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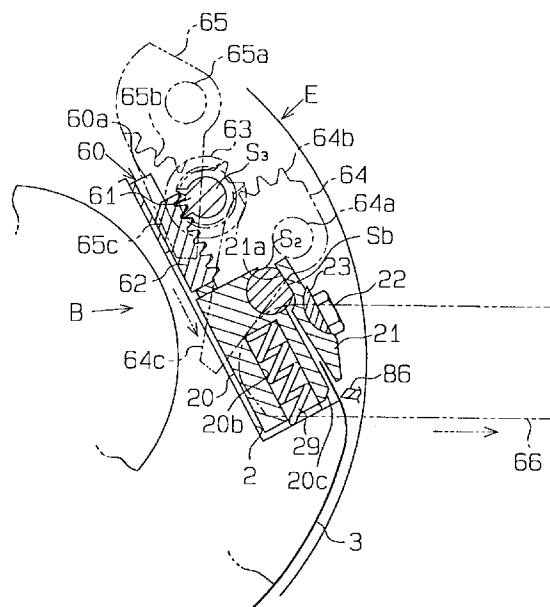
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Plate clamping device for offset press.

A clamping mechanism (B) moves between a non-clamping and a clamping positions along periphery of a plate cylinder (1). The mechanism (B) has a clamping block (20) and a moveable plate (21) which is attached to the block (20). The plate (21) is opened and closed with respect to the block (20) so as to clamp an end of a printing plate (3) in cooperation with the block (20). At the time of clamping operation, the block is moved from the non-clamping position to the clamping position by a moving mechanism (E). Thus, clamping mechanism (B) moves from the non-clamping position to the clamping position with the plate (21) being opened, and clamps the unfolded end of the printing plate (3).

Fig.12



The present invention relates to a plate clamping device for use in an offset press. More particularly, the present invention pertains to a mechanism which is able to adequately clamp a printing plate for improving the print quality.

Fig. 19 shows a general mechanical composition of an offset press machine. The offset press includes a group of rollers, a plate cylinder 200, a blanket cylinder 210, and an impression cylinder 211. Ink and water are fed from a group of inking rollers 212 and moistening rollers 213, respectively. The ink and the water are mixed. The mixture of the ink and water is applied to a printing plate 204 mounted on the plate cylinder 200. The inked image is transferred to a blanket 214 mounted on the blanket cylinder 210 from the plate 204. Subsequently, the wet image over the blanket 214 is printed onto printing sheets Pa carried on the impression cylinder 211. Thus, the state of the printing plate is transferred to the sheets. Therefore, the correct settings of the printing plate 204 on the plate cylinder 200 is a decisive factor of printing quality.

As shown in Fig. 18, a groove 201 extending perpendicularly to the drawing sheet is formed on the outer peripheral surface of the cylinder 200. A first and a second plate clamps 202, 203 are disposed in the groove 201 to clamp the top and bottom ends of the plate 204, respectively. The clamps 202, 203 are forcibly moved in the radial direction in respect to the cylinder 200 for the opening motion. The holding portions of the clamps 202, 203 are moved in the peripheral direction of the plate cylinder 200 for the opening motion. The plate 204 is made of an aluminum thin plate the both ends of which are folded back. The folded ends of the plate 204 are adequately placed in the holding portions to be securely clamped by the clamps 202, 203. Thus, the plate 204 is held on the outer periphery of the cylinder 200.

However, it is time consuming and tiresome to fold the ends of printing plate 204. Furthermore, for folding a printing plate 204 which is made of aluminum, a dedicate folding machine is required, resulting in high manufacturing cost.

Therefore, it is an object of the present invention to provide a plate clamping device which enables to easily mount a printing plate on a plate cylinder.

It is another object of the present invention to provide a plate clamping unit which minimize a manufacturing cost of the printing plate.

In the above plate clamping device, a first and second plate clamping mechanisms are moved in the radial direction of the plate cylinder for the opening and closing motion. For holding the printing plate, the second plate clamping mechanism is moved from a waiting position to a working position by a moving mechanism. At this time, the second plate clamping mechanism remains in the open state. For this arrangement, the both ends of the printing plate can be

firmly clamped.

The invention may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Figure 1 is a schematic view showing of an offset press embodying according to the present invention;

Figure 2 is a plan view showing a plate cylinder;

Figure 3 is a plan view showing a first plate clamp and a second plate clamp;

Figure 4 is a plan view showing the second plate clamp;

Figure 5 is also a plan view showing the second plate clamp;

Figure 6 is a side view showing a first clamp adjusting mechanism;

Figure 7 is a side view showing a second clamp adjusting mechanism;

Figure 8 is a cross sectional view taken along line X-X of Figure 2, illustrating the state before a first plate clamp clamps a printing plate;

Figure 9 is a cross sectional view taken along line X-X of Figure 2, illustrating the state after the first plate clamp clamps the printing plate;

Figure 10 is a cross sectional view taken along line X-X of Figure 2, illustrating the state after a second plate clamp clamps the printing plate;

Figure 11 is a side view showing a moving mechanism;

Figure 12 is a cross sectional view taken along line Y-Y of Figure 2, illustrating the state after the movement of the second plate clamp by means of the moving mechanism;

Figure 13 is a plan view showing the plate cylinder and a plate holding mechanism;

Figure 14 is a plan view showing the plate holding mechanism;

Figure 15 is a cross sectional view taken along line Z-Z of Fig. 13, illustrating the state after a roller of the plate holding mechanism is positioned in the waiting position;

Figure 16 is a cross sectional view taken along line Z-Z of Fig. 13, illustrating the state after a roller of the plate holding mechanism is positioned in the working position;

Figure 17 is a cross sectional view taken along line Z-Z of Fig. 13, illustrating the state after a blade of the plate holding mechanism holds the bottom end of the printing plate;

Figure 18 is a diagrammatic cross sectional view showing the conventional plate cylinder; and

Figure 19 is a schematic view showing a general type offset press.

A preferred embodiment of a plate clamping device according to the present invention will now be described referring to Figs. 1 through 17.

Fig. 1 shows a three-color offset press 100. The

offset press 100 includes a first-color printing unit 101, a second-color printing unit 102 and a third-color printing unit 103. A feeder 104 is disposed in the vicinity of the first-color printing unit 101 at the feeding side. A delivery unit 105 is disposed near the third-color printing unit 103 at the delivery side. In each of the printing units 101, 102, 103, ink is fed to a plate cylinder 1 via inking rollers 110. On the other hand, water is supplied to the plate cylinder 1 via moistening rollers 111. On the cylinder 1 is mounted a printing plate 3 (Fig. 8) on which the ink and the water are mixed with each other. The ink left on the plate 3 in the form of images is transferred to a blanket mounted on a blanket roller 114.

Printing sheets Pa are fed from the feeder 104 to the first-color printing unit 101 via a delivery cylinder 112. The printing sheet Pa held on the outer periphery of an impression cylinder 113 comes to contact with the outer periphery of the blanket cylinder 114. While the printing sheet Pa is in contact with the outer periphery of the blanket cylinder 114, the inked images in the first color transferred to the blanket are printed on the sheet Pa. Printing is made all over the printing sheet Pa when the blanket cylinder 114 is rotated by the rotation of the impression cylinder 113. Then, the printing sheet Pa is fed to an impression cylinder 113 of the second-color printing unit 102 via a delivery cylinder 115.

In the unit 102, the sheet Pa held on the cylinder 113 comes to contact with the outer periphery of a blanket cylinder 114. Then, the inked images of the blanket are transferred to the sheet Pa way as carried out in the first unit 101.

Then, the sheet Pa is fed to the third-color printing unit 103. After the third color printing operation, the printed sheet Pa is fed to the delivery unit 105, and the printing procedure is completed.

Now, the plate clamping device employed in each of the printing units 101, 102, 103 will be explained. Since these units are structurally identical one to another, explanation is given only for the first unit 101.

As shown in Fig. 13, the plate cylinder 1 is rotatably supported between side walls 4a, 4b of the first-color printing unit 101. The cylinder 1 is designed to carry the printing plate 3 (Fig. 8) on its outer peripheral surface. The plate 3 is made of a thin and flat aluminum. A plate holding mechanism F is provided between the side walls 4a, 4b to hold the plate on the plate cylinder 1.

As shown in Fig. 2, a groove 2 extends in the longitudinal direction of the plate cylinder, i.e., in the axial direction of the plate cylinder 1. A first plate clamp A and a second plate clamp B are disposed in the groove 2. The clamps A, B extend in the longitudinal direction of the groove 2 so as to face each other. The first plate clamp A seizes the top end of the plate 3, while the second plate clamp B seizes the bottom end of the plate 3. The plate clamps A, B are

spaced in the peripheral direction of the cylinder 1. The clamping portions of the first and second plate clamps A, B are moved in the radial direction of the cylinder 1 for the opening or closing motions.

In Fig. 2, a clamp activating mechanism D is disposed at the right end of the cylinder 1. The mechanism activates the first and second plate clamps A, B to seize the printing plate 3. A clamp moving mechanism E is disposed at the left end of the plate cylinder 1 to bring the second clamp B towards the first plate clamp A or away therefrom.

Now, the first plate clamp A is hereinafter described.

As shown in Fig. 8, a longitudinally extending clamping block 10 is disposed in the groove 2.

As shown in Fig. 2, a pair of movable clamping plates 12 are disposed on the clamping block 10. As shown in Fig. 8, the movable clamping plates 12 are attached to the respective clamping blocks 10 by means of a plurality of bolts 13 with an allowance for the upward or downward movement of the movable plate 12. The bolts 13 are screwed into the clamping blocks 10. A washer 14 is disposed between each movable clamping plate 12 and bolt 13.

Each clamping block 10 has a cam way 10a at the top of its inner end. The cam way 10a extends longitudinally with respect to the block 10. Each clamping plate 12 has a step 12a at the bottom of its inner end. The step 12a extends longitudinally with respect to the plate 12 so as to face the cam way 10a. A cam shaft S1 set in the cam way 10a opposes the step 12a. The cam shaft S1 extends along the first plate clamp A up to the vicinity of the side wall 2b of the groove. A cam face Sa is formed on the cam shaft S1.

As shown in Fig. 8, a plurality of spring housing holes 16 are provided with each clamping block 10. The holes 16 are disposed on the opposite side of the cam way 10a with respect to the bolt 13 so as to face the clamping plates 12. A compression coil spring 15 disposed in each hole 16 faces the clamping plate 12. The step 12a is continuously pressed against the cam shaft S1 by the force of each spring 15.

The outer end of each clamping plate 12 is held open and faces the clamping block 10. Therefore, as shown in Fig. 11, when the cam face Sa is in contact with the chipped portion 12a, the outer end of each clamping plate 12 is kept open by the spring 15. On the other hand, as shown in Fig. 8, when the cam face Sa is not in contact with the chipped portion 12a, the outer end of the clamping plate 12 is kept close by the spring 15.

As shown in Fig. 2, a connecting shaft 18 rotatably supported by the side wall 2b is connected with the outer end of the cam shaft S1 by way of a cylindrical coupling 17.

The second plate clamp B will be described hereinafter.

As shown in Figs. 2 and 8, clamping block 20 is

disposed in the groove 2. The clamping block 20 can be moveable between two positions shown by solid line in Figs. 8 and 10, respectively.

A moveable clamping plate 21 is disposed on the top of the clamping block 20. The plate 21 is attached to the block 20 by means of bolts 22. The plate 21 is allowed to upward or downward movement. The bolt 13 is inserted through the plate 21, and screwed into the block 20. A washer 23 is placed between the plate 21 and the bolt 22. The clamping block has a cam way 20a extending longitudinally at the top of the inner end of the block 20. A chipped portion 21a is formed at the bottom of the inner end of the plate 21. The chipped portion 21a extends longitudinally with respect to the plate 21 and faces the corresponding cam way 20a. A cam shaft S2 disposed in the cam way 20 faces the step 21a. The cam shaft S1 longitudinally extends along the second clamp B up to the vicinity of the side wall 2b of the groove. A cam face Sb is formed on the cam shaft S2.

As shown in Fig. 8, the block 20 has a plurality of spring housing hole 25 facing the plate 21 at the opposite side of the cam way 20a with respect to the bolt 22. The hole 25 accommodates a compression coil spring 24. The step 21a is continuously pressed against the cam shaft S2 by the force of each spring 24. The outer end of the clamping plate 21 is biased in the opening direction with respect to the block 21. Therefore, as shown in Fig. 8, when the cam face Sb is in contact with the step 21a, the outer end of each clamping plate 21 is held open by the force of the spring 24. Furthermore, as shown in Fig. 10, when the cam face Sb is not in contact with the step 21a, the outer end of the plate 21 is kept in the closed position by the spring 24.

The outer end of the block 20 is protruded from the outer end of the plate 21. A chamfer 20c is formed with the end corner of the block 20 in order to guide the plate 3 to smoothly.

As shown in Fig. 4, a connecting shaft 27 is rotatably supported by the side wall 2b. The shaft 27 is connected with the outer end of the cam shaft S2 by way of a coupling 26. A pair of engaging grooves 26a, 26b are formed at the both ends of the coupling 26 to lie perpendicularly to each other. An engaging projection 28 formed on the cam shaft S2 and an engaging projection 27a formed on the connecting shaft 27 engage with each other in the grooves 26a, 26b. More specifically, two projections 27a, 28 are engaged one with another so as to be slidable in the radial direction of the coupling 26. The coupling 17 described above has the same structure as the coupling 26. The connecting shaft 18 and the cam shaft S1 are connected to the coupling 17 so as to be able to slide in the radial direction of the coupling 17.

As shown in Figs. 3 and 12, a plurality of spring housing holes 20b are provided with the blocks 20. A plurality of coil springs 29 is held between holes 20b

and the inner surface of the groove 2. The block 20 is biased against the first clamp A by the force of each spring 29.

As shown in Fig. 3, a female screw 38 is formed at the left end of the block 20. An adjusting bolt 39 is screwed into the screw 38. A ball 39a rotatably supported at the outer end of the adjusting bolt 39 is in contact with the wall 2c of groove 2. A nut 39b is firmly mounted on the adjusting bolt 39. The second plate clamp B can be moved along the side walls 2b, 2c by adjusting the amount of the inserting length of the female screw 36, 38 of the bolts 37, 39.

The clamp activating mechanism D will be hereinafter described.

The clamp activating mechanism D includes a first and a second clamp activating mechanism portions D1, D2. The mechanism portion D1 is designed to activate the first plate clamp A, while the second mechanism portion D2 is designed to activate the second plate clamp B.

As shown in Figs. 6, 8 and 9, a plate clamping lever 40 is fixed to the shaft 18 connected to the cam shaft in Fig. 2. A plate clamping roller 41 is rotatably supported by a shaft 41a at the end portion of the lever 40. When the first clamp A is to seize the top end of the plate 3, the cylinder 1 is rotated. Then, the roller 41 is moved to the position where the roller 41 can meet the end of the driving arm 42. The arm 42 flexibly reciprocates in the axial direction of the cylinder 1 by means of an air cylinder which is actuated by the manipulation of an operation switch.

A plate releasing lever 43 is pivotally supported by a pivot 43a on the side wall 2b. An abutting portion 43b is integrally formed with the lever 43. The abutting portion 43b extends to contact the pivoting locus of the roller 41. On the other hand, a plate releasing roller 45 is rotatably supported by the shaft 45a. When the first clamp A is to release the top end of the plate 3, the cylinder 1 is turned, the roller 45 is moved to the position where the roller 45 can meet the end of the arm 42.

When the first clamp A is to seize the top end of the printing plate 3, the arm 42 moves in the radial direction of the cylinder 1 and abuts the roller 41. Then, the clamping lever 40 is pivoted clockwise to a position shown by the chain line in Fig. 6, and the lever 43 is pivoted counterclockwise. Subsequently, as shown in Fig. 9, the cam shaft S1 is turned via the connecting shaft 18 in the same direction as that of the lever 43. Then, each plate 12 is moved to the close position against the force of the spring 15. As a result, the top of the plate 3 is clamped by the plates 12.

On the contrary, when the first clamp A is to release the top of the plate 3, the arm 42 moves in the radial direction of the cylinder 1 and abuts the roller 45. Then, the levers 43 and the roller 41 are returned to the position shown by the solid line in Fig. 6. Sub-

sequently, the cam shaft S1 is turned in the clamping direction when the plate 3 is to be seized. Then, the clamping plate 12 is opened by the force of the spring 15. As a result, the top of the plate 3 is released from the clamping plates 12.

The second clamp activating mechanism D2 is hereinafter described.

As shown in Figs. 7, 10, a lever 50 is fixed on the connecting shaft 27 connected to the cam shaft S2. A plate clamping roller 51 and a plate releasing roller 52 are rotatably supported by shafts 51a and 52a, respectively. When the second plate clamp B is to clamp the bottom end of the plate 3, the plate cylinder 1 is turned. Then, the roller 51 is moved to the position where the roller 51 can meet the end of the arm 42. When the second clamp B is to release the bottom of the plate 3, the cylinder 1 is turned. Then, the releasing roller 52 is moved to the position where the roller 52 can meet the end of the arm 42.

When the second clamp B is to clamp the end of the plate 3, the arm 42 beats the roller 51. Then, the lever 50 is turned counterclockwise to the position shown by a dotted line in Fig. 7. Then, as shown in Fig. 10, the cam shaft S2 is turned in the direction of pivoting operation of the lever 50. Then, the plate 21 is closed against the force of the spring 24. As a result, the bottom end of the plate 3 is clamped by the plate 21.

On the hand, when the second clamp B is to release the bottom end of the plate 3, the arm 42 beats the roller 52. Then, the lever 50 is returned to the solid line position in Fig. 7. Then, the cam shaft S2 is turned in the direction opposite to the turning direction of the cam shaft S2 for clamping the plate 3. Then, each plate 21 is opened by the force of the spring 24. As a result, the bottom end of the plate 3 is released from the plate 21.

The plate clamp moving mechanism E is hereinafter described.

As shown in Figs. 2 and 3, a plurality of block-shaped bases 60 are fixed to the inner surface of the groove 2 between the first and second clamps A, B. In each base 60, a guiding groove 60a extends in the peripheral direction of the cylinder 1. As shown in Figs. 3 and 12, a rack 62 fixed to inner surface of the block 20 is slidably disposed inside the guiding groove 60a.

As shown in Fig. 2, a driving shaft S3 is rotatably disposed, by way of bearings, between the both side walls 2b, 2c of the groove 2 such that the shaft S3 extends in the axial direction of the cylinder 1. As shown in Fig. 3, pinions 61 are formed around the shaft S3 in the conformity to the racks 62 so that each pinion 61 is arranged to engage with each rack 62.

As shown in Figs. 11 and 12, a spur gear 63 is fixed to the end of the shaft S3. A first lever 64 is pivotally supported by the shaft 64a on the wall 2c in the vicinity of the spur gear 63. On the other hand, a sec-

ond lever 65 is pivotally supported by a shaft 65a on the wall 2c at the opposite side to the first lever 64 with respect to the shaft S3. External gears 64b, 65b are formed on the outer periphery of the base of the first and second levers 64, 65. The gears 64b, 65b are engaged with the spur gear 63.

The tapered abutting portion 64c, 65c are integrally formed with the first and second levers 64, 65, respectively. When the second clamp B is to clamp the bottom end of the plate 3, the cylinder 1 is turned. Then, the portion 64c is moved to the position where the portion 64c can meet the end of the arm 66. When the second clamp B releases the bottom end of the plate 3, the cylinder 1 is turned, and the portion 65c is moved to the position where the portion 65c meets the arm 66 and can contact the end thereof. The arm 66 reciprocates in the radial direction of the cylinder 1 with aid of an air cylinder (not illustrated).

When the second clamp B is to clamp the bottom end of the plate 3, the arm 66 beats the portion 64c. Then, the first lever 64 is pivoted clockwise to the chain line position in Fig. 11. Then, the shaft S3 is turned counterclockwise together with the spur gear 63. The rack 62 is slid in the guiding groove 60a by the pinion 61, and the block 20 is moved against the force of the spring 29 from the waiting position to the clamping position, shown by the solid line in Figs. 9 and 15, respectively.

When the bottom end of the plate 3 is clamped by the second clamp B and the arm 66 is moved away from the portion 64c, the block 20 returns from the solid line position to the chain line position shown in Fig. 10 according to the force of the spring 29. Then, the second clamp B can spread the plate 3 on the peripheral surface of the cylinder 1 without any slackness. Then, as shown in Fig. 12, the shaft S3 is turned clockwise. Resultingly, the first and second levers 64, 65 return to the solid line position shown in Fig. 11 before the plate 3 is clamped.

Reversely, when the second clamp B is to release the bottom end of the plate 3, the arm 66 beats the portion 65c. Subsequently, the second lever 65 is pivoted clockwise to the chain line position in Fig. 11. Then, the shaft S3 is turned counterclockwise together with the spur gear 63. The clamping block 20 is moved from the chain line position to the solid line position in Fig. 10 against the force of the spring 29. As a result, the tension of the plate 3 spread on the peripheral surface of the cylinder 1 is released to allow the plate 3 to be easily detached therefrom.

When the bottom end of the plate 3 is released from the second clamp B and the arm 66 is moved away from the portion 64c, the clamping block 20 is returned from the solid line position to the chain line position both shown in Fig. 10 in accordance with the force of the spring 29. Then, the shaft S3 is turned clockwise in Fig. 12. Resultingly, the first and second levers 64, 65 return to the solid line position in Fig. 11.

A plate holding mechanism F is hereinafter explained.

As shown in Figs. 13 and 15, a U-type connection fitting 71 is connected to an end of a rod 70a of an air cylinder 70. A proximal end of a link 72 is rotatably connected to the fitting 71 by a pin 73. A distal end of the link 72 is fixed on the shaft 72. The shaft 74 is rotatably supported on the side walls 4a, 4b. A pair of links 75 are fixed on the shaft 74 between the side walls 4a, 4b.

As shown in Figs. 14 and 15, a roller shaft 76 is rotatably supported by the distal ends of the connecting links 75. A roller 79 is rotatably supported by the shaft 76 via bearings (not illustrated) such that the roller extends in the axial direction of the cylinder 1. In this arrangement, when the rod 70a is in the contracted state in Fig. 15, the roller 79 is located in the waiting position. When the rod 70a is in the extended state in Fig. 16, the roller 79 is located in the working position where the roller 79 forces the plate 3 against the cylinder 1.

As shown in Fig. 14, a swinging lever 78 has an end fixed to the right end of the shaft 76. A torsion coil spring 77 is loosely set on the shaft 76 between the link 75 and lever 78. The both ends of the spring 77 are hooked on the link 75 and lever 78, respectively. A roller 80 is rotatably supported at the end of a shaft 81 connected to the lever 78.

A pair of driven levers 82 is fixed to the shaft 76 between the side walls 4a, 4b. The levers 82 are arranged to swing together with the shaft 76 between the waiting position and the working position, shown in Figs. 16 and 17, respectively. A supporting rod 83 is fixed to the end of the driven levers 82 by means of machine screws 84 such that the rod 83 extends between the levers 82 in the axial direction of the roller 79. A pair of clamping plates 85 is fixed on an end of the rod 83 such that the plates 85 extend in the axial direction of the roller 79. A blade like member 86 made of the hard rubber is narrowly fixed between the plates 85 by means of screw or the equivalent. A first end of the blade 87 protrudes from the clamping plates 85. A second end of the blade 87 is formed slant.

As shown in Figs. 13, 16 and 17, a plate holding cam 87 is fixed by means of a pair of machine screws 88 on the right side of the cylinder 1. An elongate hole 87a formed with the cam 87 adjusts the position thereof. When the cylinder 1 is turned, the roller 80 is pressed against a cam face 87b of the cam 87 by the force of the spring 77 for readily moving from a waiting face M1 to a working face M2. When the roller 80 moves to the working face M2 of the cam 87, the levers 78, 82 are moved to the working position. Then, the end of the blade 86 is activated to bias the bottom end of the plate 3 in the radial direction of the cylinder 1.

The above printing unit is operated as follows.

Before the printing plate 3 is set to the plate cylinder 1, the position of the plate holding cam 87 is adjusted. As shown in Fig. 8, when the plate 12 of the first clamp A is opened, the top end of the plate 3 is guided between the block 10 and the plate 12. Then, when the operation switch (not illustrated) is manipulated, the arm 42 is moved by an air cylinder (not illustrated) in the axial direction (shown by the chain line) of the cylinder 1. After, the roller 41 is beaten by the arm 42, the lever 40 is pivoted clockwise. Subsequently, the cam shaft S1 is turned clockwise, and the movable clamping plate 12 is closed against the force of the spring 15. Resultingly, the top end of the plate 3 is clamped by the first clamp A.

According to the movement of the roller 41 shown in Fig. 6, the portion 43b pressed by the roller pivots the lever 43 counterclockwise. After beating the roller 41, the arm 42 returns to the original position so as to turn the cylinder 1 in the counterclockwise direction viewed in Fig. 9. Subsequently, as shown in Fig. 7, the cylinder 1 comes to stop at the position where the roller 51 meets the arm 42.

As shown in Fig. 16, when the air cylinder 70 is activated and its rod 70a is extended, the link 75 is pivoted clockwise. Then, the roller 79 is brought to the contact with the outer surface of the cylinder 1. Then, the cylinder 1 is turned counterclockwise viewed in Figs. 9 and 16. As a result, the plate 3 is wound on the cylinder 1 while being pressed by the roller 79 against the cylinder 1.

As shown in Fig. 17, while the roller 79 keeps pressing the plate 3 against the cylinder 1, the roller 80 rolls from the waiting face M1 to the working face M2 of the cam 87 against the force of the spring 77 (Fig. 14). Then, the lever 78 is pivoted from the waiting position to the working position and the lever 82 from the working portion to the waiting portion. Simultaneously, the end portion of the blade 86 enters the groove 2 of the cylinder 1. Therefore, the bottom end of the plate 3 is held by the end of the blade 86.

As illustrated in Fig. 7, the roller 51 is kept at the stopping position to meet the arm 42. As shown in Fig. 11, the arm 66 is moved by the air cylinder (not illustrated) in the radial direction of the cylinder 1 when the operation switch (not illustrated) is manipulated in this state. Then, the portion 64c is beaten by the driving arm 64, resulting in the pivoting movement of the first and second levers 64, 65. Therefore, the shaft S3 is turned counterclockwise.

As shown in Fig. 12, each pinion 61 of the shaft S3 is turned counterclockwise in order for each rack 62 to move in the direction of the chain arrow against the force of the spring 29 together with the block 20. The bottom end of the plate 3 is precisely placed between the block 20 and the plate 21 while being sliding over the chamfer 20c of the block 20. At this time, the arm 66 remains in contact with the portion 64c.

In this state, the arm 42 is moved in the radial di-

rection of the cylinder 1 as shown with the chain line arrow in Fig. 7. Then, when the roller 51 is beaten by the driving arm 42, the lever 50 is pivoted counterclockwise. Simultaneously, as shown in Fig. 10, the cam shaft S2 is turned counterclockwise. Then, the clamping plate 21 is closed against the force of spring 24. Resultingly, the bottom end of the plate 3 is clamped by the second clamp B.

After beating the roller 51, the arm 42 returns to the original position. The cylinder 70 is activated to return the rod 70a to the contracted position. The roller 79 and the blade 86 separate from the cylinder 1 in the sequence reverse to the above description.

In more detail description, the plate 3 is mounted on the cylinder 1 with the top and bottom ends clamped by the first and second plate clamps A, B, respectively. The arm 66 is moved in the direction of chain line, resulting in the movement of the block 20 in accordance with the force of spring 29. Then, the plate 3 is tightly mounted on the cylinder 1. At this time, the rack 62 is moved in the same direction as the block 20. Then, the pinion 61 and the driving shaft S3 are turned clockwise in Fig. 12. As a result, the first and second levers 64, 65 are pivoted counterclockwise in Fig. 11, and return from the chain line position towards the solid line position.

When the plate 3 is to be detached from the cylinder 1, the cylinder 1 is turned in the reverse direction by manipulating the operation switch (not illustrated). Then, the portion 65c is moved to the position where the portion 65c is beaten by the end of the arm 66. The spur gear 63 and the driving shaft S3 are turned by the arm 66 in the same direction as clamping the plate 3. The block 20 is moved in the direction as shown by the chain line arrow in Fig. 12. As a result, the tension of the plate 3 against the cylinder 1 is released. At this time, the end of the arm 60 remains in contact with the portion 65c.

In this state, when the cylinder 1 is turned, the roller 52 is moved to meet the end of the arm 42. This end of the arm 42 is beaten by the roller 52 to rotate the lever 50 in the releasing direction, i.e. counterclockwise viewed in Fig. 7. The connecting shaft 27 and the cam shaft S2 are turned in the releasing direction so that the cam face Sb comes to contact the step 21a. Therefore, the clamping plate 21 is opened by the force of the spring 24. As a result, the bottom end of the plate 3 is released from the second clamp B. Subsequently, the arm 66 is returned to the original position. The clamping block 20 is also returned to the waiting position shown with the solid line in Figs. 8 and 9.

Then, the plate cylinder 1 is turned for releasing the roller 45 to move and beat the end of the arm 42. Simultaneously, the roller 41 is beaten by the portion 43b, and turned in the releasing direction, i.e. counterclockwise viewed in Fig. 6. The connecting shaft 18, S1 are turned in the releasing direction. The cam

face Sa comes to contact the step 12a. Then, the clamping plate 12 is opened by the force of the spring 15. As a result, the top end of the plate 3 is released from the first clamp A. The arm 42, thus, returns to the original position after beating the roller 45.

The present examples and embodiment are to be considered as illustrative and no restrictive, and the invention is not limited to the details giving herein, but may be modified within the scope of the appended claims.

Claims

1. A plate clamping device for use in an offset press machine including;
 - a plate cylinder for carrying a printing plate, said printing plate having a first and second ends;
 - a first clamping mechanism for clamping the first end of the printing plate;
 - a second clamping mechanism for clamping the second end of the printing plate;
 - a groove extending in the axial direction of the plate cylinder on the surface thereof, for accommodating the first and second clamping mechanisms;
 - the second clamping mechanisms being arranged to be moveable between a non-clamping position in the vicinity of the first clamping mechanism and a clamping position remote from the first clamping mechanism; and
 - means for moving the second clamping mechanism from the non-clamping position to the clamping position.
2. A device according to Claim 1 further including biasing means for returning the second clamping mechanism from the clamping position to the non-clamping position.
3. A device according to Claim 1, wherein said moving means includes;
 - a lever rotatably mounted on the end surface of the plate cylinder;
 - a drive shaft disposed in the groove parallel to the axis of the plate cylinder so as to be rotated in accordance with the rotation of the lever, said drive shaft having outer teeth on the outer surface thereof; and
 - a rack secured to the second clamping mechanism and mating the outer teeth.
4. A device according to Claim 1, wherein each of the clamping mechanisms includes a block and an openable member for clamping the end of the printing plate in cooperation with the block.

5. A device according to Claim 2, wherein openable member is closed by a cam shaft, which is held between a groove extending on the block and a step formed with the openable member, and opened by a biasing force of spring means disposed between the block and the openable member. 5
6. A device according to Claims 4 or 5, wherein the second clamping block has a tapered end surface for guiding the end of the printing plate. 10

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Fig. 1

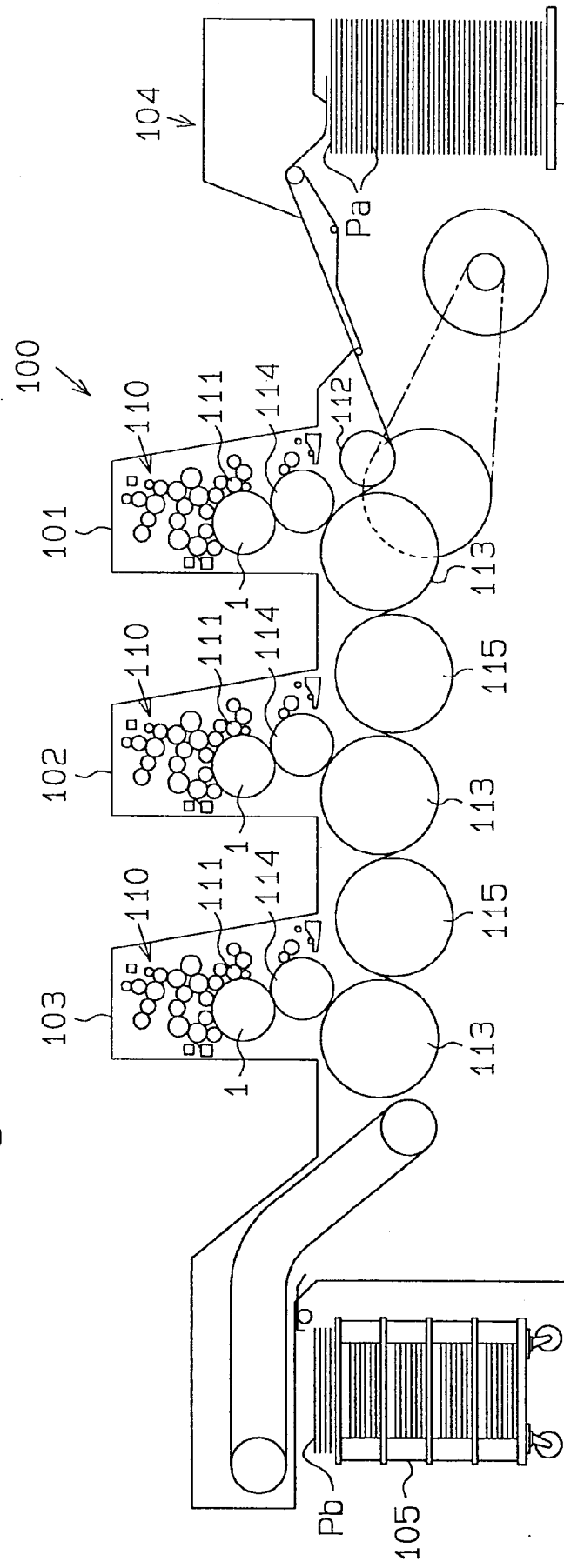


Fig. 2

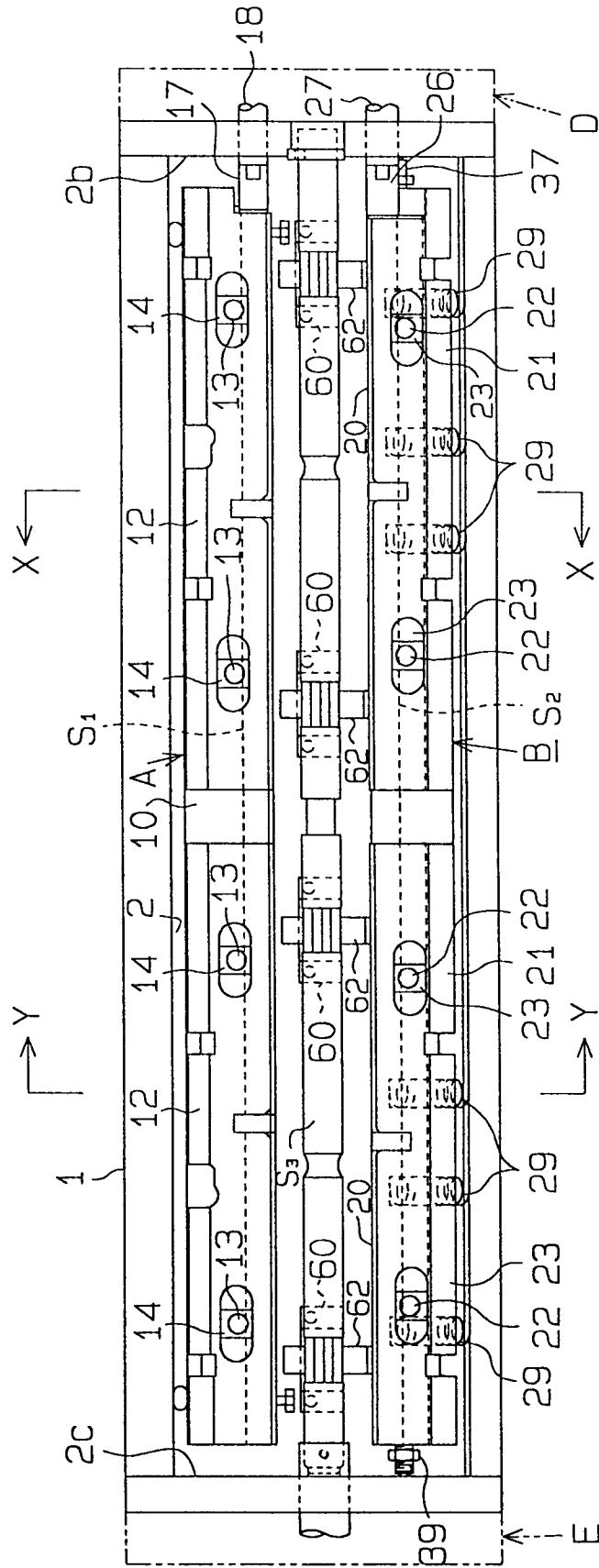


Fig. 3

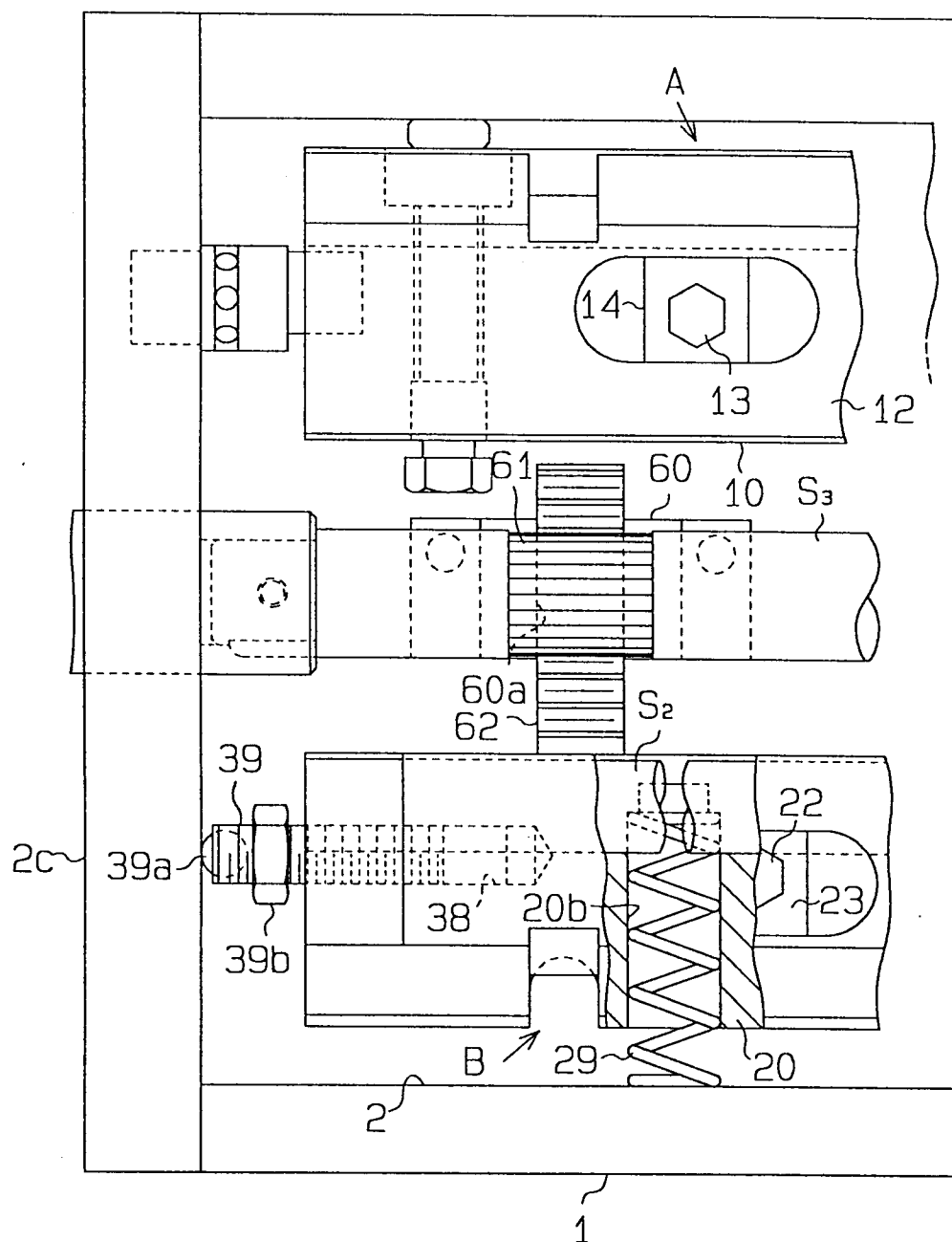


Fig. 4

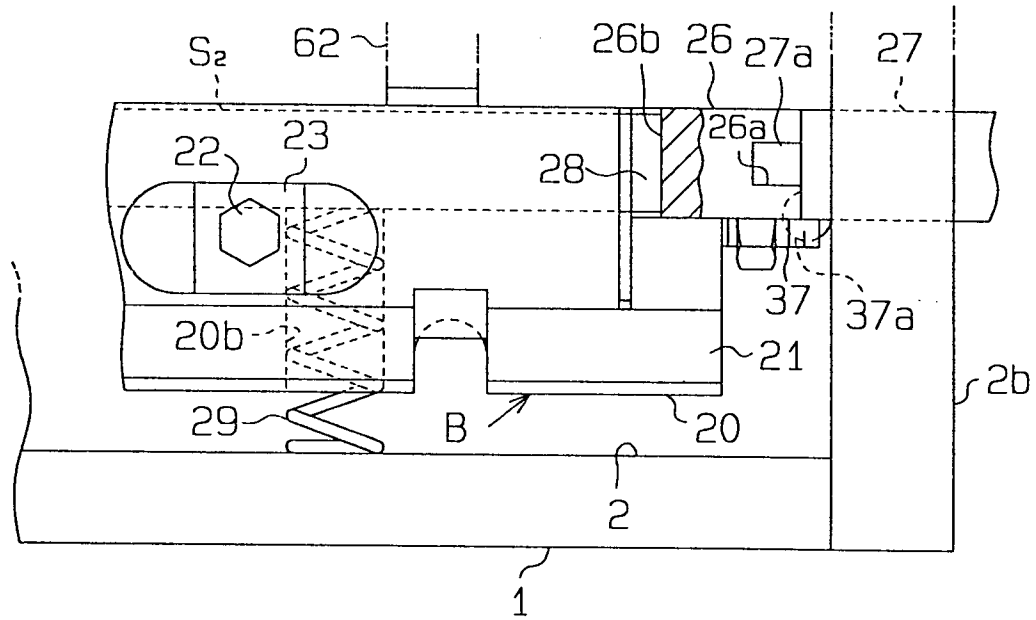


Fig. 5

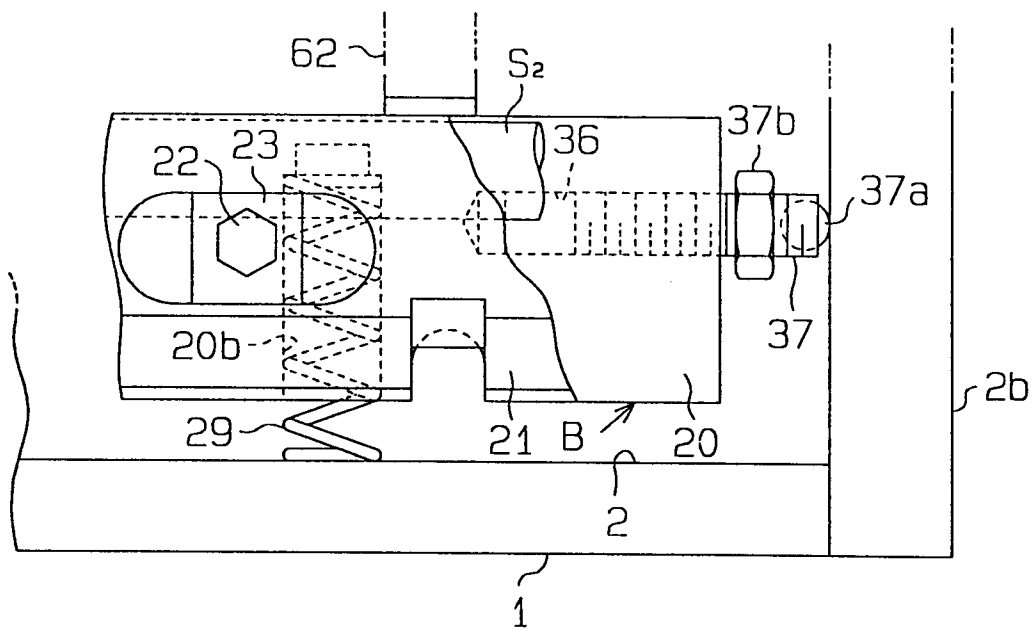


Fig.6

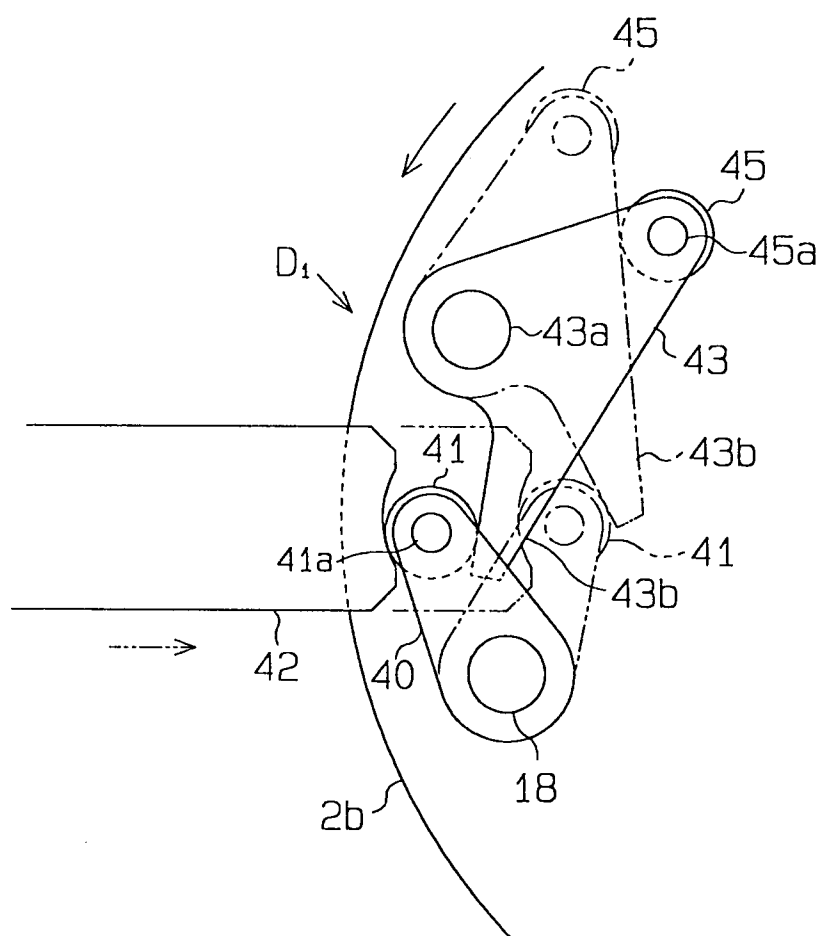


Fig. 7

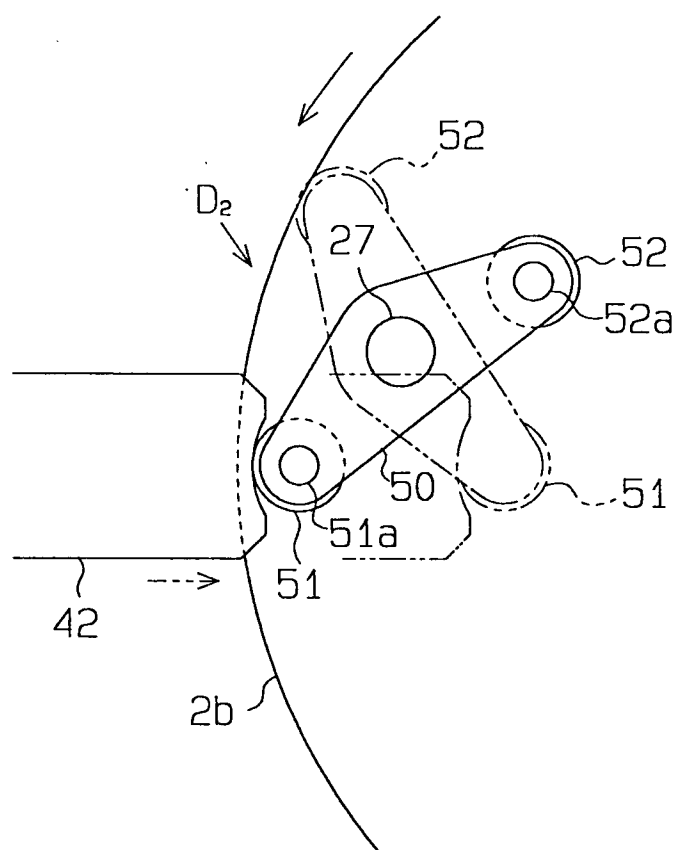


Fig.8

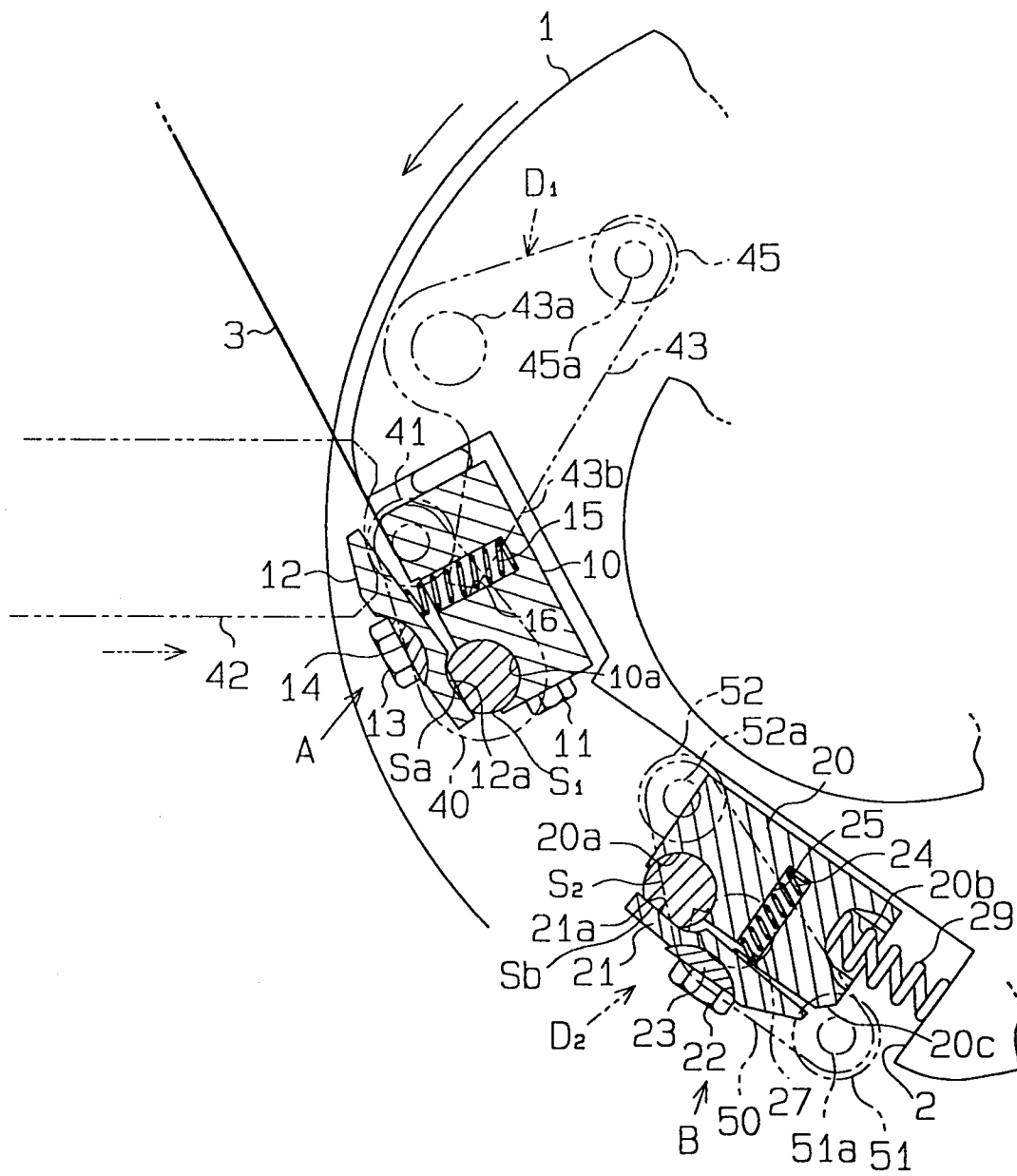


Fig. 9

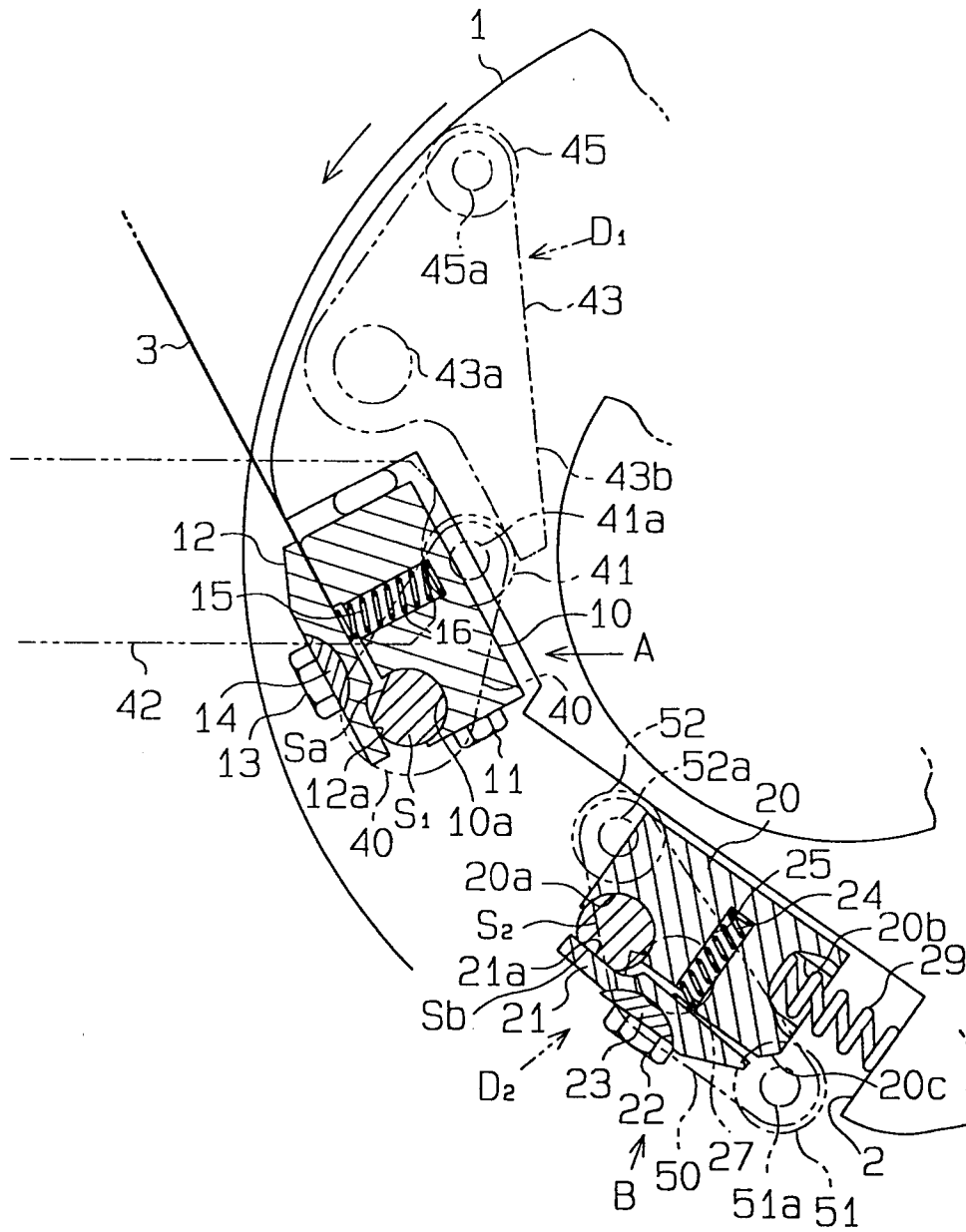


Fig. 10

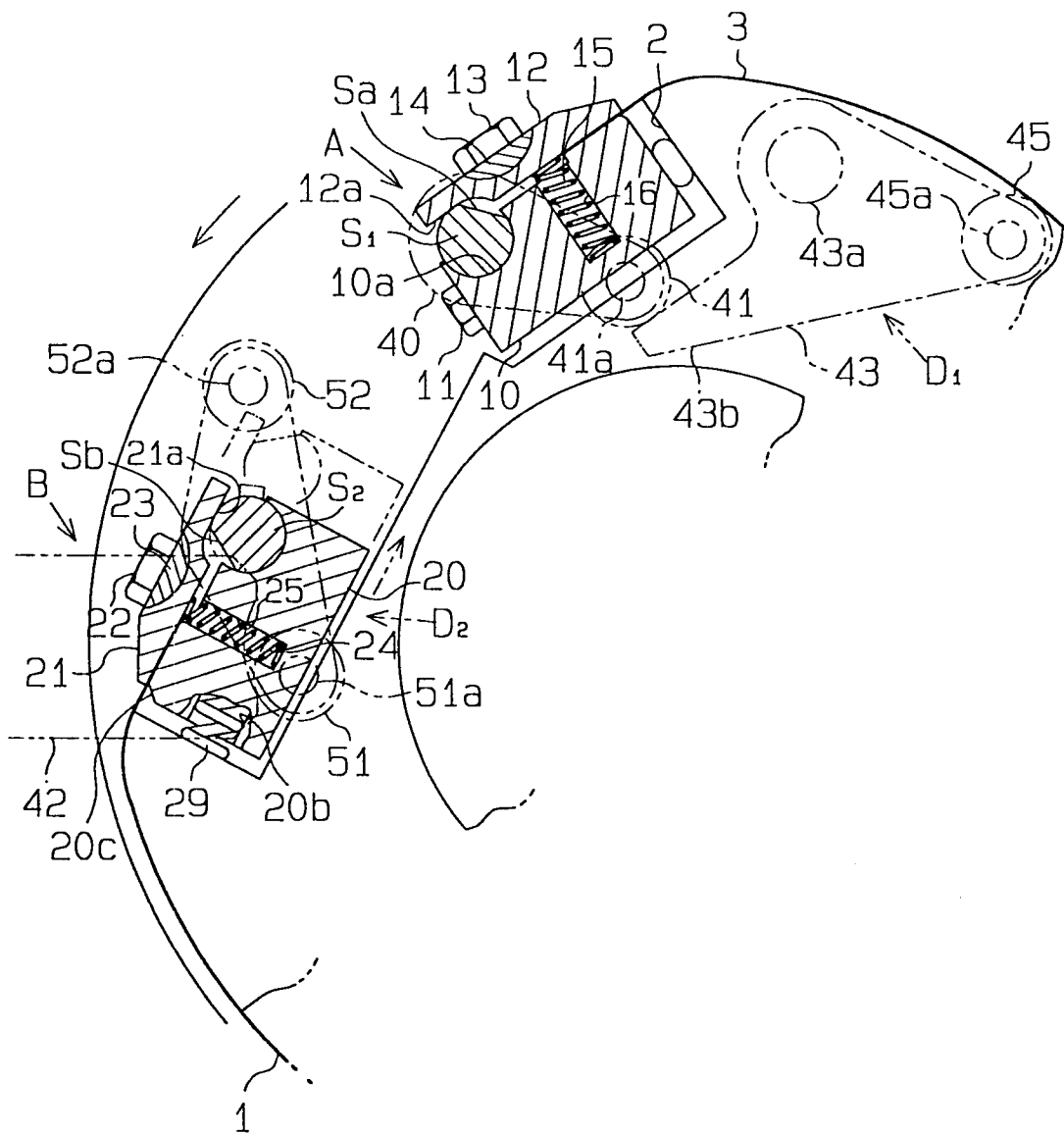


Fig. 11

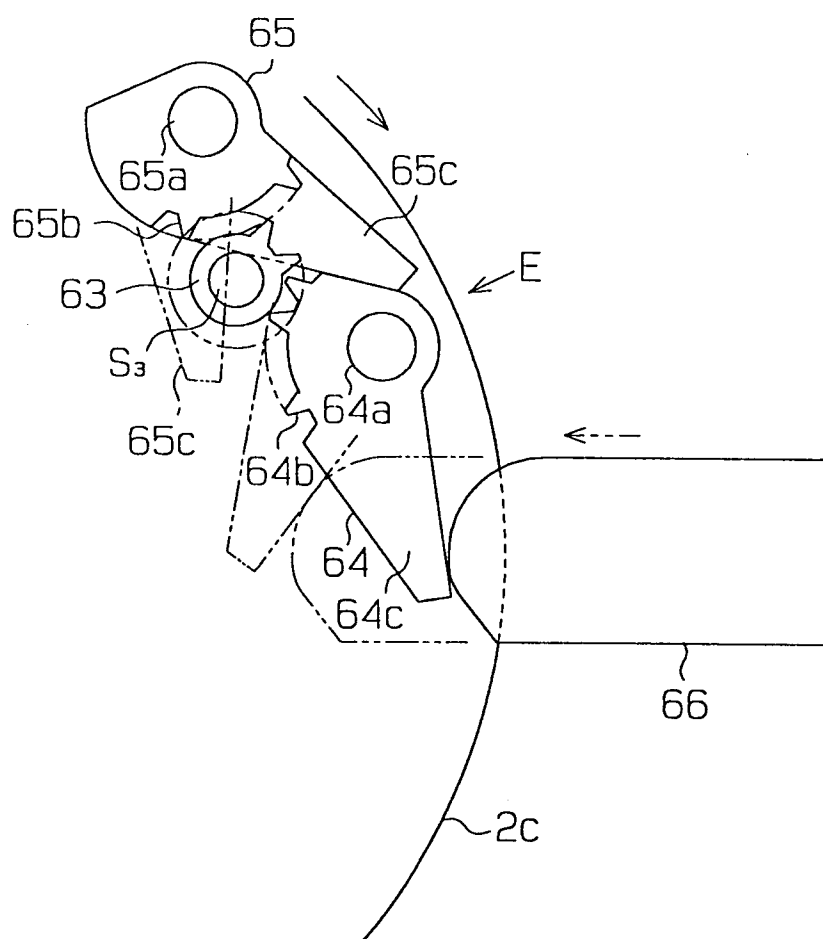


Fig.12

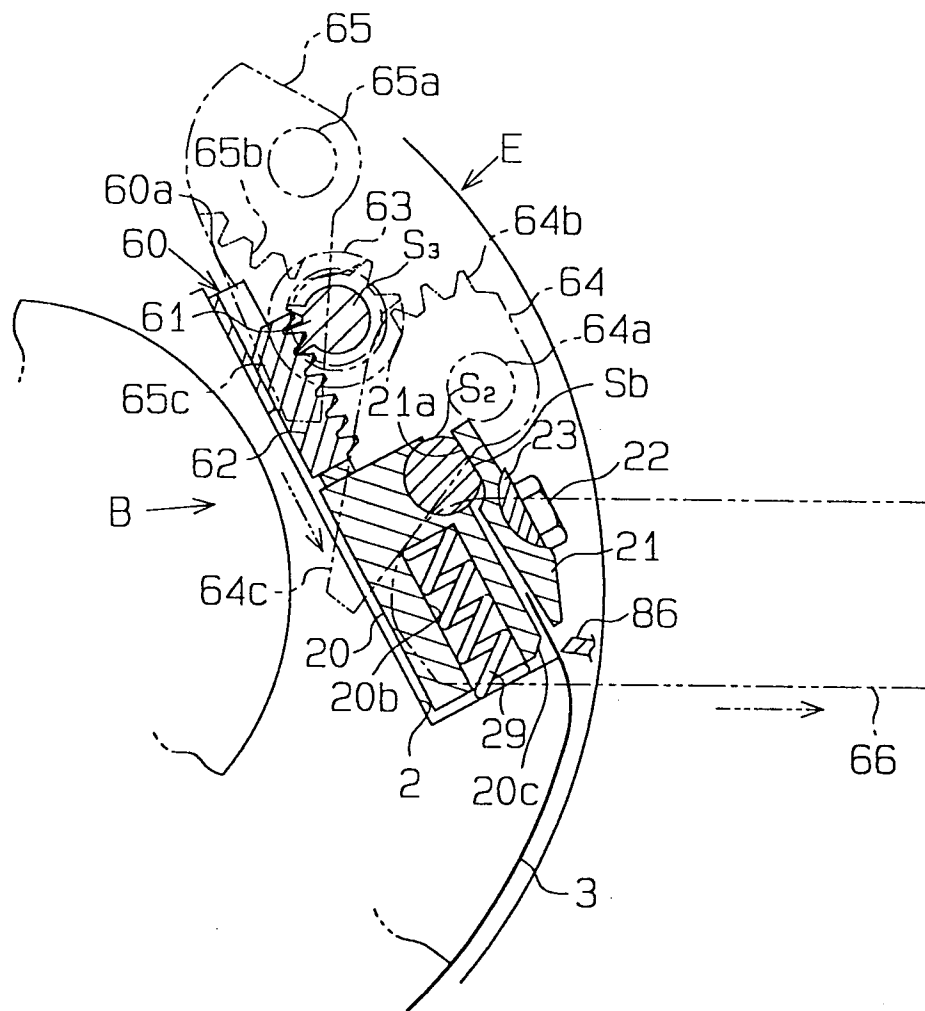


Fig.13

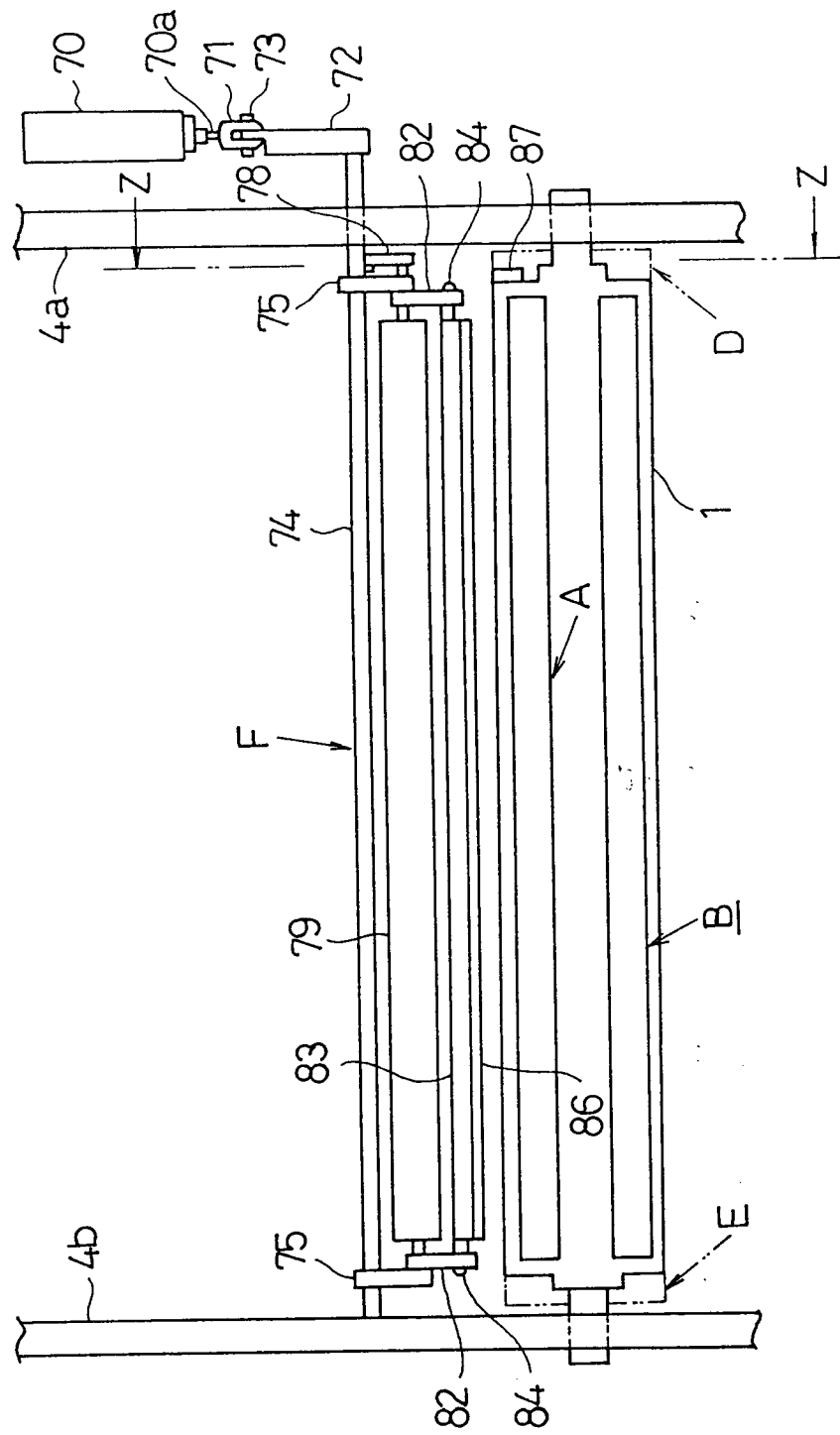


Fig. 14

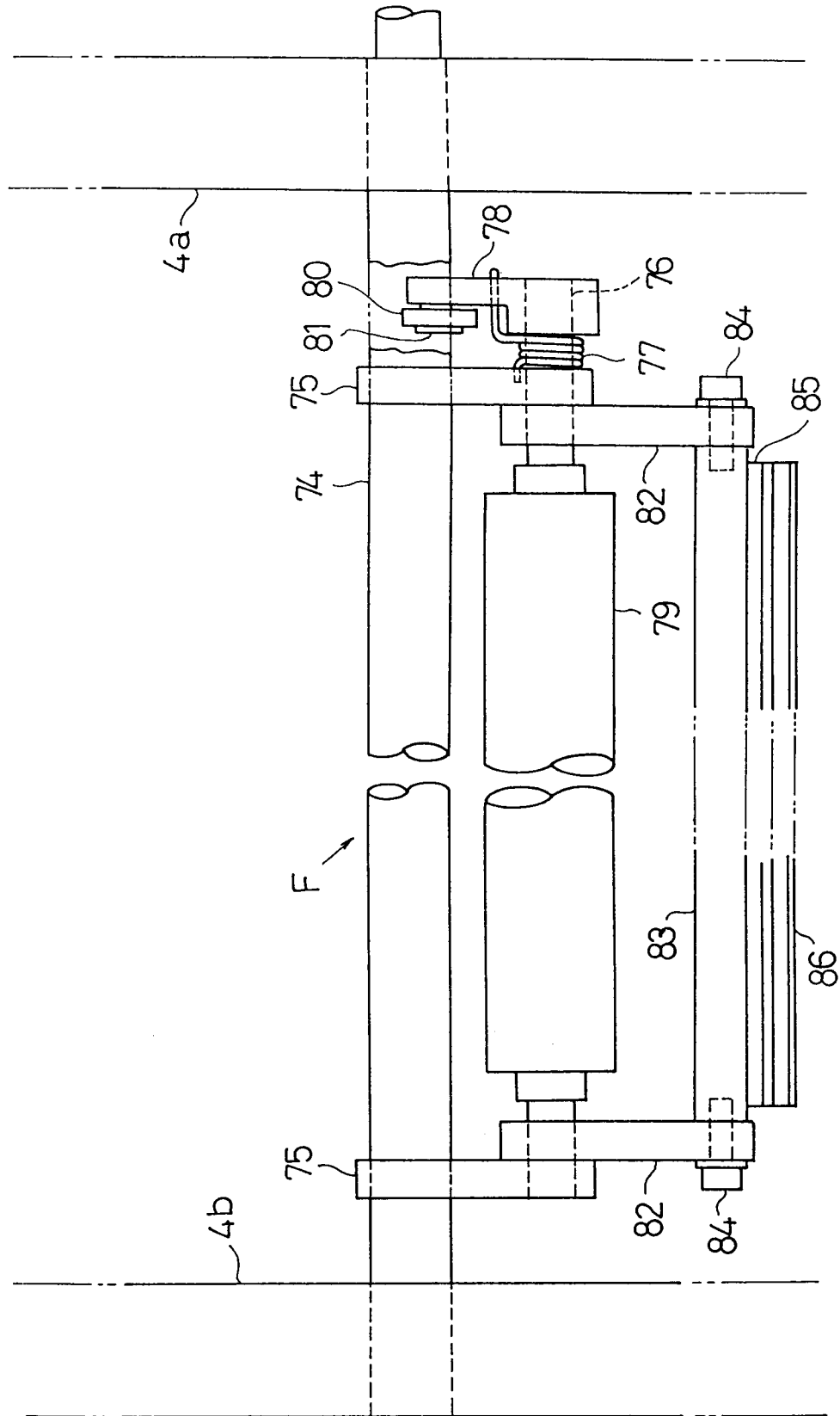
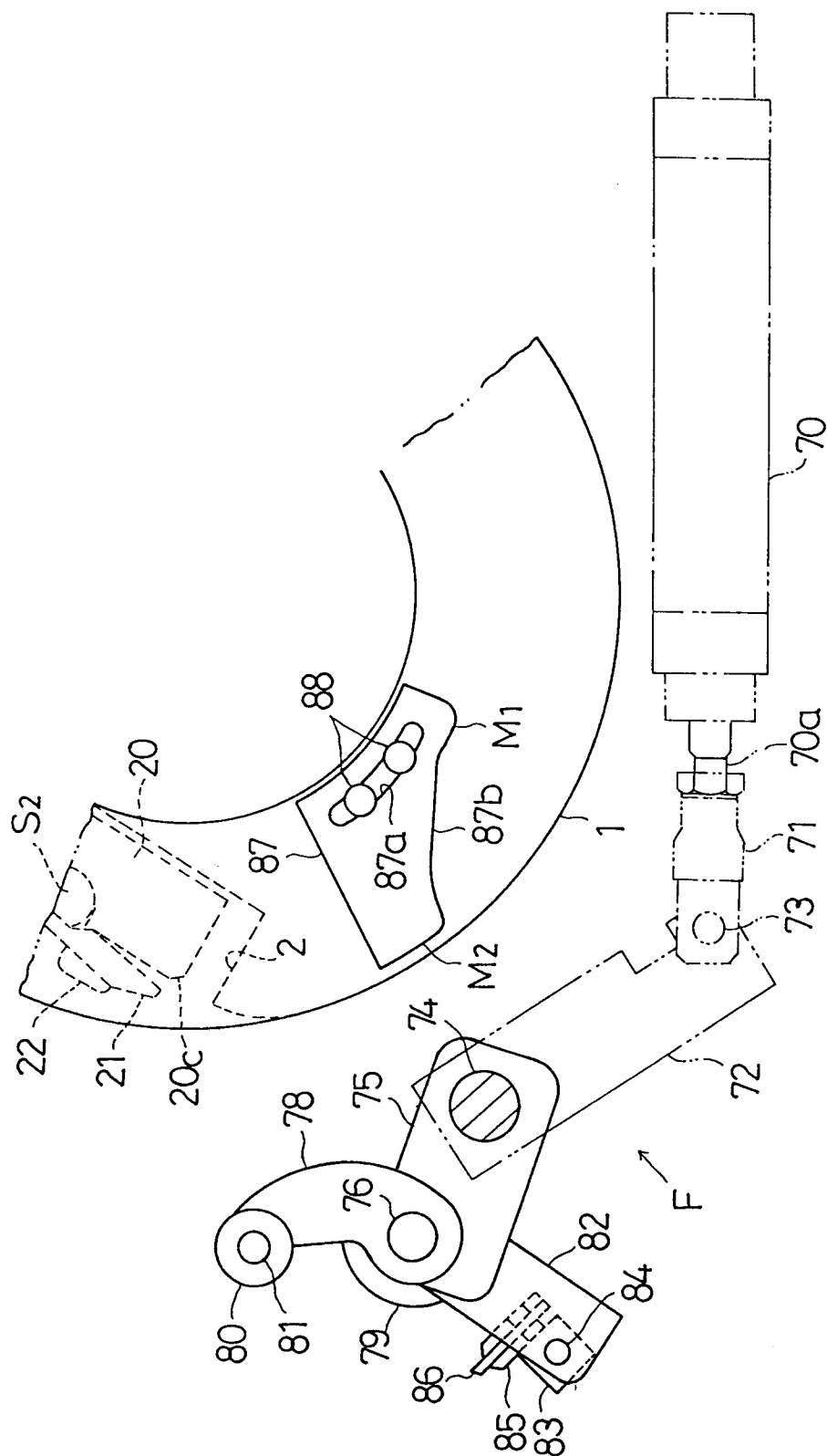


Fig. 15



16.19.16

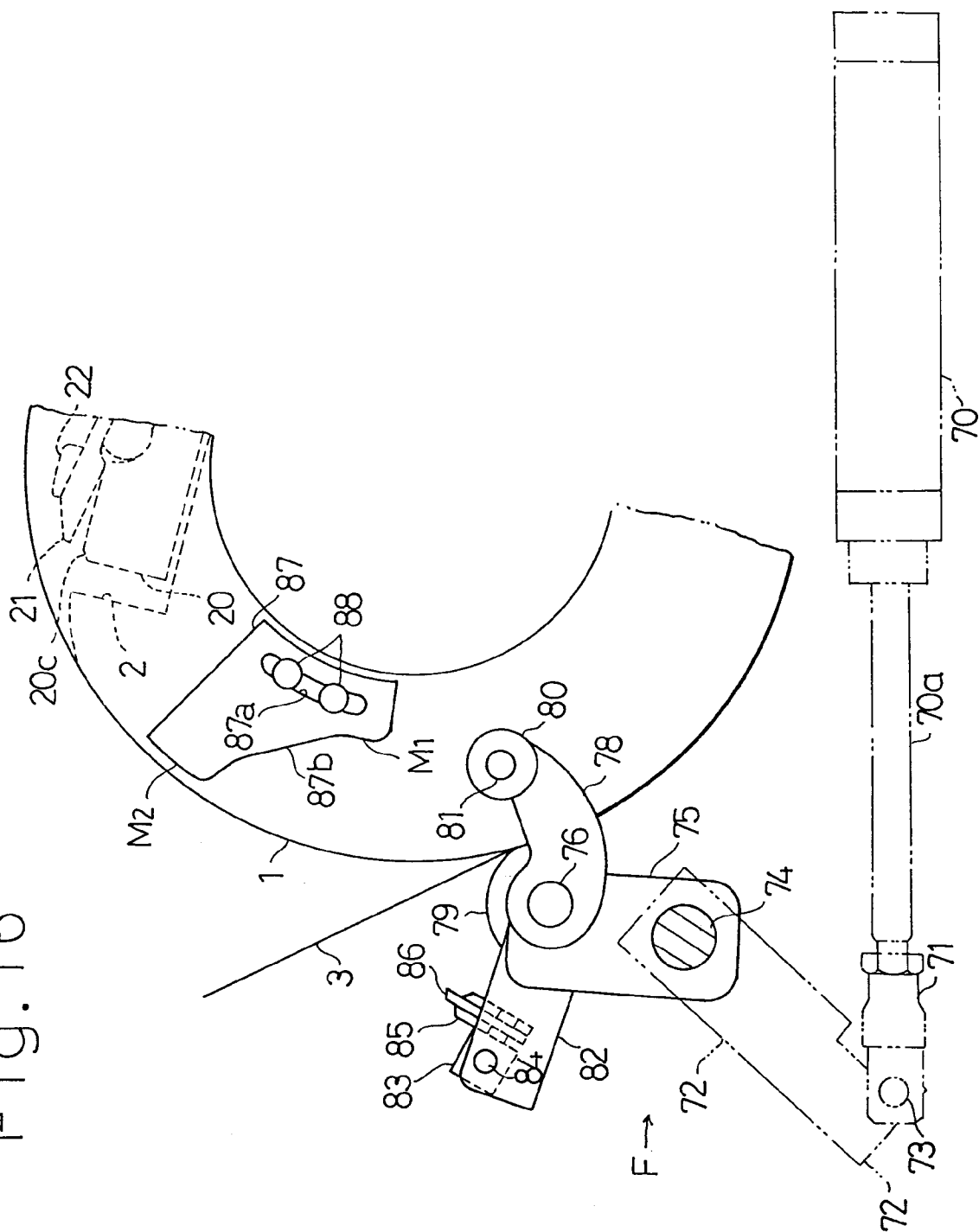


Fig. 17

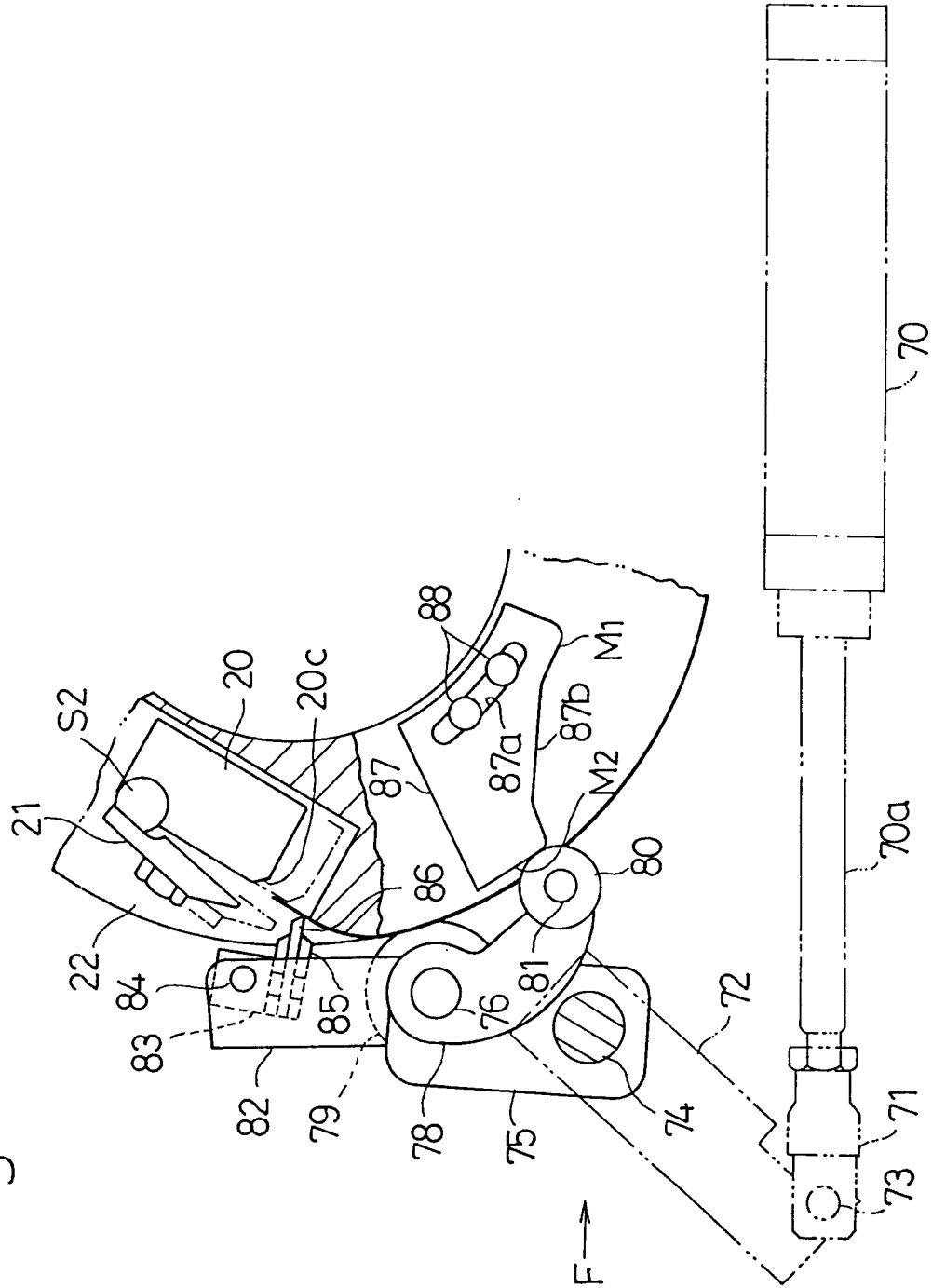


Fig. 18

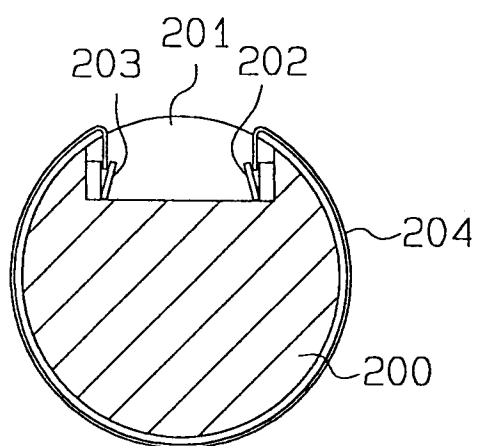
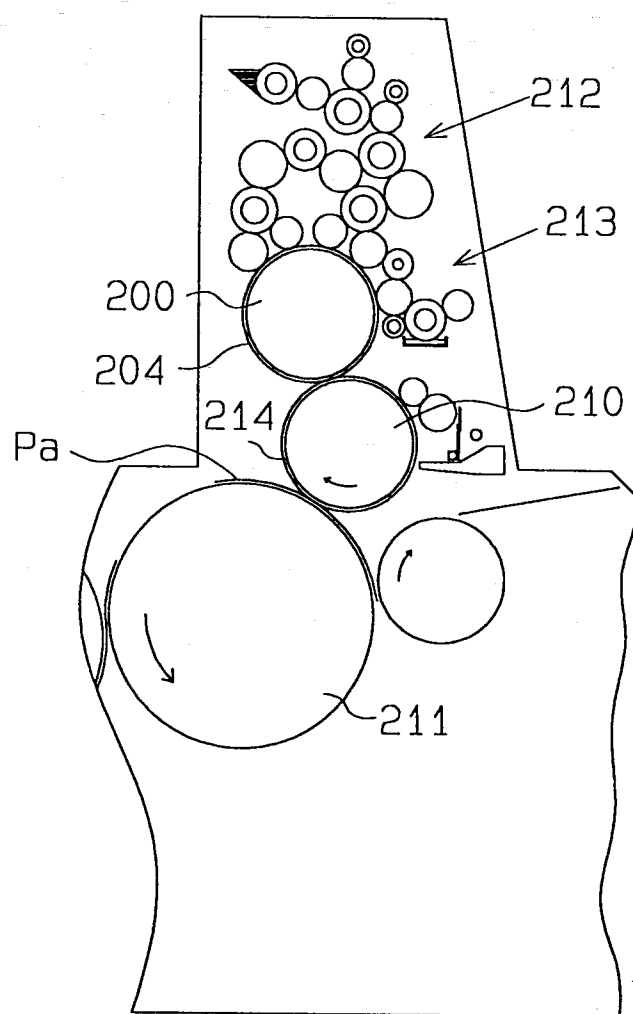


Fig. 19





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 81 0357

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	EP-A-0 426 022 (MAN MILLER DRUCKMASCHINEN GMBH) * column 5, line 55 - column 7, line 57 * * claim 1; figures 3-5 * ---	1-6	B41F27/12
A	DE-A-38 43 395 (VEB KOMBINAT POLYGRAPH "WERNER LAMBERZ") ---		
A	EP-A-0 508 113 (MAN ROLAND DRUCKMASCHINEN AG) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B41F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		15 February 1994	Bourseau, A-M
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