

# United States Patent [19] Shipley et al.

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[45] July 24, 1973

[54] LOAD HANDLING VEHICLE

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[51] Int. Cl. .... B66f 9/20

[58] Field of Search. .... 214/670, 671, 672, 214/673, 674, 141; 187/8.54; 212/57

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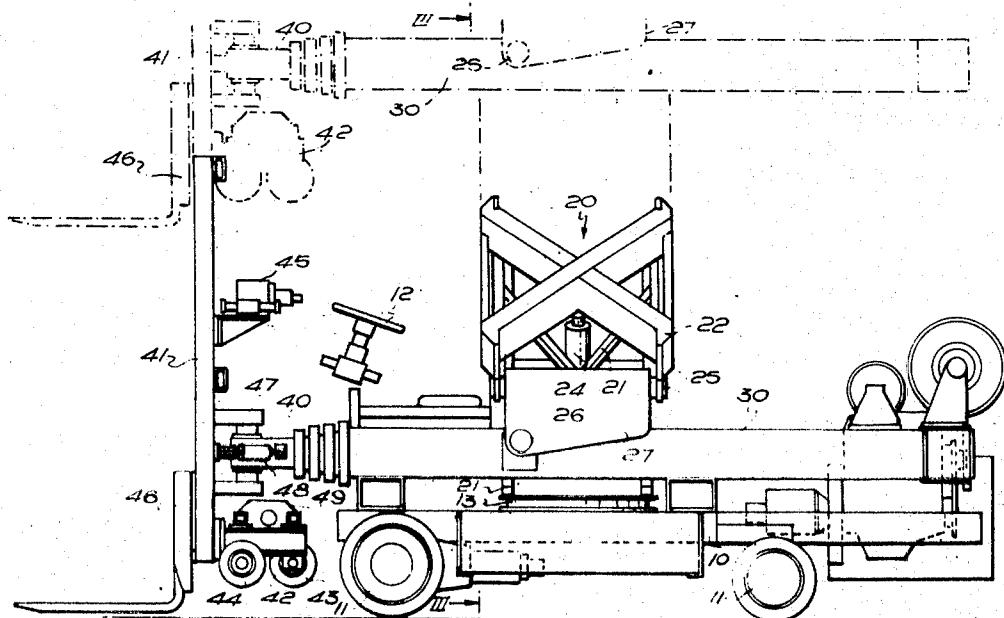
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[57] ABSTRACT

A load handling vehicle is provided with an extensible boom at the end of which is carried a load raising device such as a fork lift tower, cylinder grab, crate grab or small crane jib together with support means and the boom is mounted horizontally on a mast carried by the chassis for operating the load raising device on loading decks at varying heights and at a distance from the rest of the vehicle.

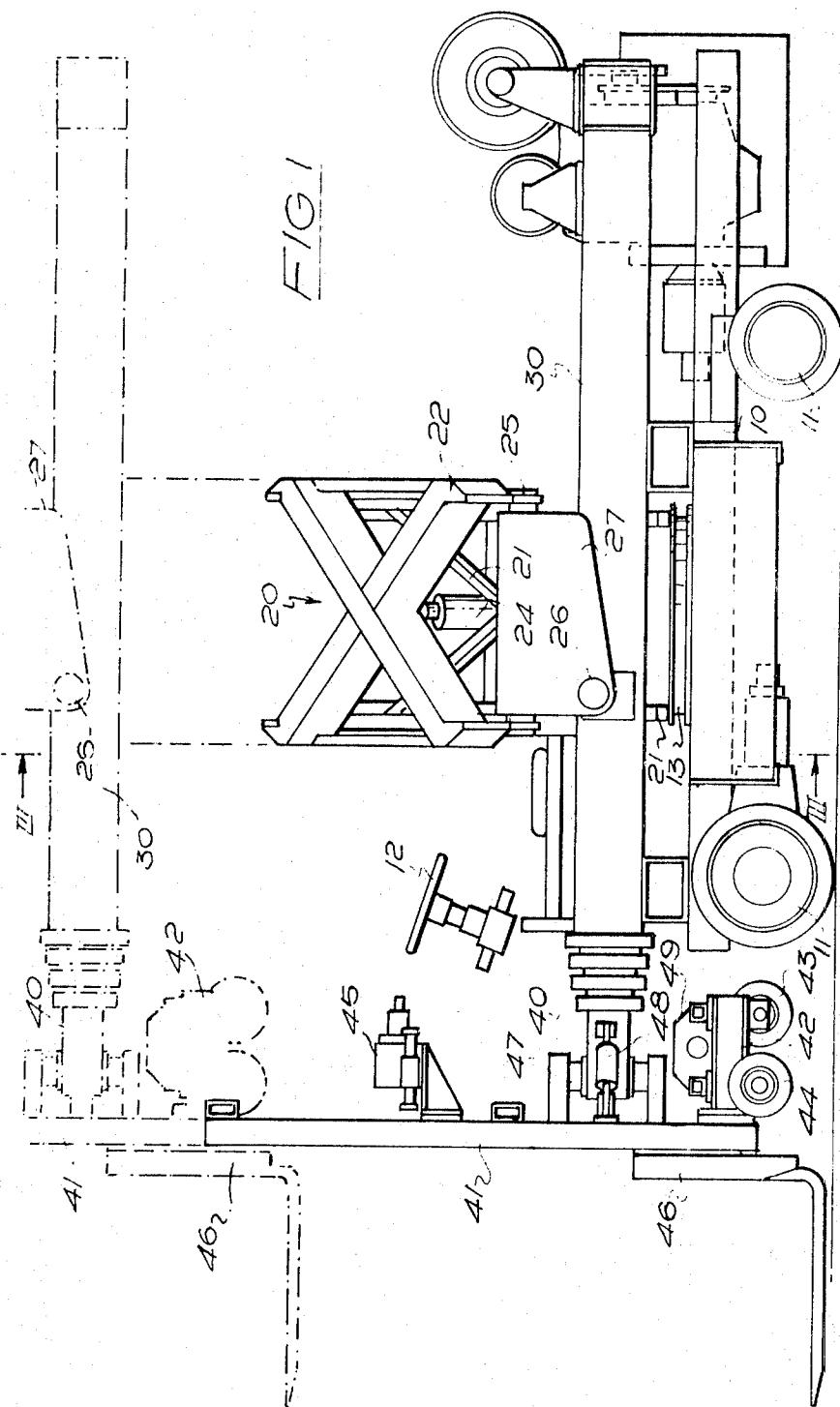
3 Claims, 3 Drawing Figures



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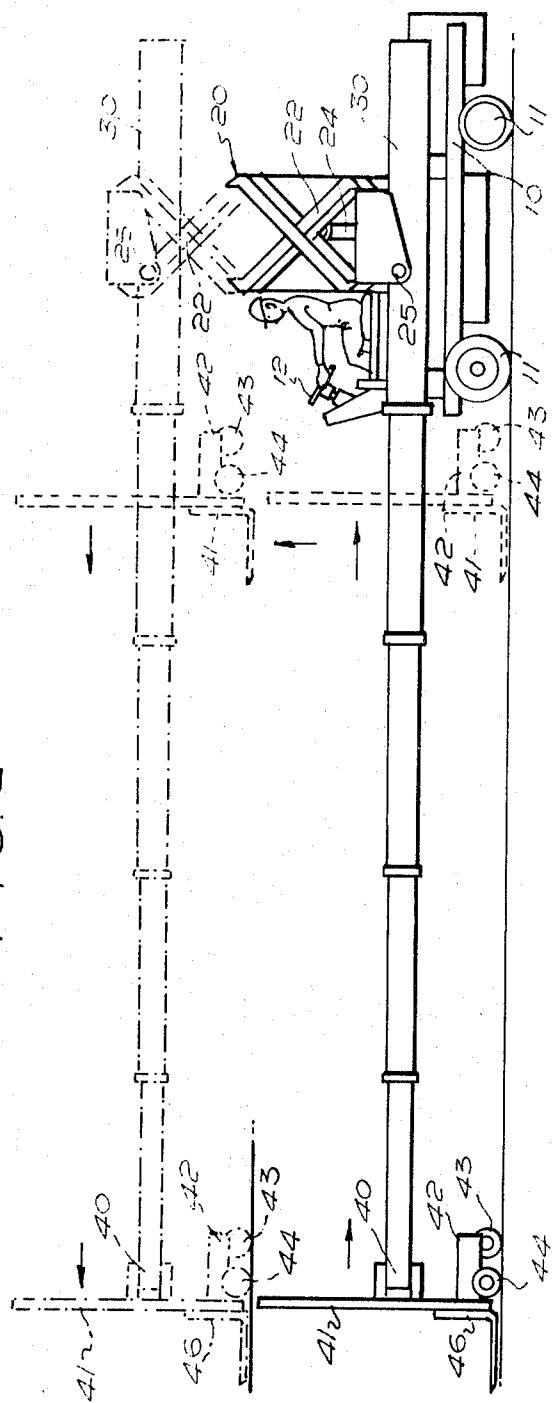
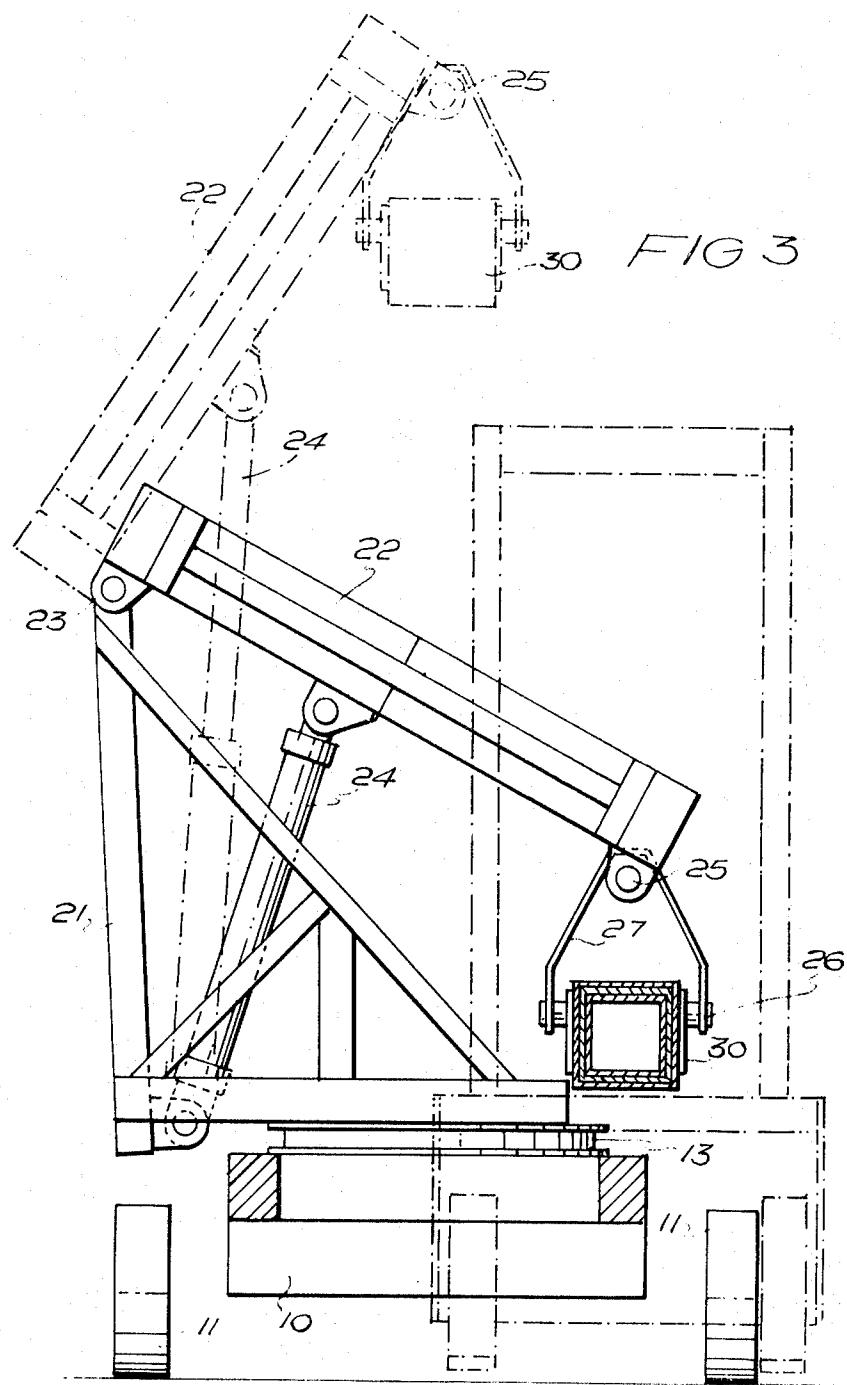


FIG. 2

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## LOAD HANDLING VEHICLE

This invention concerns improvements in and relating to load handling vehicles having load raising means such as a fork-lift tower.

With known fork-lift vehicles it is possible only to raise or lower the forks relative to the vehicle chassis, any horizontal movement which may be required necessitating movement of the vehicle as a whole. Thus, known fork-lift vehicles suffer serious disadvantages when it is required to load, for example, container-type vehicles, aircraft fuselages or the like where the loading deck is at a height above the travelling surface of the fork-lift vehicle.

At the present time, therefore, loading of containers or the like is done manually or with the use of gravity feed conveyors, both requiring the expenditure of a great deal of man-hours particularly when it is required to load to full roof height.

An object of the present invention is to provide a load handling vehicle having a load raising device operable at variable heights and at a distance from the rest of the vehicle.

According to the present invention a load-handling vehicle comprises a chassis, a mast mounted on the chassis, an extensible boom mounted horizontally or substantially horizontally on the mast, attachment means carried at the free end of the boom for receiving a load-raising device such as for example a fork-lift tower, cylinder grab, crate grab, or small crane jib and support means mounted at the free end of the boom for supporting the load raising device and the boom.

In a preferred embodiment of the invention the mast is articulated about a horizontal axis to permit raising and lowering of the boom and is preferably also rotatably mounted on the chassis to give 360° slewing of the boom. The boom may be mounted on the upper free end of the mast via a fabricated fulcrum and level-compensating hydraulic or pneumatic ram, or by a retaining ring, the boom preferably having several, e.g. three or four, extendable sections.

The support means preferably include a powered drivable wheel for effecting extension and retraction of the boom and a steering device is also preferably provided for moving the load raising device laterally to the left or the right with respect to the boom. Additionally one boom section may be hydraulically or pneumatically extensible and retractable or alternatively the boom sections may be hydraulically or pneumatically extensible and retracted by a system of wire ropes. The support means, which may include a skirted air cushion or freely rotatable wheels, castors or rollers, is movable for supporting the boom head during extension of the boom by contact with a loading deck at a height above the travelling surface of the vehicle.

The articulation of the mast permits lowering of the boom to chassis level. This allows the boom to be secured very near to the base of the load raising device, thus reducing stress in the attachment caused by the moment between the tractive wheels and the boom. The boom may be constructed or open tubular framework, cylindrical sections or box-like sections, it is only required to lift the load-raising device when the boom is retracted.

Hydraulic or pneumatic means may also be provided to pivot the load raising device about a vertical axis relative to the boom, preferably through 90° to left or

right of the boom axis and usually the powered wheels at the boom head are used to extend or retract the boom, and to turn the load carrying attachment in either lateral direction.

5 The invention will be described further, by way of example, with reference to the accompanying drawings in which:

10 FIG. 1 is a side elevation of a load handling vehicle according to the invention incorporating a fork-lift truck, a raised position of the boom and truck being shown in chain dotted lines,

15 FIG. 2 is a side elevation as in FIG. 1 showing the boom in its extended positions and

20 FIG. 3 is a section on line III — III of FIG. 1

25 The load handling vehicle comprises a chassis 10, as mast 20 mounted on the chassis 10, an extensible boom 30 mounted horizontally on the mast 20, attachment means 40 carried at the free end of the boom receiving a fork lift truck device 41 and a wheeled support carriage 42.

30 Road wheels 11 and a drivers cab with steering wheel 12 are provided on the chassis 10, also a turntable 13 on which the mast 20 is carried.

35 The mast 20 comprises a frame 21 at the apex of which a cruciform arm 22 is pivoted at 23. A hydraulic ram 24 is pivotally mounted between the base of the frame 21 and the centre of the cruciform arm 22 at the free side of which a cradle 27 is pivoted at 5 and carries the extensible boom 30, pivotally suspended at 25 in the cradle 27.

40 The boom 30 comprises four inner telescopic arms 31, 32, 33, 34 retractable into the housing 30 on which a stop (not shown) is provided for abutting the cradle 27 and maintaining the boom 30 substantially horizontal driving raising of the mast 20. At the free end of the inner arm 34 of the boom 30 a linkage 40 carried a fork-lift truck 31.

45 The fork-lift truck 41 has an electric motor 49 powering a wheel 43 of a carriage 42 provided also with two load supporting wheels 44. A further electric motor 45 is provided for raising and lowering the fork 46. The truck 41 is pivotally connected to the linkage 40 at 47 and a pair of hydraulic steering rams are provided, one on each side of the linkage, one being shown at 48 (FIG. 1).

50 In use the fork lift truck 41 moves on its wheels 43, 44 being driven by wheel 43 from the motor 49 and the extensible boom acting as a guide and carrier for control circuits from the driver's cab. In the position shown in full lines in FIG. 2 the truck 41 is loading in a restricted space at the level of the travelling surface of the road wheels 11 of the load handling vehicle. For loading at a distance from the vehicle at a height above the travelling surface the truck 41 is driven toward the rest of the vehicle, causing retraction of the boom in the direction of the arrows, the mast is then raised by the ram 24 until the truck 41 is raised to the required level and then driven along the deck at the required level.

55 60 We claim:

1. A load handling vehicle comprising a chassis, a turntable mounted on said chassis for rotation about a vertical axis, a mast mounted on said turntable, said mast consisting of a vertically swinging arm pivotably attached to said turntable at a point spaced from the axis of rotation of said turntable, an extensible boom mounted substantially horizontally on the mast, means

for moving said mast and said boom vertically relative to said chassis, load supporting and raising means carried at the free end of the boom, said load supporting and raising means including a load raising device consisting of at least one fork mounted on and supported by a load supporting device, means including a powered drivable wheel for moving said load supporting and raising means horizontally relative to said chassis, a steering device provided for moving the load support-

ing and raising means laterally with respect to said boom, and means for moving said load raising device vertically relative to said load supporting device.

5 2. A load handling vehicle as claimed in claim 1 in which the boom comprises a plurality of telescopic arms.

3. A load handling vehicle as claimed in claim 1 in which the load raising device is a fork lift truck.

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