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(54) SEAT AND WORKING MACHINE WITH THE SAME

(57) A latch body (63) is mounted on the lower portion of a seat platform (45) of a driver seat (44). An engaging portion (61) is mounted on the upper portion of a seat frame (25). When an opening (48) on the top of the seat frame (25) is covered by the seat platform (45), the latch body (63) engages the engaging portion (61). The seat frame (25) may be opened and closed to enable inspection of an engine through a top opening (48) by pivoting the seat platform (45). The seat platform (45) does not vibrate relative to the seat frame (25) due to impacts incurred while traveling. The seat platform (45) is not moved by the posture of the operator who performs tasks while sitting on the seat platform (45). The stability of the seat platform (45) is easily ensured.

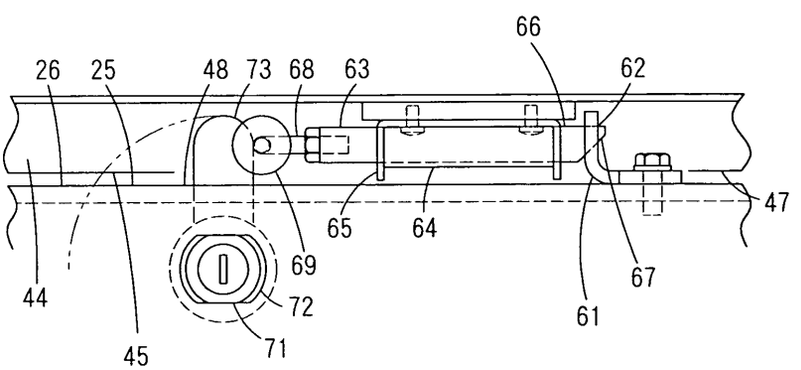

FIG. 1

EP 1 571 266 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a seat having a seat platform and a work machine provided with the same.

BACKGROUND ART

[0002] In the conventional art, as a work machine of this type, for example, the structure of a hydraulic shovel disclosed in Japanese Laid-Open Patent Publication No. 9-296481 is known. The hydraulic shovel disclosed in Japanese Laid-Open Patent Publication No. 9-296481 is provided with a work machine body to which an upper rotating body is mounted on a lower mobile body by mean of a rotating part. A seat for seating an operator who operates the hydraulic shovel is mounted on the upper rotating body of the work machine body by means of a frame. The seat is provided with a seat platform mounted on the frame. A backrest for supporting the operator sitting on the seat platform is mounted so as to be angularly adjustable.

[0003] A hinge for enabling forward pivoting of the seat platform relative to the frame is mounted between the front side of the lower end surface of the seat platform and the upper front side of the frame. The hinge allows inspection or maintenance of the objects accommodated in the upper rotating body by pivoting and moving the seat platform of the seat to the front side of the frame so as to open an inspection opening which opens on the upper side of the frame.

[0004] However, the above hydraulic shovel does not have a mechanism for engaging the seat platform to the frame when the seat when platform is rotated back to the back side to close the inspection opening of the frame after the seat platform has been pivoted to the front side so as to open the inspection opening of the frame.

[0005] Therefore, since the seat platform becomes unstable and moves unnecessarily due to the forwardly inclined posture of the operator sitting on the seat platform when performing a task and due to vibrations of the seat platform caused by impacts when the vehicle is traveling, it is difficult to ensure the stability of the operator seated on the seat platform.

[0006] Furthermore, since the structure opens the inspection opening on the upper side of the frame by pivoting the seat platform of the seat toward the front side of the frame, when the seat platform of the seat is pivoted toward the back of the frame and the operator stands on the front side of the frame to return or remove tools from a toolbox within the frame or perform repairs or inspection of the engine starter motor and generator accommodated inside through the inspection opening of the frame, such work is difficult because the seat that has been pivoted to the front side of the frame becomes an obstacle.

[0007] Moreover, since the engine body is arranged behind the starter motor and the generator, the starter motor and generator cannot easily be accessed from the back side of the work machine body. This results in a shortcoming in which inspection and maintenance are difficult to perform.

[0008] In view of these issues, the object of the present invention is to provide a seat and a work machine provided with a seat that allows work within the frame to be easily performed and readily ensures the stability of a seat platform that can be opened and closed.

DISCLOSURE OF INVENTION

[0009] The invention of claim 1 is a seat comprising a frame having a space, a seat platform capable of covering and opening at least part of an upper portion of the frame, a latch body arranged on either one of a lower portion of the seat platform or an upper portion of the frame, and an engaging portion facing toward the latch body and arranged on the other one of the lower portion of the seat platform or the upper portion of the frame, the engaging portion detatchably engaging the latch body when the seat platform covers at least part of an inner side of the upper portion of the frame. Accordingly, even if the frame may be opened and closed to remove the seat platform from the upper portion of the frame and enable objects accommodated in the frame to be inspected or taken out of or put into the frame, the seat platform does not vibrate relative to the frame when there are impacts during traveling. Further, the seat platform is not moved by the posture of the operator sitting on the seat platform. This easily ensures the stability of the seat platform.

[0010] The invention of claim 2 is the seat according to claim 1, comprising a hinge for supporting the seat platform in a manner pivotal toward a back side of the frame about a back side of the seat platform, the latch body and the engaging portion being arranged at a front side of either the lower portion of the seat platform or the upper portion of the frame. Since the seat platform is supported by the hinge in a manner pivotal toward a back side of the frame about a back side of the seat platform and each of the latch body and the engaging portion is arranged at a front side, the seat platform is pivoted from the front side of the frame to the back side to enable objects accommodated in the frame to be inspected or taken out of or put into the frame. Further, pivoting of the seat platform toward the back side that occurs when the center of gravity of the operator sitting on the seat platform moves toward the back side is prevented by the hinge. Thus, the stability of the working operator sitting on the seat platform is ensured.

[0011] The invention of claim 3 is the seat according to claim 1 or 2, comprising a locking means for releasably locking the engagement of the latch body with the

engaging portion. Accordingly, the locking means releasably locks the engagement of the latch body with the engaging portion. Thus, the stability of the operator sitting on the seat platform is further ensured since the state in which the seat platform covers at least part of the upper side of the frame is securely maintained and the release of the engagement of the latch body to the engaging part due to an erroneous operation is prevented.

[0012] The invention of claim 4 is the seat according to any one of claims 1 through 3, in which the latch body includes an engaging member with an inclined surface tapered and inclined toward a distal side at a side facing towards the engaging portion, a latch holder movably holds the latch body, and a biasing means is accommodated in the latch holder for biasing the engaging member in a manner enabling advancement and retraction and in a direction for engaging the engaging portion. Thus, the latch body, which has an inclined surface at a side facing towards the engaging portion at the engaging member, is biased by the biasing means in a manner enabling advancement and retraction and in a direction for engaging the engaging portion. Accordingly, after the engaging member temporarily moves in the direction of retraction from the engaging portion due to dispersion of the force on the inclined surface of the engaging member on the latch body when the operator sits on the seat of the seat platform, the engaging member is automatically returned by the biasing of the biasing means, resulting in the reliable engagement of the latch body with the engaging portion. Thus, the occurrence of a state of disengagement of the latch body from the engaging portion, that is, a semi-latched state, is prevented with a simple structure.

[0013] The invention of claim 5 is the seat according to claim 4, in which the latch body has an operating portion for operating the engaging member in a direction releasing the engagement of the engaging member from the engaging portion against the biasing means. Thus, the engaging member is operated by the operating portion of the latch body in a direction releasing the engagement of the engaging member from the engaging portion against the biasing means. Accordingly, this facilitates the task of moving the seat platform, which covers at least part of the upper side of the frame, to open at least part of the upper side of the frame.

[0014] The invention of claim 6 is a seat comprising a frame mounted on a work machine body, a seat platform supported on the frame for covering at least part of an inner side of an upper portion of the frame, and a hinge body for supporting the seat platform in a manner pivotal toward a back side of the frame about a back side of the seat platform. Thus, the sea platform covering at least part of an upper portion of the frame mounted on a work machine, is supported by the hinge body in a manner pivotal toward a back side of the frame about a back side of the seat platform. Accordingly, in a state in which the seat platform is pivoted toward the back side of the frame and the upper side of the frame is opened, when the operator stands on the front side of the frame for maintenance or to remove or put in an object accommodated inside the frame. Thus, operation inside the frame is easily performed because the seat platform does not hinder the operation.

[0015] The invention of claim 7 is the seat according to claim 6, in which the frame has an interior space and an opening formed in the upper portion, and the seat platform is supported on the frame and covers the opening of the frame. Since the opening on the upper side of the frame is opened and the space inside the frame may be accessed through the opening by rotating the seat platform toward the back side of the frame, maintenance and removing or replacing objects accommodated within the frame is easily performed.

[0016] The invention of claim 8 is the seat of claim 7, in which the space in the frame accommodates an engine. Accordingly, maintenance may be easily performed on the engine accommodated in the space in the frame from the opening in the frame by pivoting the seat platform toward the back side of the frame.

[0017] The invention of claim 9 is the seat according to any one of claims 6 through 9, comprising a locking means for releasably locking the seat platform in a state pivoted toward the back of the frame. Accordingly, since the state in which the seat platform is pivoted toward the back side of the frame may be locked by the locking means, erroneous rotation of the seat platform by its own weight is prevented when the seat platform is pivoted to perform inspection or maintenance of objects accommodated within the frame.

[0018] The invention of claim 10 is the seat according to any one of claims 6 through 9, comprising a latch body for detachably engaging the seat platform with the frame and holding the upper portion of the frame in a state covered by the seat platform. Accordingly, a state in which the seat platform covers the upper side of the frame is maintained by the latch body releasably connecting the seat platform to the frame. Thus, the stability of the operator sitting on the seat platform is maintained and pivoting of the seat platform due to impact while traveling is prevented.

[0019] The invention of claim 11 is a work machine comprising a work machine body, and the seat according to any one of claims 1 through 10 mounted on the work machine body. Accordingly, the advantages of the inventions of claims 1 through 10 are obtained. Further, the stability of the operator riding the work machine body is ensured, work efficiency is improved, and maintenance and removing and replacing objects accommodated within the frame is easily performed from the front side of the frame when riding on the work machine body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Fig. 1 is a side view illustrating a latch body in an engaged state in a work machine according to an

embodiment of the present invention, Fig. 2 is a front view showing part of the work machine, and Fig. 3 is a plan view showing part of the work machine.

[0021] Furthermore, Fig. 4 is a side view showing the seat platform of the work machine in a pivoted state, Fig. 5 is a side view showing the return pivot state of the seat platform of the work machine, and Fig. 6 is an exploded side view showing part of the work machine.

[0022] Furthermore, Fig. 7 is a partial enlarged view showing part of the work machine, Fig. 8 is a side view showing part of the work machine, and Fig. 9 is a side view showing the work machine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0023] An embodiment of the present invention is described below with reference to Figs. 1 through 9.

[0024] Fig. 9 shows a hydraulic shovel 1, which functions as a work machine. The hydraulic shovel 1 has an upper rotating body 5 rotatably mounted by means of a rotating part 4 on the upper side of a movable lower mobile body 3, which is provided with endless treads 2. A work machine body 6 is formed by the lower mobile body 3, the rotating part 4, and the upper rotating body 5.

[0025] A blade cylinder 8 is mounted on the front side of the lower mobile body 3. A swing bracket 11 is mounted on the front side of the upper rotating body 5. Furthermore, a forward facing reversed V-shaped boom 13 is supported pivotally in the vertical direction. Furthermore, a boom cylinder 14 is attached to the swing bracket 11 at the lower side of the boom 13.

[0026] An arm 15 is supported at the distal side of the boom 13 so as to be rotatable in forward and back directions. A bucket 16 is pivotally supported at the distal side of the arm 15. An arm cylinder 17 for pivoting the arm 15 in front-to-back directions is mounted at the back surface of boom 13. The distal side of the arm cylinder 17 is pivotally supported by the basal end of the arm 15. Furthermore, a bucket cylinder 18 is mounted on the back surface of the arm 15.

[0027] A working arm 21 is formed by the boom 13 and the arm 15. The working arm 21, the bucket 16, the boom cylinder 14, the arm cylinder 17, the bucket cylinder 18, and the swing bracket 11 form the front operating apparatus 22, which serves as work equipment.

[0028] As shown in Figs. 8 and 9, at the back side of the upper rotating body 5, a power apparatus housing 24 extending farther upward than the upper surface of the upper rotating body 5, is provided. The power apparatus housing 24 is provided with a seat frame 25, which is the frame for the power apparatus housing 24, as shown in Figs. 1 through 8. The seat frame 25 is provided with a generally rectangular frame body 26. The corners of the frame body 26 are integrally connected to the ends of rod-shaped legs 27 in the longitudinal direction, respectively, with the legs 27 arranged parallel to one another in the longitudinal direction.

[0029] The seat frame 25 is provided with a pair of support frames 28, which function as long rod-shaped support bodies, the upper ends of which extend upward and the lower ends of which are connected to the upper rotating body 5 at the upper back side of the upper rotating body 5. The support frames 28 have a pair of legs 27 positioned at the back of the seat frame 25. Furthermore, the seat frame 28 is attached to a mounting frame 30, which is formed by a long thin plate-shaped beam frame that is not shown in the drawing, connecting a pair of generally L-shaped parallel edge frames 29.

[0030] The pair of edge frames 29 of the mounting frame 30 form the pair of legs 27 positioned at the front of the seat frame 25 and the two sides of the frame body 26, which are linked to the pair of legs 27 positioned behind the seat frame 25, and the back side of the frame 26. The beam frame forms the front side of the frame 26 connected between the pair of legs 27 positioned at the front side of the seat frame 25. Accordingly, the mounting frame, which is formed by the edge frames 29 and the beam frame, forms the pair of legs 27 positioned forward of the seat frame 25 and the frame body 26 connected to the upper end of the pair of legs 27.

[0031] Within the seat frame 25, that is, within a space 32 formed by the mounting frame 30 and the support frame 28, is accommodated generally upper half of an engine 33, which is covered by the mounting frame 30 and the support frame 28. , Generally lower half of the engine 33 is accommodated in the upper rotating body 5. The engine 33 is started by a starter motor 34, and the driving of the engine 33 generates electric power with a generator 35. The starter motor 34 and generator 35 are both accommodated in the space 32 of the seat frame 25. Moreover, a main pump 36 driven by the engine 33 is mounted on the engine 33, as shown in Figs 4 through 7.

[0032] On the upper side of the seat frame 25 of the power apparatus housing 24, a driver seat 44, which functions as a seat in which a driver-operator sits to drive and operate the hydraulic shovel 1, is rotatably mounted. The driver seat 44 is supported on the work machine body 6 by the seat frame 25. Furthermore, the driver seat 44 is mounted on the upper side of the seat frame 25 and is provided with a flat rectangular seat platform 45 arranged and supported on the seat frame 25. A backrest 46 for supporting the back of the operator sitting on the seat platform 45 is attached to the back end of the seat platform 45.

[0033] A flat rectangular seat plate 47 for supporting the lower end surface of the seat platform 45 is attached to the bottom surface of the seat platform 45. The seat plate 47 covers the top side of the seat frame 25, and opens and closes a top opening 48 formed in the top side of the seat frame 25. The top opening 48 is opened approximately 2/3 on the right upper side of the seat frame 25 by a flat cover 49 mounted on the left upper side of the seat frame 25.

[0034] Furthermore, from the top opening 48 one can

look upon, mainly, the right half of the engine 33, and particularly the oil injector 51, which is an injection port of the engine 33 for engine oil, the starter motor 34, and the generator 35, as shown in Fig. 3. In this way, the starter motor 34 and the generator 35 may be maintained from the top opening 45, and engine oil may be injected from the oil injector 51 of the engine 33 through the top opening 45.

[0035] A pair of flat bent hinge connectors 52 are mounted at the back end of the seat plate 47. The pair of hinge connectors 52 are mounted spaced by an equal distance in the lateral direction from the center relative to the lateral direction of the seat plate 47. Furthermore, the pair of hinge connectors 52 extend farther backward and upward than the back end of the seat plate 47, so as to allow the seat platform 45 to pivot to the back side from the top opening 48.

[0036] Further, a pair of bent flat hinge mounts 53 are attached on the top back end of the mounting frame 30 of the seat frame 25, that is, the top back end of the seat frame 25. The pair of hinge mounts 53 are also mounted spaced by an equal distance in the lateral direction from the center at the top back end of the seat frame 25. The pair of hinge mounts 53 extend upward toward the rear from the upper side of the back end of the seat frame 25.

[0037] A shaft 54, which functions as a hinge body, is attached between the distal ends of the pair of hinge mounts 53 and the distal portions of the pair of hinge connectors 52 to enable the driver seat 44 to pivot to the back relative to the seat frame 25. The hinge 57 is formed by the hinge connectors 52, the hinge mounts 53, and the shaft 54.

[0038] Furthermore, the hinge 57 is positioned at the pivot center that is rearward from the back end of the seat platform 45 so as to allow movement of the seat platform 45 farther to the back side than the top opening 48 when pivoting the seat platform 45 of the driver seat 44. The hinge 57 allows the top opening of the seat frame 25 to open so as to allow maintenance and inspection within the seat frame 25 when the front side of the seat platform 45 is raised and pivoted toward the back side.

[0039] To the left of the center of the front end of the seat plate 47, a notched mounting concavity 55 having a hollowed shape is formed on the front end of the seat plate 47. In the mounting concavity 55, a generally U-shaped handle 56, which is used as a grip when pivoting the front end of the seat plate 47 toward the back of the seat frame 25, is attached.

[0040] Furthermore, as shown in Figs. 1 through 3, one side piece of a connector 61, which acts as an engaging portion having a flat rectangular shape bent at a right angle into an L-shape, is fastened by a bolt to the right side forward from the center on the upper front side of the seat frame 25. In addition, the connector 61 is mounted such that the thickness direction of the other side piece is facing the lateral direction of the seat frame 25. A rectangular connector hole 62 is formed in the center of the other side piece of the connector 61. The connector hole 62 is a through-hole formed in the thickness direction of the other side piece of the connector 61.

[0041] As shown in Figs. 1 through 6, a latch body 63, slidable in the lateral direction, for maintaining the closed state of the top opening 48 with the seat plate 47 when the top opening 48 of the seat frame 25 is covered by the seat plate 47, is attached to the right side with respect to the traveling direction forward from center at the bottom front side of the seat plate 47 is mounted. The latch body 63 is mounted at a position opposite the connector 61.

[0042] The latch 63 is accommodated and held in a tube-like, elastically deformable latch holding body 64 having a rectangular cross section so as to be capable of advancing and retracting in the longitudinal direction by a spring, which functions as a biasing means that is not shown in the drawings, that is, so as to be movable in the longitudinal direction of the latch holding body 64. The latch holding body 64 is mounted on the lower end surface of the seat plate 47 and inserted through a U-shaped mounting frame 65. The latch 63 is accommodated within the latching holding body 64, and is normally biased to advance or retract in a direction engaging the connector 61, that is, toward the distal side, by the resilient force of the spring in the latch holding body 64.

[0043] Furthermore, a tapered engaging member 66 for detachably engaging the connector hole 62 of the connector 61 is formed on the distal side of the latch 63. The distal portion of the engaging member 66 is movably inserted through the connector hole 62 of the connector 61 and detachably engaged with the connector hole 62. An inclined surface 67, which has a tapered shape inclined toward the distal side of the engaging member 66, is formed on the bottom surface of the engaging member 66 on the side opposite the connector 61. The inclined surface 67 is inclined upward from the basal side of the engaging member 66 toward the distal side.

[0044] Accordingly, after the engaging member 66 is once moved in the retraction direction from the connector 61 by the dispersion of the force caused by the inclined surface 67 when the operator sits in the seat platform 45 of the driver seat 44, the inclined surface 67 is automatically returned by the resilient force of the spring, such that the engaging member 66 reliably engages the connector hole 62 of the connector 61, and releasably maintains the top opening 48 of the seat frame 25 in a state covered by the seat plate 47.

[0045] The basal end of the latch 63 protrudes from the basal end of the latch holding body 64 so as to be capable of advancing and retracting, and the basal end of a rod-shaped connector 68, which forms part of an L-shaped bent operating portion, is connected to the basal portion of the latch 63. The distal portion of the connector 68 extends toward the front side of the seat plate 47

so as to extend farther forward than the front edge of the seat plate 47.

[0046] Furthermore, on the distal portion of the connector 68 is attached a spherical knob 69, which functions as a handle for the operating portion, for performing an operation to move the latch 63 in the longitudinal direction relative to the latch holding body 64 with the connector 68, that is, for performing an operation to move the engaging member 66 of the latch 63 against the resilient force of the spring in a direction that release and locks the engagement of the engaging member 66 from the connector hole 62 of the connector 61.

[0047] On the upper front end of the seat frame 25 is mounted a lock mechanism 71, which is as a locking mechanism functioning as a locking means for releasably locking the engagement of the knob 69 to the connector 61 with the latch 63. The locking mechanism 71 is positioned on the generally front side of the knob 69 when the top opening 48 of the seat frame 25 is closed by the plate 47.

[0048] Furthermore, the locking mechanism 71 is provided with a pivoting portion 72 into which a key, not shown in the drawing, functioning as a key body is inserted from the front side of the seat frame 25. Pivoting of the pivoting portion 72 is enabled by the insertion of the key and restricted by the removal of the key. A flange-like pivoting piece 73, which biases the knob 69 toward the engaging member 66 of the latch 63, is attached to the basal end of the pivoting portion 72.

[0049] Therefore, the locking mechanism 71 disables the disengagement of the latch 63 from the connector 61 by the operation of the knob 69, by inserting the key into the pivoting portion 72 and pivoting the pivoting portion 72 with the key toward the knob 69 such that the pivoting piece 73 contacts the knob 69. Furthermore, the locking mechanism 71 enables the disengagement of the latch 63 with the connector 61 by the operation of the knob 69, by pivoting piece 73 with the key inserted into the pivoting portion 72 in a direction away from the knob 69 to release the knob 69 from the pivoting piece 73.

[0050] As shown in Figs. 3 through 5, on the lower end surface of the seat plate 47 is mounted one end, that is, the upper end, of a pivot regulating rod 74, which functions as a long rod-like locking means for locking and maintaining the pivoted state of the front end of the seat plate 47 toward the rear relative to the seat frame 25, so as to be pivotal in a front-to-back direction. The other end, that is, the lower end of the pivot regulating rod 74 is releasably engaged to an engagement groove 75 provided at the opening edge on the left side of the top opening 48 of the seat frame 25 in a state in which the seat plate 47 is pivoted toward the back to keep the top opening 48 of the seat frame 25 opened.

[0051] At the end of the rear side of the engagement groove 75, a positioning groove 76 having a downwardly curved shape extends continuously from the engagement groove 75. Therefore, when the front end of the seat plate 47 is pivoted toward the back relative to the seat frame 25, the pivot regulating rod 74 locks the seat plate 47 at the pivoted position by sliding the lower end of the pivot regulating rod 74 to the rear side along the engagement groove 75 and engaging the positioning groove 76. The pivot regulating rod 74 pivots the seat plate 47 toward the front side by disengaging the lower end of the pivot regulating rod 74 from the positioning groove 76 and sliding the lower end of the pivot regulating rod 74 toward the front along the engagement groove 75 to cover the top opening 48 of the seat frame 25 with the seat plate 47.

[0052] A pedal 93 operated to move the lower mobile body 3 is mounted on the upper rotating body 5 which is positioned farther forward than the driver seat 44. Furthermore, on the two sides, or the left and right sides, of the driver seat 44 are arranged a pair of console boxes 83, which function as consoles used as elbow rests by the operator sitting on the driver seat 44. The pair of console boxes 83 are mounted on the upper sides of the frame 26 of the seat frame 25.

[0053] A pair of operating levers 84 for operating the front operating apparatus 22 and the like are provided on the upper front side of the pair of console boxes 83. A plurality, for example, two pairs or a total of four pilot valve devices 85 provided with remote control pilot valves, functioning as flow control valves, are disposed inside each console box 83 below the operating levers 84, as shown in Figs. 6 and 8. The pilot valves are incorporated in the pilot valve device 85.

[0054] Pilot oil is supplied from a pilot pump connected to the main pump 36 to transmit predetermined pilot primary pressure to the each of the pilot valves of the pilot valve device 85. Furthermore, each pilot valve of the pilot valves device 85 controls the pilot primary pressure by moving the operating lever 84 in either the forward-and-back direction or the lateral direction to output a pilot secondary pressure. One end of a pilot hose 86 is connected to the each pair of the pilot valves.

[0055] Each of the pilot hoses 86 connected to one end of each pilot valve of the pair of operating levers 84 are arranged such that the pilot hoses 86 connected to the left operating lever 84 are bundled and hang toward the basal end of the operating lever 84 on the right side along the inner surface of the support frame 28 and the inner surface of the edge frame 29 of the seat frame 25. Furthermore, the plurality of pilot hoses 86 are arranged downward and bundled at the basal end of the right side operating lever 84.

[0056] Female-type connectors attached to the distal portions of the pilot hoses 86 are each connected to a hose joint 87 through the pilot hose 86. Each hose joint 87 is connected to a pilot operating portion of the control valve 91 provided inside the upper rotating body 5 through a pilot pipe 89. Furthermore, the hose joint 87 is mounted on a pilot pipe bracket 88, which is a hose joint mounting member, as a pipe connector and mounting portion provided inside the upper rotating body 5.

The pilot pipe bracket 88 is mounted at the center part in the front-to-back direction within the upper rotating body 5 on the left side relative to the traveling direction of the upper rotating body 5 and is accommodated in the space 32 formed by the support frame 28 and the mounting frame 30.

[0057] A control valve 91, which functions as a control valve, is housed on the front side of the pilot pipe bracket 88 in the upper rotating body 5. The control valve 91 is pilot operated when the operating lever 84, the pedal 93, or a traveling lever 94 is operated. That is, the control valve 91 pilot operated by the pilot valve device 85, the pedal 93 and the traveling lever 94 controls the operating oil supplied under pressure from the main pump 36 and controls the operation of a rotation motor, a left side traveling motor, a right side traveling motor, the blade cylinder 8, the boom swing cylinder, the boom cylinder 14, the arm cylinder 17, and the bucket cylinder 18. The traveling lever 94 is provided on the upper rotating body 5 which is positioned farther forward than the front side of the driver seat 44.

[0058] The operation of the embodiment shown in Figs. 1 through 9 will now be described.

[0059] First, the top opening 48 of the seat frame 25 is covered by the seat plate 47 of the seat platform 45 of the driver seat 44. The engaging member 66 of the latch 63 mounted on the bottom surface of the seat plate 47 engages the connector hole 62 of the connector 61 mounted on the upper surface of the seat frame 25. In a state in which the engagement is locked by the locking mechanism 71, the key is inserted into the pivoting portion 72 of the locking mechanism 71 to open the top opening 48 of the seat frame 25.

[0060] Thereafter, using the key, the pivoting portion 72 is pivoted to move the pivoting piece 73 away from the knob 69. This enables the knob 69 to move in a direction retracting from the connector 61 so as to release the state in which the engagement of the connector 61 to the connector hole 62 is locked by the connector member 66 of the latch 63.

[0061] Then, the knob 69 is gripped and moved in a direction to retract the knob 69 from the connector 61, so as to release the engagement of the engaging member 66 of the latch 63 in the connector hole 62 of the connector 61.

[0062] In this state, the handle 56 of the seat plate 47 is gripped, and the front side of the seat platform 45 of the driver seat 44 is raised to pivot the seat platform 45 backward and open the top opening 48 of the seat frame 25.

[0063] Further, in this state, when maintaining the top opening 48 of the seat frame 25 in the open state, the lower end of the pivot regulating rod 74 mounted on the seat plate 47 of the driver seat 44 is slid backward along the engagement groove 75 to engage the lower end of the pivot regulating rod 74 with the engagement channel of the seat frame 25.

[0064] Then, mainly the starter motor 34, the generator 35, and the like are inspected and maintained from the top opening 48 of the seat frame 25, and engine oil is injected from the oil injector 51, which functions as the engine oil injection port of the engine 33.

[0065] When closing the top opening 48 of the seat frame 25 from this state, first, after disengaging the lower end of the pivot regulating rod 74 from the positioning groove 76 of the seat frame 25, the lower end of the pivot regulating rod 74 is slid to the front along the engagement groove 75. The pivot regulating rod 74 is accommodated in the lower end surface of the seat plate 47. The handle 56 of the seat plate 47 is gripped and the seat platform 45 of the driver seat 44 is pivoted downward. Then, the engaging member 66 of the latch 63 is engaged with the connector hole 62 of the connector 61.

[0066] In this state, even if the engagement of the latch 63 relative to the connector 61 is in an incomplete semi-latched state, after the engaging member 66 is moved in the retracting direction from the connector 61 by the dispersion of force by the inclined surface 67 provided on the engaging member 66 of the latch 63 when the operator sits on the seat platform 45 of the driver seat 44, the engaging member 66 is automatically returned by the resilient force of the spring. This ensures the engagement of the engaging member 66 of the latch 63 with the connector hole 62 of the connector 61.

[0067] Accordingly, this prevents the occurrence of a state in which the engaging member 66 of the latch 63 is not completely engaged with the connector hole 62 of the connector 61, or the semi-latched state.

[0068] In this state, the key is inserted into the pivoting portion 72 of the locking mechanism 71, and the key is used to pivot the pivoting piece 73 toward the knob 69 with the pivoting portion 72 to fix the knob 69 and lock the engagement with the connector 61 by means of the latch 63.

[0069] According to the embodiment described above, an operator standing at the driver seat 44 on the upper rotating body 5 grips the handle 56 of the seat platform 45 of the driver seat 44 and raises the front end of the seat platform 45. This pivots the seat platform 45 about the shaft 54 positioned on the back side of the seat platform 45 and thus pivots the seat platform 45 toward the back of the seat frame 25 to open the top opening 48 of the seat frame 25.

[0070] In this way, an operator or the like standing in front of the seat frame 25 can open the top opening 48 of the seat frame 25 by pivoting the seat platform 45 of the driver seat 44 and easily access the starter motor 34, the generator 35, and the oil injector 51 of the engine 33, which cannot be readily accessed from the front, back or sides of the seat frame 25, through the top opening 48 of the seat frame 25 without being hindered by the pivoted driver seat 44.

[0071] Therefore, the starter motor 34 and generator 35 and the oil injector 51 of the engine 33, which are accommodated in the space 32 of the seat frame 25 and

which cannot be readily accessed from the front, back or sides of the seat frame 25, may be easily inspected or maintained to easily perform repairs or replacements. Further, engine oil may easily be injected from the oil injector 51.

[0072] Moreover, the hinge connector 52 mounted on the back end of the seat platform 45 of the driver seat 44 and the hinge mounts 53 attached to the back end of the seat frame 25 are curved flat plates, such that the distal portions of the hinge connectors 52 and hinge mounts 53 respectively extend farther backward and upward than the back end of the seat frame 25 and the seat platform 45, respectively.

[0073] As a result, the seat platform 45 may be moved backward from the top opening 48 of the seat frame 25 by pivoting the seat platform 45 of the driver seat 44 about the shaft 54 mounted between the hinge connectors 52 and hinge mounts 53, as shown in Figs. 4 and 5. Since the top opening 48 of the seat frame 25 can be reliably opened in an upward direction, maintenance work is easily performed in the seat frame 25 from the top opening 48.

[0074] Furthermore, in the state wherein the seat platform 45 of the driver seat 44 has been pivoted backward and the top opening 48 of the seat frame 25 is opened, the lower end of the pivot regulating rod 74 mounted on the lower end surface of the seat platform 45 is slid to the back side along the engagement groove 75 of the seat frame 25 such that the lower end of the pivot regulating rod 74 engages the positioning groove 76, and the pivot regulating rod 74 acts as a support rod to lock and hold the rotation of the seat platform 45 relative to the seat frame 25.

[0075] Therefore, in the state in which the seat platform 45 is pivoted backward, when performing maintenance on the starter motor 34 and generator 35 in the top opening 48 of the seat frame 25, accidental pivoting of the seat platform 45 due to its own weight or pivoting of the seat platform 45 due to contact by the operator are prevented through a simple structure.

[0076] Furthermore, the latch 63 is mounted on the front lower end of the seat plate 47 of the driver seat 44, the back side of which is pivotally locked by the hinge 57. Further, the connector 61, which includes the connector hole 62 for detachably engaging the engaging member 66 of the latch 63, is provided on the front top front end of the seat frame 25. Thus, when the top opening 48 of the seat frame 25 is covered by the seat plate 47, the state in which the top opening 48 is covered by the seat plate 47 is maintained since the engaging member 66 of the latch 63 is releasably engaged with the connector hole 62 of the connector 61.

[0077] Therefore, it is possible to perform maintenance mainly for the starter motor 34 and the generator 35 accommodated in the space 32 of the seat frame 25. Further, even though the seat frame 25 may be opened to inject engine oil from the oil injector 51 of the engine 33 accommodated in the space 32 of the seat frame 25, the stability of the seat platform 45 is easily ensured by reliably locking the seat platform 45 of the driver seat 44 to the upper side of the seat frame 25.

[0078] That is, since the front and back of the driver seat 44 are restrained by the hinge 57 and the engagement of the connector 61 and engagement latch 63, the seat platform 45 does not vibrate relative to the seat frame 25 even when there are impacts when the hydraulic shovel 1 is traveling. Further, the seat platform 45 is not moved by the posture, such as bending forward and the like, of the operator sitting on the seat platform 45. Thus, stability is ensured while the operator sitting on the seat platform 45 is working.

[0079] The hinge 57 is mounted between the top back end of the seat frame 25 and the bottom back end of the seat plate 47 such that the back side of the seat platform 45 is pivotally supported by the hinge 57 so as to be pivoted toward the back side of the seat frame 25. Thus, the handle 56 of the seat platform 45 is gripped by the operator standing on the front side of the seat frame 25 to rotate the seat platform 45 backward and allow inspection and maintenance of the objects accommodated within the space 32 of the seat frame 25 without hindrance by the rotated seat platform 45. Further, backward pivoting of the seat platform 45 that occurs when the operator sitting on the seat platform 45 moves and shifts shifting the operator's center of gravity to the rear is prevented by the engagement of the latch 63 with the connector 61. Thus, the stability of the operator sitting on the seat platform 45 is further ensured.

[0080] Furthermore, the knob 69 is mounted to the basal end of the latch 63 by the connector 68 such that the latch 63 is movable against the spring by operating the knob 69 and the engagement of the engaging member 66 of the latch 63 with the connector hole 62 of the connector 61 is releasable. Thus, the pivoting of the seat platform 45 covering the top opening 48 of the seat frame 25 to expose the top opening 48 of the seat frame 25 is easily and reliably performed.

[0081] The locking mechanism 71 is arranged at the top front end of the seat frame 25, the key is inserted in the pivoting portion 72 of the locking mechanism 71, and the pivoting piece 73 is pivoted together with the pivoting portion 72 so that the pivoting piece 73 comes into contact with the knob 69. Thus, the engagement of the latch 63 and the connector 61 is locked and maintained. Furthermore, the engagement of the latch 63 with the connector 61 is released by operating the knob 69 using the key inserted in the pivoting portion 72 of the locking mechanism 71 to pivot in a reversed direction the pivoting piece 73 together with the pivoting portion 72.

[0082] In this way, the state in which the top opening 48 of the seat frame 25 is covered by the seat plat 47 of the seat platform 45 is reliably maintained by locking the engagement of the latch 63 with the connector 61 using the locking mechanism 71. Thus, the stability of the operator sitting on the seat platform 45 is further ensured. Further, the release of the engagement of the latch 63

with the connector 61 due to erroneous operation is prevented. Thus, pivoting of the seat platform 45 for vandalism as well as theft of objects such as the engine 33 and the like accommodated within the seat frame 25 are prevented. Further, the engagement of the latch 63 with the connector 61 is not released by vibrations and the like when the hydraulic shovel 1 is operated.

[0083] The inclined surface 67 is provided on the lower end of the engaging member 66 of the latch 63 such that the lower end of the engaging member 66 has a tapered shape inclined upward. The engaging member 66 of the latch 63 is biased toward the distal side by a spring in the latch holding body 64. Thus, when the operator sits on the driver seat 44, the engaging member 66 temporarily moves from the connector 61 in a backward retracting direction due to dispersion of force on the inclined surface 67 of the engaging member 66 and is then automatically returned by the resilient force of the spring such that the engaging member 66 reliably engages the connector hole 62 of the connector 61.

[0084] In this way, when the seat platform 45 of the driver seat 44 is pivoted to cover the top opening 48 of the seat frame 25 with the seat platform 45, the weight of the operator acts on the seat platform 45 of the driver seat 44 when the operator sits on the seat platform 45 of the driver seat 44. This prevents a state in which the engaging member 66 of the latch 63 is not securely engaged with the connector hole 62 of the connector 61, or a semi-latched state, with a simple structure. Therefore, the stability of the operator sitting on the driver seat 44 when performing tasks is further ensured with greater reliability. Further, the stability of the driver seat 44 improves maneuverability for the operator and increases the operating efficiency of the hydraulic shovel 1.

[0085] In the state in which the seat platform 45 of the driver seat 44 is rotated backward so as to expose the top opening 48 of the seat frame 25, the lower end of the pivot regulating rod 74, which is mounted on the lower end surface of the seat platform 45, engages the engagement groove of the seat frame 25 such that the pivot regulating rod 74 functions as a support rod to lock and hold the pivoted seat platform 45 relative to the seat frame 25.

[0086] Therefore, when the seat platform 45 is pivoted backward to perform maintenance on the starter motor 34 and the generator 35 in the top opening 48 of the seat frame 25, erroneous pivoting of the seat platform 45 due to its own weight or pivoting of the seat platform 45 due to inadvertent contact by the operator are reliably prevented by a simple structure.

[0087] The hinge connector 52, which is mounted on the back end of the seat platform 45 of the driver seat 44, and the hinge mount 53, which is attached to the back end of the seat frame 25, respectively extend farther backward and upward than the back end of the seat frame 25 and the seat platform 45, respectively. Thus, as shown in Figs 4 through 6, when the seat platform 45 of the driver seat 44 is pivoted backward about the shaft 54 of the hinge 57 attached between the hinge connector 52 and the hinge mount 53, the seat platform 45 is moved farther toward the back of the top opening 48 of the seat frame 25. Therefore, the area above the top opening 48 of the seat frame 25 is exposed in an ensured manner. Thus, maintenance within the seat frame 25 is easily performed from the top opening 48.

[0088] Although the connector 61 is mounted on the upper side of the seat frame 25 and the latch 63, which is provided with an engaging member 66 for engaging the connector hole 62 of the connector 61, is mounted on the lower side of the seat plate 47 in the above embodiment, the latch 63 may be mounted on the lower side of the seat frame 25 and the connector 61 for engaging the latch 63 may be mounted on the lower side of the seat plate 47. This obtains the same advantages as the above embodiment.

[0089] In this case, when the latch 63 is mounted on the upper side of the seat frame 25, the tapered inclined surface 67 is provided at the upper end, that is, on the side of the engaging member 66 of the latch 63 opposite the connector 61. This prevents semi-latching of the latch 63 with the connector 61 through a simple structure when the operator sits on the seat platform 45 of the driver seat 44.

[0090] Furthermore, although the backrest 46, which supports the back of an operator sitting on the seat platform 65, is mounted on the seat platform 45 of the driver seat 44 on the seat frame 25 so as to be angularly adjustable, a driver seat without a backrest, a driver seat having a non-reclining backrest of which angle is fixed relative to the seat platform and cannot recline, a driver seat with a backrest separate from the seat platform, or a driver seat having a backrest fixed to the upper rotating body may be used. This would obtain the same advantages as the above embodiment.

[0091] Although approximately 2/3 of the top opening 48 is opened on the top right side of the seat frame 25, as shown in Fig. 3, by opening at least part of the top opening 48 at the top of the seat frame 25 and covering the top opening with the seat plate 47 of the seat platform 45 of the driver seat 44, the same advantages as the above embodiment may be obtained.

[0092] Furthermore, although parallel rod-shaped legs 27 are attached to the corners of the generally rectangular frame 26 as the seat frame 25, and the top opening 48, which opens to the space 32 within the seat frame 25, is provided on the upper side of the seat frame 25, the seat frame 25 may be U-shaped, and the top of the space 32, which is formed between the U-shaped seat frame 25 and the power apparatus housing 24 extending farther upward than the upper rotating body 5 positioned at the back of the seat frame 25, may be covered by the seat platform 45 in a manner that it may also be opened. The space 32 formed between the seat frame 25 and the power apparatus housing 24 may be opened by pivoting the seat platform 45 backward. This would facilitate tasks such as maintenance in the seat

frame 25.

INDUSTRIAL APPLICABILITY

[0093] As described above, the seat and work machine provided with the seat of the present invention is widely used, for example, as a hydraulic shovel.

Claims

1. A seat being comprising:

a frame having a space;
a seat platform capable of covering and opening at least part of an upper portion of the frame;
a latch body arranged on one of a lower portion of the seat platform and an upper portion of the frame; and
an engaging portion facing toward the latch body and arranged on the other one of the lower portion of the seat platform and the upper portion of the frame, the engaging portion detatchably engaging the latch body when the seat platform covers at least part of an inner side of the upper portion of the frame.

2. The seat according to claim 1, comprising:

a hinge for supporting the seat platform in a manner pivotal toward a back side of the frame about a back side of the seat platform;

wherein the latch body and the engaging portion are arranged at a front side of either the lower portion of the seat platform or the upper portion of the frame.

3. The seat according to claim 1 or 2, comprising:

a locking means for releasably locking the engagement of the latch body with the engaging portion.

4. The seat according to any one of claims 1 through 3, comprising:

the latch body including an engaging member with an inclined surface tapered and inclined toward a distal side at a side facing towards the engaging portion;
a latch holder for movably holding the latch body; and
a biasing means accommodated in the latch holder for biasing the engaging member in a manner enabling advancement and retraction and in a direction for engaging the engaging portion.

5. The seat according to claim 4, wherein:

the latch body has an operating portion for operating the engaging member in a direction releasing the engagement of the engaging member from the engaging portion against the biasing means.

6. A seat being comprising:

a frame mounted on a work machine body;
a seat platform supported on the frame for covering at least part of an inner side of an upper portion of the frame; and
a hinge body for supporting the seat platform in a manner pivotal toward a back side of the frame about a back side of the seat platform.

7. The seat according to claim 6, wherein:

the frame has an interior space and an opening formed in the upper portion; and
the seat platform is supported on the frame and covering the opening of the frame.

8. The seat according to claim 7, wherein:

the space in the frame accommodates an engine.

9. The seat according to any one of claims 6 through 9, comprising:

a locking means for releasably locking the seat platform in a state pivoted toward the back of the frame.

10. The seat according to any one of claims 6 through 9, comprising:

a latch body for detachably engaging the seat platform with the frame and holding the upper portion of the frame in a state covered by the seat platform.

11. A work machine comprising:

a work machine body; and
the seat according to any one of claims 1 through 10 mounted on the work machine body.

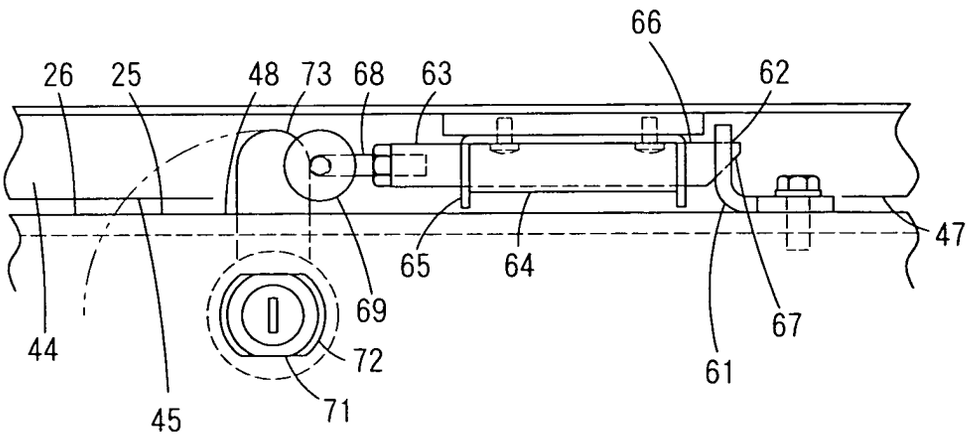

FIG. 1

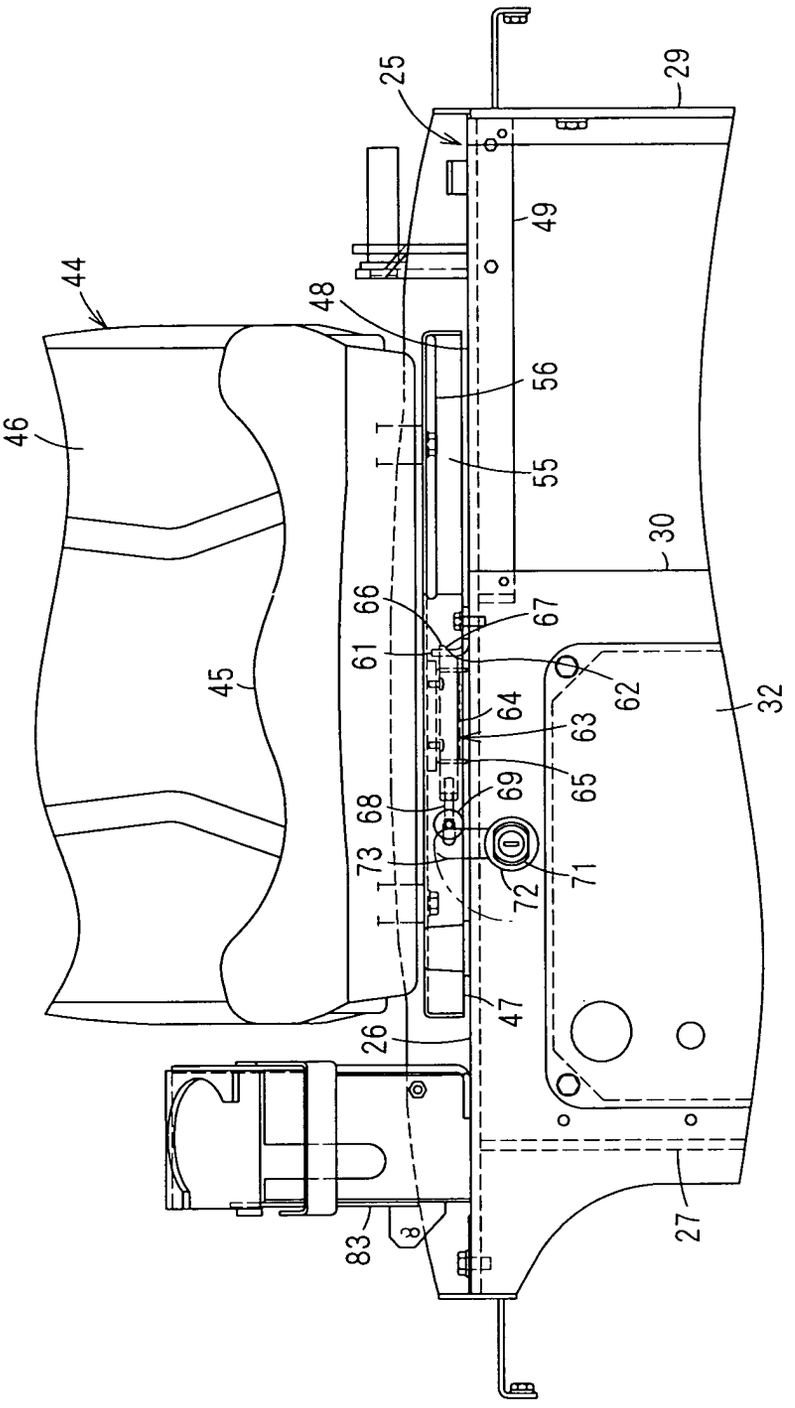
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FIG. 2

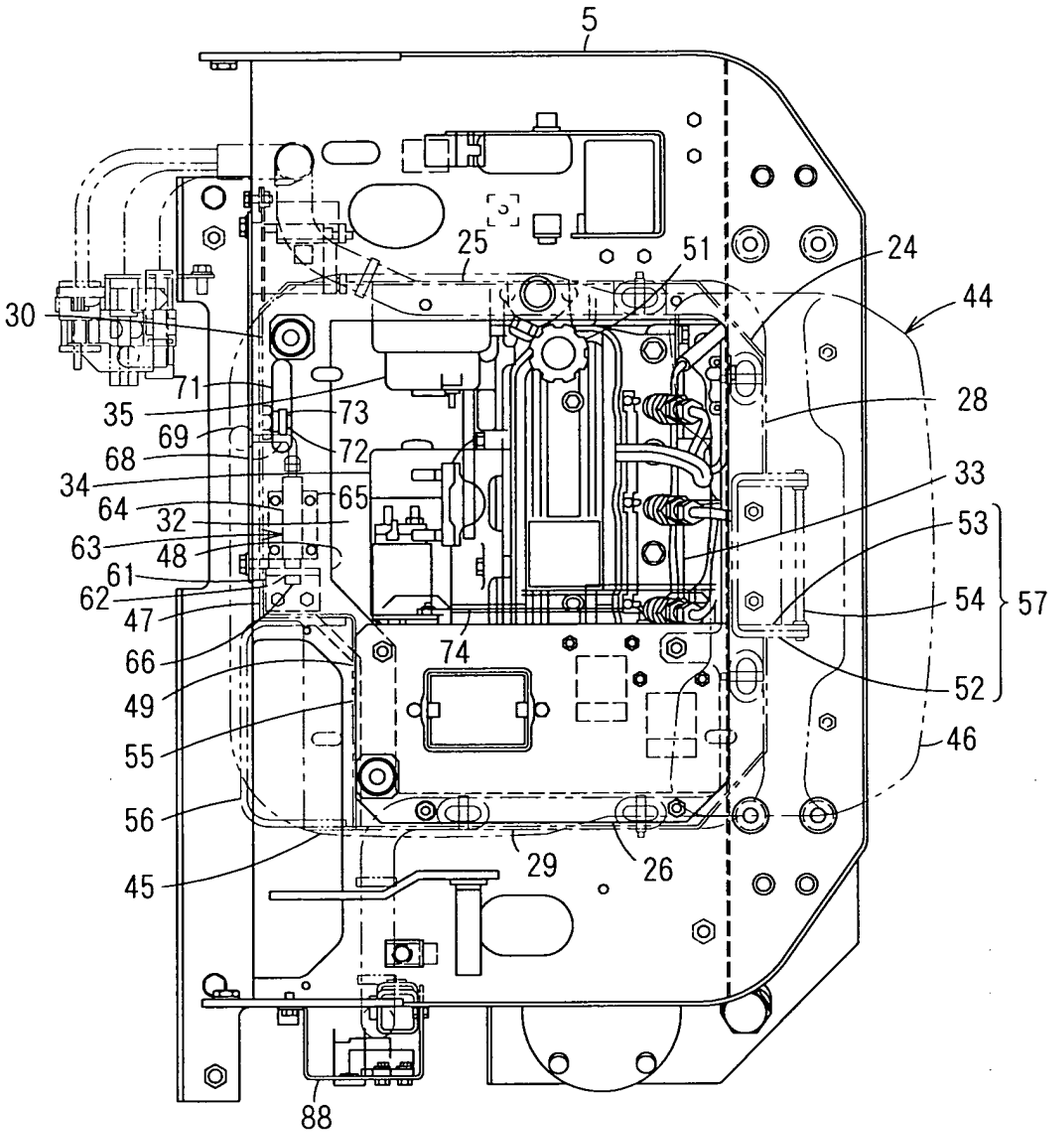
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FIG. 3

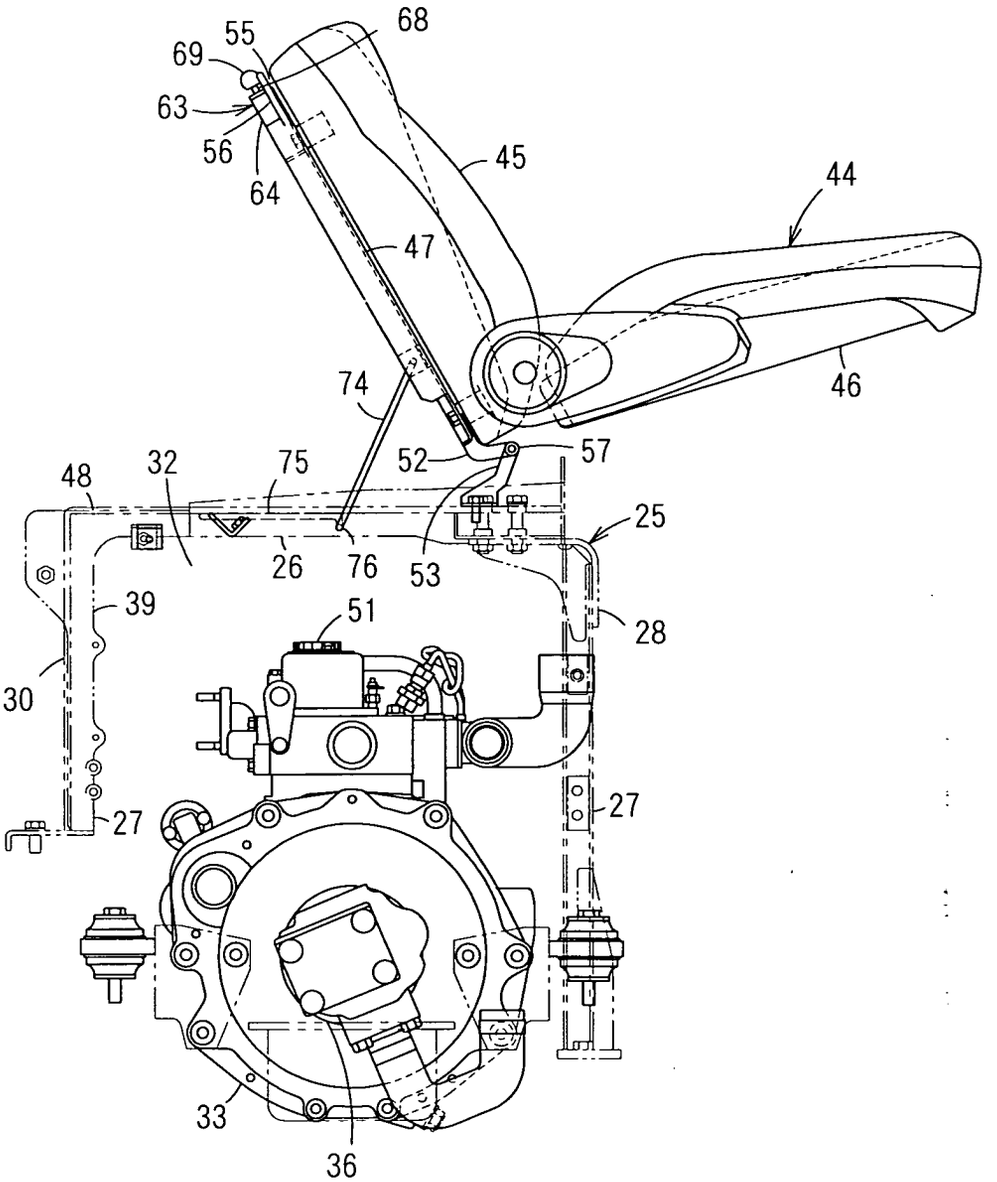
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FIG. 4

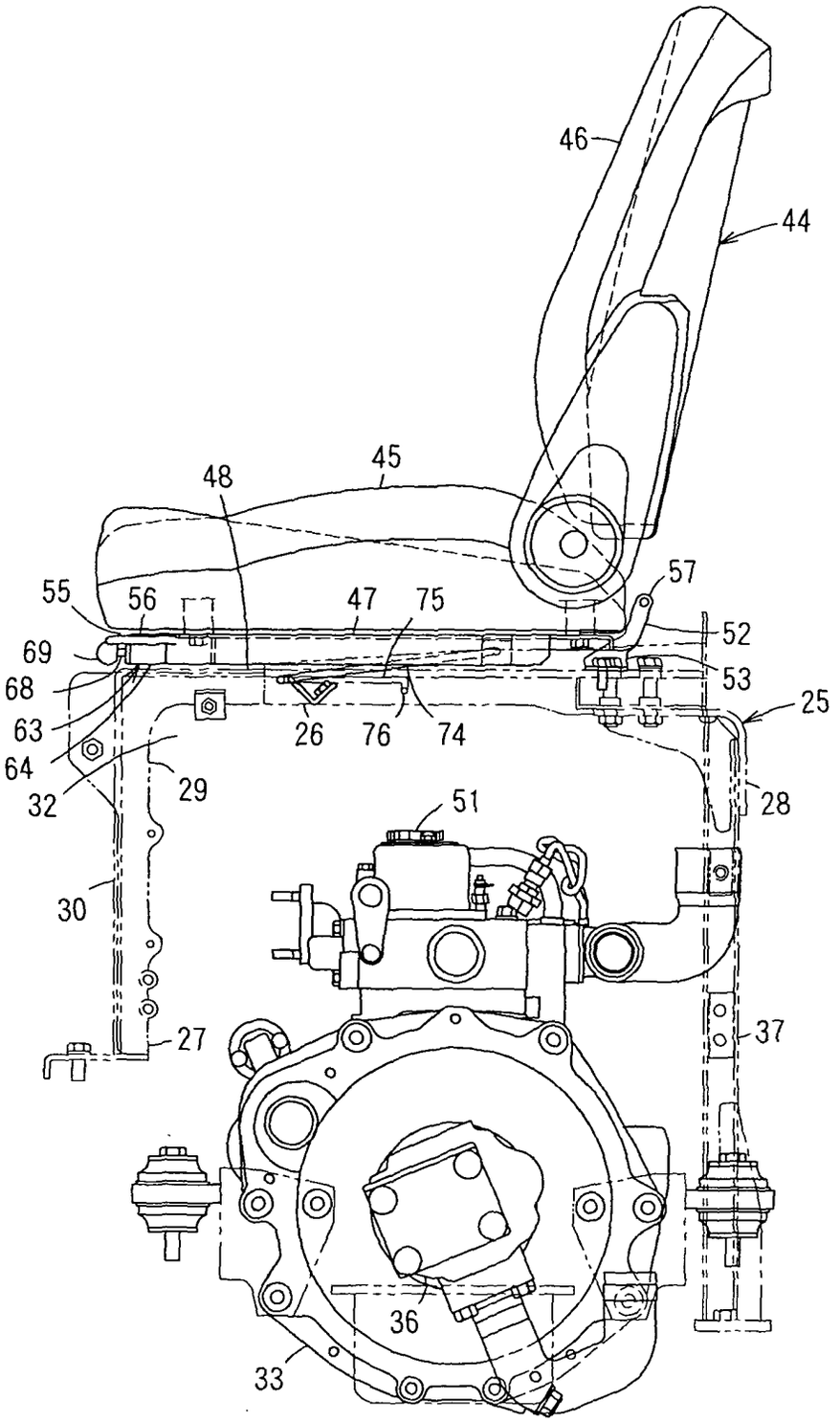
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FIG. 5

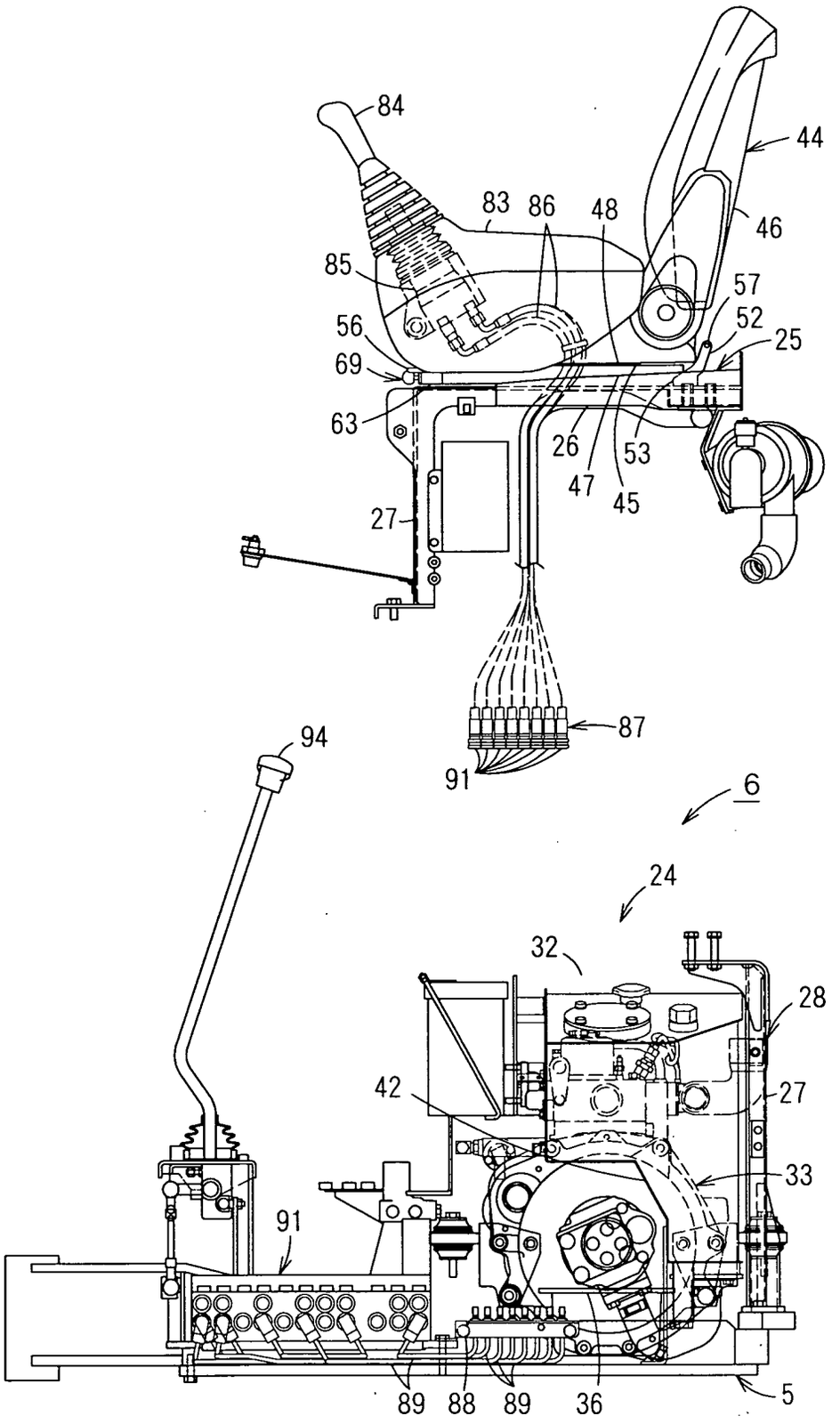
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FIG. 6

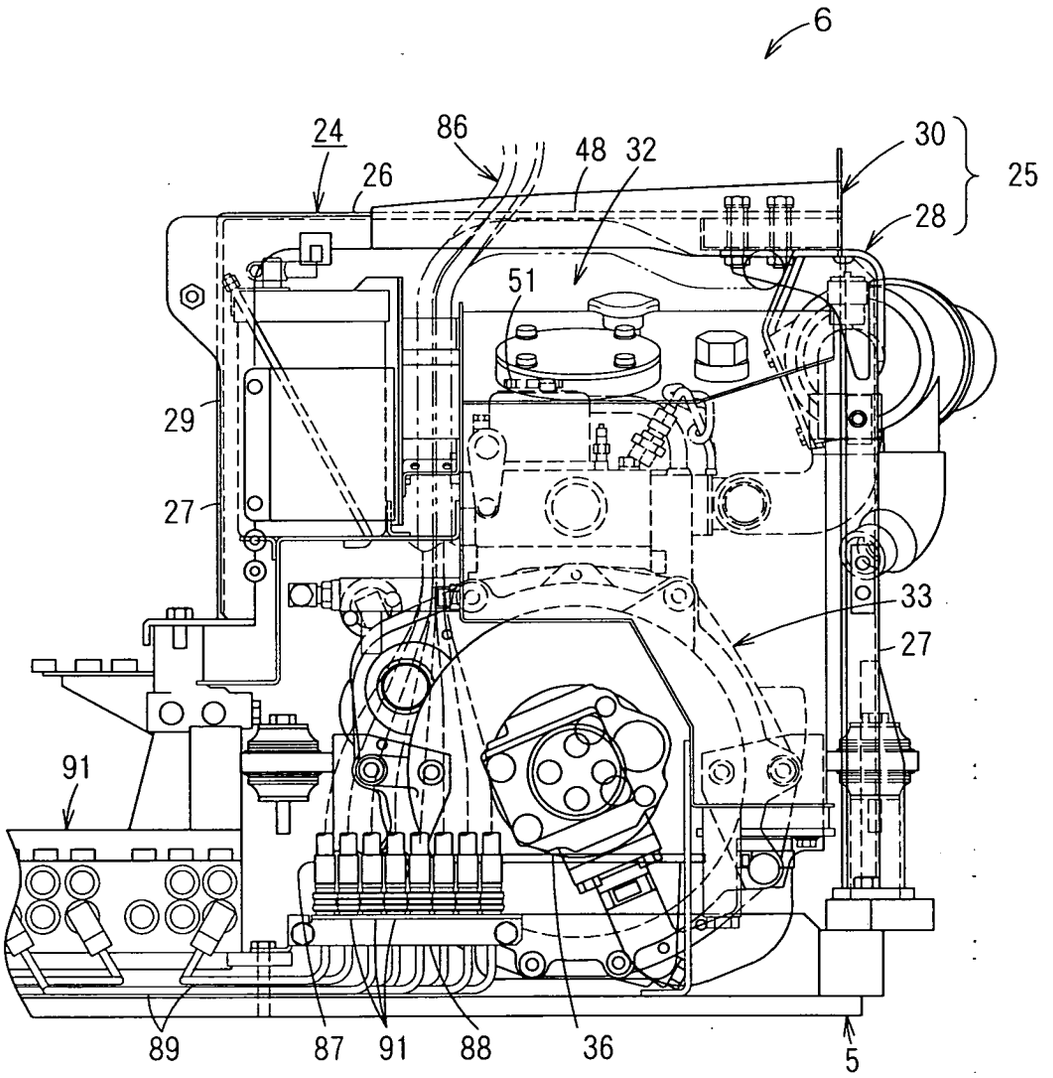

FIG. 7

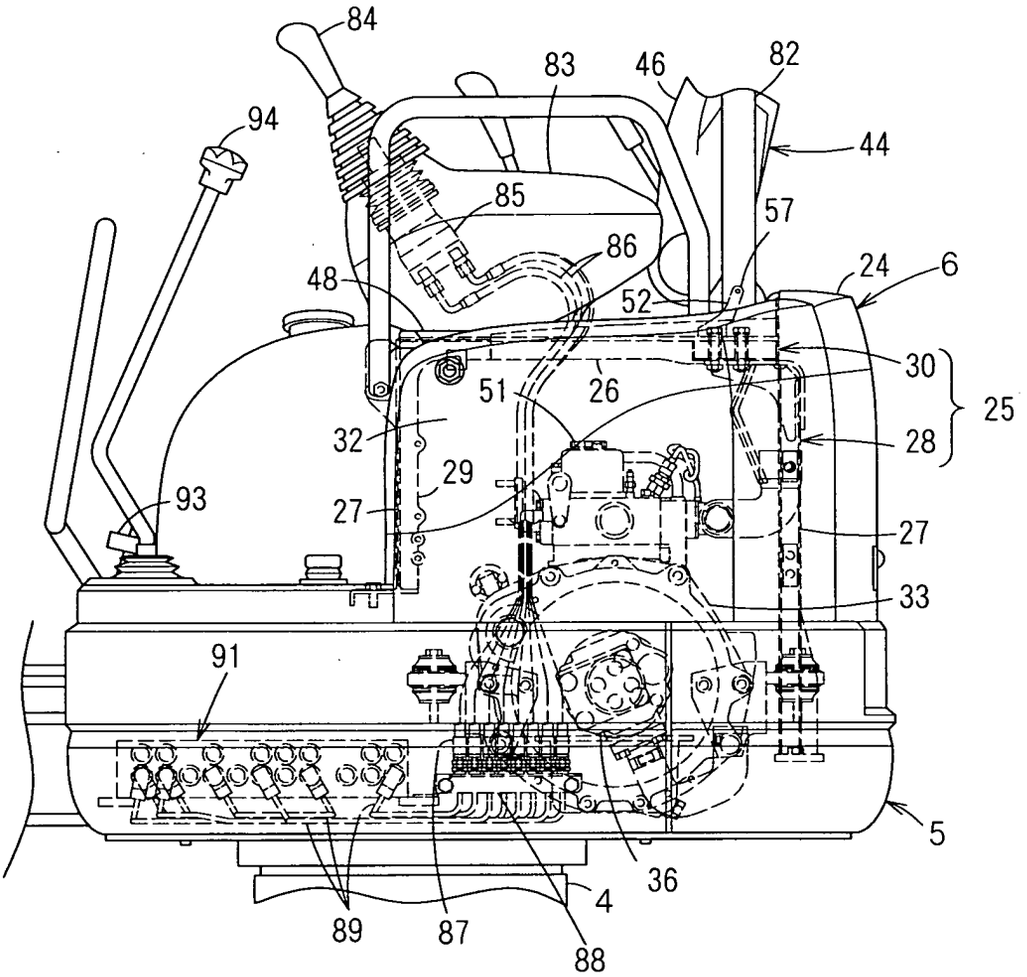
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FIG. 8

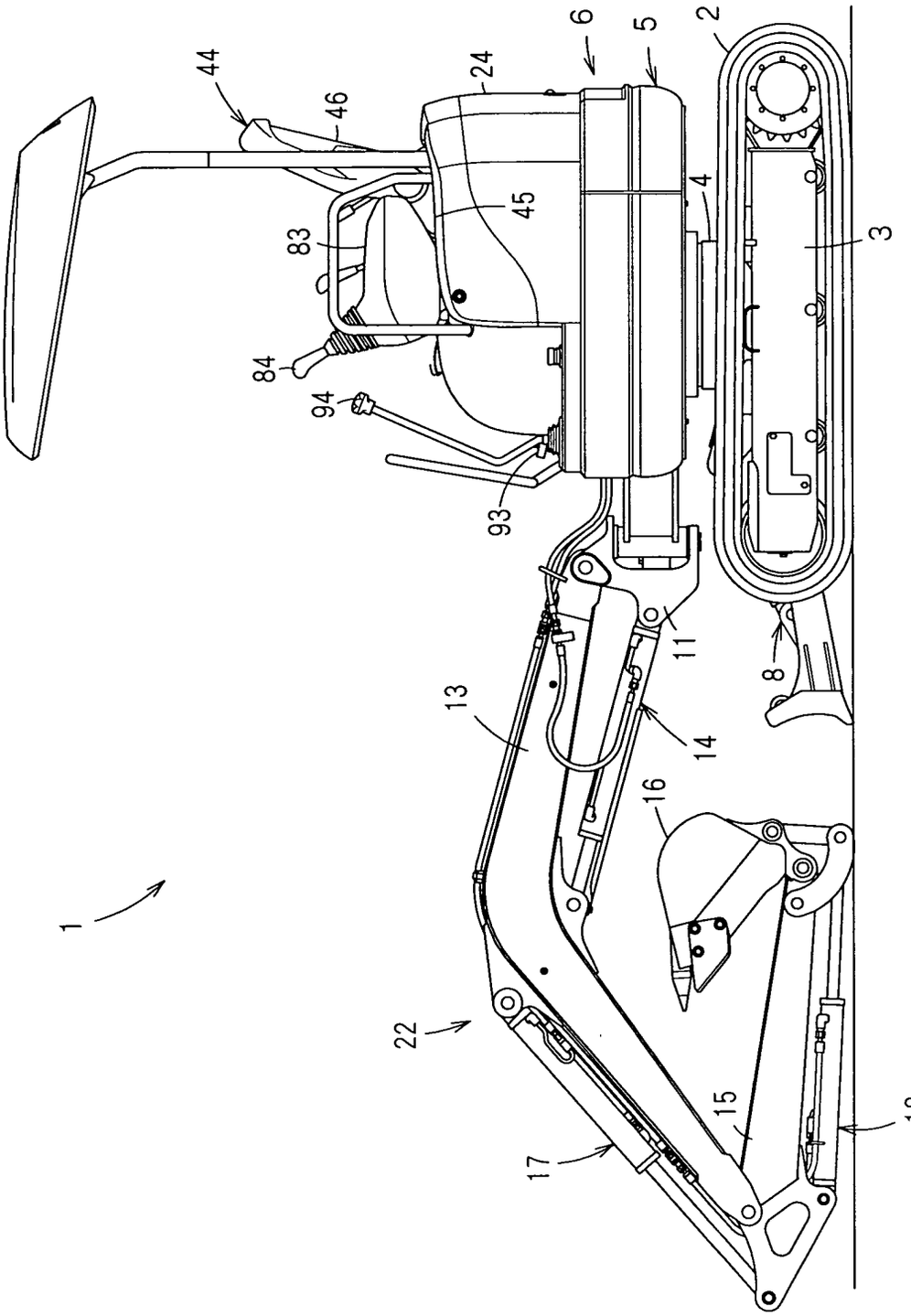

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/13247

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] E02F9/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] E02F9/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Toroku Jitsuyo Shinan Koho	1994-2004
Kokai Jitsuyo Shinan Koho	1971-2004	Jitsuyo Shinan Toroku Koho	1996-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 70869/1990(Laid-open No. 30149/1992) (Seirei Industry Co., Ltd.), 11 March, 1992 (11.03.92), Full text; all drawings (Family: none)	1,3-5,11 2,6-10
Y	JP 9-137467 A (Kubota Corp.), 27 May, 1997 (27.05.97), Full text; all drawings (Family: none)	2,6-10
Y	JP 9-296481 A (Komatsu Zenoah Co., Komatsu Ltd.), 18 November, 1997 (18.11.97), Full text; all drawings (Family: none)	8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 January, 2004 (26.01.04)	17 February, 2004 (17.02.04)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)