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(54) Plate clamping device for offset press

Vorrichtung zum Spannen von Druckplatten an Offsetdruckmaschinen

Dispositif de serrage des plaques d'impression pour une presse à imprimer

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EP 0 595 760 B1

Description

The present invention relates to a plate clamping device as per defined in the preamble of claim 1, for use in an offset press. More particularly, the present invention pertains to a mechanism which is able to adequately adjust a torsion of a printing plate with respect to a plate cylinder.

A clamping device according to the preamble of the independent claim 1 is disclosed in US-3.156.184. The clamping device described there does not allow for adjustment or compensation of torsion of a printing plate relative to a plate cylinder.

Fig. 22 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 Figs. 20 and 21, 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 forcively 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.

As shown in Fig. 21, the first clamp 202 is fixed to the cylinder 200. A pair of torsion adjusting screws 208, 209 is disposed in the distal end of the second clamps 205, 206, so as to be advanced or retreated. The distal end of each torsion adjusting screws 208, 209 is in contact with the inner wall of the groove 201, respectively.

The plate 204 mounted on the cylinder 200 is under the torsion as shown in the chain line in Fig. 21. This torsion can be eliminated by retreating the screw 208 and advancing the screw 209 to move the second clamps 205, 206 for expanding the end of the plate 204.

However, two screws 208, 209 at the both ends of each clamp 205, 206 must be manipulated by turn to adjust the torsion of the printing plate 204. This troublesome adjusting operation causes the efficiency of the work to be lowered.

Therefore, it is an object of the present invention to provide a plate clamping device wherein the torsion of a printing plate can be easily adjusted. A plate clamping according to this invention is characterized by the features of the characterizing part of claim 1.

In the above plate clamping device, if the printing plate is twisted in respect with the plate cylinder, the screw is advanced or retreated to adjust the torsion. Then, the plate clamping mechanism is moved in the axial direction of the plate cylinder while being forcively supported in a groove by biasing members. Subsequently, the printing plate is moved together with the plate clamping mechanism. As a result, the torsion of the printing plate is adjusted.

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 development of the plate cylinder;

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

Figure 8 is a side view showing a second clamp adjusting mechanism;

Figure 9 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 10 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 11 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 12 is a side view showing a moving mechanism;

Figure 13 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 14 is a cross sectional view showing a central part of the first plate clamp;

Figure 15 is a plan view showing the plate cylinder and a plate holding mechanism;

Figure 16 is a plan view showing the plate holding mechanism;

Figure 17 is a cross sectional view taken along line Z-Z of Fig. 15, illustrating the state after a roller of the plate holding mechanism is positioned in the waiting position;

Figure 18 is a cross sectional view taken along line Z-Z of Fig. 15 , illustrating the state after a roller of the plate holding mechanism is positioned in the working position;

Figure 19 is a cross sectional view taken along line Z-Z of Fig. 15, illustrating the state after a blade of the plate holding mechanism holds the bottom end of the printing plate;

Figure 20 is a diagrammatic cross sectional view showing the conventional plate cylinder;

Figure 21 is a development of the conventional plate cylinder; and

Figure 22 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 19.

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 (Figs. 6 and 9) 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 in the same 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. 15, 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. 9) 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.

The second plate clamp B has at its each end an adjusting mechanism C for adjusting the torsion of the plate 3 with respect to the cylinder 1. 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 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 clamp A or away therefrom.

The first clamp A is hereinafter described.

As shown in Figs. 9, 14, a longitudinally extending clamping block 10 is disposed in the groove 2. A bearing 19 is fixed to the central portion of the clamping block 10. The clamping block 10 is rotatably attached to the cylinder 1 by a bolt 9. The bolt 9 is inserted through the clamping block 10 and the bearing 19, and screwed into the inner bottom of 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 Figs. 11, 16, 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. 9, 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. 9, 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. 10, 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 clamp B will be described hereinafter.

As shown in Figs. 2, 9, a pair of clamping blocks 20 are spaced in the groove 2. Each clamping block 20 can be moveable between two positions shown by solid line in Figs. 9 and 11, respectively.

A moveable clamping plate 21 is disposed on the top of each clamping block 20. The plates 21 are attached to the blocks 20 by means of bolts 22. The plate 21 are allowed to upward or downward movement. The bolt 22 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. Each clamping block has a cam way 20a extending longitudinally at the top of the inner end of each block 20. A chipped portion 21a is formed at the bottom of the inner end of each 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. 9, each block has a plurality of spring housing holes 25 facing the plates 21 at the opposite side of the cam way 20a with respect to the bolt 22. Each 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 each clamping plate 21 is biassed in the opening direction with respect to the block 20. Therefore, as shown in Fig. 9, 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. 11, when the cam face Sb is not in contact with the step 21a, the outer end of each plate 21 is kept in the closed position by the spring 24.

Each block 20 has an outer end protruding from the outer end of each clamping plate 21. A chamfer 20c is formed with the end corner of each block 20 in order to guide the plate 3 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 13, a plurality of spring housing holes 20b are provided with each blocks 20. A plurality of coil springs 29 is held between holes 20b and the inner surface of the groove 2. Each block 20 is biassed against the first clamp A by the force of each spring 29.

As shown in Fig. 5, a hole 36 is formed on the right side of the block 20. In the hole 36 is disposed a plunger 37 with a coil spring 35. The plunger 37 is arranged to slide in the axial direction of the cylinder 1. A ball 37a rotatably supported at the outer end of the plunger 37 is in contact with the side wall 2b. The right end of the plunger 37 is biassed to the side wall 2b by the force of the spring 35.

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 in the axial direction of the plate cylinder 1 by adjusting the amount of the inserting

length of the female screw 38 into the clamping block 20.

The clamp activating mechanism D will be hereinafter described.

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

As shown in Figs. 7, 9 and 10, 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 (not illustrated) 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. 7, and the lever 43 is pivoted counterclockwise. Subsequently, as shown in Fig. 10, 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. 7. Subsequently, the cam shaft S1 is turned in the clamping direction when the plate 3 is to be seized. Then, each 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. 8 and 11, 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. 8. Then, as shown in Fig. 11, 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. 8. Then, the cam shaft S2 is turned in the reverse direction reverse 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 Fig. 13, a rack 62 fixed to inner surface of each 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. 12 and 13, 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 second 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 portions 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 cyl-

inder (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. 12.

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 each block 20 is moved against the force of the spring 29 from the waiting position of Fig. 10 to the clamping position of Fig. 13.

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. 11 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. 13, the shaft S3 is turned clockwise. Resultingly, the first and second levers 64, 65 return to the solid line position shown in Fig. 12 before the plate 3 is clamped.

A plate holding mechanism F is hereinafter explained.

As shown in Figs. 15 and 17, 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. 16 and 18, 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. 17, the roller 79 is located in the waiting position. When the rod 70a is in the extended state in Fig. 18, 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. 16, 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. 18 and 19, 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 86 protrudes from the clamping plates 85. A second end of the blade 86 is formed slant.

As shown in Figs. 15, 18 and 19, 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. 9, 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 and the lever 40 is pivoted clockwise.

Subsequently, the cam shaft S1 is turned clockwise as shown in Fig. 12, 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. 7, 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 turns the cylinder 1 in the counterclockwise direction viewed in Fig. 12. Subsequently, as shown in Fig. 8, the cylinder 1 comes to stop at the position where the roller 51 meets the arm 42.

As shown in Fig. 18, 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. 10 and 18. 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. 19, 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. 16). 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. 8, the roller 51 is kept at the stopping position to meet the arm 42. As shown in Fig. 12, the arm 66 is moved by the air cylinder (not illustrated) in the radial direction of the cylinder 1 (shown by the chain line arrow) 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. 13, 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 direction of the cylinder 1 as shown with the chain line arrow in Fig. 8. Then, when the roller 51 is beaten by the driving arm 42, the lever 50 is pivoted counterclockwise. Simultaneously, as shown in Fig. 11, 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.

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. 13. As a result, the first and second levers 64, 65 are pivoted counterclockwise in Fig. 12, 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. 13. 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. 8. 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. 9 and 10. Then, the plate cylinder 1 is turned for releasing the roller 45 to move and meet the end of the arm 42. Then, the end of the arm 42 is beaten by the roller 45. Simultaneously, the roller 41 is beaten by the portion 43b, and turned in the releasing direction , i.e. counterclockwise viewed in Fig. 7. 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.

After the plate 3 is mounted on the cylinder 1, the widths of the plate 3 is adjusted by moving the second clamp B in the axial direction of the cylinder 1. Now, the explanation will be given in connection with the total distortion case where the top and bottom ends of the plate 3 clamped by the first and second clamps A, B, respectively, are not conformable as shown in Fig. 6.

The nut 39b is turned to advance the bolt 39 in the protruding direction of the chain line arrow in Fig. 3. The spring 35 is compressed, as shown in Fig. 5, for moving the blocks 20 of the second clamp B in the direction of the chain line arrow against the spring force.

Therefore, as shown in Fig. 6, when the second clamp B is moved rightwardly with respect to the cylinder 1, the first clamp A is rotated about the bolt 9. The bottom end of the plate 3 is moved in the direction of the chain line arrow. The undesirable inconformity between the top and bottom ends of the plate 3 is, thus, corrected by the displacement of the bottom end accordingly. As a result, the plate 3 is squarely spread on the cylinder 1.

On the contrary, when the top end of the plate 3 clamped by the first clamp A is displaced leftwardly while the bottom end seized by the second clamp B is moved rightwardly in Fig. 7, the entire plate 3 is twisted. In this case, the bolt 39 is turned so as to retreat into the second clamp B. Then, the bottom end of the plate 3 is moved leftwardly. As a result, the torsion of the plate 3 is eliminated.

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 (100) including

   a plate cylinder (1) for carrying a printing plate

(3), said printing plate (3) having a first and second ends;

a first clamping mechanism (A) for clamping the first end of the printing plate (3);

a second clamping mechanism (B) for clamping the second end of the printing plate (3);

a groove (2) for accommodating the first (A) and second (B) clamping mechanisms;

one of the first (A) and second (B) clamping mechanisms being arranged to be moveable in the axial direction of the plate cylinder (1) and;

a screw (39; C) connected to a first end of the moveable clamping mechanism (B) to move the clamping mechanism (B) in the axial direction of the plate cylinder (1) for adjusting the twist of the printing plate (3); characterized in

that the other one of clamping mechanisms (A) is rotatably supported in the groove (2); and

by a biasing member (36, 37, 37a, 2b) disposed at a second end of the moveable clamping mechanism (B) to press the screw (39; C) against the inner surface (2c) of the groove (2).

2. A device according to claim 1, wherein each of the clamping mechanisms (A; B) includes a block (10; 20) and an openable member (12; 21) for clamping the end of the printing plate (3) in cooperation with the block (10; 20).

3. A device according to claim 2, wherein the openable member (12; 21) is closed by a cam shaft (S1; S2), which is held between a groove (10a; 20a) extending on the block (10; 20) and a step (12a; 21a) formed with the openable member (12; 21), and opened by a biasing force of spring means (15; 25) disposed between the block (10; 20) and the openable member (12; 21).

4. A device according to the precedent claims, wherein the biasing means includes a coil spring (35).

5. A device according to claim 3 further including an activating mechanism (E) connected to the cam shaft (S1; S2), said activating mechanism (E) activating the clamp mechanism (A; B) to perform the clamping operation.

Patentansprüche

1. Vorrichtung zum Einspannen von Platten an einer Offset-Druckmaschine (100) welche umfasst:

einen Plattenzylinder (1) für die Aufnahme einer Druckplatten (3), wobei diese Druckplatten (3) ein erstes Ende und ein zweites Ende aufweisen;

eine erste Spannvorrichtung (A) zum Einspannen des ersten Endes der Druckplatte (3);

eine zweite Spannvorrichtung (B) zum Einspannen des zweiten Endes der Druckplatte (3);

eine Nute (2) für die Aufnahme der ersten (A) und zweiten (B) Spannvorrichtung

wobei die erste (A) und die zweite (B) Spannvorrichtung so ausgebildet sind, dass sie in axialer Richtung des Plattenzylinders (1) bewegt werden können und;

mit einer Schraube (39; C), welche mit einem ersten Ende der bewegbaren Spannvorrichtung (B) verbunden ist, um die Spannvorrichtung (B) in axialer Richtung des Plattenzylinders (1) zu bewegen und um die Verspannung der Druckplatte (3) auszugleichen, dadurch gekennzeichnet, dass

die andere Spannvorrichtung (A) in der Nute (2) drehbar abgestützt ist; und

dass ein Vorspannglied (36, 37, 37a, 2b) an einem zweiten Ende der bewegbaren Spannvorrichtung (B) angeordnet ist, um die Schraube (39; C) gegen die innere Oberfläche (2c) der Nute (2) zu pressen.

2. Vorrichtung nach Anspruch 1, bei welcher jede der Spannvorrichtungen (A; B) einen Block (10; 20) und ein Glied zum Öffnen (12; 21) aufweist, um zusammen mit dem Block (10; 20) das Ende der Druckplatte (3) einzuspannen.

3. Vorrichtung nach Anspruch 2, bei welcher das Glied zum Öffnen (12; 21) mit einer Nockenwelle (S1; S2) geschlossen wird, welche zwischen einer Nute (10a; 20a) und einem Absatz (12a; 21a), der mit dem Glied zum Öffnen (12, 21) gebildet wird und der mit der Spannkraft einer Federeinrichtung (15; 25) geöffnet wird, welche zwischen dem Block (10; 20) und dem Glied zum Öffnen (12; 21) angeordnet ist.

4. Vorrichtung nach den vorherstehenden Ansprüchen, bei welcher die Spanneinrichtung eine Schraubenfeder (35) umfasst.

5. Vorrichtung nach Anspruch 3, welche weiter eine Betätigungseinrichtung (E) aufweist, die mit der Nockenwelle (S1; S2) verbunden ist, wobei die Betätigungseinrichtung (E) und die Spannvorrichtung (A; B) den Einspannvorgang ausführen.

Revendications

1. Dispositif de serrage de plaque pour utilisation dans une machine de presse offset (100) incluant

un cylindre porte-clichés (1) pour porter une plaque d'impression (3), ladite plaque d'impression (3) ayant des première et deuxième extrémités ;

un premier mécanisme de serrage (A) pour serrer la première extrémité de la plaque d'impression (3) ;

un deuxième mécanisme de serrage (B) pour serrer la deuxième extrémité de la plaque d'impression (3) ;

une rainure (2) pour loger les premier (A) et deuxième (B) mécanismes de serrage ;

l'un parmi le premier (A) et deuxième (B) mécanismes de serrage étant agencés pour être déplaçables dans la direction axiale du cylindre porte-clichés (1) et ;

une vis (39; C) reliée à une première extrémité du mécanisme de serrage mobile (B) pour déplacer le mécanisme de serrage (B) dans la direction axiale du cylindre porte-clichés (1) pour ajuster la torsion de la plaque d'impression (3) ; caractérisé en ce que

l'autre des mécanismes de serrage (A) est supporté à rotation dans la rainure (2) ; et par un élément de sollicitation (36, 37, 37a, 2b) disposé à une deuxième extrémité du mécanisme de serrage mobile (B) pour presser la vis (39; C) contre la surface intérieure (2c) de la rainure (2).

2. Dispositif selon la revendication 1, dans lequel chacun des mécanismes de serrage (A; B) comporte un bloc (10; 20) et un élément ouvrant (12; 21) pour serrer l'extrémité de la plaque d'impression (3) en coopération avec le bloc (10; 20).

3. Dispositif selon la revendication 2, dans lequel l'élément ouvrant (12; 21) est fermé par un arbre à cames (S1; S2), qui est tenu entre une rainure (10a; 20a) s'étendant sur le bloc (10; 20) et un gradin (12a; 21a) présentant l'organe ouvrant (12; 21), et ouvert par une force de sollicitation du moyen de ressort (15; 25) disposé entre le bloc (10; 20) et l'élément ouvrant (12; 21).

4. Dispositif selon les revendications précédentes, dans lequel le moyen de sollicitation inclut un ressort hélicoïdal (35).

5. Dispositif selon la revendication 3, incluant en outre un mécanisme d'activation (E) relié à l'arbre à cames (S1; S2), ledit mécanisme d'activation (E) activant le mécanisme de serrage (A; B) pour exécuter l'opération de serrage.

Fig.1

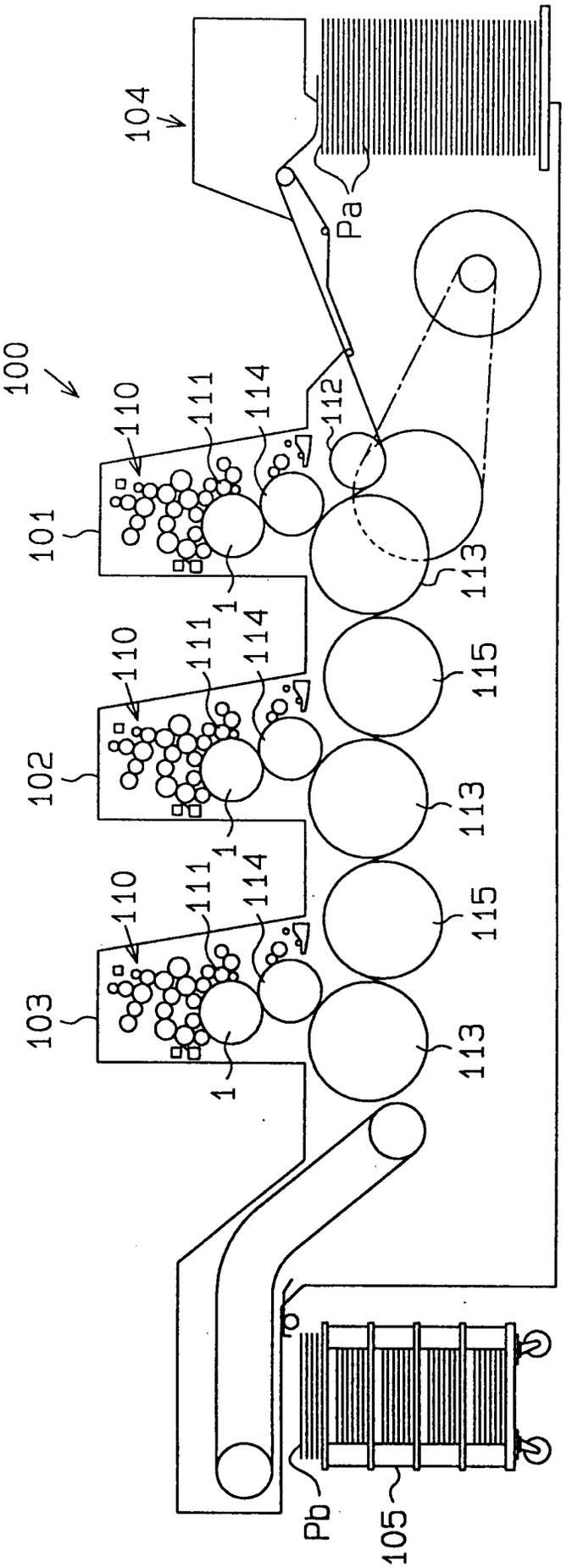


Fig.2

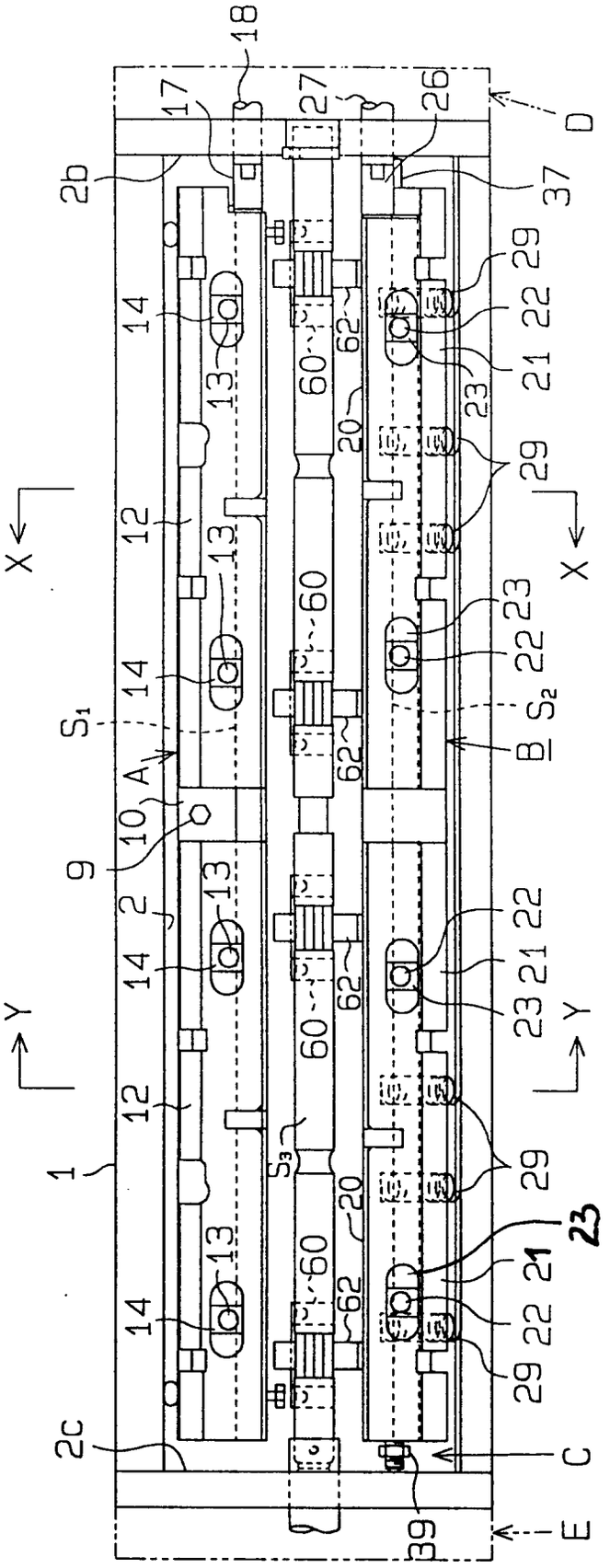

18
17
27
26
D
2b
37
29
22
21
23
14
62
60
20
13
12
X
S_1
S_2
B
A
10
9
2
1
S_3
2c
C
E
39

Fig.3

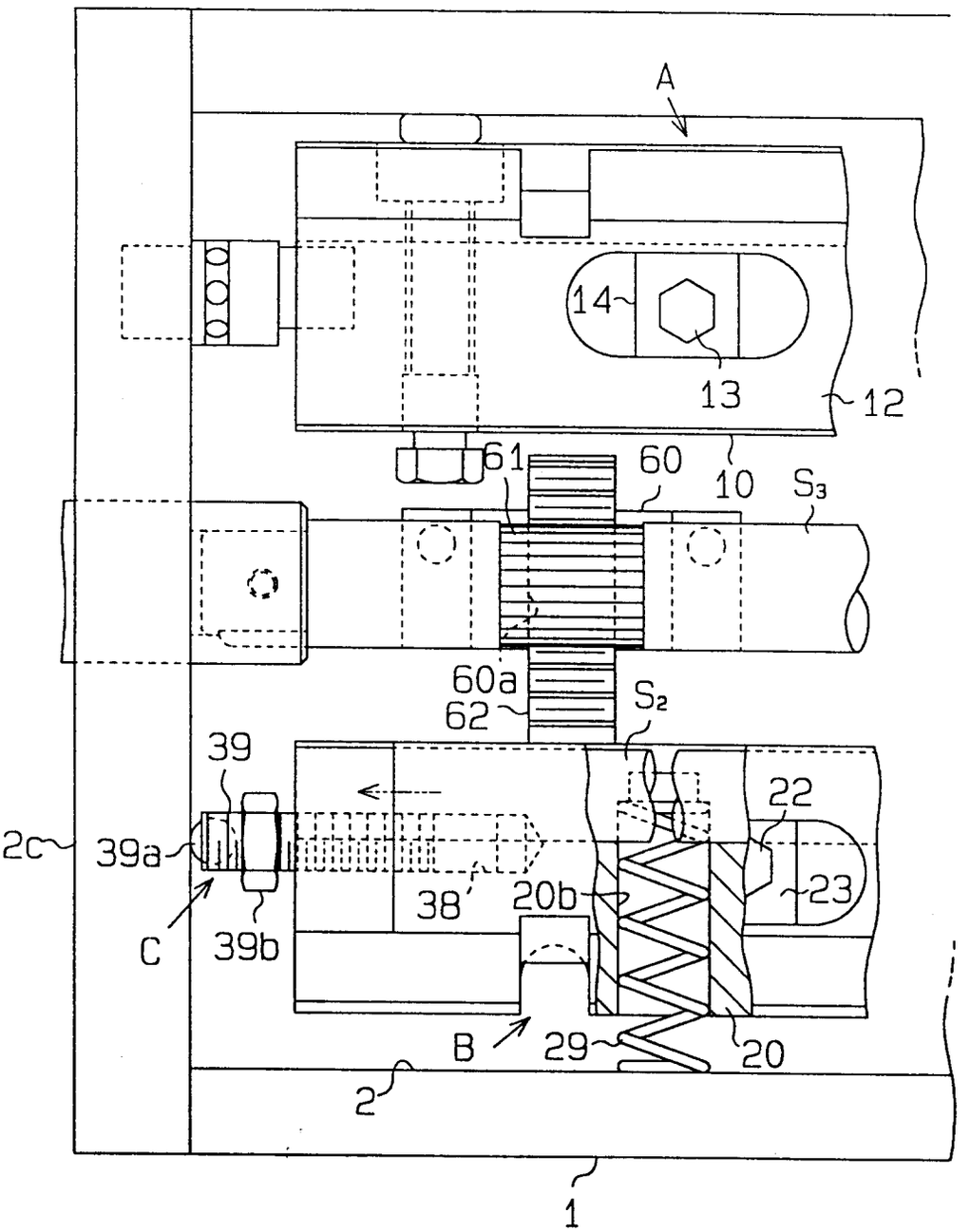


Fig.4

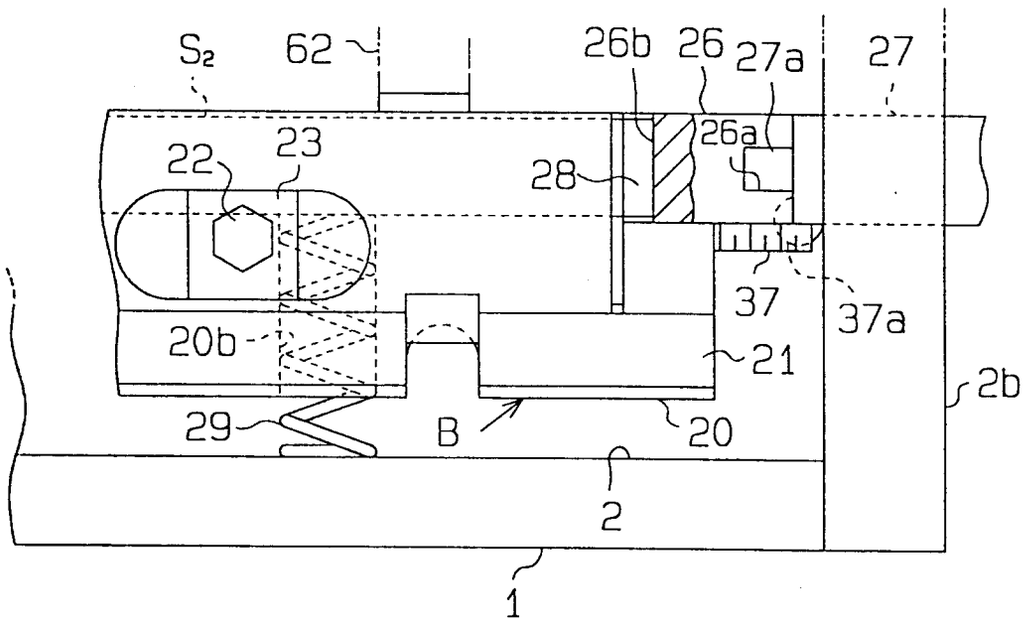

S2
62
26b
26
27a
27
22
23
28
26a
37
37a
20b
21
2b
29
B
20
2
1

Fig.5

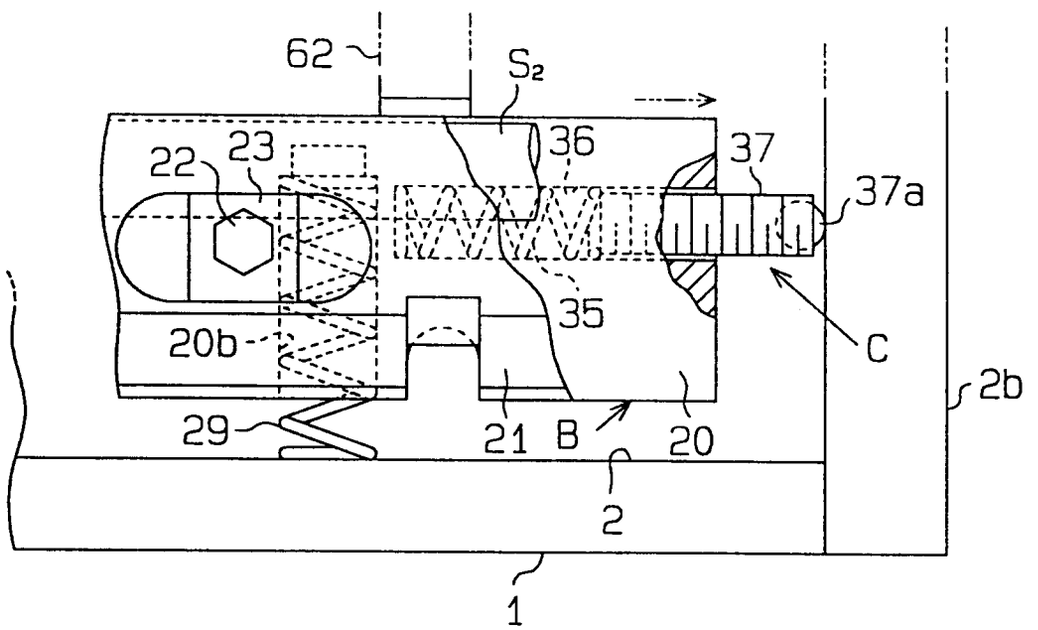

62
S2
36
37
22
23
37a
35
C
20b
2b
29
21
B
20
2
1

Fig.6

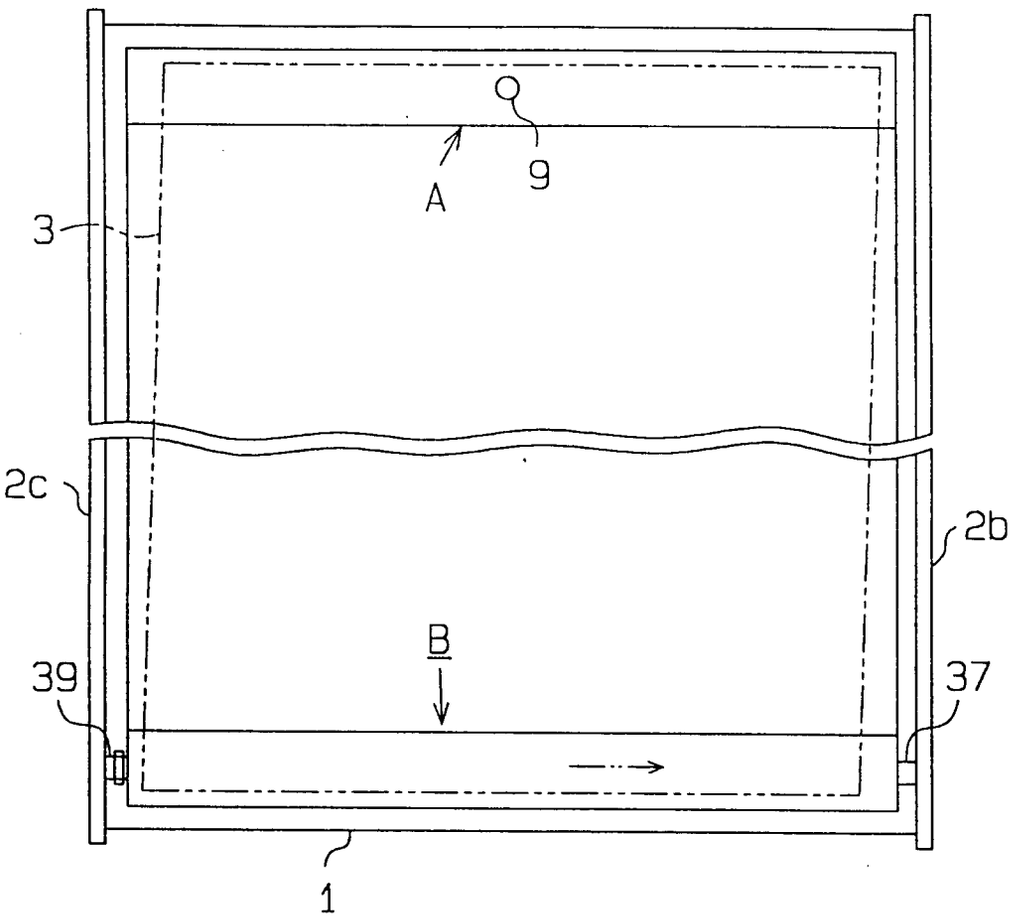


Fig.7

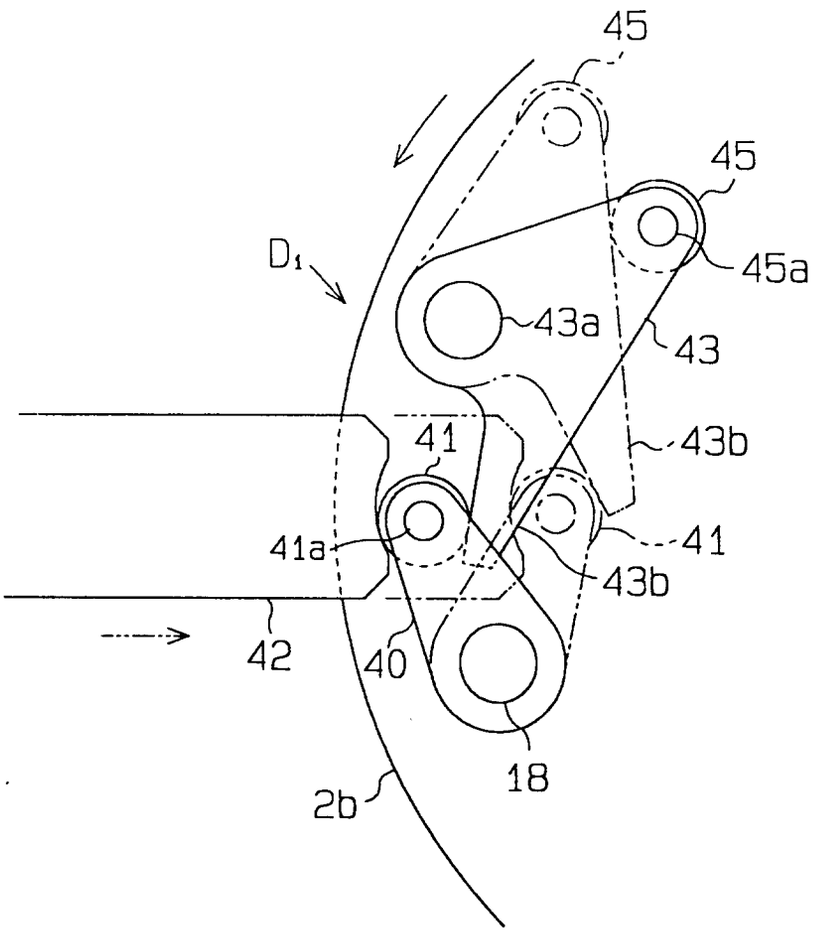


Fig.8

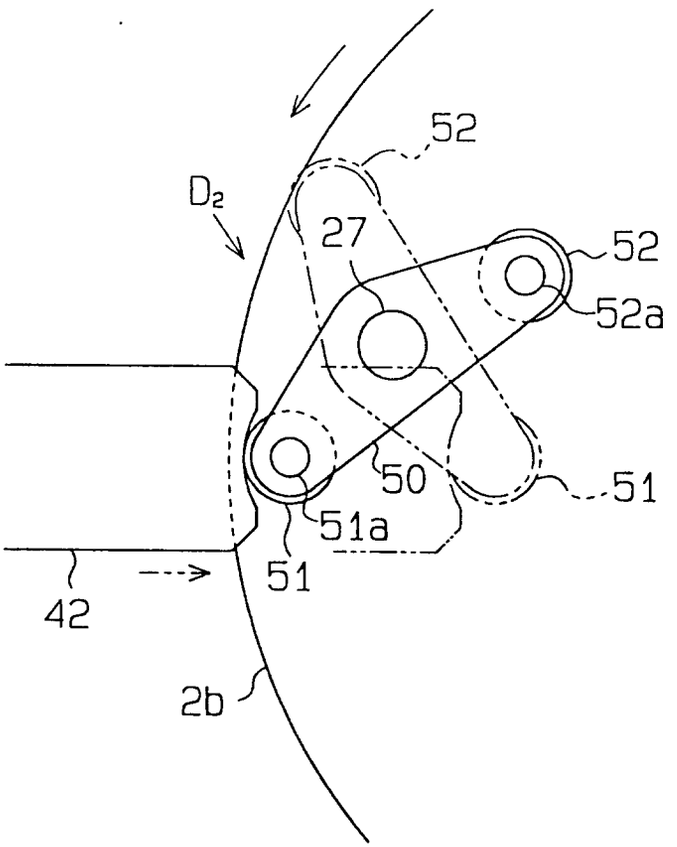


Fig.9

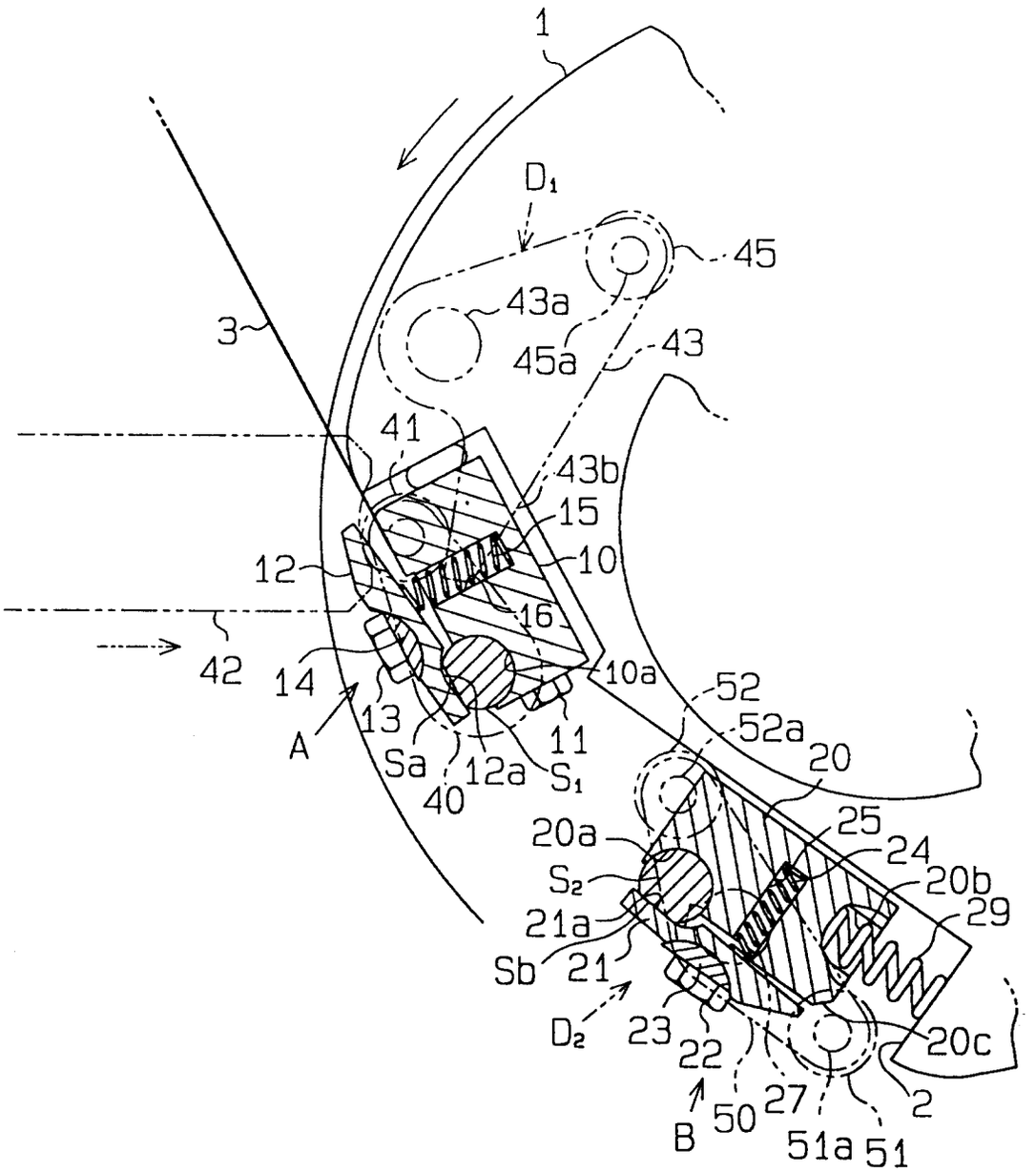

1
D1
45
43a
3
45a
43
41
43b
15
12
10
16
42
14
10a
52
52a
A
13
11
20
Sa
12a
S1
40
20a
25
24
S2
20b
21a
29
Sb
21
D2
23
22
20c
B
50
27
2
51a
51

Fig.10

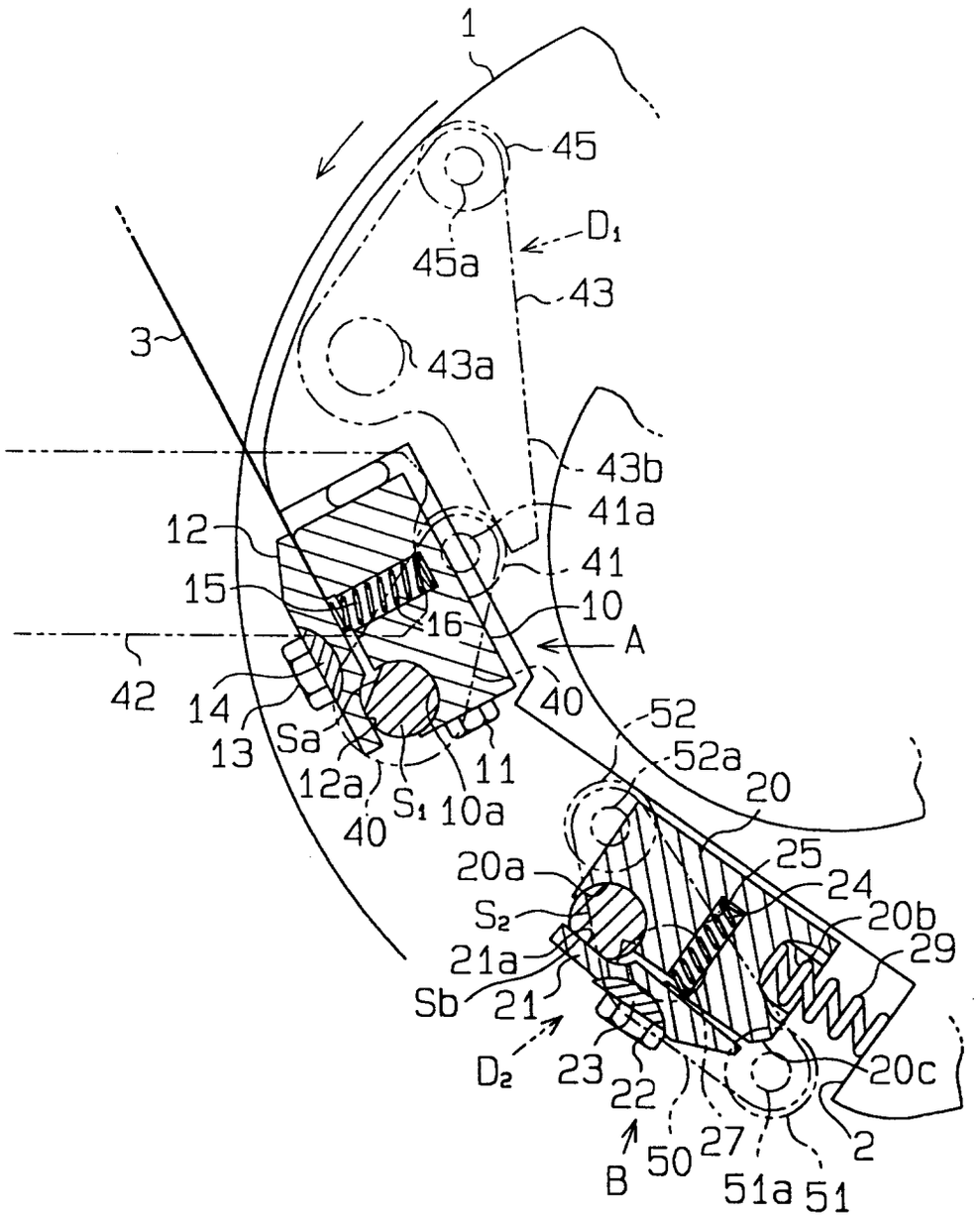

1
45
45a
D1
43
3
43a
43b
41a
12
41
15
10
16
A
42
14
40
52
13
Sa
52a
12a
11
20
S1
10a
40
20a
25
24
S2
20b
21a
29
Sb
21
D2
23
22
20c
B
50
27
2
51a
51

Fig.11

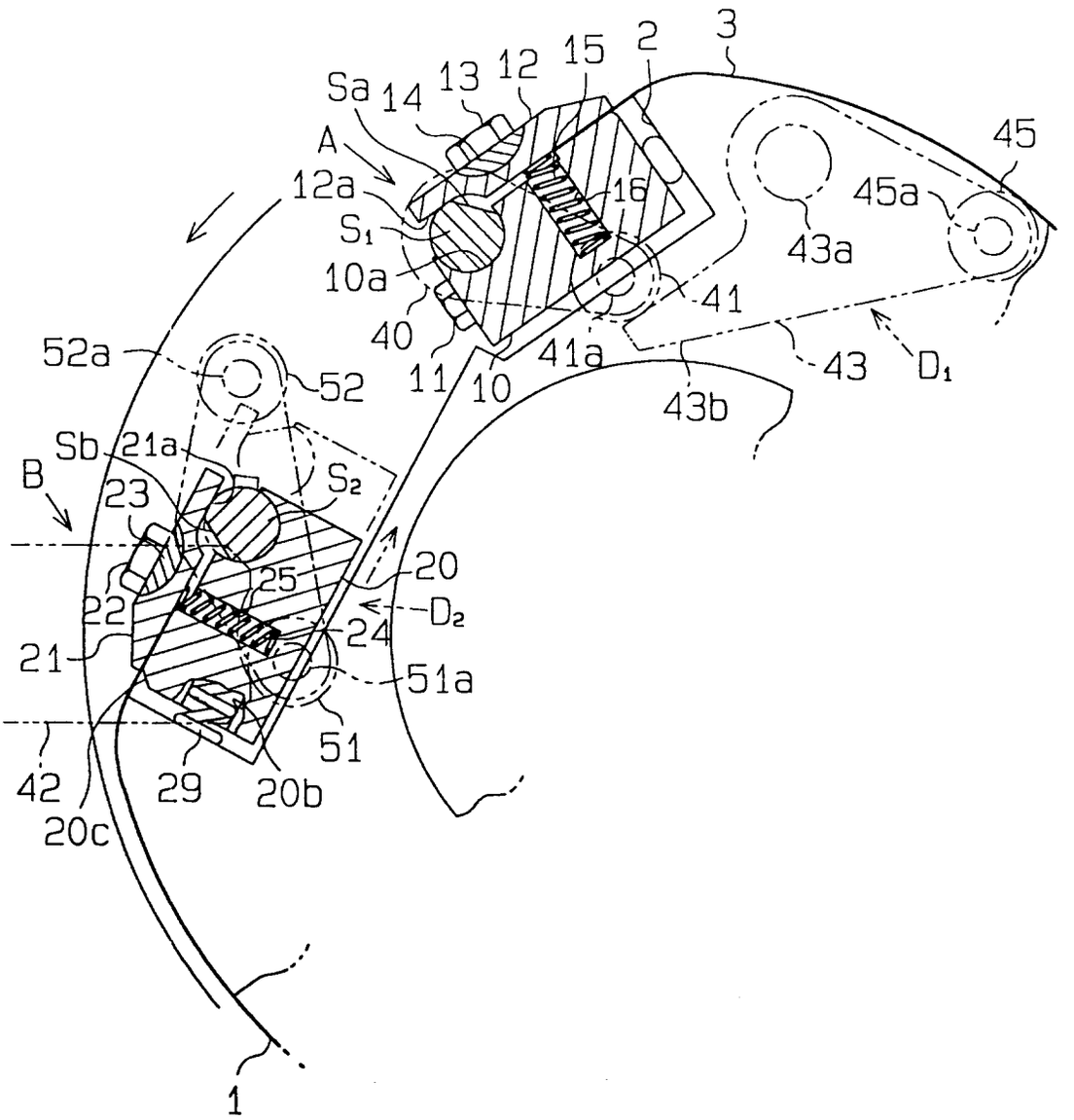

Sa
14
13
12
15
2
3
A
12a
16
45
45a
S_1
10a
43a
41
40
11
10
41a
43
D_1
52a
52
43b
Sb
21a
B
23
S_2
20
25
22
D_2
24
21
51a
51
42
29
20b
20c
1

Fig.12

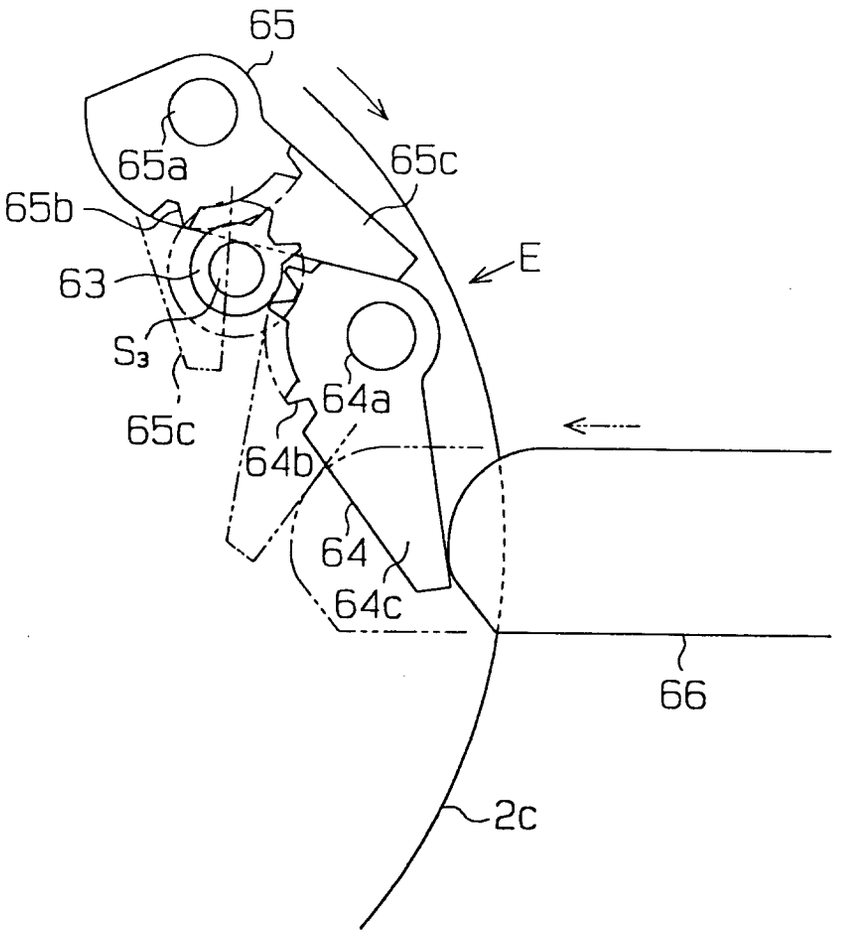


Fig.13

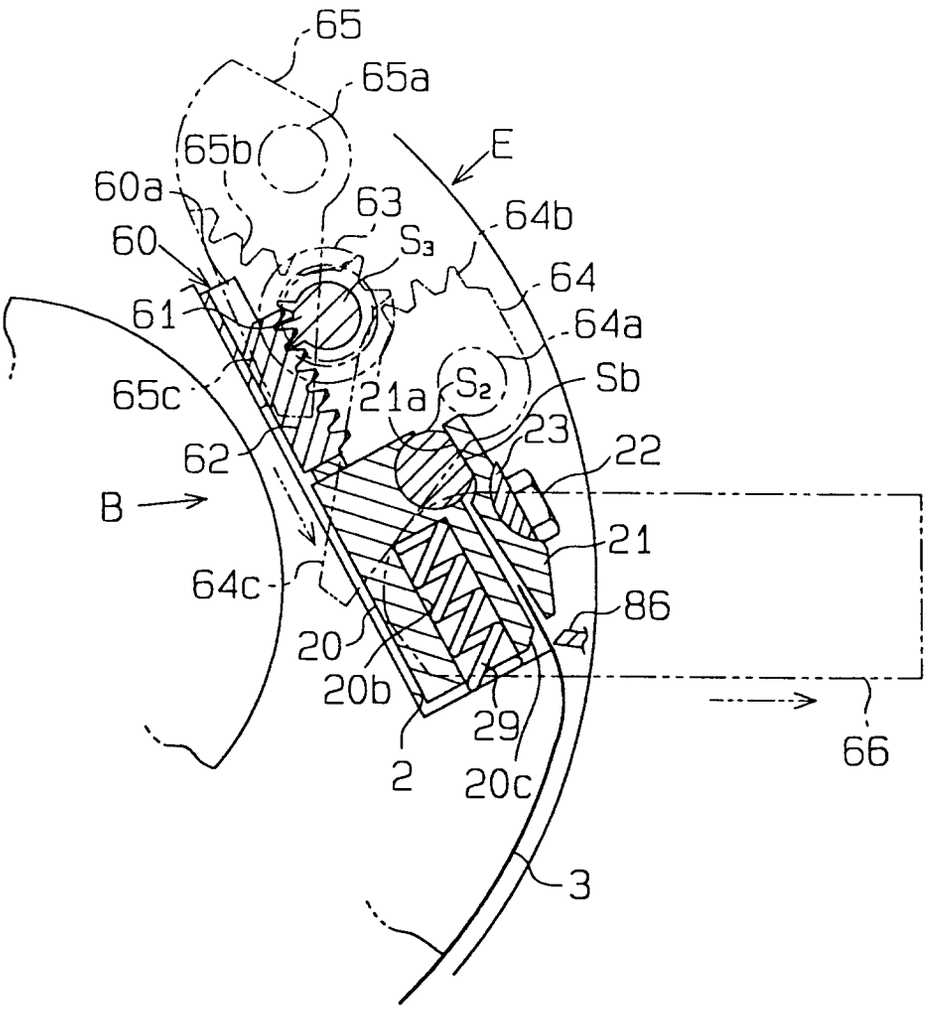

65
65a
65b
E
60a
63
64b
60
S3
64
61
64a
65c
21a
S2
Sb
23
62
22
B
21
64c
86
20
20b
29
66
2
20c
3

Fig.14

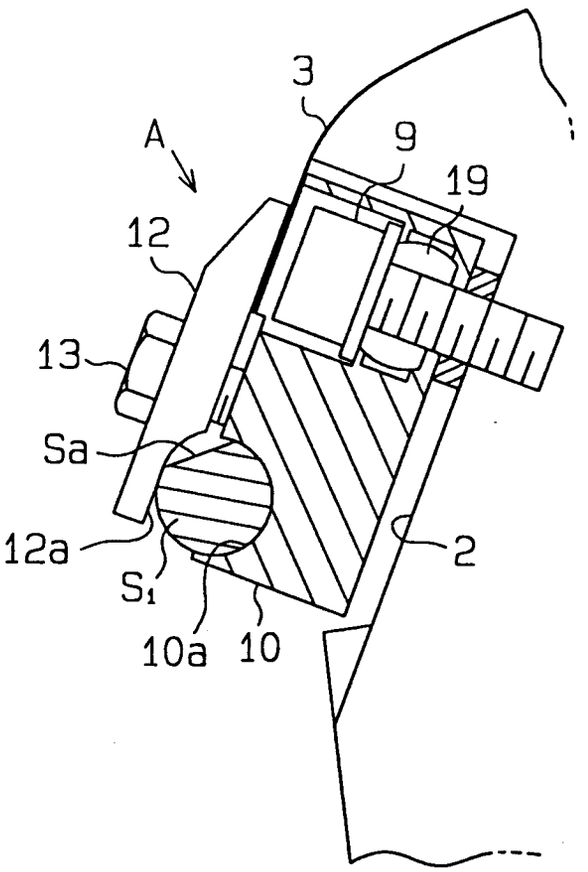


Fig.15

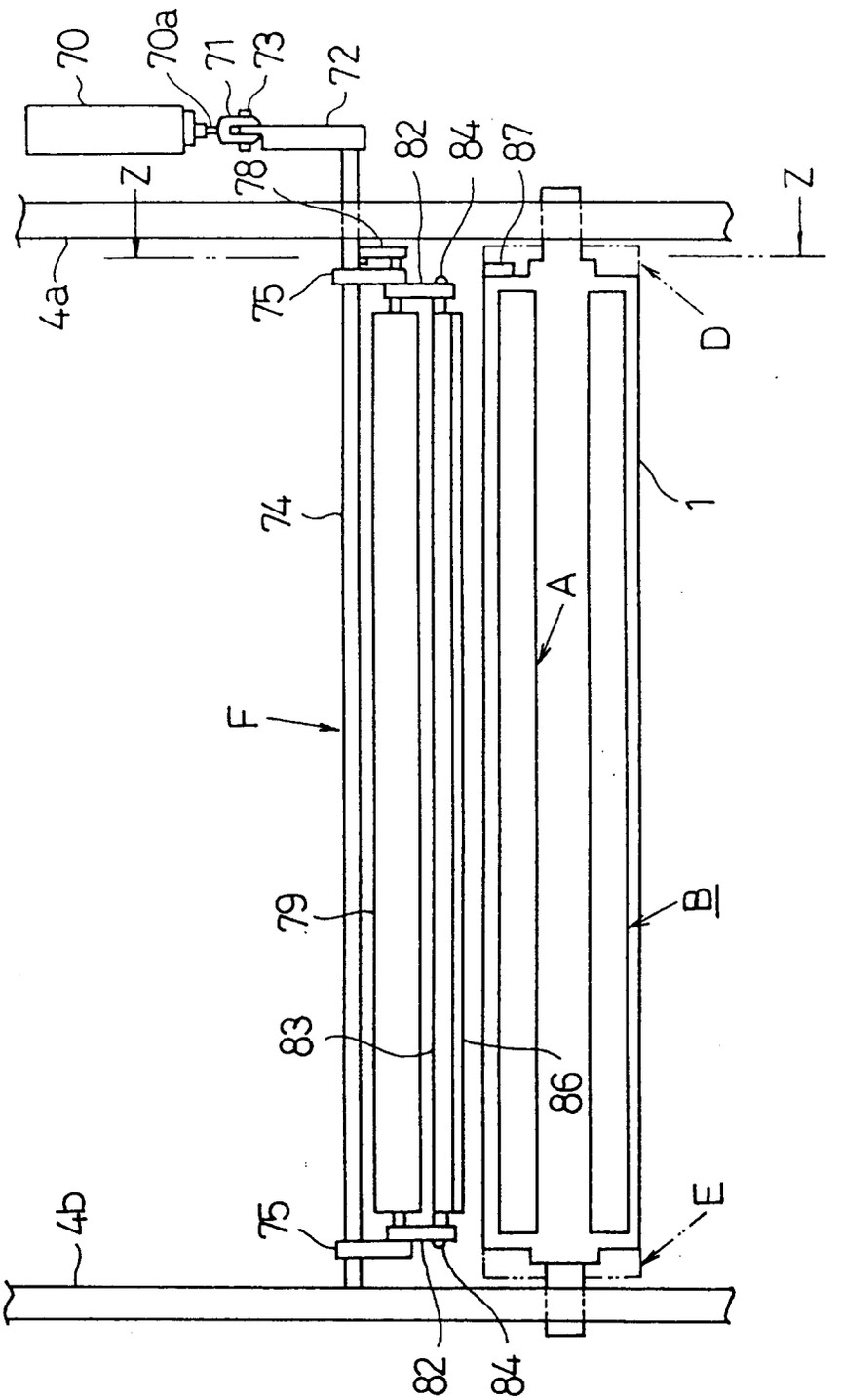


Fig.16

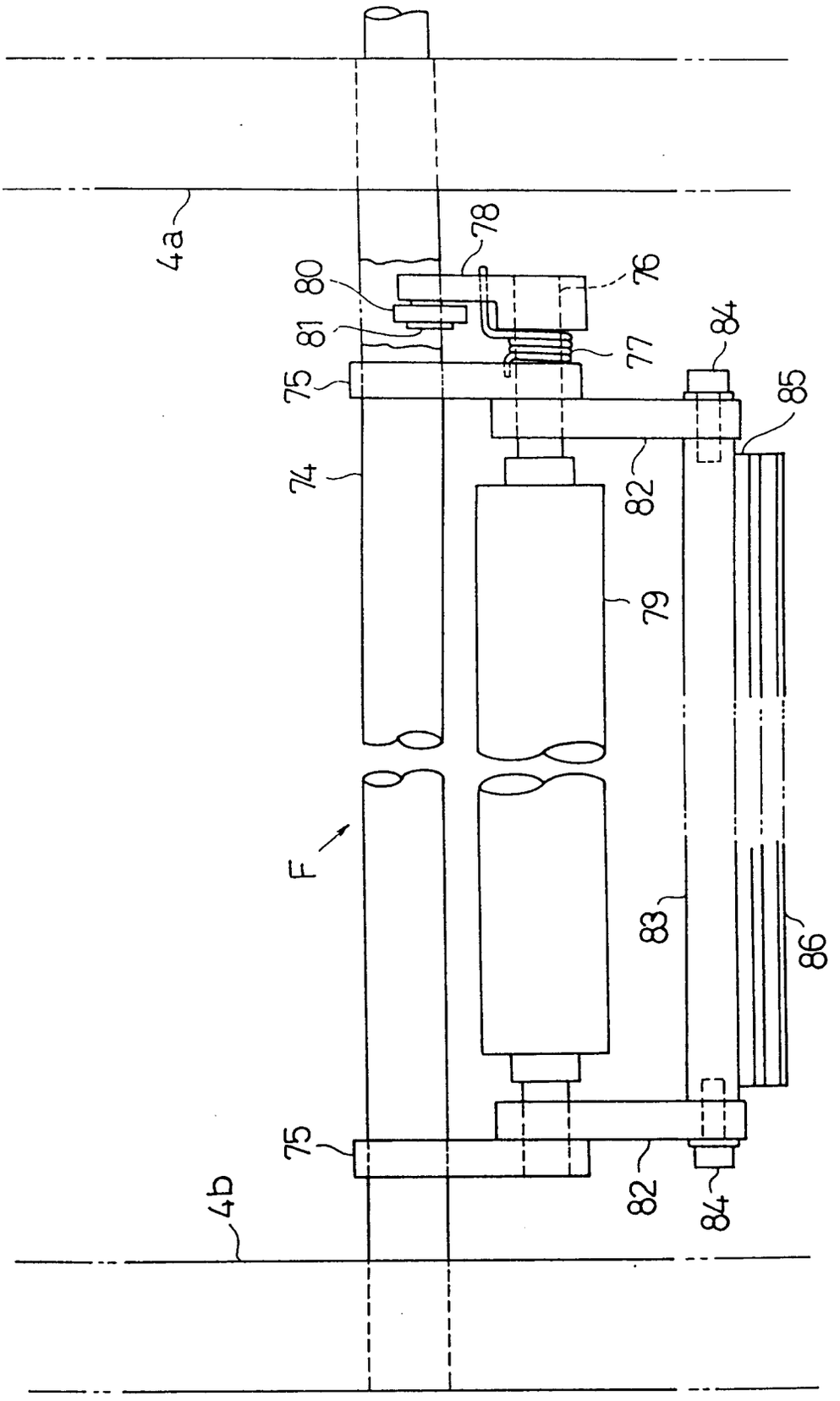


Fig.17

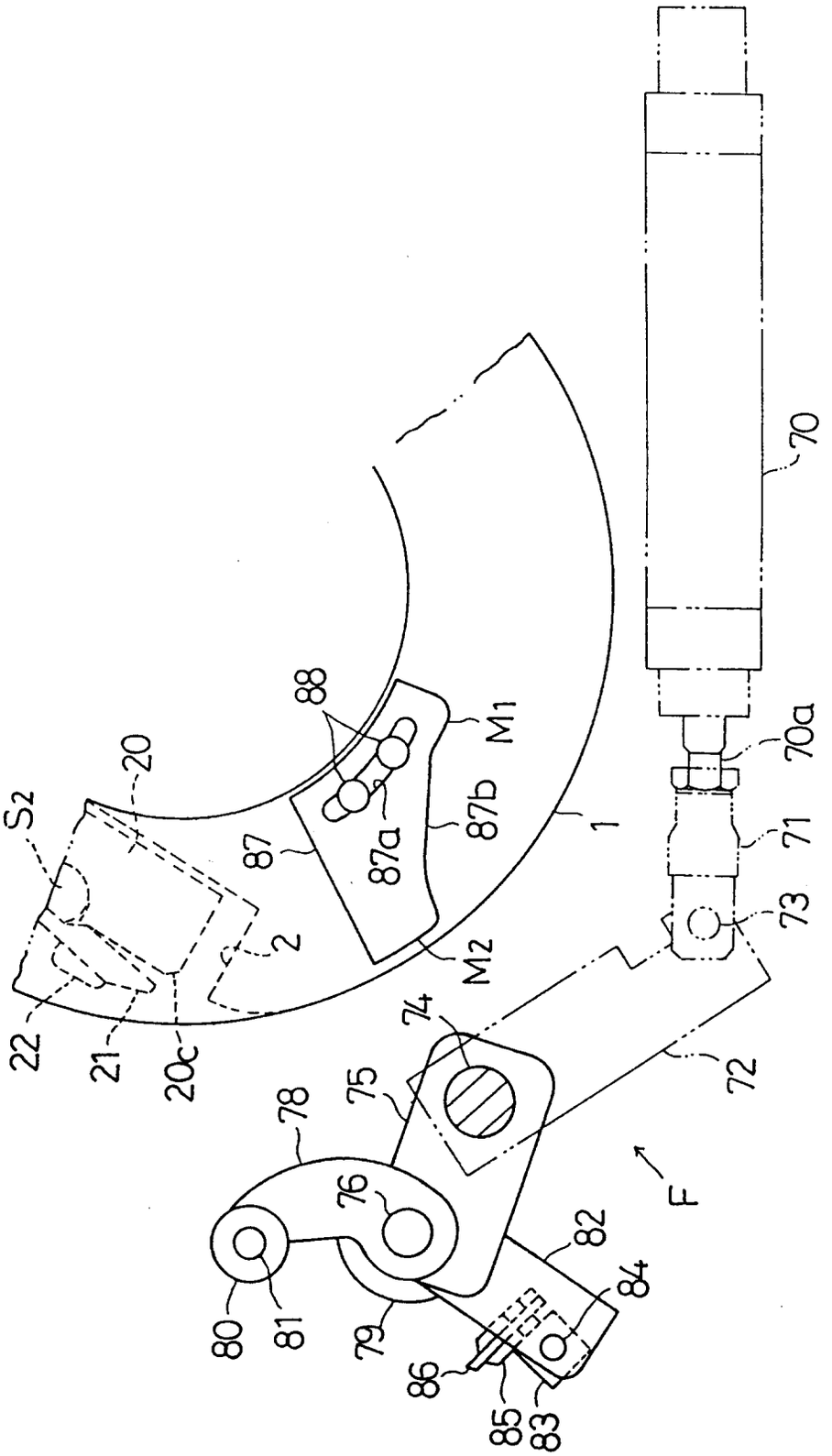

70
70a
71
73
72
F
74
75
78
76
82
84
80
81
79
86
85
83
88
M1
87b
87a
87
1
2
M2
S2
20
22
21
20c

Fig. 18

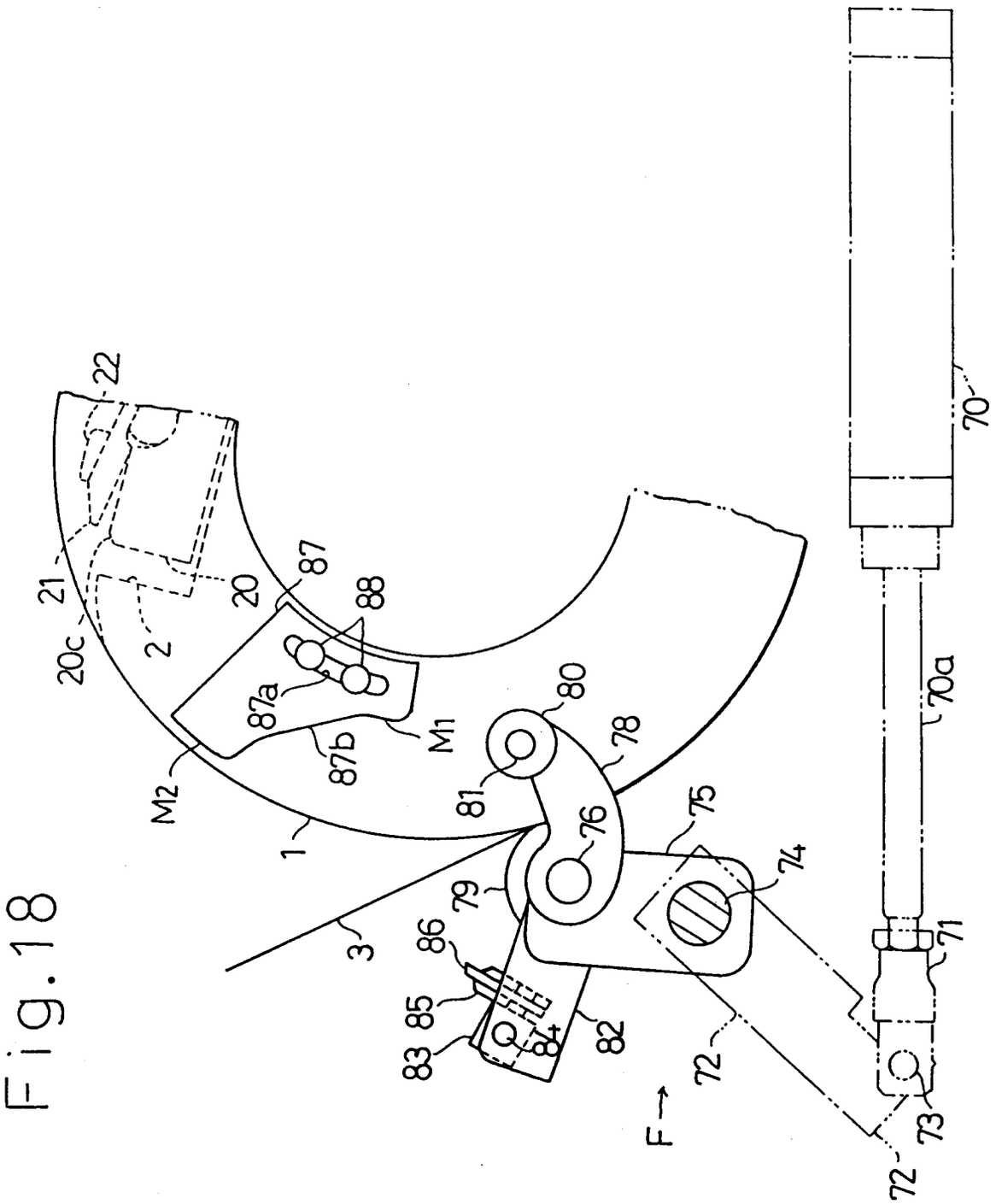

22
21
20
20c
2
87
88
87a
87b
M1
M2
1
3
80
81
78
76
75
74
79
86
85
83
84
82
F→
72
73
71
70a
70

Fig. 19

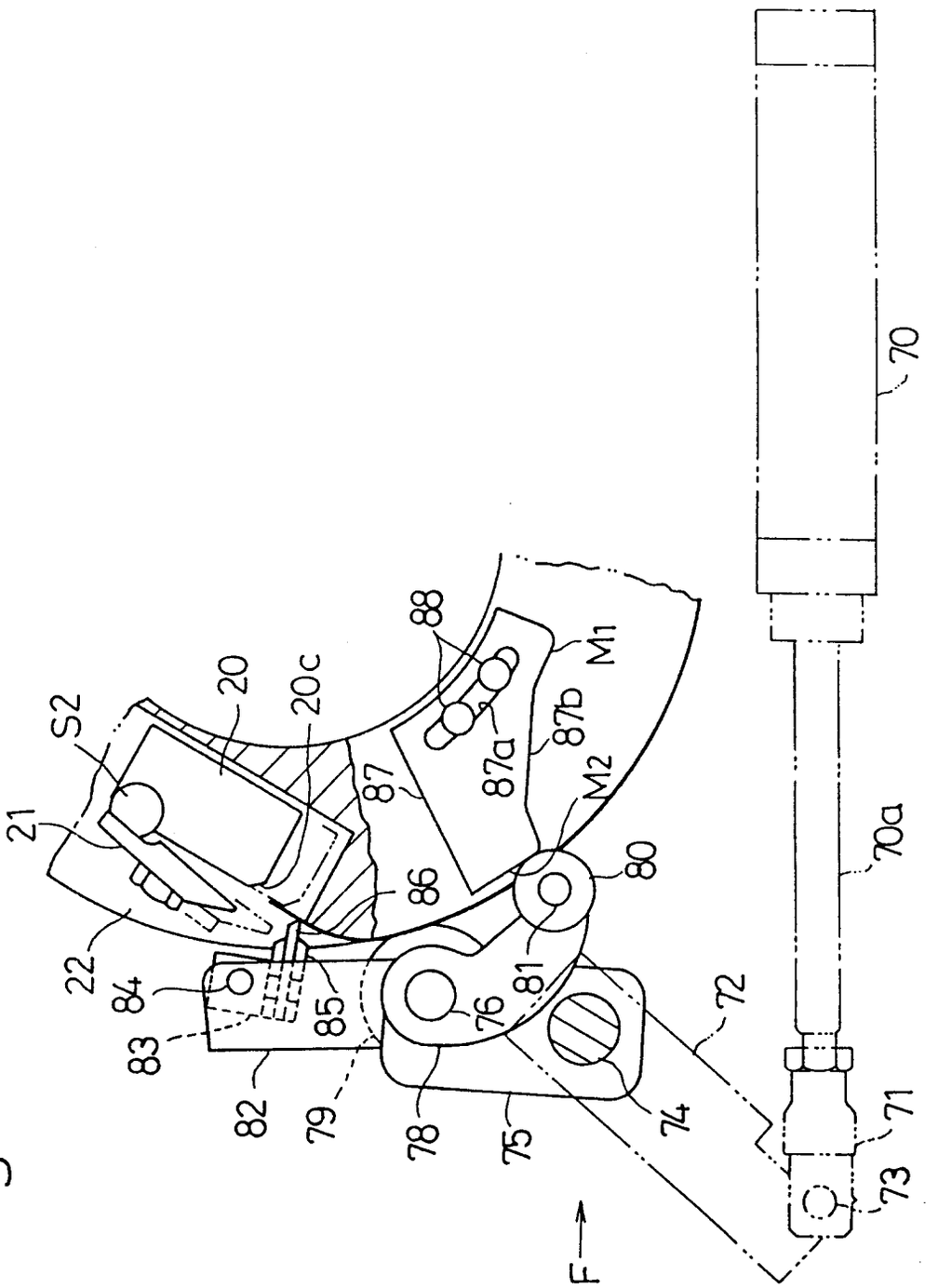

70
70a
71
72
73
74
75
76
78
79
80
81
82
83
84
85
86
87
87a
87b
88
M1
M2
S2
20
20c
21
22
F

Fig.20

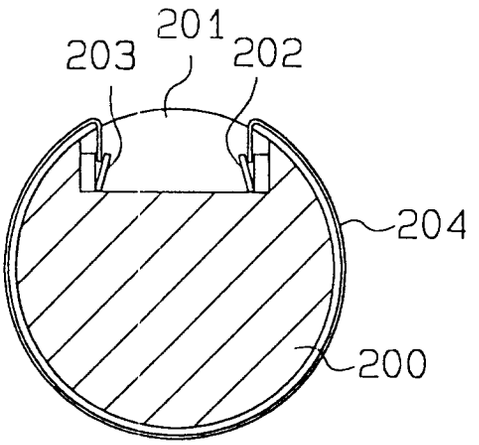


Fig.21

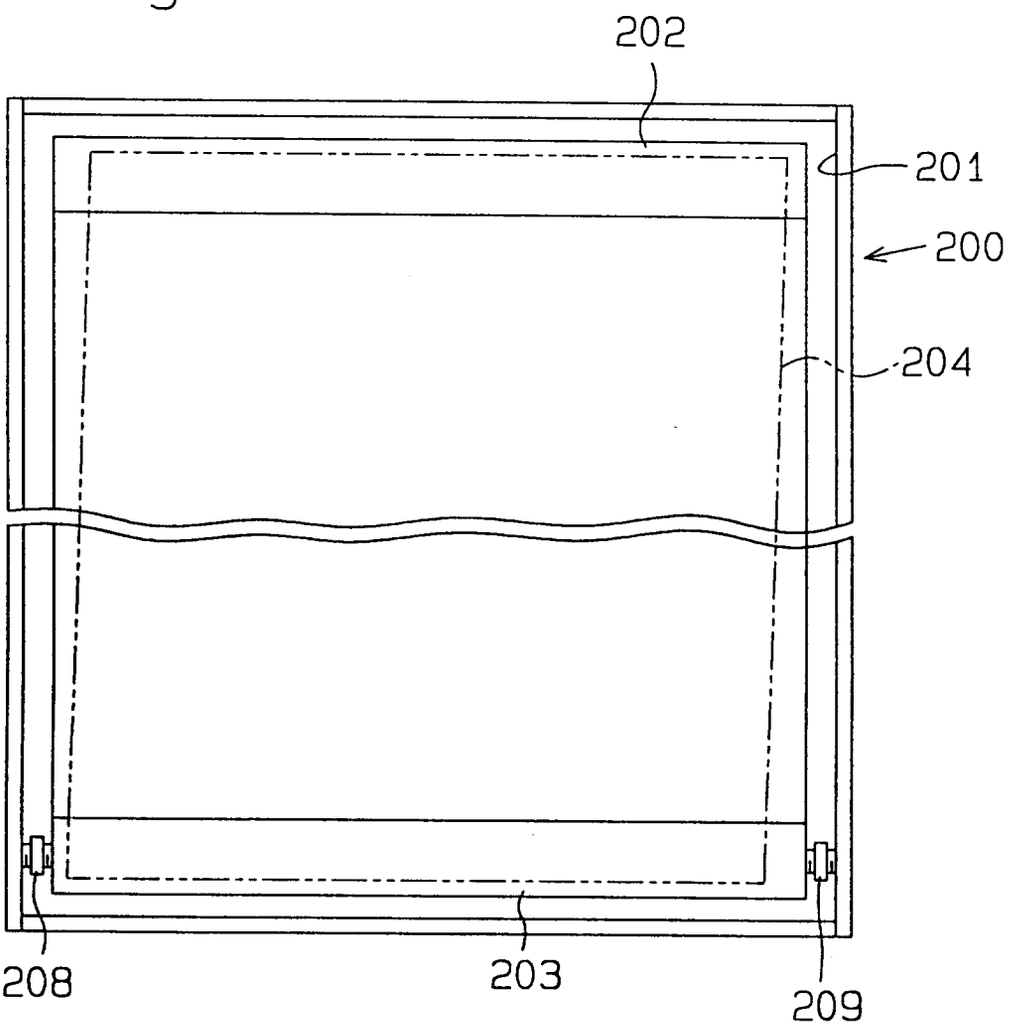


Fig.22

