rod 41 is like a seesaw, and the tail end of the first connecting rod 41 is coupled to the head end of the second connecting end 42; the upper side of the central portion of the first connecting rod 41 has a protuberance 412; the protuberance 412 contacts the bottom side of the first safety lever 22 normally; the upper side of the head end of the first connecting rod 41 has an upward forward-stroke protuberance 410, and the bottom side of the head end of the first connecting rod 41 has a downward backward-stroke protuberance 411. The tail end of the second connecting rod 42 is coupled to the tail end of the yam-changing plate 40. The second connecting rod 42 functions to transfer the pulling force of the first connecting rod 41 to the yam-changing plate 40 and transform the pulling motion of the first connecting rod 41 into a motion of another direction in order to actuate the yam-changing plate 40 to reciprocate between a normal position (shown in Fig. 4A) and an external position (shown in Fig. 5C). The first portion further comprises: a first elastic element 43 and a second elastic element 44; one end of the first elastic element 43 is fixed to the sideboard 24, and the other end supports the first connecting rod 41 from the bottom side of the head end of the first connecting rod 41. As shown in Fig. 5A, when the trigger 21 shifts to the enable position, the upward pressing force of the first elastic element 43 will push the head end of the first connecting rod 42 upward, and the first safety lever 22 will also move to the unlock position simultaneously, so that the forward-stroke protuberance 410 of the first connecting rod 41 rises above the sideboard 24 to a standby position. The second elastic element 44 supports the yam-changing plate 40 from the bottom side of the yam-changing plate 40 in order to complement the first elastic element 43 and provide elastic force for the yam-changing plate 40.

[0016] The tail end of the movable blade 50 is coupled to the tail end of the driving link 51. The upper side of the central portion of the driving link 51 has a protuberance 512, which contacts the bottom side of the second safety lever 23 normally. Both sides of the head end of the driving link 51 separately have an upward forward-stroke protuberance 510 and a downward backward-stroke protuberance 511 in order to actuate the movable blade 50 to reciprocate between a normal holding position (shown in Fig. 4B) and an external release position (shown in Fig. 5D). The second portion further comprises a third elastic element 52; one end of the third elastic element 52 is fixed to the sideboard 24, and the other end supports the driving link 51 from the bottom side near the head end of the driving link 51. When the trigger 21 shifts to the enable position (shown in Fig. 5B), the upward pushing force of the third elastic element 52 will push the head end of the driving link 51 upward, and the second safety lever 23 will also be moved to the unlock position simultaneously, so that the forward-stroke protuberance 510 of the driving link 51 rises above the sideboard 24 to the standby position ready for being pushed out.

[0017] The drive unit further comprises: a first cam set 60, a second cam set 70, and return cams 80, and as shown in Fig. 3, all of them together with the selector 30 are installed to a mount board 90 and rotate around the knitting portion of the circular knitting machine synchronously. The first, second cam sets 60, 70 respectively have forward cams 61, 71 and backward cams 62, 72. The forward cam 61 of the first cam set 60 is responsible for pushing the yam-changing plate 40 to the external position; the forward cam 71 of the second cam set 70 is responsible for pushing the movable blade 50 to the external release position; the backward cam 62 of the first cam set 60 is responsible for pulling the yam-changing plate 40 back to the normal non-enable position; the backward cam 72 of the second cam set 70 is responsible for pulling the movable blade 50 for clipping/cutting yarns back to the normal holding position. When in the holding position, a hook 502 at the front end of the movable blade 50 will clip the tail of the yam Y to position it between the hook 502 and the sideboard 24.

[0018] The practical operation is to be described below in cooperation with from Fig. 5A to Fig. 5H.

[0019] Firstly, as shown in Fig. 5A, the control circuit or the central computer controls a movable element 31 of the selector 30 to move to a triggering position. When the selector 30 passes nearby the controller 20, the movable element 31, which has reached the triggering position, will trigger the second nose 214 of the corresponding trigger 21. The second noses 214 of the triggers 21 are respectively at different heights; therefore, different movable elements 31 of the selector 30 can be used to trigger different second noses 214 of the corresponding triggers 21 separately, so that the corresponding triggers 21 move to the enable positions, and then, the first safety levers 22 move to the unlock positions, so that the forward-stroke protuberance 410 of the first connecting rod 41 rises above the sideboard 24 to the standby position ready for being pushed in. Simultaneously, as shown in Fig. 5B, the forward-stroke protuberance 510 also rises above the sideboard 24 to the standby position ready for being pushed out.

[0020] Next, as shown in Fig. 5C, the drive unit moves to the yarn-feed unit, and a first inclined plane 610 of the forward cam 61 of the first cam set 60 touches the forward-stroke protuberance 410 of the first connecting rod 41 to actuate the first connecting rod 41 and the second connecting rod 42 to push the yam-changing plate 40 to the external position. Further, as shown in Fig. 5D, a first inclined plane 710 of the forward cam 71 of the second cam set 70 touches the forward-stroke protuberance 510 of the driving link 51 to actuate the movable blade 50 to the external release position.

[0021] As shown in Fig. 5E, the return cam 80 moves to the controller 20 again, and the front inclined plane 801 of the return cam 80 gradually closes to the return nose 212 of the trigger 21, and the rear plane 802 of the return cam 80 pushes the trigger 21 to the normal lock position to actuate the backward-stroke protuberance

411 of the first connecting rod 41 to emerge from below the sideboard 24. Simultaneously, as shown in Fig.5F, the backward-stroke protuberance 511 of the driving link 51 also emerges from below the sideboard 24.

[0022] Lastly, as shown in Fig.5G, the drive unit moves to the yarn-feed unit again, and the first inclined plane 620 of the backward cam 62 of the first cam set 60 touches the backward-stroke protuberance 411 of the first connecting rod 41 to actuate the first connecting rod 41 and the second connecting rod 42 to pull the yarn-changing plate 40 back to the normal non-enable position. Further, as shown in Fig.5H, the first inclined plane 720 of the backward cam 72 of the second cam set 70 also touches the backward-stroke protuberance 511 of the driving link 51 to actuate the driving link 51 to pull the movable blade 50 back to the normal holding position; at this time, the hook 502 at the front end of the movable blade 50 for clipping/cutting yarns will not only clip the tail of the yarn Y to position it between the hook 502 and the sideboard 24 but also will cut off the yarn Y

[0023] The time difference between the action of the backward cam 62 of the first cam set 60 and the action of the backward cam 72 of the second cam set 70, i.e. the time difference between that the first inclined plane 620 touches the backward-stroke protuberance 411 and that the first inclined plane 720 touches the backward-stroke protuberance 511, can be adjusted according to demand. A practical method is installing the backward cams 62, 72 separately at cam seats 63, 64; such a design can make an old yarn be quickly withdrawn and cut off when striping (changing a yarn) and make the tail of a new yarn be released from the movable blade 50 before the new yarn is torn off lest the yarn be torn off and yarnlets appear; thereby, fabric quality can be improved.

[0024] A preferred embodiment of the forward cam 71 of the second cam set 70 shown in Fig.3 is a two-stage cam, which further comprises: a static cam 73 and a movable cam 74, wherein the first inclined plane 710 is positioned at the front end of the static cam 73, and the movable cam 74 further has a second inclined plane 730. The static cam 73 and the movable cam 74 are separately positioned at different heights. The movable cam 74 is fixed to the forward cam 71 with a screw 741, and after the screw 741 is loosened, the relative position of the movable cam 74 and the static cam 73 can be adjusted. The abovementioned forward-stroke protuberances of the multiple driving links of the yarn-feed unit are also divided into two kinds of forward-stroke protuberances 510, 510a, and the forward-stroke protuberance 510 can be pushed by the first inclined plane 710 of the static cam 73, and the forward-stroke protuberance 510a can be pushed by the second inclined plane 730 of the movable cam 74.

[0025] Refer to Fig.6, wherein the present invention is exemplified by a six-color striping apparatus. Suppose that the old yarn is the yarn 6 and the new yarn is the yarn 1 herein; when the knitting needle moves to the yarn-entering point shown in Fig.6, the movable cam 74 can

be moved forward to advance the timing that the second inclined plane 730 touches the lower one of the forward-stroke protuberance 510a from time t1 to time t2 shown in Fig.7 lest the old yarn be released by the movable blade 50 too late and the old yarn be torn off.

Claims

1. A striping apparatus of a circular knitting machine, comprising: a controller (20), a yarn-feed unit, and a drive unit, wherein
 - said controller (20) is driven by a selector (30) that rotates around the knitting portion of said circular knitting machine;
 - said yarn-feed unit has a first portion and a second portion; said first portion comprising a yarn-changing plate (40), a first connecting rod (41) and a second connecting rod (42), and being used to feed a yarn (Y) to a yarn-entering position; and said second portion comprising a movable blade (50) and a driving link (51), and being used to clip the tail end of the yarn (Y) in a standby state and to cut off an old yarn when changing a yarn in order to release said old yarn from fabric and restore said standby state; and said drive unit and said selector (30) rotate around the knitting portion of said circular knitting machine, said drive unit comprising a first cam set (60) and a second cam set (70), said first cam set (60) and said second cam set (70) further respectively comprising forward cams (61, 71) and backward cams (62, 72); wherein
 - said forward cam (61) of said first cam set (60) is responsible for pushing said yarn-changing plate (40) to an external position;
 - said forward cam (71) of said second cam set (70) is responsible for pushing said movable blade (50) to an external release position;
 - said backward cam (62) of said first cam set (60) is responsible for pulling said yarn-changing plate (40) back to a normal position; and
 - said backward cam (72) of said second cam set (70) is responsible for pulling said movable blade (50) back to a normal holding position;
 - wherein said yarn-changing plate (40) and said movable blade (50) are separately actuated by said first cam set (60) and said second cam set (70);
 - characterized in that** both sides of the head end of said first connecting rod (41) respectively have an upward forward-stroke protuberance (410) and a downward backward-stroke protuberance (411);
 - said forward-stroke protuberance (410) is actuated by said forward cam (61) of said first cam set (60), and said backward-stroke protuberance (411) is actuated by said backward cam (62) of said first cam set (60); and
 - the tail end of said second connecting rod (42) is coupled to the tail end of said yarn-changing plate

(40) in order to actuate said yarn-changing plate (40) to reciprocate between said normal position and said external position.

2. The striping apparatus according to claim 1, wherein the tail end of said movable blade (50) of said second portion is coupled to the tail end of said driving link (51); both sides of the head end of said driving link (51) respectively have an upward forward-stroke protuberance (510) and a downward backward-stroke protuberance (511); said forward-stroke protuberance (510) is actuated by said forward cam (71) of said second cam set (70), and said backward-stroke protuberance (511) is actuated by said backward cam (72) of said second cam set (70); thereby, said movable blade (50) is actuated to reciprocate between said normal holding position and said external release position.
3. The striping apparatus according to claim 2, wherein said forward cam (71) of said second cam set (70) further comprises: a static cam (73) and a movable cam (74); a first inclined plane (710) is positioned at the front end of said static cam (73), and said movable cam (74) further has a second inclined plane (730); said static cam (73) and said movable cam (74) are separately positioned at different heights; said forward-stroke protuberances (510) of multiple said driving links (51) of said yarn-feed mit have two kinds of forward-stroke protuberances (510, 510a) at different heights; the higher one of said forward-stroke protuberances (510, 510a) is pushed by said first inclined plane (710) of said static cam (73), and the lower one of said forward-stroke protuberances (510, 510a) is pushed by said second inclined plane (730) of said movable cam (74).
4. The striping apparatus according to claim 3, wherein said movable cam (74) is fixed to said forward cam (71) with a screw (741), and after said screw (741) is released, the relative position of said movable cam (74) and said static cam (73) can be adjusted.

Patentansprüche

1. Ringel- bzw. Abstreifvorrichtung einer Rundstrickmaschine, umfassend:

eine Steuereinrichtung (20), eine Garn-Zuführeinheit und eine Antriebseinheit, wobei die Steuereinrichtung (20) von einer Auswahl-einrichtung (30) angetrieben wird, die sich um den Strickabschnitt der Rundstrickmaschine dreht;
die Garn-Zuführeinheit einen ersten Abschnitt und einen zweiten Abschnitt aufweist; wobei der erste Abschnitt eine Garn-Wechselplatte (40),

eine erste Verbindungsstange (41) und eine zweite Verbindungsstange (42) aufweist und zum Zuführen eines Garns (Y) zu einer Garn-Eintrittsposition verwendet wird; und wobei der zweite Abschnitt eine bewegliche Klinge (50) und eine Antriebskulisie (51) aufweist und dazu eingesetzt wird, um das hintere Ende des Garns (Y) in einem Bereitschaftszustand zu klemmen und um ein altes bzw. verbrauchtes Garn abzutrennen, wenn das Garn gewechselt wird, um das alte Garn von dem Gewirk freizugeben und den Bereitschaftszustand wieder einzunehmen; und

die Antriebseinheit und die Auswahl-einrichtung (30) sich um den Strickabschnitt der Rundstrickmaschine drehen, wobei die Antriebseinheit eine erste Nockenkörpergruppe (60) und eine zweite Nockenkörpergruppe (70) aufweist, wobei die erste Nockenkörpergruppe (60) und die zweite Nockenkörpergruppe (70) jeweils Vorschub-Nockenkörper (61, 71) und Rückschub-Nockenkörper (62, 72) aufweisen, wobei der Vorschub-Nockenkörper (61) der ersten Nockenkörpergruppe (60) dafür zuständig ist, um die Garn-Wechselplatte (40) zu einer äußeren Position zu schieben; der Rückschub-Nockenkörper (71) der zweiten Nockenkörpergruppe (70) dafür zuständig ist, um die bewegliche Klinge (50) zu einer externen Freigabestellung zu schieben; der Rückschub-Nockenkörper (62) der ersten Nockenkörpergruppe (60) dafür zuständig ist, um die Garn-Wechselplatte (40) zurück zu einer Ausgangsstellung zu ziehen; und der Rückschub-Nockenkörper (72) der zweiten Nockenkörpergruppe (70) dafür zuständig ist, um die bewegliche Klinge (50) zurück zu einer normalen Haltestellung zu ziehen; wobei die Garn-Wechselplatte (40) und die bewegliche Klinge (50) jeweils von der ersten Nockenkörpergruppe (60) bzw. der zweiten Nockenkörpergruppe (70) betätigt wird;

dadurch gekennzeichnet, dass beide Seiten des vorderen Endes bzw. der Stirnseite der ersten Verbindungsstange (41) jeweils einen aufwärts gerichteten Vorschubtakt-Vorsprung (410) und einen abwärts gerichteten Rückschubtakt-Vorsprung (411) aufweisen; wobei der Vorschubtakt-Vorsprung (410) durch den Vorschub-Nockenkörper (61) der ersten Nockenkörpergruppe (60) betätigt wird und der Rückschubtakt-Vorsprung (411) durch den Rückschub-Nockenkörper (62) der ersten Nockenkörpergruppe (60) betätigt wird und das hintere Ende der zweiten Verbindungsstange (42) mit dem hinteren Ende der Garn-Wechselplatte (40) gekoppelt ist, um die Garn-Wechselplatte (40) zu betätigen, sodass diese sich zwischen

der Ausgangsstellung und der externen Stellung hin- und her bewegt.

2. Ringel- bzw. Abstreifvorrichtung nach Anspruch 1, wobei das hintere Ende der beweglichen Klinge (50) des zweiten Abschnittes mit dem hinteren Ende der Antriebskulisse (51) gekoppelt ist; beide Seiten des vorderen Endes bzw. der Stirnseite der Antriebskulisse (51) jeweils einen aufwärts gerichteten Vorschubtakt-Vorsprung (510) und einen abwärts gerichteten Rückschubtakt-Vorsprung (511) aufweisen; der Vorschubtakt-Vorsprung (510) durch den Vorschub-Nockenkörper (71) der zweiten Nockenkörpergruppe (70) betätigt wird und der Rückschubtakt-Vorsprung (511) durch den Rückschub-Nockenkörper (72) der zweiten Nockenkörpergruppe (70) betätigt wird; sodass die bewegliche Klinge (50) betätigt wird und zwischen der normalen Haltestellung und der externen Freigabestellung hin- und her bewegt wird.
3. Ringel- bzw. Abstreifvorrichtung nach Anspruch 2, wobei der Vorschub-Nockenkörper (71) der zweiten Nockenkörpergruppe (70) außerdem umfasst: einen ortsfesten Nockenkörper (73) und einen beweglichen Nockenkörper (74); wobei sich eine erste schräge Ebene (710) am vorderen Ende des ortsfesten Nockenkörpers (73) befindet und der bewegliche Nockenkörper (74) außerdem eine zweite schräge Ebene (730) aufweist; wobei der ortsfeste Nockenkörper (73) und der bewegliche Nockenkörper (74) getrennt zueinander auf unterschiedlichen Höhen positioniert sind; wobei die Vorschubtakt-Vorsprünge (410) von mehreren Antriebskulissen (51) der Garn-Zuführeinheit zwei Arten von Vorschubtakt-Vorsprüngen (510, 510a) auf unterschiedlichen Höhen aufweisen; wobei der höhere der Vorschubtakt-Vorsprünge (510, 510a) von der ersten schrägen Ebene (710) des ortsfesten Nockenkörpers (73) vorgeschoben wird und wobei der untere der Vorschubtakt-Vorsprünge (510, 510a) von der zweiten schrägen Ebene (730) des beweglichen Nockenkörpers (74) vorgeschoben wird.
4. Ringel- bzw. Abstreifvorrichtung nach Anspruch 3, wobei der bewegliche Nockenkörper (74) mittels einer Schraube (741) an dem Vorschub-Nockenkörper (71) befestigt ist und wobei nach Lösen der Schraube (741) die Relativstellung zwischen dem beweglichen Nockenkörper (74) und dem ortsfesten Nockenkörper (73) eingestellt werden kann.

Revendications

1. Dispositif de changement de fils pour métier à tricoter circulaire, comprenant : un contrôleur (20), une unité de fourniture de fil et une unité d'entraînement, dans

lequel

ledit contrôleur (20) est entraîné par un sélecteur (30) qui tourne autour de la partie de tricotage dudit métier à tricoter circulaire ;

ladite unité de fourniture de fil possède une première partie et une seconde partie ; ladite première partie comprenant une plaque de changement de fils (40), une première bielle de liaison (41) et une seconde bielle de liaison (42) et étant utilisée pour fournir un fil (Y) à une position d'entrée de fil ; et ladite seconde partie comprenant une lame mobile (50) est une liaison d'entraînement (51), et étant utilisée pour pincer l'extrémité de queue du fil (Y) dans un état d'attente et pour couper un ancien fil lors du changement de fil afin de libérer ledit ancien fil du tissu et de rétablir ledit état d'attente ; et

ladite unité d'entraînement et ledit sélecteur (30) tournent autour de la partie de tricotage dudit métier à tricoter circulaire, ladite unité d'entraînement comprenant un premier jeu de cames (60) et un second jeu de cames (70), ledit premier jeu de cames (60) et ledit second jeu de cames (70) comprenant en outre respectivement des cames avant (61, 71) et des cames arrière (62, 72) ; dans lequel

ladite came avant (61) dudit premier jeu de cames (60) a pour charge de pousser ladite plaque de changement de fils (40) vers une position externe ;

ladite came avant (71) dudit second jeu de cames (70) a pour charge de pousser ladite lame mobile (50) vers une position de sortie externe ;

ladite came arrière (61) dudit premier jeu de cames (60) a pour charge de tirer à nouveau ladite plaque de changement de fils (40) vers une position normale ; et ladite came arrière (72) dudit second jeu de cames (70) a pour charge de tirer à nouveau ladite lame mobile (50) vers une position de maintien normale ;

dans lequel ladite plaque de changement de fils (40) et ladite lame mobile (50) sont actionnées séparément par ledit premier jeu de cames (60) et ledit second jeu de cames (70) ;

caractérisé en ce que les deux côtés de l'extrémité de tête de ladite première bielle de liaison (41) ont respectivement une protubérance à course avant ascendante (410) et une protubérance à course arrière descendante (411) ;

ladite protubérance à course avant (410) est actionnée par ladite came avant (61) dudit premier jeu de cames (60) et ladite protubérance à course arrière (411) est actionnée par ladite came arrière (62) dudit premier jeu de cames (60) ; et

l'extrémité de queue de ladite seconde bielle de liaison (42) est couplée à l'extrémité de queue de ladite plaque de changement de fils (40) afin d'actionner ladite plaque de changement de fils (40) pour effectuer un mouvement de va-et-vient entre ladite position normale et ladite position externe.

2. Dispositif de changement de fils selon la revendication 1, dans lequel l'extrémité de queue de ladite lame mobile (50) de ladite seconde partie est couplée à l'extrémité de queue de ladite liaison d'entraînement (51) ; les deux côtés de l'extrémité de tête de ladite liaison d'entraînement (51) ont respectivement une protubérance à course avant ascendante (510) et une protubérance à course arrière descendante (511) ; ladite protubérance à course avant (510) est actionnée par ladite came avant (71) dudit second jeu de cames (70) et ladite protubérance à course arrière (511) est actionnée par ladite came arrière (72) dudit second jeu de cames (70) ; ainsi, ladite lame mobile (50) est actionnée pour effectuer un mouvement de va-et-vient entre ladite position de maintien normale et ladite position de sortie externe.
3. Dispositif de changement de fils selon la revendication 2, dans lequel ladite came avant (71) dudit second jeu de cames (70) comprend en outre : une came statique (73) et une came mobile (74) ; un premier plan incliné (710) est positionné à l'extrémité avant de ladite came statique (73) et ladite came mobile (74) possède en outre un second plan incliné (730) ; ladite came statique (73) et ladite came mobile (74) sont positionnées séparément à différentes hauteurs ; lesdites protubérances à course avant (510) desdites liaisons d'entraînement multiples (51) de ladite unité de fourniture de fil possèdent deux sortes de protubérances à course avant (510, 510a) à différentes hauteurs ; la plus haute desdites protubérances à course avant (510, 510a) est poussée par ledit premier plan incliné (710) de ladite came statique (73) et la plus basse desdites protubérances à course avant (510, 510a) est poussée par ledit second plan incliné (730) de ladite came mobile (74).
4. Dispositif de changement de fils selon la revendication 3, dans lequel ladite came mobile (74) est fixée sur ladite came avant (71) avec une vis (741) et une fois que ladite vis (741) est retirée, la position relative de ladite came mobile (74) et de ladite came statique (73) peut être ajustée.

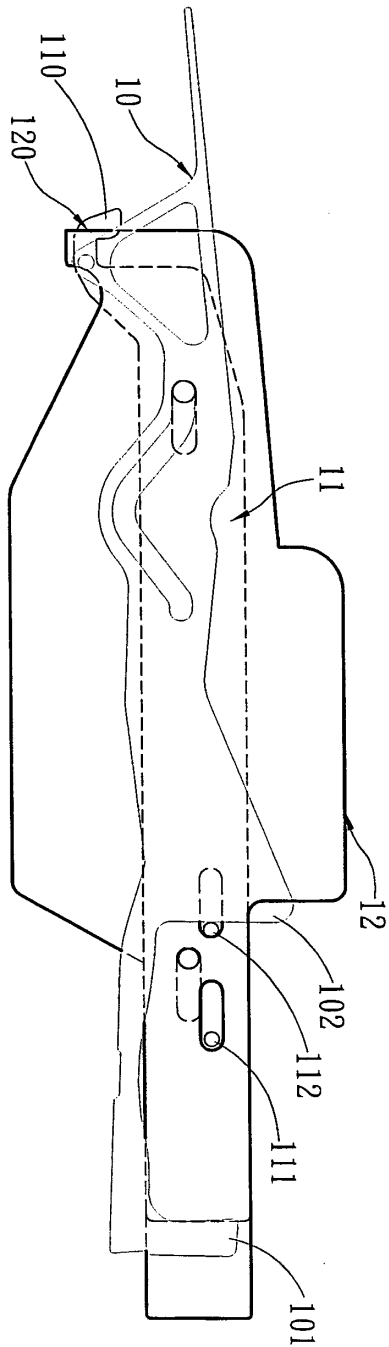


Fig. 1A PRIOR ART

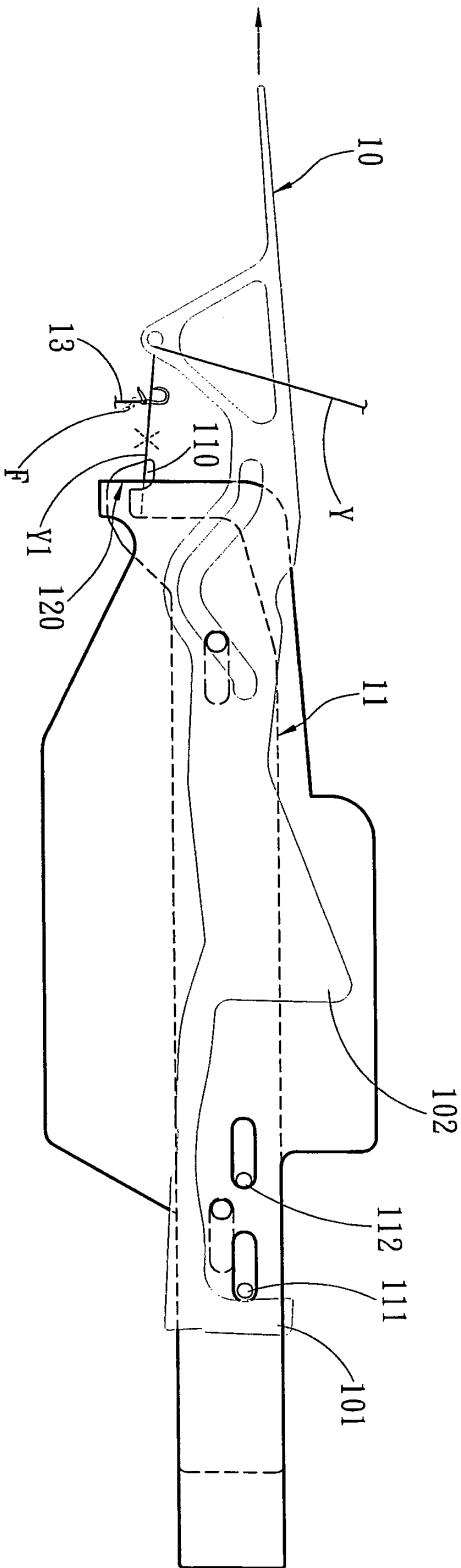


Fig. 1B PRIOR ART

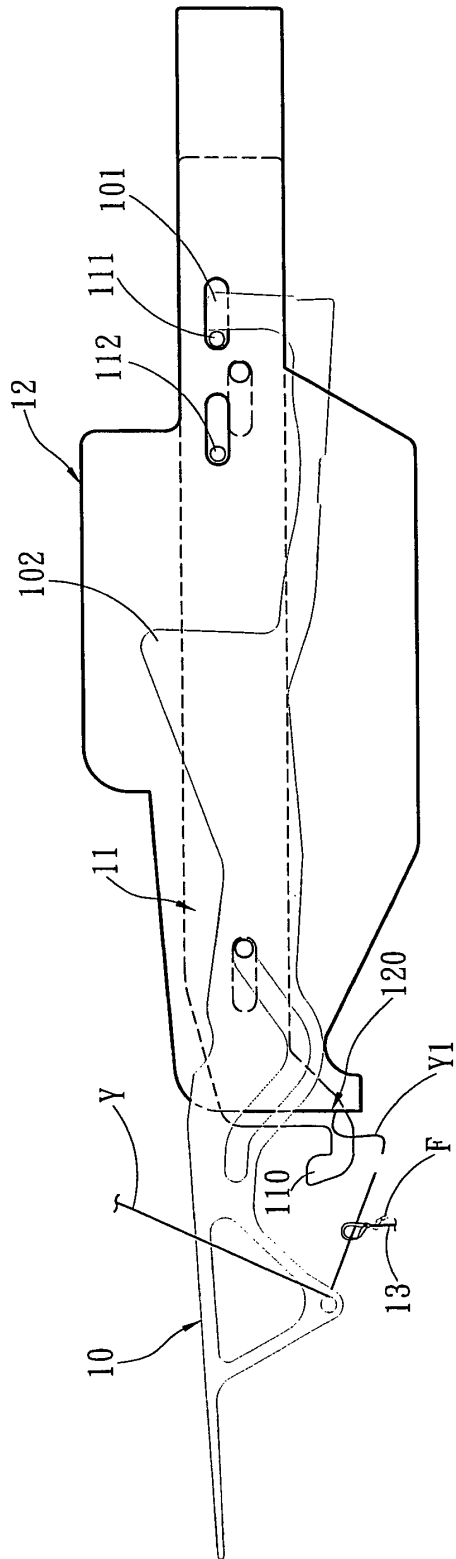


Fig. 1C PRIOR ART

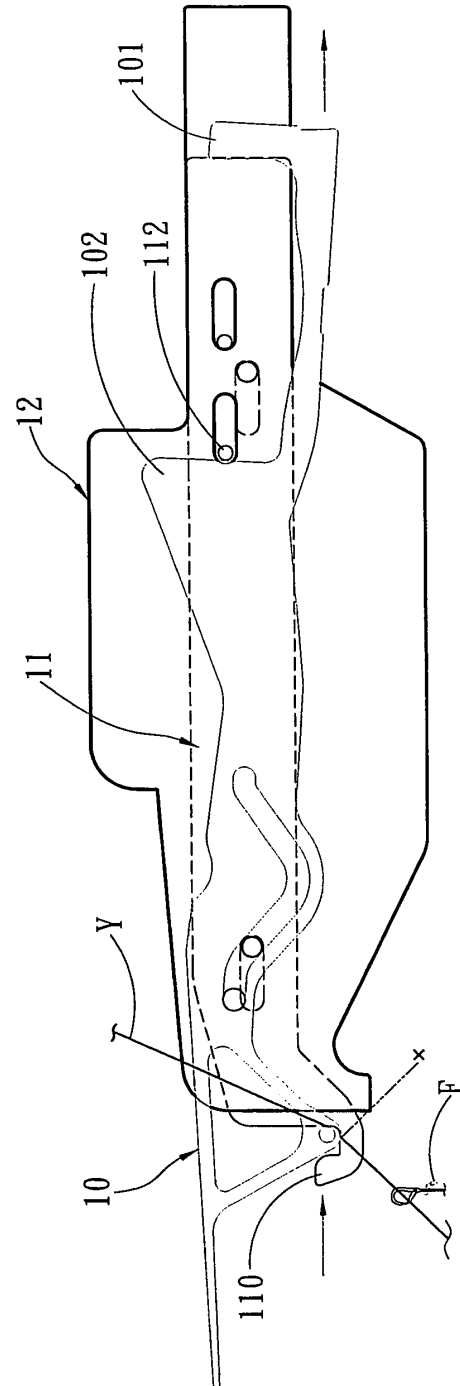


Fig. 1D PRIOR ART

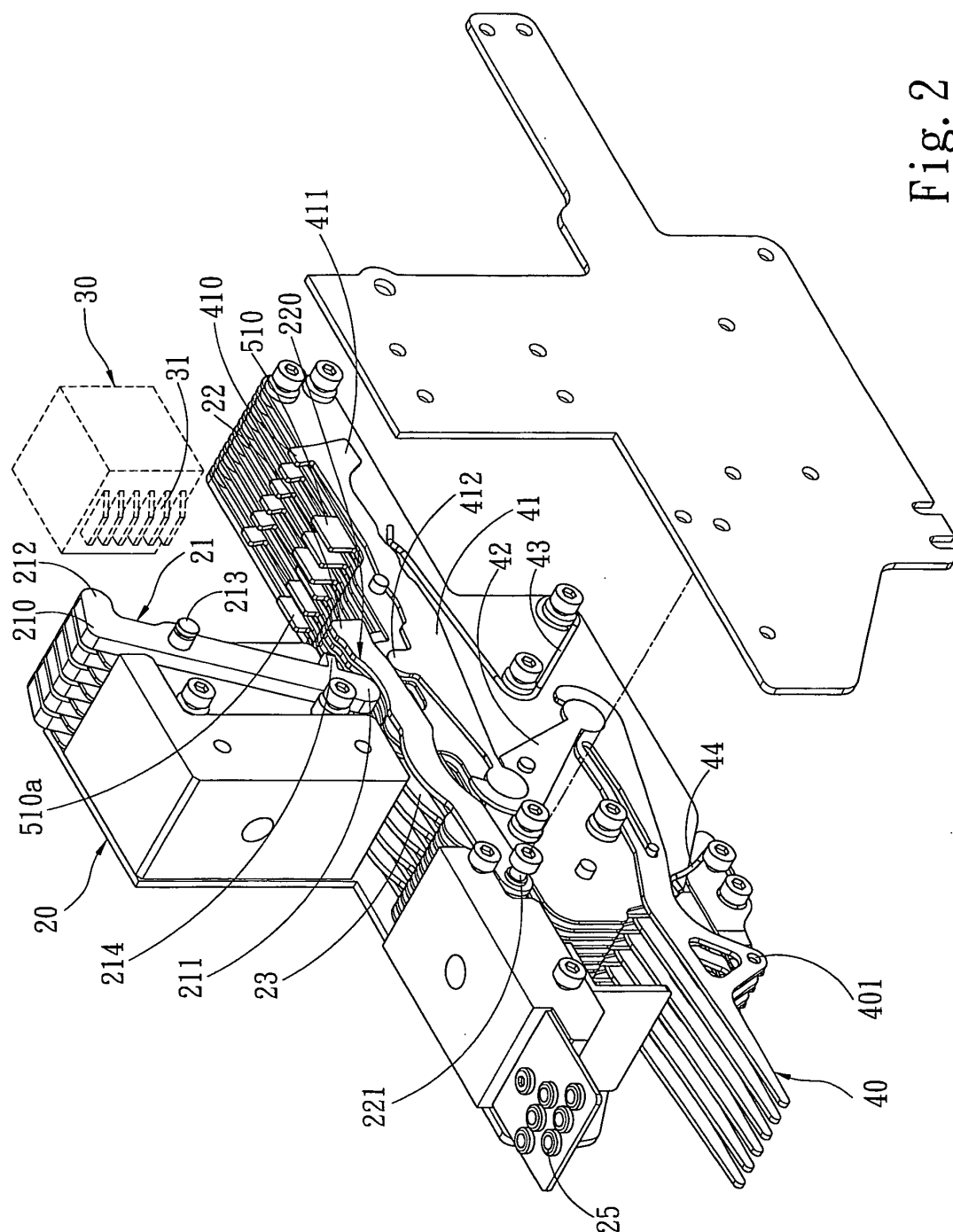
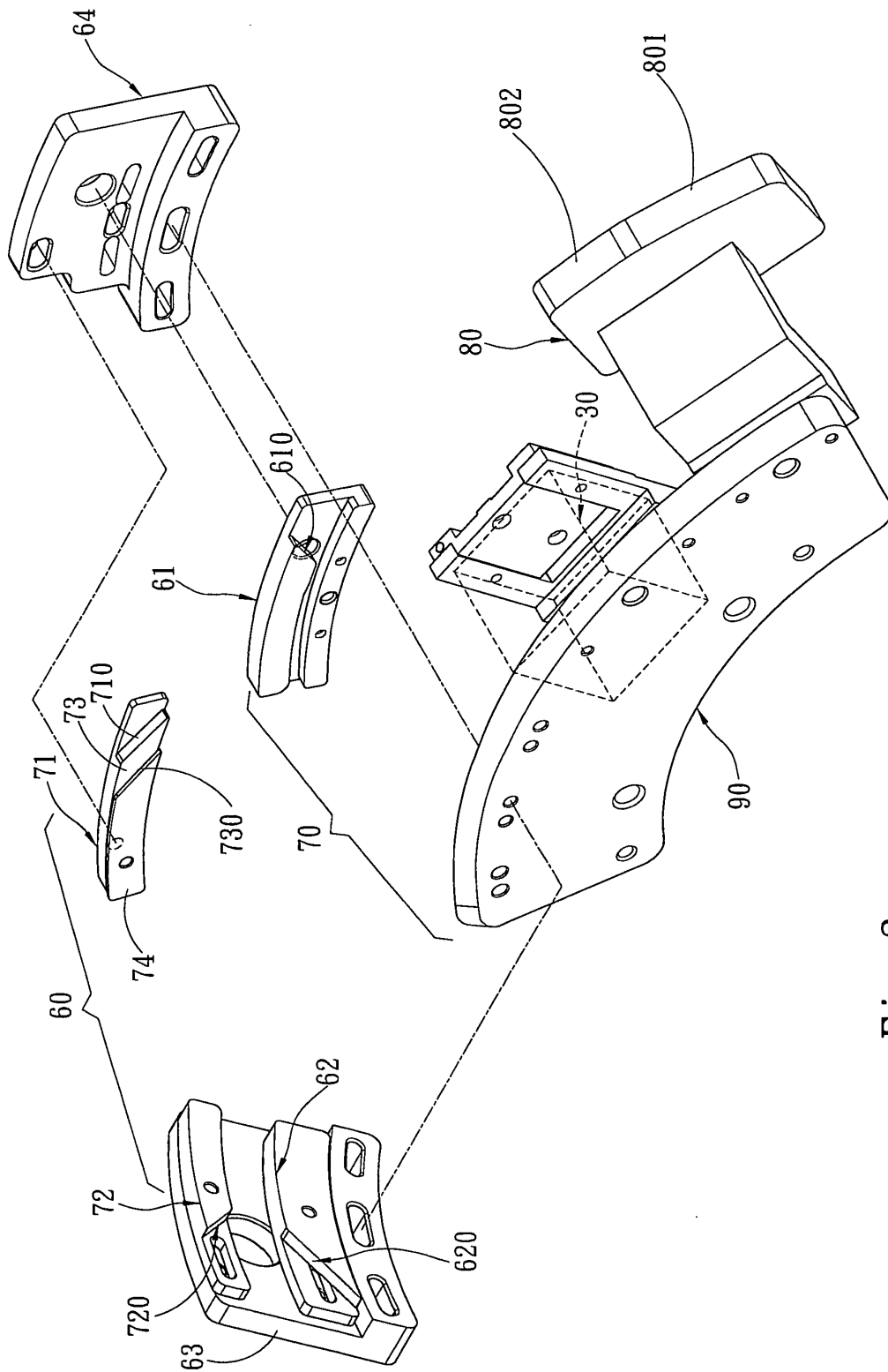


Fig. 2



Fi-
r-
3

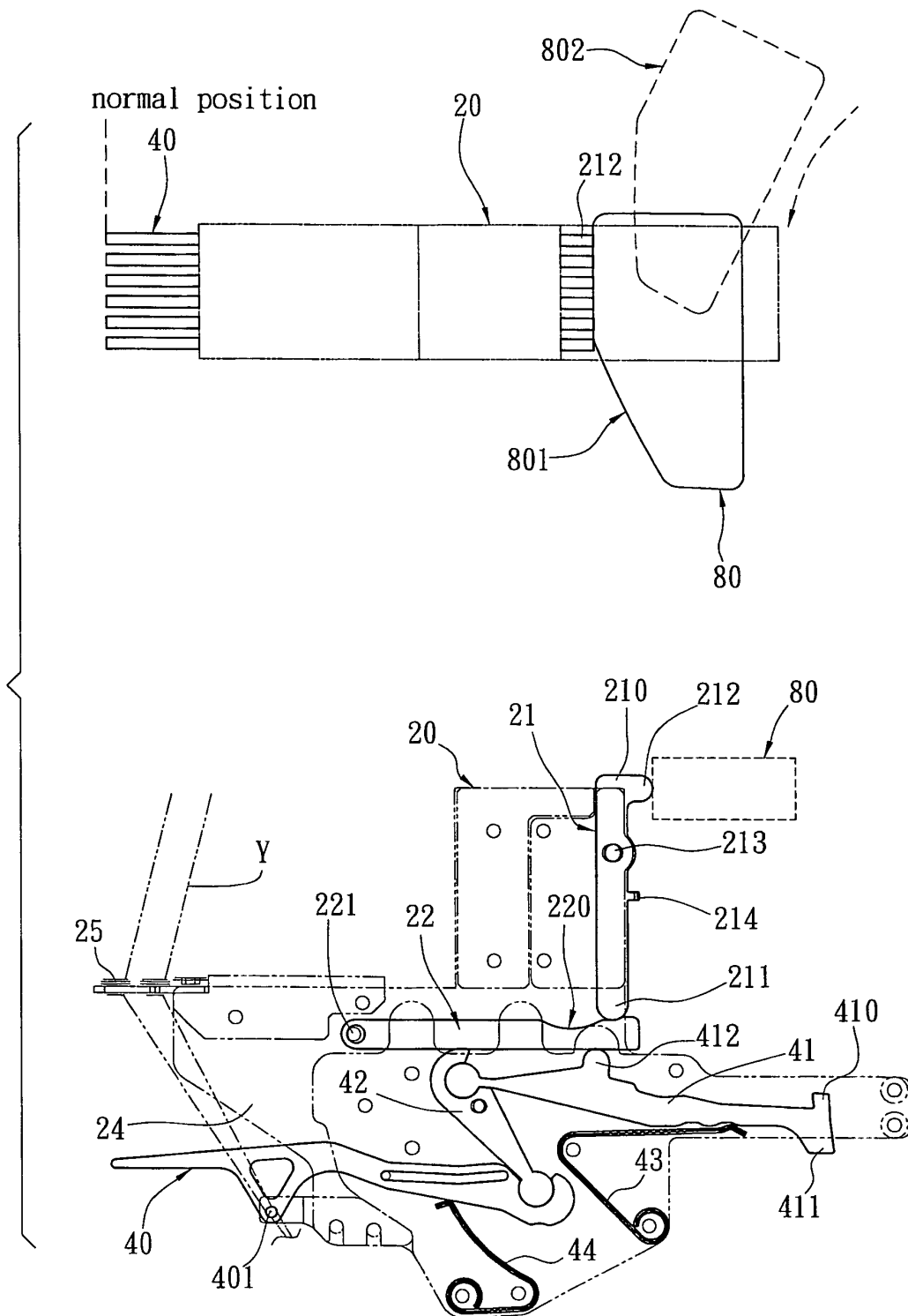


Fig. 4A

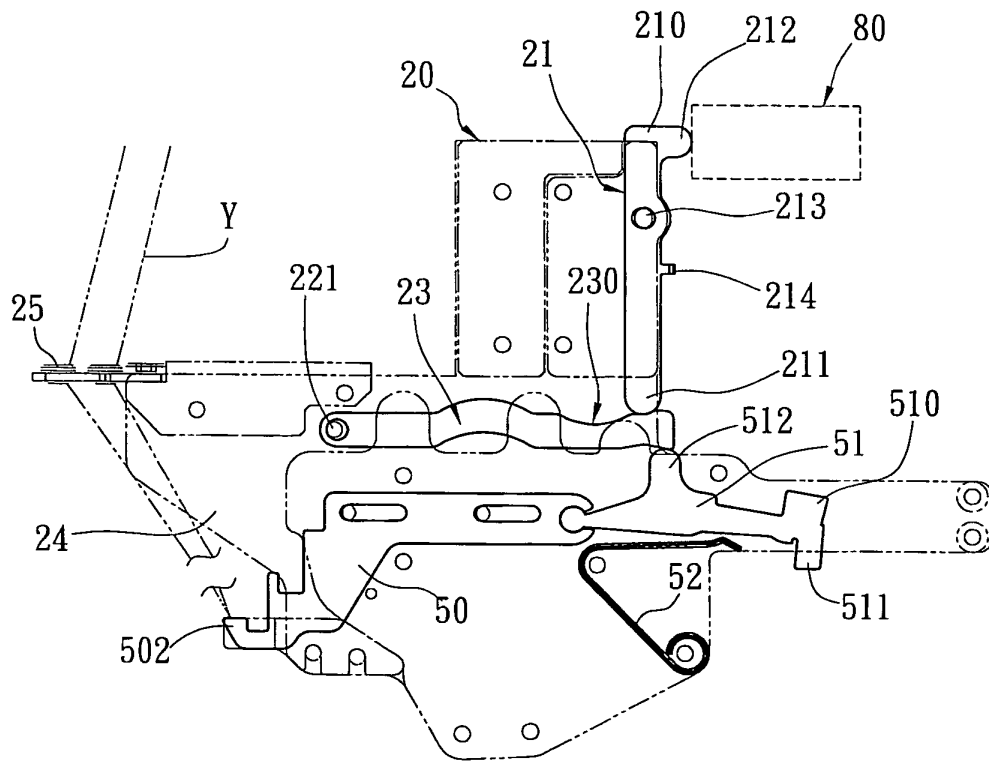


Fig. 4B

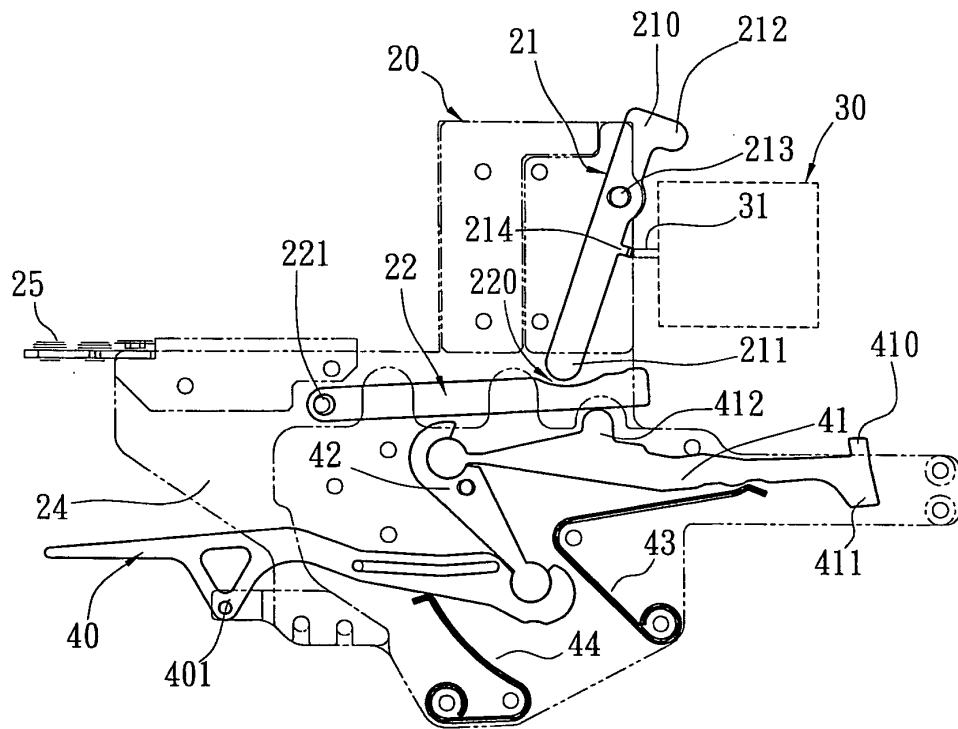


Fig. 5A

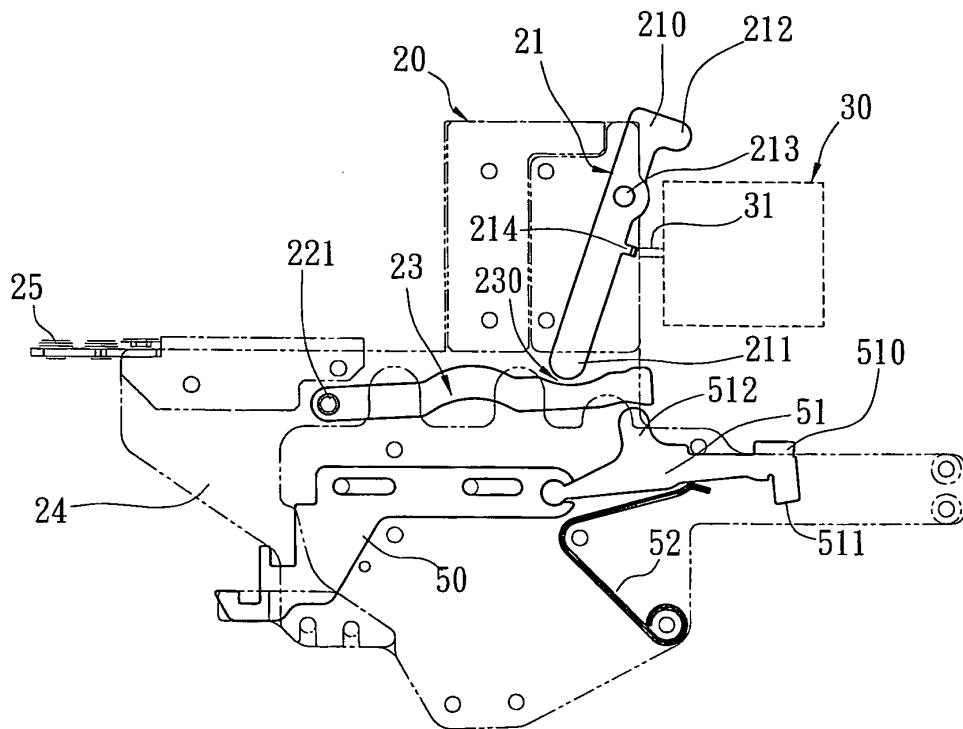


Fig. 5B

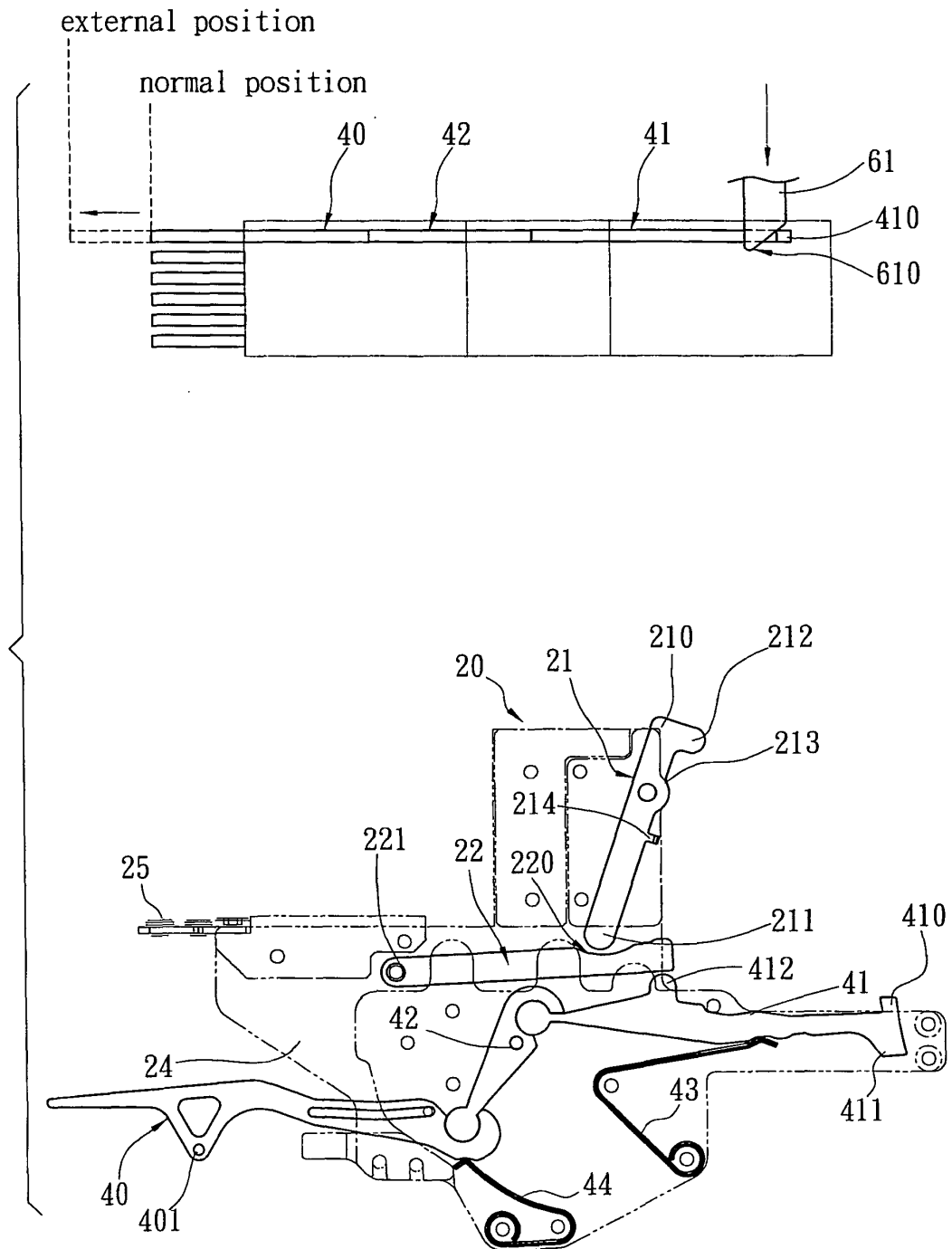


Fig. 5C

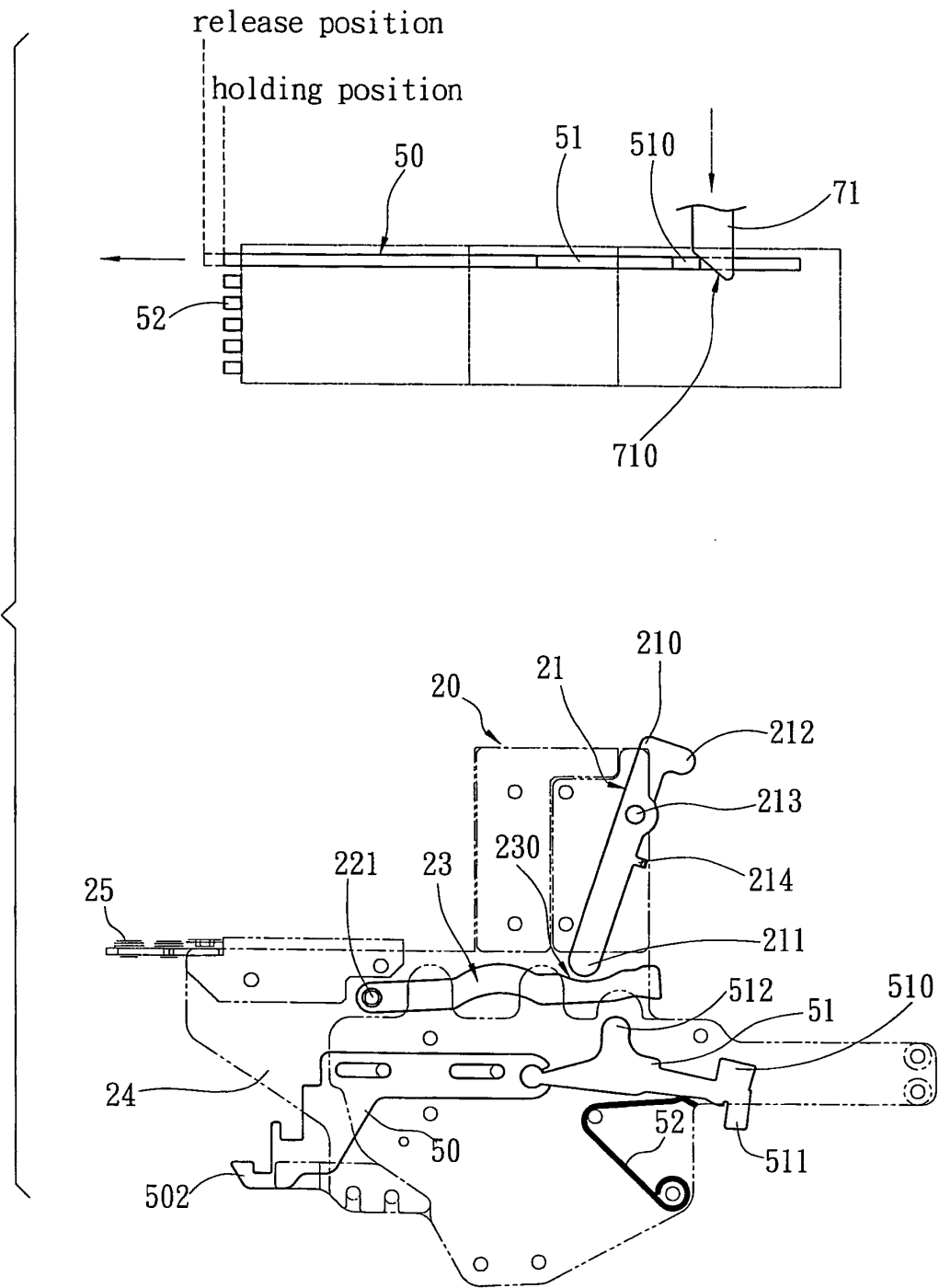


Fig. 5D

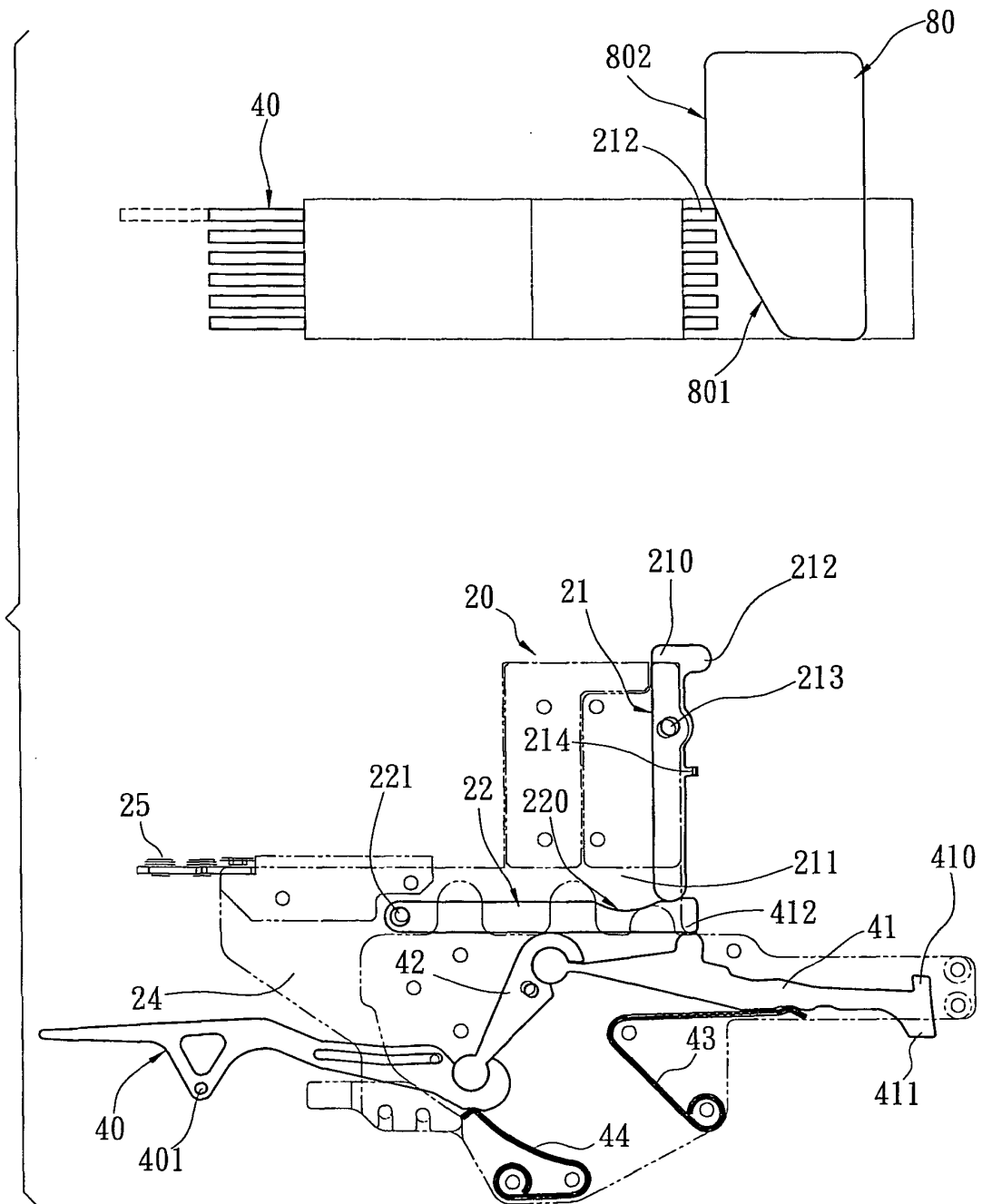


Fig. 5E

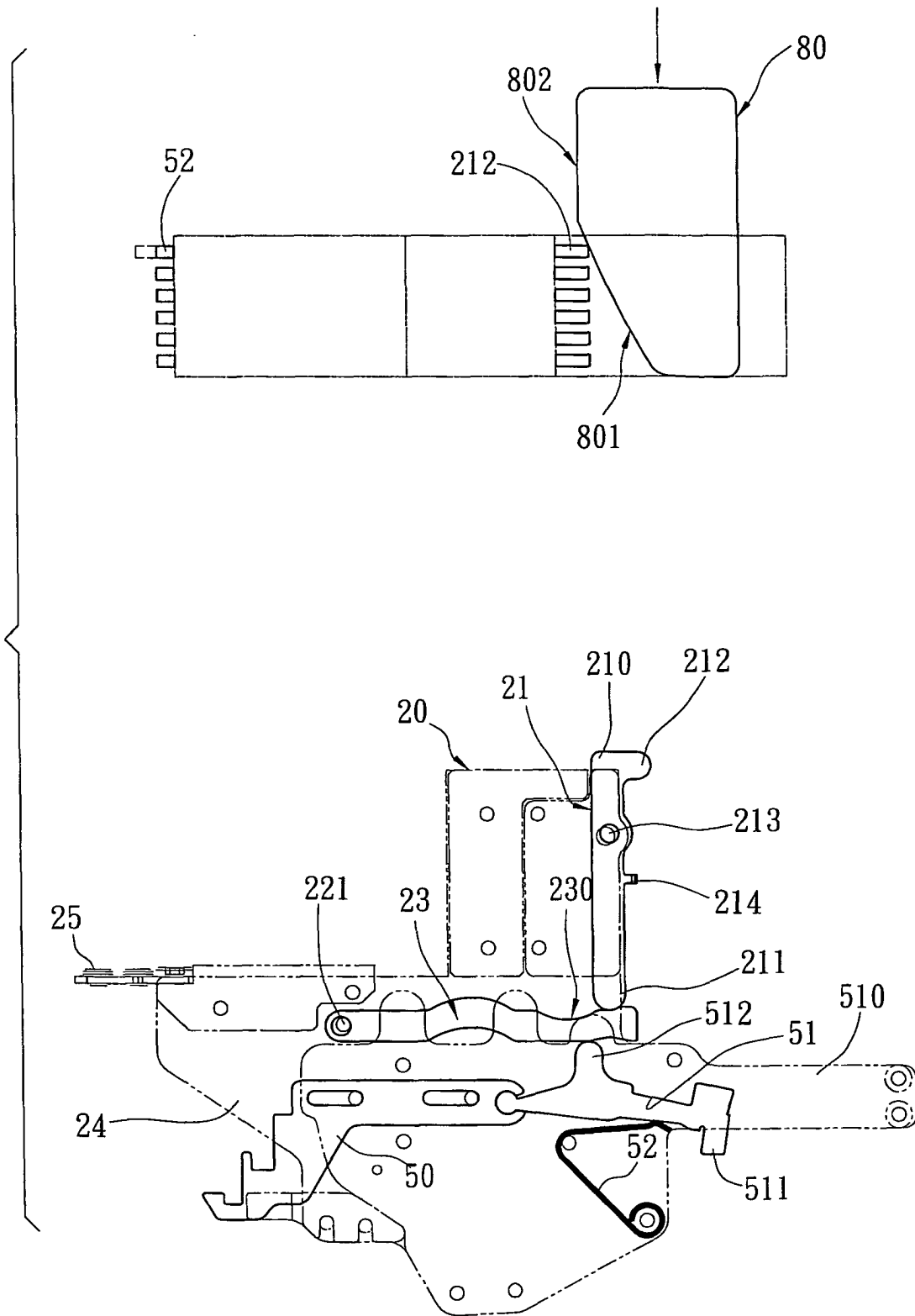


Fig. 5F

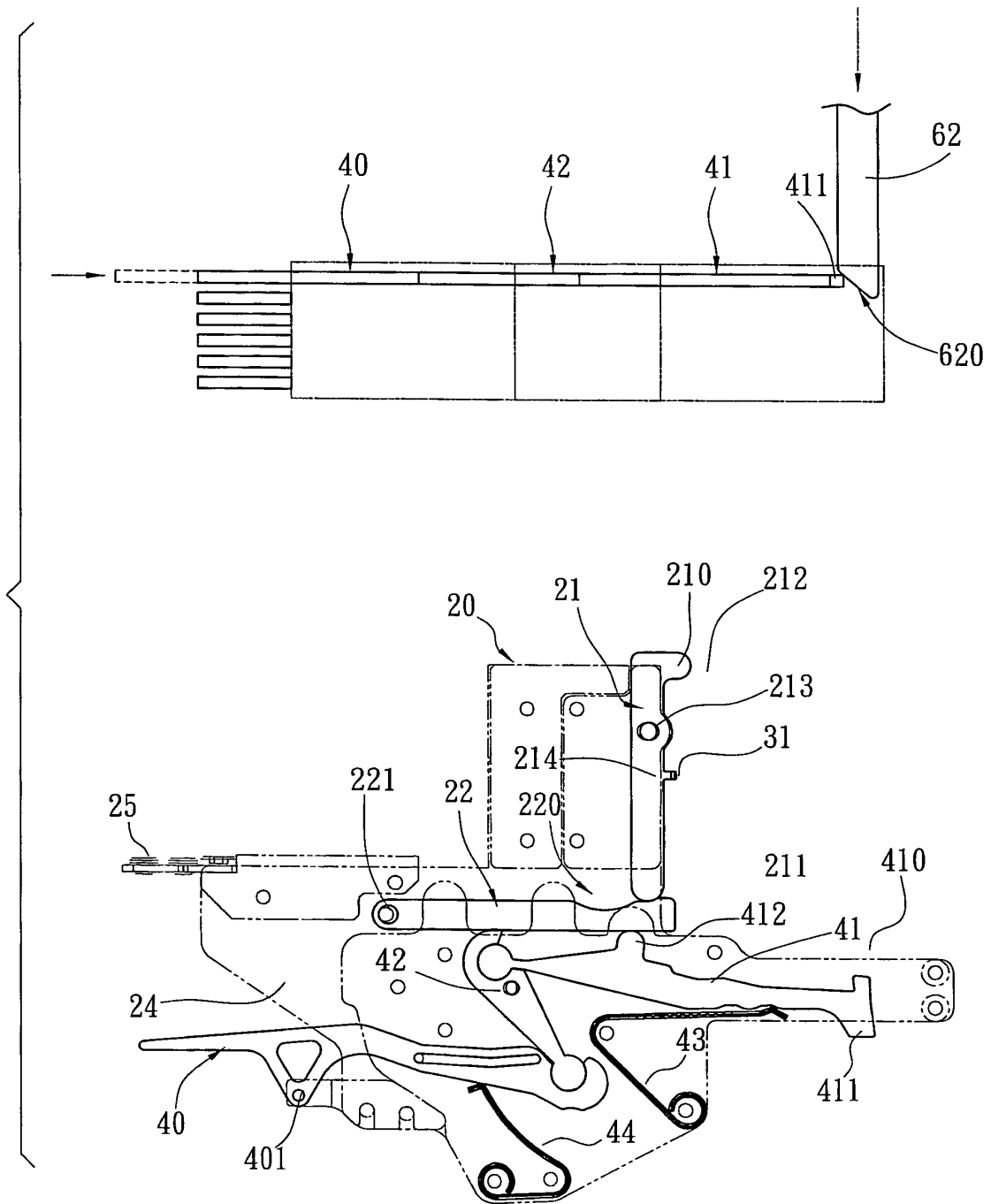


Fig. 5G

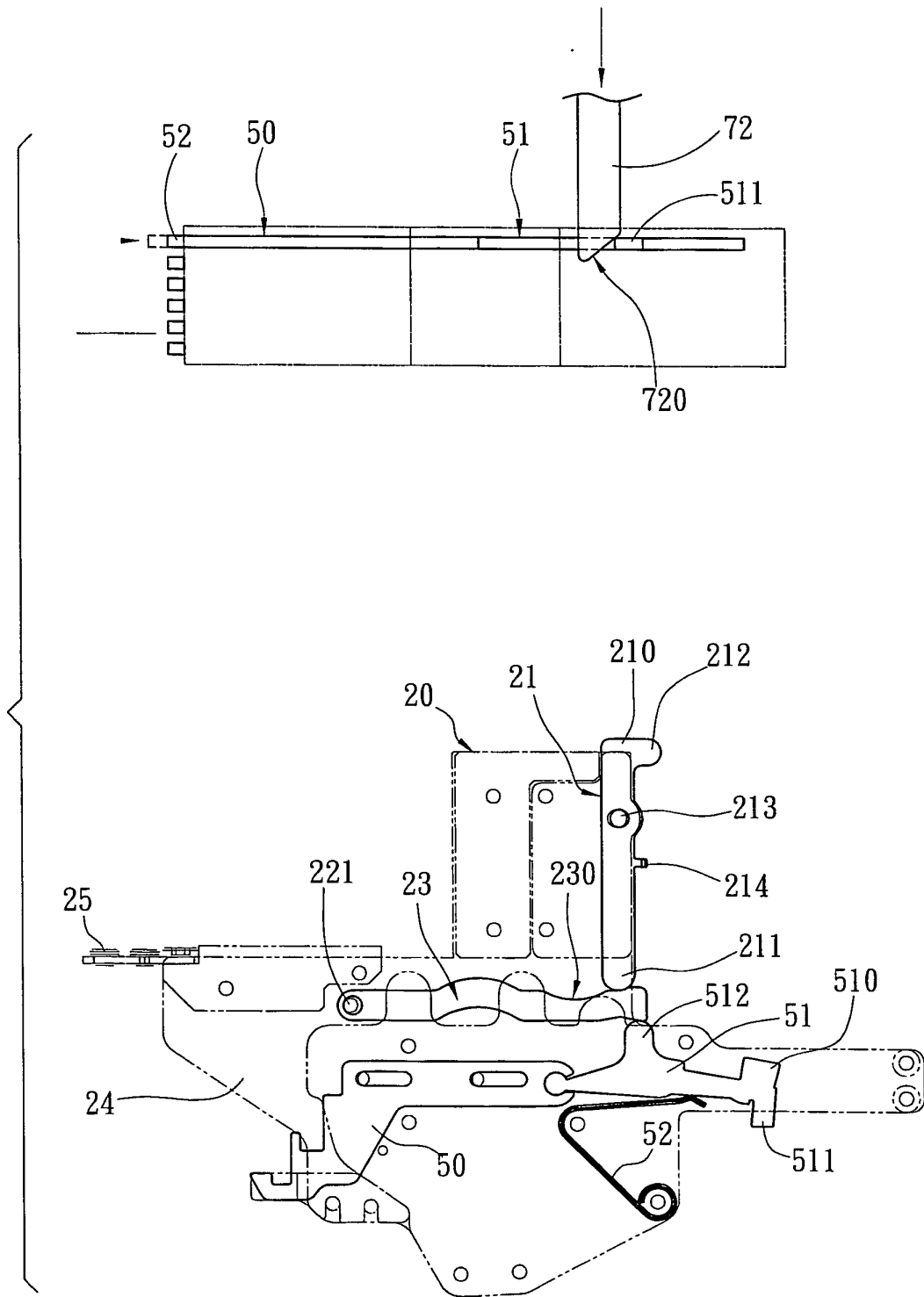


Fig. 5H

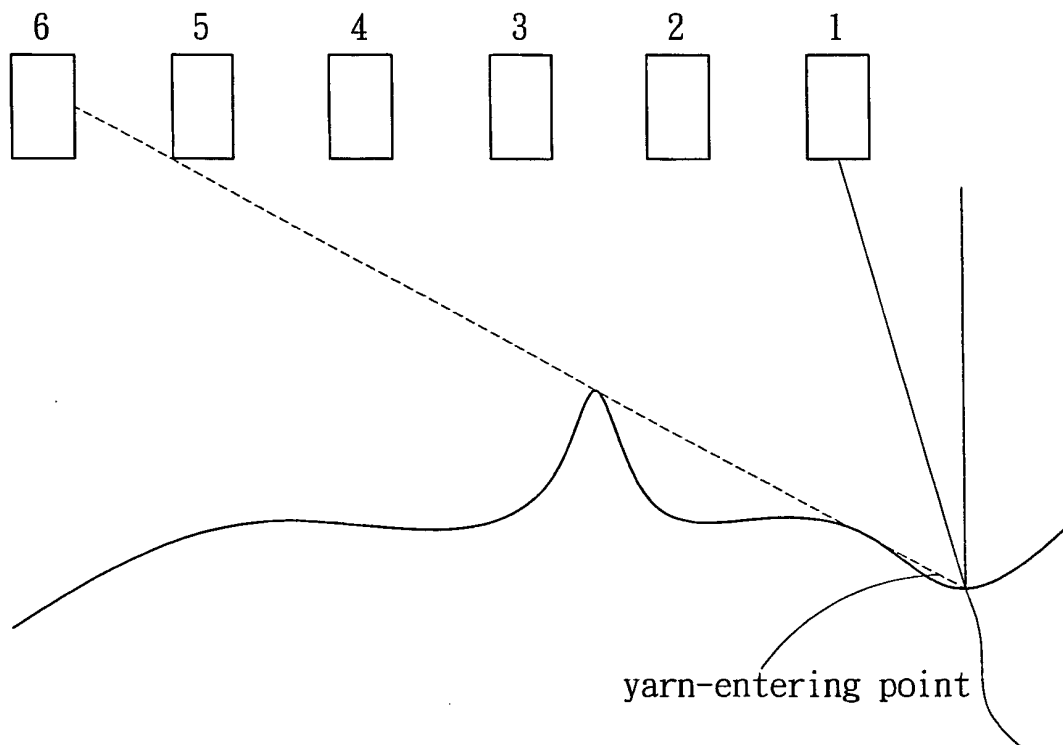


Fig. 6

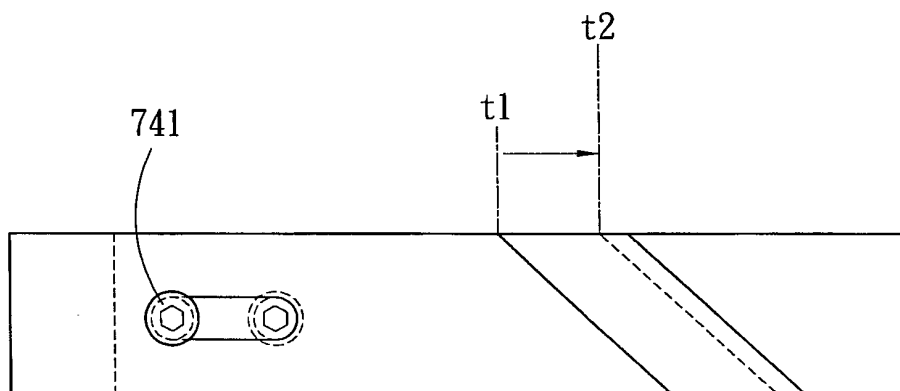


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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