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M. L. TROTTER ET AL

2,779,488

SELF-CONTAINED ELEVATOR UNIT FOR TRUCK BODIES

Filed March 7, 1955

3 Sheets-Sheet 1

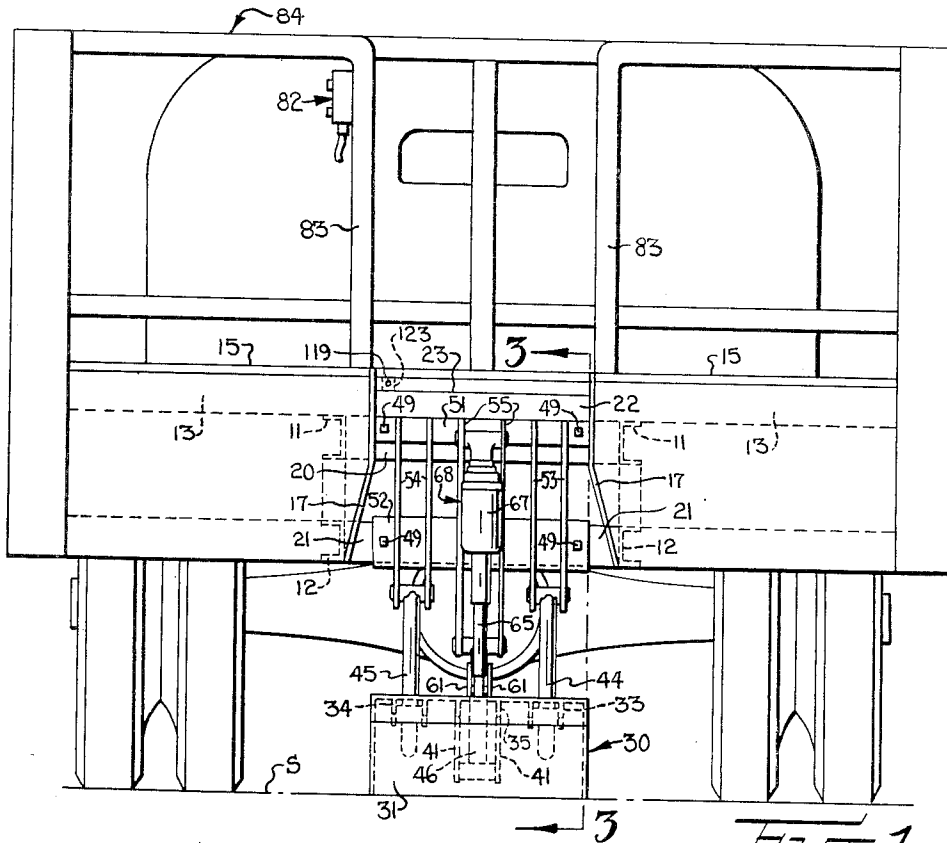
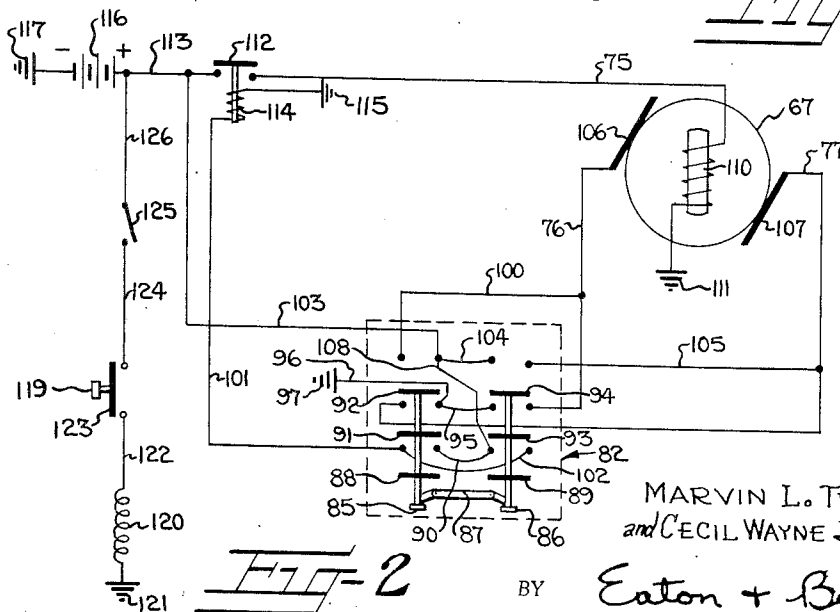


FIG-1



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3 Sheets-Sheet 2

FIG-3

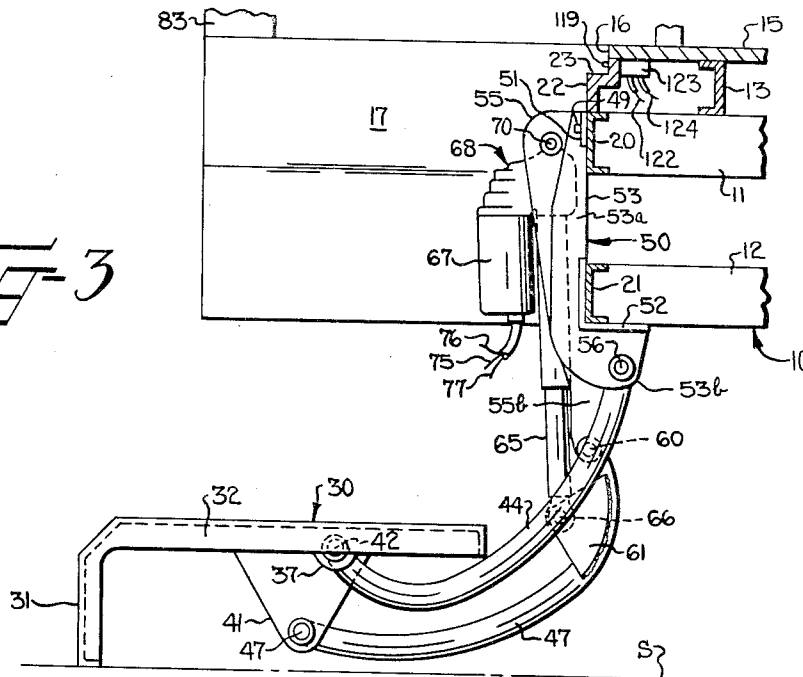
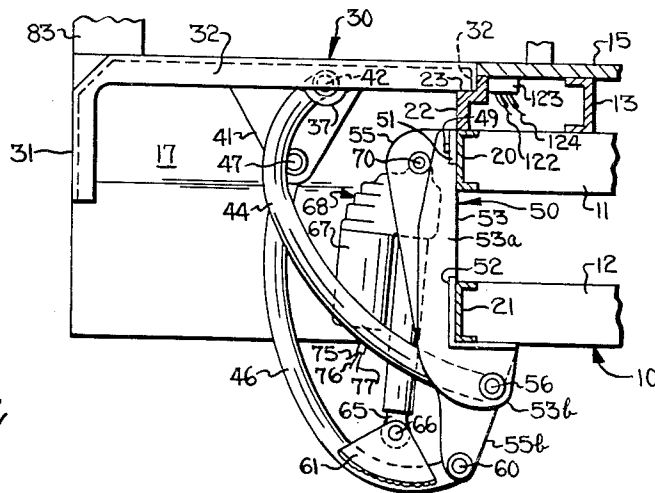


FIG-4



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3 Sheets-Sheet 3

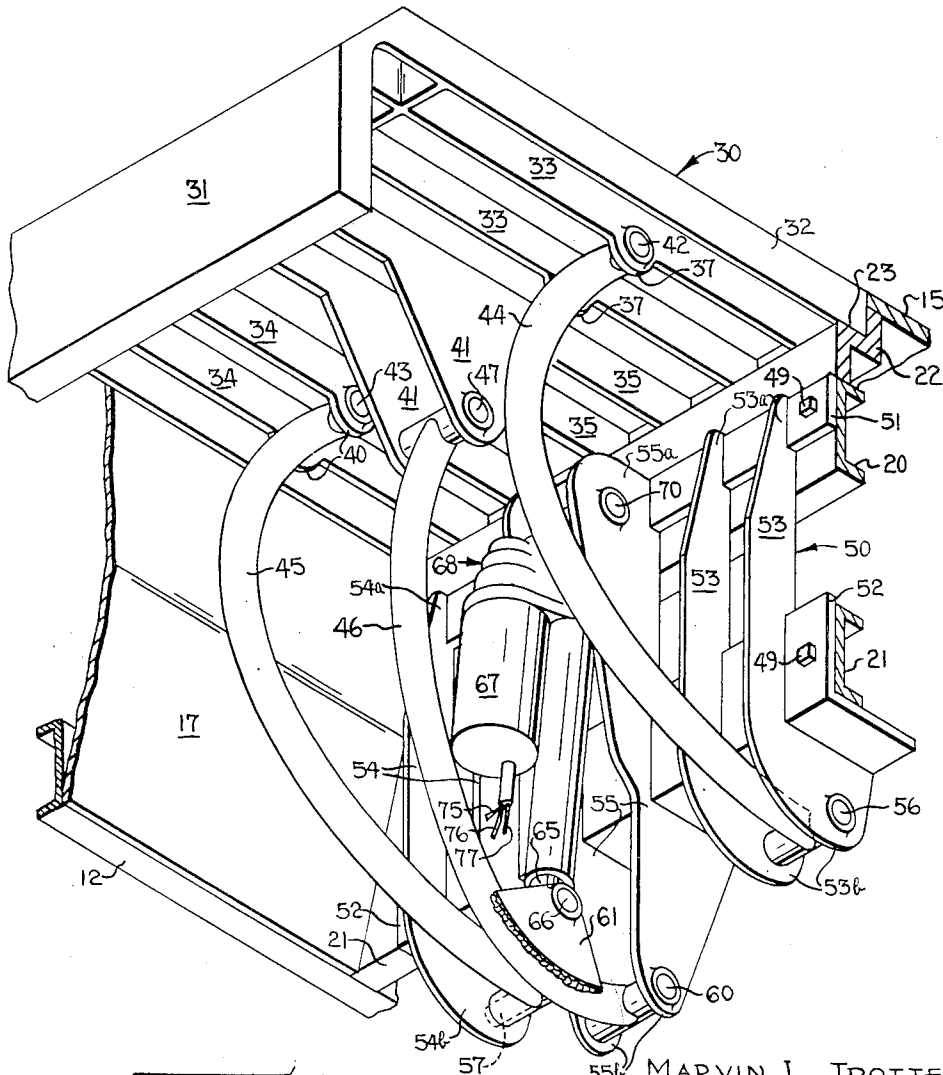


FIG-5

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SELF-CONTAINED ELEVATOR UNIT FOR TRUCK BODIES

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Application March 7, 1955, Serial No. 492,720

10 Claims. (Cl. 214-77)

This invention relates to elevators of the type used for loading goods onto and unloading goods from the deck or floor of a vehicle body or truck and this invention is especially concerned with improvements in an elevator of the type disclosed in our copending application, Serial Number 385,396, filed October 12, 1953, and now Patent No. 2,752,052, and entitled Truck Body With Elevator for Loading and Unloading, of which the present application is a continuation-in-part.

The apparatus disclosed in said copending application includes a truck bed whose floor is provided with a well in the rear end thereof in which an elevator platform is mounted. The elevator platform is movable from a position even with the floor to a position below the floor, adjacent the surface supporting the truck by means of a screw-and-nut actuator driven through gearing means by an electric motor. Linkage is provided for connecting the elevator platform with a frame which is, in turn, fixed to the chassis of the vehicle or truck. On the other hand, the electrically driven screw-and-nut actuator is pivoted on a separate frame member attached to the chassis of the truck.

It is an object of this invention to provide a self-contained elevator unit of the character disclosed in said copending application wherein the framework which supports the links to which the elevator is connected also supports the electrically operated ram and piston so that it is merely necessary to secure the single frame which supports the elevator unit to the chassis of the vehicle in installing the improved elevator unit. This not only greatly simplifies the installation of the elevator unit on the chassis of the vehicle, but it also insures that the connections between the links and the electrically operated ram and piston are accurately located to insure smooth operation of the elevator unit.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is a rear elevation of a truck provided with a well in the rear portion thereof in which the improved elevator unit is mounted and showing the elevator platform in lowered position;

Figure 2 is a schematic diagram showing the electrical connections between the elevator lift driving element and the manual switch for controlling the same;

Figure 3 is an enlarged vertical sectional view, mostly in elevation, taken substantially along the line 3-3 in Figure 1;

Figure 4 is a view similar to Figure 3, but showing the elevator platform in raised position;

Figure 5 is an enlarged isometric view of the elevator unit showing the platform thereof in raised position and looking up at the lower surface of the platform.

Referring more specifically to the drawings, the numeral 10 broadly designates the frame or chassis of a wheeled vehicle or truck, which chassis comprises upper and lower

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longitudinally extending frame members 11 and 12. The upper longitudinal frame members 11 support a plurality of transverse frame members or channel bars 13, only one of which is shown in Figure 3, which, in turn, support a floor 15. The rear end of the floor has a centrally disposed opening or well 16 therein, opposed sides of which are defined by skirts 17, only one of which is shown in Figures 3, 4 and 5, but both of the side skirts 17 being shown in Figure 1.

It will be noted that the rear end of the well 16 is open and the front wall of the well 16 is defined by a pair of vertically spaced transverse frame members 20, 21 carried by the corresponding longitudinal frame members 11, 12. The upper transverse frame member 20 also supports a suitably formed sill frame member 22 which has a shoulder formed thereon, as at 23, upon which the flanged front end of an elevator platform, broadly designated at 30, is positioned when the elevator platform is in raised or elevated position as shown in Figures 4 and 5. It will be noted that the portion of the floor 15 defining the opening 16 terminates at its rear edge flush with the shoulder 23 formed on the sill frame member 22.

The elevator or lift platform 30 is preferably, but not necessarily, of cast construction and has a downwardly projecting foot portion 31 depending from the rearmost edge thereof which is adapted to rest upon the ground or surface S upon which the wheels of the truck are resting when the elevator platform 30 is in lowered position. The front and side edges of the elevator platform 30 are also preferably provided with a reinforcing flange 32 depending therefrom.

Three groups of paired ribs 33, 34, 35 extend longitudinally beneath the platform 30 as best shown in Figure 5. The ribs 33 and 34 have spaced relatively short ears 37 and 40, respectively, depending therefrom and the ribs 35 have spaced relatively long ears 41 depending therefrom which are substantially triangularly shaped and the lower ends of which are disposed rearwardly of the lower ends of the respective ears 37, 40.

The ears 37, 40 have respective axially aligned rear pivot shafts 42, 43 therein to which the rear ends of respective supporting arms or stabilizer links 44, 45 are pivotally connected. The rear end of a power link or lever 46 is pivotally mounted on a rear pivot shaft 47 mounted in the lower ends of the ears 41. Each of the parallel links 44, 45, 46 is curved throughout its length in order to clear the lower edge of the front reinforcing transverse flange 32 when the elevator platform is in lowered position, as shown in Figures 1 and 3. The opposite end of each of the links 44, 45, 46 is pivotally connected to an elevator supporting frame broadly designated at 50.

The elevator supporting frame 50 is also preferably of cast construction and comprises upper and lower transverse frame members 51, 52, the upper transverse frame member 51 being shown in the form of a flat bar and the lower transverse frame member 52 being shown in the form of an angle bar. The frame members 51, 52 are adapted to be secured, as by bolts or screws 49, to the respective upper and lower transverse chassis frame members 20, 21, the lower horizontal flange of the member 52 fitting against the lower surface of the transverse chassis frame member 21. The elevator supporting frame 50 also comprises three sets of paired upright frame members 53, 54, 55 which are transversely spaced and which correspond of the respective sets of ribs 33, 34, 35 on the elevator platform 30.

The upright frame members 53, 54, 55 are of substantially L-shaped construction, including vertically disposed legs 53a, 54a and 55a and horizontally disposed legs. The vertical legs 53a, 54a and 55a extend between the transverse members 51, 52 and the horizontal legs define ears 53b, 54b and 55b disposed beneath the hori-

zontal flange of the frame member 52. The ears 53b, 54b have respective front pivot shafts 56, 57 mounted therein to which the inner or forward ends of the respective links 44, 45 are pivotally connected.

The ears 55b project downwardly substantially below the level of the ears 53b, 54b and have a shaft 69 mounted therein on which the front or inner end of the power link 47 is pivotally mounted. The medial portion of the power link 47, adjacent the pivot shaft 69, has a pair of spaced projections or fins 61 thereon between which the lower end of a ram or piston 65 is pivotally mounted, as at 66.

The ram or piston 65 is a part of a screw-and-nut actuator or power unit broadly designated at 68 and which is driven through gearing means by an electric motor designated at 67. The screw-and-nut actuator and electric power unit may be of the type disclosed in said copending application and, accordingly, a detailed description thereof is deemed unnecessary. The upper end of the power unit 68 is pivotally connected, as at 70, between the uppermost portions of the upright frame members 55. The electric motor of the power unit 68 is of the reversible type and has wires or electrical conductors 75, 76, 77 extending therefrom which are parts of an electrical circuit to be presently described.

The electric motor 67 is controlled by a manually operable two-position reversing switch broadly designated at 82 which, as shown in Figure 1, is preferably secured to one of a pair of upright posts 83 disposed at opposite sides of the well 16 and which support corresponding portions of a railing generally designated at 84.

Referring to Figure 2, it will be observed that the switch 82 has a pair of push buttons 85, 86 thereon which are connected to opposite ends of a link 87 shiftably supported in the housing of the switch 82. The push buttons 85, 86 are normally urged outwardly to the position shown in Figure 2 and control the position of respective bus bars 88, 91, 92 and 89, 93, 94. Switch 82 is preferably of a type in which only one of the push buttons 85 or 86 may be manually depressed or actuated at a time and wherein suitable spring means, not shown, causes the push buttons to return to inoperative position when they are released by the operator. The switch 82 may be of a type manufactured by Cutler-Hammer, Inc., 1418 St. Paul Avenue, Milwaukee, Wisconsin, under their Bulletin No. 9109H3B.

It should be noted that, when the push buttons 85, 86 are in normal or open position, the respective bus bars 88, 91, 92 and 89, 93, 94 controlled thereby do not engage any of the contacts of the switch 82. However, upon the operator depressing the push button 85, the bus bar 88 establishes contact between wires or conductors 101, 102 and 90, 108. Also, the bus bar 91 then establishes contact between the wire or conductor 77 and two wires or conductors 95, 96, the wire 96 being grounded at 97. At the same time, the bus bar 92 establishes contact between corresponding ends of wires or conductors 103, 104, 108 and a wire or conductor 100.

As heretofore stated, the switch 82 is of the type which, upon either of the push buttons 85 or 86 being released, both of the push buttons return to the open position as shown in Figure 2. Thus, when the push button 86 is depressed, the bus bars 89, 93, 94 move inwardly and, in so doing, the bus bar 89 establishes contact between wire 102 and wires 90, 108. The bus bar 93 then also establishes contact between the wires 76 and 95 while the bus bar 94 establishes contact between the wire 104 and a wire or conductor 105. The end of the wire 100 remote from switch 82 is connected to the medial portion of wire 76 and the end of wire 105 remote from switch 82 is connected to the medial portion of wire 77.

Now, the electric motor 67 is of the direct current type, since a direct current source of electrical energy is usually used with automotive vehicles. Therefore, the wires 76 and 77 are connected to respective field coils 106, 107

of the electric motor 67 and the wire 75 is connected to one side of the armature 110 of the electric motor 67, the other end of the armature 110 being grounded, as at 111. The end of the wire 75 remote from the electric motor 67 is connected to one side of a solenoid switch or relay 112, to the other side of which a lead wire 113 is connected.

The solenoid switch 112 is controlled by a coil 114 to one end of which the end of the wire 101 remote from the switch 82 is connected; the end of said coil 114 remote from the wire 101 being grounded, as at 115. The end of the wire 103 remote from switch 82 is connected to the medial portion of the lead wire 113, which lead wire is also connected to a suitable source of direct current, such as a storage battery 116 suitably grounded, as at 117.

As is well known, the storage battery 116 is disposed in the usual position adjacent the engine of the vehicle and controls the flow of current to the spark coil, which, of course, controls the operation of the engine of the vehicle. The spark coil is indicated in Figure 2 at 120 and one end thereof is grounded, as at 121, and the other end thereof has a wire 122 extending therefrom to one side of a normally open safety switch 123. The safety switch 123 is suitably secured to the lower surface of the floor 15 of the truck bed as shown in Figures 3 and 4, and the spring loaded plunger 119 thereof projects through the sill member 22 so as to be engaged by the front flange portion 32 of the elevator platform 30 when the platform 30 is in a raised or elevated position as shown in Figures 4 and 5.

The side of the switch 123 remote from wire 122 has one end of a wire 124 connected thereto whose other end is connected to one side of the usual ignition switch 125. The other side of the ignition switch 125 has a wire 126 connected thereto whose other end is connected to the medial portion of the lead wire 113.

It is thus seen that, upon depressing the push button 85 of switch 82 and thereby moving the bus bars 88, 91, 92 inwardly, current flows from battery 116, through the wires 113, 103, 108, 90, through bus bar 88 and through wire 101 and coil 114 which is grounded at 115, thereby energizing the coil 114 and closing the normally open relay 112. It is evident that this causes current to flow through the wire 75 and armature 110 of the electric motor 67. Also, as the push button 85 is depressed, current flows from the bus bar 92 through the wires 100, 76 to the field coil 106 to positively energize the field coil 106. The field coil 107 is then negative, since current flows therethrough and thence through the wire 77, bus bar 91 and wire 96 which is grounded at 97.

Thus, the electric motor 67 is caused to rotate in one direction wherein it is to be assumed that this will cause the ram or piston 65 to move toward the gear housing of the power unit 68 (Fig. 3). It is apparent that this will cause the elevator platform to move upwardly from the lowered position shown in Figures 1 and 3 to the raised position substantially as shown in Figures 4 and 5. As the elevator platform 30 is raised it moves upwardly and forwardly in an arcuate path so the flange 32 on the elevator platform 30 comes to rest on the shoulder member 22 and, in so doing, the flange 32 engages and depresses the plunger of the normally open switch 123 for closing switch 123, whereupon the ignition switch 125 may then be effective to close the circuit to the spark coil 120.

In order to reverse the electric motor 67 for lowering the elevator platform 30, the push button 86 is depressed, which causes the bus bars 89, 93, 94 to move inwardly. In so doing, the coil of the magnetic or solenoid switch 112 is again energized, since current then flows from the lead wire 113, through the wires 103, 108, through the bus bar 89 and through wires 102, 101 to the coil 114 which is grounded at 115. This again completes the circuit to the armature 110 of the electric motor 67.

Also, since the bus bar 94 is then in its inward or closed position, current flows from the wire 104 through the wires 105 and 77 to the field coil 107 to thereby positively energize the field coil 107. The current continues through the field coil 107 and to field coil 106 which is negative, since current flows from the field coil 106, through the wire 76, through the bus bar 93, through the wires 95, 96 and is grounded at 97.

Since the flow of current through the field coils 106, 107 is then opposite from that direction in which it flows when the push button 85 is depressed, it is apparent that the electric motor will then rotate in the reverse direction to cause the ram 65 to move inwardly relative to the gear housing of the power unit 68 and to thereby move the elevator platform 30 downwardly from the raised position shown in Figures 4 and 5 to the lowered position substantially as shown in Figures 1 and 3. As the elevator platform 30 is lowered, the flange 32 thereon moves out of engagement with the plunger of switch 123, thus permitting the switch 123 to open and to thereby insure that the circuit to the spark coil 120 is broken in the event of the ignition switch 125 being closed to thus stop the truck engine immediately upon activation of the elevator platform 30 to further insure that the truck cannot be moved while the elevator platform 30 is in any position other than fully raised. Of course, when the elevator platform 30 has been lowered to the desired level, the operator releases the push button 85 which then returns to the open position shown in Figure 2.

It is thus seen that there is provided an improved electrically operable elevator or lift for vehicular trucks and the like wherein all of the components thereof are supported by a common elevator-supporting frame to thereby provide a compact elevator unit which may be manufactured and shipped in completely assembled form ready for installation on the chassis of existing trucks without making any modifications whatsoever in the existing vehicular trucks. In other words, the elevator-supporting frame 50 supports the screw-and-nut actuator 68 as well as the links 44, 45, 47 which, in turn, support the elevator platform 30. Installation of the elevator on an existing truck is thereby simplified to the extent that only the frame 50 need be connected to the truck.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. A self-contained elevator unit comprising a substantially upright frame, stabilizer links pivotally connected at corresponding ends to said frame, an elevator platform, means pivotally connecting the other ends of said stabilizer links to said platform, a power link pivotally connected at one end to said frame, means pivotally connecting the other end of said power link to said platform, an electrically operable ram pivotally connected at one end to said frame, and means pivotally connecting the other end of said ram to said power link at a point adjacent the end of the power link which is pivotally connected to said frame.

2. A structure according to claim 1 wherein said platform is provided with a ground engaging foot portion on its end remote from the frame and the means pivotally connecting the power link to the platform terminating on a level above the lower edge of said foot portion.

3. A structure according to claim 1 wherein said stabilizer links and said power link are curved and wherein the curvature of said links is such that the medial portions of the links are spaced outwardly from the edge of the platform adjacent said frame when the platform is positioned below the frame.

4. A self-contained elevator unit comprising a substantially upright frame, a pair of curved stabilizer links

having corresponding ends pivotally connected to said frame, an elevator platform, means pivotally connecting the other ends of said stabilizer links to a medial portion of and beneath said platform, a curved power link pivotally connected at one end to said frame on a level below the level at which the stabilizer links are connected to the frame, means pivotally connecting the other end of said power link to a medial portion of said platform on a level below the level at which the corresponding ends of the stabilizer links are connected to the platform, an electrically operable ram pivotally connected at one end to said frame, and means pivotally connecting the other end of said ram to a medial portion of said power link adjacent the point at which the power link is pivotally connected to said frame.

5. A self-contained elevator unit adapted to be connected to the chassis of a vehicle, said self-contained elevator unit comprising a substantially upright frame, means for connecting said frame to said chassis, a plurality of curved stabilizer links pivotally connected at corresponding ends to the lower portion of said upright frame, an elevator platform, means pivotally connecting the other ends of said stabilizer links to the medial portion of and beneath said elevator platform, a curved power link pivotally connected at one end to the lower portion of said upright frame beneath the pivotal connections of the stabilizer links to the frame, means pivotally connecting the other end of said power link to the medial portion of the elevator platform beneath the pivotal connections of the stabilizer links to said elevator platform, an electrically operable ram pivotally connected at one end to the upper portion of said upright frame, and means connecting the other end of said ram to said power link at a point adjacent the pivotal connection of the power link with the frame and between the upright frame and the elevator platform.

6. A structure according to claim 5 wherein said truck is provided with an ignition circuit and a source of electrical energy and wherein the truck is provided with a bed disposed above the upright frame and provided with an opening therein for accommodating the elevator platform, the combination therewith of switch means normally biased to move to open position disposed in one wall of said opening and connected in series in said ignition circuit and being closable by said elevator platform when the platform is in fully raised position.

7. A self-contained elevator unit comprising an elevator platform and a frame disposed in perpendicular relation to each other, a plurality of foreshortened links pivotally connected at corresponding ends to the frame and to the platform, a reciprocable ram pivotally connected at one end to said frame at a point spaced laterally and vertically from the pivotal connections of said foreshortened links with said frame, means pivotally connecting the other end of the ram to one of said foreshortened links at a point between the frame and the platform and adjacent the pivotal connection of said one link with the frame, and means for actuating said ram to move said platform through successive parallel planes perpendicular to the frame with a minimum of lateral displacement.

8. A self-contained elevator unit comprising a frame and an elevator platform, a pair of supporting arms pivotally connected at corresponding ends to the frame and pivotally connected at their other ends to the platform, said supporting arms being of generally arcuate configuration throughout their length and the end portions of the supporting arms adjacent the elevator platform being shaped to define a smaller arc than the remaining portions of said supporting arms, a lever disposed between the supporting arms and pivotally connected at its ends to the elevator platform and the frame, the pivotal connections of the lever with the platform and the frame being spaced vertically and laterally relative to the respective pivotal connections of said supporting arms with the platform and frame, a ram pivotally connected at one end to said

frame, means pivotally connecting the other end of the ram to said lever at a point between the frame and the elevator and adjacent the frame, and means for imparting reciprocatory movement to the ram whereby the elevator platform is caused to pass through successive parallel planes with a minimum of lateral displacement.

9. A self-contained elevator unit comprising a frame and an elevator platform extending in perpendicular relation to said frame, a pair of parallel supporting arms pivotally connected at corresponding ends to the frame and pivotally connected at their other ends to the undersurface of the elevator platform, said supporting arms being of generally arcuate configuration throughout their length and the end portions of the supporting arms adjacent the elevator platform being shaped to define smaller arcs than the remaining portions of said supporting arms, a lever disposed between the supporting arms and pivotally connected at its ends to the undersurface of the elevator platform and to the frame, the pivotal connections of the lever with the platform and the frame being spaced vertically and laterally relative to the respective pivotal connections of said supporting arms with the platform and frame, said lever being of generally arcuate configuration throughout its length and the end portion of the lever adjacent the frame being shaped to define a smaller arc than the remaining portion of said lever, a ram pivotally connected at one end to said frame, means pivotally connecting the other end of the ram to said lever at a point between the frame and the elevator and adjacent the frame, and means for imparting reciprocatory movement to the ram whereby the elevator platform is

caused to pass through successive parallel planes perpendicular to the frame with a minimum of lateral displacement.

10. A self-contained elevator unit comprising an elevator platform and a frame disposed in perpendicular relation to each other, a pair of foreshortened supporting arms pivotally connected at corresponding ends to the frame and to the platform, a lever disposed between said supporting arms and pivotally connected at its ends to the frame and to the platform, said lever being of generally arcuate configuration throughout its length and the end portion of the lever adjacent the frame being shaped to define a smaller arc than the remaining portion of said lever, a reciprocable ram pivotally connected to said frame and to said lever, the pivotal connection of the ram with the lever being at a point adjacent the frame but between the frame and the platform, and means for actuating said ram to move said platform through successive parallel planes perpendicular to the frame with a minimum of lateral displacement.

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