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MOBILE LIFTING EQUIPMENT

Filed May 8, 1959

2 Sheets-Sheet 1

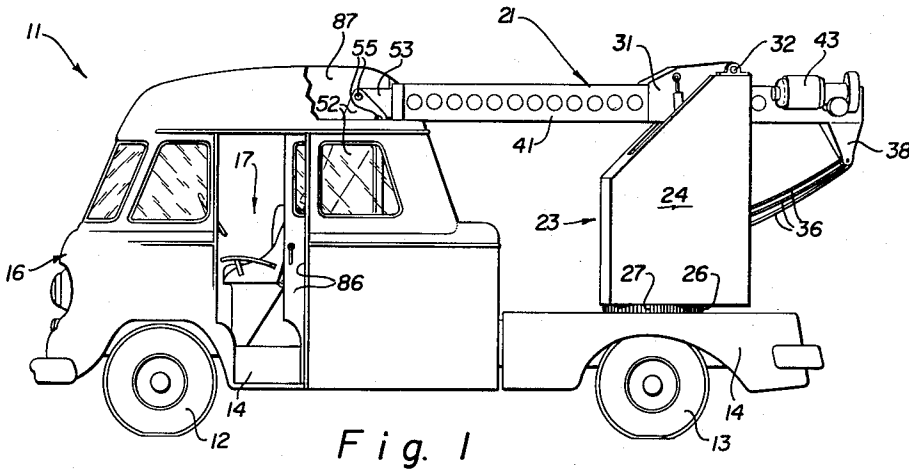


Fig. 1

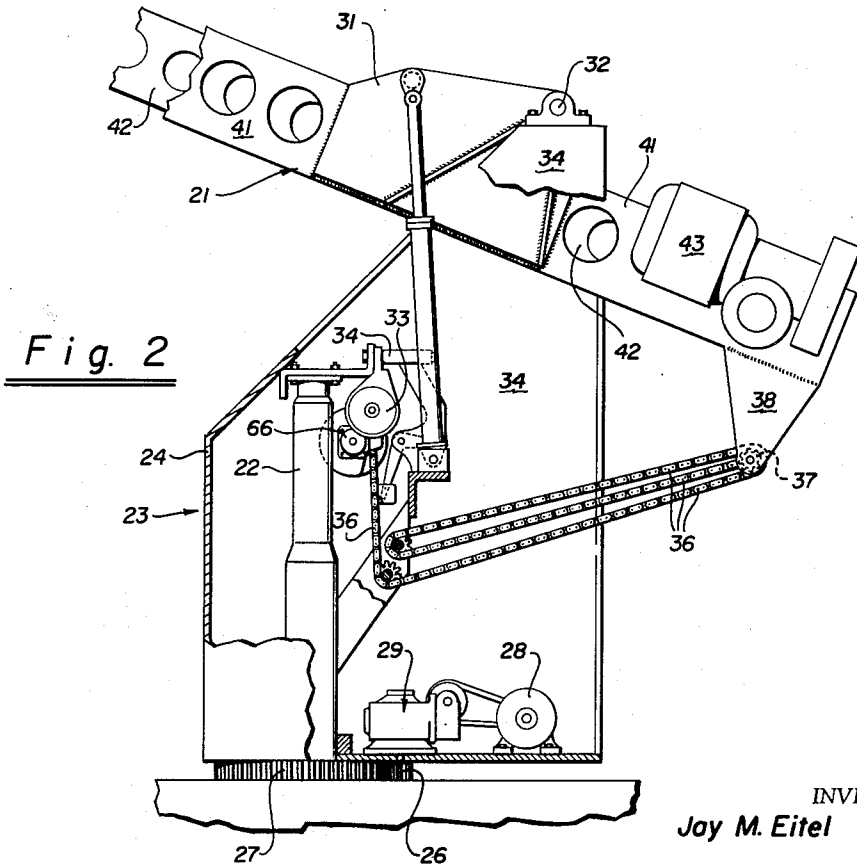


Fig. 2

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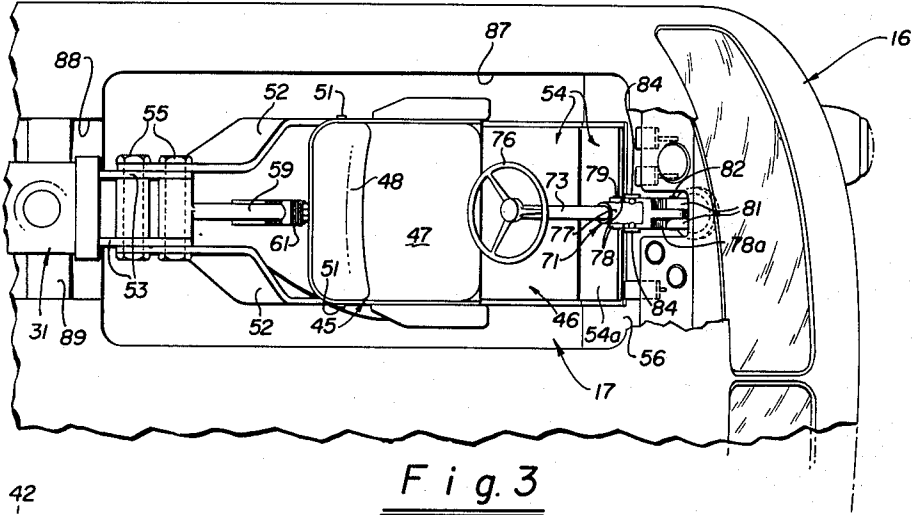


Fig. 3

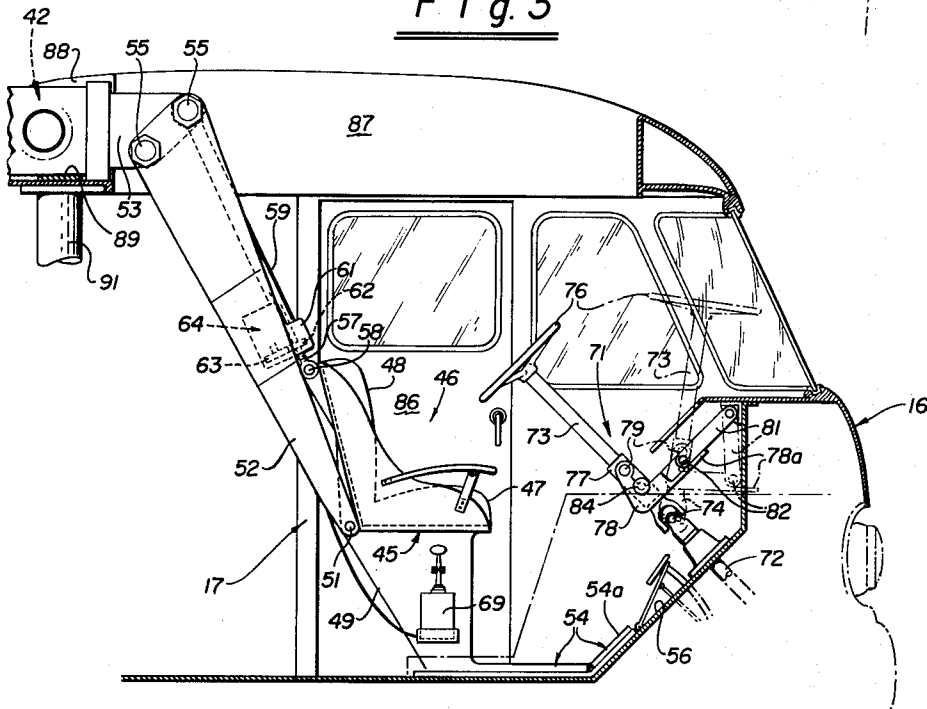


Fig. 4

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**MOBILE LIFTING EQUIPMENT**

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11 Claims. (Cl. 182-2)

This invention relates generally to a mobile lifting equipment.

In my copending application Serial No. 632,480, filed Jan. 4, 1957, entitled, "Vehicle and Lift Construction," and now abandoned, I have disclosed a mobile lifting equipment in which the worker carried by the workman's platform or basket can lower himself into the cab of the vehicle so that he can dismount directly from the workman's basket or platform into the cab of the vehicle and move directly to the driving station of the vehicle. However, with such lifting equipment, the worker or operator must still dismount from the workman's basket or platform before he can move into the driving station of the vehicle to operate the vehicle. There is a need for equipment where this is not necessary.

In general, it is an object of the present invention to provide a mobile lifting equipment in which the operator of the mobile lifting equipment can lower himself directly into the driving station of the vehicle so that he can operate the vehicle without dismounting from the platform.

Another object of the invention is to provide a mobile lifting equipment of the above character in which the workman's platform has been constructed so that the worker can remain in a seated position if desired.

Another object of the invention is to provide a mobile lifting equipment of the above character in which the control for the lifting equipment and for the vehicle is readily accessible to the workman on the workman's platform.

Another object of the invention is to provide a mobile lifting equipment of the above character in which the control for the lifting equipment and for the vehicle may be readily operated by the workman in a seated position.

Another object of the invention is to provide a mobile lifting equipment of the above character in which the workman's platform is automatically maintained in a level position as it is raised and lowered.

Additional objects and features of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

FIGURE 1 is a side elevational view of a mobile lifting equipment incorporating the present invention.

FIGURE 2 is an enlarged cross-sectional view of the load supporting structure and a portion of the boom structure.

FIGURE 3 is a plan view of a portion of the cab of a vehicle showing the operator's driving station and the workman's platform lowered into the driving station.

FIGURE 4 is a cross-sectional view taken along the line 4-4 of FIGURE 3 showing a side elevational view of the driving station and the workman's platform.

In general, the present invention consists of a vehicle with an operator's driving station mounted on the vehicle. A lifting equipment is mounted on the vehicle and is provided with means for raising and lowering the workman or operator. The means for raising and lowering the operator is movable into a position adjacent the driving station so that the operator can operate the vehicle from the means for raising and lowering the operator without dismounting from the same.

The mobile lifting equipment illustrated in the drawing consists of a self-propelled vehicle 11 having front and rear wheels 12 and 13, and a framework 14 mounted

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upon the front and rear wheels. A cab 16 is mounted on the front of the vehicle and houses an operator's driving station 17.

A lifting equipment 21 is mounted on the rear of the vehicle on the framework 14. The lifting equipment 21 can be of any suitable type. For example, if desired, the lifting equipment can be simply of the type in which the object to be lifted is merely raised and lowered. However, with the lifting equipment shown in the drawing, the object to be lifted can also be extended and retracted, and rotated about a vertical axis. For that reason, suitable means is provided for mounting the lifting equipment 21 for rotation about a vertical axis. It consists of a vertical stud shaft 22 having its lower end fixed to the framework 14 in a region generally overlying the rear wheels 13. A load supporting structure 23 is rotatably mounted on the stud shaft 22 and is adapted to be rotated about the vertical axis formed by the stud shaft.

The load supporting structure consists of a housing 24 which is open at the rear and at the top and has its bottom wall or floor rotatably mounted on the stud shaft 16. The load supporting structure is rotated about the stud shaft by a pinion 26 which is rotatably mounted in the bottom wall and engages a large ring gear 27 affixed to the stud shaft 22. The pinion 26 is driven by suitable means such as a reversible motor 28 which drives the speed reducing gearing 29 connected to the pinion 26. By changing the direction of rotation of the motor 28, the load supporting structure can be rotated in either a clockwise or counter-clockwise direction about the vertical axis provided by the stud shaft 22.

A boom structure 31 is pivotally mounted for movement about a horizontal axis by a pin 32 carried by the upper portion of the side walls of the housing 24. Suitable means is provided for raising and lowering the outer free end of the boom structure, or in other words, for swinging the boom structure about a horizontal axis provided by the pivot pin 32. It consists of a gearmotor 33 supported by a mounting bracket 34 rotatably carried by the upper end of the stud shaft 22. The gearmotor 33 is of the conventional hoist type and is provided with means (not shown) for paying in and out a chain 36 to raise and lower the boom structure. The chain passes over a sprocket 37 carried by a tail 38 of the boom structure.

The boom structure 31 consists of a main or outer section 41 and a telescoping or inner section 42. Means is provided for extending and retracting the telescoping section 42 with respect to the main section 41 and consists of a motor 43 mounted on the outer or main section 41 which drives a chain (not shown) which has both ends attached to the inner or telescoping section 42 as described in copending applications Serial No. 560,621, filed January 23, 1956, entitled "Lifting Equipment," and Serial No. 579,690, filed April 20, 1956, entitled "Telescoping Assembly," now Patent No. 2,896,750, issued July 28, 1959. By operation of the gearmotor 43, the boom structure can be lengthened or shortened by extending or retracting the telescoping section 42.

A workman's or operator's platform 46 is mounted on the outer or free end of the boom structure. As shown particularly in FIGURES 3 and 4, it consists of a chair 45 formed by an upholstered seat 47 and an upholstered back rest 48. The chair is mounted in a framework 49 which is pivotally connected at points 51 to a pair of supporting arms 52. The supporting arms extend upwardly at an angle from the seat 47 and are secured to a boom fitting 53 which is affixed to the outer or free end of the telescoping or inner section 42 of the boom structure. The framework 49 includes a foot rest 54 which is spaced at substantial distance below the seat 47 and extends outwardly in a plane parallel to the seat. The foot rest 54 is provided with an upwardly and outwardly inclined por-

tion 54a so that the foot rest corresponds to the contour of the floor 56 of the cab as shown particularly in FIGURE 4.

Means is provided for maintaining the platform or chair in a substantially horizontal position as the chair is raised and lowered and consists of a screw 57 which is pivotally connected to the framework 49 at 58. The screw 57 extends into a tubular member 59 and a casing 61. The tubular member 59 is secured to the fitting 53 by one of the bolts 55. A toothed nut 62 is disposed in the casing on the screw 57 and is adapted to be rotated by a pinion 63 driven by a servo gearmotor 64. The servo 64 is electrically connected to a servo 66 carried by the gearmotor 33.

The control switch 69 is mounted on one side of the framework 49 for operating the motors 28, 33 and 43. The control switch is of the type described in Patent No. 2,841,659.

The operator's driving station 17 is provided with conventional controls utilized for driving the vehicle with the exception that the steering wheel assembly 71 is of a special type to permit it to be folded to an out-of-the-way position. The steering wheel assembly consists of a steering rod 72 which is connected to another steering rod 73 by a universal joint 74. A steering wheel 76 is mounted on the steering rod 73. The steering rod 73 is rotatably mounted in a sleeve-like bearing 77. A pair of L-shaped lever arms 78 are pivotally mounted on the bearing 77 at 79. They are also pivotally connected to a pair of links 81 at 82 and which are pivotally connected to the cab at 83. The lever arms 78 are provided with extensions 78a which prevent movement of the lever arms 78 above the straight-line position shown in FIGURE 4. Stops 84 are mounted on opposite sides of the bearing 77 and engage the lever arms 78 when the extensions 78a of the lever arms are in alignment with the links 81.

As will be noted from the drawing, the steering wheel 76 through operation of the assembly hereinbefore described is movable between the driving position shown in FIGURE 4 and the out-of-the-way position shown in dashed lines in FIGURE 4. When the steering assembly is moved to the out-of-the-way position, the linkage is broken at 82 to permit such movement.

The cab 16 is provided with a door 86 to permit ingress and egress into and out of the cab. The roof of the cab is provided with an opening 87 through which the workman's platform can be raised and lowered. The cab is also provided with an elongated recess 88 which is adapted to accommodate the boom structure 31. A load supporting pad 89 is mounted in the recess and is adapted to support the boom assembly. A reinforcing pipe 91 is mounted in the cab immediately below the pad 91 to provide additional support for the boom structure.

Operation of my mobile lifting equipment may now be briefly described as follows: Let it be assumed that the operator has entered the vehicle and has seated himself in the chair 46. It is readily apparent that the operator, when the chair is in the position shown, can readily operate the vehicle to move the vehicle to the desired location.

After the vehicle has been moved to the desired location, let it be assumed that the operator wishes to perform an operation at an elevation substantially above the vehicle. The operator need merely push the steering wheel 76 away from him to cause the toggle assembly to break at the pivot point 82 to move the steering wheel to the out-of-the-way position. The operator can then operate the control 69 to cause operation of the gearmotor 31 to raise and elevate the outer end of the boom structure and to raise the workman's platform or chair 46 out of the cab through the opening 87. Since the steering wheel has been moved to the out-of-the-way position, the foot rest 54 will readily clear the steering assembly.

As the workman's chair is raised, the servo motor 64 is operated to maintain the chair in a level position. This

will be automatic because the servo motor 64 is tied to the servo motor 66 which is controlled by the reversible motor 31. As soon as the workman's platform and chair 46 have been raised above the roof of the cab, the extension and retraction motor 33 and the gearmotor 28 for rotating the boom clockwise and counter-clockwise can be operated to move the chair 46 to the desired location.

After the operator has performed the desired operations at the elevation above the vehicle, it is a simple matter for the operator to lower himself into the cab of the vehicle through the opening 87 and down into a position adjacent the driving station so that he can operate the vehicle. As soon as the workman's platform and chair 46 have been lowered to the position shown in FIGURE 4, the steering wheel can be pulled into the driving position and the vehicle operated in a conventional manner.

To facilitate the return of the workman's platform or chair 46 to the position adjacent the driving station, circuitry such as that described in my copending application Serial No. 790,622, filed February 2, 1959, entitled, "Mobile Lifting Equipment with Extensible Boom Structure," now Patent No. 2,936,847, issued May 17, 1960, can be utilized.

It is readily apparent from the foregoing that I have provided a new and improved lifting equipment whose use is particularly advantageous in that it permits the operator of the mobile lifting equipment to operate the vehicle without dismounting from the workman's platform. Such a mobile lifting equipment is particularly advantageous where work must be performed at an elevation at many different locations as, for example, changing lamps in street lights.

I claim:

1. In a mobile lifting equipment, a vehicle, an operator's driving station mounted on the vehicle, and a lifting equipment mounted on the vehicle, the lifting equipment including means for raising and lowering the operator, said last named means being movable into a position remote from the driving station and a position adjacent the driving station so that when the raising and lowering means is adjacent the driving station the operator can operate the vehicle while in the raising and lowering means.

2. A mobile lifting equipment as in claim 1 wherein said operator's driving station includes a steering assembly, the steering assembly being movable between a driving position and an out-of-the-way position, said steering assembly in the out-of-the-way position permitting the raising and lowering means to be raised and lowered out of and into the position adjacent the driving station.

3. A mobile lifting equipment as in claim 1 wherein said lifting equipment includes a boom structure movable about a horizontal axis, the means for raising and lowering the operator being secured to the boom structure, and means for automatically maintaining the means for raising and lowering the operator in a horizontal position as the boom structure is rotated about the horizontal axis.

4. A mobile lifting equipment as in claim 1 wherein said means for raising and lowering the operator includes a chair so that the operator can be seated while driving the vehicle.

5. In a mobile lifting equipment, a vehicle, an operator's driving station mounted on the vehicle, a lifting equipment mounted on the vehicle, the lifting equipment including an extensible boom structure rotatable about a vertical axis and adapted to have its outer end raised and lowered about a horizontal axis, and a workman's platform mounted on the outer end of the boom structure, the boom structure being movable to move the operator's platform to a position adjacent the driving station so that the operator can operate the vehicle from the driving

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station without dismounting from the workman's platform.

6. A mobile lifting equipment as in claim 5 together with means for maintaining said workman's platform in a horizontal position as the boom structure is raised and lowered about the horizontal axis.

7. A mobile lifting equipment as in claim 5 wherein said operator's driving station includes a steering assembly which extend over the workman's platform when the workman's platform is in a position adjacent the driving station, said steering assembly being movable between a driving position and an out-of-the-way position, said steering assembly in the out-of-the-way position permitting said workman's platform to be raised out of and lowered into the position adjacent the driving station.

8. In a mobile lifting equipment, a vehicle, an operator's driving station mounted on the vehicle, the vehicle including a cab mounted on the front end of the vehicle and housing said operator's driving station, and a lifting equipment mounted on the rear end of the vehicle, the lifting equipment including an extensible boom structure rotatable about a vertical axis and adapted to have its outer end raised and lowered about a horizontal axis, a workman's platform secured to the outer end of the boom

structure, the boom structure being movable to position the workman's platform adjacent the driving station so that the operator can operate the vehicle from the driving station without dismounting from the workman's platform.

9. A mobile lifting equipment as in claim 8 wherein said workman's platform includes a chair to permit the operator to be seated while driving the vehicle.

10. A mobile lifting equipment as in claim 9 together with means for automatically maintaining said chair in a horizontal position as the chair is raised and lowered.

11. A mobile lifting equipment as in claim 10 together with control means mounted on the chair to permit the operator to control the boom structure from the chair.

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