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(54) DUAL-ROLLER CONTINUOUS CASTING DEVICE

STRANGGIESSVORRICHTUNG MIT DOPPELTER WALZE

DISPOSITIF DE COULÉE CONTINUE À DOUBLE ROULEAU

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(56) References cited:
EP-A2- 0 903 191
CN-A- 103 302 256
CN-A- 103 537 641
KR-B1- 100 674 616
KR-B1- 100 779 606
US-A- 4 012 825
US-A1- 2009 236 068

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Description

Technical Field

[0001] The present invention provides a twin-roller continuous casting device.

Background Art

[0002] In the twin-roller continuous casting device, a casting roller is required to be replaced sometimes, such as when the casting roller is degraded due to abrasion caused by casting operation and the like, when changing the width of a thin strip, when maintaining or inspecting and repairing parts, or the like.

[0003] Due to the fact that the replacement of the casting roller is accompanied by the stop of the casting operation, it becomes an important task to reduce the working time for replacing the casting roller while improving the productivity.

[0004] For example, in JP 4234819 B2, EP0903191 and US2009/236068, a metal thin-strip continuous casting apparatus is described, which is provided with a pair of casting rollers, a roller box which is provided with the pair of casting rollers and can be horizontally movable in the length direction of the rollers from a standby position deviated from a lower portion of a single side of the casting position to an intermediate position below the casting position, and a lifter for lifting the roller box from the intermediate position toward the casting position.

Summary of the Invention

Problems to be solved by the invention

[0005] However, when the positions of the casting rollers are deviated, the leakage of molten steel may occur or the quality of the thin strip is reduced. For these reasons, in the twin-roller continuous casting device, it is required to firmly support the casting rollers at a correct position.

[0006] In JP 4234819 B2, while it is described that an indexing device for correctly positioning a frame mounted with the casting rollers is provided, the specific structure of the indexing device is not described, and it is considered that even for a person of ordinary skill in the art, it is not possible to firmly support the casting rollers at the correct position.

[0007] In JP H059185 B2, while it is described that a pair of positioning pins are fitted with a pin hole disposed on a lower surface of a frame, a change in the distance dimension between the positioning pins corresponding to the temperature of the surrounding environment or a gap for fitting of the pin or the like is required, and therefore, there is one issue, namely, for the positioning pins, the aperture of the pin hole needs to be expanded, and for the reason, it is difficult to firmly support the casting rollers at the correct position.

[0008] EP 0 903 191 A2 discloses a twin roll caster for continuously casting metal strip comprising a pair of parallel casting rolls to which molten metal is supplied through a delivery nozzle. The rolls are mounted on roll carriers moveable on a frame to allow rolls to move toward and away from one another. Biasing units allow inward biasing forces to be applied to the roll carriers so as to bias one of the rolls toward the other. The biasing units incorporate biasing springs and means to adjust the thrust exerted by the springs.

[0009] According to the described situations, the present invention aims to solve the problem as described above, to provide a twin-roller continuous casting device that can easily replace the pair of casting rollers and can firmly support the pair of casting rollers at the correct position.

Means for solving the problem

[0010] A twin-roller continuous casting device for solving the described problem according to the present invention is provided with a pair of casting rollers having a cooling function and being adapted to rotate in mutual directions, and a trolley carrying the pair of the casting rollers and being adapted to travel on guide rails, the guide rails extending from a casting position to a casting roller replacement position, and the twin-roller continuous casting device further comprises a first fixing device, which is adapted to press the trolley in a horizontal direction at a right angle to an axis of the casting rollers at the casting position, so as to fix the trolley in the horizontal direction at the right angle to the axis of the casting rollers, and a second fixing device, which is adapted to press the trolley in an axial direction of the casting rollers at the casting position, so as to fix the trolley in the axial direction of the casting rollers, wherein the twin-roller continuous casting device further comprises a trolley replacement device, the trolley replacement device being adapted to replace the trolley with another of the trolleys, and the trolley replacement device being provided with a support table and a support table moving device, the support table having trolley carrying portions adapted to carry two of the trolleys in parallel, and the support table moving device being adapted to move the support table at a position at which the trolley can be moved between the trolley carrying portion on one side and the casting position, and at a position at which the support table can be moved between the trolley carrying portion on the other side and the casting position.

Effects of the invention

[0011] According to the present invention, due to the fact that the pair of casting rollers in the state of being carried on the trolley can move from the casting position to the casting roller replacement position, the pair of casting rollers can be replaced easily. Due to the fact that the trolley can be fixed at the casting position relative to the

axis of the casting rollers in the horizontal direction at a right angle to the axis of the casting rollers and in the axial direction of the casting rollers, the pair of casting rollers can be firmly supported at the correct position. By means of the first fixing device and the second fixing device, the trolley can also be firmly fixed seamlessly during the operation even the dimension of the trolley changes because of temperature change.

Description of the Drawings

[0012]

Fig.1 shows a top view of a twin-roller continuous casting device according to a first embodiment of the present invention.

Fig. 2 shows a side view of the twin-roller continuous casting device.

Fig. 3 shows the III-III arrow view in Fig.2.

Fig. 4 shows a top view of the twin-roller continuous casting device with a casting position enlarged.

Fig. 5 shows a side view of the twin-roller continuous casting device with the casting position enlarged.

Fig. 6 is a top view of a twin-roller continuous casting device with a casting position enlarged according to a second embodiment of the present invention.

Fig. 7 shows a side view of the twin-roller continuous casting device with the casting position enlarged.

Fig. 8 shows an enlarged view of the frame line VIII in Fig. 7.

Fig. 9 shows a front view of the casting position in the twin-roller continuous casting device.

Detailed description of the preferred embodiments

[0013] The detailed description of the preferred embodiments of a twin-roller continuous casting device according to the present invention are described below with reference to the drawings, however, the present invention is not limited to the following embodiments described with reference to the drawings.

[First embodiment]

[0014] A twin-roller continuous casting device according to the first embodiment of the present invention is described with reference to Figs. 1-5.

[0015] Moreover, Fig.1 shows a state before a casting roller trolley is fixed at the casting position through the first (horizontal direction at right-angle to an axis of the casting roller) fixing device and the second (casting roller axial direction) fixing device. Fig. 4 shows a state when the casting roller trolley is fixed at the casting position through the first fixing device and the second fixing device. Fig. 5 shows a state when the casting roller trolley is fixed at the casting position through the second fixing device.

[0016] In the twin-roller continuous casting device 100 of the embodiments as shown in Figs. 1-5, on the casting roller trolley 10 that is disposed in the manner that the casting roller trolley 10 can travel on a pair of left and right guide rails 103 and 104 extending from a casting position P1 to a casting roller replacement position P3, a pair of left and right casting rollers 1a and 1b are carried. In the twin-roller continuous casting device 100, the casting position P1, an intermediate position P2, the casting roller replacement position P3 and a trolley moving device retreat position P4 are adjacent in the described sequence. The pair of left and right guide rails 103 and 104 are constituted by first guide rail bodies 103A and 104A, second guide rail bodies 103B and 104B, third guide rail bodies 103C and 104C, and fourth guide rail bodies 103D and 104D respectively corresponding to the casting position P1, the intermediate position P2, the casting roller replacement position P3 and the trolley moving device retreat position P4.

[0017] A casting device framework 102 is disposed outside of the left and right directions (width direction) of the first guide rail bodies 103A and 104A in the guide rails 103 and 104. The casting device framework 102 is provided with a first framework body 102a disposed outside the right side of the first guide rail body 103A in the guide rail 103 and a second framework body 102b disposed outside the left side of the first guide rail body 104A in the guide rail 104. At the casting roller replacement position P3, a casting roller trolley replacement device 50 that is according to the invention and that will be described in details later is disposed. Also, the pair of left and right guide rails 103 and 104, the casting device framework 102 and the casting roller trolley replacement device 50 are disposed on a frame 101.

[0018] The casting roller trolley 10 is provided with a plate-shaped trolley body 11, and four wheels 13a, 13b, 14a and 14b. The wheel 13a is disposed at a front end portion 11a side at a right side end portion 11c of the trolley body 11, and the wheel 13b is disposed at a rear end portion 11b side at the right side end portion 11c of the trolley body 11. The wheel 14a is disposed at the front end portion 11a side at a left side end portion 11d of the trolley body 11, and the wheel 14b is disposed at the rear end portion 11b side at the left side end portion 11d of the trolley body 11. That is, wheels 13a and 13b are disposed to the trolley body 11 in a manner that the wheels 13a and 13b can travel on the guide rail 103, and the wheels 14a and 14b are disposed to the trolley body 11 in a manner that the wheels 14a and 14b can travel on the guide rail 104.

[0019] The pair of left and right casting rollers 1a and

1b carried on the casting roller trolley are supported by bearing boxes 2aa, 2ab, 2ba and 2bb in a manner that they can rotate respectively. The bearing boxes 2aa and 2ba are supported by a support member 3a. The bearing boxes 2ab and 2bb are supported by a support member 3b. The support members 3a and 3b are disposed on the trolley body 11 of the casting roller trolley 10. These devices are disposed in the manner that the axial direction of the casting rollers 1a and 1b extends in a front-back direction of the trolley body 11, and are symmetrically disposed at the trolley body 11 in the front-back direction and the left-right direction.

[0020] In the casting rollers 1a and 1b, a cooling water passage (not illustrated) for circulating cooling water is disposed. At end portions of the casting roller 1a, rotary joints 4aa and 4ab are respectively disposed. The rotary joints 4aa and 4ab are connected to end portions of hoses 5a and 5b on one side respectively. End portions of the hoses 5a and 5b on the other side are respectively connected to the cooling water passage (not illustrated) in the trolley body 11. Rotary joints 4ba and 4bb are respectively disposed at end portions of the casting roller 1b. Similar to the rotary joints 4aa and 4ab, the rotary joints 4ba and 4bb are connected to the cooling water passage in the trolley body 11 through hoses (not illustrated).

[0021] When the casting roller trolley 10 is disposed at the casting position P1, the cooling water passage in the trolley body 11 is connected with a cooling water distribution pipe 107 through a cooling water connector 106 which will be described later in details. A base end side of the cooling water distribution pipe 107 is connected with a cooling water supply and discharge source for supplying and discharging the cooling water, to supply and discharge the cooling water of the cooling water passage in the casting rollers 1a and 1b through the cooling water distribution pipe 107, the cooling water connector 106, the cooling water passage in the trolley body 11, the hoses 5a and 5b, the rotary joints 4aa, 4ab, 4ba and 4bb and the like. In this way, the casting rollers 1a and 1b are cooled. Moreover, the cooling water distribution pipe 107 is supported by a support member 111 that is disposed on the frame 101.

[0022] In a center of the rear end portion 11b of the trolley body 11 in the left-right direction, a concave portion 11ba having a concave shape toward the front end portion 11a side is formed. On the concave portion 11ba, a second stopper receiving member 18 which is in contact with a top end portion 47a of a second (casting roller axial direction) stopper 47 which will be described later in details is provided. In a center of the front end portion 11a side of the trolley body 11 in the left-right direction, a connecting part receiving member 17 which is in contact with a one end portion 44a of a connecting part 44 of a second (casting roller axial direction) fixing device 40 which will be described later in details is provided. In a center of the front end portion 11a side in the middle of an upper surface of the trolley body 11 in the left-right direction, a claw portion 11e having a shape in which it can be caught by a hook 84 of a trolley moving device 80 which will be described later in details is provided. Moreover, on the trolley body 11, in the centers of the left-right direction and of the front-back direction, a through hole 11f is formed through an upper surface portion and a lower surface portion.

[0023] At the casting position P1, drive shafts 105a and 105b are supported on the frame 101 by means of a support member 112. Drive shaft couplings 104a and 104b are disposed at a top end of the drive shafts 105a and 105b. When the casting roller trolley 10 is disposed at the casting position P1, the pair of right and left casting rollers 1a and 1b are coupled to the drive shafts 105a and 105b via the drive shaft couplings 104a and 104b. The casting rollers 1a and 1b are rotated relatively by means of the drive shafts 105a and 105b.

[0024] The twin-roller continuous casting device 100 is provided with a first (hereinafter, referred to as casting roller axis right-angle horizontal direction) fixing device 20 for fixing the casting roller trolley 10 in the horizontal direction at the right angle to an axis of the casting rollers 1a and 1b (casting roller axis right-angle horizontal direction) at the casting position P1. The first fixing device 20 is provided with a first pressing device body 20A and a second pressing device body 20B, which are disposed on the first framework body 102a of the casting device framework 102. The first pressing device body 20A and the second pressing device body 20B are respectively provided with a hydraulic cylinder 21.

[0025] The hydraulic cylinder 21 of the first pressing device body 20A is disposed in the following manner, that is, a piston rod 21a is enabled to advance or retreat in the casting roller axis right-angle horizontal direction by supplying and discharging operating oil (operating fluid) to and from the hydraulic cylinder 21, and when the trolley body 11 is disposed at the casting position P1, the piston rod 21a is pressed against a position opposite to the bearing boxes 2aa and 2ba in the casting roller axis right-angle horizontal direction.

[0026] The first pressing device body 20A is provided with an operating oil supply and discharge device 30 for supplying and discharging the operating oil to and from the hydraulic cylinder 21. The operating oil supply and discharge device 30 is provided with an operating oil supply and discharge passage 31, a solenoid valve 32 and a relief valve 34. A head side and a rod side of the hydraulic cylinder 21 of the first pressing device body 20A are respectively connected to ends of first and second passages 31a, 31b on one side in the operating oil supply and discharge passage 31. The solenoid valve 32 is disposed at ends of the first and second passages 31a, 31b on the other side. The solenoid valve 32 is connected to an operating oil supply source (not illustrated). Through the alternative supplying and discharging of the operating oil to and from the hydraulic cylinder 21 by the solenoid valve 32, the piston rod 21a is switched to advance or retreat. In addition, an end of a third passage 31c on one side in the operating oil supply and discharge passage

31 is coupled to the first passage 31a. The relief valve 34 is disposed in the third passage 31c.

[0027] The hydraulic cylinder 21 of the second pressing device body 20B is disposed in the following manner, that is, the piston rod 21a is enabled to advance or retreat in the casting roller axis right-angle horizontal direction by supplying and discharging operating oil (operating fluid) to and from the hydraulic cylinder 21, and when the trolley body 11 is disposed at the casting position P1, the piston rod 21a is pressed against a position opposite to the bearing boxes 2ab and 2bb in casting roller axis right-angle horizontal direction. The second pressing device body 20B is provided with the same operating oil supply and discharge device as that of the first pressing device body 20A.

[0028] Therefore, a pressing force F1A of the piston rod 21a of the first pressing device body 20A and a pressing force F1B of the piston rod 21a of the second pressing device body 20B are respectively adjusted to pressing forces of preset magnitude. In the case of excess pressing force, the operating oil is discharged via the relief valve 34, and presses the trolley body 11 with a proper force (force of the preset magnitude). Other devices such as a pressure accumulator can be also used for inhibiting the excessive pressure of the operating oil.

[0029] Side protruding portions 15a, 15b, 16a and 16b, which protrude toward the outer side of the side, are respectively disposed on the right end portion 11c and the left end portion 11d of the trolley body 11. The side protruding portions 15a, 15b, 16a and 16b are made of, for example, the same material as that of the casting roller trolley 10, preferably, steel. When the casting roller trolley 10 is disposed at the casting position P1, the side protruding portions 15a and 16a are disposed at a position opposite to the piston rod 21a of the first pressing device body 20A in the casting roller axis right-angle horizontal direction. When the casting roller trolley 10 is disposed at the casting position P1, the side protruding portions 15b and 16b are disposed at a position opposite to the piston rod 21a of the second pressing device body 20B in the casting roller axis right-angle horizontal direction. Therefore, both the advancing and retreating amount of the piston rod 21a of the first pressing device body 20A and advancing and retreating amount of the piston rod 21a of the second pressing device body 20B can be reduced.

[0030] In addition, liners (first stoppers) 121a and 121b are disposed on the second framework body 102b. The liner 121a is disposed opposite to the side protruding portion 16a. The liner 121b is disposed opposite to the side protruding portion 16b. Therefore, when the casting roller trolley 10 is pressed through the piston rod 21a of the first pressing device body 20A and the piston rod 21a of the second pressing device body 20B, the casting roller trolley 10 can be more correctly disposed at the casting position P1.

[0031] The twin-roller continuous casting device 100 is provided with a second fixing device 40 for fixing the casting roller trolley 10 at the casting position P1 in the axial direction of the casting rollers. The second fixing device 40 is provided with a hydraulic cylinder 41, the connecting part 44 and a second stopper 47. The connecting part 44 is fixed to the frame 101 by means of a support 46 via a shaft body 43, and, is fixed to a top end portion of a piston rod 41a of the hydraulic cylinder 41 via a shaft body 42. The hydraulic cylinder 41 is fixed to the frame 101 by means of a support 45. The hydraulic cylinder 41 is connected to the operating oil supply and discharge device (not illustrated), the top end portion of the piston rod 41a is enabled to advance or retreat in the vertical direction by supplying and discharging of the operating oil (operating fluid) to and from the hydraulic cylinder 41 by the operating oil supply and discharge device. The second fixing device 40 is provided with the same hydraulic oil supply and discharge device as that of the first pressing device body 20A. The top end portion of the piston rod 41a extends upwardly via the shaft body 43, whereby the connecting part 44 is swung by taking the shaft body 43 as an origin, the one end portion 44a disposed on the connecting part 44 presses the connecting part receiving member 17 of the front end portion 11a of the trolley body 11 at the casting position P1 toward the axial direction of the casting rollers. When the connecting part 44 is swung, the piston rod 41a and the connecting part 44 are disposed in the manner that the one end portion 44a is in contact with the connecting part receiving member 17 of the front end portion 11a of the trolley body 11.

[0032] The second stopper 47 is disposed on the frame 101. The second stopper 47 is disposed in the following manner, that is, when the casting roller trolley 10 is disposed at the casting position P1 and is pressed by the connecting part 44, a top end portion 47a is in contact with a second stopper receiving member 18 that is disposed on a concave part 11ba of the trolley body 11. Therefore, by pressing the trolley body 11 with the connecting part 44, the casting roller trolley 10 is fixed at the casting position P1 in the axial direction of the casting rollers by means of the connecting part 44 and the second stopper 47.

[0033] Moreover, a pressing force F2 of the connecting part 44 of the piston rod 41a of the second fixing device 40 is adjusted to be a force of preset magnitude. In the case of excess pressing force, the operating oil is discharged through the relief valve of the operating oil supply and discharge device of the second fixing device 40, and presses the trolley body 11 with a proper force (force of preset magnitude).

[0034] The casting roller trolley replacement device 50 according to the invention is provided with a support table 52, and the support table 52 is provided with trolley carrying portions 52a and 52b capable of carrying two casting roller trolleys in parallel. The support table 52 can be disposed in a manner that the support table 52 can move along guide rails 51a and 51b disposed on a table 51 at a frame 101C at the casting roller replacement position

P3. The table 51 is in a shape extending in the right-angle horizontal direction relative to the extending direction of the guide rails 103 and 104. Wheels 53a, 53b and 53c intended to travel on the guide rails 51a and 51b are disposed respectively at the lower portion of the support table 52. On an upper protruding part 57 fixed at the end portion of the table 51, a base end side of a side shifter action actuator 54 is fixed via a support 56. A top end portion of a shaft body 54a that advances or retreats by the side shifter action actuator 54 is fixed on the support table 52 via a support 55. That is, the support table 52 of the casting roller trolley replacement device 50 is movable in the direction A2, between a position that the casting roller trolley 10 can move through the intermediate position P2 between the trolley carrying portion 52a on one side and the casting position P1 when the trolley carrying portion 52a on the one side is located at the casting roller trolley replacement position P3B and a position that the casting roller trolley 10 can move through the intermediate position P2 between the trolley carrying portion 52b on the other side and the casting position P1 when the trolley carrying portion 52b on the other side is located at the casting roller trolley replacement position P3B. When the trolley carrying portion 52b on the other side is located at the casting roller trolley replacement position P3B, the trolley carrying portion 52a on one side is located at a new casting roller trolley carrying position P3A. When the trolley carrying portion 52a on one side is located at the casting roller trolley replacement position P3B, the trolley carrying portion 52b on the other side is located at a casting roller trolley retreat position P3C. That is, in the casting roller replacement position P3, the new casting roller trolley carrying position P3A, the casting roller trolley replacement position P3B, and the casting roller trolley retreat position P3C are adjacent to each other according to the described sequence.

[0035] Moreover, the table 51, the guide rails 51a and 51b, the wheels 53a, 53b and 53c, the upper protruding part 57, the support 56, the side shifter action actuator 54, the shaft body 54a, the support 55 and the like constitute a support table moving device.

[0036] The trolley moving device 80 is provided with a trolley moving device body 81, four wheels 82a, 82b, 83a and 83b, and a hook 84. The four wheels 82a, 82b, 83a and 83b are disposed on the trolley moving device body 81 in the manner that they can travel on the guide rails 103 and 104. The hook 84 is disposed on the trolley moving device body 81, and forms a shape capable of catching the claw portion 11e of the casting roller trolley 10. Also, the wheels 82a, 82b, 83a and 83b of the trolley moving device 80 are driven to rotate through a drive device (not illustrated) such as a motor.

[0037] The trolley moving device 80 can move on the guide rails 103 and 104 across the intermediate position P2, the casting roller replacement position P3 and the trolley moving device retreat position P4. Therefore, when the claw portion 11e of the casting roller trolley 10 is caught by the hook 84 of the trolley moving device 80, the casting roller trolley 10 can move in the direction A1, and move over the casting position P1, the intermediate position P2, and the casting roller replacement position P3.

[0038] Here, the sequence of replacing the casting rollers in the described twin-roller continuous casting device 100 is described as follows. Where, in the casting roller trolley replacement device 50, a trolley carrying portion 52b on the other side of the support table 52 is disposed at the casting roller trolley replacement position P3B which is adjacent to the casting position P1 via the intermediate position P2, a trolley carrying portion 52a on the one side of the support table 52 is disposed at a new casting roller trolley carrying position P3A, and a casting roller trolley (a new casting roller trolley) 10C1 is carried on the trolley carrying portion 52a on the one side of the support table 52, and the new casting rollers 1a and 1b are carried on the casting roller trolley (a new casting roller trolley) 10C1.

[0039] First, the fixing of the casting roller trolley 10 by the first fixing device 20 is released, and the fixing of the casting roller trolley 10 by the second fixing device 40 is released. The piston rods 21a and 21b of the first pressing device body 20A and the second pressing device body 20B are retracted by supplying the operating oil to or discharging the operating oil from the hydraulic cylinders 21. Hence, the fixing of the casting roller trolley 10 in the casting roller axis right-angle horizontal direction is released. In addition, the operating oil is supplied to or discharged from the hydraulic cylinder 41 of the second fixing device 40, so that the piston rod 41a is retracted, and the connecting part 44 is enabled to rotate. Hence, the fixing of the casting roller trolley 10 in the axial direction of the casting roller is released.

[0040] Next, the casting roller trolley (a replacement object casting roller trolley) 10 carrying the casting rollers 1a and 1b that are the replacement objects is moved from the casting position P1 to the casting roller replacement position P3 by means of the trolley moving device 80. Hence, the replacement object casting roller trolley 10 is disposed on the trolley carrying portion 52b on the other side in the support table 52 of the casting roller trolley replacement device 50. Also, at this moment, the connections of the drive shafts 105a and 105b as well as the cooling water distribution pipe 107 and the like are automatically released.

[0041] Next, the new casting roller trolley 10C1 carried on the trolley carrying portion 52a on one side is moved on the support table 52 in a manner that it is disposed at the casting roller trolley replacement position P3B. That is, the guide rails 103C1 and 104C1 on the trolley carrying portion 52a on one side in the support table 52 are moved on the support table 52 in a manner that the guide rails 103C1 and 104C1 are linear with the second guide rail bodies 103B and 104B at the intermediate position P2 and the fourth guide rail bodies 103D and 104D at the moving device retreat position P4. At this moment, the replacement object casting roller trolley 10 on the trolley

carrying portion 52b on the other side carried on the support table 52 is located at the casting roller trolley retreat position P3C.

[0042] Next, the new casting roller trolley 10C1 is moved from the casting roller trolley replacement position P3B to the casting position P1 by means of the trolley moving device 80. At this moment, the drive shafts 105a and 105b as well as the cooling water distribution pipe 107 and the like are automatically coupled. The new casting roller trolley 10C1 is fixed in the casting roller axis right-angle horizontal direction by the first fixing device 20, and is fixed in the axial direction of the casting roller by the second fixing device 40. Hence, the new casting roller trolley 10C1 is disposed at the casting position P1 more correctly.

[0043] In this way, the replacement object casting roller trolley can be easily replaced with the new casting roller trolley.

[0044] Therefore, according to the present embodiment, the twin-roller continuous casting device 100 is provided with the pair of casting rollers 1a and 1b having a cooling function and capable of rotating in the mutual directions, and the casting roller trolley 10 carrying the pair of casting rollers 1a and 1b and being capable of traveling on the guide rails 103 and 104, and the guide rails 103 and 104 extend from the casting position P1 to the casting roller replacement position P3. Therefore, the casting roller trolley 10 carrying the pair of casting rollers 1a and 1b can move between the casting position P1 and the casting roller replacement position P3, and the pair of casting rollers 1a and 1b can be easily replaced. By virtue of the first fixing device 20 for fixing the casting roller trolley 10 in the casting roller axis right-angle horizontal direction by pressing the casting roller trolley 10 at the casting position P1 in the casting roller axis right-angle horizontal direction, and the second fixing device 40 for fixing the casting roller trolley 10 in the casting roller axial direction by pressing the casting roller trolley 10 in the casting roller axial direction, the casting roller trolley 10 is fixed both in the casting roller axis right-angle horizontal direction and in the casting roller axial direction, and therefore, the pair of casting rollers 1a and 1b can be firmly supported at the correct position. Through the first fixing device 10 and the second fixing device 40, the casting roller trolley 10 still can be seamlessly and firmly fixed during the operation, even though the dimension of the casting roller trolley 10 varies with the temperature change.

[0045] The first pressing device body 20A and the second pressing device body 20B of the first fixing device 20, and the second fixing device 40, by being provided with the piston rods 21a, 21a and 41a of the hydraulic cylinders 21, 21 and 41, which advance or retreat due to the supply and discharge of the operating oil, the operating oil supply and discharge passages 31, 31, and 31 for supplying the operating oil to or discharging the operating oil from the hydraulic cylinders 21, 21, and 41, and the relief valves 34, 34 and 34 that are disposed on the operating oil supply and discharge passages 31, 31, and 31 for inhibiting the excess pressure, can also impart the push force with a preset magnitude to the casting roller trolley 10, so as to dispose the casting roller trolley 10 at the correct position at the casting position P1,even the size of the device varies with the temperature change. That is, the pair of casting rollers 1a and 1b can be firmly supported at the correct position.

[0046] The piston rod 21a of the first pressing device body 20A is disposed in a manner that it is opposite to the bearing boxes 2aa and 2ba in the width direction of the casting roller trolley 10 (the casting roller axis right-angle horizontal direction), the piston rod 21a of the second pressing device body 20B is disposed in a manner that it is opposite to the bearing boxes 2ab and 2bb in the width direction of the casting roller trolley 10 (the casting roller axis right-angle horizontal direction), so as to suppress the reduction of the positioning precision of the casting rollers 1a and 1b.

[0047] The side protruding portions 15a, 15b, 16a and 16b are disposed on the side end portions 11c and 11d of the casting roller trolley 10, the side protruding portions 15a and 16a are disposed in a manner that they are opposite to the piston rod 21a of the first pressing device body 20A, and the side protruding portions 15b and 16b are disposed in a manner that they are opposite to the piston rod 21a of the second pressing device body 20B. In this way, the advancing or retreating amount of the piston rod can be reduced as compared to the case where the side protruding portions do not exist.

[0048] Further provided is the casting roller trolley replacement device 50 for replacing the casting roller trolley with other casting roller trolley. The casting roller trolley replacement device 50 is provided with the support table 52 and the side shifter action actuator 54, so that the trolley replacement device 50 itself is of a relatively simple structure, and the replacement of the casting rollers 1a and 1b is made easier. The support table 52 is provided with the trolley carrying portions 52a and 52b capable of carrying two casting roller trolleys in parallel, and the side shifter action actuator 54 can enable the support table 52 to move at the position that the casting roller trolley 10 is movable between the trolley carrying portion 52a on one side of the support table 52 and the casting position P1, and at the position that the casting roller trolley 10 is movable between the trolley carrying portion 52b on the other side of the support table 52 and the casting position P1.

[Second embodiment]

[0049] The twin-roller continuous casting device according to the second embodiment of the present invention is described with reference to Figs. 6-9.

[0050] The present embodiment becomes of the structure that a third (vertical direction) fixing device is added to the twin-roller continuous casting device according to the first embodiment as shown in Fig.1. The remaining

structures are substantially the same as those of the devices as shown in Figs. 1-5. The same component is labeled with the same symbol, and the repeated description is properly omitted.

[0051] Also, Fig. 6 shows a state when the casting roller trolley is fixed at the casting position through the first fixing device and the second fixing device. Fig. 7 shows the state when the casting roller trolley is fixed at the casting position through the second fixing device.

[0052] As shown in Figs. 6-9, the twin-roller continuous casting device 100A is further provided with a third fixing device 60. A third fixing device 60 is provided with a first pressing device body 60A and a second pressing device body 60B.

[0053] The pressing device body 60A is provided with a hydraulic cylinder 61 fixed to the first framework body 102a through a support 62. The hydraulic cylinder 61 of the first pressing device body 60A is disposed in a manner that a piston rod 61a is vertically moved forward and backward. The second pressing device body 60B is provided with a hydraulic cylinder 61 that is fixed to a second framework body 102b through the support 62. The hydraulic cylinder 61 of the second pressing device body 60B is disposed in a manner that a piston rod 61a is vertically moved forward and backward. Both the first pressing device body 60A and the second pressing device body 60B are respectively provided with the same operating oil supply and discharge device as that the first pressing device body 20A.

[0054] Therefore, a pressing force F3A of the piston rod 61a of the first pressing device body 60A and a pressing force F3B of the piston rod 61a of the second pressing device body 60B are adjusted to pressing forces of preset magnitude respectively. In the case of excess pressing force, the operating oil (operating fluid) is respectively discharged by the relief valve of the operating oil supply and discharge device of the first and second pressing device bodies 60A and 60B, and presses the trolley body 11 with a proper force (force of preset magnitude).

[0055] In addition, the hydraulic cylinder 61 of the first pressing device body 60A is respectively disposed adjacent to the side protruding portions 15a and 15b. The hydraulic cylinder 61 of the second pressing device body 60B is respectively disposed adjacent to the side protruding portions 16a and 16b.

[0056] The twin-roller continuous casting device 100A is provided with a casting roller trolley 10A which is provided with wheels 13c and 14c adjacent to the wheels 13b and 14b at the side end portions 11c and 11d respectively on the trolley body 11. That is, the casting roller trolley 10A is provided with six wheels 13a, 13b, 13c, 14a, 14b and 14c.

[0057] On a first guide rail body 103A of the guide rail 103, concave portions 103Aa, 103Ab and 103Ac are disposed corresponding to the wheels 13a, 13b and 13c. On a first guide rail body 104A of the guide rail 104, concave portions (not illustrated) are disposed corresponding to the wheels 14a, 14b and 14c. Hence, when the casting roller trolley 10A is disposed at the casting position P1 which will be described later in details, liners 19aa, 19ab and 19ba on the trolley body 11 side ride over the liners 109aa, 109ab and 109ba of the frame 101 side. In addition, liner 19bb of the trolley body 11 side rides over the liner (not illustrated) of the frame 101 side. Hence, contact between wheels 13a, 13b and 13c and the guide rail 103A are avoided, and contact between wheels 14a, 14b and 14c and the guide rail 104A are also avoided.

[0058] On the lower surface portion of the trolley body 11 and the frame 101, liners 19aa and 19ab as well as liners 109aa and 109ab are respectively disposed below the piston rod 61a of the hydraulic cylinder 61 of the first pressing device body 60A correspondingly.

[0059] On the lower surface portion of the trolley body 11, liners 19ba and 19bb are respectively disposed below the piston rod 61a of the hydraulic cylinder 61 of the second pressing device body 60B correspondingly. In addition, liners 109ba and the liner (not illustrated) corresponding to liners 19ba and 19bb are disposed on the frame 101.

[0060] Therefore, according to the twin-roller continuous casting device 100A of the present embodiment, on the basis of achieving the same effect as the described twin-roller continuous casting device 100, the casting roller trolley 10A can also be correctly disposed at the casting position P1 even in the vertical direction by means of the third fixing device 60. Hence, the casting rollers 1a and 1b can be firmly supported at the more correct position.

[0061] The first pressing device body 60A and the second pressing device body 60B of the third fixing device 60, through the piston rods 61a and 61a of the hydraulic cylinders 61 and 61, which advance or retreat due to the supply and discharge of the operating oil, the operating oil supply and discharge passages 31 and 31 for supplying the operating oil to or discharging the operating oil from the hydraulic cylinders 61 and 61, and the relief valves 34 and 34 that are disposing in the operating oil supply and discharge passages 31 and 31 for inhibiting the excess pressure, can also impart the push force of a preset magnitude to the casting roller trolley 10A even the dimension of the device varies with the temperature change, so as to dispose the casting roller trolley 10 at the correct position at the casting position P1. That is, the pair of casting rollers 1a and 1b can be firmly supported at the correct position.

[0062] Moreover, by supporting the casting roller trolley 10A by means of the liners respectively disposed on the casting roller trolley 10A and on the frame 101 at the casting position P1, the casting roller trolley 10A can be disposed in the vertical direction more correctly.

[0063] In addition, the first guide rail body 103A of the guide rail 103 is provided with the concave portions 103Aa, 103Ab and 103Ac at the casting position P1 corresponding to the wheels 13a, 13b and 13c of the casting roller trolley 10A, the first guide rail body 104A of the guide rail 104 is provided with the concave portions at

the casting position P1 corresponding to the wheels 14a, 14b and 14c of the casting roller trolley 10A. Therefore, the casting roller trolley 10A can be disposed in the vertical direction more properly.

[0064] The piston rods 61a and 61a of the first pressing device body 60A and the second pressing device body 60B can inhibit the vertical movement of the casting roller trolley 10A caused by the rotation of the casting rollers 1a and 1b and the like by arranging the first pressing device body 60A and the second pressing device body 60B in the manner that the piston rods 61a and 61a of the first pressing device body 60A and the second pressing device body 60B press the outer side in the width direction of the bearing boxes 2aa, 2ba, 2ab and 2bb respectively, so as to fix the casting roller trolley 10A in the vertical direction.

[Additional embodiments]

[0065] In the described contents, the twin-roller continuous casting device 100A is described in which the casting roller trolley 10A is provided with three wheels in the extending direction of the guide rails 103 and 104 and the guide rails 103 and 104 have the concave portions at the casting position P1 corresponding to the three wheels of the casting roller trolley 10A. However, the number of the wheels and the number of the concave portions in the extending direction of the guide rails are not limited to three, and can also be four or more.

Description of symbols

[0066]

1a, 1b: casting rollers;
10: a casting roller trolley;
11: a trolley body;
13a, 13b: wheels;
14a, 14b: wheels;
15a, 15b: side protruding portions;
16a, 16b: side protruding portions;
20: a first fixing device;
20A: a first pressing device body;
20B: a second pressing device body;
30: an operating oil supply and discharge device;
34: a relief valve (an excessive pressure inhibition device);
40: a second fixing device;
50: a casting roller trolley replacement device;
60: a third fixing device;
60A: a first pressing device body;
60B: a second pressing device body;
80: a trolley moving device;
100, 100A: twin-roller continuous casting devices;
103, 104: guide rails.

Claims

1. A twin-roller continuous casting device (100, 100A), comprising
a pair of casting rollers (1a, 1b) having a cooling function and being adapted to rotate in mutual directions,
a trolley (10, 10A) carrying the pair of casting rollers (1a, 1b) and being adapted to travel on guide rails (103, 104), the guide rails (103, 104) extending from a casting position (P1) to a casting roller replacement position (P3),
a first fixing device (20), which is adapted to press the trolley (10, 10A) at the casting position (P1) in a horizontal direction at a right angle to an axis of the casting roller (1a, 1b), so as to fix the trolley (10, 10A) in the horizontal direction at the right angle to the axis of the casting roller (1a, 1b), and
a second fixing device (40), which is adapted to press the trolley (10, 10A) at the casting position (P1) in an axial direction of the casting roller (1a, 1b), so as to fix the trolley (10, 10A) in the axial direction of the casting roller (1a, 1b),
a trolley replacement device (50), the trolley replacement device (50) being adapted to replace the trolley (10, 10A) with another of the trolleys (10, 10A), and the trolley replacement device (50) being provided with a support table (52) and a support table moving device (51, 51 a, 51b), the support table (52) having trolley carrying portions (52a, 52b) adapted to carry two of the trolleys (10, 10A) in parallel, and the support table moving device (51, 51a, 51b) being adapted to move the support table (52) at a position at which the trolley (10, 10A) can be moved between the trolley carrying portion (52a) on one side and the casting position (P1), and at a position at which the support table (52) can be moved between the trolley carrying portion (52b) on the other side and the casting position (P1).

2. The twin-roller continuous casting device (100, 100A) of claim 1, **characterized in that**,
both the first fixing device (20) and the second fixing device (40) are provided with piston rods (21a, 41a) of a cylinder (21, 41) adapted to advance or retreat due to supply and discharge of an operating fluid, an operating fluid supply and discharge passage (31) for supplying the operating fluid to and discharging the operating fluid from the cylinder (21, 41), and an excessive pressure inhibition device (34) for inhibiting excessive pressure that is disposed on the operating fluid supply and discharge passage (31).

3. The twin-roller continuous casting device (100, 100A) of claim 1 or 2, **characterized in that**,
the pair of casting rollers (1a, 1b) are supported in a rotatable manner by means of a bearing (2aa, 2ab, 2ba, 2bb), and
the piston rod (21a) of the first fixing device (20) is

disposed in a manner that it is opposite to the bearing (2aa, 2ab, 2ba, 2bb) in a width direction of the trolley (10, 10A).

4. The twin-roller continuous casting device (100, 100A) of claim 3, **characterized by** further comprising,
a side protruding portion (15a, 15b, 16a, 16b), the side protruding portion (15a, 15b, 16a, 16b) is disposed at a side portion of the trolley (10, 10A), and protrudes toward outside of the side portion of the trolley (10, 10A), and
the side protruding portion (15a, 15b, 16a, 16b) is disposed in a manner that it is opposite to the piston rod (21a) of the first fixing device (20).

5. The twin-roller continuous casting device (100A) of any one of claims 1-4, **characterized by** further comprising,
a third fixing device (60), the third fixing device (60) being adapted to press the trolley (10A) in a vertical direction, so as to fix the trolley (10A) in the vertical direction.

6. The twin-roller continuous casting device (100A) of claim 5, **characterized in that**, the third fixing device (60) is provided with a piston rod (61a) of a cylinder (61) that is adapted to advance or retreat due to supply and discharge of an operating fluid, an operating fluid supply and discharge passage (31) for supplying the operating fluid to or discharging the operating fluid from the cylinder (61), and an excessive pressure inhibition device (34) for inhibiting excessive pressure that is disposed on the operating fluid supply and discharge passage (31).

7. The twin twin-roller continuous casting device (100, 100A) of claim 1 or 5, **characterized by** further comprising,
a liner (121a, 121b, 109aa, 109ab, 109ba) is provided to support the trolley (10, 10A) at the casting position (P1).

8. The twin-roller continuous casting device (100A) of claim 5 or 6, **characterized in that**,
the trolley (10A) is provided with three or more wheels (13a, 13b, 13c) in an extending direction of the guide rails (103, 104), and
the guide rails (103, 104) are provided with recessed portions (103Aa, 103Ab, 103Ac) corresponding to the three or more wheels (13a, 13b, 13c) at the casting position (P1).

Patentansprüche

1. Doppelwalzen-Stranggießvorrichtung (100, 100A), aufweisend:
ein Paar Gießwalzen (1a, 1b), die eine Kühlfunktion aufweisen und dazu eingerichtet sind, sich in gegenseitige Richtungen zu drehen,
einen Wagen (10, 10A), der das Paar Gießwalzen (1a, 1b) trägt und dazu eingerichtet ist, auf Führungsschienen (103, 104) zu fahren, wobei sich die Führungsschienen (103, 104) von einer Gießposition (P1) zu einer Gießwalzenaustauschposition (P3) erstrecken,
eine erste Fixierungsvorrichtung (20), die dazu eingerichtet ist, den Wagen (10, 10A) an der Gießposition (P1) in eine horizontale Richtung in einem rechten Winkel zu einer Achse der Gießwalze (1a, 1b) zu drücken, um den Wagen (10, 10A) im rechten Winkel zur Achse der Gießwalze (1a, 1b) in der horizontalen Richtung zu fixieren, und
eine zweite Fixierungsvorrichtung (40), die dazu eingerichtet ist, den Wagen (10, 10A) an der Gießposition (P1) in eine Axialrichtung der Gießwalze (1a, 1b) zu drücken, um den Wagen (10, 10A) in der Axialrichtung der Gießwalze (1a, 1b) zu fixieren,
eine Wagenaustauschvorrichtung (50), wobei die Wagenaustauschvorrichtung (50), dazu eingerichtet ist, den Wagen (10, 10A) gegen einen anderen der Wagen (10, 10A) auszutauschen, und wobei die Wagenaustauschvorrichtung (50) mit einem Auflagetisch (52) und einer Auflagetischbewegungsvorrichtung (51, 51a, 51b) versehen ist, wobei der Auflagetisch (52) Wagentragabschnitte (52a, 52b) aufweist, die dazu eingerichtet sind, zwei Wagen (10, 10A) parallel zu tragen, und wobei die Auflagetischbewegungsvorrichtung (51, 51a, 51b) dazu eingerichtet ist, den Auflagetisch (52) an eine Position zu bewegen, an der der Wagen (10, 10A) zwischen dem Wagentragabschnitt (52a) auf einer Seite und der Gießposition (P1) bewegt werden kann, und an eine Position, an der der Auflagetisch (52) zwischen dem Wagentragabschnitt (52b) auf der anderen Seite und der Gießposition (P1) bewegt werden kann.

2. Doppelwalzen-Stranggießvorrichtung (100, 100A) nach Anspruch 1, **dadurch gekennzeichnet, dass** sowohl die erste Fixierungsvorrichtung (20) als auch die zweite Fixierungsvorrichtung (40) mit Kolbenstangen (21a, 41a) eines Zylinders (21, 41), die dazu eingerichtet sind, sich durch Einlass und Auslass eines Betriebsfluids vor und zurück zu bewegen, einem Betriebsfluideinlass- und -auslasskanal (31) zum Zuführen des Betriebsfluids zu dem und Ablassen des Betriebsfluids von dem Zylinder (21, 41), und einer Überdrucksperrvorrichtung (34) zum Hemmen übermäßigen Drucks, die auf dem Betriebsfluideinlass- und -auslasskanal (31) angeordnet ist, versehen sind.

3. Doppelwalzen-Stranggießvorrichtung (100, 100A) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass**
das Paar Gießwalzen (1a, 1b) drehbar über ein Lager (2aa, 2ab, 2ba, 2bb) gelagert sind, und
die Kolbenstange (21a) der ersten Fixierungsvorrichtung (20) derart angeordnet ist, dass sie in einer Breitenrichtung des Wagens (10, 10A) dem Lager (2aa, 2ab, 2ba, 2bb) gegenüber liegt.

4. Doppelwalzen-Stranggießvorrichtung (100, 100A) nach Anspruch 3, **dadurch gekennzeichnet, dass** sie ferner aufweist
einen Seitenvorsprungsabschnitt (15a, 15b, 16a, 16b), wobei der Seitenvorsprungsabschnitt (15a, 15b, 16a, 16b) an einem Seitenabschnitt des Wagens (10, 10A) angeordnet ist und zur Außenseite des Seitenabschnitts des Wagens (10, 10A) vorsteht, und
wobei der Seitenvorsprungsabschnitt (15a, 15b, 16a, 16b) derart angeordnet ist, dass er der Kolbenstange (21a) der ersten Fixierungsvorrichtung (20) gegenüber liegt.

5. Doppelwalzen-Stranggießvorrichtung (100A) nach einem der Ansprüche 1-4, **dadurch gekennzeichnet, dass** sie ferner aufweist
eine dritte Fixierungsvorrichtung (60), wobei die dritte Fixierungsvorrichtung (60) dazu eingerichtet ist, den Wagen (10A) in eine vertikale Richtung zu drücken, um den Wagen (10A) in der vertikalen Richtung zu fixieren.

6. Doppelwalzen-Stranggießvorrichtung (100A) nach Anspruch 5, **dadurch gekennzeichnet, dass**
die dritte Fixierungsvorrichtung (60) mit einer Kolbenstange (61a) eines Zylinders (61), die dazu eingerichtet ist, sich durch Einlass und Auslass eines Betriebsfluids vor und zurück zu bewegen, einem Betriebsfluideinlass- und -auslasskanal (31) zum Zuführen des Betriebsfluids zu dem und Ablassen des Betriebsfluids von dem Zylinder (61), und einer Überdrucksperrvorrichtung (34) zum Hemmen übermäßigen Drucks, die auf dem Betriebsfluideinlass- und -auslasskanal (31) angeordnet ist, versehen ist.

7. Doppelwalzen-Stranggießvorrichtung (100, 100A) nach Anspruch 1 oder 5, **dadurch gekennzeichnet, dass** sie ferner aufweist
eine Auskleidung (121a, 121b, 109aa, 109ab, 109ba), die vorgesehen ist, um den Wagen (10, 10A) an der Gießposition (P1) zu stützen.

8. Doppelwalzen-Stranggießvorrichtung (100A) nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** der Wagen (10A) mit drei oder mehr Rädern (13a, 13b, 13c) in einer Erstreckungsrichtung der Führungsschienen (103, 104) versehen ist, und
die Führungsschienen (103, 104) an der Gießposition (P1) mit ausgesparten Bereichen (103Aa, 103Ab, 103Ac) versehen sind, die den drei oder mehr Rädern (13a, 13b, 13c) entsprechen.

Revendications

1. Dispositif de coulée continue à deux rouleaux (100, 100A), comprenant une paire de rouleaux de coulée (1a, 1b) ayant une fonction de refroidissement et étant adaptés pour tourner dans des directions mutuelles,
un chariot (10, 10A) portant la paire de rouleaux de coulée (1a, 1b) et étant adapté pour se déplacer sur des rails de guidage (103, 104), les rails de guidage (103, 104) s'étendant d'une position de coulée (P1) à une position de remplacement du rouleau de coulée (P3),
un premier dispositif de fixation (20), qui est adapté pour presser le chariot (10, 10A) au niveau de la position de coulée (P1) dans une direction horizontale à angle droit par rapport à un axe du rouleau de coulée (1a, 1b), de manière à fixer le chariot (10, 10A) dans la direction horizontale à l'angle droit par rapport à l'axe du rouleau de coulée (1a, 1b), et
un deuxième dispositif de fixation (40), qui est adapté pour presser le chariot (10, 10A) au niveau de la position de coulée (P1) dans une direction axiale du rouleau de coulée (1a, 1b), de manière à fixer le chariot (10, 10A) dans la direction axiale du rouleau de coulée (1a, 1b),
un dispositif de remplacement de chariot (50), le dispositif de remplacement de chariot (50) étant adapté pour remplacer le chariot (10, 10A) par un autre des chariots (10, 10A), et
le dispositif de remplacement de chariot (50) étant pourvu d'une table de support (52) et d'un dispositif de déplacement de table de support (51, 51a, 51b), la table de support (52) ayant des parties de support de chariot (52a, 52b) adaptées pour porter deux des chariots (10, 10A) en parallèle, et le dispositif de déplacement de table de support (51, 51a, 51b) étant adapté pour déplacer la table de support (52) à une position dans laquelle le chariot (10, 10A) peut être déplacé entre la partie de support de chariot (52a) d'un côté et la position de coulée (P1), et à une position dans laquelle la table de support (52) peut être déplacée entre la partie de support de chariot (52b) de l'autre côté et la position de coulée (P1).

2. Dispositif de coulée continue à deux rouleaux (100, 100A) selon la revendication 1, **caractérisé en ce que**,
le premier dispositif de fixation (20) et le deuxième dispositif de fixation (40) sont tous les deux pourvus de tiges de piston (21a, 41a) d'un cylindre (21, 41) adapté pour avancer ou reculer en raison de l'ali-

mentation et de l'évacuation d'un fluide de fonctionnement, d'un passage d'alimentation et d'évacuation de fluide de fonctionnement (31) pour fournir le fluide de fonctionnement et évacuer le fluide de fonctionnement du cylindre (21, 41), et d'un dispositif d'inhibition de pression excessive (34) pour empêcher une pression excessive qui est disposé sur le passage d'alimentation et d'évacuation de fluide de fonctionnement (31).

3. Dispositif de coulée continue à deux rouleaux (100, 100A) selon la revendication 1 ou 2, **caractérisé en ce que**,
la paire de rouleaux de coulée (1a, 1b) est supportée de manière rotative au moyen d'un palier (2aa, 2ab, 2ba, 2bb), et
la tige de piston (21a) du premier dispositif de fixation (20) est disposée de manière à être opposé au palier (2aa, 2ab, 2ba, 2bb) dans le sens de la largeur du chariot (10, 10A).

4. Dispositif de coulée continue à deux rouleaux (100, 100A) selon la revendication 3, **caractérisé en ce qu'**il comprend en outre,
une partie saillante latérale (15a, 15b, 16a, 16b), la partie saillante latérale (15a, 15b, 16a, 16b) est disposée sur une partie latérale du chariot (10, 10A), et fait saillie vers l'extérieur de la partie latérale du chariot (10, 10A), et
la partie saillante latérale (15a, 15b, 16a, 16b) est disposée de manière à être opposée à la tige de piston (21 a) du premier dispositif de fixation (20).

5. Dispositif de coulée continue à deux rouleaux (100A) selon l'une quelconque des revendications 1 à 4, **caractérisé en ce qu'**il comprend en outre,
un troisième dispositif de fixation (60), le troisième dispositif de fixation (60) étant adapté pour presser le chariot (10A) dans une direction verticale, de manière à fixer le chariot (10A) dans la direction verticale.

6. Dispositif de coulée continue à deux rouleaux (100A) selon la revendication 5, **caractérisé en ce que**,
le troisième dispositif de fixation (60) est pourvu d'une tige de piston (61 a) d'un cylindre (61) qui est adaptée pour avancer ou reculer en raison de l'alimentation et de l'évacuation d'un fluide de fonctionnement, d'un passage d'alimentation et d'évacuation de fluide de fonctionnement (31) pour fournir le fluide de fonctionnement ou évacuer le fluide de fonctionnement du cylindre (61), et d'un dispositif d'inhibition de pression excessive (34) pour empêcher une pression excessive qui est disposé sur le passage d'alimentation et d'évacuation de fluide de fonctionnement (31).

7. Dispositif de coulée continue à deux rouleaux jumelés (100, 100A) selon la revendication 1 ou 5, **caractérisé en ce qu'**il comprend en outre,
une doublure (121a, 121b, 109aa, 109ab, 109ba) qui est prévue pour supporter le chariot (10, 10A) au niveau de la position de coulée (P1).

8. Dispositif de coulée continue à deux rouleaux (100A) selon la revendication 5 ou 6, **caractérisé en ce que**,
le chariot (10A) est pourvu de trois roues ou plus (13a, 13b, 13c) dans une direction d'extension des rails de guidage (103, 104), et
les rails de guidage (103, 104) sont pourvus de parties évidées (103Aa, 103Ab, 103Ac) correspondant aux trois roues ou plus (13a, 13b, 13c) au niveau de la position de coulée (P1).

Fig. 1

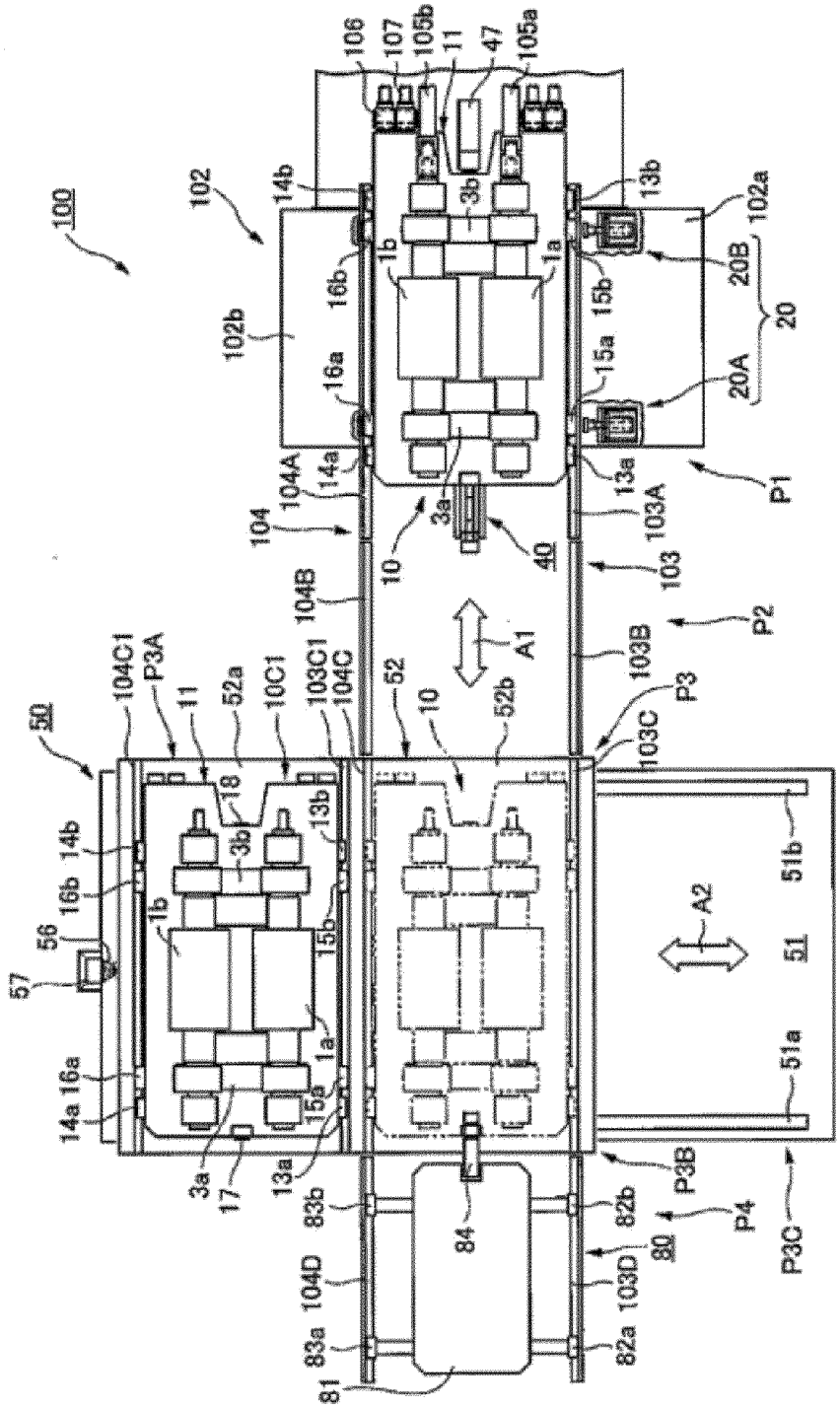
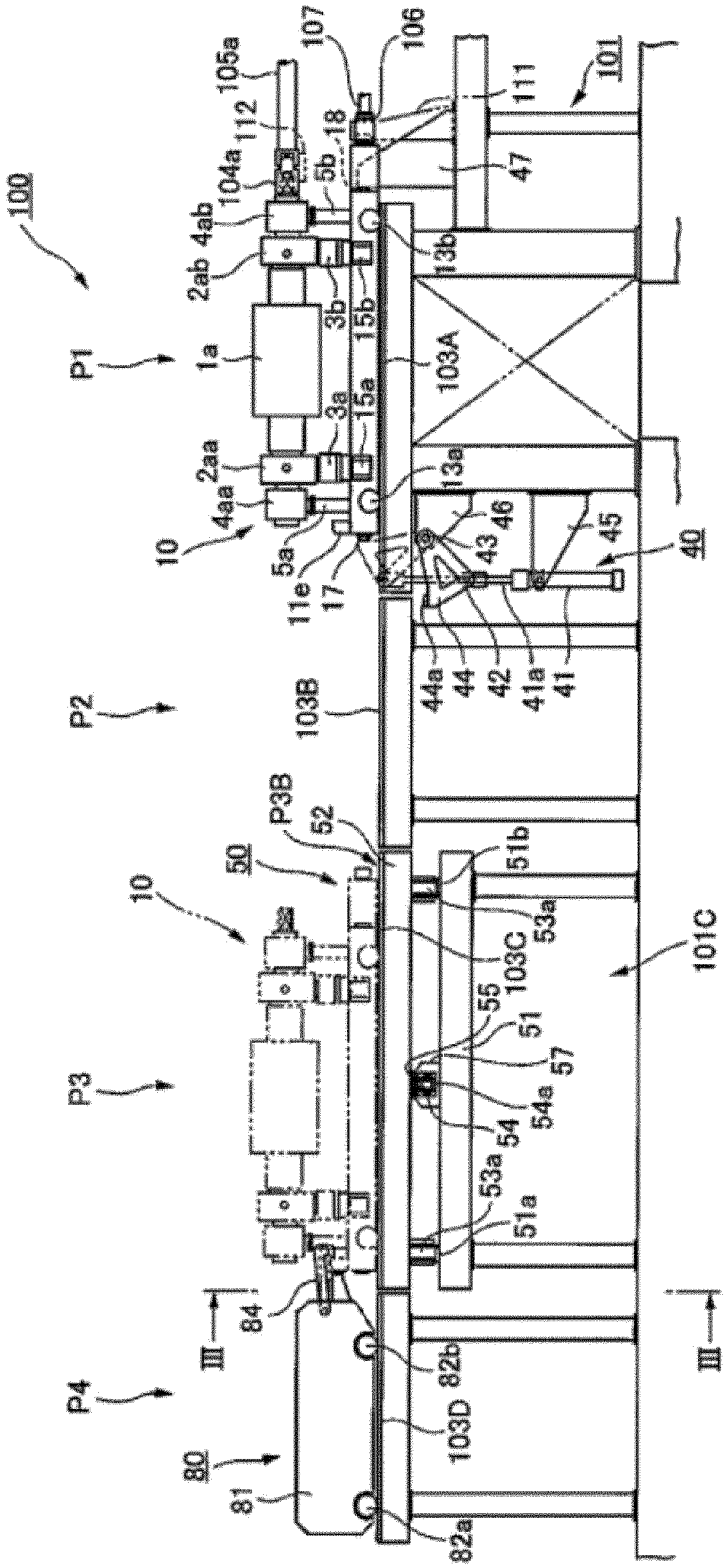

100
102
102a
102b
20
20A
20B
P1
P2
P3
P3A
P3B
P3C
P4
A1
A2
40
50
51
51a
51b
52
52a
52b
80
81
83a
83b
84
82a
82b
10
11
47
105a
105b
106
107
103
103A
103B
103C
103D
104
104A
104B
104C
104D
104C1
103C1
10C1
1a
1b
3a
3b
13a
13b
14a
14b
15a
15b
16a
16b
17
18
56
57

Fig. 2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P1
P2
P3
P4
10
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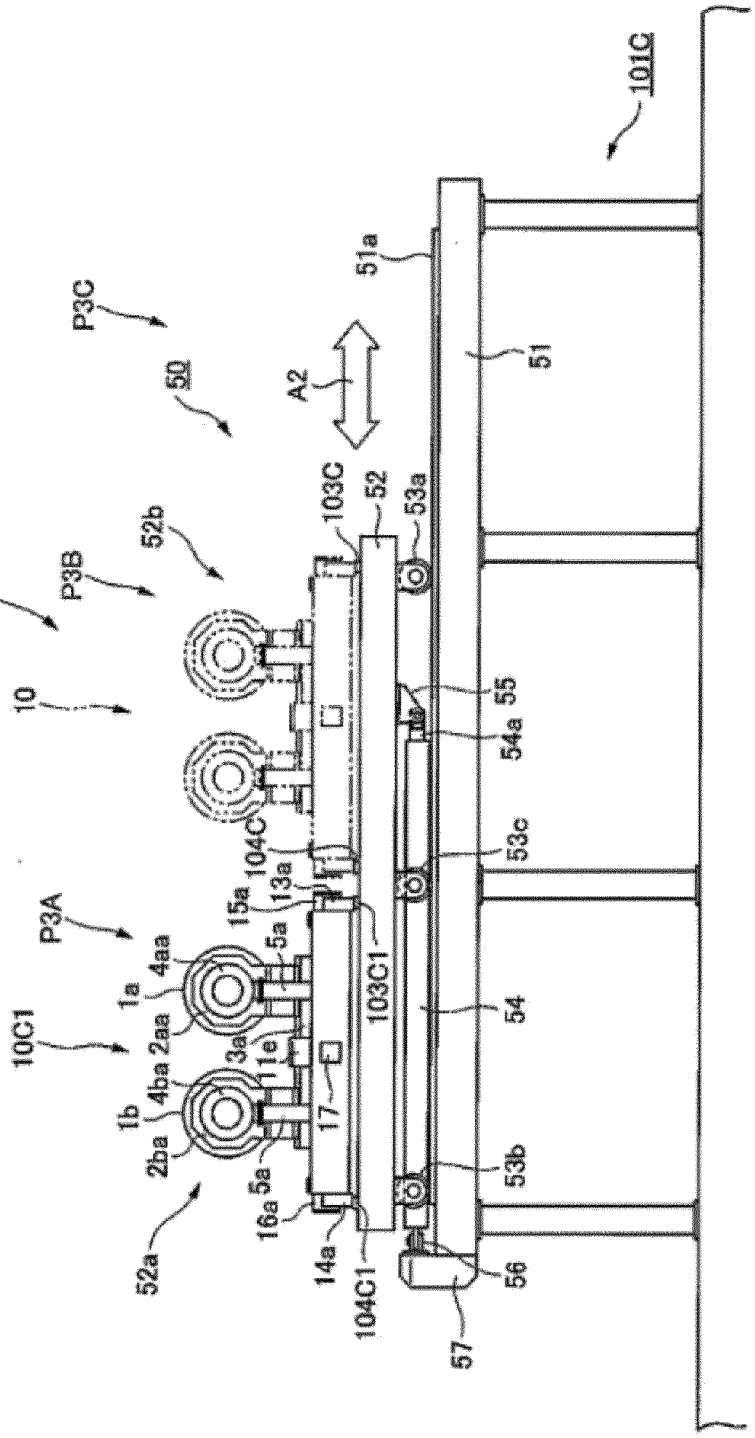
2aa
3a
4aa
5a
11e
17
15a
13a
103A
2ab
4ab
3b
5b
15b
13b
105a
112
104a
18
107
106
111
101
47
46
43
45
40
44a
44
42
41a
41
103B
P3B
52
50
51b
53a
103C
101C
55
51
57
54a
54
53a
51a
84
III
82b
103D
80
81
82a

Fig. 3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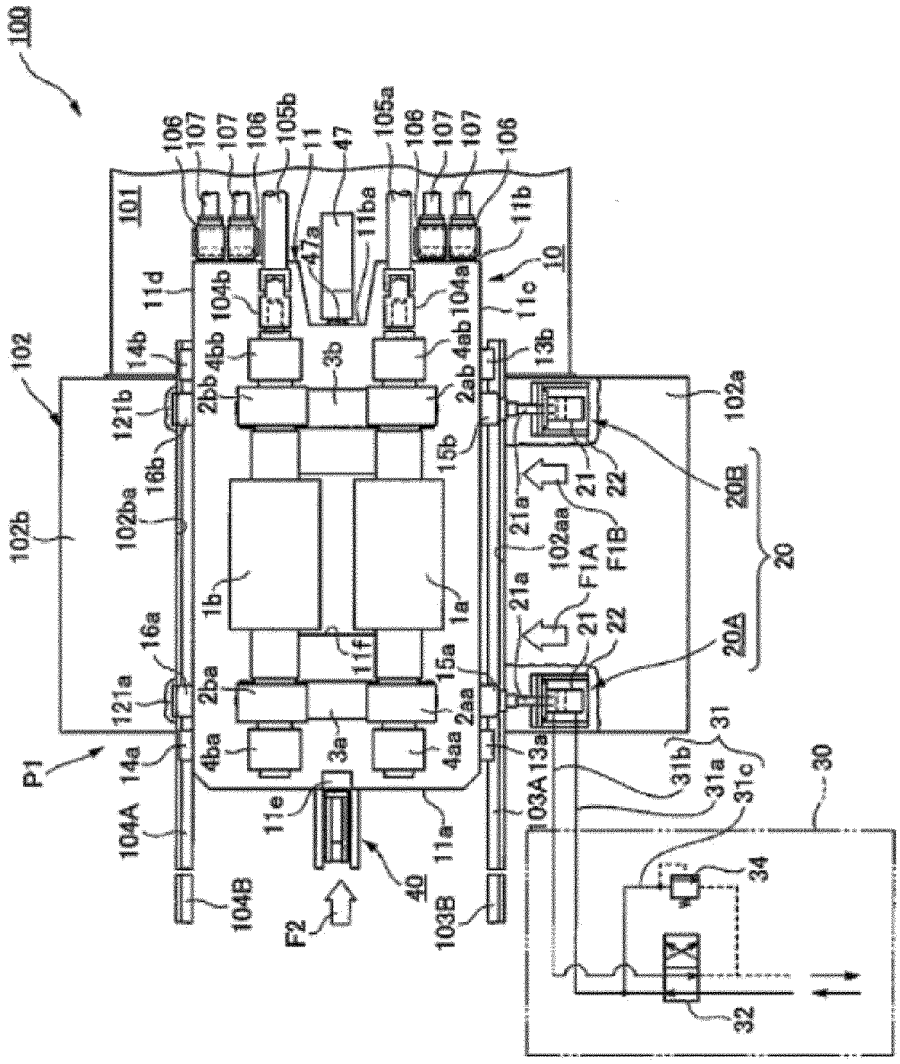
51
P3C
50
A2
52
103C
53a
52b
P3
P3B
10
55
54a
104C
53c
15a
13a
P3A
5a
4aa
1a
103C1
54
10C1
2aa
3a
11e
4ba
1b
17
2ba
53b
5a
16a
52a
14a
104C1
56
57

Fig. 4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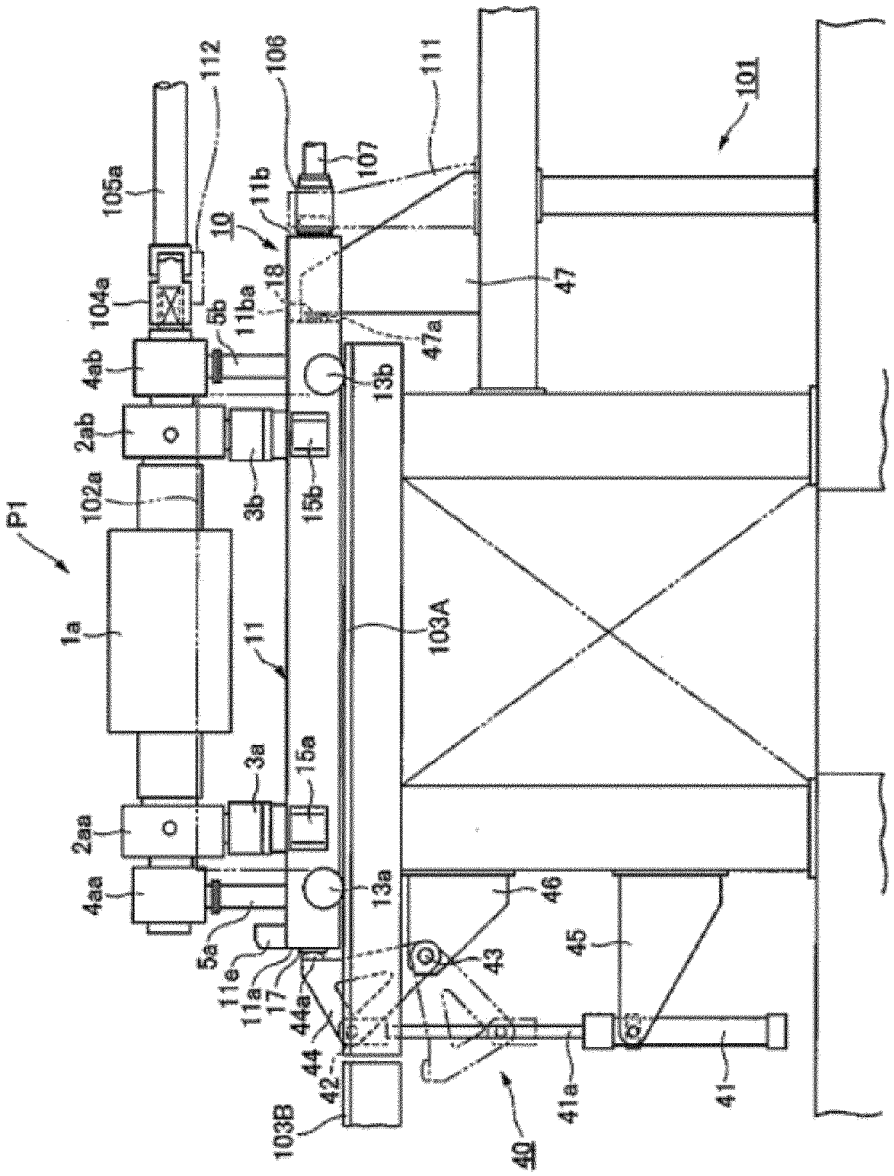
102a
102b
10
11
11a
11b
11c
11d
11e
11f
11ba
1a
1b
2aa
2ab
2ba
2bb
3a
3b
4aa
4ab
4ba
4bb
13a
13b
14a
14b
15a
15b
16a
16b
20
20A
20B
21
21a
22
31
31a
31b
31c
30
32
34
40
47
47a
102aa
102ba
103A
103B
104A
104B
104a
104b
105a
105b
106
107
121a
121b
F1A
F1B
F2
P1

Fig. 5


P1
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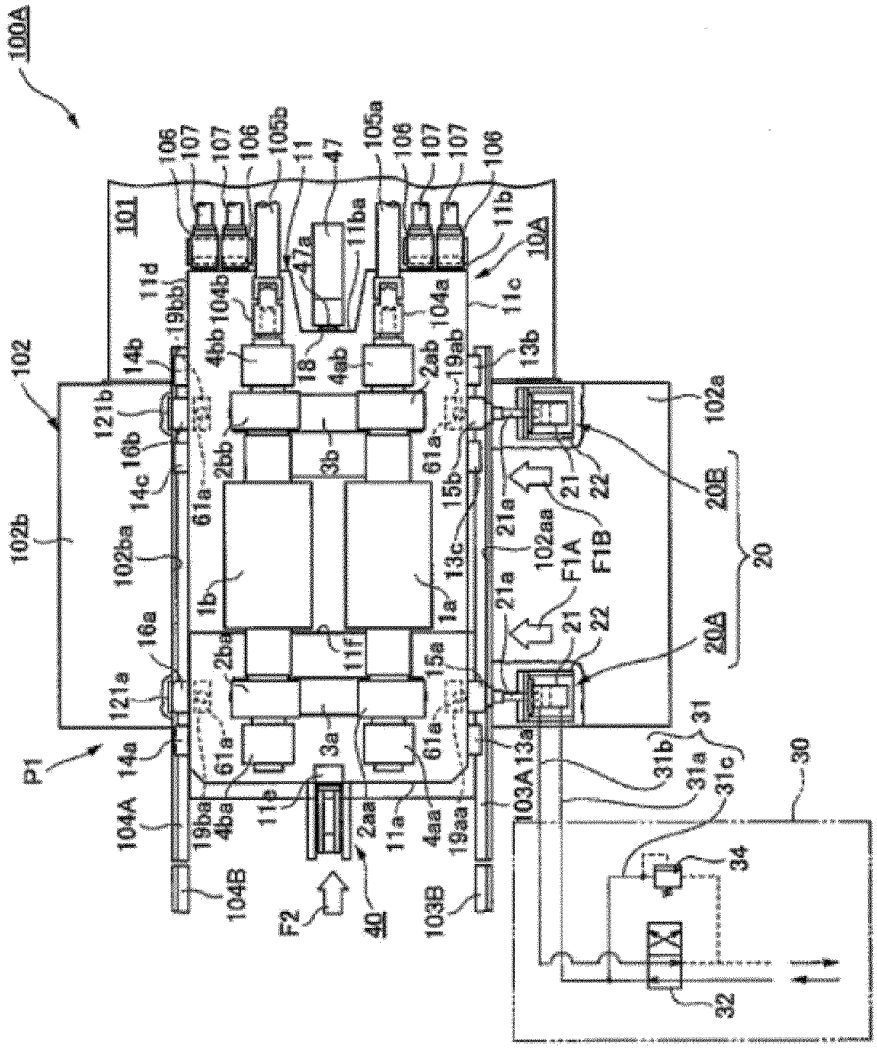
2aa
2ab
3a
3b
4aa
4ab
5a
5b
10
11
11a
11b
11e
13a
13b
15a
15b
17
18
40
41
41a
42
43
44
44a
45
46
47
47a
101
102a
103A
103B
104a
105a
106
107
111
112

Fig. 6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102
102a
102b
10A
20
20A
20B
30
31
31a
31b
31c
34
32
40
P1
F1A
F1B
F2
X
106
107
105b
105a
11
47
47a
11ba
11b
11c
11d
19bb
104b
104a
4bb
4ab
18
2ab
19ab
13b
14b
121b
16b
14c
61a
2bb
3b
15b
21
22
21a
102aa
13c
102ba
1b
1a
16a
2ba
11f
15a
121a
14a
3a
13a
104A
19ba
4ba
11p
2aa
11a
4aa
19aa
103A
104B
103B

Fig. 7

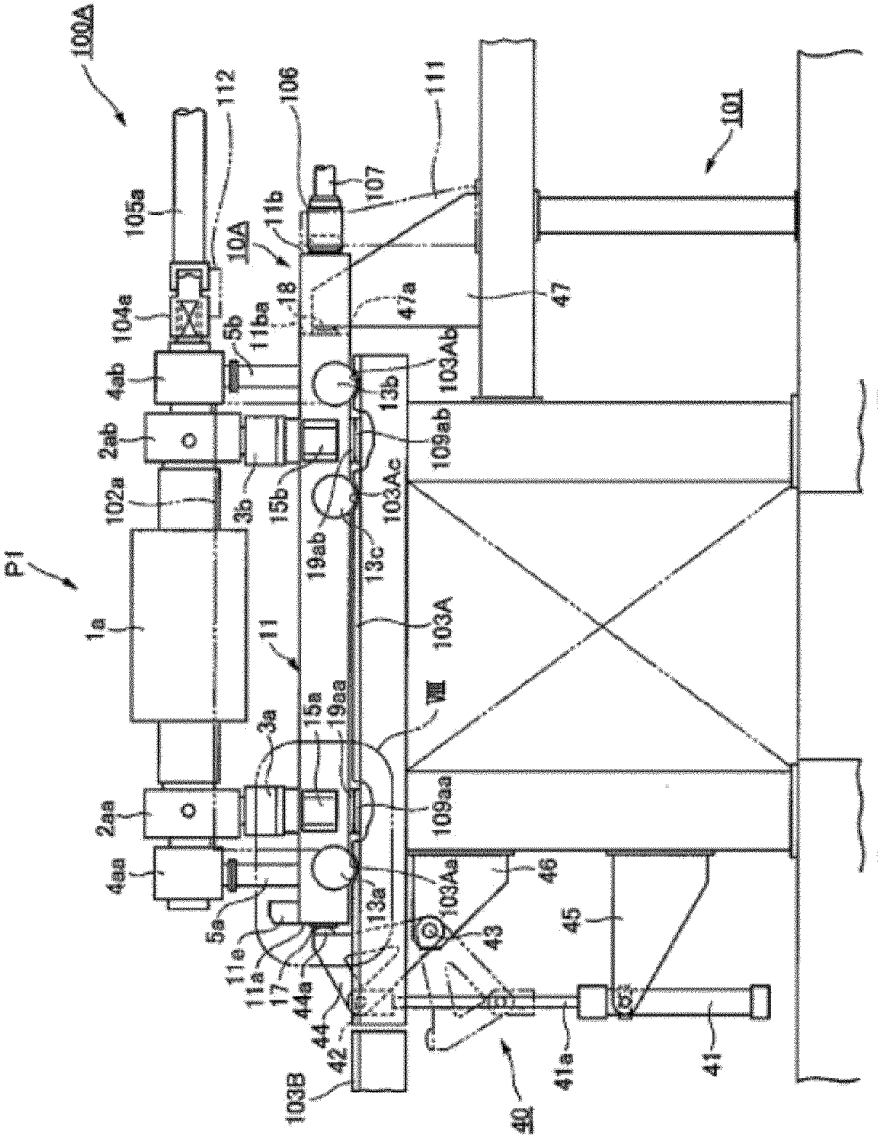

100A
112
106
111
101
105a
107
11b
10A
104a
18
47a
47
5b
11ba
4ab
103Ab
13b
2ab
109ab
102a
3b
15b
103Ac
19ab
13c
P1
1a
11
103A
3a
15a
19aa
2aa
109aa
4aa
46
103Aa
13a
5a
43
45
11e
11a
17
44a
44
42
41a
41
103B
40

Fig. 8

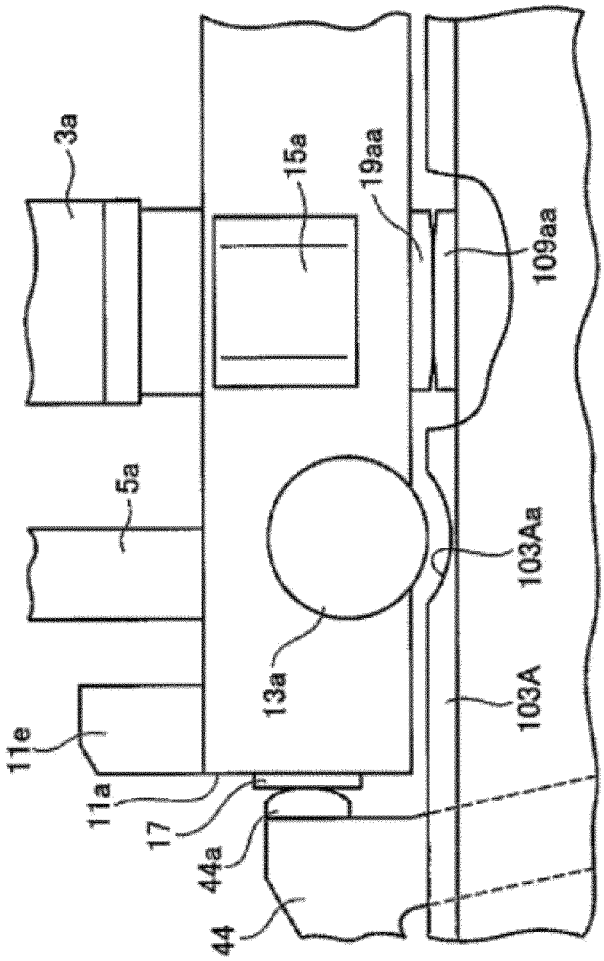
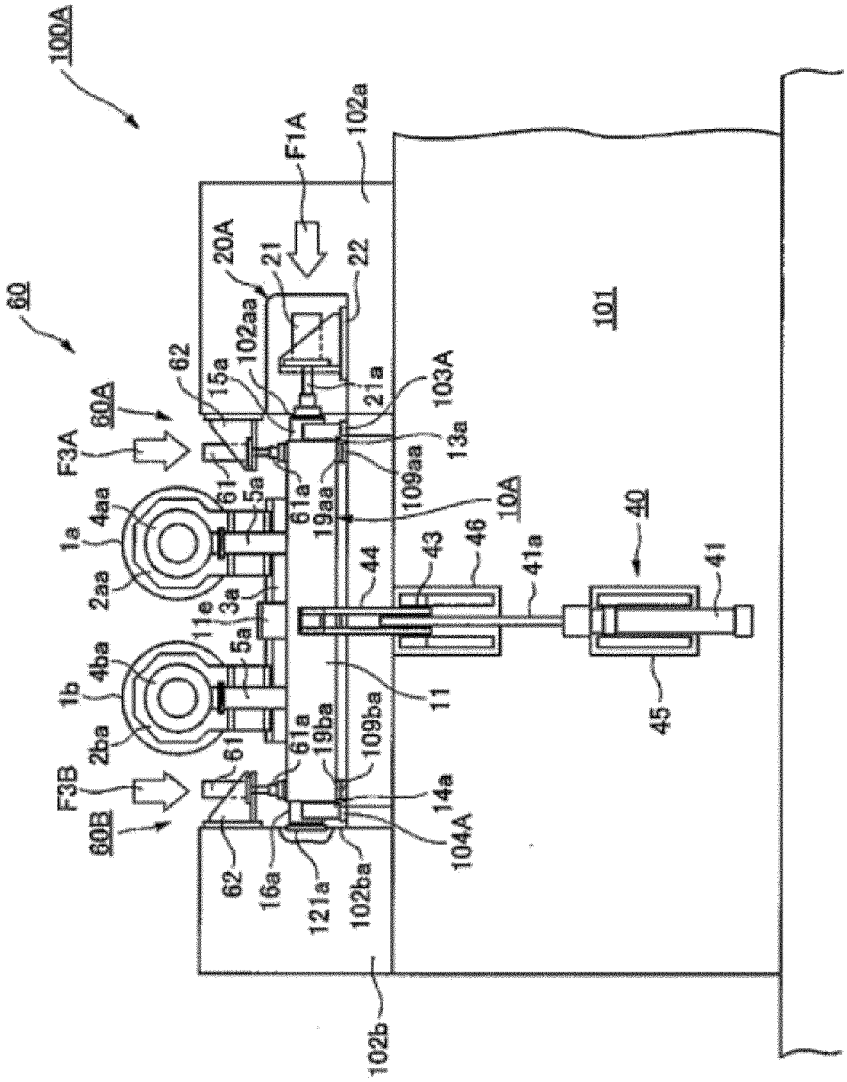


Fig. 9


100A
60
60A
60B
F1A
F3A
F3B
20A
21
22
102a
102aa
101
62
15a
21a
103A
13a
109aa
10A
40
41
41a
46
43
44
11
45
61
61a
5a
19aa
1a
4aa
2aa
3a
11e
1b
4ba
2ba
19ba
109ba
14a
104A
16a
121a
102ba
102b

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 4234819 B **[0004] [0006]**
- EP 0903191 A **[0004]**
- US 2009236068 A **[0004]**
- JP H059185 B **[0007]**
- EP 0903191 A2 **[0008]**