

- 1 -

PLATFORM OF VEHICLE FOR HIGH LIFT WORK

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a platform of a vehicle for high lift work used for work at a high place, such as loading of cargo into an airplane or a ship, maintenance, checking, and cleaning.

2. Description of Related Art

[0002] For such a vehicle for high lift work, for example, when in-flight meal, furnishings, baggage, etc. are loaded into an airplane, after a truck body is brought close to an airframe, a work bed is brought close to a loading port in the airframe at a high place by using a link mechanism provided on the truck body to load the in-flight meal etc. via a platform extending from the work bed.

[0003] However, in the case of a large airplane, the weight of loaded fuel only reaches two hundred and several tens tons, so that the airframe lowers. In particular, when cargoes are loaded, or passengers are allowed to get on, the amount of lowering sometimes reaches several hundred millimeters. In this case, due to the lowering of airframe, an airframe door that is open outward from the loading port interferes with the distal end of platform, which may present a problem that the airframe door is damaged. Therefore, the worker must always pay attention to a difference in height between the airframe door and the platform.

[0004] To solve this problem, a conventional platform is configured so that a connection platform is fixed to the work bed, the connection platform is provided with an extension platform which has a width narrower than that of the connection platform and slides along the width direction, and the distal end of the extension platform is slid to a position at which the distal end does not overlap with an airframe door, by which interference of the extension platform with the airframe door is prevented (for example, refer to Patent Document 1).

04054 (2004-7,973 comb.)

- 2 -

[0005]

[Patent Document 1] Unexamined Japanese Patent Publication No. 2000-272403

SUMMARY OF THE INVENTION

[0006] On the other hand, in the case of an airplane etc. having a characteristic shape, the condition of usage is sometimes limited extremely. For example, referring to Figure 6, in the case where a loading port 12 of an airframe 10 lies above a main wing 11 and a door 13 thereof is open to the left outward, when a lift truck 100 is stopped, it is necessary to set a clearance C1 with respect to an engine 14 at 1.1 meters and to set a horizontal distance C2 between the left distal end corner of the platform 200 and the main wing 11 at 1 meter or larger.

[0007] Therefore, if the prior art is improved so that a main platform, which slides in the width direction with respect to the connection platform, is provided, and two extension platforms are arranged in parallel with respect to the main platform so as to be slid in the longitudinal direction only, one extension platform can be set to the loading port and the other extension platform can also be pulled out to a position at which the extension platform does not overlap with the door. Therefore, as compared with the conventional example, the interference of the extension platform with the airframe door can be prevented while a wide work space is secured.

[0008] However, the inventor of the present invention found that even in the case where two extension platforms are used on the sliding main platform, considering the work efficiency, there is room for improvement in that the amount of slide of the sliding platform is restrained.

[0009] The present invention has been made in view of the above situation, and accordingly an object thereof is to provide a platform of a vehicle for high lift work, which is capable of keeping the amount of slide of a sliding platform at a minimum while a wide work space is secured.

[0010] The invention described in claim 1 provides a platform of a

04054 (2004-7,973 comb.)

- 3 -

vehicle for high lift work including a self-propelled truck body having a cabin at the front, a work bed provided so as to be elevated with respect to the truck body, and a platform attached to a front face of the work bed, characterized in that the platform is provided with a main platform which slides along the width direction extending toward both sides of the work bed; the main platform is provided with a first extension platform capable of being pulled out of and stored in a front face of the main platform in the longitudinal direction and a second extension platform capable of being pulled out of and stored in the front face of the main platform in the longitudinal direction; and a width of the first extension platform is narrower than that of the second extension platform.

[0011] The invention described in claim 2 provides the platform of a vehicle for high lift work according to claim 1, characterized in that a chamfer portion is provided at at least one of a distal end corner of the main platform and the first extension platform and a distal end corner of the main platform and the second extension platform.

[0012] The invention described in claim 3 provides the platform of a vehicle for high lift work according to claim 1 or 2, characterized in that at least one of the first extension platform and the second extension platform is provided with an extension platform which can swing or slide the extension platform and can be pulled out of and stored in a front face of the chamfer portion.

[0013] The invention described in claim 4 provides the platform of a vehicle for high lift work according to any one of claims 1 to 3, characterized in that the platform is provided with a connection platform which moves relative to the work bed along two pillars extending upward or downward from both front sides of the work bed and is fixedly held on the work bed at a position at which the floor surface thereof coincides with the floor surface of the work bed, and the connection platform is formed by a rectangular flat plate, and on a front face thereof, a wide slit, which is open toward both sides, and an extension portion for supporting the main platform are provided, and

04054 (2004-7,973 comb.)

- 4 -

the main platform is provided with a floor surface coinciding with the floor surface of the connection platform and a projecting portion which has a width narrower than that of the slit, and is inserted in the slit to slide the main platform along the slit.

[0014] The invention described in claim 5 provides the platform of a vehicle for high lift work according to any one of claims 1 to 3, characterized in that the main platform has a slide frame, which is connected to the front face of the work bed and is provided with at least one beam sliding along the width direction and two pillars extending upward or downward from the ends of the beam, and moves relative to the slide frame along the pillars between the pillars of the slide frame and is fixedly held on the slide frame at a position at which the floor surface thereof coincides with the floor surface of the slide frame.

[0015] According to the present invention, since the main platform is provided with a first extension platform capable of being pulled out of and stored in a front face of the main platform in the longitudinal direction and a second extension platform capable of being pulled out of and stored in the front face of the main platform in the longitudinal direction, even if the target position such as the loading port, which is located above the main wing of airplane and is open outward, is located at a far place to which the main platform is difficult to slide, after the main platform is slid, one extension platform can be set to the loading port, and the other extension platform can be pulled out to a position at which the extension platform does not overlap with the door. Therefore, as compared with the conventional example, the interference of the extension platform with the airframe door can be prevented while a wide work space is secured.

[0016] Also, according to the present invention, the width of the first extension platform is narrower than that of the second extension platform. In this case, if the first extension platform is arranged on the side such that the main platform is difficult to slide, the center axis of the first extension platform lies at a position shortest from the

04054 (2004-7,973 comb.)

- 5 -

center axis of the loading port of the target position. Therefore, even in the state in which the main platform is difficult to slide, the center axis of the first extension platform has only to be slid in the direction of the center axis of the target position such as the loading port of airplane. As a result, the amount of slide of the main platform is kept at a minimum, so that the work time for loading of cargoes etc. and maintenance at a high place is shortened, which results in improved work efficiency. Also, when a vehicle for high lift work is used to perform work, usually, if the vehicle is caused to approach the airframe in a state in which the vehicle axis coincides with the center axis of the target position, the platform is easily set to the target position. However, if the width of the second extension platform is greater than that of the first extension platforms, when the vehicle is caused to approach the airframe in a state in which the vehicle axis coincides with the center axis of the loading port, the center axis of the second extension platform lies at a position shortest from the center axis of the loading port. Therefore, even in the state in which the main platform can be slid freely, the center axis of the second extension platform has only to be slid in the direction of the center axis of the target position. As a result, the amount of slide of the main platform is kept at a minimum, so that the work time for loading of cargoes etc. and maintenance at a high place is shortened, which results in improved work efficiency.

[0017] Also, in the present invention, it is preferable that the chamfer portion be provided at at least one of the distal end corner of the main platform and the first extension platform and the distal end corner of the main platform and the second extension platform.

In this case, even if the work bed is raised or lowered, the distal end corner of the platform does not become a hindrance, and therefore the vehicle for high lift work can be moved to a position close to the target position. As a result, the amount of extension of the extension platform can be kept at a minimum.

[0018] Further, in the present invention, it is preferable that at least

04054 (2004-7,973 comb.)

- 6 -

one of the first extension platform and the second extension platform be provided with the extension platform which can swing or slide the extension platform and can be pulled out of and stored in a front face of the chamfer portion. In this case, even if the work bed is raised or lowered, the distal end corner of the extension platform does not become a hindrance, and therefore a wide work space can be secured even at the time of actual work.

[0019] In the present invention, the platform is provided with the connection platform which moves relative to the work bed along the two pillars extending upward or downward from both front sides of the work bed and is fixedly held on the work bed at a position at which the floor surface thereof coincides with the floor surface of the work bed, the slit open toward both sides is provided on the front face of the connection platform, the projecting portion of the main platform having a width narrower than that of the slit is inserted, and the projecting portion of the main platform is supported by the extension portion provided on the front face of the connection platform. Therefore, even if the floor surface of the main platform is secured so as to be equal to or greater than the width of the connection platform, the main platform can be slid with respect to the connection platform. Therefore, according to the present invention, a wide work space can be secured while a function of sliding the main platform with respect to the connection platform is maintained. In addition, according to the present invention, the width of the projecting portion of the main platform is narrower than the width of the slit of the connection platform. As a result, the amount of slide of the main platform increases, so that even if the floor surface of the main platform is secured so as to be equal to or greater than the width of the sub-platform, a necessary amount of slide of the main platform can be secured.

[0020] Also, in the present invention, the configuration may be such that the main platform has the slide frame, which is connected to the front face of the work bed and is provided with at least one beam

04054 (2004-7,973 comb.)

- 7 -

sliding along the width direction and two pillars extending upward or downward from the ends of the beam, and moves relative to the slide frame along the pillars between the pillars of the slide frame and is fixedly held on the slide frame at a position at which the floor surface thereof coincides with the floor surface of the slide frame. In this case, since the main platform slides together with the slide frame with respect to the work bed, even if, after the transversely opened doors of a hinged double construction, which form platform protective walls, are opened, the plural doors are extended, there is no influence exerted by the slide of the main platform with respect to the work bed.

Therefore, the platform protective walls can be formed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

[Figure 1] A side view of a lift truck, being one embodiment of the present invention, which is used at an airport and has a box-type cargo bed for loading in-flight meal etc. into an airplane.

[Figure 2] Figures 2(a) and 2(b) are a top view and a side view, respectively, showing a case where a platform is at a neutral position, in the embodiment shown in Figure 1.

[Figures 3] A top view of a main platform in the embodiment shown in Figure 1.

[Figure 4] A front view of a main platform and a top view of a sub-platform in the embodiment shown in Figure 1.

[Figure 5] A front view of a sub-platform and a top view of auxiliary platforms in the embodiment shown in Figure 1.

[Figure 6] A top view of a principal portion showing a state in which a lift truck is stopped near an airframe in the embodiment shown in Figure 1.

[Figure 7] A top view of a principal portion showing a work state in which a platform is extended from a lift truck to load cargoes in the embodiment shown in Figure 1.

[Figure 8] A side view showing a lift truck together with a part of an airframe in the embodiment shown in Figure 1.

04054 (2004-7,973 comb.)

- 8 -

[Figure 9] A top view of a principal portion showing a state in which a sub-platform is slid to the left with respect to a main platform in the embodiment shown in Figure 1.

[Figure 10] A top view of a principal portion showing a state in which auxiliary platforms are pulled out forward from a sub-platform slid to the left in the embodiment shown in Figure 1.

[Figure 11] A top view of a principal portion showing a state in which auxiliary platforms are set to a loading port in the embodiment shown in Figure 1.

[Figure 12] A top view of a principal portion showing a state in which auxiliary platforms are set to a loading port having no obstacle such as a main wing in the embodiment shown in Figure 1.

[Figure 13] A top view of a principal portion showing a state in which a sub-platform is slid to the left with respect to a main platform and auxiliary platforms are pulled out forward in another embodiment of the present invention.

[Figure 14] Figures 14(a) and 14(b) are a top view and a side view, respectively, showing a case where a platform is at a neutral position in still another embodiment of the present invention.

[Figure 15] A top view of a principal portion showing a state in which an extension platform is pulled out forward from a main platform slid to the left in the embodiment shown in Figure 14.

[Figure 16] Figures 16(a) and 16(b) are a top view and a side view, respectively, of a principal portion showing a case where a platform in accordance with still another embodiment of the present invention is at a neutral position.

[Figure 17] A top view of a principal portion showing a state in which an extension platform is pulled out forward from a main platform slid to the left in the embodiment shown in Figure 16.

[0022] Embodiments of the present invention will now be described with reference to the accompanying drawings. In the following explanation, the direction in which a driver seat is located is taken as the front, and upper, lower, right and left directions are defined by the

04054 (2004-7,973 comb.)

- 9 -

direction viewed from the driver.

[0023] Figure 1 is a side view of a lift truck 100, being one embodiment of the present invention, which is used at an airport and has a box-type cargo bed for loading in-flight meal etc. into an airplane. Also, Figures 2(a) and 2(b) are a top view and a side view, respectively, showing a case where a platform 200, described later, is at a neutral position. Figures 3 to 5 are exploded views showing parts of the platform 200 shown in Figure 2.

[0024] As shown in Figure 1, the lift truck 100 includes a self-propelled truck body 120 having a cabin 110 at the front, a pantographic link mechanism 130 provided on a truck body frame 121 mounted on the truck body 120, and a box-type cargo bed (work bed) 140 elevating on the truck body 120 by means of the link mechanism 130. At four places at the front, rear, right and left of the truck body frame 121, a stabilizing hydraulic jack 122 is provided to secure stability with respect to wind pressure at the time when the box-type cargo bed 140 is raised.

[0025] The link mechanism 130 is made up of two outside links 131 arranged in parallel with each other transversely and two inside links 132 arranged in parallel with each other transversely, a link shaft 133 for rotatably supporting the side links 131 and 132, and a hydraulic lift cylinder 134 connected with the side links 131 and 132.

[0026] The outside links 131 are configured so that portions near the upper ends thereof are connected integrally by a front shaft 151, and the lower ends thereof are supported so as to be movable along the truck body frame 121. The inside links 132 are also configured so that portions near the upper ends thereof are connected integrally by a rear shaft 152, and the lower ends thereof are fixed to the truck body frame 121 by a fixed shaft 150 so as to be turnable. The front shaft 151 and the rear shaft 152 each extend in a rectangular cargo bed frame 160 for holding the box-type cargo bed 140. Thereby, the link mechanism 130 is raised and lowered by the extension and retraction of the hydraulic lift cylinder 134 while the box-type cargo bed 140 is

04054 (2004-7,973 comb.)

- 10 -

kept in a state of being parallel with a road surface with respect to the truck body 120. In this embodiment, a linear-motive mechanism consisting of rollers, rails, etc. is provided between the box-type cargo bed 140 and the cargo bed frame 160, so that the cargo bed frame 160 supports the box-type cargo bed 140 so as to be movable along a beam 160a of the cargo bed frame 160.

[0027] In this embodiment, the box-type cargo bed 140 has, as shown in Figure 1, a platform 200 which can be extended and contracted in the front direction of the vehicle to load meal and cargoes into the airplane. In an ordinary state, for example, during the running of vehicle, the platform 200 is supported in a state of being in contact with a frame 123 fixed to the truck body frame 121 as indicated by region A in Figure 1, and is placed at a predetermined upper position of the cabin 110 provided on the truck body 120.

[0028] The platform 200 is one independent unit as shown in Figure 2, and consists of a connection platform 210, a main platform 220, and three extension platforms 230, 240 and 250 as shown in Figures 3 to 5. These platforms operate independently on the basis of the connection platform 210.

[0029] As shown in Figures 3 and 4, the connection platform 210 is formed by a rectangular flat plate, and on a front face 210t thereof, a wide slit 211, which is open toward both sides, is provided, and at both sides of the slit 211, a bracket 212 is integrally provided. Also, the bracket 212 is fitted with rollers 213, and the roller 213 is attached to two guide rails (pillars) 142 extending upward or downward from the front both sides of the box-type cargo bed 140. Thereby, when the box-type cargo bed 140 begins to rise, the guide rails 142 move relative to the connection platform 210. Therefore, although the box-type cargo bed 140 is raised while the platform 200 is kept at a position indicated by region A in Figure 1, when the height of floor surface of the box-type cargo bed 140 coincides with the floor surface height of the connection platform 210f, the connection platform 210 comes into contact with a lower end portion of the guide rail 142 and

04054 (2004-7,973 comb.)

- 11 -

is fixedly held on the box-type cargo bed 140, so that the platform 200 rises integrally with the box-type cargo bed 140.

[0030] Also, as shown in Figure 3, the connection platform 210 is provided with a flat plane shaped extension portion 214 projecting forward in a front lower portion of the slit 211. This extension portion 214 is provided with rollers 215 at the distal end 214t thereof to support a main portion 221 of the main platform 220, described later, by means of the rollers 215. The extension portion 214 may be constructed by a frame only for the purpose of lighter weight of the connection platform 210. Also, in the slit 211, a guide rail 216 is provided. This guide rail 216 supports rollers 224 provided on a projecting portion 222 of the main platform 220, described later. Therefore, the connection platform 210 supports the main platform 220 so as to be slidable along the slit 211.

[0031] As shown in Figure 4, the main platform 220 includes the main portion 221 having a width W2 greater than a width W1 of the connection platform 210, and the projecting portion 222 which connects with the rear portion of the main portion 221, has a width W3 narrower than a width Ws of the slit 211 in the connection platform 210, and is inserted in the slit 211. Also, between the main portion 221 and the projecting portion 222, a difference in height 223 is formed. By this difference in height 223, as shown in Figure 2(b), a floor surface 221f of the main platform 220 (main portion 221) forms a flat floor surface which coincides with a floor surface 210f of the connection platform 210.

[0032] Further, between the connection platform 210 and the projecting portion 222 of the main platform 220, as shown in Figure 2(a), a hydraulic or electrically-controlled actuator 260 is provided. By the extension and retraction of this actuator 260, the main platform 220 is slid along the width direction of the connection platform 210.

[0033] As shown in Figures 4 and 5, the main platform 220 is provided with two passages 225 and 226 which are open to a front face 220t thereof and have a different width, and near the distal end thereof,

04054 (2004-7,973 comb.)

- 12 -

a slope portion 220I having a gentle slope is formed. Therefore, when the first extension platform 230 and the second extension platform 240 are inserted in the passages 225 and 226, respectively, the floor surface 221f of the main platform 220 connects with a floor surface 230f of the extension platform 230 without a difference in height via the slope portion 220I, and also connects with a floor surface 240f of the extension platform 240 without a difference in height via the slope portion 220I.

[0034] As shown in Figure 5, the extension platform 230 is of a substantially rectangular plane shape the rear portion of which projects. The extension platform 230 is provided with a protector rubber 231, which is a tubular buffering member, on the front face thereof, and is provided with a roller 232 at both sides thereof. As shown in Figure 2(a), between the extension platform 230 and the main platform 220, a hydraulic or electrically-controlled actuator 270 is provided. Therefore, by the extension and retraction of the actuator 270, the extension platform 230 moves the main platform 220 in the longitudinal direction along the passage 225 so as to be pulled out of and stored in the front face 220t thereof. Similarly, as shown in Figure 5, the extension platform 240 is also of a substantially rectangular plane shape the rear portion of which projects. The extension platform 240 is provided with a protector rubber 241, which is a tubular buffering member, on the front face thereof, and is provided with a roller 242 at both sides thereof. As shown in Figure 2(a), between the extension platform 240 and the main platform 220, a hydraulic or electrically-controlled actuator 280 is provided. Therefore, by the extension and retraction of the actuator 280, the auxiliary platform 240 also moves the main platform 220 in the longitudinal direction along the passage 226 so as to be pulled out of and stored in the front face 220t thereof.

[0035] Although both of the extension platforms 230 and 240 are moved longitudinally by only the rollers 232 and 242 in this embodiment, means, for example, such that guide rails for slidably supporting the extension platforms via the rollers 232 and 242 are provided in the

04054 (2004-7,973 comb.)

- 13 -

passages 225 and 226 may be used.

[0036] Further, in this embodiment, as shown in Figures 4 and 5, at the distal end corners of the main platform 220 and the extension platform 230, chamfer portions 220c and 230c are provided, respectively. As shown in Figure 2(a), when the extension platform 230 is stored in the main platform 220, the distal ends of the chamfer portions 220c and 230c align on the same plane.

[0037] In addition, the extension platform 230 is provided with the fan-shaped extension platform 250 which can swing or slide the extension platform 230 and can be pulled out of and stored in the front face of the chamfer portion 230c. Specifically, the extension platform 250 is provided with a protector rubber 251, which is a buffering member, on the front face thereof, and, like other platforms, is provided with a roller on both sides. Alternatively, the extension platform 250 is pivotally supported so as to be turnable with respect to the extension platform 230 so as to be pulled out of and stored in the front face of the chamfer portion 230c by the extension and retraction of an actuator disposed between the extension platform 250 and the main platform 220.

[0038] In this embodiment, as shown in Figure 1, at the front of the box-type cargo bed 140, transversely opened doors 143 of a hinged double construction having two right and left doors are provided. These doors 143 are attached to the inner wall of the box-type cargo bed 140 via a hinge. The door 143 consists of a plurality of sliding doors 143a, 143b and 143c. When the doors 143 are extended toward the platform 200 after the floor surface height of the box-type cargo bed 140 coincides with the height of the floor surface 210f of the connection platform 210, the doors 143 form platform protective walls by being slid along the platform 200, as indicated by region B in Figure 1.

[0039] On a front roof of the box-type cargo bed 140, a rain-averting canopy 144, which is stored in the roof at the time of running and is taken out as necessary, is provided. This canopy 144 improves the

04054 (2004-7,973 comb.)

- 14 -

work environment in bad weather by being raised and extended by a hydraulic cylinder, not shown. Reference numeral 145 denotes a hand rail which is foldably provided on the platform 200 for the safe of workers.

[0040] Next, the specific operation of this embodiment is explained with reference to Figures 6 to 12.

[0041] Figure 6 is a top view of a principal portion showing a state in which the lift truck 100 is stopped near an airframe 10. Figure 7 is a top view of a principal portion showing a work state in which the platform 200 is extended from the lift truck 100 to load cargoes. Figure 8 is a side view showing the lift truck 100 shown in Figure 6 together with a part of the airframe 10.

[0042] In the case where a loading port 12 in the airframe 10 is located at an upper part of a main wing 11, and a door 13 is open outward to the left, as shown in Figure 6, when the lift truck 100 is stopped, it is necessary to set a clearance C1 with respect to an engine 14 at 1.1 meters and to set a horizontal distance C2 between the left distal end corner of the platform 200 and the main wing 11 at 1 meter or larger. In this case, since another vehicle 300 is stopping at the right, as shown in Figure 6, the lift truck 100 must be stopped substantially perpendicularly to the airframe 10.

[0043] Therefore, the lift truck 100 in accordance with the present invention forms a passage for connecting the lift truck 100 substantially perpendicularly to the airframe 10 between the box-type cargo bed 140 and the loading port 12 by the procedure described below.

[0044] Figure 9 is a top view of a principal portion showing a state in which the main platform 220 is slid to the left with respect to the connection platform 210. Figure 10 is a top view of a principal portion showing a state in which the extension platforms 230 to 250 are pulled out forward from the main platform 220 slid to the left. Figure 11 is a top view of a principal portion showing a state in which the extension platforms 230 to 250 are set to the loading port 12.

04054 (2004-7,973 comb.)

- 15 -

[0045] In this embodiment, first, as shown in Figure 6, after the lift truck 100 is stopped at a position close to the position of the loading port 12 in the airframe 10, the hydraulic jacks 122 are lowered to stabilize the truck 100. Next, as shown in Figure 8, the box-type cargo bed 140 is raised to a height at which the floor surface height thereof coincides with the floor surface height of the loading port 12 by the link mechanism 130, and then is slid forward along the cargo bed frame 160 by an actuator, not shown.

[0046] Then, as shown in Figure 9, the actuator 260 is extended to slide the main platform 220 to the left (upper side on the figure) with respect to the connection platform 210. In this case, the slit 211 open toward both sides is provided on the front face 210t of the connection platform 210. The projecting portion 222 of the main platform 220 having a width narrower than that of the slit 211 is inserted, and the remaining portion (main portion 221) of the main platform is supported by the extension portion 214 provided at a lower part of the front face 210t of the connection platform 210. Therefore, even if the width W2 of the floor surface 221f of the main platform 220 is secured so as to be equal to or greater than the width W1 of the connection platform 210, the main platform 220 can be slid with respect to the connection platform 210. Therefore, according to such a configuration, a wide work space can be secured while a function of sliding the main platform 220 with respect to the connection platform 210 is maintained. In addition, according to such a configuration, the width W3 of the projecting portion 222 of the main platform 220 is narrower than the width Ws of the slit 221 of the connection platform 210. As a result, the amount of slide of the main platform 220 increases, so that even if the width W2 of the floor surface 221f of the main platform 220 is secured so as to be equal to or greater than the width W1 of the connection platform 210, a necessary amount of slide of the main platform 220 can be secured.

[0047] Subsequently, as shown in Figure 10, the actuators 270 and 280 are extended to pull out the extension platforms 230 and 240

04054 (2004-7,973 comb.)

- 16 -

forward (to the right-hand side on the figure) toward the airframe 10 from the main platform 220. In this case, as shown in Figure 11, the extension platform 230 is positioned at a position at which the distal end (protector rubber 231) thereof does not come into contact with the airframe 10, and the extension platform 250 is pulled out of the chamfer portion 230c. Since the airframe door 13 of the loading port 12 is opened to the left outward, the extension platform 240 is positioned by actuator 280 at a position at which the distal end (protector rubber 241) of the extension platform 240 does not overlap with the airframe door 13.

[0048] Specifically, since the extension platform 230 and the extension platform 240 are provided on the main platform 220, even if the target position such as the loading port 12, which is located above the main wing 11 of airplane and is provided with the door 13 which opens outward, is located at a far place to which the main platform 220 is difficult to slide, after the main platform 220 is slid, one extension platform 230 can be set to the loading port 12, and the other extension platform 240 can be pulled out to a position at which the extension platform 240 does not overlap with the door 13. Therefore, as compared with the conventional example, the interference of the extension platform 240 with the airframe door 12 can be prevented while a wider work space is secured.

[0049] In this embodiment, as shown in Figure 7, a detachable auxiliary plate 290 is placed between the extension platform 230 and the loading port 12. However, work may be performed without the use of the auxiliary plate 290.

[0050] Also, in this embodiment, to set the platform 200 to the loading port 12, as shown in Figure 11, the main platform 220 is positioned at a position at which the center axis O1 of the extension platform 230 substantially coincides with the center axis O of the loading port 12 by the actuator 260. If the extension platform 230 is arranged on the side such that the main platform 220 is difficult to slide, the center axis O1 of the extension platform 230 lies at a

04054 (2004-7,973 comb.)

- 17 -

position shortest from the center axis O of the loading port 12.

Therefore, if the width W4 of the extension platform 230 is narrower than the width W5 of the extension platform 240, even in the state in which the connection platform 210 is difficult to slide, the center axis O1 of the extension platform 230 has only to be slid in the direction of the center axis O of the loading port 12. As a result, the amount of slide of the main platform 220 is kept at a minimum, so that the work time for loading of cargoes etc. and maintenance at a high place is shortened, which results in improved work efficiency.

[0051] Figure 12 is a top view of a principal portion showing a state in which the extension platforms 230 to 250 are set to a loading port 15 having no obstacle such as the main wing 11. In this case, since a door 16 for the loading port 15 opens to the right outward, the extension platform 230 may be aligned with the loading port 15 by sliding the main platform 220 to the left. However, according to the platform 200 of this embodiment, the following operation is performed so that the work space is as even as possible.

[0052] First, when a lift truck is used to perform work, usually, if the truck is caused to approach the airframe in a state in which the vehicle axis Ov coincides with the center axis O of the loading port 15, the platform 200 is easily set to the loading port 15. However, if the width of the extension platform 240 is greater than that of the extension platforms 230, when the truck is caused to approach the airframe in a state in which the vehicle axis Ov coincides with the center axis O of the loading port 15, the center axis O2 of the extension platform 240 lies at a position shortest from the center axis O of the loading port 15. Therefore, in the case where the width W4 of the extension platform 230 is narrower than the width W5 of the extension platform 240, even in the state in which the connection platform 210 can be slid freely, the center axis O2 of the extension platform 240 has only to be slid in the direction of the center axis O of the loading port 15. As a result, the amount of slide of the main platform 220 is kept at a minimum, so that the work time for loading

04054 (2004-7,973 comb.)

- 18 -

of cargoes etc. and maintenance at a high place is shortened, which results in improved work efficiency.

[0053] Also, in this embodiment, since the chamfer portions 220c and 230c are provided at the distal end corners of the main platform 220 and the extension platform 230, respectively, the clearance C2 is secured between the distal end corner of the platform 200 and the main wing 11, so that even if the box-type cargo bed 140 is raised or lowered, the distal end corner of the platform 200 does not become a hindrance, and therefore the lift truck 100 can be moved to a position close to the loading port 12. As a result, the amount of extension of the extension platform 230 can be kept at a minimum. Although the chamfer portions 220c and 230c are provided at the distal end corners of the main platform 220 and the extension platform 230, respectively, in this embodiment, the chamfer portion may be provided only the distal end corner of the main platform 220 and the extension platform 240, or may be provided both of the distal end corners of the main platform 220 and the extension platform 240.

[0054] Further, in this embodiment, since the extension platform 230 is provided with the extension platform 250 which can swing or slide the extension platform 230 in the longitudinal direction and can be pulled out of and stored in the front face of the chamfer portion 230c, even if the box-type cargo bed 140 is raised or lowered, the distal end corner of the extension platform 230 does not become a hindrance, and therefore a wide work space can be secured even at the time of actual work. In this embodiment, the extension platform 250 is provided on the extension platform 230. However, in the case where the chamfer portion is provided only at the distal end corner of the extension platform 240 or on both of the extension platform 240 and the extension platform 230, the extension platform 240 may be provided with an extension platform which can swing or slide the extension platform 240 and can be pulled out of and stored in the front face of the chamfer portion thereof.

[0055] Also, in the present invention, the main platform 220 may be

04054 (2004-7,973 comb.)

- 19 -

supported slidably along the width by only the extension portion 214 without providing the slit 211 in the connection platform 210.

[0056] Figure 13 is a top view of a principal portion showing a state in which the main platform 220 is slid to the left with respect to the connection platform 210 and the extension platforms 230 to 250 are pulled out forward in another embodiment of the present invention in which the above-described concept is embodied. In this embodiment, the same reference numerals are applied to elements that are the same as those in Figures 1 to 12, and the explanation thereof is omitted.

[0057] In this embodiment, on the front face 210t of the connection platform 210, the guide rail 216 is provided in place of the slit 211, and on the other hand, on the rear face of the main platform 220, the plurality of rollers 224 are directly provided on the rear face of the main portion 221 without providing the projecting portion 222.

Specifically, in this embodiment, the connection platform 210 supports the main portion 221 of the main platform 220 by means of the roller 215 provided at the distal end 214t of the extension portion 214, and also supports the rollers 224 provided in the main portion 221 of the main platform 220 by means of the guide rail 216. Therefore, the connection platform 210 supports the main platform 220 so as to be slidable along the width thereof.

[0058] In this case as well, the platforms 210 and 220 are connected by the actuator 260 arranged on the extension portion 214, the extension portion 214 is provided at a lower part of the front face 210t of the connection platform 210, and the main platform 220 provided with a floor surface 221f coinciding with the floor surface 210f of the connection platform 210 is supported by the extension portion 214. Therefore, even if the floor surface 221f of the main platform 220 is secured so as to be equal to or greater than the width of the connection platform 210, the main platform 220 can be slid with respect to the connection platform 210. Therefore, according to this configuration as well, a wide work space can be secured while a function of sliding the main platform 220 with respect to the connection platform 210 is

04054 (2004-7,973 comb.)

- 20 -

maintained. The guide rail 216 and the rollers 224 may be configured so that the rollers are provided on the front face 210t of the connection platform and the guide rail for supporting the rollers is provided on the rear face of main portion of the main platform 220.

[0059] Figures 14(a) and 14(b) are a top view and a side view, respectively, showing a case where a platform 400, which is still another embodiment of the present invention, is at a neutral position. Figure 15 is a top view of a principal portion showing a state in which the extension platforms 230 to 250 are pulled out forward from a main platform 420, described later, that has been slid to the left in the embodiment shown in Figure 14. In this embodiment, the same reference numerals are applied to elements that are the same as those in Figures 1 to 13, and the explanation thereof is omitted.

[0060] In this embodiment, the platform 400 includes a slide frame 410, which is connected to the front face of the box-type cargo bed 140 and slides along the width direction, and a main platform 420, which is fixedly held on the slide frame 410 so as to move relatively together with the slide frame 410. The main platform 420 is provided with the extension platforms 230 to 250.

[0061] First, the slide frame 410 is a rectangular frame body having almost the same shape as that of the front face of the box-type cargo bed 140. The slide frame 410 has an upper beam 411 extending in the width direction so as to align with the roof of the box-type cargo bed 140 and a lower beam 412 extending in the width direction so as to align with the floor surface of the box-type cargo bed 140, and also has two pillars 413 and 414 for connecting the opposed ends of the upper beam 411 and the lower beam 412 to each other. On the rear upper face of the upper beam 411, rollers 415 are provided so as to be rotatable in parallel with the upper face of the upper beam 411, and on the other hand, on the rear lower face of the lower beam 412, rollers 416 are provided so as to be rotatable in parallel with the rear face of the lower beam 412. On the other hand, at the upper part of the front face of the box-type cargo bed 140, a substantially L-shaped guide rail

04054 (2004-7,973 comb.)

- 21 -

146 extending forward is provided so that the rollers 415 are rotatably supported by the guide rail 146. At the lower part of the front face thereof, a substantially C-shaped guide rail 147 is provided so that the rollers 416 are rotatably supported by the guide rail 147. Therefore, the box-type cargo bed 140 slidably supports the slide frame 410 in a state in which the slide frame 410 does not tilt forward. Also, at the lower part of the front face of the box-type cargo bed 140, an actuator 148 is provided between the box-type cargo bed 140 and the slide frame 410. Thereby, the slide frame 410 is slid transversely along the width direction on the front face of the box-type cargo bed 140 by the actuator 148.

[0062] On the other hand, the main platform 420 consists of a main portion 421 having a width W_2 approximately equal to a width W_0 of the box-type cargo bed 140 and a projecting portion 422 having a width W_3 narrower than the width W_2 of the main portion 421.

On both sides of the projecting portion 422, rollers 424 are provided via a bracket 423. On the other hand, the pillars 413 and 414 of the slide frame 410 each have a guide rail 417. The guide rail 416 rotatably supports the rollers 424 of the main platform 420. Therefore, when the slide frame 410 begins to rise together with the box-type cargo bed 140, the guide rail 417 moves relative to the main platform 420, so that, as in the case of the above-described embodiment, the box-type cargo bed 140 is raised while the main platform 420 is kept at the position indicated by region A in Figure 1. As shown in Figure 13(b), at the time when the height of a floor surface 420f of the main platform 420 coincides with the height of a floor surface 410f of the slide frame 410, the main platform 420 comes into contact with a lower end portion of the guide rail 417 and is fixedly held on the box-type cargo bed 140 via the slide frame 410. Therefore, the main platform 420 rises integrally with the box-type cargo bed 140.

[0063] The main platform 420 is also provided with the extension platforms 230 and 240 which move the main platform 420 in the

04054 (2004-7,973 comb.)

- 22 -

longitudinal direction and can be pulled out of and stored in a front face 420t thereof by the extension and retraction of the actuators 270 and 280, and chamfer portions 420c and 230c are provided at the distal end corners of the main platform 420 and the extension platform 230, respectively. Also, on the extension platform 230 as well, the fan-shaped extension platform 250 capable of being pulled out of and stored in the front face of the chamfer portion 230c is provided.

[0064] In this embodiment, since the main platform 420 slides together with the slide frame 410 with respect to the box-type cargo bed 140, even if, after the transversely opened doors 143 of a hinged double construction is stored in the slide frame 410 as indicated by a broken line in Figure 14, and the doors 143 are opened as indicated by a solid line in Figure 15, the sliding doors 143a, 143b and 143c are extended, there is no influence exerted by the slide of the main platform 420 with respect to the box-type cargo bed 140. Therefore, the platform protective walls can be formed.

[0065] Figures 16(a) and 16(b) are a top view and a side view, respectively, of a principal portion showing a case where the platform 400 of still another embodiment is located at a neutral position. Figure 17 is a top view of a principal portion showing a state in which the extension platforms 230 to 250 are pulled out forward from the main platform slid to the left. In this embodiment, the transversely opened doors 143 each consist of four sliding doors 143a, 143b, 143c and 143d, and is stored in the slide frame 410 at positions at which the doors 143 do not overlap with each other. Other configurations, operation, and effects of this embodiment are the same as those of the embodiment shown in Figures 14 and 15.

[0066] The above-described embodiments merely show some typical examples of the present invention, and various changes and modifications can be made. For example, in the above-described embodiments, the work bed is a box-type cargo bed for loading in-flight meal. However, the work bed may be a flat plate shaped work bed used for maintenance etc.

04054 (2004-7,973 comb.)

- 23 -

What is claimed is:

1. A platform of a vehicle for high lift work comprising a self-propelled truck body having a cabin at the front, a work bed provided so as to be elevated with respect to said truck body, and a platform attached to a front face of said work bed, characterized in that

said platform is provided with a main platform which slides along the width direction extending toward both sides of said work bed;

said main platform is provided with a first extension platform capable of being pulled out of and stored in a front face of said main platform in the longitudinal direction and a second extension platform capable of being pulled out of and stored in the front face of said main platform in the longitudinal direction; and

a width of said first extension platform is narrower than that of said second extension platform.

2. The platform of a vehicle for high lift work according to claim 1, characterized in that a chamfer portion is provided at at least one of a distal end corner of said main platform and said first extension platform and a distal end corner of said main platform and said second extension platform.

3. The platform of a vehicle for high lift work according to claim 1 or 2, characterized in that at least one of said first extension platform and said second extension platform is provided with an extension platform which can swing or slide said extension platform and can be pulled out of and stored in a front face of said chamfer portion.

4. The platform of a vehicle for high lift work according to any one of claims 1 to 3, characterized in that

said platform is provided with a connection platform which moves relative to said work bed along two pillars extending upward or downward from both front sides of said work bed and is fixedly held on said work bed at a position at which the floor surface thereof coincides with the floor surface of said work bed, and said connection platform is formed by a rectangular flat plate, and on a front face

04054 (2004-7,973 comb.)

- 24 -

thereof, a wide slit, which is open toward both sides, and an extension portion for supporting said main platform are provided, and

said main platform is provided with a floor surface coinciding with the floor surface of said connection platform and a projecting portion which has a width narrower than that of said slit, and is inserted in said slit to slide said main platform along said slit.

5. The platform of a vehicle for high lift work according to any one of claims 1 to 3, characterized in that said main platform has a slide frame, which is connected to the front face of said work bed and is provided with at least one beam sliding along the width direction and two pillars extending upward or downward from the ends of said beam, and moves relative to said slide frame along said pillars between said pillars of said slide frame and is fixedly held on said slide frame at a position at which the floor surface thereof coincides with the floor surface of said slide frame.

04054 (2004-7,973 comb.)