July 13, 1948. N. E. TORGERSEN 2,445,160

HYDRAULIC ACTUATING MECHANISM FOR MOBILE LOADING APPARATUS

Filed Nov. 2, 1946 3 Sheets-Sheet 1

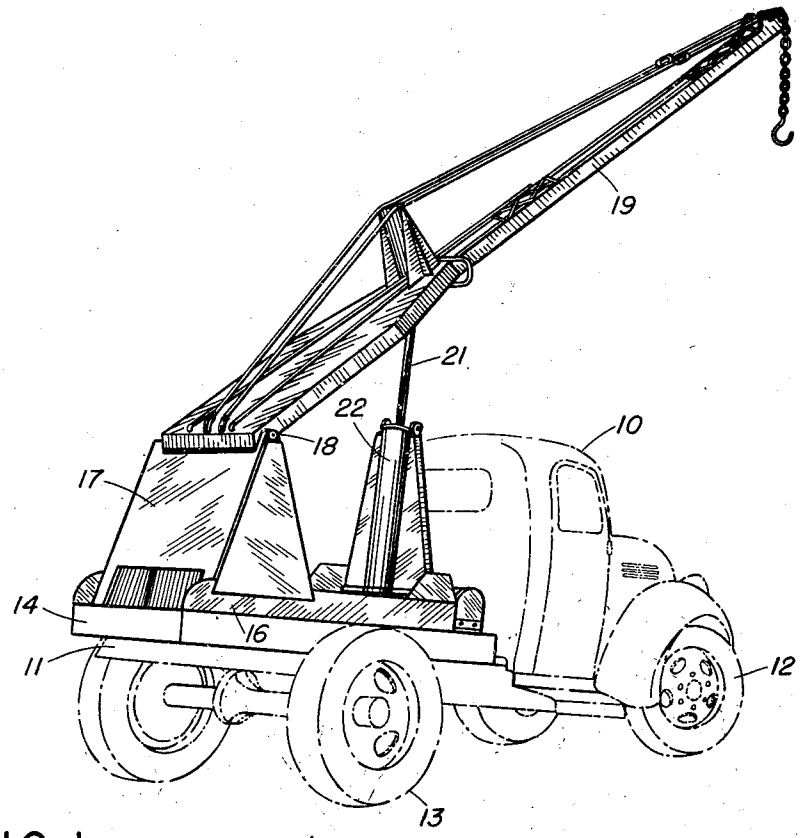


FIG. 1

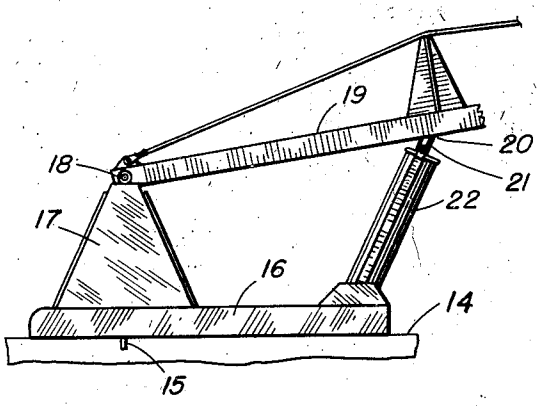


FIG. 2

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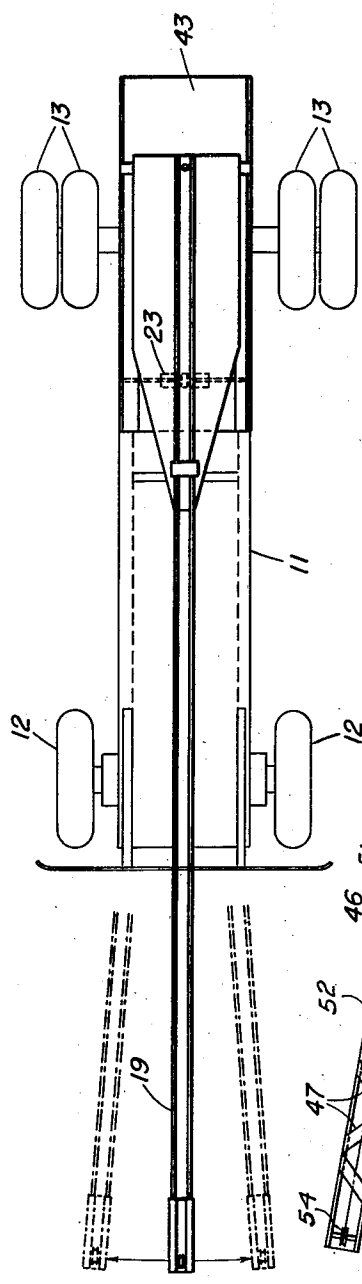


Fig. 3.

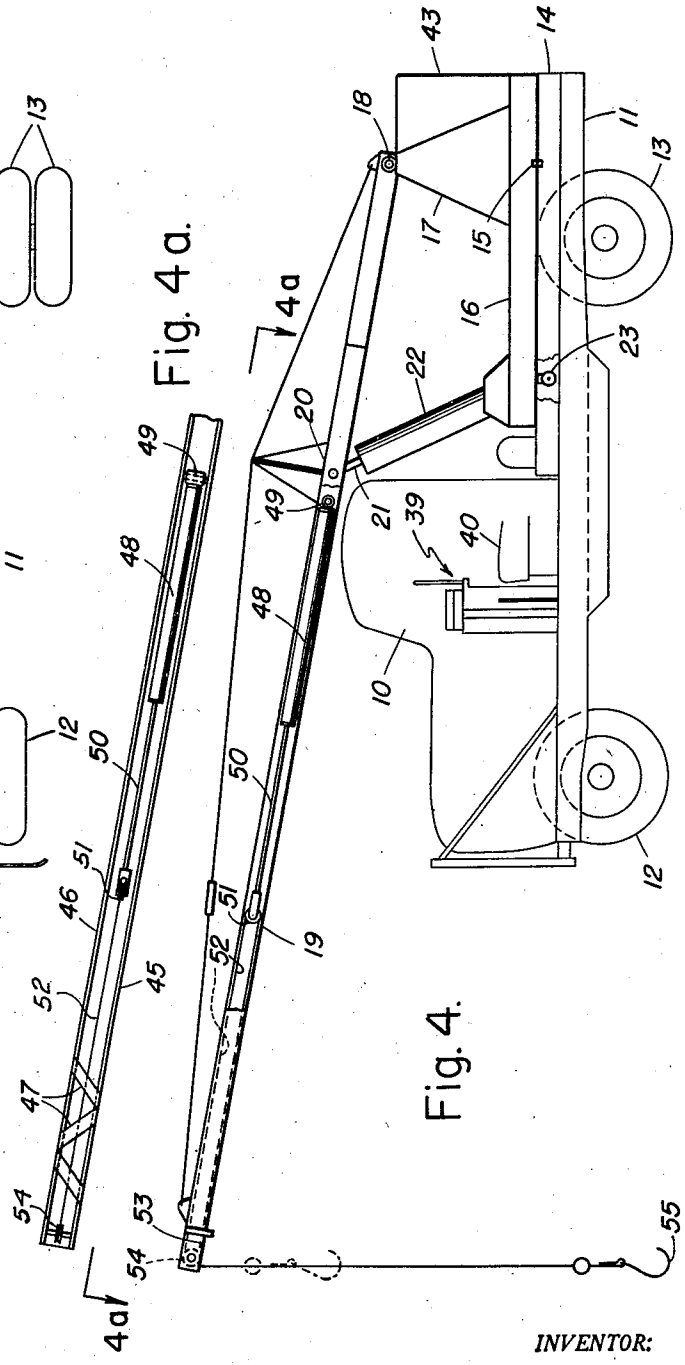


Fig. 4a.

Fig. 4.

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Fig. 5.

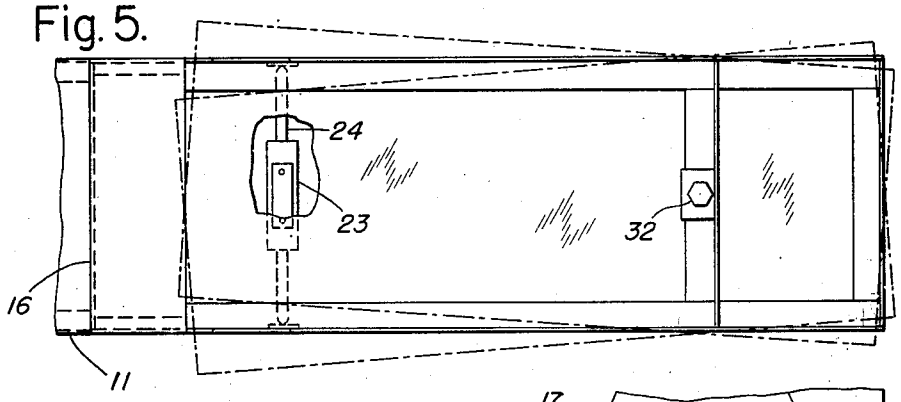


Fig. 6.

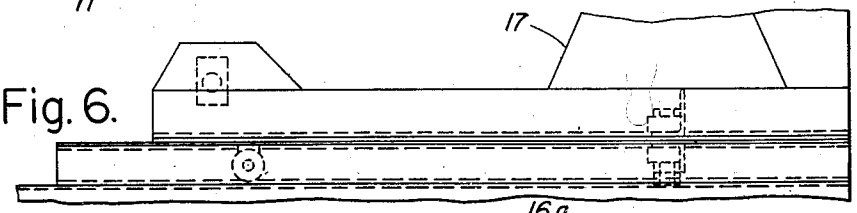


Fig. 8.

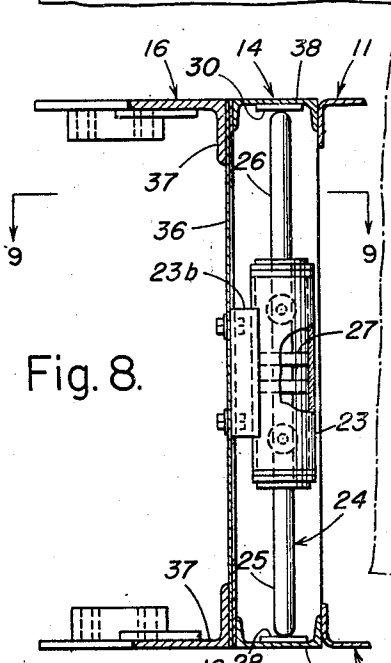


Fig. 7.

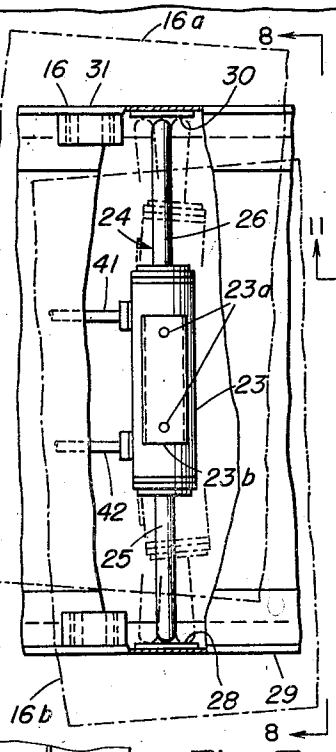


Fig. 10.

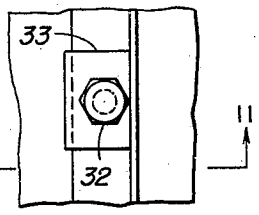


Fig. 11.

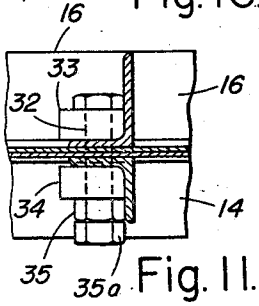
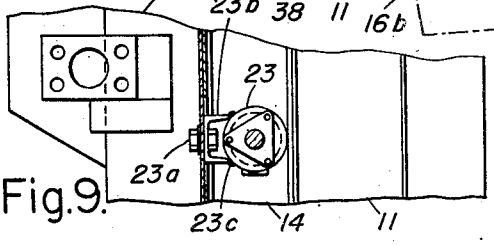


Fig. 9.



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HYDRAULIC ACTUATING MECHANISM FOR MOBILE LOADING APPARATUS

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Application November 2, 1946, Serial No. 707,401

6 Claims. (Cl. 212—30)

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This invention relates to hoisting apparatus in which an overhanging loading boom is capable of angular swinging movement about a vertical axis, and more specifically to hoisting apparatus or cranes of the mobile kind.

It is among the objects of this invention to provide simple hydraulically operated means for effecting such movement.

According to this invention a single hydraulic actuating cylinder controls the swinging movement of the boom in both directions. To this end the cylinder is provided with a two-ended piston rod. Each free end extends outwardly from the respective end of the cylinder into contact with an abutment member or resistance member. In the operation of the cylinder the free ends of the piston rod are alternately and/or selectively employable to effect the desired angular movement of the boom in the one or in the other direction.

According to one feature the boom is mounted on a platform which in turn is pivotally movable about a vertical axis upon a vehicle frame. The hydraulic cylinder with its two-ended piston rod extends substantially transversely of the vehicle frame and is effective between it and the platform to effect the swinging movement of the boom in the desired direction.

According to a more specific feature the cylinder is fastened to the underside of the platform while the respective free ends of the piston rod are adapted to operatively engage upon the corresponding sides of the vehicle frame.

It is among the advantages that the piston rod requires no positive connection with the associated parts of the movable platform, has a minimum of parts, and can be readily mounted or dismounted as an assembly unit.

According to another feature a sub-frame is mounted on a chassis frame, which sub-frame carries thereon a swingable boom-carrying platform actuated by the horizontal hydraulic cylinder. That is to say the sub-frame with the parts mounted thereon represents a unit of assembly which in turn is mounted on the chassis frame.

Other features lie in the provision of a hydraulic cylinder unitary with the boom for raising and lowering a load on the boom.

The invention possesses other objects and features of advantage, some of which with the foregoing will be set forth in the following description. In the following description and in the claims, parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as

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the art will permit. In the accompanying drawings there has been illustrated the best embodiment of the invention known to me, but such embodiment is to be regarded as typical only of many possible embodiments, and the invention is not to be limited thereto.

The novel features considered characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings in which

Fig. 1 is a general perspective view upon the mobile crane when viewing a rear end portion thereof;

Fig. 2 is a partially broken-off side view of the assembled unit represented by the sub-frame carrying the boom-carrying platform;

Fig. 3 is a somewhat diagrammatic top view upon the mobile crane indicating the potential lateral swinging movements of the boom;

Fig. 4 is a similarly diagrammatic side view of the mobile crane in Fig. 3;

Fig. 4a is a separate partial view of the top side of the boom showing a hydraulic cylinder unitary therewith for raising and lowering of the load;

Fig. 5 is an enlarged detailed plan view also diagrammatic of the platform frame indicating its potential lateral angular movements with respect to the sub-frame or chassis frame;

Fig. 6 is a side view of the parts shown in Fig. 5;

Fig. 7 is a further enlarged detail plan view of a portion of Fig. 5 showing more clearly the operation of the horizontal cylinder;

Fig. 8 is a view taken upon Fig. 7 along the line 8—8;

Fig. 9 is a sectional view on the line 9—9 taken in Fig. 8;

Fig. 10 is an enlarged top view of the pivotal connection between the platform frame and sub-frame;

Fig. 11 is a sectional view on the line 11—11 taken in Fig. 10.

Figs. 1 to 4 show views of a motor truck having a cab 10 on the front portion of a chassis frame 11 supported by front wheels 12 and rear wheels 13. Upon the rear portion of the chassis frame is fixedly mounted a sub-frame 14 having a vertical upright pivot 15 about which is swingable a platform frame 16 overlying and supported by the sub-frame 14. The rear end portion of the

sub-frame 14 has rising therefrom and unitary therewith a pedestal 17 upon which is mounted at 18 to be swingable about a horizontal axis the rear end of a loading boom 19 overhanging and extending forwardly beyond the driver's cab 10.

At an intermediate point 20 the boom is supported by the piston rod 21 of a second hydraulic power cylinder 22 although shown to be substantially upright somewhat inclined toward the driver's cab 10 and having its bottom end portion pivotally mounted on platform frame 16 to be swingable about a horizontal axis extending transversely of the platform frame.

Hydraulic actuating mechanism for effecting and controlling the horizontal swinging movement of the platform frame 16 and thereby of the boom 19 upon the sub-frame 14 comprises a horizontally extending cylinder 23 the longitudinal axis of which extends transversely of the platform frame 16. The cylinder 23 is fastened to the under side of the platform frame 16 by means of bolts 23^a and a channel-shaped bracket portion 23^b the shanks or flanges of which are shown to be welded to the cylinder 23 as at 23^c, the longitudinal edges of these flanges thus being parallel to the longitudinal axis of the cylinder.

This cylinder 23 has a two-ended piston rod 24 the free end portions 25 and 26 of which extend from and beyond the respective ends of the cylinder. A piston 27 is fixed upon and intermediately of end portions of the piston rod. The free end portion 25 is adapted to contact and engage upon a wearing plate 28 fixed to the inside of one side portion 29 of the sub-frame 14. Similarly the opposite end portion 26 of the piston rod is adapted to engage upon a wearing plate 30 provided upon the inner face of the opposite side portion 31 of the sub-frame.

Details of the vertical pivot shown in Fig. 4 are more clearly presented in the detail of Figs. 10 and 11 showing the pivot to consist of a bolt 32 passing through eyes 33 and 34 provided upon the platform frame 16 and upon the sub-frame 14 respectively, the bolt being secured by a nut 35 and a counter-nut 35^a in a manner to allow for the swinging movement of the platform frame.

The platform frame 16 (in Fig. 8) is shown to comprise a plate element 36 to the underside of which the horizontal cylinder is bolted. This plate element is marginally reinforced by angle irons 37 constituting the frame proper. The platform frame 16 rests and operates upon the sub-frame 14 which is shown to be constructed of channel irons 38. The chassis frame 11 upon which the sub-frame is mounted is fractionally indicated in Fig. 8.

The operation of the hydraulic cylinders 22 and 23 can be controlled by a hydraulic master control valve 39 indicated near the driver's seat 40 in the cab 10, such control being effective through a pump usually driven by the engine and a system of hydraulic conduits herein not particularly shown.

The operation of the horizontal cylinder for effecting sidewise angular swinging movement of the loading boom 19 is now substantially self-explanatory from Figs. 5 to 7, that is to say when pressure fluid is forced through a flexible connection 41 into the cylinder this will cause the piston rod end 25 to engage wearing plate 28 thereby causing the platform frame 16 to swing from its neutral full-line position, for example, to the dot-and-dash line position 16^a, while fluid from the opposite side of the piston is allowed to be displaced therefrom through a flexible connection 42. Similarly when pressure fluid is forced into the cylinder to act upon the opposite side of the piston through the connection 42, this will relatively shift the piston rod in the opposite direction so that the piston rod end 26 engages the stationary wearing plate 30 causing the platform frame 16 to swing from its full line neutral position, for example, to the dot-and-dash line position 16^b, while fluid from the opposite side of the piston is being displaced through the connection 41.

Connected to the rear of the pedestal 17 and also carried by the platform frame 16 upon the rear end thereof (see Figs. 3 and 4) is provided a bin or receptacle 43 adapted to receive counterweight material such as rocks or sand to help compensate for a load on the boom 19.

The boom 19 is composed of a pair of symmetrically disposed parallel channel irons indicated at 45 and 46 and suitably inter-connected at the top and bottom by a number of diagonal tie-members some of which are indicated at 47. In this way the boom is constituted as a composite beam the hollow interior of which is occupied by a hydraulic actuating cylinder 48 the bottom end of which is pivotally mounted as at 49 within the boom to enable the cylinder to have slight angular motion about a horizontal axis. This cylinder 48 has an extendable and retractable piston rod 50 having at its free end a sheave 51 over which runs a wire rope 52. The wire rope extends from an anchoring point 53 at the free end of the boom over sheave 51, then over another sheave 54 mounted at the free end of the boom, and terminates in a load-hook 55. Because of this arrangement of the sheaves any change in position of piston rod 50 will result in a shift of the load-hook double the distance of the shift of the piston rod. A lowered position of the load-hook 55 is shown in full lines while a raised position thereof is shown in dot-and-dash lines. The cylinder 48 which may herein be termed the boom cylinder can be actuated hydraulically from the driver's seat by master control mechanism indicated at 39 in a manner similar to that in which the other cylinders 22 and 23 are controlled. The control is suitably such that all cylinders are double-acting, that is to say they are hydraulically power-controllable in both directions of movement of the piston rod.

I claim:

1. Hoisting apparatus comprising an overhanging boom, a platform frame carrying said boom, a horizontal base frame carrying said platform frame, means for pivotally mounting the platform frame on the base frame for angular movement about a vertical axis relative to said base frame, actuating means for effecting said angular movement in both directions comprising a horizontally disposed hydraulic power cylinder having a two-ended piston rod with each end extending from and beyond a respective end of the cylinder, said cylinder being attached to one of said frames while said piston rod ends are adapted to operatively engage respective opposed portions of the other frame.

2. Hoisting apparatus according to claim 1 in which the cylinder is fixed to the under side of the platform frame.

3. Hoisting apparatus according to claim 1 in which the base frame comprises a vehicle frame and the cylinder extends transversely thereof.

4. Hoisting apparatus according to claim 1 in

which the base frame comprises a vehicle frame and the cylinder extends transversely thereof, and in which said piston rod ends are adapted to operatively engage an associated adjacent side portion of the vehicle frame.

5. Hoisting apparatus according to claim 1 in which the base frame comprises a chassis frame and a sub-frame attached to the top side of the chassis frame, and in which the swingable platform frame as well as the horizontal cylinder is mounted upon the sub-frame.

6. Hoisting apparatus according to claim 1 in which the base frame comprises a chassis frame and a sub-frame attached to the top side of the chassis frame, and in which the horizontal cylinder is fixed to the under side of the platform frame and the platform frame is swingably mounted upon the sub-frame.

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