



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.01.2019 Bulletin 2019/02

(51) Int Cl.:
B41F 31/30 ^(2006.01)

(21) Application number: **18180682.9**

(22) Date of filing: **29.06.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **06.07.2017 JP 2017132692**

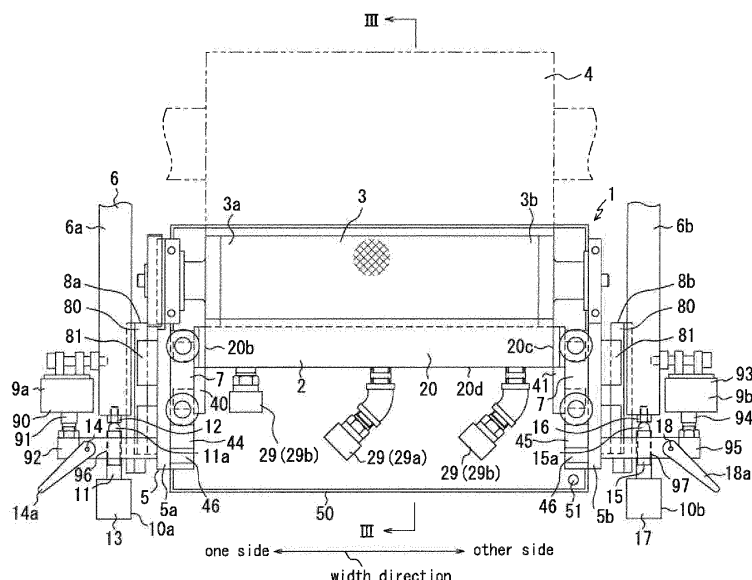
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(54) **INK SUPPLY DEVICE OF A PRINTING MACHINE**

(57) In an ink supply device of a printing machine, an abutting pressure of doctor blades is adjusted and maintained to be an appropriate value. A position adjusting and fixing mechanism 7 comprises a first part for position adjusting and fixing 7a-1, a second part for position adjusting and fixing 7a-2 which are attached to a frame, and parts to be position-adjusted and fixed provided on a housing 20. The first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 are movable between fixing positions in abutment

with the parts to be position-adjusted and fixed and releasing positions of fixation separated from the parts to be position-adjusted and fixed respectively. The ink doctor chamber 2 is fixed so as not to move by fixing the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 at the fixing position, together with this, the abutting pressure of doctor blades 21 can be adjusted and maintained to be an appropriate value.

Fig. 1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to an ink supply device of a printing machine which supplies ink to a plate cylinder and the like by using an ink doctor chamber in the printing machine.

Related Background of the Invention

[0002] Various kinds of ink supply devices of a printing machine which supply ink to a plate cylinder and the like by using an ink doctor chamber have been proposed.

[0003] For example, in the Japanese Patent Laid-Open No. 2000-127,350, there is disclosed an ink supply device of a printing machine provided with an ink doctor chamber (referred to an ink chamber doctor in the Japanese Patent Laid-Open No. 2000-127,350) and an anilox roll, in which ink is delivered to the anilox roll by the ink doctor chamber and is supplied to a plate cylinder (referred to a printing roller in the Japanese Patent Laid-Open No. 2000-127,350) by abutting the anilox roll on the plate cylinder.

[0004] The ink doctor chamber is provided with a housing with an ink groove, and two doctor blades arranged in the shape of a roof along an open edge of the ink groove of the housing and attached thereto.

[0005] The doctor blades are pressed against the anilox roll by moving the housing toward the anilox roll so as to be abutted on the anilox roll while maintaining parallel and uniform abutment therewith in an axial direction of the anilox roll.

[0006] The above-mentioned doctor blades are uniformly abutted on the anilox roll, and as the anilox roll is rotated while keeping this state, surplus ink on a surface of the anilox roll is scraped with the doctor blades, then only ink for the internal volume of cells existing on the surface of the anilox roll can be delivered.

[0007] In other words, the doctor blades play a role for scraping the surplus ink and for sealing to block the surplus ink.

[0008] In addition, since abrasion and transformation of the doctor blades of the ink doctor chamber may be caused, it is necessary to check the doctor blades regularly and to exchange the doctor blades when abrasion and transformation exceed limitations.

[0009] As seen here, when checking and exchanging the doctor blades, in other words, when performing maintenance, the housing is moved away from the anilox roll to separate the doctor blades from the anilox roll to facilitate the maintenance work.

[0010] The ink supply device of the printing machine disclosed in the Japanese Patent Laid-Open No. 2000-127,350 has constitutions for enabling easy introduction of the ink doctor chamber into an ink unit and for

easily pressing the doctor blades against the anilox roll and for maintaining the doctor blades in abutting on the anilox roll.

[0011] In other words, in the above-mentioned ink supply device, as the ink doctor chamber is moved manually toward the anilox roll, a lever rotatable toward and away from the anilox roll is rotated toward the anilox roll, then, the line of force of a compression spring provided on the lever is moved to the anilox roll side across a center of rotation, then a rotational load in a direction to approach the ink doctor chamber close to the anilox roll is applied on the lever by a compression spring.

[0012] On the other hand, as the ink doctor chamber is moved manually oppositely to the anilox roll, the lever is rotated in the opposite direction to the anilox roll, then, the line of force of the compression spring is moved oppositely to the anilox roll across the center of rotation, whereby the rotational load in a direction to separate the ink doctor chamber from the anilox roll is applied on the lever by the compression spring.

[0013] In the above-mentioned ink supply device, since the lever is to be followed by the manual movement of the ink doctor chamber, when the lever is rotated oppositely to the anilox roll, the line of force of the compression spring is moved oppositely to the anilox roll across the center of rotation, which serves to facilitate next introduction of the ink doctor chamber, and when the lever is rotated toward the anilox roll, the line of force of the compression spring is moved toward the anilox roll side across the center of rotation, then the doctor blades are pressed against the anilox roll, which serves to maintain the doctor blades in abutment with the anilox roll.

[0014] Therefore, the ink doctor chamber can be easily introduced into the ink unit, together with this, the doctor blades can be easily pressed against the anilox roll, thereby maintained to be in abutment with the anilox roll.

[0015] In the above-mentioned ink supply device, when a piston rod of a pressure medium cylinder is extended while the doctor blades are in abutment with the anilox roll, a pressure member at a tip of the piston rod comes to abut on a projection of the lever farthest from the center of rotation of the lever.

[0016] When the pressure member is abutted on the projection of the lever, the lever is rotated toward the anilox roll to press the doctor blades of the ink doctor chamber strongly against the anilox roll.

[0017] As such, the doctor blades can play a role for scraping the surplus ink and for sealing to block the surplus ink.

SUMMARY OF THE INVENTION

[0018] In above-mentioned ink supply device of the printing machine, the housing of the ink doctor chamber, when it is associated with the lever, is easy to move away from the anilox roll by the rotation of the lever.

[0019] Therefore, an ink leakage is apt to be occurred, because when the housing moves away from the anilox

roll due to vibrations and the like during operation of the printing machine, abutting pressure of the doctor blades acting on the anilox roll decreases, which results in failing of uniform scraping of ink on the surface of the anilox roll and in impairing of sealing ability.

[0020] To prevent this, the housing is pushed by the spring power of the compression spring and the thrust of the pressure medium cylinder through the lever to press the doctor blades against the anilox roll with strong power.

[0021] However, this may cause early abrasion of the doctor blades, which results in an increase of exchange frequency.

[0022] In addition, it may bring an increase of load of the maintenance workers, an increase in maintenance cost, still more reduction in a rate of operation in the printing machine.

[0023] This invention is made in consideration of the above-mentioned problems, the object of the invention is to provide an ink supply device of a printing machine, in which abutting pressure of doctor blades can be adjusted and maintained to be an appropriate value to enable uniform scraping of ink on a surface of an anilox roll and to prevent leakage of ink, a housing can be easily moved away from the anilox roll, and still more, the doctor blades can be prevented from early abrasion.

[0024] An ink supply device of a printing machine of the present invention comprises an ink doctor chamber in which two doctor blades are attached detachably to an open edge of an ink groove of a housing, an anilox roll, and a position adjusting and fixing mechanism, wherein the ink doctor chamber is supported to be movable by a frame between an attaching position close to the anilox roll where the doctor blades are abutted on the anilox roll and a maintenance work position away from the anilox roll where the doctor blades are separated from the anilox roll, the position adjusting and fixing mechanism has a first part for position adjusting and fixing and a second part for position adjusting and fixing which are attached to the frame, and parts to be position-adjusted and fixed provided on the housing, the first part for position adjusting and fixing and the second part for position adjusting and fixing are movable between fixing positions in abutment with the parts to be position-adjusted and fixed and releasing positions of fixation separated from the parts to be position-adjusted and fixed, respectively, the first part for position adjusting and fixing is constituted such that, as it is at the fixing position, the ink doctor chamber is movable away from the anilox roll but is fixed so as not to move toward the anilox roll, together with this, the fixing position of the ink doctor chamber can be adjusted by changing a moving distance at the fixing position, and as it is at the releasing position of fixation, the ink doctor chamber is movable toward and away from the anilox roll, and the second part for position adjusting and fixing is constituted such that, as it is at the fixing position, the ink doctor chamber is movable toward the anilox roll, but is fixed so as not to move away from the

anilox roll, together with this, the fixing position of the ink doctor chamber can be adjusted by changing the moving distance at the fixing position, and as it is at the releasing position of fixation, the ink doctor chamber is movable toward and away from the anilox roll.

[0025] In the ink supply device of the printing machine of the present invention, the first part for position adjusting and fixing is constituted such that it has an inclined face and fixes the ink doctor chamber so as not to move toward the anilox roll by abutting the inclined face on a part to be position-adjusted and fixed, the second part for position adjusting and fixing is constituted such that it has an inclined face and fixes the ink doctor chamber so as not to move away from the anilox roll by abutting the inclined face on the part to be position-adjusted and fixed.

[0026] Accordingly, since a wedging action between the first part for position adjusting and fixing and the part to be position-adjusted and fixed, and a wedging action between the second part for position adjusting and fixing and the part to be position-adjusted and fixed act to move the ink doctor chamber in opposite directions each other, the first part for position adjusting and fixing and the second part for position adjusting and fixing can firmly fix the ink doctor chamber at the attaching position so as not to move the ink doctor chamber.

[0027] In the ink supply device of the printing machine of the present invention, the part to be position-adjusted and fixed comprises a first part to be position-adjusted and fixed and a second part to be position-adjusted and fixed spaced apart from each other in the moving direction of the ink doctor chamber, the first part to be position-adjusted and fixed is constituted such that the inclined face of the first part for position adjusting and fixing is abutted on the first part to be position-adjusted and fixed, and the second part to be position-adjusted and fixed is constituted such that the inclined face of the second part for position adjusting and fixing is abutted on the second part to be position-adjusted and fixed.

[0028] Accordingly, the ink doctor chamber can be moved while maintaining the stability of its posture by the movement of the first part for position adjusting and fixing and the second part for position adjusting and fixing.

[0029] In the ink supply device of the printing machine of the present invention, guide rails are attached to the frame, a first support pin and a second support pin supporting the ink doctor chamber movably between the attaching position and the maintenance work position are attached to the housing spaced apart from each other in the moving direction of the ink doctor chamber, and, the first support pin is the first part to be position-adjusted and fixed and the second support pin is the second part to be position-adjusted and fixed.

[0030] Accordingly, the ink doctor chamber can be easily moved with small force, parts count and cost are reduced.

[0031] In the ink supply device of the printing machine of the present invention, the guide rails have pin support parts to rotate the ink doctor chamber at the maintenance

work position around first support pins as a fulcrum up to the maintenance work posture where an opening of the ink groove faces upward.

[0032] Accordingly, the maintenance work can be performed simply and in a short time by rotating the ink doctor chamber such that it takes the maintenance work posture at the maintenance work position.

[0033] In the ink supply device of the printing machine of the present invention, the anilox roll is attached to the frame, the doctor blades of the ink doctor chamber at the attaching position are abutted on the anilox roll and the anilox roll is pressed against a plate cylinder by moving the frame.

[0034] According to the ink supply device of the printing machine of the present invention, the abutting pressure of the doctor blades can be adjusted and maintained to be an appropriate value to enable uniform scraping of ink on the surface of the anilox roll and to prevent leakage of ink, the housing can be easily moved away from the anilox roll, and still more, the doctor blades can be prevented from early abrasion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035]

Fig.1 is a schematic plan view of an ink supply device.

Fig.2 is a schematic front view of the ink supply device.

Fig.3 is an enlarged sectional view taken along the line III-III of Fig.1.

Fig.4 is an enlarged plan view of an ink doctor chamber.

Fig.5 is a right side elevational view of Fig.4.

Fig.6 is an enlarged plan view of a position adjusting and fixing mechanism.

Fig.7 is a sectional view taken along the line VII-VII in Fig.6.

Fig.8 is a side view of the position adjusting and fixing mechanism in Fig.6.

Fig.9 is a view illustrating the ink doctor chamber moved away from an anilox roll.

Fig.10 is a view illustrating the ink doctor chamber which is rotated to a maintenance work posture.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] An embodiment of an ink supply device of a printing machine of the present invention will be described with reference to Fig.1 and Fig.2.

[0037] Fig.1 is a schematic plan view of the ink supply device, Fig.2 is a schematic front view of the ink supply device.

[0038] An ink supply device 1 of the printing machine of the present embodiment is provided with an ink doctor chamber 2 and an anilox roll 3.

[0039] Ink is delivered to the anilox roll 3 by the ink

doctor chamber 2 and is supplied to a plate cylinder 4 by abutting the anilox roll 3 on the plate cylinder 4.

[0040] The anilox roll 3 is rotatably attached to a frame 5.

5 **[0041]** The frame 5 is supported by a body frame 6 such that it can reciprocate toward and away from the plate cylinder 4.

[0042] The ink doctor chamber 2 is supported by the frame 5 such that it can reciprocate toward and away from the anilox roll 3.

10 **[0043]** A position of the ink doctor chamber 2 with respect to the anilox roll 3 is adjusted by the position adjusting and fixing mechanism 7, and the ink doctor chamber 2 is fixed to the frame 5 by the position adjusting and fixing mechanism 7 so that it is irremovable at an adjusted position.

15 **[0044]** The ink doctor chamber 2 is movable toward and away from the anilox roll 3 by releasing fixation by the position adjusting and fixing mechanism 7.

20 **[0045]** The plate cylinder 4 is rotatably attached to the body frame 6.

[0046] The plate cylinder 4, the anilox roll 3 and the ink doctor chamber 2 are arranged in the order of the plate cylinder 4, the anilox roll 3 and the ink doctor chamber 2 in a moving direction of the frame 5.

25 **[0047]** Then, the anilox roll 3 and the ink doctor chamber 2 are integrally moved toward the plate cylinder 4 respectively so as to press the anilox roll 3 against the plate cylinder 4, by moving the frame 5 toward the plate cylinder 4, while the ink doctor chamber 2 is kept to be fixed to the frame 5 by the position adjusting and fixing mechanism 7.

30 **[0048]** The anilox roll 3 and the ink doctor chamber 2 are integrally separated from the plate cylinder 4 and the ink supply device 1 of the printing machine (anilox roll 3) can be separated from the plate cylinder 4, by moving the frame 5 away from the plate cylinder 4, while the ink doctor chamber 2 is kept to be fixed to the frame 5 by the position adjusting and fixing mechanism 7.

35 **[0049]** The frame 5 has one side frame 5a and the other side frame 5b, which are separated from each other in the width direction.

[0050] One end of the ink doctor chamber 2 in a lengthwise direction is movably supported by the one side frame 5a, and the other end of the ink doctor chamber 2 in the lengthwise direction is movably supported by the other side frame 5b.

[0051] The anilox roll 3 is rotatably attached across a portion of the one side frame 5a near the plate cylinder 4 and a portion of the other side frame 5b near the plate cylinder 4.

[0052] The body frame 6 has one side body frame 6a and the other side body frame 6b, which are separated from each other in the width direction.

55 **[0053]** The width direction means the lengthwise direction of the ink doctor chamber 2, the anilox roll 3 and the plate cylinder 4.

[0054] A space between the one side body frame 6a

and the other side body frame 6b in the width direction is wider than a space between the one side frame 5a and the other side frame 5b in the width direction, and the one side frame 5a is located on the other side body frame 6b side of the one side body frame 6a, and the other side frame 5b is located on the one side body frame 6a side of the other side body frame 6b.

[0055] In other words, the one side frame 5a and the other side frame 5b are located between the one side body frame 6a and the other side body frame 6b.

[0056] The one side frame 5a is supported by the one side body frame 6a so that it can be slid by one side guide 8a toward the plate cylinder 4, the other side frame 5b is supported by the other side body frame 6b so that it can be slid by the other side guide 8b toward the plate cylinder 4.

[0057] Each of the one side guide 8a and the other side guide 8b is a straight line liner guide having rails 80 and a plurality of sliders 81 slidably fitted into the rails 80.

[0058] The rails 80 are attached to the one side body frame 6a and the other side body frame 6b respectively.

[0059] The sliders 81 are attached to the one side frame 5a and the other side frame 5b respectively.

[0060] Accordingly, the one side frame 5a and the other side frame 5b can slide while maintaining parallelism there-between.

[0061] The one side frame 5a is slid by a cylinder 9a for moving one side ink supply device.

[0062] A cylinder tube 90 of the cylinder 9a for moving one side ink supply device is attached to the one side body frame 6a, and its piston rod 91 is connected to one side plate 92.

[0063] The one side plate 92 is fixed to the one side frame 5a.

[0064] The other side frame 5b is slid by a cylinder 9b for moving the other side ink supply device.

[0065] A cylinder tube 93 of the cylinder 9b for moving the other side ink supply device is attached to the other side body frame 6b, and its piston rod 94 is connected to the other side plate 95.

[0066] The other side plate 95 is fixed to the other side frame 5b.

[0067] In other words, the cylinder 9a for moving one side ink supply device and the cylinder 9b for moving the other side ink supply device have the same constitutions and the same attaching structures.

[0068] Accordingly, the one side frame 5a and the other side frame 5b are slid away from the plate cylinder 4 while maintaining parallelism there-between, whereby the ink supply device 1 (ink doctor chamber 2, anilox roll 3) of the printing machine can be moved to a detaching position separated from the plate cylinder 4, by extending the piston rod 91 of the cylinder 9a for moving one side ink supply device and the piston rod 94 of the cylinder 9b for moving the other side ink supply device.

[0069] The one side frame 5a and the other side frame 5b are slid toward to the plate cylinder 4 while maintaining parallelism there-between, whereby the ink supply de-

vice 1 (ink doctor chamber 2, anilox roll 3) of the printing machine can be moved to an attaching position where the anilox roll 3 is pressed against the plate cylinder 4 by retracting the piston rod 91 of the cylinder 9a for moving one side ink supply device and the piston rod 94 of the cylinder 9b for moving the other side ink supply device.

[0070] The ink supply device 1 has a nip pressure (compression amount of the plate cylinder 4) finely adjusting mechanism 10a of the one side ink supply device for finely adjusting the nip pressure acting on the plate cylinder 4 at one end 3a of the anilox roll 3 in its lengthwise direction, and a nip pressure (compression amount of the plate cylinder 4) finely adjusting mechanism 10b of the other side ink supply device for finely adjusting the nip pressure acting on the plate cylinder 4 at the other end 3b of the anilox roll 3 in its lengthwise direction.

[0071] The nip pressure finely adjusting mechanism 10a of the one side ink supply device is provided with one side adjusting screw 11 screwed into a screw hole 96 in the one side plate 92, a receiving member 12 provided on the one side body frame 6a on which a hemispheric distal end 11a of the one side adjusting screw 11 is abutted, and a rotary handle 13 attached to a base end of the one side adjusting screw 11.

[0072] The one side plate 92 is formed with a slit 92a for making the screw hole 96 discontinuous in its circumferential direction.

[0073] One side locking screw 14 which passes vertically through the slit 92a is screwed into the one side plate 92, the screw hole 96 is transformed into a hole with a smaller diameter thereby lock the one side adjusting screw 11 so as not to rotate by rotating the one side locking screw 14 in tightening direction by rotating a handle 14a.

[0074] The screw hole 96 is restored to a hole with an original diameter thereby unlock the one side adjusting screw 11 so as to rotate by rotating the one side locking screw 14 in loosening direction by rotating the handle 14a.

[0075] The one side frame 5a is slightly slid away from the plate cylinder 4 through the one side plate 92 by rotating the rotary handle 13 to rotate the one side adjusting screw 11 in the direction of forward movement of its hemispheric distal end 11a, under the condition that the anilox roll 3 is pressed against the plate cylinder 4 and the one side adjusting screw 11 is unlocked.

[0076] Accordingly, nip pressure acting on the plate cylinder 4 at the one end 3a of the anilox roll 3 in its lengthwise direction will be slightly lowered.

[0077] The one side frame 5a is slightly slid toward the plate cylinder 4 through the one side plate 92 by rotating the rotary handle 13 to rotate the one side adjusting screw 11 in the direction of backward movement of its hemispheric distal end 11a, under the condition that the anilox roll 3 is pressed against the plate cylinder 4 and the one side adjusting screw 11 is unlocked.

[0078] Accordingly, nip pressure acting on the plate cylinder 4 at the one end 3a of the anilox roll 3 in the

lengthwise direction will be slightly raised.

[0079] In this way, nip pressure acting on the plate cylinder 4 at the one end 3a of the anilox roll 3 in the lengthwise direction may be finely adjusted.

[0080] After having made a fine adjustment, the one side adjusting screw 11 is locked so as not to rotate for preventing the one side adjusting screw 11 from rotating due to vibrations and the like during the operation of the printing machine.

[0081] The nip pressure finely adjusting mechanism 10b of the other side ink supply device is provided with the other side adjusting screw 15 screwed into a screw hole 97 in the other side plate 95, a receiving member 16 provided on the other side body frame 6b on which a hemispheric distal end 15a of the other side adjusting screw 15 is abutted, and a rotary handle 17 attached to a base end of the other side adjusting screw 15.

[0082] The other side plate 95 is formed with a slit 95a for making the screw hole 97 discontinuous in its circumferential direction.

[0083] The other side locking screw 18 which passes vertically through the slit 95a is screwed into the other side plate 95, the screw hole 97 is transformed into a hole with a smaller diameter thereby lock the other side adjusting screw 15 so as not to rotate by rotating the other side locking screw 18 in tightening direction by rotating a handle 18a.

[0084] The screw hole 97 is restored to a hole with an original diameter thereby unlock the other side adjusting screw 15 so as to rotate by rotating the other side locking screw 18 in loosening direction by rotating the handle 18a.

[0085] The other side frame 5b is slightly slid away from the plate cylinder 4 through the other side plate 95 by rotating the rotary handle 17 to rotate the other side adjusting screw 15 in the direction of forward movement of its hemispheric distal end 15a, under the condition that the anilox roll 3 is pressed against the plate cylinder 4 and the other side adjusting screw 15 is unlocked.

[0086] Accordingly, nip pressure acting on the plate cylinder 4 at the other end 3b of the anilox roll 3 in its lengthwise direction will be slightly lowered.

[0087] The other side frame 5b is slightly slid toward the plate cylinder 4 through the other side plate 95 by rotating the rotary handle 17 to rotate the other side adjusting screw 15 in the direction of backward movement of its hemispheric distal end 15a, under the condition that the anilox roll 3 is pressed against the plate cylinder 4 and the other side adjusting screw 15 is unlocked.

[0088] Accordingly, nip pressure acting on the plate cylinder 4 at the other end 3b of the anilox roll 3 in the lengthwise direction will be slightly raised.

[0089] In this way, nip pressure acting on the plate cylinder 4 at the other end 3b of the anilox roll 3 in the lengthwise direction may be finely adjusted.

[0090] After having made a fine adjustment, the other side adjusting screw 15 is locked so as not to rotate for preventing the other side adjusting screw 15 from rotating

due to vibrations and the like during the operation of the printing machine.

[0091] Besides, nip pressure acting on the plate cylinder 4 throughout full length of the anilox roll 3 in its lengthwise direction can be finely adjusted by rotating both the one and other side adjusting screws 11, 15.

[0092] An ink saucer 50 is attached across the one side frame 5a and the other side frame 5b.

[0093] The ink saucer 50 has a drain port 51 which is communicated with a drain valve 52.

[0094] Still more, the ink saucer 50 is structured to enable its attachment and detachment with ease between the one side frame 5a and the other side frame 5b.

[0095] For example the ink saucer 50 can be easily attached or detached by inserting into or pulling out from between the one side frame 5a and the other side frame 5b.

[0096] Then, the constitution of the ink doctor chamber will be described with reference to Fig.3, Fig.4 and Fig.5.

[0097] Fig.3 is an enlarged sectional view taken along the line III-III of Fig. 1, Fig.4 is an enlarged plan view of the ink doctor chamber, and Fig.5 is a right side elevational view of Fig.4.

[0098] Besides, in Fig.3, the body frame is omitted, in Fig.4, the middle part of the ink doctor chamber in the lengthwise direction is omitted and only the both ends thereof in the lengthwise direction are illustrated.

[0099] The ink doctor chamber 2 is provided with a housing 20, two doctor blades 21 and two side seals 22.

[0100] The housing 20 has an ink groove 23 open to a front face 20a.

[0101] The front face 20a of the housing 20 is a surface facing to the anilox roll 3.

[0102] Upper and lower two pressing plates 25 are fixed to the front face 20a of the housing 20 by bolts 24.

[0103] That is to say, the two doctor blades 21 are arranged in inverted V shaped viewed from the side, wherein each end of the two doctor blades is positioned by a stepped part 20a-1 of the front face 20a, then pressed by each of two pressing plates 25, fixed to the front face 20a by the bolts 24 and attached thereto along an open edge of the ink groove 23 of the front face 20a of the housing 20.

[0104] Accordingly, the doctor blades 21 can be detached from the housing 20, by loosening the bolts 24 to decrease the clamping power of the pressing plates 25.

[0105] The housing 20 is formed with recessed portions 26 at one end face 20b and the other end face 20c in the lengthwise direction of the housing 20 respectively.

[0106] Each of the side seals 22 is fitted into each of the recessed portions 26 and attached thereto.

[0107] As shown in Fig.4, each of plates 27 is provided in each of the recessed portions 26.

[0108] The side seals 22 are pressed at the both ends in the lengthwise direction of the anilox roll 3 respectively by rotating the bolt 28 in a screwing direction to cause a forward movement of the plates 27 to push the side seals 22.

[0109] Couplers 29 connected to an ink circulation pipe (not shown) are connected to the housing 20 for circulating and filling ink in the ink groove 23 (see Fig.1, Fig.2).

[0110] Couplers 29 have one supply coupler 29a to which an ink supply pipe not shown is connected and two return couplers 29b to each of which an ink return pipe not shown is connected.

[0111] The supply coupler 29a is provided at the center in a longitudinal direction and close to the bottom in a vertical direction of the housing 20, and is communicated with the ink groove 23 at its center in the longitudinal direction and at a position partly overlapped with the lowermost position in the vertical direction thereof.

[0112] The return couplers 29b are provided at the both ends in the longitudinal direction and close to the top in the vertical direction of the housing 20 and are communicated with the ink groove 23 at the both ends in the longitudinal direction and at a position partly overlapped with the uppermost position in the vertical direction thereof.

[0113] The ink supply pipe and ink return pipes are connected to an ink circulation tank not shown respectively, and the ink supply pipe, the ink return pipes and the ink circulation tank constitute an ink circulation path.

[0114] Ink pumped from the ink circulation tank is collected in the ink groove 23 through the ink supply pipe via the supply coupler 29a.

[0115] Ink overflowed from the ink groove 23 flows into the ink return pipes from the return couplers 29b and returns to the ink circulation tank.

[0116] Accordingly, ink is circulated and fills in the ink groove 23.

[0117] Since the number of the ink return pipe is larger than that of the ink supply pipe so that flow rate in an ink return side is larger than that of an ink supply side, ink may be efficiently and certainly circulated.

[0118] The supply coupler 29a and the return couplers 29b have constitutions enabling to attach and detach the pipes at a touch whereby the pipes are easily connected or disconnected.

[0119] In addition, when attaching or detaching the pipes, ink leak may be prevented by using any coupler with valve as the supply coupler 29a and the return couplers 29b.

[0120] In the above description, the ink circulation path is explained as being furnished with the ink circulation tank, one ink supply pipe and two ink return pipes, but the ink circulation path is not limited to this constitution, it may be provided with a flow rate adjusting valve, a flow rate detecting sensor, a flow rate exchanging valve and the like on the way of the path.

[0121] One side bracket 40 is attached to the one end face 20b in the longitudinal direction of the housing 20 as shown in Fig.4.

[0122] The other side bracket 41 is attached to the other end face 20c in the longitudinal direction of the housing 20.

[0123] One side bracket 40 and the other side bracket

41 project behind a back face 20d of the housing 20 respectively.

[0124] The back face 20d of the housing 20 is the opposite face to the anilox roll 3.

5 **[0125]** The one side bracket 40 closes the recessed portion 26 at the one end face 20b of the housing 20 in its longitudinal direction and presses the side seal 22 against the recessed portion 26 to hold it.

10 **[0126]** The other side bracket 41 closes the recessed portion 26 at the other end face 20c of the housing 20 in its longitudinal direction and presses the side seal 22 against the recessed portion 26 to hold it.

[0127] A first support pin 42 which is a first support part of the housing 20, a second support pin 43 which is a second support part of the housing 20 are attached to the one side bracket 40 and the other side bracket 41 spaced apart from each other in the moving direction of the housing 20 (the moving direction of the ink doctor chamber 2).

20 **[0128]** The first support pin 42 and the second support pin 43 on the one end face 20b side of the housing 20 in its longitudinal direction are projected toward the one side in the lengthwise direction beyond the one end face 20b in the longitudinal direction of the housing 20.

25 **[0129]** The first support pin 42 and the second support pin 43 on the other end face 20c side of the housing 20 in its longitudinal direction are projected toward the other side in the lengthwise direction beyond the other end face 20c in the longitudinal direction of the housing 20.

30 **[0130]** The second support pin 43 is located behind the back face 20d of the housing 20, and the first support pin 42 is located closer to the anilox roll 3 than the second support pin 43.

35 **[0131]** The first support pin 42 and the second support pin 43 attached to the one side bracket 40 are guided as being held between an upper face 44a of one side guide rail 44 and a lower face 70b of a body 70 of the position adjusting and fixing mechanism 7 described later from top and bottom while being mounted on a guide portion of the frame 5, for example an upper face 44a of the one side guide rail 44 attached to the one side frame 5a, and reciprocally support the one end of the ink doctor chamber 2 in its longitudinal direction toward the anilox roll 3 (see Fig.1, Fig.2, Fig.3, Fig.7).

45 **[0132]** The first support pin 42 and the second support pin 43 attached to the other side bracket 41 are guided as being held between an upper face 45a of the other side guide rail 45 and a lower face 70b of the body 70 of the position adjusting and fixing mechanism 7 described later from top and bottom while being mounted on a guide portion of the frame 5, for example an upper face 45a of the other side guide rail 45 attached to the other side frame 5b, and reciprocally support the other end of the ink doctor chamber 2 in its longitudinal direction toward the anilox roll 3 (see Fig.1, Fig.2, Fig.3, Fig.7).

55 **[0133]** The upper face 44a of the one side guide rail 44 and the upper face 45a of the other side guide rail 45 are parallel to a straight line connecting a center of rota-

tion 3A of the anilox roll 3 and a center of rotation 4A of the plate cylinder 4, and each of the support pins 42, 43 has same diameter dimension and centers 42A, 43A of the support pins 42, 43 are located on an extension line of the straight line X.

[0134] In other words, the ink doctor chamber 2 reciprocates along the straight line X.

[0135] Portions of the upper face 44a of the one side guide rail 44 and the upper face 45a of the other side guide rail 45 opposite to the anilox roll 3 are formed with upward recessed portions 46, respectively (see Fig.1, Fig.2, Fig.3).

[0136] Then, the position adjusting and fixing mechanism 7 will be described with reference to Fig.3 and Fig.6-8.

[0137] Fig.6 is an enlarged plan view of the position adjusting and fixing mechanism, Fig.7 is a sectional view taken along the line VII-VII in Fig.6, Fig.8 is a side view of the position adjusting and fixing mechanism in Fig.6.

[0138] The position adjusting and fixing mechanism 7 is formed across one side frame 5a and one side of the housing 20 of the ink doctor chamber 2 in its lateral direction, and formed across the other side frame 5b and the other side of the housing 20 of the ink doctor chamber 2 in its lateral direction (see Fig.1, Fig.2).

[0139] The position adjusting and fixing mechanism 7 is provided with bodies 70 attached to the frame 5, a first part for position adjusting and fixing 7a-1 and a second part for position adjusting and fixing 7a-2 provided on the bodies 70 spaced apart from each other in the moving direction of the housing 20 and parts to be position-adjusted and fixed provided on the housing 20 of the ink doctor chamber 2.

[0140] The bodies 70 are provided on the one side frame 5a and the other side frame 5b respectively.

[0141] The parts to be position-adjusted and fixed are provided on the housing 20 of the ink doctor chamber 2 at the both ends in its lateral direction respectively.

[0142] In this embodiment, the part to be position-adjusted and fixed has a first part to be position-adjusted and fixed 7b-1 and a second part to be position-adjusted and fixed 7b-2, provided on the housing 20 spaced apart from each other in the moving direction of the housing 20 (moving direction of the ink doctor chamber 2).

[0143] Fig.3 and Fig.6-8 show the position adjusting and fixing mechanism 7 on the one side frame 5a side, the position adjusting and fixing mechanism 7 on the other side frame 5b side has same constitutions.

[0144] When the doctor blades 21 of the housing 20 of the ink doctor chamber 2 are abutted on the anilox roll 3, that is, when the ink doctor chamber 2 is at the attaching position, the first part for position adjusting and fixing 7a-1 opposes to the first support pin 42, and the first support pin 42 is the first part to be position-adjusted and fixed 7b-1.

[0145] At the same time, the second part for position adjusting and fixing 7a-2 opposes to the second support pin 43, and the second support pin 43 is the second part

to be position-adjusted and fixed 7b-2.

[0146] The first part for position adjusting and fixing 7a-1 is provided on the bodies 70 so as to be movable vertically between a fixing position abutting on the first support pin 42 and a releasing position of fixation separated from the first support pin 42, but not to be movable in the moving direction of the housing 20.

[0147] When the first part for position adjusting and fixing 7a-1 is at the fixing position, the housing 20 of the ink doctor chamber 2 is movable away from the anilox roll 3, but is fixed so as not to move toward the anilox roll 3.

[0148] The first part for position adjusting and fixing 7a-1 is movable at the fixing position.

[0149] In other words, the first part for position adjusting and fixing 7a-1 is movable further in a projecting direction (downward direction) after start of abutting on the first support pin 42.

[0150] A position where the housing 20 of the ink doctor chamber 2 is fixed so as not to move toward the anilox roll 3 can be adjusted by changing a moving distance of the first part for position adjusting and fixing 7a-1 at the fixing position, that is, a moving distance in the projecting direction (downward direction) after start of abutting.

[0151] If the moving distance of the first part for position adjusting and fixing 7a-1 at the fixing position, that is, the moving distance after start of abutting, for example the moving distance in the projecting direction (downward direction) is long, the space between the housing 20 of the ink doctor chamber 2 fixed so as not to move toward the anilox roll 3 and the anilox roll 3 is widened compared to the case that the moving distance is short, thus abutting pressure of the doctor blades 21 acting on the anilox roll 3 is decreased.

[0152] If the moving distance of the first part for position adjusting and fixing 7a-1 at the fixing position, that is, the moving distance after start of abutting, for example the moving distance in the projecting direction (downward direction) is short, the space between the housing 20 of the ink doctor chamber 2 fixed so as not to move toward the anilox roll 3 and the anilox roll 3 is shortened compared to the case that the moving distance is long, thus abutting pressure of the doctor blades 21 acting on the anilox roll 3 is increased.

[0153] When the first part for position adjusting and fixing 7a-1 is positioned at the releasing position of fixation, the housing 20 of the ink doctor chamber 2 is movable away from the anilox roll 3 and also movable toward the anilox roll 3.

[0154] In this embodiment, an end of the first part for position adjusting and fixing 7a-1 opposing to the first support pin 42 is of wedge shaped, a face of the end opposite to the side opposing to the anilox roll 3 (face facing to the second part for position adjusting and fixing 7a-2) is an inclined face 71.

[0155] The inclined face 71 has an inclined shape to get close to the anilox roll 3 (a position apart from the second part for position adjusting and fixing 7a-2) as approaching the end and to get away from the anilox roll 3

(a position close to the second part for position adjusting and fixing 7a-2) as approaching a base end.

[0156] The housing 20 of the ink doctor chamber 2 is fixed so as not to move toward the anilox roll 3 by abutting the inclined face 71 of the first part for position adjusting and fixing 7a-1 on a side 42a of the first support pin 42 opposing to the anilox roll 3 (the opposite side to the side opposing to the second support pin 43).

[0157] The housing 20 of the ink doctor chamber 2 is moved toward or away from the anilox roll 3 through a wedging action between the inclined face 71 and the first support pin 42, due to change of an abutting position of the inclined face 71 on the side 42a of the first support pin 42 opposing to the anilox roll 3 caused by the movement of the first part for position adjusting and fixing 7a-1.

[0158] Accordingly, the fixing position where the housing 20 of the ink doctor chamber 2 is fixed so as not to move toward the anilox roll 3 may be adjusted.

[0159] Since the first part for position adjusting and fixing 7a-1 is irremovable in the moving direction of the housing 20, the ink doctor chamber 2 can be firmly fixed so as not to move toward the anilox roll 3.

[0160] The second part for position adjusting and fixing 7a-2 is provided on the bodies 70 so as to be movable vertically between a fixing position abutting on the second support pin 43 and a releasing position of fixation apart from the second support pin 43, but not to be movable in the moving direction of the housing 20.

[0161] When the second part for position adjusting and fixing 7a-2 is at the fixing position, the housing 20 of the ink doctor chamber 2 is movable toward the anilox roll 3, but is fixed not to move away from the anilox roll 3.

[0162] The second part for position adjusting and fixing 7a-2 is movable at the fixing position.

[0163] In other words, the second part for position adjusting and fixing 7a-2 is movable further in a projecting direction (downward direction) after start of abutting on the second support pin 43.

[0164] A position where the housing 20 of the ink doctor chamber 2 is fixed so as not to move away from the anilox roll 3 can be adjusted by changing a moving distance of the second part for position adjusting and fixing 7a-2 at the fixing position, that is, a moving distance in the projecting direction (downward direction) after start of abutting.

[0165] If the moving distance of the second part for position adjusting and fixing 7a-2 at the fixing position, that is, the moving distance after start of abutting, for example the moving distance in the projecting direction (downward direction) is long, the space between the housing 20 of the ink doctor chamber 2 fixed so as not to move away from the anilox roll 3 and the anilox roll 3 is shortened compared to the case that the moving distance is short, thus the housing 20 of the ink doctor chamber 2 is fixed at a position close to the anilox roll 3.

[0166] If the moving distance of the second part for position adjusting and fixing 7a-2 at the fixing position, that is, the moving distance after start of abutting, for

example the moving distance in the projecting direction (downward direction) is short, the space between the housing 20 of the ink doctor chamber 2 fixed so as not to move away from the anilox roll 3 and the anilox roll 3 is widened compared to the case that the moving distance is long, thus the housing 20 of the ink doctor chamber 2 is fixed at a position farther from the anilox roll 3.

[0167] When the second part for position adjusting and fixing 7a-2 is at the releasing position of fixation, the housing 20 of the ink doctor chamber 2 is movable away from the anilox roll 3 and also movable toward the anilox roll 3.

[0168] In this embodiment, an end of the second part for position adjusting and fixing 7a-2 opposing to the second support pin 43 is of wedge shaped, a face of the end on the side opposing to the anilox roll 3 (face facing to the first part for position adjusting and fixing 7a-1) is an inclined face 72.

[0169] The inclined face 72 has an inclined shape to get away from the anilox roll 3 (a position apart from the first part for position adjusting and fixing 7a-1) as approaching the end and to get close to the anilox roll 3 (a position close to the first part for position adjusting and fixing 7a-1) as approaching the base end.

[0170] The housing 20 of the ink doctor chamber 2 is fixed so as not to move away from the anilox roll 3 by abutting the inclined face 72 of the second part for position adjusting and fixing 7a-2 on a side 43a of the second support pin 43 opposite to the side opposing to the anilox roll 3 (the opposite side to the side opposing to the first support pin 42).

[0171] The housing 20 of the ink doctor chamber 2 is moved toward or away from the anilox roll 3 through a wedging action between the inclined face 72 and the second support pin 43, due to change of an abutting position of the inclined face 72 on side 43a of the second support pin 43 opposite to the side opposing to the anilox roll 3 caused by the movement of the second part for position adjusting and fixing 7a-2.

[0172] Accordingly, the fixing position where the housing 20 of the ink doctor chamber 2 is fixed so as not to move away from the anilox roll 3 may be adjusted.

[0173] Since the second part for position adjusting and fixing 7a-2 is irremovable in the moving direction of the housing 20, the ink doctor chamber 2 can be firmly fixed so as not to move away from the anilox roll 3.

[0174] In this way, the ink doctor chamber 2 is firmly fixed so as not to move toward or away from the anilox roll 3 at the attaching position, because the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 are irremovable in the moving direction of the housing 20.

[0175] Then, there will be described an example of operations for adjusting the abutting pressure of the doctor blades 21 acting on the anilox roll 3 and for fixing the ink doctor chamber 2 so as not to move.

[0176] The housing 20 of the ink doctor chamber 2 is moved toward the anilox roll 3 to press the doctor blade 21 against the anilox roll 3 by sliding the first support pin

42 and the second support pin 43 on the upper face 44a of the one side guide rail 44 and the upper face 45a of the other side guide rail 45, while the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 are located at the releasing position of fixation.

[0177] Then, the second part for position adjusting and fixing 7a-2 is moved to the fixing position to abut the inclined face 72 on the side 43a of the second support pin 43.

[0178] Furthermore, the housing 20 of the ink doctor chamber 2 is moved toward the anilox roll 3 to adjust the abutting pressure of the doctor blades 21 acting on the anilox roll 3 so that it gradually increases by moving the second part for position adjusting and fixing 7a-2 in the projecting direction (downward direction).

[0179] In this way, the abutting pressure is adjusted to an appropriate value such that ink leakage does not occur and ink can be uniformly scraped off the surface of the anilox roll while remaining suitable amount of ink in cells of the anilox roll 3.

[0180] In this condition, as the movement of the second part for position adjusting and fixing 7a-2 is stopped, the housing 20 of the ink doctor chamber 2 is fixed so as not to move away from the anilox roll 3.

[0181] Further, if the abutting pressure is unnecessarily too high, the abutting pressure is lowered by moving the second part for position adjusting and fixing 7a-2 in a direction (upward direction) opposite to the above mentioned direction to move the housing 20 of the ink doctor chamber 2 away from the anilox roll 3.

[0182] Then, the first part for position adjusting and fixing 7a-1 is moved to the fixing position to abut the inclined face 71 on the side 42a of the first support pin 42 to prevent the housing 20 of the ink doctor chamber 2 from moving toward the anilox roll 3.

[0183] Thus, the housing 20 of the ink doctor chamber 2 is fixed so as not to move toward the anilox roll 3.

[0184] Since the abutting pressure of the doctor blades 21 acting on the anilox roll 3 can be adjusted by moving the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2, the abutting pressure can be easily adjusted.

[0185] The housing 20 of the ink doctor chamber 2 is fixed so as not to move toward or away from the anilox roll 3 by holding the first support pin 42 and the second support pin 43 between the inclined face 71 of the first part for position adjusting and fixing 7a-1 and the inclined face 72 of the second part for position adjusting and fixing 7a-2.

[0186] Accordingly, since the abutting pressure of the doctor blades 21 is maintained to be an appropriate value, the abutting pressure of the doctor blades 21 is not required to be unnecessarily high, and the doctor blades 21 are prevented from an early wear.

[0187] Still more, since the housing 20 of the ink doctor chamber 2 is prevented from moving away from the anilox roll 3 due to vibrations and the like during the operation

of the printing machine, such problems caused by reduction of the abutting pressure of the doctor blades 21 acting on the anilox roll 3 as disabling of uniform scraping of ink on the surface of the anilox roll 3, ink leakage and so on are never occurred.

[0188] When performing the maintenance work, the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 are moved to the releasing position of fixation respectively to move the housing 20 up to a position where the maintenance work is to be performed after completion of the maintenance work, the abutting pressure of the doctor blades 21 is maintained to be an appropriate value through the performance of one example of the above mentioned operations.

[0189] The maintenance work may be performed in this way, but for example, the housing 20 of the ink doctor chamber 2 may be movable away from the anilox roll 3 by moving only the second part for position adjusting and fixing 7a-2 to the releasing position of fixation, therefore, according to this method, the ink doctor chamber 2 may be moved easily and in short time in comparison to the method in which both the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 are moved to the releasing position of fixation respectively.

[0190] Still more, after completion of the maintenance work, since the first part for position adjusting and fixing 7a-1 remains in an original attaching position (fixing position), it is only required to return the second part for position adjusting and fixing 7a-2 to the original attaching position (fixing position), thus the ink doctor chamber 2 can be restored to the original attaching position easily and in short time in comparison to one example of the above mentioned operations.

[0191] Therefore, maintenance work such as cleaning, inspection of the ink doctor chamber 2, exchange of the doctor blades 21 and so on can be performed in a short time and reduction of the operational efficiency of the printing machine due to stopping of the printing machine for the maintenance work can be minimized.

[0192] Furthermore, support parts (the first support pin 42, the second support pin 43) for supporting the housing 20 of the ink doctor chamber 2 movably along the frame 5 are the first part to be position-adjusted and fixed 7b-1 and the second part to be position-adjusted and fixed 7b-2, which results in a small parts count, a simple constitution, and low cost.

[0193] Since the first part to be position-adjusted and fixed 7b-1 and the second part to be position-adjusted and fixed 7b-2 are separated in the moving direction, powers to move the housing 20 of the ink doctor chamber 2 toward or away from the anilox roll 3 act on separated positions in the moving direction of the housing 20.

[0194] Accordingly, the housing 20 is moved while keeping its stable posture.

[0195] Since the first support pin 42 and the second support pin 43 are moved along the one side guide rail

44 and the other side guide rail 45, the ink doctor chamber 2 is moved smoothly with a small force.

[0196] The ink doctor chamber 2 (housing 20) is supported to be movable along the guide rails 44 and 45 between the attaching position and the maintenance work position.

[0197] Then, constitutions of the first part for position adjusting and fixing 7a-1 and the second part for position adjusting and fixing 7a-2 will be described with reference to Fig 6-Fig 8.

[0198] The body 70 is formed with a first hole 73 and a second hole 74 spaced apart from each other in the moving direction of the housing 20 of the ink doctor chamber 2.

[0199] The first hole 73 and the second hole 74 are long holes of circular cross section extending through the body 70 from an upper face 70a to a lower face 70b and having upper large-diameter parts 73a, 74a, lower small-diameter parts 73b, 74b and upwardly stepped parts 73c, 74c located between both large- and small-diameter parts.

[0200] The small-diameter parts 73b, 74b are formed with key grooves 75 respectively.

[0201] The first part for position adjusting and fixing 7a-1 is a first rod 76 of circular cross section slidably fitted into the first hole 73.

[0202] The first rod 76 is formed with the inclined face 71 at its lower part and a screw hole 76a open to an upper surface at its upper part.

[0203] In the first rod 76, a slide key 76b is attached to a face opposite to the inclined face 71 in a radial direction.

[0204] The first rod 76 is fitted into the first hole 73 such that the slide key 76b is slidably fitted into a key groove 75.

[0205] Since the first rod 76 is irremovable in the moving direction of the housing 20 and moves vertically in the first hole 73 without rotation, the direction of the inclined face 71 is always fixed.

[0206] The inclined face 71 of the first rod 76 is located on the opposite side with respect to the side opposing to the anilox roll 3 and is opposing to the second part for position adjusting and fixing 7a-2.

[0207] The second part for position adjusting and fixing 7a-2 is a second rod 77 of circular cross section slidably fitted into the second hole 74.

[0208] The second rod 77 is formed with the inclined face 72 at its lower part and a screw hole 77a open to an upper surface at its upper part.

[0209] In the second rod 77, a slide key 77b is attached to a face opposite to the inclined face 72 in the radial direction.

[0210] The second rod 77 is fitted into the second hole 74 such that the slide key 77b is slidably fitted into the key groove 75.

[0211] Since the second rod 77 is irremovable in the moving direction of the housing 20 and moves vertically in the second hole 74 without rotation, the direction of the inclined face 72 is always fixed.

[0212] The inclined face 72 of the second rod 77 is

located on the side opposing to the anilox roll 3 and is opposing to the inclined face 71 of the first rod 76.

[0213] In other words, the inclined face 71 of the first rod 76 and the inclined face 72 of the second rod 77 are opposing each other in the moving direction of the housing 20.

[0214] The first rod 76 is moved vertically between the fixing position and the releasing position of fixation by the operation of a first moving operation part 78.

[0215] The first moving operation part 78 has a rod 78a, a middle flange 78b provided at one end of the rod 78a in its lengthwise direction, and a screw 78c provided on the opposite side of the middle flange 78b to the rod 78a.

[0216] The screw 78c is threaded into the screw hole 76a of the first rod 76, and the middle flange 78b is fitted into the upper large-diameter part 73a of the first hole 73 and is abutted on the upwardly stepped part 73c.

[0217] The rod 78a projects upwardly from a first hole 61 of a pressing plate 60 attached to the upper face 70a of the body 70, and a first handle 62 which is a rotational operation part is attached to a projected part of the rod 78a.

[0218] In other words, the first moving operation part 78 is rotatable and is supported so as not to move vertically by abutting the middle flange 78b on the upwardly stepped part 73c of the first hole 73 and on the pressing plate 60.

[0219] Accordingly, the first rod 76 is moved upwardly through the rotation of the screw 78c in a tightening direction by manually rotating the first handle 62 to rotate the first moving operation part 78 in the one direction.

[0220] The first rod 76 is moved downwardly through the rotation of the screw 78c in a releasing direction by manually rotating the first handle 62 to rotate the first moving operation part 78 in the other direction.

[0221] Namely, the screw hole 76a and the screw 78c are means to convert rotation of the first moving operation part 78 into vertical movement of the first rod 76.

[0222] In this way, the first rod 76 (the first part for position adjusting and fixing 7a-1) can be moved between the fixing position and the releasing position of fixation by the rotational operation of the first handle 62.

[0223] The second rod 77 is moved vertically between the fixing position and the releasing position of fixation by the operation of a second moving operation part 79.

[0224] The second moving operation part 79 has a rod 79a, a middle flange 79b and a screw 79c as in the first moving operation part 78.

[0225] The screw 79c is threaded into the screw hole 77a of the second rod 77, and the middle flange 79b is fitted into the upper large-diameter part 74a of the second hole 74 and is abutted on the upwardly stepped part 74c.

[0226] The rod 79a projects upwardly from a second hole 63 of the pressing plate 60 attached to the upper face 70a of the body 70, and a second handle 64 which is a rotational operation part is attached to a projected part of the rod 79a.

[0227] In other words, the second moving operation part 79 is rotatable and is supported so as not to move vertically by abutting the middle flange 79b on the upwardly stepped part 74c of the second hole 74 and on the pressing plate 60.

[0228] Accordingly, the second rod 77 is moved upwardly through the rotation of the screw 79c in the tightening direction by manually rotating the second handle 64 to rotate the second moving operation part 79 in one direction.

[0229] The second rod 77 is moved downwardly through the rotation of the screw 79c in the releasing direction by manually rotating the second handle 64 to rotate the second moving operation part 79 in the other direction.

[0230] Namely, the screw hole 77a and the screw 79c are means to convert rotation of the second moving operation part 79 into vertical movement of the second rod 77.

[0231] In this way, the second rod 77 (the second part for position adjusting and fixing 7a-2) can be moved between the fixing position and releasing position of fixation by the rotational operation of the second handle 64.

[0232] The first moving operation part 78 can be locked so as not to rotate by a first rotational locking part 65.

[0233] The first rotational locking part 65 has a constitution having a locking screw 65a threaded into the pressing plate 60.

[0234] The first moving operation part 78 is locked so as not to rotate by rotating the locking screw 65a in a tightening direction to press a distal end thereof against the rod 78a.

[0235] The first moving operation part 78 is unlocked so as to rotate by rotating the locking screw 65a in a releasing direction to separate the distal end thereof from the rod 78a.

[0236] The second moving operation part 79 can be locked so as not to rotate by a second rotational locking part 66.

[0237] The second rotational locking part 66 has a constitution having a locking screw 66a threaded into the pressing plate 60.

[0238] The second moving operation part 79 is locked so as not to rotate by rotating the locking screw 66a in a tightening direction to press a distal end thereof against the rod 79a.

[0239] The second moving operation part 79 is unlocked so as to rotate by rotating the locking screw 66a in a releasing direction to separate the distal end thereof from the rod 79a.

[0240] The first rod 76 (the first part for position adjusting and fixing 7a-1) is moved to the fixing position by the operation of the first moving operation part 78, and the second rod 77 (the second part for position adjusting and fixing 7a-2) is moved to the fixing position by the operation of the second moving operation part 79, whereby the housing 20 of the ink doctor chamber 2 is fixed so as not to move.

[0241] In this condition, the first moving operation part 78 is locked so as not to rotate by the first rotational locking part 65, and the second moving operation part 79 is locked so as not to rotate by the second rotational locking part 66.

[0242] Thus, the first rod 76 and the second rod 77 are irremovable, because the first moving operation part 78 and the second moving operation part 79 are prevented from rotation due to vibrations and the like during operation of the printing machine.

[0243] Accordingly, the housing 20 of the ink doctor chamber 2 is irremovable during operation of the printing machine, and the abutting pressure of the doctor blades 21 acting on the anilox roll 3 can be maintained to be an adjusted appropriate value during operation of the printing machine too.

[0244] As shown in Fig.3, one example of operation for adjustment of the abutting pressure of the doctor blades 21 acting on the anilox roll 3 will be described from state that the housing 20 of the ink doctor chamber 2 is fixed so as not to move by the position adjusting and fixing mechanism 7.

[0245] It will be described on a case that the abutting pressure of the doctor blades 21 acting on the anilox roll 3 is lower than an appropriate value.

[0246] At first, the first moving operation part 78 is operated to rotate to move the first rod 76 (the first part for position adjusting and fixing 7a-1) upwardly to the releasing position of fixation, then the housing 20 of the ink doctor chamber 2 is enabled to move toward the anilox roll 3.

[0247] In this condition, the second moving operation part 79 is operated to rotate to move the second rod 77 (the second part for position adjusting and fixing 7a-2) downwardly while the inclined face 72 of the second rod 77 is kept in abutment with the side 43a of the second support pin 43 (kept in the fixing position), thereby elongate the moving distance at the fixing position and then move the housing 20 of the ink doctor chamber 2 toward the anilox roll 3.

[0248] By this movement, the doctor blades 21 are further pressed against the anilox roll 3.

[0249] Thereby, the abutting pressure of the doctor blades 21 acting on the anilox roll 3 is increased up to an appropriate value.

[0250] Then, the first moving operation part 78 is operated to rotate to move the first rod 76 (the first part for position adjusting and fixing 7a-1) downwardly to the fixing position.

[0251] Accordingly, the inclined face 71 of the first rod 76 is made to abut on the side 42a of the first support pin 42, to fix the housing 20 of the ink doctor chamber 2 so as not to move toward the anilox roll 3.

[0252] Then, the abutting pressure of the doctor blades 21 acting on the anilox roll 3 can be kept at an appropriate value.

[0253] It will be described on a case that the abutting pressure of the doctor blades 21 acting on the anilox roll

3 is higher than an appropriate value.

[0254] The second moving operation part 79 is operated to rotate to move the second rod 77 (the second part for position adjusting and fixing 7a-2) upwardly to the releasing position of fixation, then the housing 20 of the ink doctor chamber 2 is enabled to move away from the anilox roll 3.

[0255] In this condition, the first moving operation part 78 is operated to rotate to move the first rod 76 (the first part for position adjusting and fixing 7a-1) downwardly, while the inclined face 71 of the first rod 76 is kept in abutment with the side 42a of the first support pin 42 (kept in the fixing position), thereby elongate the moving distance at the fixing position, and then move the housing 20 of the ink doctor chamber 2 away from the anilox roll 3.

[0256] By this movement, pressing power of the doctor blades 21 against the anilox roll 3 is weakened.

[0257] Thereby, the abutting pressure of the doctor blades 21 acting on the anilox roll 3 is decreased down to an appropriate value.

[0258] Then, the second moving operation part 79 is operated to rotate to move the second rod 77 (the second part for position adjusting and fixing 7a-2) downwardly to the fixing position.

[0259] Accordingly, the inclined face 72 of the second rod 77 is made to abut on the side 43a of the second support pin 43 to fix the housing 20 of the ink doctor chamber 2 so as not to move away from the anilox roll 3.

[0260] Accordingly, the abutting pressure of the doctor blades 21 acting on the anilox roll 3 can be kept at an appropriate value.

[0261] Then, the maintenance work of the ink doctor chamber 2 will be described with reference to Fig.3, Fig.9, Fig.10.

[0262] Fig.9 is a view illustrating the ink doctor chamber moved away from the anilox roll, and Fig.10 is a view illustrating the ink doctor chamber which is rotated to a maintenance work posture.

[0263] As shown in Fig.3, when the housing 20 of the ink doctor chamber 2 is fixed so as not to move by the position adjusting and fixing mechanism 7 (the first part for position adjusting and fixing 7a-1, the second part for position adjusting and fixing 7a-2, the first part to be position-adjusted and fixed 7b-1 and the second part to be position-adjusted and fixed 7b-2), it is difficult and actually impossible to perform the maintenance work of the ink doctor chamber 2.

[0264] Therefore, the second moving operation part 79 is operated to rotate to move the second rod 77 (the second part for position adjusting and fixing 7a-2) upwardly to the releasing position of fixation.

[0265] Accordingly, the housing 20 of the ink doctor chamber 2 is enabled to move away from the anilox roll 3.

[0266] The ink doctor chamber 2 is moved away from the anilox roll 3 and up to a maintenance work position shown in Fig.9 by sliding the first support pins 42 and the second support pins 43 on the upper face 44a of the one side guide rail 44 and on the upper face 45a of the other

side guide rail 45.

[0267] At the maintenance work position, first support pins 42 are fallen down into the recessed portions 46 of the one side guide rail 44 and the other side guide rail 45 and are rotatably supported in the recessed portions 46.

[0268] In other words, the first support pin 42 is of circular cross section.

[0269] Further, the second support pin 43 is also of circular cross section.

[0270] Therefore, the ink doctor chamber 2 is rotatably supported by a recessed portion 46 as a guide in counterclockwise direction about the first support pins 42 as a fulcrum as indicated by a circular-arc arrow.

[0271] Means for rotatably supporting the ink doctor chamber 2 at the maintenance work position is not limited to the recessed portion 46.

[0272] For example, projections are provided on the upper face 44a of the one side guide rail 44 and the upper face 45a of the other side guide rail 45, and the ink doctor chamber 2 may be rotatably supported by making the first support pins 42 rotatably abut on the projections.

[0273] Namely, it is only required to provide a pin supporting part for rotatably supporting the first support pins 42.

[0274] Still more, the second support pins 43 may be rotatably supported.

[0275] The ink doctor chamber 2 is rotated by about 90 degrees in a counterclockwise direction from the state shown in Fig.9, therefore, the posture of the ink doctor chamber 2 is changed into a maintenance work posture where the doctor blades 21 and the bolts 24 face upward and the opening of the ink groove 23 of the housing 20 faces upward as shown in Fig. 10.

[0276] In this maintenance work posture, since the doctor blades 21 are easy to be seen by a maintenance worker, inspection of the doctor blades 21 is facilitated.

[0277] Since rotating operation of the bolts 24 is facilitated, the doctor blades 21 can be exchanged with ease.

[0278] Since the opening of the ink groove 23 of the housing 20 faces upward, residual ink in the housing 20 is hardly leaked during the maintenance work.

[0279] In other words, when the maintenance work is performed, ink supply from the ink supply pipe is stopped, and ink in the ink groove 23 of the housing 20 is returned to the ink circulation tank from the ink return pipes, but ink other than overflow from the ink groove 23 is remained, residual ink can be prevented from spilling off the housing 20.

[0280] The maintenance work is easily performed and in short time by all of these effects.

[0281] In other words, as shown in Fig.3, when the ink doctor chamber 2 is at the attaching position, the doctor blades 21 and the bolts 24 of the ink doctor chamber 2 are directed laterally toward the anilox roll 3.

[0282] Then the ink doctor chamber 2 is moved to the maintenance work position shown in the Fig.9 as being kept to be directed laterally. In this state, it is troublesome

and takes a time to exchange and inspect of the doctor blades 21.

[0283] In addition, since the opening of the ink groove 23 is directed laterally toward the anilox roll 3, residual ink in the housing 20 is easy to leak during the maintenance work as compared with a case in which the opening of the ink groove 23 of the housing 20 directed upwardly.

[0284] Since the housing 20 of the ink doctor chamber 2 is only required to rotate by about 90 degrees, the maintenance work can be performed without detaching the ink supply pipe and ink return pipes not shown connected to the supply coupler 29a and the return couplers 29b of the housing 20 respectively (see Fig.1, Fig.2).

[0285] Still more, the ink saucer 50 is detached beforehand as shown in Fig.10, because the ink saucer 50 interferes with the ink supply pipe and the ink return pipes when the ink supply pipe and the ink return pipes are remained in connection.

[0286] Since the first support pin 42 can be moved upwardly by detaching it from the recessed portion 46, the ink doctor chamber 2 can be detached from the one side guide rail 44 and the other side guide rail 45 by lifting it.

[0287] In this case, the ink doctor chamber 2 is easily attached or detached by detaching the ink supply pipe and ink return pipes not shown connected to the supply coupler 29a and the return couplers 29b of the housing 20 respectively.

[0288] In this embodiment, the first part for position adjusting and fixing 7a-1 is located on the right side (a side of the anilox roll 3) and the second part for position adjusting and fixing 7a-2 is located on the left side (an opposite side of the anilox roll 3), but the first part for position adjusting and fixing 7a-1 may be located on the left side (the opposite side of the anilox roll 3) and the second part for position adjusting and fixing 7a-2 may be located on the right side (the side of the anilox roll 3).

[0289] In this embodiment, the inclined face 71 and the inclined face 72 are formed on the first rod 76 (the first part for position adjusting and fixing 7a-1) and the second rod 77 (the second part for position adjusting and fixing 7a-2) respectively, but inclined faces may be formed on the first support pin 42 (the first part to be position-adjusted and fixed 7b-1) and the second support pin 43 (the second part to be position-adjusted and fixed 7b-2) respectively.

[0290] In this embodiment, the first part to be position-adjusted and fixed 7b-1 and the second part to be position-adjusted and fixed 7b-2 which are support parts movably supporting the housing 20 of the ink doctor chamber 2 along the frame 5 are of pin shaped, but may be of block shaped or the like other than pin shaped.

[0291] In this embodiment, the support parts (the first support pin 42, the second support pin 43) movably supporting the housing 20 of the ink doctor chamber 2 along the frame 5 are the first part to be position-adjusted and fixed 7b-1 and the second part to be position-adjusted and fixed 7b-2, but the support part and the part to be

position-adjusted and fixed may be provided separately.

[0292] In this case, support parts may be put into one.

[0293] When parts to be position-adjusted and fixed are put into one, such constitution is adapted that the first part for position adjusting and fixing 7a-1 is abutted on a side face of the part to be position-adjusted and fixed opposing to the anilox roll 3, and the second part for position adjusting and fixing 7a-2 is abutted on a side face of the part to be position-adjusted and fixed opposite to the side opposing to the anilox roll 3.

[0294] Still more, the support parts may be constituted such that a lower face of the housing 20 is mounted on the guide rail (guide portion).

Claims

1. An ink supply device of a printing machine comprising an ink doctor chamber in which two doctor blades are attached detachably to an open edge of an ink groove of a housing, an anilox roll, and a position adjusting and fixing mechanism, wherein:

the ink doctor chamber is supported to be movable by a frame between an attaching position close to the anilox roll where the doctor blades are abutted on the anilox roll and a maintenance work position away from the anilox roll where the doctor blades are separated from the anilox roll,

the position adjusting and fixing mechanism has a first part for position adjusting and fixing and a second part for position adjusting and fixing which are attached to the frame, and parts to be position-adjusted and fixed provided on the housing,

the first part for position adjusting and fixing and the second part for position adjusting and fixing are movable between fixing positions in abutment with the parts to be position-adjusted and fixed and releasing positions of fixation separated from the parts to be position-adjusted and fixed, respectively,

the first part for position adjusting and fixing is constituted such that, as it is at the fixing position, the ink doctor chamber is movable away from the anilox roll but is fixed so as not to move toward the anilox roll, together with this, the fixing position of the ink doctor chamber can be adjusted by changing a moving distance at the fixing position, and as it is at the releasing position of fixation, the ink doctor chamber is movable toward and away from the anilox roll, and the second part for position adjusting and fixing is constituted such that, as it is at the fixing position, the ink doctor chamber is movable toward the anilox roll, but is fixed so as not to move away from the anilox roll, together with this, the

fixing position of the ink doctor chamber can be adjusted by changing the moving distance at the fixing position, and as it is at the releasing position of fixation, the ink doctor chamber is movable toward and away from the anilox roll.

2. The ink supply device of the printing machine according to claim 1, wherein:

the first part for position adjusting and fixing is constituted such that it has an inclined face and fixes the ink doctor chamber so as not to move toward the anilox roll by abutting the inclined face on a part to be position-adjusted and fixed, the second part for position adjusting and fixing is constituted such that it has an inclined face and fixes the ink doctor chamber so as not to move away from the anilox roll by abutting the inclined face on the part to be position-adjusted and fixed.

3. The ink supply device of the printing machine according to claim 2, wherein:

the part to be position-adjusted and fixed comprises a first part to be position-adjusted and fixed and a second part to be position-adjusted and fixed spaced apart from each other in the moving direction of the ink doctor chamber, the first part to be position-adjusted and fixed is constituted such that the inclined face of the first part for position adjusting and fixing is abutted on the first part to be position-adjusted and fixed, and the second part to be position-adjusted and fixed is constituted such that the inclined face of the second part for position adjusting and fixing is abutted on the second part to be position-adjusted and fixed.

4. The ink supply device of the printing machine according to claim 3, wherein:

guide rails are attached to the frame, a first support pin and a second support pin supporting the ink doctor chamber movably between the attaching position and the maintenance work position are attached to the housing spaced apart from each other in the moving direction of the ink doctor chamber, and, the first support pin is the first part to be position-adjusted and fixed and the second support pin is the second part to be position-adjusted and fixed.

5. The ink supply device of the printing machine according to claim 4, wherein:

the guide rails have pin support parts to rotate the ink doctor chamber at the maintenance work position

around first support pins as a fulcrum up to the maintenance work posture where an opening of the ink groove faces upward.

6. The ink supply device of the printing machine according to any one of claims 1-5, wherein: the anilox roll is attached to the frame, the doctor blades of the ink doctor chamber at the attaching position are abutted on the anilox roll and the anilox roll is pressed against a plate cylinder by moving the frame.

Fig. 1

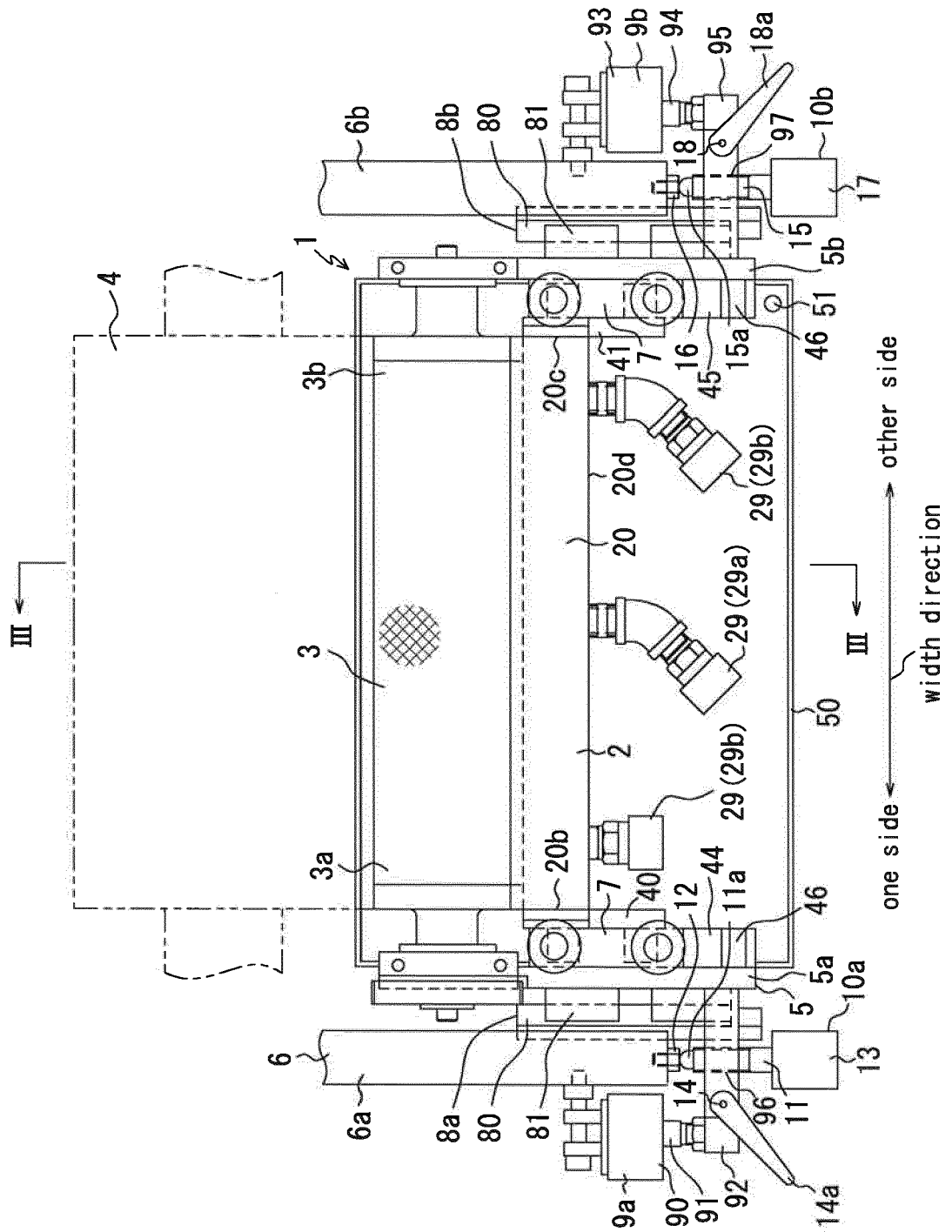


Fig. 2

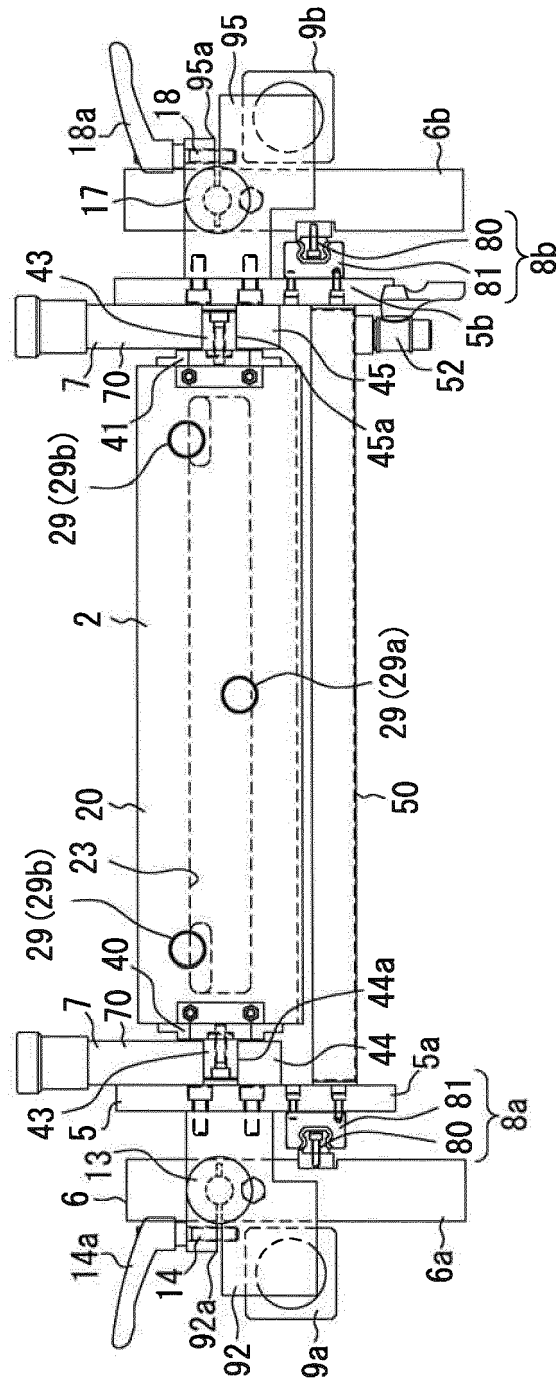


Fig. 3

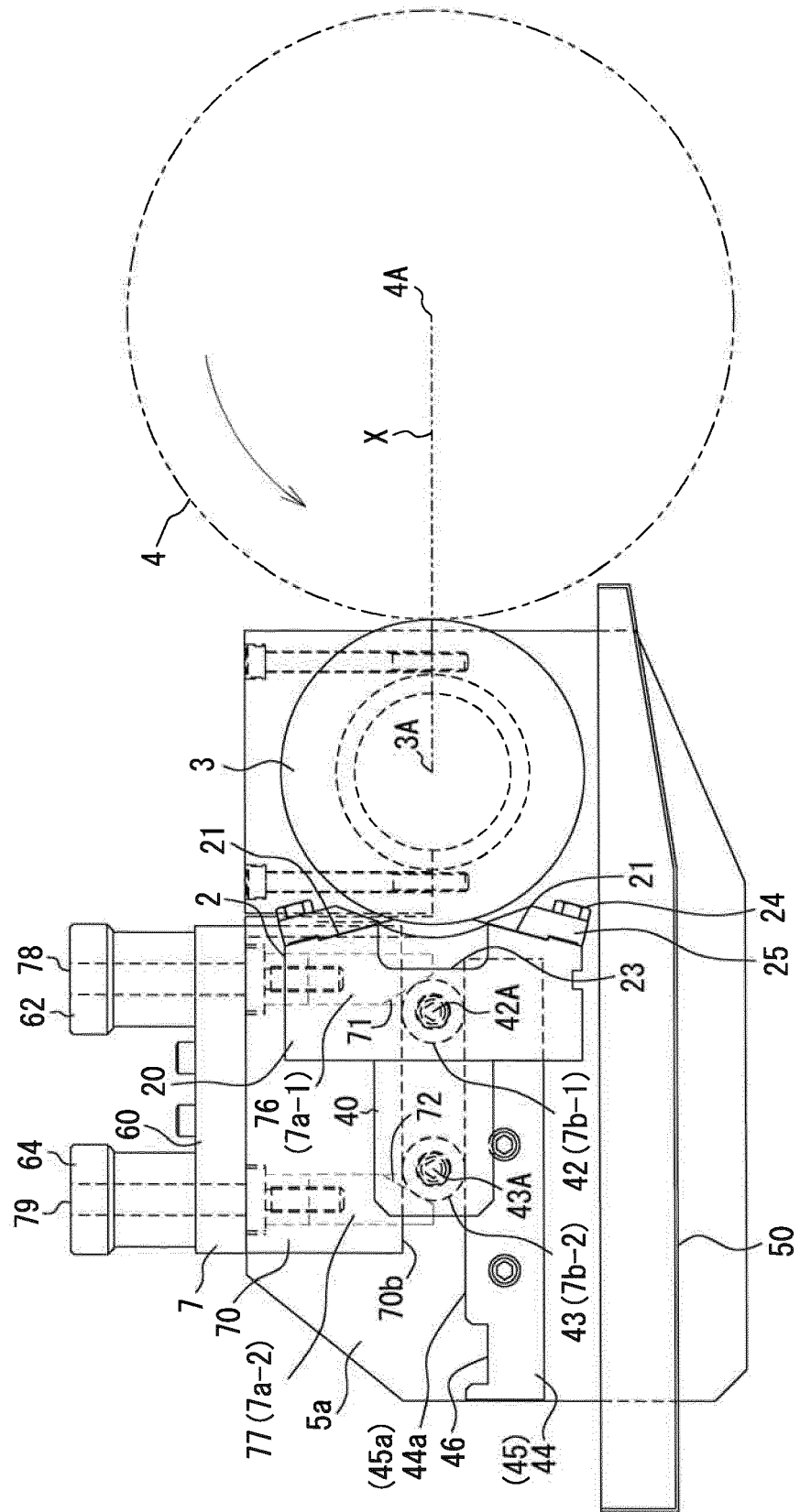


Fig. 4

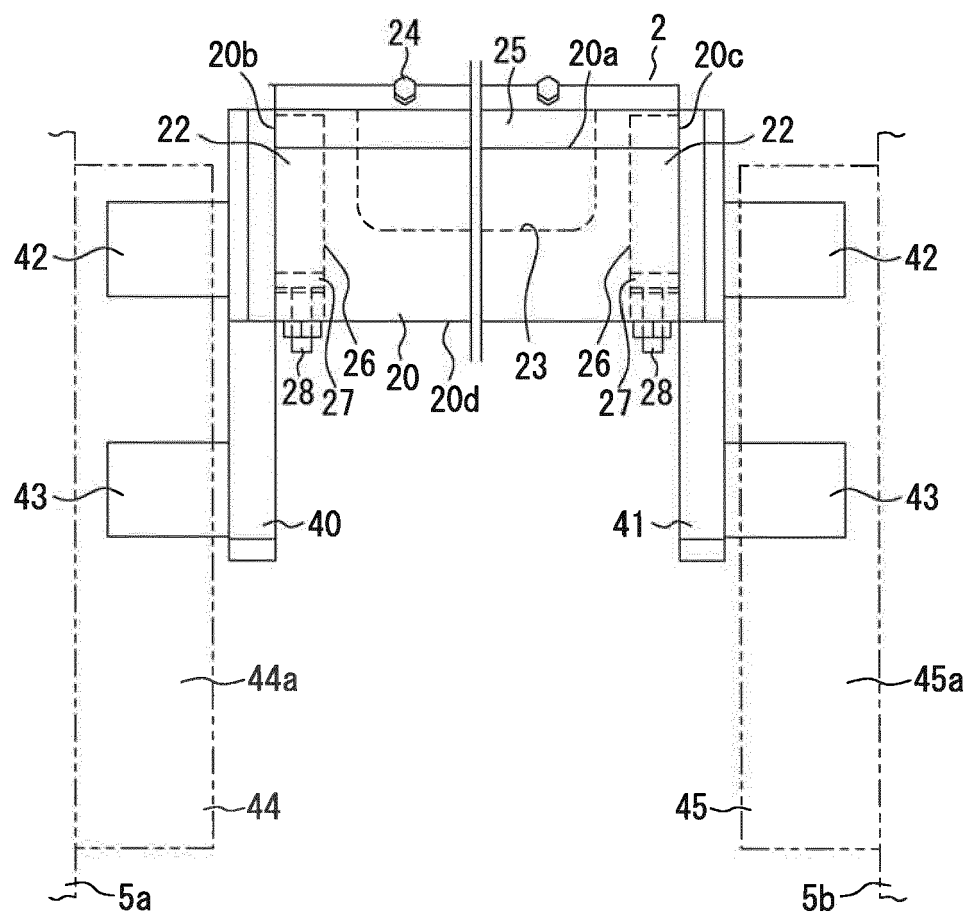


Fig. 5

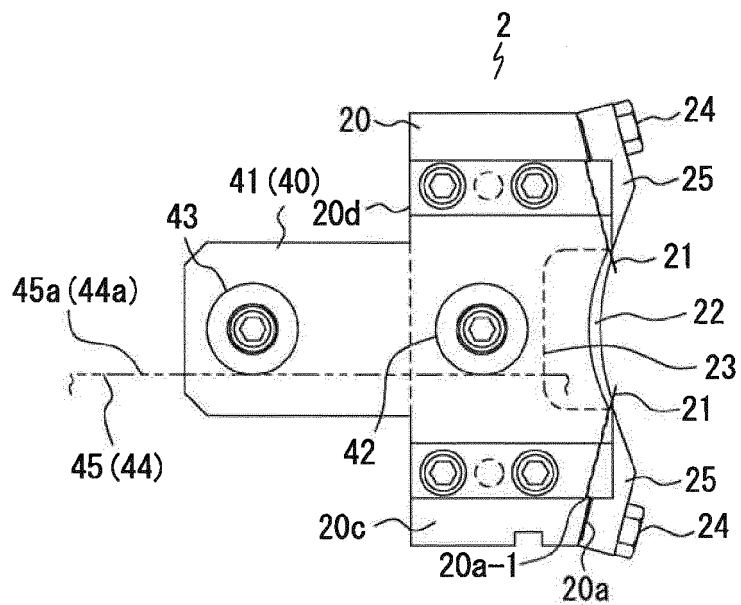


Fig. 6

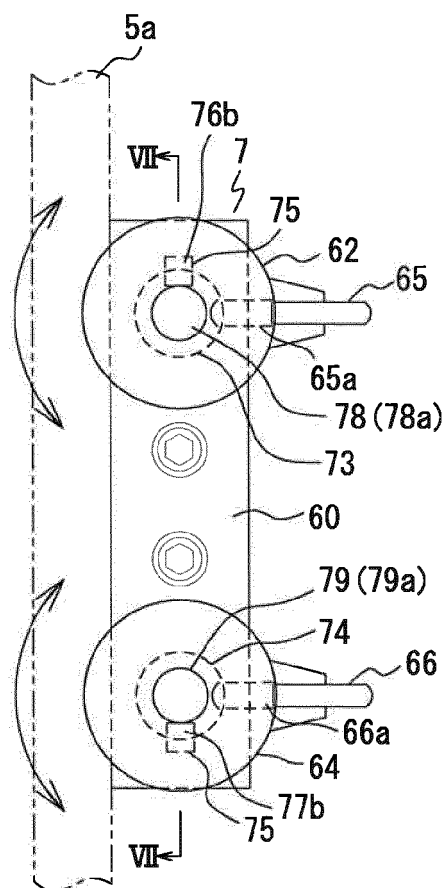


Fig. 7

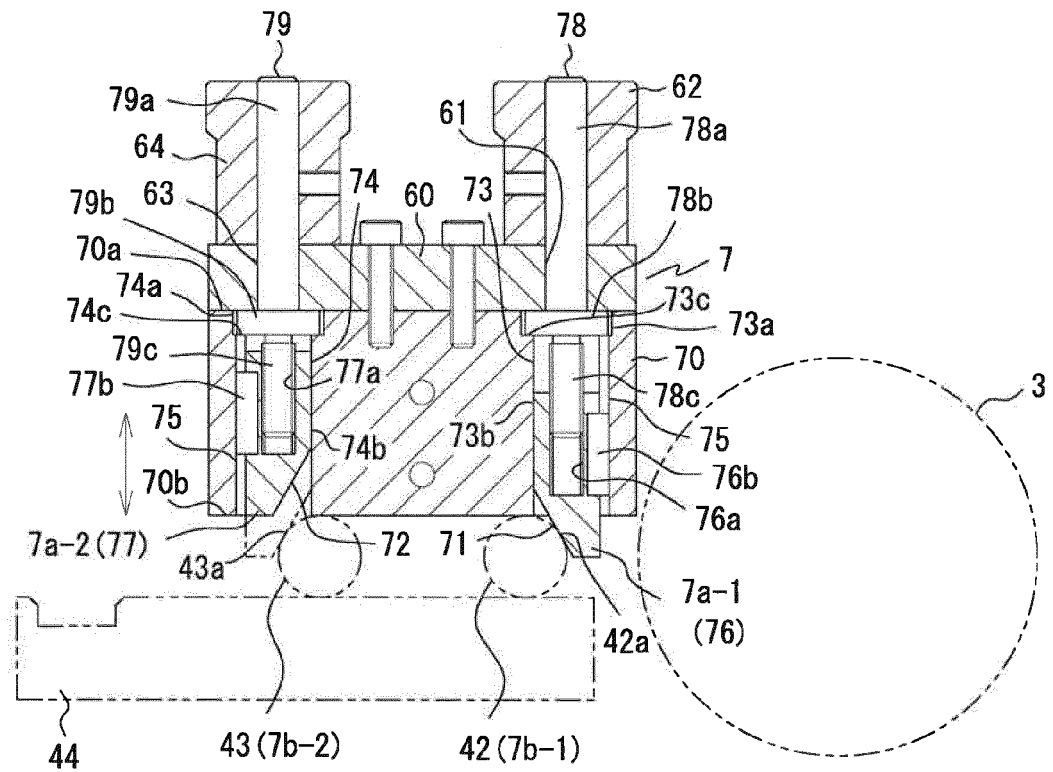


Fig. 8

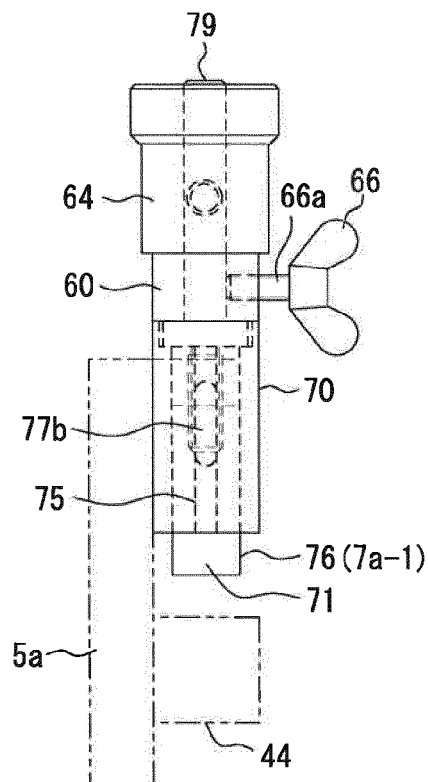


Fig. 9

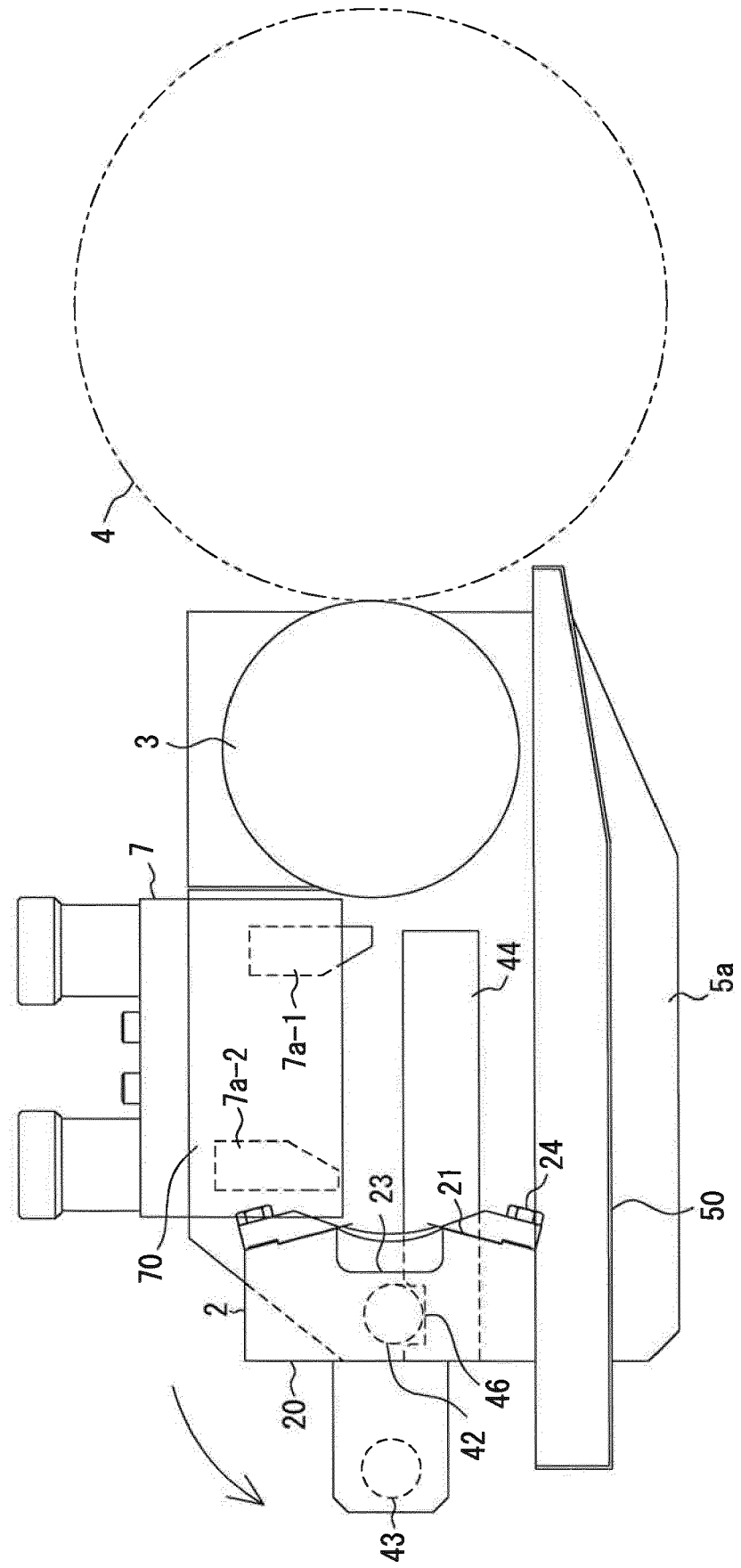
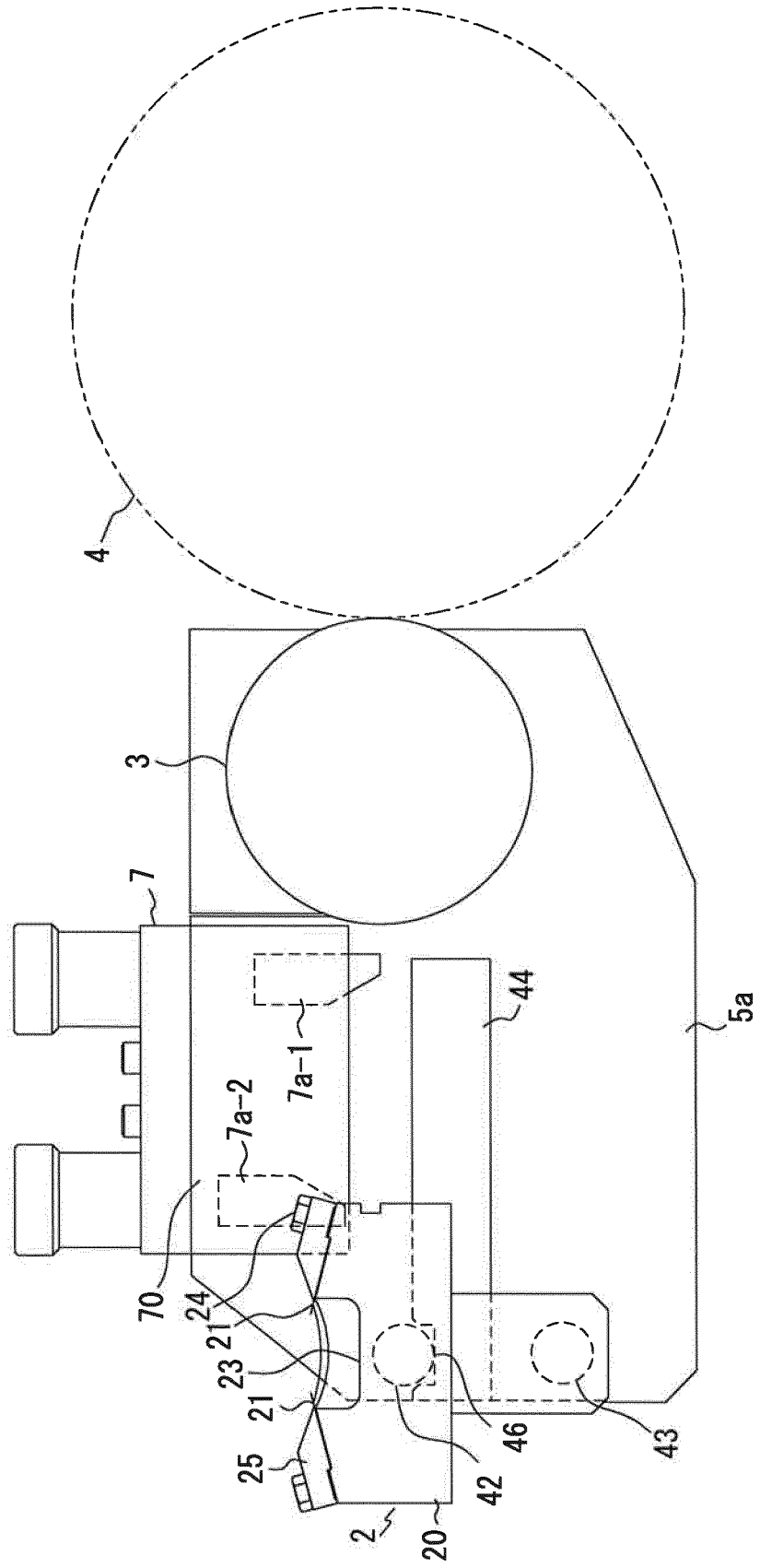


Fig. 10



REFERENCES CITED IN THE DESCRIPTION

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