Sept. 28, 1948. H. A. WAGNER ET AL 2,450,102

MATERIAL LIFTING AND TRANSPORTING VEHICLE

Filed Aug. 18, 1945

2 Sheets-Sheet 1

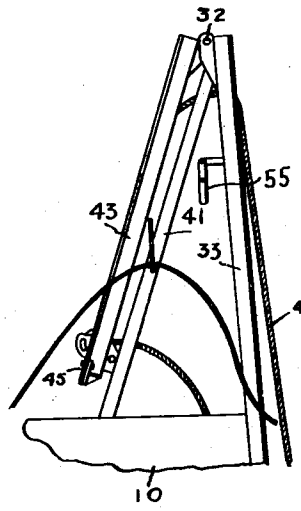

FIG. 2

FIG. 1

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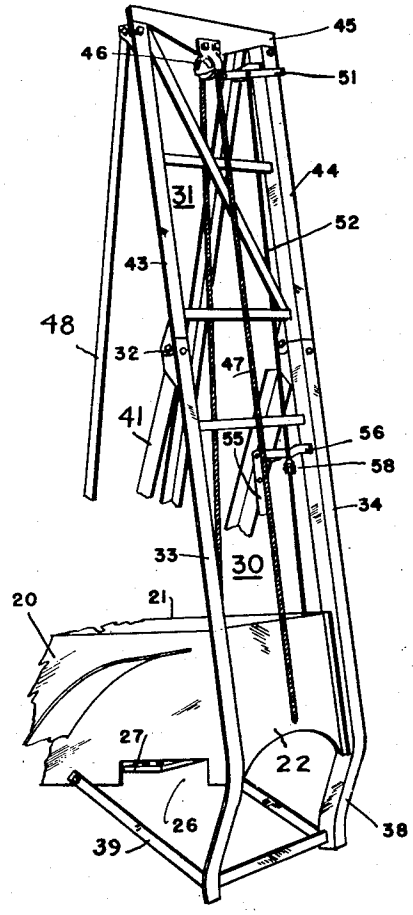

FIG. 3

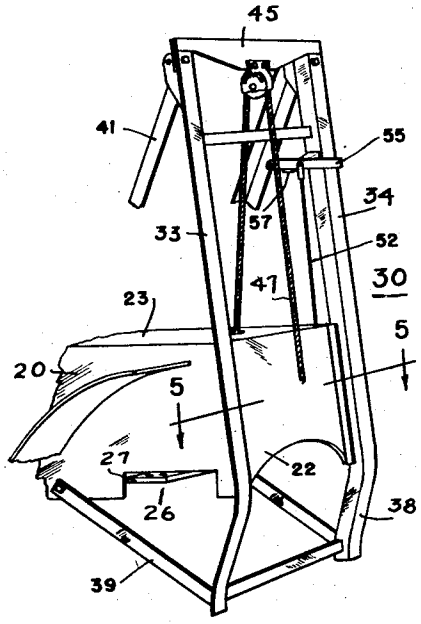

FIG. 4

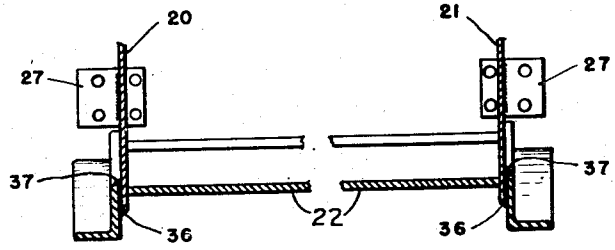

FIG. 5

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MATERIAL LIFTING AND TRANSPORTING VEHICLE

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3 Claims. (Cl. 214—120)

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The present invention relates to material handling apparatus and, more particularly, to vehicles for lifting and transporting loads.

Material handling apparatus such as scoop trucks or lift trucks comprise prime mover vehicle having an elevator tower structure mounted on the forward end thereof, upon which the load lifting element such as a scoop or platform is vertically movable. Because of the fact that it is sometimes desirable to operate such trucks either within buildings or in other locations providing low overhead clearance the top of the tower structure is normally relatively low with provision for extending it for elevating loads to maximum heights when overhead conditions permit. Such tower structures are generally of a telescopic nature and, accordingly, are relatively complicated and expensive. There is a very definite need for a simple and inexpensive lift truck particularly designed for handling bulk material such as coal, sand, dirt, fertilizer, snow and the like and for general utility over ordinary ground.

It is an object of the present invention, therefore, to provide a new and improved general utility lift truck having a relatively simple and inexpensive elevator tower structure and mounting arrangement therefor.

A still further object of the present invention is to provide a new and improved elevator tower structure for vertical lift trucks having an elongated extension at the upper end which may readily be folded downwardly or removed for use of the truck when restricted overhead clearance conditions prevail.

And another object of the invention is to provide a new and improved vehicle body and tower structure for a lift truck which is relatively light in weight, low in manufacturing cost, yet sturdy and capable of handling relatively heavy loads.

Further objects and advantages of the present invention will appear from the following description taken in connection with the accompanying drawings, while the features of novelty will be pointed out with greater particularity in the appended claims.

In the drawings Fig. 1 is a side elevation illustrating the invention according to one embodiment thereof; Fig. 2 is a partial side elevation illustrating the upper end of the tower structure in the folded condition; Fig. 3 is a fragmentary perspective view illustrating the tower structure of the apparatus shown in Fig. 1; Fig. 4 is a fragmentary view in perspective illustrating the tower structure shown in Fig. 3 with the upper end section removed; and Fig. 5 is an enlarged cross-

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sectional view taken along the line 5—5 of Fig. 4.

Referring now to the drawings, in Fig. 1 is shown a vehicle indicated generally at 10, having a prime mover engine (not shown) mounted therewithin operatively connected to a pair of front drive wheels 11. The rear end of the vehicle is supported by a single rear wheel 12 upon the lower end of a vertically arranged column 13 which is mounted for free rotation about a vertical axis, a tiller arm 14 being connected to the upper end of the column 13 by means of which steering movements of the vehicle may be controlled by a driver positioned upon the seat 15. A tower structure, indicated generally at 16, is mounted upon the forward end of the vehicle 10 and a load handling element, such as a scoop 17 supported by a carriage 18, is arranged for longitudinal vertical movement upon the tower structure.

The body of the vehicle 10 is of a generally box-like construction and is made of steel plate forming not only the enclosure for the prime mover engine, power transmission apparatus and other mechanisms but also the structural framework for the vehicle. As shown more clearly in the views of Figs. 3 to 5, inclusive, the vehicle body is comprised of a plurality of relatively wide steel plates forming the opposite side walls 20 and 21 and a forward wall 22 spacing the opposite side walls apart and rigidly welded thereto along the opposite side edges. A top plate 23 is also provided across the upper ends of the side walls 21 and 22 adjacent the forward end of the vehicle body forming an enclosure for the hoist drum and driving mechanism therefor (not shown). The plates 20, 21, 22 and 23 are relatively heavy and the body structure formed thereby is mechanically strong and is inexpensive to manufacture since no additional framework is required. As will be described, the front wheel assembly may be attached directly to the lower edges of the body side walls.

The front wheel and axle assembly may readily be obtained as a complete assembled unit from automotive truck manufacturers at a relatively low cost. As shown in the drawings, cutout openings 26 are provided in the lower edges of the side walls 20 and 21 and relatively heavy mounting plates 27 are welded directly to the edges of the side wall plates at the upper ends of the openings 26 for attachment thereto of the axle housing by U-bolts or other suitable fastening means.

The tower structure 16 provided on the front end of the vehicle comprises a lower section 30

and an upper section 31 hingedly mounted as at 32 onto the upper end of the lower section. The lower section is comprised of a pair of relatively heavy angle iron uprights 33 and 34 which are so arranged that the forward flanges extend in a common plane and away from each other defining tracks for the rollers of the scoop carriage 18. The other flanges of the angle iron members extend rearwardly of the vehicle and are welded directly to the opposite side walls 20 and 21 adjacent the foremost edges thereof. As shown more clearly in the sectional view of Fig. 5 the forward wall 22 is welded to the opposite side walls 20 and 21 slightly rearwardly of the foremost edges thereof, so that the edge portions of the side walls are available for welding to the flange of the adjacent angle iron as indicated at 36. The rear edge of the angle iron members may be welded to the outer surfaces of the side wall plates as indicated at 37. This mode of welding of the angle iron upright members onto the vehicle body provides a structurally strong attachment, particularly in view of the fact that the side walls are relatively high and the welds 36 and 37 extend the full height of the side walls.

The lowermost ends of the angle iron members 33 and 34 are curved rearwardly as indicated at 38 in order to cause downward tilting of the scoop in the lowermost portion thereof whereby the forward edge of the scoop is brought substantially into contact with the ground. Braces 39 are provided between the lowermost ends of the angle iron members and rearward portions of the side walls 20 and 21 for strengthening the lower end portions, which may be desirable in the event that the scoop is to be used for loading coal and the like when a very considerable amount of power may be required to drive the scoop forwardly into the pile of such material upon the ground. The braces 39 are removable in order to facilitate assembly and removal of the front wheel and axle assembly.

The upper ends of the angle iron members 33 and 34 are braced by rearwardly extending bracing members 41 which are welded at opposite ends to the corresponding tower members and the vehicle body side walls, respectively.

The upper elevator tower section 31 is comprised of a pair of parallel spaced apart angle iron members 43 and 44 having suitable cross braces extending therebetween, the angle iron members in the upright position of the tower section 31 as shown in Figs. 1 and 3 extending in cooperative end to end alignment with the angle iron members 33 and 34 of the lower tower section 30. A crosshead 45 is mounted upon the upper end of the upper tower section 31 having a sheave block 46 secured to the central portion thereof and around which is trained the cable 47 extending from a winch drum (not shown) provided within the forward portion of the vehicle body and connected at its other end to the carriage 18 of the load handling scoop 17. The upper tower section is adapted to be braced in the upright or extended position by means of a pair of removable angle iron braces 48 extending between the uppermost ends of the angle iron members 43 and 44 and rearward portions of the side walls 20 and 21 of the vehicle body. When it is desired to reduce the over-all height of the vehicle, such as may be required for shipment thereof or for moving the vehicle from the site of one job to the next, the braces 48 may be removed and stowed alongside the vehicle body and the

upper tower section 31 folded rearwardly and downwardly against the fixed braces 41 for the lower tower section as shown in the fragmentary view of Fig. 2. For such temporary lowering of the tower extension 31 the cable 47 need not be removed from the sheave block 46 and the erection of the tower to the operative extended position may be effected with little effort in a relatively short space of time.

Under certain conditions it may be desirable to remove the upper tower section 31 entirely and to mount the crosshead 45 onto the upper end of the lower tower section as shown more clearly in Fig. 4. The pins of the hinge connections 32 are removable as well as the crosshead 45 itself, and the upper ends of the lower angle irons are provided with suitable holes for attachment of the crosshead 45 thereto.

In a lift truck of the type herein described it is desirable to provide means for precluding movement of the load lifting carriage 18 beyond a predetermined upper limit position. Such means usually consist of a lever extending into the path of movement of the carriage and which when engaged by the carriage is operative for automatically shifting the driving mechanism for the cable winch drum to the inoperative or disengaged position. As shown in the drawings, such a lever is indicated at 51 which is pivotally mounted at its rear end onto a bracket arm secured to the inner surface of the rearwardly extending flange of the angle iron member 44. The lever 51 is connected by a cable 52 extending downardly into the forward end of the vehicle body where suitable connection is made to the drive clutch for the winch drum. Upon engagement of the lever 51 by the carriage 18 the lever is moved upwardly which pulls on the cable 52 to effect disengagement of the clutch and arresting further movement of the carriage. A lever 55 similar to lever 51 is also provided on the lower tower section, it being mounted on the end of a bracket arm 56 welded to the inner surface of the rearwardly extending flange of the angle iron member 34. When the upper tower section is removed, as shown in Fig. 4, the lever 55 is swung to the operative position above the supporting stop 57 and connected to the cable 52. The upper end portion of the cable 52 may be disconnected from the lower portion at the coupling 58 during such use.

Having described the invention in what is considered to be a preferred embodiment thereof, it is desired that it be understood that the specific details shown are merely illustrative and that the invention may be carried out by other means.

What we claim is:

1. In an apparatus of the class described, the combination comprising a vehicle body, metal plates defining a pair of relatively high vertical side walls for said body, a metal plate defining a relatively high forward wall for said body and welded along its opposite side edges to said side walls for spacing them rigidly apart, an elevator tower structure on the forward end of said body, said tower structure including a lower section rigidly secured to said body and an upper section hingedly mounted on the upper end of said lower section for rearward folding movement, load lifting means mounted on said tower structure for vertical longitudinal movement thereupon, said tower sections each including a pair of spaced apart parallel angle iron members defining tracks for said load lifting means, the forward flanges

of said angle iron members extending in a common plane, the other flanges of said members extending rearwardly from said plane with respect to said body, said rearwardly extending flanges of said members of said lower section being rigidly welded to the outer surfaces of said side walls adjacent the foremost end of said body throughout the full height of said side walls, a pair of braces extending between rearward portions of said side walls and the uppermost end of said upper tower section for holding said angle iron members thereof in an aligned relation with respect to said members of said lower section, said braces being adjustable to permit rearward folding of said upper section.

2. In an apparatus of the class described, the combination comprising a vehicle body, metal plates defining a pair of relatively high vertical side walls for said body, a metal plate defining a relatively high forward wall for said body and welded along its opposite side edges to said side walls for spacing them rigidly apart, an elevator tower structure on the forward end of said body including a lower section rigidly secured on said body and an upper section hingedly secured on the upper end of said lower section, said tower sections each including a pair of parallel spaced apart uprights defined by relatively heavy angle iron members with forward flanges extending in a common plane facing forwardly of said body and with the other flanges thereof extending rearwardly relative to said body, load lifting means including a carriage mounted upon said tower structure for longitudinal movement upon said angle iron members, a crosshead including a sheave block mounted upon the upper end of said upper section, a hoist cable extending from said body over said sheave block and connected at its opposite end to said load lifting means, said upper tower section being rearwardly foldable upon said lower tower section, said crosshead being removable from the upper end of said upper section and adaptable for mounting on the upper end of said lower section.

3. In an apparatus of the class described the combination comprising a vehicle body, metal plates defining a pair of relatively high vertical side walls for said body, a metal plate defining a relatively high forward wall for said body and welded along its opposite side edges to said side walls for spacing them rigidly apart, an elevator tower structure on the forward end of said body, said structure including a pair of relatively heavy angle iron members defining a pair of spaced apart parallel uprights, the forward flanges of said angle iron members extending in a common plane with the other flanges of said members extending rearwardly from said plane, said rearwardly extending flanges of said members being rigidly welded to the outer surfaces of said side walls adjacent the foremost end of said body and throughout the full height thereof, a second pair of angle iron members hingedly connected to the upper end of said first pair of members and defining in part the upper end of said tower structure, removable braces secured between the upper ends of said second pair of members and said side walls adjacent the rear end thereof, said braces being removable to permit rearward folding of said second pair of members.

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