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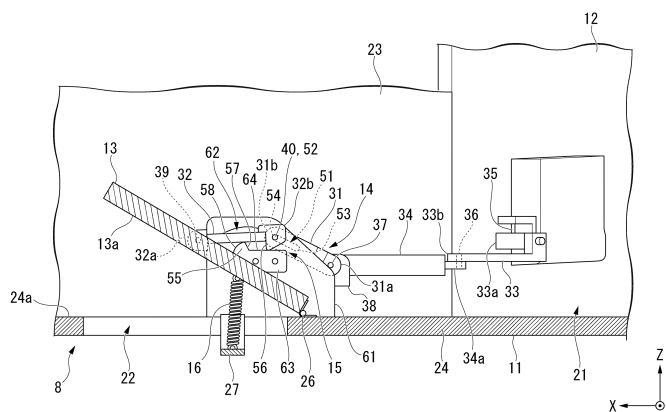
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(54) **OPERATOR CAB FOR WORK VEHICLES**

(57) An operator cab (8) for work vehicles includes an operator cab body (11) that forms a doorway (21) and a ventilation port (22), a door (12) that opens and closes the doorway (21), a lid portion (13) that opens and closes the ventilation port (22), a link mechanism (14) that connects the door (12) and the lid portion (13) to each other so that the lid portion (13) is opened when the door (12)

is opened and the lid portion (13) is closed when the door (12) is closed, and a closing timing adjustment unit (15) that stops a closing motion of the lid portion (13) in a first stage of a motion of closing the door (12) and that performs the closing motion of the lid portion (13) in a second stage of the motion of closing the door (12) after the first stage.

FIG. 4



**Description**

## [Technical Field]

**[0001]** The present invention relates to an operator cab for work vehicles.

**[0002]** Priority is claimed on Japanese Patent Application No. 2018-147031, filed August 3, 2018, the content of which is incorporated herein by reference.

## [Background Art]

**[0003]** An operator cab for work vehicles such as dump trucks operating at mining sites or civil engineering sites needs to have high airtightness in order to prevent dust entry from an outside area and to maintain an indoor temperature adjusted by an air conditioner. Patent Literature 1 discloses a configuration in which a ventilation port formed in an operator cab performs an opening operation when an opening motion of a door is detected, and the ventilation port performs a closing operation when a closing motion of the door is detected. In this configuration, when the door of the operator cab is closed, air inside the operator cab flows out through the ventilation port, thereby preventing an instantaneous increase in an air pressure inside the operator cab. In this manner, the door of the operator cab can be closed with a weak force.

## [Citation List]

## [Patent Literature]

**[0004]** [Patent Literature 1]  
Japanese Unexamined Patent Application, First Publication No. 2004-142667

## [Summary of Invention]

## [Technical Problem]

**[0005]** In a configuration of Patent Literature 1, it is necessary to use electrical means such as a sensor or a solenoid in order to detect opening and closing motions of the door and open and close the ventilation port. However, the work vehicle is operated at a site where there is a lot of dust, and many vehicle vibrations are generated during an operation. Accordingly, the electrical means needs to be reliably operated under a harsh environment. Therefore, it is necessary to take measures for durability of the electrical means, thereby causing a problem in that the costs for manufacturing the operator cab increase.

**[0006]** The present invention is made in view of the above-described problems, and an object thereof is to provide an operator cab for work vehicles, which is capable of easily closing a door of the operator cab at a low cost and capable of maintaining airtightness of the operator cab.

## [Solution to Problem]

**[0007]** According to an aspect of the present invention, an operator cab for work vehicles includes an operator cab body that forms a doorway and a ventilation port, a door that is configured to open and close the doorway, a lid portion that is configured to open and close the ventilation port, a link mechanism that connects the door and the lid portion to each other so that the lid portion is opened when the door is opened and the lid portion is closed when the door is closed, and a closing timing adjustment unit that stops a closing motion of the lid portion in a first stage of a motion of closing the door and that performs the closing motion of the lid portion in a second stage of the motion of closing the door after the first stage.

## [Advantageous Effects of Invention]

**[0008]** According to the present invention, a door of an operator cab can be easily closed at a low cost, and airtightness of the operator cab can be maintained.

## [Brief Description of Drawings]

**[0009]**

Fig. 1 is a side view representing a dump truck including an operator cab according to an embodiment of the present invention.

Fig. 2 is a plan sectional view representing a main part of the operator cab according to the embodiment of the present invention.

Fig. 3 is a sectional view taken along line III-III in Fig. 2.

Fig. 4 is a sectional view taken along line IV-IV in Fig. 2.

Fig. 5 is a perspective view representing a closing timing adjustment unit included in the operator cab.

Fig. 6 is a schematic diagram representing a process of a motion of closing a door in a configuration illustrated in Figs. 2 to 5.

Fig. 7 is a schematic diagram representing a process of a motion of closing the door in the configuration illustrated in Figs. 2 to 5.

Fig. 8 is a schematic diagram representing a process of a motion of closing the door in the configuration illustrated in Figs. 2 to 5.

Fig. 9 is a schematic diagram representing a process of a motion of opening the door in the configuration illustrated in Figs. 2 to 5.

Fig. 10 is a schematic diagram representing a process of a motion of opening the door in the configuration illustrated in Figs. 2 to 5.

Fig. 11 is a schematic diagram representing a process of a motion of opening the door in the configuration illustrated in Figs. 2 to 5.

### [Description of Embodiments]

**[0010]** Hereinafter, an embodiment of the present invention will be described in detail with reference to Figs. 1 to 11. An operator cab according to the present embodiment includes a dump truck 1 illustrated in Fig. 1. First, the dump truck 1 will be described.

#### <Dump Truck>

**[0011]** As illustrated in Fig. 1, the dump truck 1 is a work vehicle and is an articulated-type dump truck in which a front frame 2 and a rear frame 3 are connected to each other to freely swing so as to be centered on an axial line O.

**[0012]** The rear frame 3 is provided with a rear wheel 4 and a vessel 5. The vessel 5 is provided to freely raised and lowered with respect to the rear frame 3. The vessel 5 is driven by a hoist cylinder 6 which is a hydraulic actuator.

**[0013]** The front frame 2 is provided with a front wheel 7, an operator cab 8 (cab), and an engine room 9. The engine room 9 is disposed in front of the operator cab 8 and is covered with an exterior cover 10.

#### <Operator Cab>

**[0014]** As illustrated in Figs. 1 to 4, the operator cab 8 includes an operator cab body 11, a door 12, a lid portion 13, a link mechanism 14, and a closing timing adjustment unit 15.

#### <Operator Cab Body>

**[0015]** As illustrated in Figs. 2 and 4, the operator cab body 11 is formed in a box shape internally having a space. The operator cab body 11 has a doorway 21 for an operator of the work vehicle to enter and exit the operator cab 8, and a ventilation port 22 for allowing air to flow into and flow out from the operator cab 8.

**[0016]** The doorway 21 and the ventilation port 22 may be formed at any desired portion of the operator cab body 11. In the present embodiment, the doorway 21 is formed in a side wall portion 23 of the operator cab body 11. The ventilation port 22 is formed in a bottom wall portion 24 of the operator cab body 11. That is, the ventilation port 22 is open on an inner surface 24a of the bottom wall portion 24. The ventilation port 22 causes an internal space of the operator cab body 11 to communicate with an external space of the operator cab body 11.

**[0017]** The ventilation port 22 may be formed at any desired position in the bottom wall portion 24. The ventilation port 22 of the present embodiment is formed at a position which is not stepped on by the operator who enters and exits the operator cab 8. Specifically, the ventilation port 22 is located at a distance from the doorway 21 in a direction (X-axis direction; hereinafter, also referred to as a first direction) orthogonal to an opening

direction (Y-axis direction; hereinafter, also referred to as a second direction) of the doorway 21 along the inner surface 24a of the bottom wall portion 24. The direction orthogonal to both the Y-axis direction and the X-axis direction is a height direction (Z-axis direction; hereinafter, also referred to as a third direction) of the operator cab body 11 orthogonal to the inner surface 24a of the bottom wall portion 24.

#### 10 <Door>

**[0018]** As illustrated in Fig. 2, the door 12 opens and closes the doorway 21 of the operator cab body 11. The door 12 of the present embodiment is attached to the side wall portion 23 of the operator cab body 11 to be rotatable. A shaft 25 (door rotation shaft 25) that rotates the door 12 with respect to the side wall portion 23 extends in the height direction (Z-axis direction) of the operator cab body 11. The door rotation shaft 25 is located between the doorway 21 and the ventilation port 22 which are arranged in the first direction. The door 12 opens the doorway 21 of the operator cab body 11 by rotating to be separated outward of the operator cab body 11 from the doorway 21.

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#### <Lid Portion>

**[0019]** As illustrated in Figs. 2 and 4, the lid portion 13 opens and closes the ventilation port 22 of the operator cab body 11. The lid portion 13 of the present embodiment is attached to the bottom wall portion 24 of the operator cab body 11 to be rotatable. A shaft 26 (lid portion rotation shaft 26) that connects the lid portion 13 and the bottom wall portion 24 to each other to rotate the lid portion 13 with respect to the bottom wall portion 24 extends in the opening direction (Y-axis direction) of the doorway 21 along the inner surface 24a of the bottom wall portion 24. The lid portion rotation shaft 26 is located between the doorway 21 and the ventilation port 22 which are arranged in the first direction. The lid portion 13 is disposed to overlap the inner surface 24a of the bottom wall portion 24, thereby closing the ventilation port 22 of the operator cab body 11. That is, the lid portion 13 closes the ventilation port 22 by performing a closing motion, thereby blocking the internal space of the operator cab body 11 and the external space of the operator cab body 11. The lid portion 13 may be formed in any desired shape. The lid portion 13 of the present embodiment is formed in a flat plate shape having a rectangular shape in a plan view. One side of the lid portion 13 in a plan view is parallel to the lid portion rotation shaft 26. In the following description, a direction orthogonal to a plate thickness direction of the lid portion 13 and away from the lid portion rotation shaft 26 may be referred to as a longitudinal direction of the lid portion 13 in some cases.

## &lt;Link Mechanism&gt;

**[0020]** As illustrated in Figs. 2 to 4, the link mechanism 14 connects the door 12 and the lid portion 13 to each other so that the lid portion 13 is opened when the door 12 is opened and the lid portion 13 is closed when the door 12 is closed. The link mechanism 14 of the present embodiment includes a door-side link 31 and a lid-side link 32. The door-side link 31 and the lid-side link 32 are formed to respectively extend linearly.

**[0021]** The door-side link 31 is swingably connected to the door 12 so as to be centered on a first end portion 31a in the longitudinal direction of the door-side link 31. For example, the door-side link 31 may be directly connected to the door 12. The door-side link 31 of the present embodiment is connected to the door 12 via a first link member 33 and a second link member 34 which configure the link mechanism 14 together with the door-side link 31.

**[0022]** The first link member 33 is formed in an L-shape. The first link member 33 is swingably connected to the door 12 so as to be centered on a first end portion 33a in the longitudinal direction of the first link member 33. The first link member 33 is swingable with respect to the door 12 so as to be centered on a first rotation shaft 35 parallel to the door rotation shaft 25.

The second link member 34 is formed to extend linearly. The second link member 34 is swingably connected to a second end portion 33b of the first link member 33 so as to be centered on a first end portion 34a in the longitudinal direction of the second link member 34. The first link member 33 and the second link member 34 is mutually swingable so as to be centered on a second rotation shaft 36 parallel to the door rotation shaft 25.

**[0023]** The door-side link 31 of the present embodiment is swingably connected to a second end portion 34b of the above-described second link member 34 so as to be centered on the first end portion 31a in the longitudinal direction of the door-side link 31. The door-side link 31 and the second link member 34 is mutually swingable so as to be centered on a third rotation shaft 37 extending in the second direction (Y-axis direction) orthogonal to the first direction along the inner surface 24a of the operator cab body 11.

**[0024]** The first end portion 31a of the door-side link 31 is movable only in the first direction with respect to the operator cab body 11. This point will be specifically described. As illustrated in Figs. 2 and 3, a rail portion 38 is provided between the first end portion 31a of the door-side link 31 and the second end portion 34b of the second link member 34. The rail portion 38 guides a movement of the first end portion 31a and the second link member 34 of the door-side link 31 only in the first direction. Specifically, the rail portion 38 has an elongated hole 38a extending in the first direction. The third rotation shaft 37 connecting the door-side link 31 and the second link member 34 to each other is inserted into the elongated hole 38a. In this manner, the first end portion 31a and the second link member 34 of the door-side link

31 are movable only in the first direction with respect to the operator cab body 11. For example, the first end portion 31a and the second link member 34 of the door-side link 31 move toward the lid portion 13 side in the first direction in response to a motion of closing the door 12. The above-described rail portion 38 is fixed to the operator cab body 11. Specifically, the rail portion 38 is fixed to the inner surface 24a of the bottom wall portion 24 via a slit-provided plate member 61 (to be described later).

**[0025]** As illustrated in Figs. 2 and 4, the lid-side link 32 is swingably connected to the lid portion 13 so as to be centered on the first end portion 32a in the longitudinal direction of the lid-side link 32. The lid-side link 32 is swingable with respect to the lid portion 13 around a fourth rotation shaft 39 extending in the second direction. The lid-side link 32 of the present embodiment is directly connected to the lid portion 13. The first end portion 32a of the lid-side link 32 is connected to an intermediate portion in the longitudinal direction of the lid portion 13. As illustrated in Figs. 2 to 4, the second end portion 32b of the lid-side link 32 is swingably connected to the second end portion 31b of the door-side link 31. The door-side link 31 and the lid-side link 32 is mutually swingable so as to be centered on a fifth rotation shaft 40 extending in the second direction.

**[0026]** The door-side link 31 and the lid-side link 32 described above are sequentially arranged in the first direction from the door 12 side (doorway 21 side) toward the lid portion 13 side (ventilation port 22 side). In addition, the longitudinal direction of the door-side link 31 is inclined with respect to the inner surface 24a of the bottom wall portion 24 so that the second end portion 31b of the door-side link 31 is located farther away from the inner surface 24a of the bottom wall portion 24 than the first end portion 31a in the third direction.

## &lt;Closing Timing Adjustment Unit&gt;

**[0027]** The closing timing adjustment unit 15 stops a closing motion of the lid portion 13 in a first stage of a motion of closing the door 12 and performs the closing motion of the lid portion 13 in a second stage of the motion of closing the door 12 after the first stage. As illustrated in Figs. 3 and 5, the closing timing adjustment unit 15 of the present embodiment includes a slot hole 51 formed in the second end portion 31b of the door-side link 31, and a slot projection 52 formed in the second end portion 32b of the lid-side link 32 and inserted into the slot hole 51.

**[0028]** The slot hole 51 is formed to extend in the longitudinal direction of the door-side link 31. The slot hole 51 is formed in an elongated hole shape when viewed in the second direction which is the plate thickness direction of the door-side link 31. The slot hole 51 may be formed so that at least the slot projection 52 is inserted. The slot hole 51 of the present embodiment is formed to penetrate the door-side link 31 in the second direction.

The slot projection 52 is movable in the longitudinal direction of the slot hole 51 in a state of being inserted into

the slot hole 51. The slot projection 52 also serves as the above-described fifth rotation shaft 40. That is, the slot projection 52 connects the door-side link 31 and the lid-side link 32 so as to be mutually swingable.

**[0029]** The slot projection 52 is movable in the longitudinal direction with respect to the slot hole 51 in the first stage of the motion of closing the door 12. In addition, the slot projection 52 reaches an end 53 in the longitudinal direction of the slot hole 51 in the second stage of the motion of closing the door 12. The end 53 of the slot hole 51 is located on the first end portion 31a side in the longitudinal direction of the door-side link 31. In the following description, an end of the slot hole 51 located on a side opposite to the end 53 of the slot hole 51 in the longitudinal direction of the slot hole 51 will be referred to as a starting end 54 of the slot hole 51.

**[0030]** As illustrated in Figs. 4 and 5, the closing timing adjustment unit 15 of the present embodiment further includes a first projection portion 55 fixed to the operator cab body 11, and a second projection portion 56 provided in the lid-side link 32. That is, the closing timing adjustment unit 15 of the present embodiment includes the slot hole 51, the slot projection 52, the first projection portion 55, and the second projection portion 56.

**[0031]** The first projection portion 55 of the present embodiment is fixed to the inner surface 24a of the bottom wall portion 24 via a slit-provided plate member 61 (to be described later). The first projection portion 55 is located between the inner surface 24a of the bottom wall portion 24 and the lid-side link 32 in a direction orthogonal to the inner surface 24a of the bottom wall portion 24 (Z-axis direction). In addition, the first projection portion 55 is located in an intermediate portion of a movement range of the second end portion 32b of the lid-side link 32 that moves in the first direction in conjunction with the opening and closing of the lid portion 13.

**[0032]** The first projection portion 55 has a pressed surface 57 against which the second projection portion 56 is pressed toward the door 12 side in the first direction. For example, the pressed surface 57 may be orthogonal to the inner surface 24a of the bottom wall portion 24. In the present embodiment, the pressed surface 57 is inclined from the door 12 side toward the lid portion 13 side in the first direction while being away from the inner surface 24a of the bottom wall portion 24 in the Z-axis direction. That is, the pressed surface 57 is a surface inclined at a predetermined angle with respect to the third direction.

In addition, the first projection portion 55 has an inclined surface 58 facing a side opposite to the pressed surface 57 in the first direction. The inclined surface 58 is inclined from the door 12 side to the lid portion 13 side in the first direction while being closer to the inner surface 24a of the bottom wall portion 24 in the Z-axis direction.

**[0033]** The second projection portion 56 of the present embodiment projects from the second end portion 32b of the lid-side link 32 toward the inner surface 24a of the bottom wall portion 24. The second projection portion 56

is pressed against the first projection portion 55 toward the lid portion 13 side, thereby restricting the movement of the lid-side link 32 in a closing direction of the lid portion 13. For example, the second projection portion 56 may be pressed against the first projection portion 55 in a state where the door 12 and the lid portion 13 are completely opened. In the present embodiment, as illustrated in Figs. 2 and 4, in the state where the door 12 and the lid portion 13 are completely opened, the second projection portion 56 is located on the door 12 side (side in the first direction) at a distance from the first projection portion 55. Therefore, the second projection portion 56 is pressed against the first projection portion 55 in an intermediate stage of closing the lid portion 13. Pressing of the second projection portion 56 against the first projection portion 55 is released when the above-described slot projection 52 reaches the end 53 of the slot hole 51 in the longitudinal direction by the movement of the door-side link 31.

<Elastic Member>

**[0034]** As illustrated in Fig. 4, the operator cab 8 of the present embodiment further includes an elastic member 16. The elastic member 16 is provided between the lid portion 13 and the operator cab body 11. The elastic member 16 gives force in the closing direction of the lid portion 13 by an elastic force. The elastic member 16 may be a torsion spring or rubber. The elastic member 16 of the present embodiment is a coil spring. A first end of the elastic member 16 is attached to a facing surface 13a of the lid portion 13 that faces the ventilation port 22. A second end of the elastic member 16 is attached to an attachment portion 27 of the operator cab body 11 which is disposed outside the ventilation port 22. As illustrated in Fig. 4, the attachment portion 27 may be formed separately from the bottom wall portion 24, and then, may be fixed to the bottom wall portion 24, or may be formed integrally with the bottom wall portion 24, for example. Since the elastic member 16 is attached in this way, it is possible to prevent the elastic member 16 from hindering the lid portion 13 when the ventilation port 22 is closed. That is, the elastic member 16 has a characteristic of expanding and contracting (elastic force). Accordingly, a force that causes the elastic member 16 to contract is generated during the closing motion of the lid portion 13. In this manner, the lid portion 13 tends to be closed by using the lid portion rotation shaft 26 as a rotation shaft. In addition, even in a state where the closing motion of the lid portion 13 is completed (state where the ventilation port 22 is closed by the lid portion 13), the force that causes the elastic member 16 to contract is generated. In this manner, the lid portion 13 maintains a closed state of the ventilation port 22.

When the elastic member 16 is a torsion spring or a coil spring, for example, the elastic member 16 may be attached to the lid portion rotation shaft 26 provided between the lid portion 13 and the operator cab body 11.

**[0035]** As illustrated in Figs. 2 to 5, the operator cab 8 of the present embodiment further includes the slit-provided plate member 61 fixed to the operator cab body 11 and interposed between the door-side link 31 and the lid-side link 32 in the second direction. The slit-provided plate member 61 has a slit 62 which penetrates in the second direction and into which the slot projection 52 (fifth rotation shaft 40) is inserted. The slit 62 is formed to have a proper movement range of the slot projection 52 in conjunction with the opening and closing motions of the door 12.

**[0036]** As illustrated in Figs. 4 and 5, the operator cab 8 of the present embodiment further includes a support portion 63 fixed to the operator cab body 11. The support portion 63 supports the second projection portion 56 from the inner surface 24a side of the bottom wall portion 24. The support portion 63 is disposed at a position adjacent to the door 12 side with respect to the first projection portion 55 in the first direction. The support portion 63 has a support surface 64 extending in the first direction to be parallel to the inner surface 24a of the bottom wall portion 24 and supports the second projection portion 56. The support surface 64 is located on the inner surface 24a side of the bottom wall portion 24 from the first projection portion 55 (particularly, the pressed surface 57). The pressed surface 57 and the support surface 64 are continuously connected to each other. In Figs. 4 and 5, the support portion 63 is formed integrally with the first projection portion 55. However, the present invention is not limited thereto.

#### <Operational Effect>

**[0037]** Next, a motion of the operator cab 8 of the present embodiment will be described with reference to Figs. 6 to 11. Figs. 6 to 11 illustrate a simplified or changed structure of the operator cab 8 illustrated in Figs. 2 to 4 in order to describe the motion of the operator cab 8. First, the motion when the door 12 is closed will be described with reference to Figs. 6 to 8.

**[0038]** As illustrated in Fig. 6, in a state where the door 12 and the lid portion 13 are completely opened, the second projection portion 56 is located on the door 12 side at a distance from the first projection portion 55. In addition, the elastic force of the elastic member 16 causes the slot projection 52 to reach the starting end 54 of the slot hole 51. Therefore, in the state where the door 12 and the lid portion 13 are completely opened, when the door 12 is closed as indicated by an arrow ND1, until the second projection portion 56 is pressed against the first projection portion 55 as illustrated in Figs. 6 and 7, the closing motion of the lid portion 13 is performed as indicated by an arrow NC1 in conjunction with the closing motion of the door 12. At this time, the second projection portion 56 may be located away from the support surface 64 of the support portion 63, or may be disposed on the support surface 64 of the support portion 63.

**[0039]** As illustrated in Fig. 7, in a state where the sec-

ond projection portion 56 is pressed against the first projection portion 55, the movement of the lid-side link 32 is restricted in the closing direction of the lid portion 13. That is, the closing motion of the lid portion 13 is stopped. In this state, when the closing motion of the door 12 is continuously performed as indicated by the arrow ND1, the first end portion 31a of the door-side link 31 moves toward the lid portion 13 side in the first direction as indicated by an arrow N. Therefore, the door-side link 31 moves with respect to the lid-side link 32 so that the slot projection 52 moves toward the end 53 from the starting end 54 of the slot hole 51. In this manner, the closing motion of the door 12 can be performed while the closing motion of the lid portion 13 is stopped. The motion at this stage corresponds to the first stage of the above-described motion of closing the door 12.

**[0040]** Thereafter, as illustrated in Fig. 8, the closing motion of the door 12 indicated by the arrow ND1 is further continuously performed. In this manner, when the slot projection 52 reaches the end 53 of the slot hole 51, pressing of the second projection portion 56 against the first projection portion 55 is released. Hereinafter, this point will be described in detail.

**[0041]** The longitudinal direction of the door-side link 31 is inclined with respect to the inner surface 24a of the bottom wall portion 24 so that the second end portion 31b of the door-side link 31 is located farther away from the inner surface 24a of the bottom wall portion 24 than the first end portion 31a. Therefore, after the slot projection 52 reaches the end 53 of the slot hole 51, when the first end portion 31a of the door-side link 31 further moves toward the lid portion 13 side in the first direction in conjunction with the closing motion of the door 12, the door-side link 31 rotates around the first end portion 31a so that the second end portion 31b of the door-side link 31 and the second end portion 32b of the lid-side link 32 including the second projection portion 56 move in a direction away from the inner surface 24a of the bottom wall portion 24. In this manner, pressing of the second projection portion 56 against the first projection portion 55 is released.

**[0042]** In a case where the pressed surface 57 of the first projection portion 55 is inclined as illustrated in Fig. 4, even when a swing center (that is, the fourth rotation shaft 39) of the lid-side link 32 is located closer to the inner surface 24a of the bottom wall portion 24 than the first projection portion 55, the second projection portion 56 pressed against the first projection portion 55 can be smoothly released.

**[0043]** When pressing of the second projection portion 56 against the first projection portion 55 is released in conjunction with the closing motion of the door 12, the lid-side link 32 is allowed to move in the closing direction of the lid portion 13 (direction indicated by the arrow NC1). In this state, the slot projection 52 has reached the end 53 of the slot hole 51. Accordingly, the lid-side link 32 can be pressed to the lid portion 13 side by the movement of the door-side link 31 in conjunction with the clos-

ing motion of the door 12 indicated by the arrow ND1. In this manner, the closing motion of the lid portion 13 is performed, and the ventilation port 22 can be closed by the lid portion 13. In addition, according to the present embodiment, the lid portion 13 is given force in the closing direction of the lid portion 13 by the elastic force of the elastic member 16. Therefore, the ventilation port 22 can be quickly and reliably closed by the lid portion 13. The motion at this stage corresponds to the second stage of the above-described motion of closing the door 12.

As described above, the motion of closing the door 12 and the lid portion 13 is completed.

**[0044]** In the second stage of the motion of closing the door 12, the second projection portion 56 pressed against the first projection portion 55 may be released immediately before the doorway 21 of the operator cab body 11 is closed by the door 12 as illustrated in Fig. 8, or may be released simultaneously with the closing of the doorway 21 of the operator cab body 11 which is performed by the door 12, for example. When pressing of the second projection portion 56 against the first projection portion 55 is released immediately before the closing of the doorway 21 of the operator cab body 11, the doorway 21 and the ventilation port 22 can be simultaneously closed. In addition, when the second projection portion 56 pressed against the first projection portion 55 is released simultaneously with the closing of the doorway 21 of the operator cab body 11, the ventilation port 22 can be closed immediately after the doorway 21 is closed. That is, the ventilation port 22 is not closed earlier than the doorway 21.

**[0045]** In a state where the door 12 and the lid portion 13 are completely closed, the second projection portion 56 is located on the lid portion 13 side from the pressed surface 57 of the first projection portion 55 in the first direction. The second projection portions 56 may be disposed at a distance above the inclined surface 58 of the first projection portions 55. According to the present embodiment, the second projection portion 56 is disposed on the inclined surface 58 of the first projection portion 55 as illustrated in Fig. 9.

**[0046]** Next, an operation when opening the door 12 will be described with reference to Figs. 9 to 11.

**[0047]** In the state where the door 12 and the lid portion 13 are completely closed, when the door 12 is opened in a direction indicated by an arrow ND2 as illustrated in Fig. 9, the first end portion 31a of the door-side link 31 is moved in the first direction by being pulled toward the door 12 side. In this manner, the slot projection 52 is located in the starting end 54 of the slot hole 51, and the lid-side link 32 moves toward the door 12 side in the first direction together with the door-side link 31. At this time, the second projection portion 56 of the lid-side link 32 is disposed on the inclined surface 58 of the first projection portion 55. Accordingly, the movement of the above-described lid-side link 32 is not hindered by the first projection portion 55. In conjunction with the movement of the lid-side link 32, a force of opening the lid portion 13 acts

on the lid portion 13 to overcome the elastic force of the elastic member 16, and the lid portion 13 is opened in a direction indicated by an arrow NC2.

**[0048]** Thereafter, as illustrated in Fig. 10, when the door 12 is further opened in the direction indicated by the arrow ND2 and the second projection portion 56 of the lid-side link 32 moves to the door 12 side from the first projection portion 55 in the first direction, the second projection portion 56 is disposed on the support surface 64 of the support portion 63 and is located on the door 12 side with respect to the pressed surface 57 of the first projection portion 55. In this state, even when the lid portion 13 tries to move in the closing direction of the lid portion 13 due to the elastic force of the elastic member 16, the second projection portion 56 is pressed against the pressed surface 57 of the first projection portion 55. Therefore, it is possible to prevent the lid portion 13 and the door 12 from being closed due to the elastic force of the elastic member 16.

**[0049]** Then, as illustrated in Fig. 11, the door 12 is further opened in the direction indicated by the arrow ND2. In this manner, the door 12 and the lid portion 13 can be completely opened.

**[0050]** As described above, according to the operator cab 8 in the present embodiment, means for opening and closing the lid portion 13 in conjunction with the opening and closing of the door 12 is the link mechanism 14 which is mechanical means. Accordingly, compared to a case of using electrical means, the mechanical means is more durable against dust or vibrations of the dump truck. In this manner, costs for manufacturing the operator cab 8 can be minimized. In addition, the operator cab 8 according to the embodiment does not need a power source required for the electrical means. Accordingly, for example, the door 12 and the lid portion 13 can be easily closed without starting an engine to supply electric power to the electrical means.

**[0051]** In addition, according to the operator cab 8 of the present embodiment, in the first stage of the motion of closing the door 12, the closing motion of the lid portion 13 is stopped by the closing timing adjustment unit 15. That is, even when the closing motion of the door 12 is continuously performed, the lid portion 13 can be held in a widely opened state. Therefore, in the first stage, air inside the operator cab 8 can be efficiently discharged outward of the operator cab 8 from the ventilation port 22. In this manner, it is possible to effectively prevent an increase in the air pressure inside the operator cab 8 when the door 12 is closed. Therefore, the door 12 of the operator cab 8 can be easily closed with a weak force.

**[0052]** In addition, according to the operator cab 8 of the present embodiment, in the second stage of the motion of closing the door 12 of the operator cab 8, the closing motion of the lid portion 13 is performed by the closing timing adjustment unit 15 or the elastic member 16. Therefore, the ventilation port 22 can be quickly closed by the lid portion 13 simultaneously with the door 12 closing the doorway 21 or immediately after the door 12 clos-

es the doorway 21. In this manner, it is possible to effectively prevent foreign substances such as dust existing outside the operator cab 8 from entering the inside of the operator cab 8 through the ventilation port 22.

**[0053]** In addition, according to the operator cab 8 of the present embodiment, the closing timing adjustment unit 15 includes the slot hole 51 formed in the door-side link 31 and the slot projection 52 formed in the lid-side link 32.

Therefore, in the first stage of the motion of closing the door 12, even when the door-side link 31 moves in conjunction with the motion of closing the door 12, the slot projection 52 of the lid-side link 32 moves in the longitudinal direction of the slot hole 51 of the door-side link 31. In this manner, the door-side link 31 can be moved with respect to the lid-side link 32. As a result, it is possible to prevent the lid-side link 32 from moving in conjunction with the motion of closing the door 12. That is, the closing motion of the lid portion 13 can be stopped in the first stage of the motion of closing the door 12.

On the other hand, in the second stage of the motion of closing the door 12, the slot projection 52 of the lid-side link 32 reaches the end 53 in the longitudinal direction of the slot hole 51. In this manner, the lid-side link 32 can be moved in conjunction with the movement of the door-side link 31. That is, the closing motion of the lid portion 13 can be performed in conjunction with the motion of closing the door 12.

**[0054]** In addition, according to the operator cab 8 of the present embodiment, in addition to the slot hole 51 and the slot projection 52, the closing timing adjustment unit 15 further includes the first projection portion 55 fixed to the operator cab body 11, and the second projection portion 56 provided in the lid-side link 32. Therefore, in a state where the slot projection 52 does not reach the end 53 in the longitudinal direction of the slot hole 51, the second projection portion 56 of the lid-side link 32 is pressed against the first projection portion 55. In this manner, it is possible to reliably prevent the lid-side link 32 from moving together with the door-side link 31. That is, it is possible to reliably prevent the closing motion of the lid portion 13 from being performed in the first stage of the motion of closing the door 12.

**[0055]** In addition, according to the operator cab 8 of the present embodiment, the elastic member 16 that gives force to the lid portion 13 in the closing direction by using the elastic force is provided between the lid portion 13 and the operator cab body 11. Therefore, the lid portion 13 can be quickly and reliably closed by the elastic force of the elastic member 16. Since the lid portion 13 is quickly closed, it is possible to further prevent foreign substances such as dust from entering the inside of the operator cab 8 through the ventilation port 22. Furthermore, even in a state where the lid portion 13 is closed, a closed state of the ventilation port 22 is maintained by the elastic force of the elastic member 16. Accordingly, airtightness of the internal space of the operator cab 8 is maintained.

#### <Other Embodiments>

**[0056]** Hitherto, the embodiment according to the present invention has been described. However, the present invention is not limited thereto and can be appropriately modified within the scope not departing from the technical idea of the invention.

**[0057]** For example, the operator cab 8 of the present invention may not include the elastic member 16. For example, the lid portion 13 may be provided so that gravity acts in the closing direction of the lid portion 13. In this case, the lid portion 13 can be closed by using the gravity instead of the elastic force. In addition, in the operator cab 8 of the present invention, the elastic force or the gravity does not have to act on the lid portion 13 in the closing direction of the lid portion 13. Even in this case, when pressing of the second projection portion 56 against the first projection portion 55 is released, the slot projection 52 reaches the end 53 of the slot hole 51. In this manner, the lid-side link 32 can be pushed to the lid portion 13 side due to the movement of the door-side link 31 in conjunction with the closing motion of the door 12. In this manner, the closing motion of the lid portion 13 can be performed.

**[0058]** In the operator cab 8 according to the present invention, the ventilation port 22 may be formed in the side wall portion 23 of the operator cab body 11 as in the doorway 21, for example. In this case, the link mechanism 14 or the closing timing adjustment unit 15 may be provided to correspond to an inner surface of the side wall portion 23 instead of the inner surface 24a of the bottom wall portion 24.

**[0059]** The operator cab according to the present invention is not limited to an example applicable to the articulated-type dump truck and may be applicable to any desired work vehicle, for example, such as a rigid-type dump truck, a hydraulic excavator, a bulldozer, a motor grader, and a crane.

#### [Reference Signs List]

#### [0060]

- 1 Dump truck
- 8 Operator cab
- 11 Operator cab body
- 12 Door
- 13 Lid portion
- 14 Link mechanism
- 15 Closing timing adjustment unit
- 16 Elastic member
- 21 Doorway
- 22 Ventilation port
- 23 Side wall portion
- 24 Bottom wall portion
- 24a Inner surface
- 31 Door-side link
- 32 Lid-side link



33 First link member  
 34 Second link member  
 38 Rail portion  
 51 Slot hole  
 52 Slot projection  
 53 End  
 54 Starting end  
 55 First projection portion  
 56 Second projection portion  
 57 Pressed surface  
 58 Inclined surface

## Claims

### 1. An operator cab for work vehicles, comprising:

an operator cab body that forms a doorway and a ventilation port;  
 a door that is configured to open and close the doorway;  
 a lid portion that is configured to open and close the ventilation port;  
 a link mechanism that connects the door and the lid portion to each other so that the lid portion is opened when the door is opened and the lid portion is closed when the door is closed; and  
 a closing timing adjustment unit that stops a closing motion of the lid portion in a first stage of a motion of closing the door and that performs the closing motion of the lid portion in a second stage of the motion of closing the door after the first stage.

### 2. The operator cab for work vehicles according to Claim 1,

wherein the link mechanism includes  
 a door-side link swingably connected to the door so as to be centered on a first end portion of the door-side link, and  
 a lid-side link swingably connected to the lid portion so as to be centered on a first end portion of the lid-side link, a second end portion of which being swingably connected to a second end portion of the door-side link,  
 the closing timing adjustment unit includes

a slot hole formed in the second end portion of the door-side link so as to extend in a longitudinal direction of the door-side link, and  
 a slot projection formed in the second end portion of the lid-side link, inserted into the slot hole, being movable in a longitudinal direction of the slot hole in the first stage, and reaching an end in the longitudinal direction of the slot hole in the second stage.

### 3. The operator cab for work vehicles according to

Claim 2,  
 wherein the closing timing adjustment unit further includes  
 a first projection portion fixed to the operator cab body, and  
 a second projection portion provided in the lid-side link and pressed against the first projection portion toward the lid portion side to restrict a movement of the lid-side link,  
 when the slot projection reaches the end in the longitudinal direction of the slot hole, pressing of the second projection portion against the first projection portion is released.

4. The operator cab for work vehicles according to Claim 3,  
 wherein the door, the door-side link, the lid-side link, and the lid portion are sequentially arranged in a first direction along an inner surface of the operator cab body through which the ventilation port is open, the longitudinal direction of the door-side link is inclined with respect to the inner surface so that the second end portion of the door-side link is located farther away from the inner surface than the first end portion of the door-side link,  
 the first end portion of the door-side link is movable only in the first direction with respect to the operator cab body and moves toward the lid portion side in response to the motion of closing the door,  
 the first projection portion is fixed to the inner surface of the operator cab body and is located between the lid-side link and the inner surface, and  
 the second projection portion projects toward the inner surface from the second end portion of the lid-side link.

5. The operator cab for work vehicles according to any one of Claims 1 to 4, further comprising:  
 an elastic member provided between the lid portion and the operator cab body, and configured to give force in a closing direction of the lid portion by an elastic force.

FIG. 1

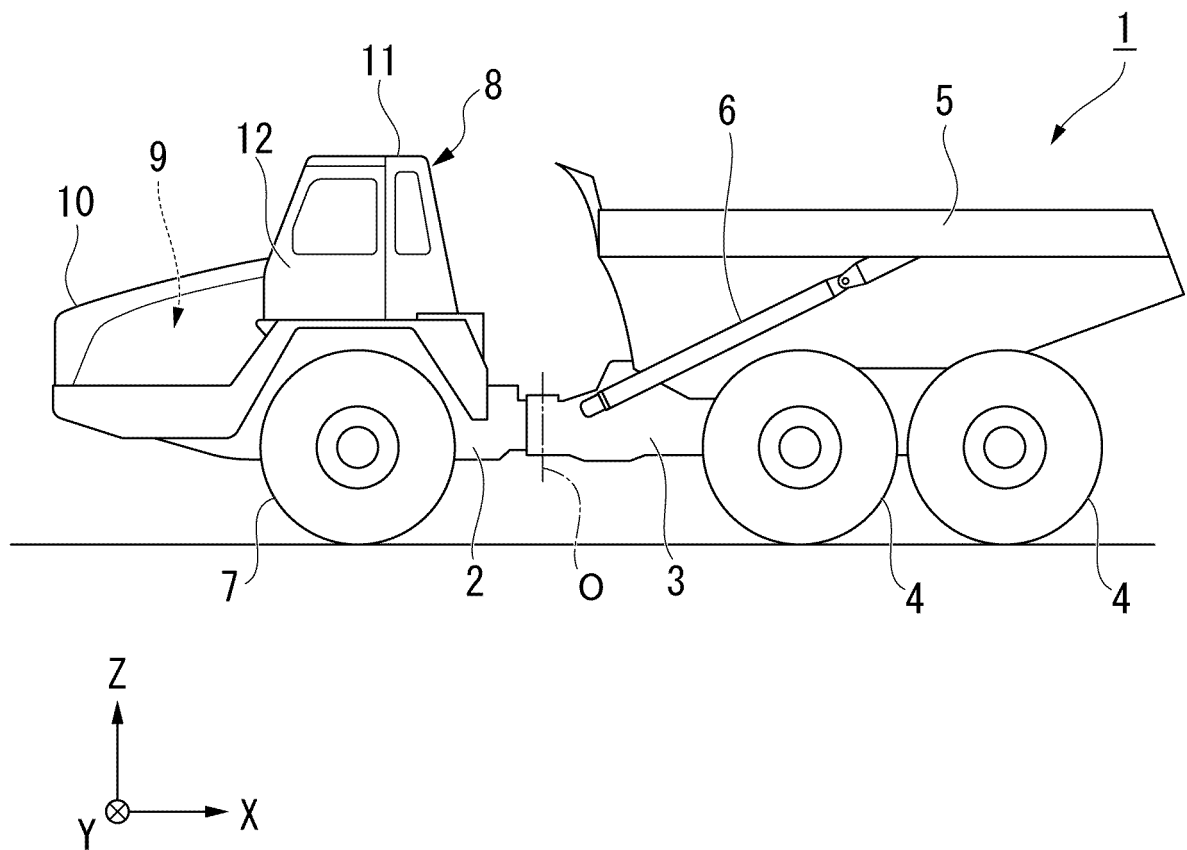


FIG. 2

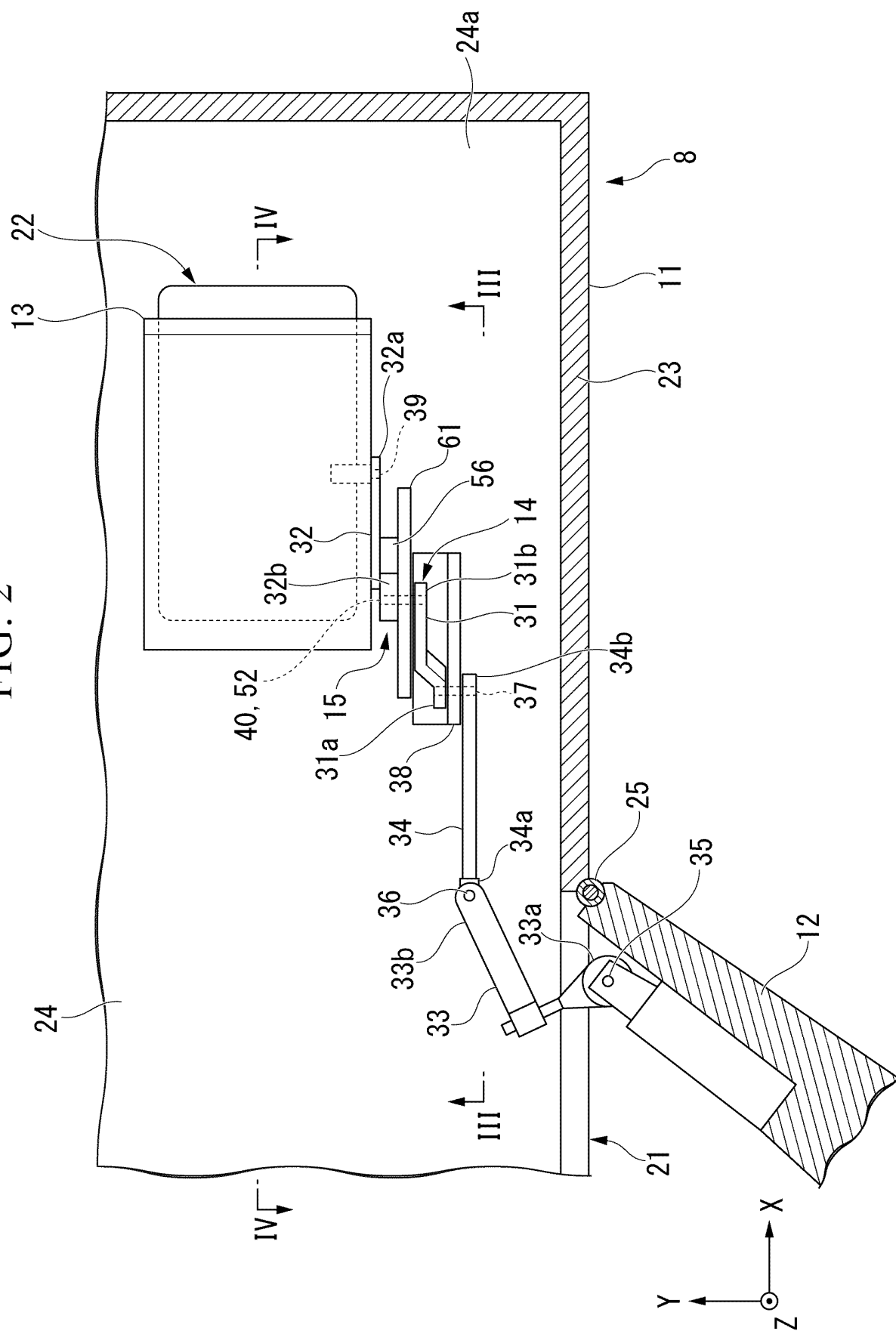




FIG. 4

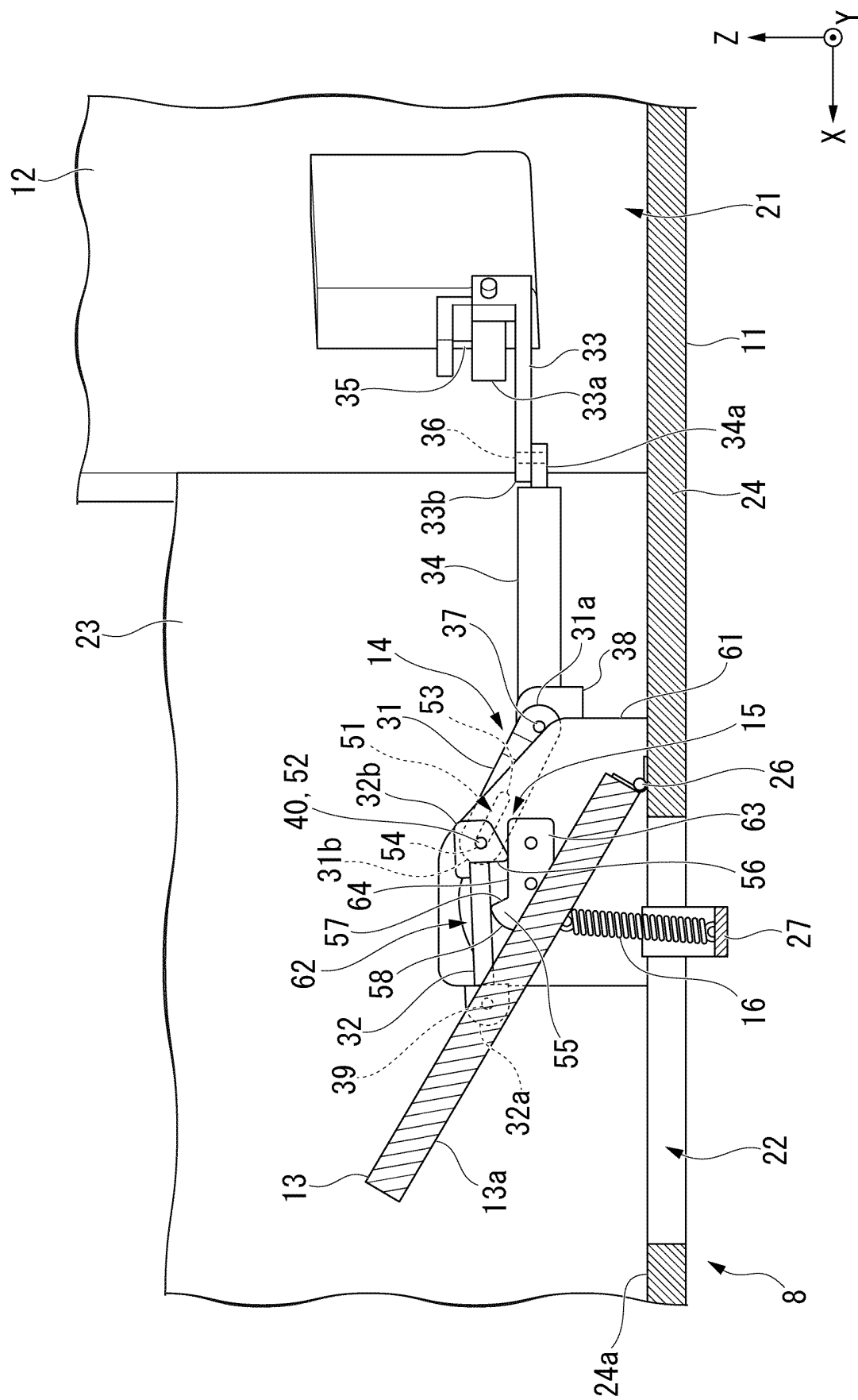


FIG. 5

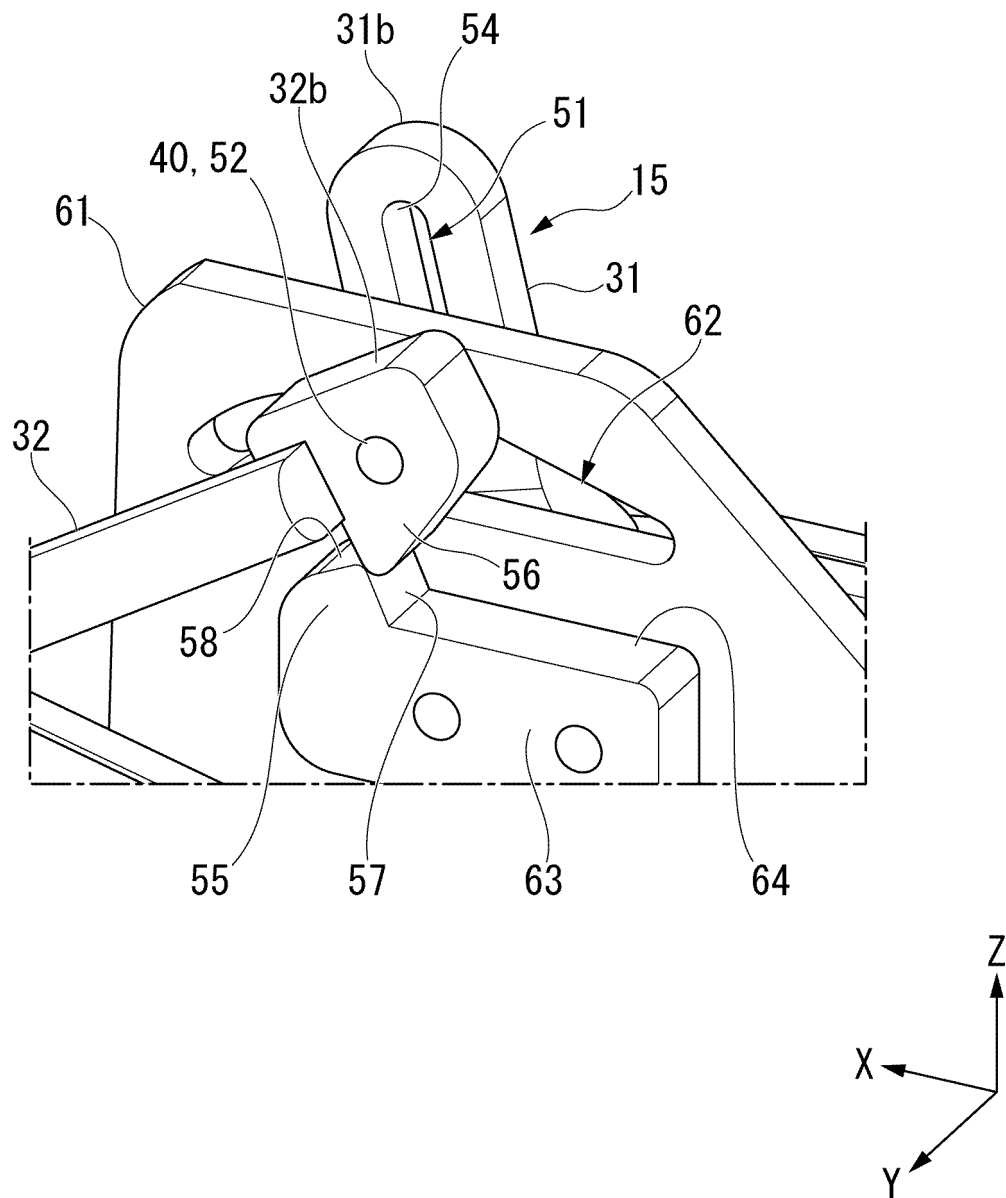


FIG. 6

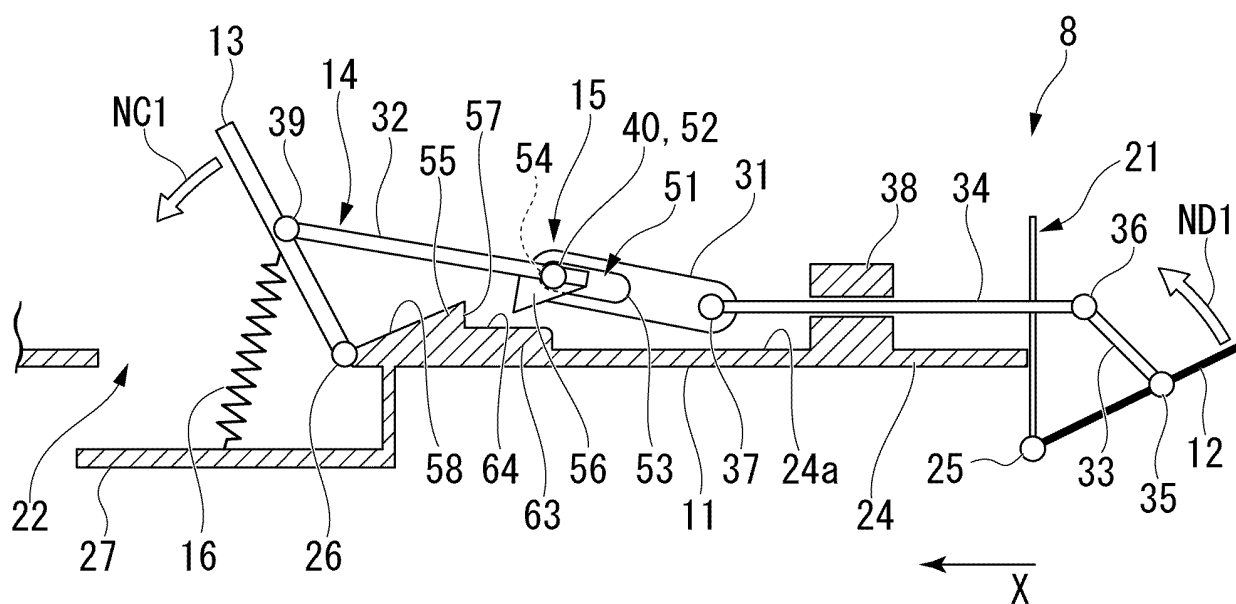


FIG. 7

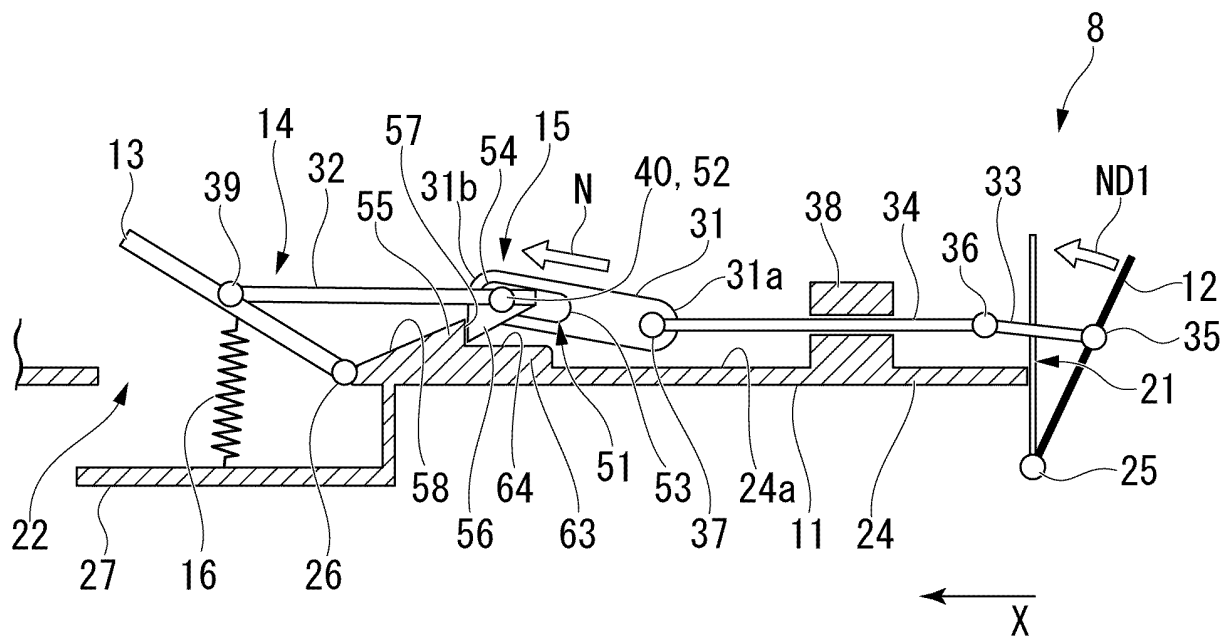


FIG. 8

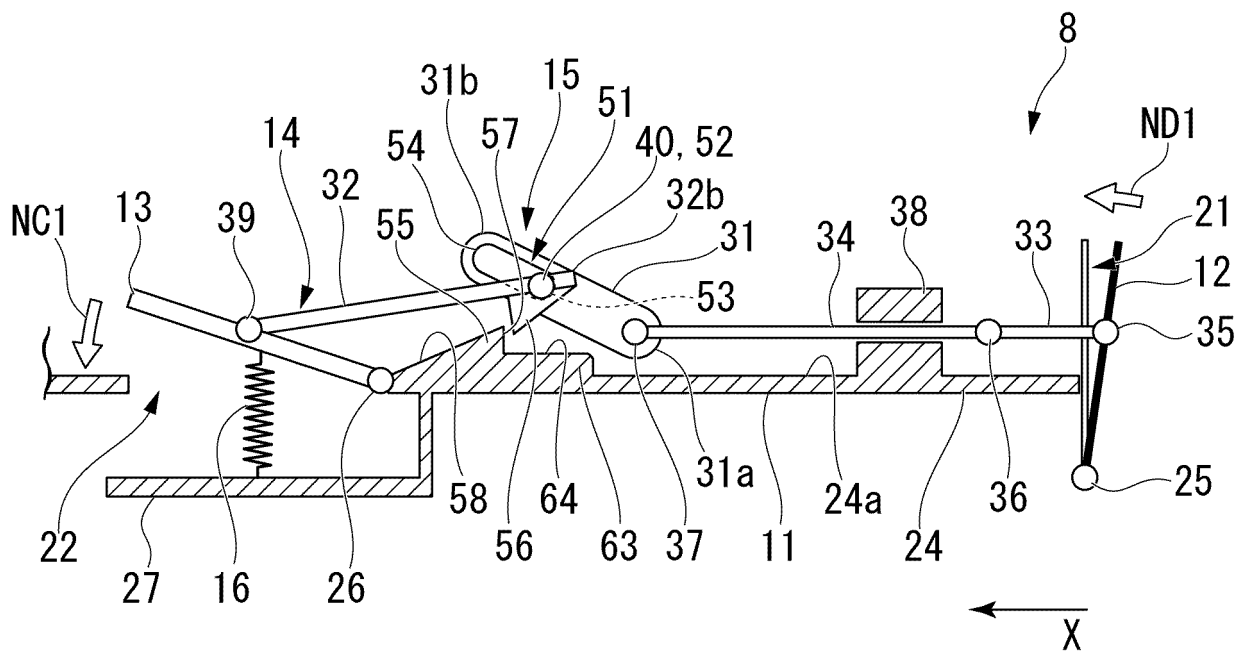


FIG. 9

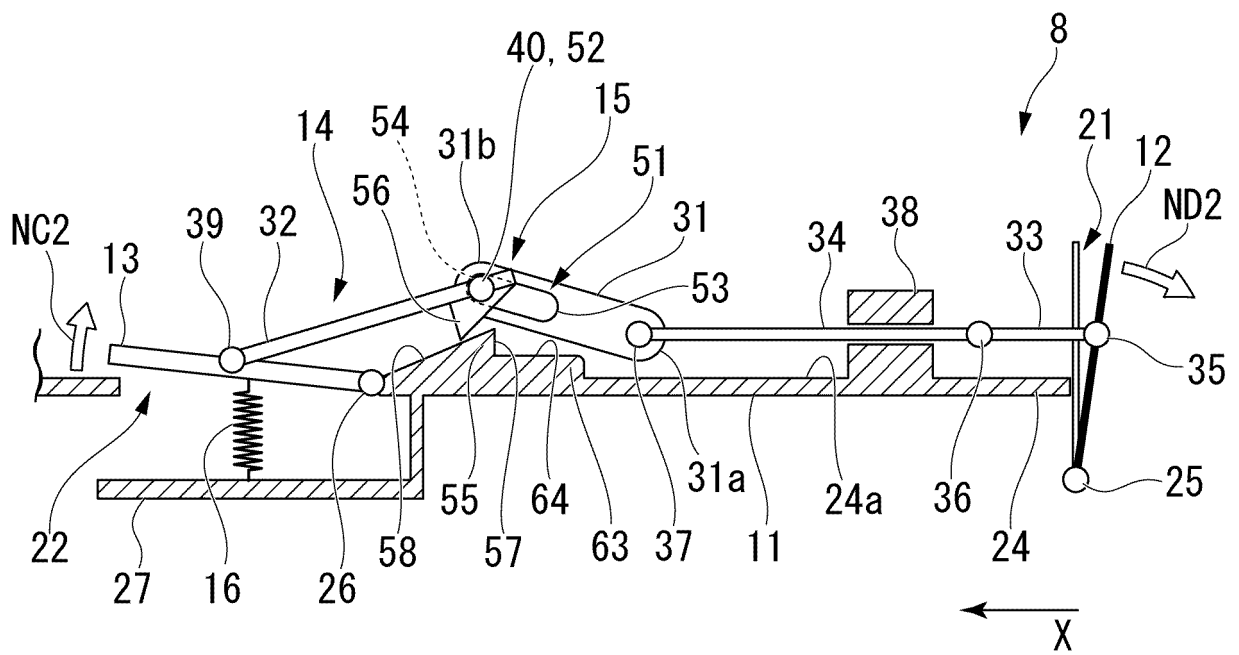




FIG. 10

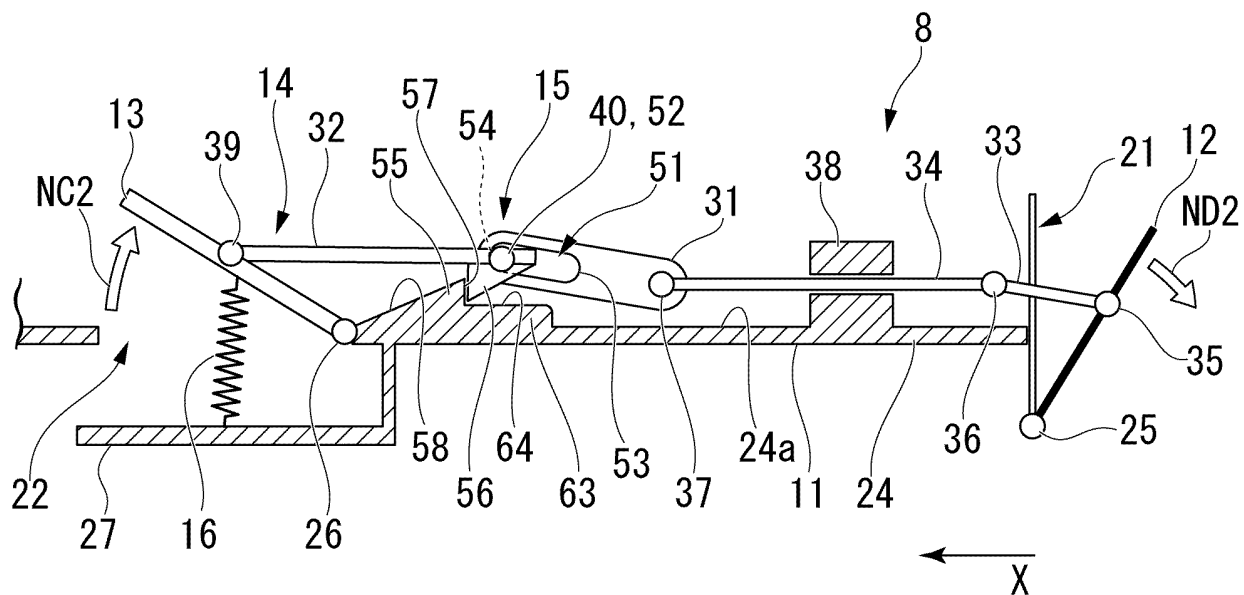
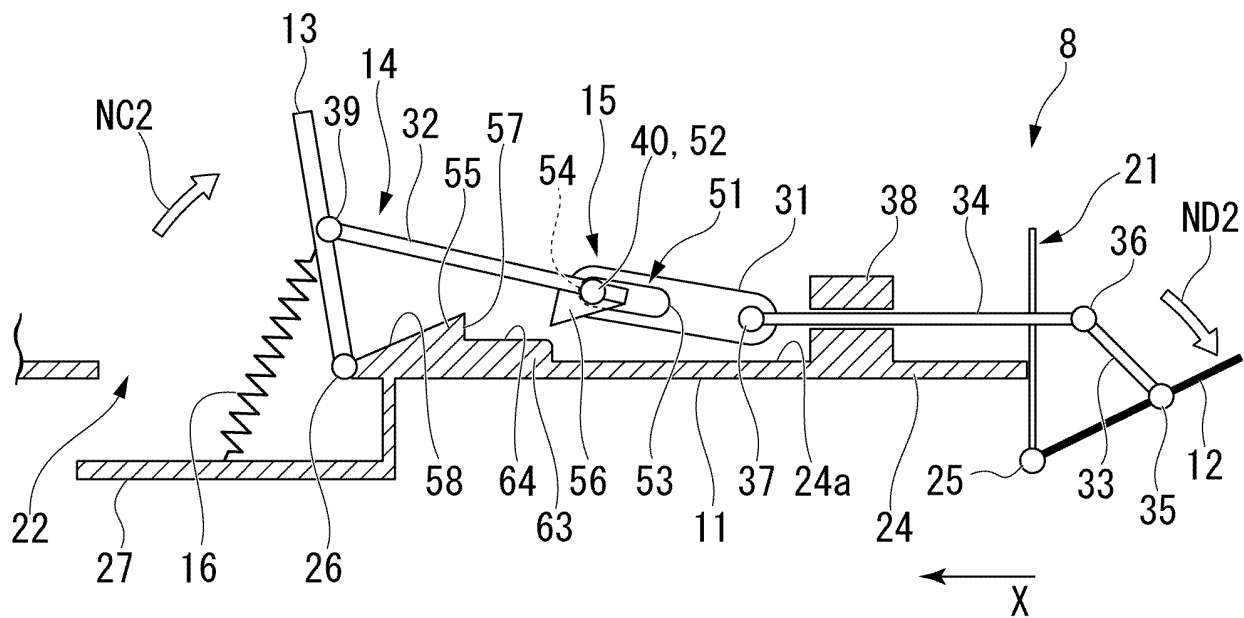


FIG. 11



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/025281

## A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. E02F9/16 (2006.01) i, B60J5/00 (2006.01) i

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. E02F9/16, B60J5/00

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2019

Registered utility model specifications of Japan 1996-2019

Published registered utility model applications of Japan 1994-2019

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.
A	JP 2004-142667 A (KOMATSU LTD.) 20 May 2004, abstract (Family: none)	1-5
A	JP 2012-144928 A (HITACHI CONSTRUCTION MACHINERY CO., LTD.) 02 August 2012, abstract (Family: none)	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

27.08.2019

Date of mailing of the international search report

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Name and mailing address of the ISA/

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Tokyo 100-8915, Japan

Authorized officer

Telephone No.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/025281

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 154703/1980 (Laid-open No. 76128/1982) (TOYOTA MOTOR CORP.) 11 May 1982, fig. 1, 2 (Family: none)	1-5
A	JP 2001-294175 A (MARUHARA, Takeshi) 23 October 2001, abstract (Family: none)	1-5
A	US 2014/0259928 A1 (MORRIS, D. E.) 18 September 2014, abstract (Family: none)	1-5

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

**REFERENCES CITED IN THE DESCRIPTION**

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