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Ahrendt et al.

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[45] **Sept. 23, 1975**

[54] **OPERATOR'S STATION OPTIONALLY STATIONARY OR ELEVATED**

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[21] Appl. No.: **501,072**

[52] **U.S. Cl.** ..... **214/701 P**; 182/148; 187/9 R; 296/65 R

[51] **Int. Cl.²** **B66F 9/16**

[58] **Field of Search** ..... 187/9; 214/660, 670–674, 214/700, 701 P, 701 R, 730, 731, 16.4 R, 16.4 A, 16.4 B, 16.4 C; 182/148; 180/77 S; 296/65 R

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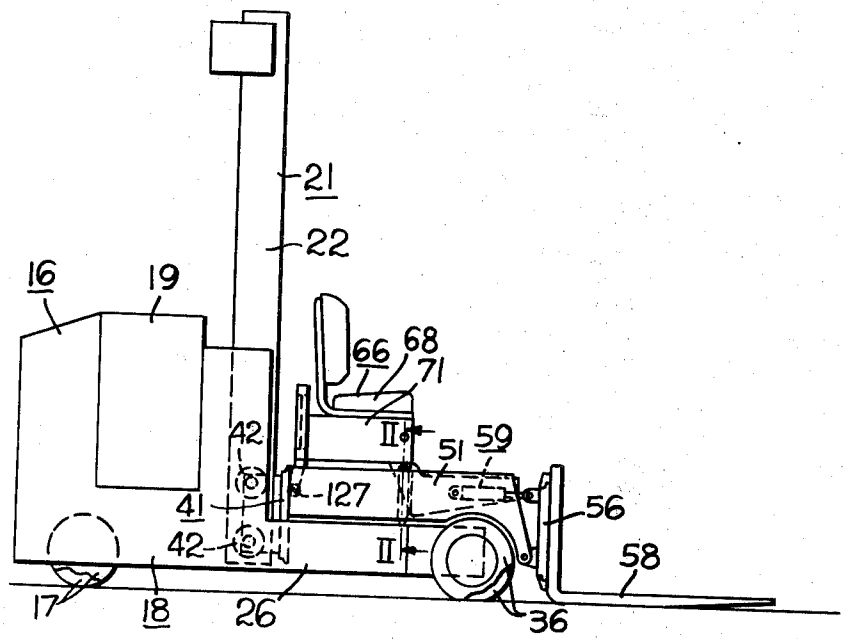
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Assistant Examiner—James L. Rowland
Attorney, Agent, or Firm—Charles L. Schwab

[57] **ABSTRACT**

An operator's station is optionally stationary with the main frame of a lift truck or elevatable with the carriage which is reciprocably mounted on a vertical mast. The operator's station is disposed within a rectangular box formed by components of the carriage. An operator controlled latching device is operable to connect the operator's station to a transverse wall of the carriage and a second latching device automatically locks the operator's station to longitudinally extending support arms of the carriage upon the operator's station being lifted from the main frame of the truck. In order to guard against faulty latching and possible damage to latching parts, an interlock system is provided which prevents raising of the carriage unless the shiftable latch part is shifted completely to either its latch or unlatch position.

14 Claims, 11 Drawing Figures



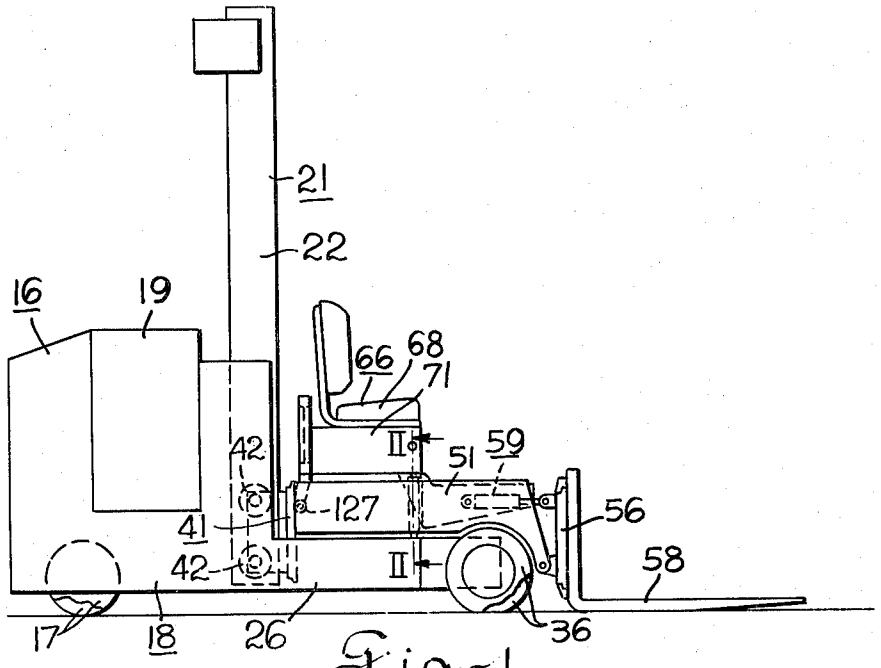


Fig.-1

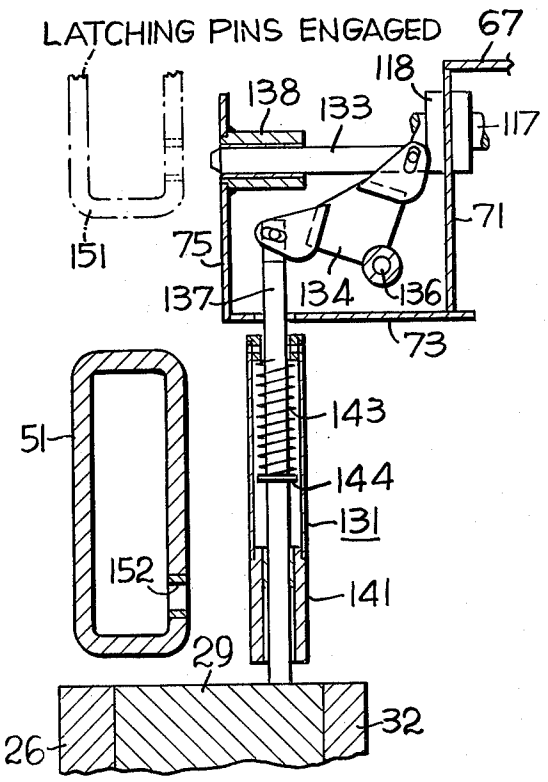


Fig.2

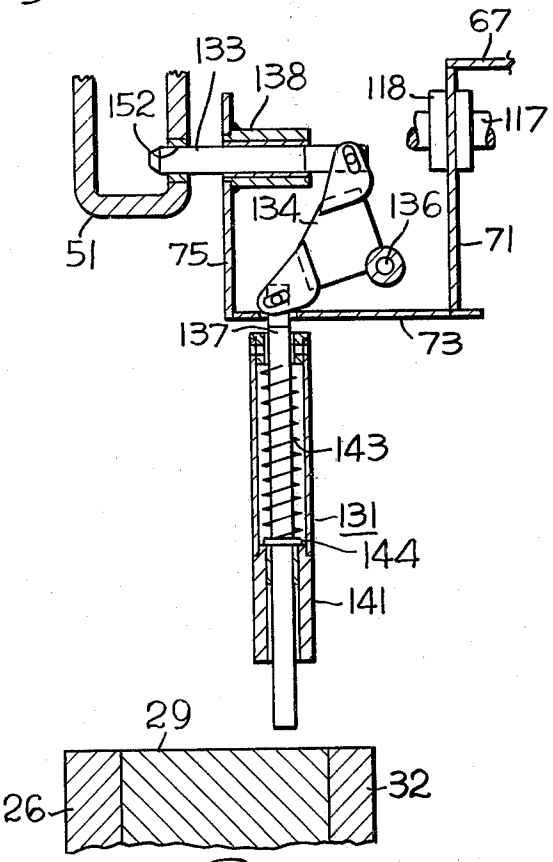


Fig.3

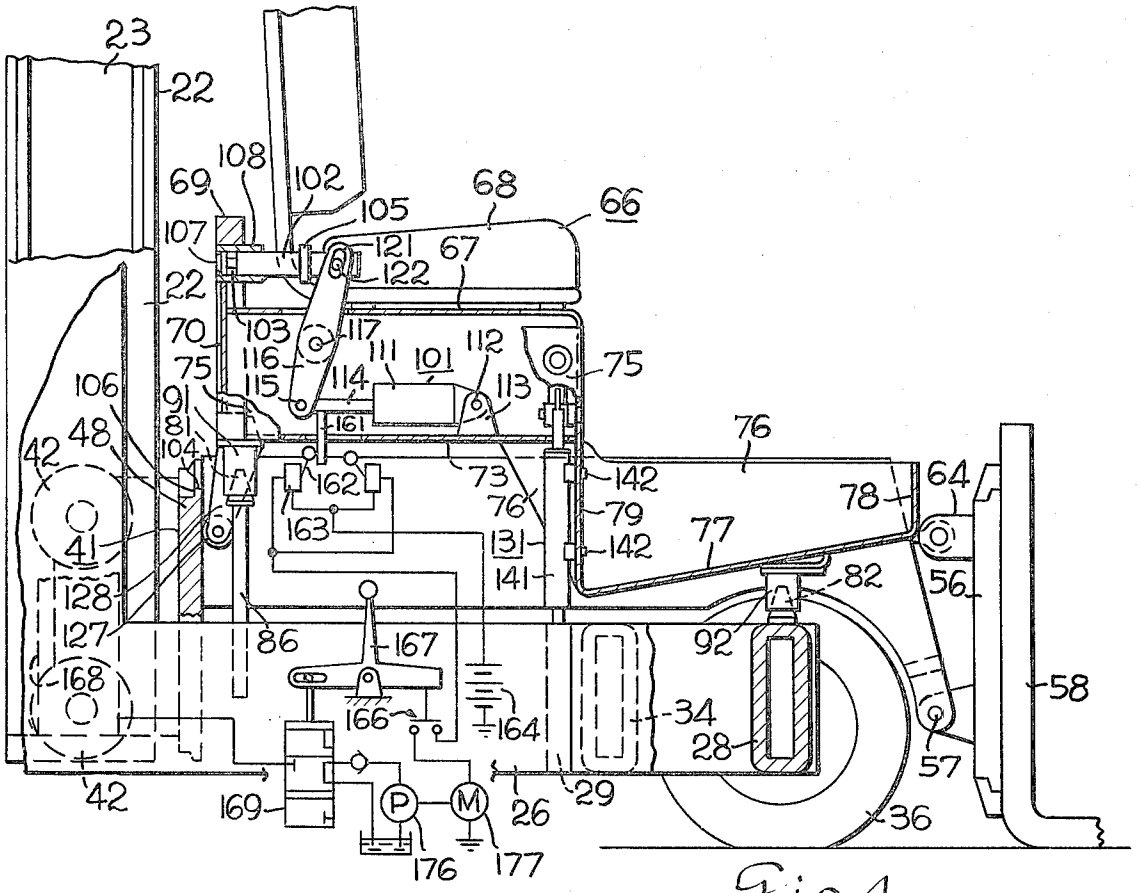

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Fig. 4

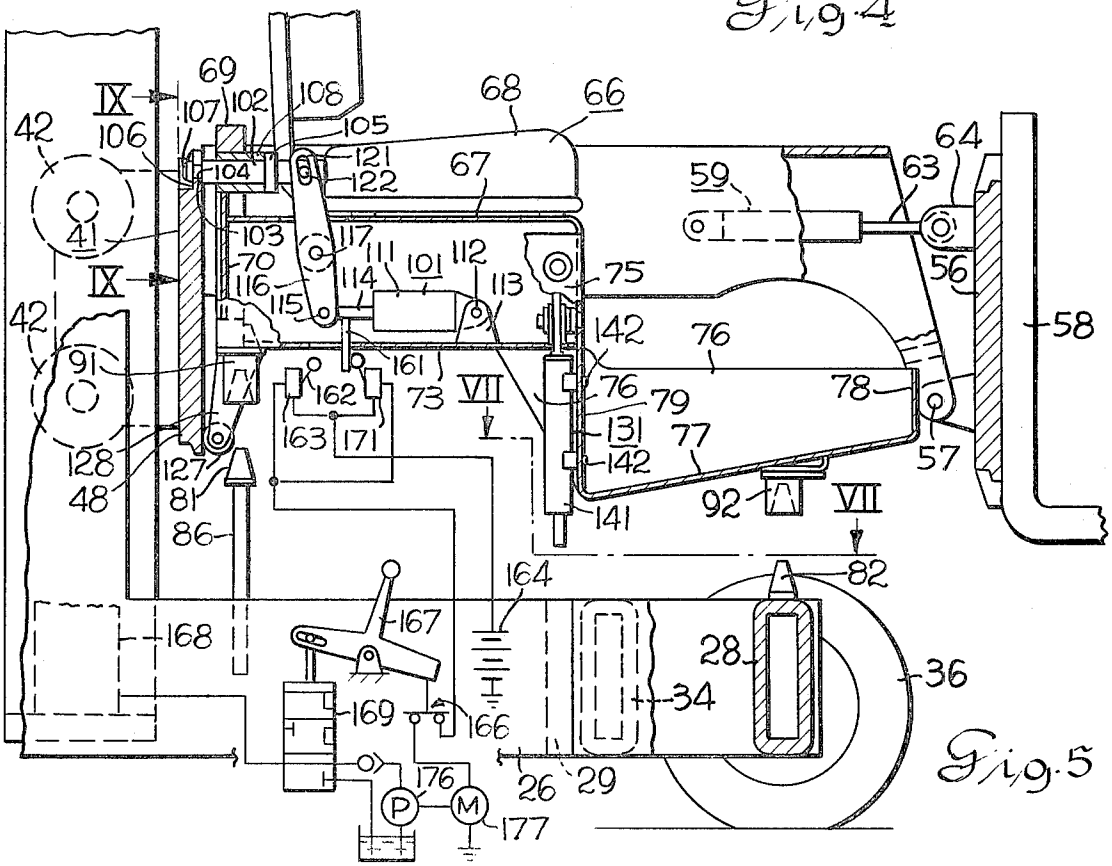

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Fig. 5

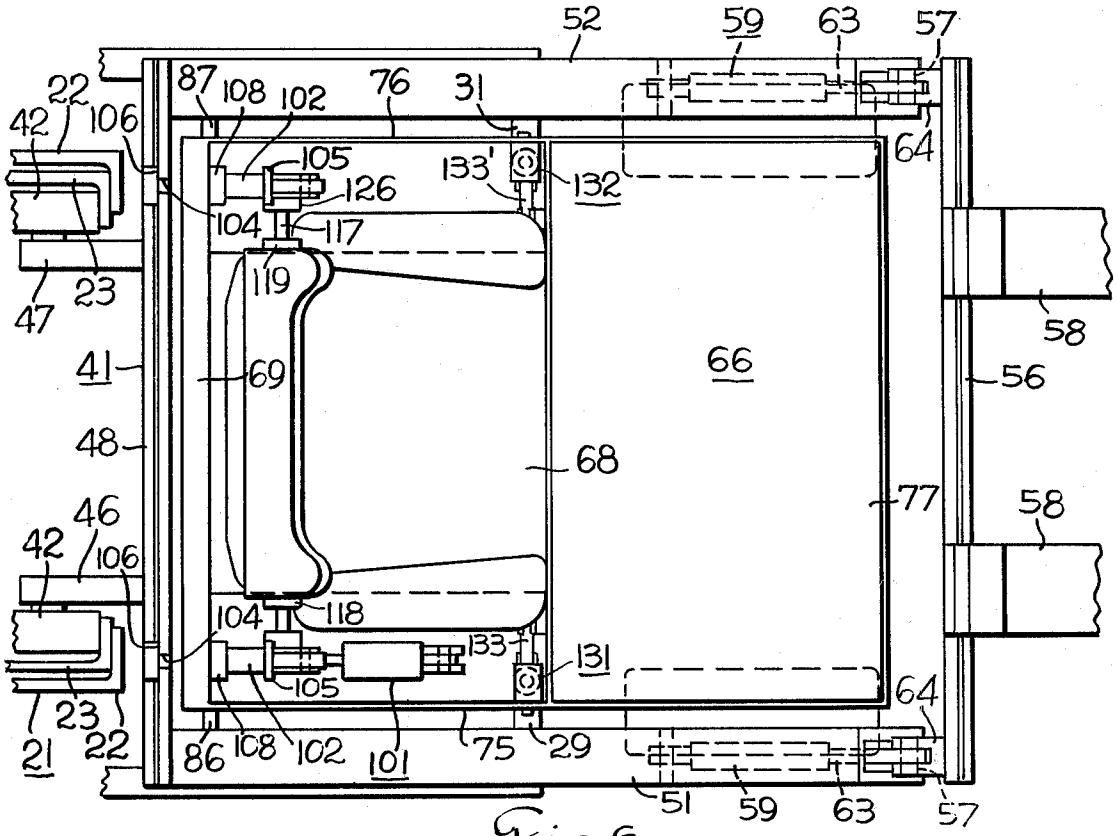

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Fig. 6

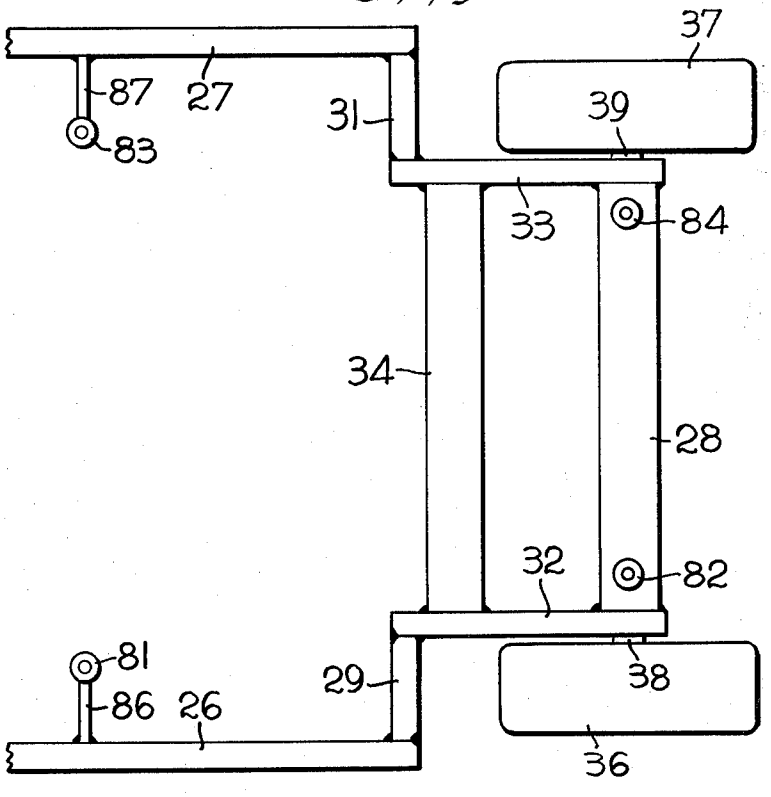

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Fig. 7

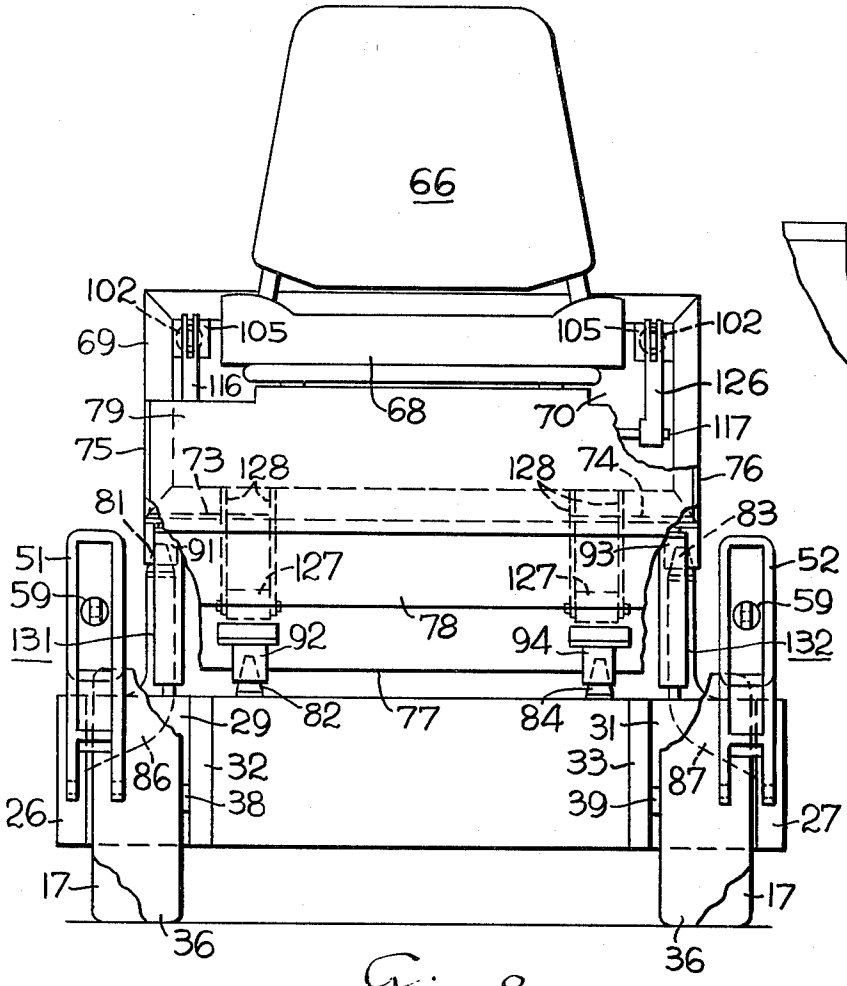


Fig. 8

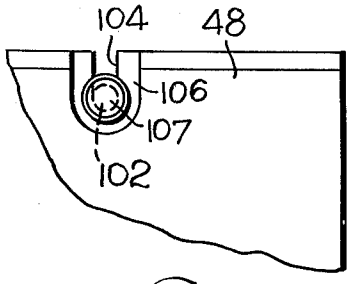


Fig. 9

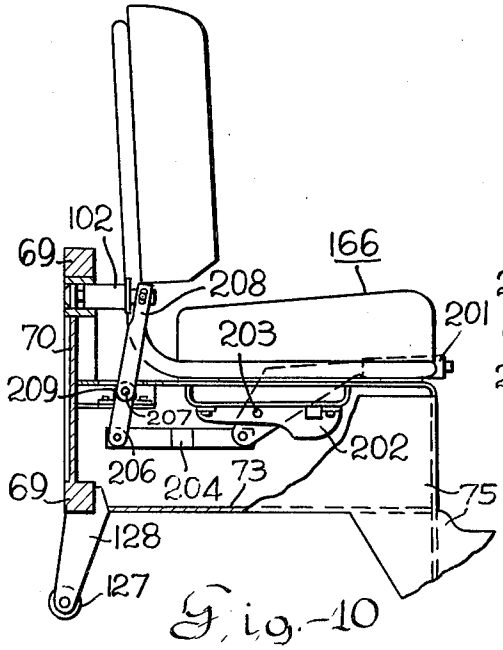


Fig. -10

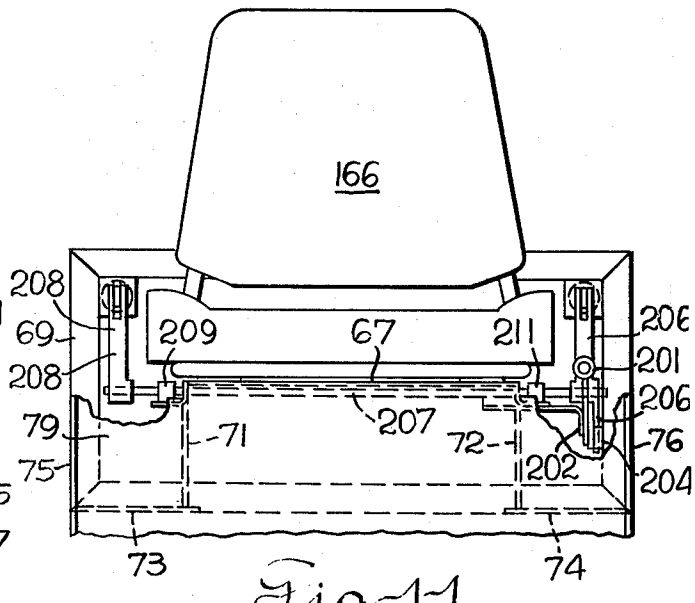


Fig. -11

OPERATOR'S STATION OPTIONALLY STATIONARY OR ELEVATED

BACKGROUND OF THE INVENTION

Heretofore, various lift trucks have been provided in the materials handling industry for a wide variety of material handling functions. While the most common position for the operator's station is on the main frame of the truck, order picker trucks provide an operator's station on the carriage. U.S. Pat. No. 2,598,865 illustrates a lift truck wherein the operator's seat is fixed to the carriage of a lift truck behind the forks and between the uprights of the mast, the latter being mounted behind the front wheels of the truck. Also, some prior art vehicles may be controlled from two different operator's stations.

BRIEF DESCRIPTION OF THE INVENTION

In the present invention the operator can selectively cause the operator's station to be either mounted on the main frame or elevated with the lift carriage thus providing a more versatile lift truck. The operator's station is positioned between a pair of carriage arms extending longitudinally from the mast and is selectively latched to the carriage by retractable pins controlled by the operator.

BRIEF DESCRIPTION OF THE DRAWINGS

Two embodiments of the present invention are illustrated in the drawings wherein:

FIG. 1 is a side view of the lift truck incorporating one embodiment of the present invention;

FIG. 2 is a section view taken along the line II—II in FIG. 1;

FIG. 3 is a view similar to FIG. 2 but showing the operator's station locked to the carriage support arms;

FIG. 4 is an enlarged side view of the operator's station area of the truck shown in FIG. 1 with parts broken away for illustration purposes;

FIG. 5 is a view similar to FIG. 4 but showing the carriage supporting the operator's compartment;

FIG. 6 is a top view of the structure shown in FIG. 4;

FIG. 7 is a view taken along the line VII—VII in FIG. 5;

FIG. 8 is a front view of the structure shown in FIG. 4;

FIG. 9 is a section view taken along the line IX—IX in FIG. 5;

FIG. 10 is a partial view of the operator's station of a second embodiment of the invention showing a manually operated latching control; and

FIG. 11 is a front view of the operator's station shown in FIG. 10.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, a lift truck 16 includes a pair of steerable rear drive wheels 17, a main frame 18, an electric battery 19, and a centrally located lift mast 21, the outer uprights 22 of which are secured as by welding to the main frame 18. As shown in FIG. 7, the main frame 18 includes a pair of longitudinally extending frame members 26, 27 which are connected to a rigid axle support 28 through a pair of transverse members 29, 31 and forwardly extending frame members 32, 33. An additional crossbrace 34 provides increased rigidity to the lift truck frame. A pair of front support wheels

36, 37 are rotatably mounted on stub axles 38, 39 rigidly secured to frame members 32, 33.

Referring to FIGS. 4, 5 and 6, a novel lift carriage 41 is connected to the mast 21 for vertical reciprocal movement by rollers 42 cooperatively engaging the inner uprights 23. The rollers 42 are rotatably mounted on a pair of rearwardly extending brackets 46, 47 which are welded to a transverse vertical rear wall in the form of a carriage plate 48. A pair of longitudinally extending support arms 51, 52 are welded at their rearward ends to the carriage plate 48 and have downwardly extending forward ends which are pivotally connected to a lower part of a vertical transverse front wall in the form of a fork mounting plate 56 by a pair of pins 57 aligned on a transverse axis. The fork mounting plate 56 carries a pair of conventional lift forks 58 for supporting payloads. A pair of selectively expansible and contractible actuators in the form of double acting hydraulic tilt jacks 59 are disposed within the hollow interior of arms 51, 52 and have their cylinder components pivotally connected at their rearward ends to the arms 51, 52. The jacks 59 have their rod components 63 pivotally connected to brackets 64 extending rearwardly from the fork mounting plate 56.

As shown in FIG. 6 the carriage plate 48, arms 51, 52 and fork mounting plate 56 define a rectangular frame or boxlike enclosure within which an operator's station 66 is disposed. As shown in FIGS. 4, 5 and 6, the operator's station 66 includes a horizontal deck plate 67 to which an operator's seat 68 is secured by means not shown. A rear frame structure 69 shaped like a window frame has a vertical wall 70 welded thereto, which in turn is welded to the horizontal plate 67. As shown in FIGS. 2, 3 and 11, a pair of sidewalls 71, 72 extend downwardly from the deck plate 67 and are joined near their bottom edges to a pair of horizontal bottom plates 73, 74 which extend laterally outward where they are joined by vertical sidewalls 75, 76. A transverse wall 79 is secured to top wall 67, bottom plates 73, 74 and sidewalls 75, 76. The sidewalls 75, 76 extend downwardly and forwardly to form the sidewalls of a tray for the operator's feet, the tray being completed by a bottom wall 77 and a front wall 78 both of which are welded to the sidewalls 75, 76. In the illustrated embodiments of the invention the deck plate 67, transverse wall 79, bottom wall 77 and front wall 78 are formed by bending a single sheet of metal plate.

The operator's station is optionally supported on the lift truck frame 18 by four posts 81, 82, 83, 84 each of which has an upstanding truncated cone formed at its upper end. Posts 81, 83 include L-shaped plates 86, 87 welded to the inside of frame members 26, 27. The truncated cones of posts 81, 82, 83, 84 engage downwardly opening seats 91, 92, 93, 94 securely fastened as by welding to mounting brackets which are in turn welded to the operator's station. Each of the seats 91, 92, 93, 94 presents a downwardly diverging conical abutment surface complimentary to the cones on posts 81, 82, 83, 84. The conical shape of the top of the posts and the complimentary abutment surfaces on the seats facilitate registration of the seats on the posts when the operator's station is lowered into place on the truck main frame.

When the operator wishes to go up with the carriage, he may do so by causing double acting hydraulic jack 101 to contract, thus causing a pair of latching pins 102 to be shifted longitudinally to the rear from their re-

tracted position shown in FIG. 4 to their latching position shown in FIG. 5. Enlarged diameter portions 105 of the pins 102 limit the rearward movement of the pins upon their abutment with drilled blocks 108 welded to the frame structure 69.

When the carriage is subsequently raised, the reduced diameter portions or notches 103 in the pins 102 register with upward opening slots 104 in the carriage plate 48 as shown in FIGS. 5 and 9. The carriage plate is milled on its back side at each of the slots 104 to provide flat, vertical surfaces 106 and pockets for the heads 107 on the free or rear ends of the pins 102. The jack 101 for operating the pins 102 has its cylinder component 111 pivotally connected by a pin 112 to brackets 113 welded to bottom plate 73 and has its rod 114 pivotally connected by a pin 115 to the bottom end of a vertical lever 116. The lever 116 is non-rotatably secured to a shaft 117 which is pivotally supported in bushings 118, 119 welded to walls 71, 72 of the operator's station. The upper end of the lever 116 is bifurcated and slotted with the slots 121 receiving a pin 122 fixedly secured to the front end of latching pin 102. Referring to FIGS. 6 and 8, a lever 126 is nonrotatably secured to the left end of a shaft 117 and is bifurcated and slotted at its upper end for pivotal connection to the associated pin 102 in the same manner as the upper end of lever 116 is formed and connected to its associated pin 102.

As the operator's station is picked up by the interconnection between the pins 102 and the carriage plate 48, a pair of rollers 127 come into thrust transmitting engagement with the carriage plate. The rollers and the lower front of the carriage plate may be considered to be cooperable abutments from a functional standpoint. As shown in FIGS. 4, 5 and 8, the rollers 127 are rotatably journalled on downwardly extending brackets 128 welded to the operator's station. Also, as the operator's station is picked up by the carriage, a pair of automatic locking mechanisms 131, 132 operate to lock the operator's station to the support arms 51, 52. Referring to FIGS. 2 and 4, the operator's station 66 is supported on the main frame and the carriage is in the lowered position. The automatic locking mechanism 131 is in its inactive, nonlocking position wherein a locking pin 133 is retracted by a spring biased linkage including a bellcrank 134 pivoted at its apex on a pin 136 secured to the wall 79 and a vertical operating rod 137 pivotally connected at its upper end by a pin and slot connection to one arm of the bellcrank 134. The other arm of the bellcrank 134 is pivotally connected to the laterally inner end of pin 133 by a pin and slot connection and the pin is reciprocably supported by a sleeve 138 welded to the wall 75 of the operator's station. The operating rod 137 is reciprocably supported by a cylinder fastened by cap screws 142 to the wall 79 of the operator's station. A compression type coil spring 143 surrounds the rod 137 and biases the rod downwardly by its axial thrust transmitting engagement at its upper and lower ends against a downward facing shoulder at the upper inside of the cylinder 141 and a washer 144 welded to the rod 137.

Assuming the operator causes the latching pin operating jack 101 to be contracted, by conventional hydraulic control means not shown, when the carriage is subsequently elevated to the position of arm 51 shown by dash lines 151 in FIG. 2, the latching pins 102 will pick up the operator's station and further elevation of the carriage permits the spring 143 to urge the rod 137 downwardly relative to the operator's station thereby causing bellcrank 134 to rotate counterclockwise, as viewed in FIGS. 2 and 3. When the bell-crank rotates counterclockwise, it causes the free end of the locking pin 133 to be inserted laterally outwardly into a registering opening 152 in the arm 51. This occurs as the carriage arm 51 moves from the dash line position 151 of FIG. 2 to the position shown in FIG. 3. The truck is controlled from the operator's station through flexible conduits or cables, not shown, extending between the main frame and the operator's station.

A safety interlock system is schematically shown in FIGS. 4 and 5 which prevents raising of the lift truck carriage if the latching pins 102 are disposed between their fully latched and fully retracted positions. In FIG. 4, a finger 161 has contacted the actuating element 162 of microswitch 163 thereby permitting flow of current from the battery 164 to the motor switch 166; which is closed by the lift control lever 167 when the operator manually moves it to the raise position shown in FIG. 5. Referring back again to FIG. 4, the latching pin is in its fully retracted position and if the lift control lever is now moved to its raise position the carriage will be elevated, leaving the operator's station on the main frame. When the lift lever 167 is in its raise position the motor 177 is energized thereby driving the pump 176 connected thereto to deliver fluid to the lift jack 168 which expands to raise the carriage 41 through conventional means, not shown. When the lever 167 closes switch 166 it also shifts a lift jack control valve 169 to its raise position shown in FIG. 5.

If the operator shifts the latching pins 102 to their fully extended latching position shown in FIG. 5, the finger 161 closes microswitch 171, thereby permitting the carriage to be raised by movement of the lift lever 167 to its raise position to complete a circuit for the motor 177. If the latching pins 102 are partially extended or partially retracted neither of the microswitches 163, 171 will be closed and the carriage cannot be raised because the motor circuit is broken between the battery 164 and switch 166. If the carriage 41 were raised when the pins 102 were partially extended there is the possibility of damage to the pins and attendant safety problems. This interlock system obviates the possible pin damage and safety problems.

Referring to FIGS. 10 and 11, a manual control is provided for the latching pins 102 in the form of a hand lever 201 pivoted to a bracket 202 on the operator's station 166 by a pin 203. The bottom end of the hand lever 201 is pivotally connected to a link 204 which in turn is pivotally connected to the bottom end of latch operating lever 206. The lever 206, and a second lever 208, are nonrotatably secured to a transverse shaft 207 which is pivotally mounted on the operator's station by a pair of pivot blocks 209, 211. When the manual lever 201 is raised the upper ends of the levers 206, 208 swing rearwardly thereby moving the latching pins 102 to their latching position.

It should be understood that the latching pins may be operated by hand, by a hydraulic actuator or by other suitable means such as an electrically powered actuator. It should also be understood that when the carriage is lowered from an elevated position with the operator's station latched thereto, the locking elements or pins 133, 133′ will automatically be retracted as the operator's station is set down on the main frame 18.

This invention provides a novel lift truck affording unique material handling capabilities. By placing the operator on the truck ahead of the mast, but behind the lift forks, the operator has excellent visibility for operating the truck and observing the loading and unloading operations. In many high level stacking situations, it is advantageous to permit the operator to go up with the carriage so he may see more accurately the position of the forks relative to the load and storage racks. The present invention gives the operator the option to either stay on the main frame of the truck or be elevated with the carriage. Thus accidental damage to the goods can be minimized.

The embodiments of the invention in which an enclusive property or privilege is claimed are defined as follows:

1. In a lift truck of the type having a main frame and front and rear wheels supporting said main frame, the combinations comprising:

a vertical mast rigidly secured to said main frame intermediate said front and rear wheels and including a pair of uprights,

a carriage mounted on said mast for vertical reciprocal movement between a fully lowered position and a fully raised position including

a transverse carriage plate adjacent the front of said mast,

a pair of laterally spaced brackets rigidly secured to the rear of said transverse carriage plate and extending rearwardly therefrom,

rollers rotatably mounted on said brackets and cooperatively engaging said uprights whereby said carriage is connected thereto for vertical reciprocal movement,

a pair of laterally spaced longitudinally extending arms rigidly secured at their rear ends to said carriage plate, and

a transverse fork mounting plate connected to the front of said longitudinally extending arms, and

an operator's station mounted on said main frame independently of said carriage and disposed laterally between said arms and longitudinally between said plates, said operator's station being of sufficiently small lateral and longitudinal dimensions so as to permit said carriage to be elevated from its fully lowered position to its fully raised position without lifting said operator's station.

2. The structure of claim **1** wherein said fork plate is pivotally connected on a transverse pivot axis to the lower forward ends of said arms and a pair of extensible and retractable actuators interconnect said arms and said fork mounting plate so as to permit selectively tilting of said fork mounting plate upon actuation of said actuators.

3. The structure of claim **2** wherein said arms are hollow and said actuators are substantially disposed therein.

4. The structure of claim **1** wherein said operator's station is mounted on said main frame in a manner permitting vertical separation therefrom and further comprising latching means for selectively connecting said operator's station to said carriage, said latching means being selectively operable by an operator at said operation's station and including cooperable latching parts on said operator's station and carriage.

5. In a lift truck of the type having a main frame, a pair of laterally spaced front support wheels journaled on the front of the main frame and at least one floor engaging rear support wheel journaled on the rear of the main frame, the combination comprising:

a source of power mounted on the rear of said main frame,

a vertical mast rigidly secured to said main frame forwardly of said source of power and longitudinally intermediate said front and rear wheels,

a carriage mounted on said mast for vertical reciprocal movement including

a transverse carriage plate,

a pair of laterally spaced longitudinally extending support arms rigidly secured at their rear ends to said carriage plate, and

a transverse fork mounting plate connected to said support arms,

an operator's station supportable on said main frame between said support arms and between said carriage and fork support plates, and

selectively operable latching means including latching components mounted on said operator's station for horizontal shifting movement between retracted and latching positions and complementary latching parts on said carriage, said latching components in their latching position cooperatively engaging said latching parts when said carriage is raised whereby said operator's station elevates with said carriage when the latter is elevated, said operator's station remaining in its supported position on said main frame when said latching components are in said retracted position and said carriage is elevated.

6. The structure of claim **5** and further comprising locking means for automatically connecting said operator's station to said carriage when the operator's station is raised by said carriage from said main frame.

7. The structure of claim **6** wherein said locking means comprises locking elements reciprocably mounted on said operator's station for movement between retracted and latching positions, complementary locking parts on said carriage adapted for locking engagement with said locking elements and spring loaded operating means connected to said locking elements and in abutable relation to said main frame operative to move said locking elements from their retracted position to their latching position when said operator's station is raised from said main frame.

8. The structure of claim **5** wherein said latching parts are laterally spaced vertical slots in said carriage plate open at the upper edge of the latter and said latching components are laterally spaced longitudinally reciprocable pins with recessed portions adapted to be received in said slots when said carriage is raised with said pins in said latching position.

9. The structure of claim **8** and further comprising cooperable abutments on the lower front part of said carriage plate and the lower rear of said operator's station engageable upon the latter being raised by said carriage.

10. The structure of claim **9** wherein said abutment on said operator's station includes a roller having a transverse axis.

11. The structure of claim **5** wherein said carriage mounting plate is pivotally connected to said arms on a transverse axis and selectively expansible and contractable actuators interconnected between said carriage and fork mounting plate operable to tilt the latter.

12. The structure of claim 11 wherein said arms are hollow and said actuators are disposed at least in part within said arms.

13. In a lift truck of the type having a main frame and front and rear wheels supporting said main frame, the combinations comprising:

a vertical mast rigidly secured to said main frame,

a carriage mounted on said mast for vertical reciprocal movement between a fully lowered position and a fully raised position including

a transverse carriage plate adjacent said mast,

a transverse fork mounting plate spaced longitudinally from said carriage plate, and

a pair of laterally spaced longitudinally extending arms rigidly secured at their longitudinally opposite ends to said carriage plate and fork mounting plate, respectively,

an operator's station supportable on said main frame and disposed laterally between said arms and longitudinally between said plates, and

selectively operable latching means for optionally connecting said operator's station to said carriage including latching parts on said operator's station shiftable horizontally between a fully extended latching position in which they are engageable with said carriage and a fully retracted position in which they are free from engagement with said carriage throughout the full reciprocal movement of the latter on said mast, said operator's station being elevated with said carriage when the latter is elevated and said latching parts are in their fully extending latching position and said operator's station remaining on said main frame when said latching parts are in their fully retracted position and said elevator is elevated from its fully lowered position to its fully raised position.

14. The structure of claim 13 and further comprising:

a lift jack,

a control for said lift jack having a raised condition of adjustment for effecting extension of said lift jack, and

interlock means operatively associated with said latch means and control for preventing extension of said lift jack except when said latching parts are in either of said fully extended latching or retracted positions.

* * * * *