

Feb. 6, 1968

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3,367,441

UNITIZED BATTERY CASE AND COUNTERWEIGHT

Filed April 1, 1966

2 Sheets-Sheet 1

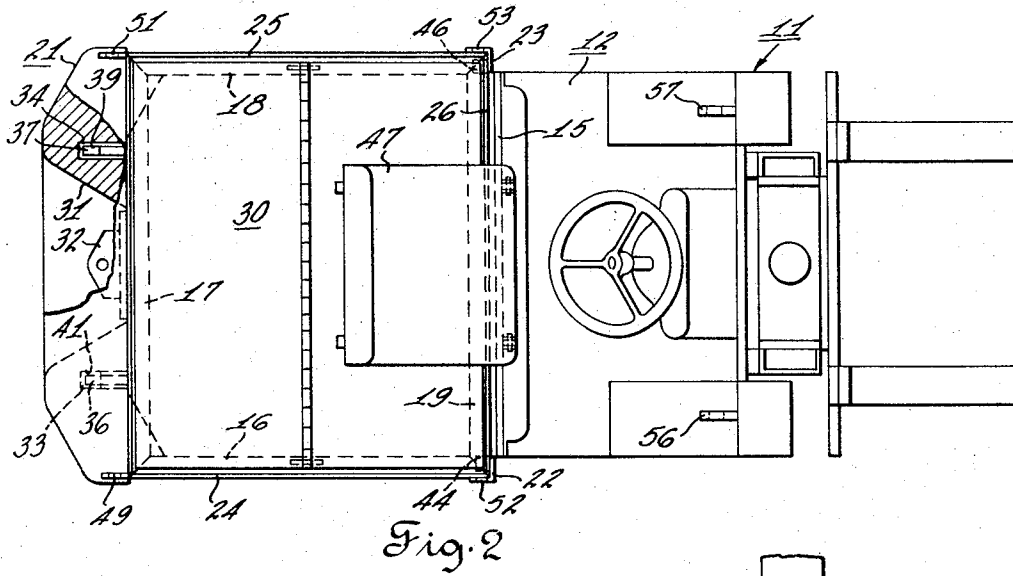


Fig. 2

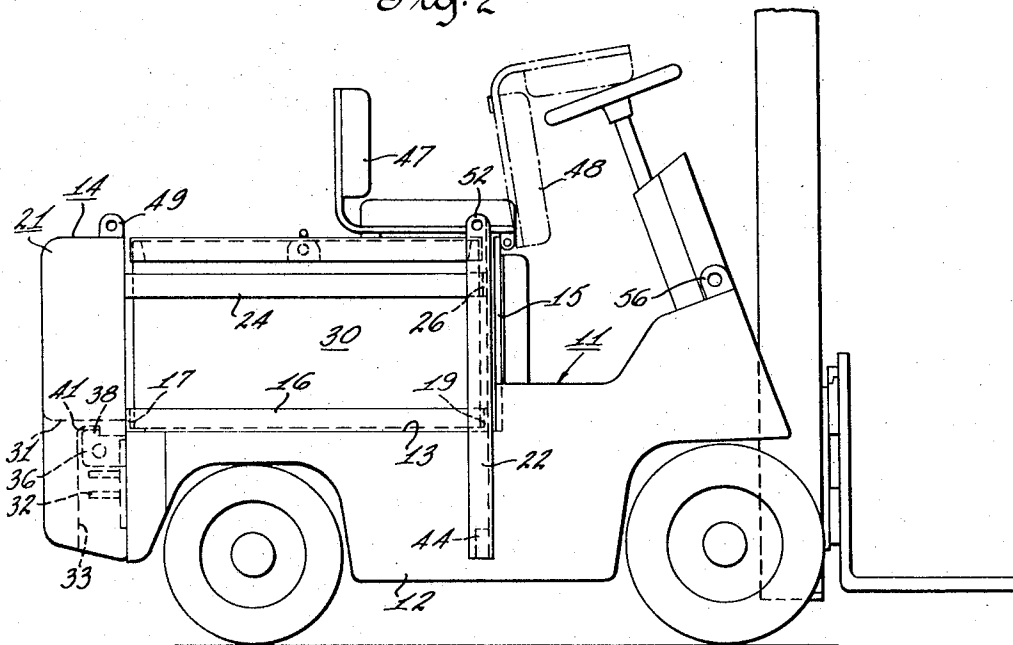


Fig. 1

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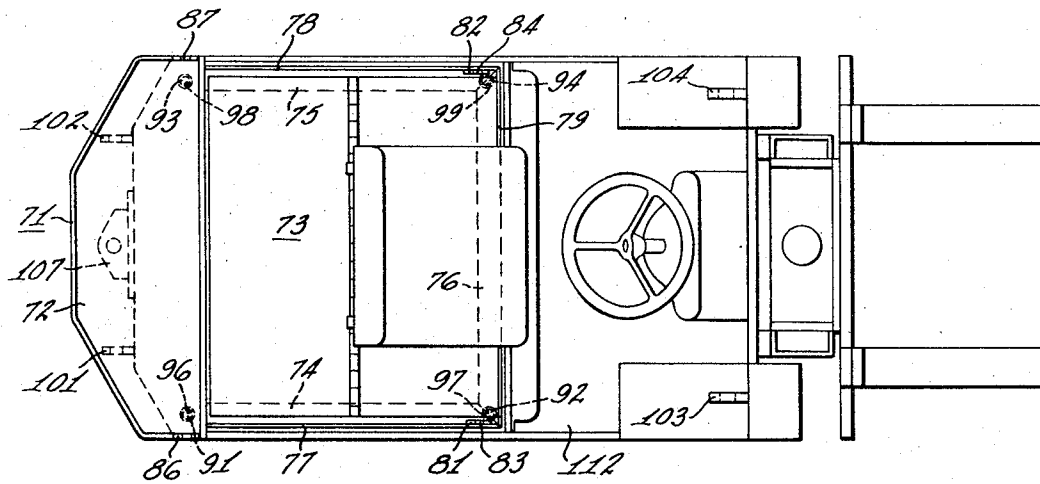


Fig. 4

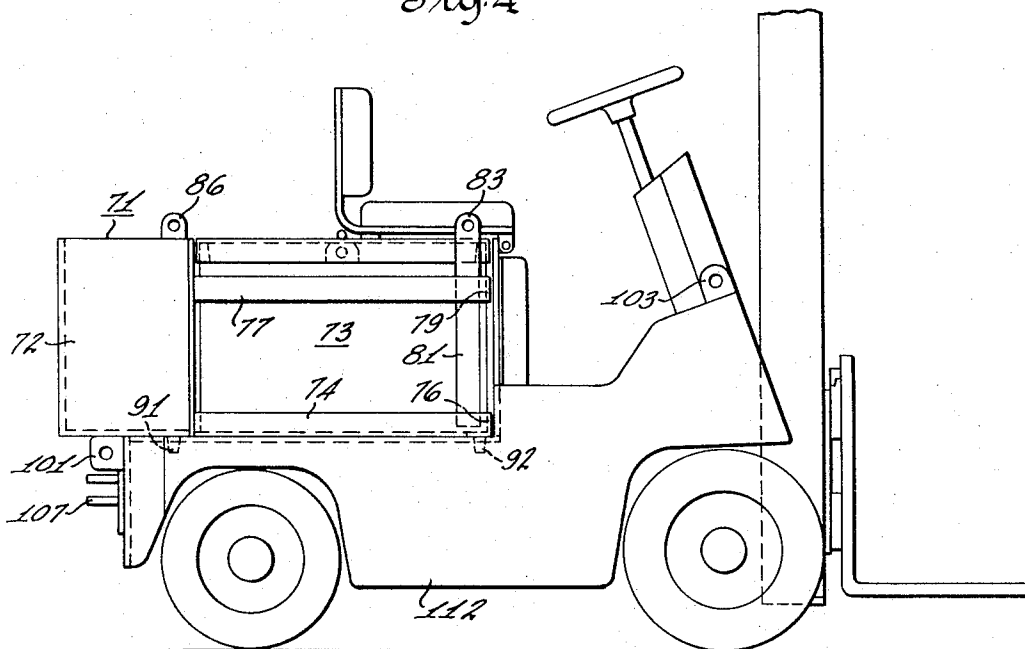


Fig. 3

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UNITIZED BATTERY CASE AND COUNTERWEIGHT

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Filed Apr. 1, 1966, Ser. No. 539,437

6 Claims. (Cl. 180-68.5)

ABSTRACT OF THE DISCLOSURE

A unitary battery case and counterweight for lift trucks. The counterweight may be integral with the case for the battery or the case may provide compartments into which the counterweight material and battery fit. The case and truck chassis have registering components preventing lateral and longitudinal movement.

In unloading ships it is often desirable to utilize a lift truck in the hold of the ship to move the cargo to and from the hatchway. Because of their clean operating characteristics, electric lift trucks have become increasingly popular for such use. Heretofore, lift trucks have been lifted with ship booms from the dock into the hold of the ship. However, many ships have booms which singularly do not have the capacity to lift the desired lift truck into the hold. On some ships it is possible to use two cargo booms, but this is a considerable inconvenience. In other instances, the lift truck may be partially disassembled to facilitate its being loaded into the hold of the ship.

It is an object of this invention to provide a combined battery case and counterweight assembly for an electric lift truck which is readily removable from the lift truck as a single unit.

It is a further object of this invention to provide a combined battery case and counterweight assembly for an electric lift truck which is quickly removable to permit the battery case and counterweight assembly and the remainder of the lift to be separately loaded on ships with a conventional cargo boom.

It is a further object of this invention to provide a combined battery case and counterweight assembly which is quickly detachable from an electric lift truck and which may be rested on a dock or other flat support in its customary upright attitude.

These and other objects and advantages of this invention will be apparent when the following description is read in conjunction with the drawings in which:

FIG. 1 is a side view of an electric lift truck incorporating a first embodiment of this invention;

FIG. 2 is a top view of the lift truck shown in FIG. 1;

FIG. 3 is a side view of an electric lift truck incorporating a second embodiment of this invention;

FIG. 4 is a top view of the lift truck shown in FIG. 3.

Referring to FIGS. 1 and 2 of the drawings the lift truck 11 includes a chassis 12 having a flat rear platform 13 on which a combined battery case and counterweight assembly 14 rests. The chassis 12 also includes an upright plate 15 to which a seat 47 is pivotally connected. The battery case portion of the combined assembly 14 includes bottom battery support angles 16, 17, 18 and 19 which are welded together at their mitered corners. The rear angle 17 is welded to a cast counterweight 21 and a pair of angle corner braces 22, 23, which serve also as legs, are welded to the forward corners of the open bottom tray formed by angles 16, 17, 18, 19. A pair of side rails 24, 25 are welded at their rear ends to the counterweight 21 and at their forward ends to the angles 22, 23. A transverse rail 26 welded at its trans-

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versely opposite ends to angles 22, 23 completes the battery case for the main electric power battery 30. The lower central portion of the counterweight has a longitudinal opening 31 formed therein to permit access to and use of a trailer hitch 32 secured to the rear of the chassis 12 when the unitary battery case and counterweight assembly 21 is in place. A pair of vertically extending recesses 33, 34 are formed in the counterweight for receiving lifting eyes 36, 37 welded to and extending rearwardly from the truck chassis 12. The lifting eyes 36, 37 have upwardly extending hook portions 38, 39 which register with upwardly extending pockets at the upper end of recesses 33, 34, one of these pockets being designated 41. The leg portions of corner angles 22, 23 fit in front of blocks 44, 46 welded to the side of the chassis 12. The eyes 36, 37, recesses 33, 34, angles 22, 23 and blocks 44, 46 provide means releasably interconnecting the assembly 21 and the chassis 12 to prevent relative lateral and longitudinal movement.

When it is desired to remove the combined battery case and counterweight from the lift truck the operator's seat 47 is pivoted forwardly to the position shown by dot-dash lines 48. The hooks on the lift chains are then connected to the lift eyes 49, 51 on counterweight portion 21 and to lifting eyes 52, 53 formed on the upper ends of angles 22, 23. Upward movement of the combined battery case and counterweight disengages the leg portions of angles 22, 23 from the blocks 44, 46 and the counterweight recesses 33, 34 from eyes 36, 37.

The lower end of the counterweight 21 is at approximately the same elevation as the lower end of legs 22, 23. This permits the battery to be in its proper upright position when the combined battery case and counterweight is removed from the truck and rested on a flat support such as the deck of a ship or the surface of the dock. After the combined battery case and counterweight are lifted from the truck and shifted, for instance, from the dock to the hold of the ship a single cargo boom may be employed to lift the remainder of the truck onto the ship by connecting the hooks of the lifting chains to the rear eyes 36, 37 and to front lifting eyes 56, 57 secured to the chassis 12 of the lift truck.

In the second embodiment of this invention, shown in FIGS. 3 and 4, the combined counterweight and battery case 71 differs from that illustrated in FIGS. 1 and 2 in that the counterweight 72 does not extend downwardly at the rear of the truck and the counterweight 72 is a container for counterweight material such as scrap iron. The main power battery 73 rests on angles 74, 75, 76 forming a bottom tray. Side rails 77, 78 are welded at their rear ends to the counterweight box 72 and at their forward ends to transversely opposite ends of a front rail 79. Vertical members 81, 82 are welded at their lower ends to channels 74, 75 and intermediately to side rails 77, 78. Lifting eyes 83, 84 are formed in the upper end of the members 81, 82 and a pair of lifting eyes 86, 87 are welded to the counterweight portion 72. Locking members 91, 92, 93, 94 in the form of tapered or conically shaped legs are welded to the bottom of the combined battery case and counterweight and when the combined assembly is installed on the rear platform of the chassis 112, these locking means fit in registering recesses or openings 96, 97, 98, 99 in the lift truck chassis 112. Appropriate lifting eyes 101, 102, 103, 104 are provided on the lift truck chassis to facilitate its being loaded onto and removed from a ship by a cargo boom.

The embodiment of the invention illustrated in FIGS. 3 and 4 is the less expensive version and does not require long legs at its forward end to maintain the battery in the proper upright position when the combined battery case and counterweight are separated from the electric

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lift truck. Also the counterweight does not extend downwardly in the vicinity of the trailer hitch 107, thus avoiding any possible interference with sharp turning with a trailing vehicle. The tapered feature of the downwardly extending members 91, 92, 93, 94 facilitates registering with the pocket openings 96, 97, 98, 99 during lowering of the assembly 71 onto the chassis 112.

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

1. A battery operated lift truck comprising:
 - a lift truck chassis having a rear platform,
 - a hitch on the rear of said chassis,
 - a combined battery case and counterweight assembly resting on said platform and quickly removable therefrom as a unit including,
 - a counterweight portion at the rear of said lift truck chassis having a part extending downwardly below said platform at the rear of said chassis and presenting an opening permitting access to said hitch, and
 - a battery case portion for receiving a main power battery rigidly secured to said counterweight portion and extending forwardly therefrom, and
 - means releasably interconnecting said assembly and chassis to prevent relative lateral and longitudinal movement.
2. The structure set forth in claim 1 and further comprising a pair of front legs on opposite sides, respectively, of said battery case portion extending downwardly therefrom to the approximate same extent as said downwardly extending part.
3. A battery operated lift truck comprising:
 - a lift truck chassis having a rear platform,
 - a combined battery case and counterweight assembly resting on said platform and quickly removable therefrom as a unit including,
 - a counterweight portion at the rear of said lift truck chassis having a part extending downwardly below said platform at the rear of said chassis, and
 - a battery case portion for receiving a main power battery rigidly secured to said counterweight portion and extending forwardly therefrom,
 - means releasably interconnecting said assembly and

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- chassis to prevent relative lateral and longitudinal movement, and
- a pair of front legs secured to and extending downward at laterally opposite sides of said battery case portion whereby said assembly maintains its upright position when removed from said chassis and placed on a flat support.
- 4. A battery operated lift truck comprising:
 - a lift truck chassis having a rear platform,
 - a combined battery case and counterweight assembly resting on said platform and quickly removable therefrom as a unit including,
 - a counterweight portion at the rear of said lift truck chassis, and
 - a battery case portion for receiving a main power battery rigidly secured to said counterweight portion and extending forwardly therefrom,
 - means releasably interconnecting said assembly and chassis to prevent relative lateral and longitudinal movement including
 - a pocket opening in said platform, and
 - a downwardly extending member on the bottom of said assembly registering with said pocket opening.
- 5. The structure set forth in claim 4 wherein said counterweight portion is a box adapted to receive counterweight material.
- 6. The structure set forth in claim 4 wherein said member is tapered to facilitate registration with said pocket opening during lowering of said assembly onto said chassis.

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