Jan. 21, 1958 W. G. MEAGHER 2,820,561

VEHICULAR HOIST UNIT

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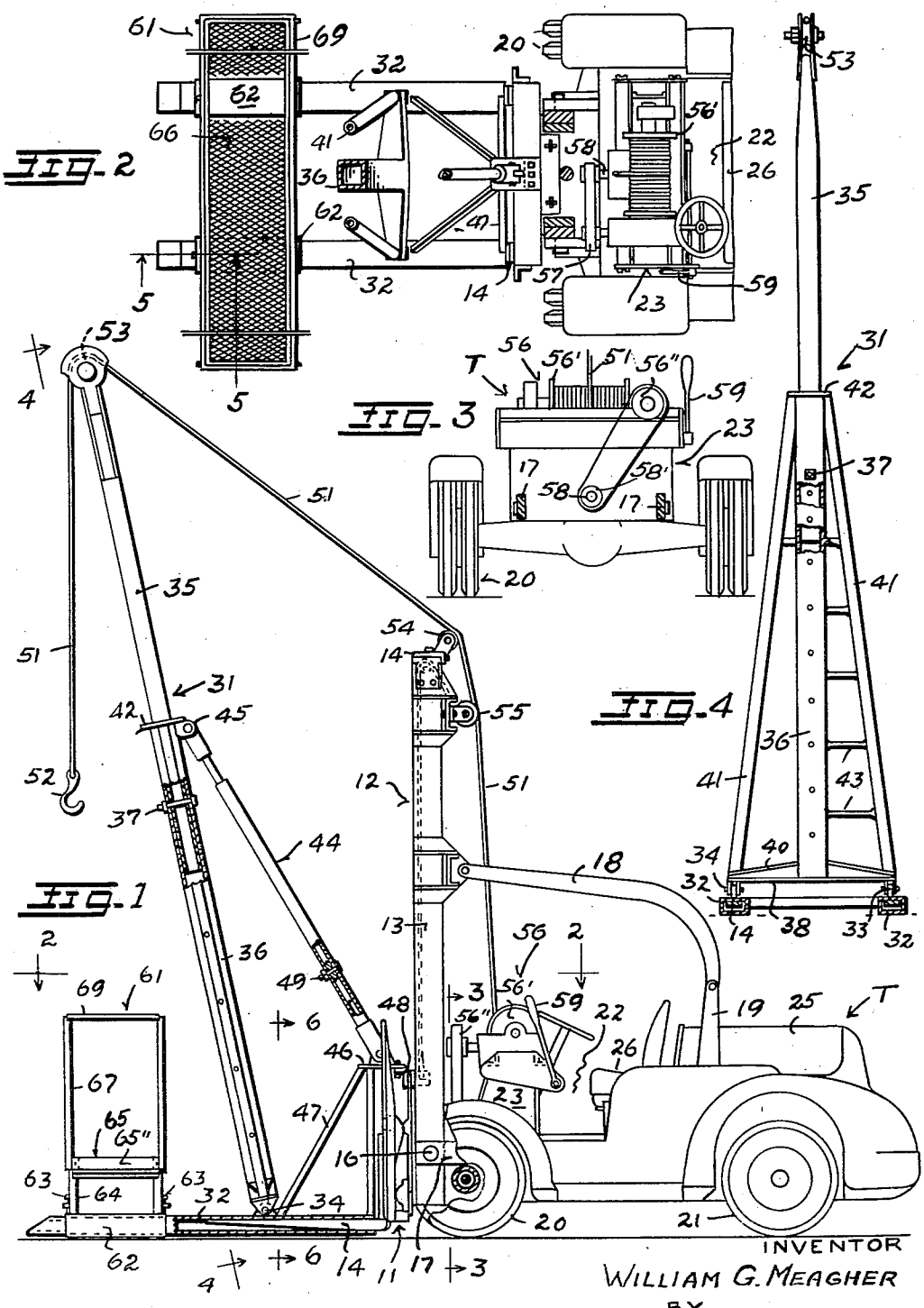

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FIG. 7

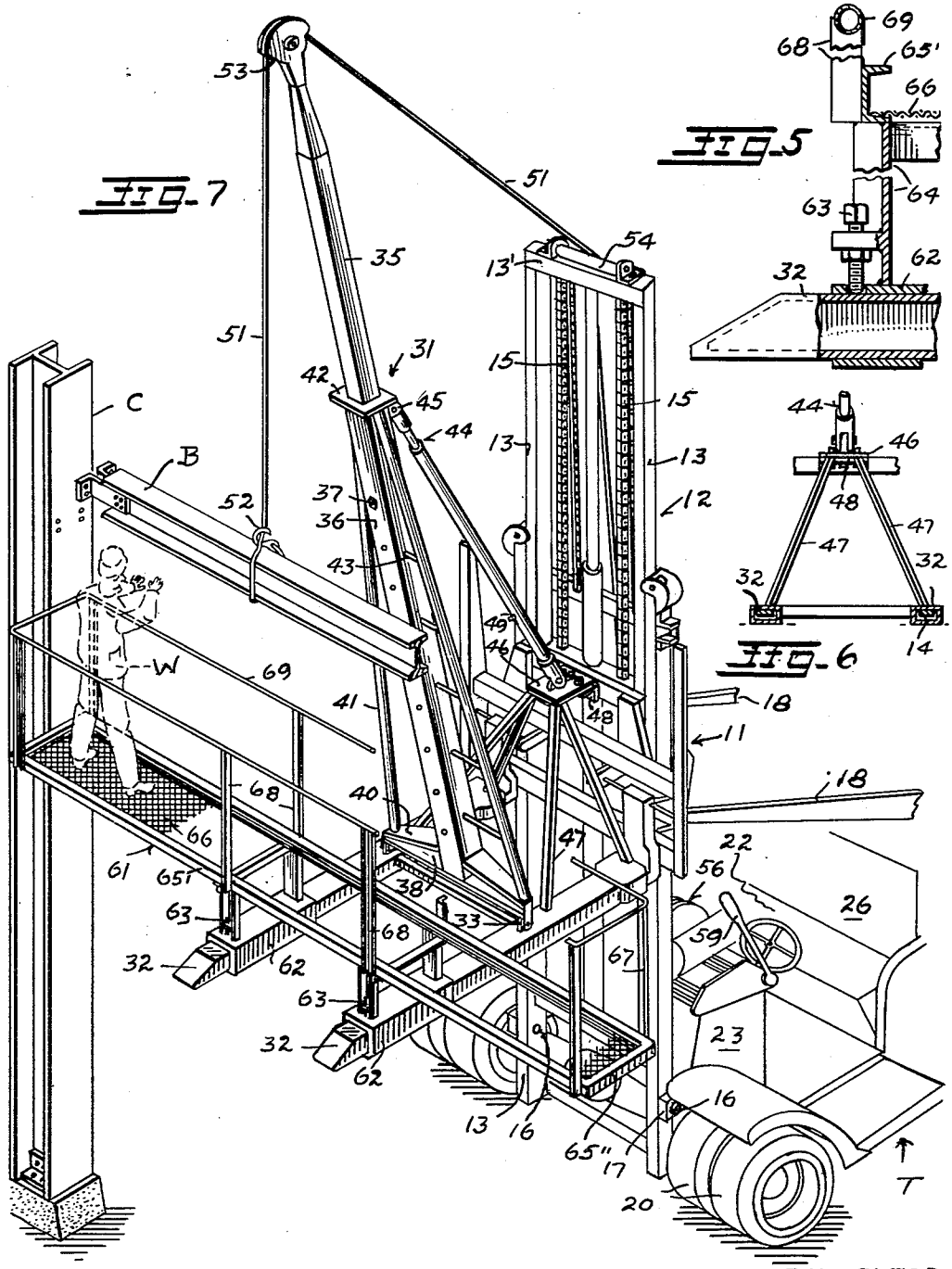

FIG. 5

FIG. 6

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VEHICULAR HOIST UNIT

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4 Claims. (Cl. 214—620)

The invention relates to a vehicular hoist unit providing a crane boom for use in the support and elevated spot positioning of a load element.

An object of the invention is to provide a particularly effective mounting for a vehicle-carried boom for supporting workpieces in vertically adjusted relation to the ground.

Another object is to provide a workman's staging which is mounted for height adjustments with the boom to provide for its cooperative use with a boom-supported load.

A further object is to provide boom and staging units which are arranged for their removable mounting on the elevator carriages of industrial lift trucks or tractors as attachments therefor.

An added object is to provide boom and staging units which are readily adaptable to their mounting on the lifting carriages of vehicular lift hoists of various structures.

A more specific object is to provide a boom-and-staging unit of the character described which is particularly adapted for its removable mounting on the fork of an industrial truck or tractor of the fork-lift type.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent in the following description of a typical embodiment of the invention, and in the accompanying drawings, in which:

Figure 1 is a side elevation of a vehicular hoist assembly embodying the features of my invention.

Figure 2 is a fragmentary plan view of the assembly taken at the line 2—2 in Figure 1.

Figure 3 is an elevation taken at the line 3—3 in Figure 1.

Figure 4 is an elevation of a boom structure of the assembly taken at the line 4—4 in Figure 1.

Figure 5 is an enlarged fragmentary upright section taken at the line 5—5 in Figure 2.

Figure 6 is a fragmentary elevation taken at the line 6—6 in Figure 1.

Figure 7 is a perspective view showing a present assembly in use during the placement of a beam for the bolted or riveted attachment of one end thereof to an erected column of a building structure.

The present boom-and-staging units have been particularly designed for mounting on a self-propelled truck or tractor T having a work-supporting elevator or lift carriage 11 mounted at the front of the vehicle. The present carriage 11 is supported for its rectilinear adjustment in an upright guideway provided by a frame 12 which is mounted at and across the front of the vehicle T and includes side standards 13 connected at their tops by a cross-bar 13'. Mutually parallel fork arms 14 extend rigidly and forwardly from the bottom of the frame 12 for cooperatively supporting articles to be raised or lowered with respect to the ground which supports the vehicle T. The carriage 11 may be disposed and held

at variably adjusted heights with respect to the ground in a suitable manner, as by chains 15 which extend from the carriage 11 over pulleys carried by the frame cross bar 13', and are arranged for their actuation from the vehicle engine, or other source of power, by a suitable drive connection, not shown.

The frame 12 is hingedly supported on the vehicle T at aligned hinge pins 16 connecting bottom points of its standards 13 with corresponding forward points of side frame members 17 of the vehicle chassis, and brace links 18 extending rearwardly from corresponding intermediate points of the standards 13 of the frame 12 positionably connect the frame with corresponding arms 19 extending upwardly from the side frame members 17 of the vehicle chassis. It will be understood that if angular adjustments of the frame 12 are desired, the arms 19 may be angularly adjustable in a fore-and-aft direction under suitable control, as of a dogged hand lever and a connecting link in a well understood manner.

The chassis of the vehicle T is dirigibly supported in a usual manner on pairs of front and rear wheels 20 and 21 respectively, and its body provides an operator's compartment 22 between a forward part 23 supporting the instrument panel and a rearward part which mounts the vehicle-operating engine within a protective hood 25. The rear disposal of the vehicle engine and the use of weighted fenders for the rear wheels 21 are arranged to cooperatively provide the necessary counter-balancing of the weight carried in front of the line of engagement of the front wheels 20 with the ground. An operator's seat 26 is provided in the vehicle compartment 22, and the controls and indicators and steering wheel for the vehicle and hoist mechanism are disposed within ready reach of an operator occupying the seat, chiefly on or adjacent the forward body part 23 disposed in front of the seat.

It will now be noted that the fork arms 14 are utilized for the direct support of a work-positioning boom 31. As particularly illustrated, the boom base is provided by a pair of mutually parallel sleeve element 32 spaced to simultaneously and telescopically receive the fork arms 14 for a major portion of their length, it being noted that the upper faces of the fork arms are flat and mutually coplanar for their primarily intended use to directly support load elements or load-holding pallets or containers across them. Intermediately thereof, and inwardly of the forward points of the fork arms F, the sleeves 32 provide upstanding ears 33 to which the bottom of the boom 31 is hingedly attached by coaxial hinge pins 34 for an adjusted swinging of the boom in a vertical plane including the longitudinal axis of the vehicle midway between the fork arms, the bottom of the boom being appropriately widened thereat to provide said hinged connection.

As particularly illustrated, the boom 31 comprises an upper section 35 of polygonal (square) cross-section which is complementarily engaged in a lower socket section 36 for its adjusted extension from the latter section in accordance with the location of a securing pin 37 which is variably engageable through and between registerable holes in the sections to secure the sections in different longitudinally adjusted relations, it being understood that the polygonal form of the upper section 35 desirably prevents its rotation in the lower section 36, independently of the pin 37. It will be understood that the present sectional boom structure desirably provides for an adjustment of length of the boom as may be required under different working conditions.

In the present boom structure, a plate member 38 extends beneath the bottom end of the lower boom section 36 in fixed relation thereto, and terminates at pairs of spaced ears 39 which receive the hinge pins 34 through

and between them. Brace plates 40 connect the ends of the plates 38 with side points of the lower boom section 36 slightly above the plate 38, and brace rods 41 extend from the outer extremities of the plates 40 to fixed connections with a crown plate 42 fixed at the top of the boom section 36, it being noted that the aforesaid elements, which are fixedly related to the lower boom section 36, are mutually welded in an assembly having the outline of an upright isoscles triangle when viewed from the front or rear. As particularly shown, ladder rungs 43 are provided between a brace rod 41 and the lower boom section 36 for use by a workman for climbing the lower boom section as may be needed. The various elements making up the present lower boom section 36 are unitarily fixed together, as by welding.

Means are provided for securing the boom assembly in adjusted angular positions in its plane, said means comprising a link 44 extending from a hinge joint 45 provided at the top of the boom section 36 adjacent the crown plate 42 to a hinge connection with a member 46 which is fixedly related to the lift carriage 11 and to the boom-mounting sleeves 32; in the present structure, the member 46 comprises a horizontal plate element carried at the top of mutually converging struts 47 extending thereto from the sleeves 32, while said plate member is releasably bolted to a forwardly directed flange of an angle plate 48 fixed to an upper member 11' of the carriage 11, whereby the arrangement anchors the lower strut end to the carriage while releasably securing the sleeves 32 on the fork arms 14. To desirably provide for the angular adjustment of the boom with respect to the carriage and the frame 12, the link 44 has telescopically engaged sections which are arranged to be held in different longitudinally adjusted relations by a bolt 49 which is variably engageable through mutually overlapped portions of the sections.

It will now be noted that a flexible hoist line 51, comprising a suitable cable or chain, extends from a terminal load hook 52 around a sheave 53 at the top of the upper boom section 35, thence around sheaves 54 and 55 provided at the top and back of the frame 12 and thence to the line-carrying drum 46' of a winch assembly 56 which is mounted on the forward body part 23 of the vehicle. The winch 56 is provided as part of the boom assembly for the control of the hoist line 51 to raise or lower the hook 52, or to hold the hook in fixed set position, by a suitable drive and control means. As particularly indicated in Figure 4, the actuation of the winch drum 56' is arranged to be effected through a chain 57 which connects a pulley 56'' of the winch assembly with a pulley 58' provided on the forward end of a drive shaft 58 which is arranged for reversible actuation from the vehicle engine, the action of the winch being controlled by a hand lever 59. The arrangement is essentially such that the hook 52 may be lowered for secured engagement with an article on the ground for thereafter raising the same to a desired height above the fork arms, and then effecting an adjustable elevating of the carriage 11 to raise the boom and load together, it being important to note that the carriage-mounted boom provides for the lifting of a load carried on its line 51 well above the height to which the carriage forks alone might lift it.

It will now be particularly noted that a truck or vehicle having a lift carriage supporting a boom is particularly useful in the positioning of elements being assembled in a fabricated structure, such a use of the present arrangement being illustrated in Figure 7 in which the placement of a cable-carried beam B for its connection with a particular point of a building frame column C is indicated. To facilitate such a use of a present assembly, the same is preferably provided with the staging unit 61 for supporting a workman W adjacent the point where the manual activities of the workman are required, the staging unit extending for a required distance laterally of the plane of action of the boom 31, and being removably mounted on the sleeve members 32 of the boom base in unitary association with the boom.

The base of the present staging 61 is provided by a pair of sleeves 62 which closely and slidably receive outer end portions of the base sleeves 32 of the boom assembly, and may be releasably secured in place on the latter sleeves by means of set-screws 63 carried by the staging. Relatively short posts or standards 64 of like length extend fixedly from forward and rear points of the base sleeves 62 of the staging, and cooperatively support a rectangular frame 65 having its greater length extending across the sleeves and carrying a mesh floor 66 between its sides 65' and ends 65''. Upright posts 67 extend from the corners of the frame 65, while upright posts 68 extend from the frame sides 65' at the standard 64, said posts all being shown as of like length and cooperatively carrying a continuous guard rail 69 at their tops for the protection of a workman W positioned on the staging floor 66, and at a height above the floor which permits a workman to reach over it as required to handle an adjacent workpiece supported by the boom line 51. The elements of the described staging unit are suitably connected in their assembly, as by welding.

It will be noted that when a workpiece has been raised clear of the ground on the line 51 and generally above the staging unit 61, the subsequent raising of the carriage to correspondingly raise the boom and staging will shorten the portion of the cable 31 below the top boom sheave 33 to move the load upwardly away from the staging unless and until the cable 31 is correspondingly released at the winch 37, this normally being effected after the workman riding the staging is positioned within ready reaching distance of a point at which a manual operation is required of him; as illustrated in Figure 7, the workman would be disposed within reach of bolt or rivet holes in the column C at which an end of the beam B is to be secured by bolting or riveting.

In view of the foregoing description of the boom and staging structures, it will be understood that the mounting of these units on the elevator carriage of a lift truck or tractor permits a ready placement of elements of a building or other structure being erected, and at heights and positions not possible if the boom is not used. It will also be understood that in the present novel type of vehicular hoist unit in which the boom is to be constantly used, the sleeves 32 of the boom base may comprise integral or fixed parts of the elevator carriage 11 whereby the boom and carriage and staging then provide a permanent assembly. On the other hand, the disclosed removability of the boom unit, with the staging, permits a more varied use of the present type of vehicular hoist when such is desirable. Noting that the horizontal positioning of a loaded boom hook 32 is to be entirely controlled by appropriately disposing the dirigible vehicle, it will be understood that a maximum stability of the entire assembly is assured by maintaining the boom in the fixed vertical plane of its adjustability which includes the longitudinal vehicle axis.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the present vehicular hoist unit may be readily understood by those skilled in the art to which the invention appertains. While I have described a form of my invention which I now consider to comprise a preferred embodiment thereof, I desire to have it understood that the showings are primarily illustrative, and that such changes and developments may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In a vehicular hoist unit of the type described, a dirigible vehicle, a load-mounting elevator carriage supported by the vehicle at an end thereof for its upright adjustment and providing horizontally extending load supporting fork arms, means providing a boom base telescop-

ically receiving said arms, a boom extending upwardly from said base and disposed in a fixed upright plane including the longitudinal vehicle axis, a running hoist line supported by the boom and having a depending end thereof arranged for its fixing to a load element, a winch means on the vehicle operative to mechanically control said hoist line, and a workman's staging dismountably and directly supported upon the boom base for movement therewith and disposable with the carriage to provide for the direct manual access by a workman thereon to a load element carried by the hoist line.

2. In a vehicular hoist unit of the type described, a dirigible vehicle, a load-mounting elevator carriage supported by the vehicle at an end thereof for its upright adjustment with its load and providing horizontally extending and mutually parallel fork arms, a boom base providing elements telescopically and removably receiving said fork arms to directly support the base on the fork arms, a boom extending upwardly from said base for its load-supporting use in an upright plane including the longitudinal vehicle axis, and a workman's staging unit telescopically and removably mounted on said boom base elements for its movement with the carriage and providing for the direct manual access by a workman thereon to an elevated load carried by the boom.

3. A structure in accordance with claim 2 having the boom of longitudinally adjustable length and hinged to the base member at its bottom, and means to effect mutually independent length and angle adjustment of the boom to provide for the positioning of a boom-supported load within ready reach of the workman disposed on the staging unit.

4. In a vehicular hoist unit of the type described, a dirigible vehicle, a load-mounting elevator carriage supported by the vehicle at an end thereof for its upright adjustment with its load and providing horizontally extending and mutually spaced and parallel fork arms extending from an upright carriage portion guidedly engaged by the vehicle, a base member providing tubular bottom elements telescopically receiving said fork arms to directly support the base member thereon, a boom extending upwardly from said base member for its load-supporting use in a fixed upright plane including the longitudinal vehicle axis, means releasably fixing the boom to said upright carriage portion for securing the boom base in fixed mounted relation to the fork arms, a workman's staging unit providing bottom elements telescopically and removably mounted on said base member elements and providing for the direct manual access by a workman thereon to a load carried by the boom, and means releasably fixing said bottom elements of the staging unit to said bottom elements of the base member in mutually adjusted relation.

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