Feb. 23, 1932. O. M. LANIER 1,846,973

PORTABLE PILE DRIVER

Filed Aug. 4, 1930 5 Sheets-Sheet 1

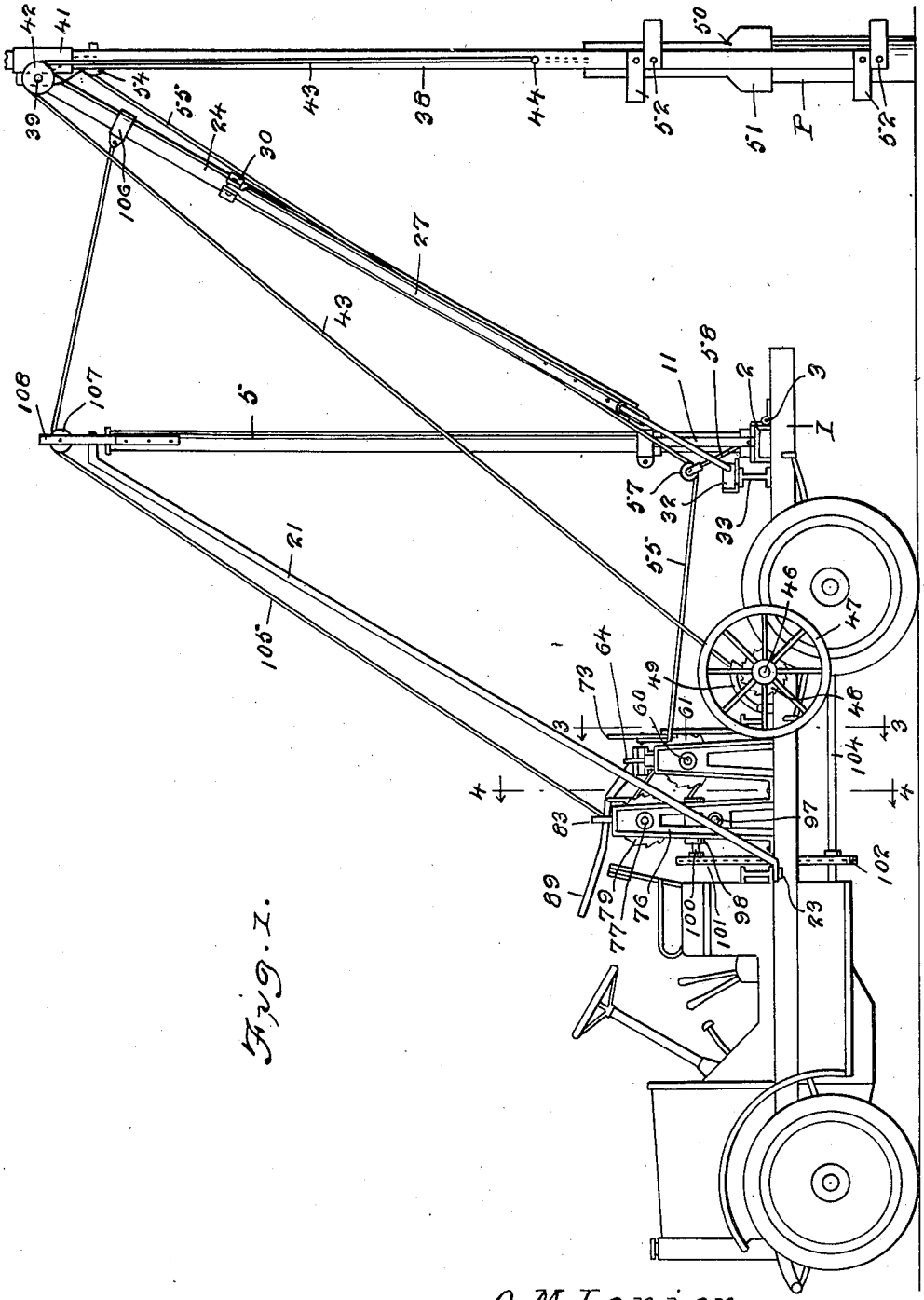


Fig. 1.

O. M. Lanier INVENTOR

BY Victor J. Evans

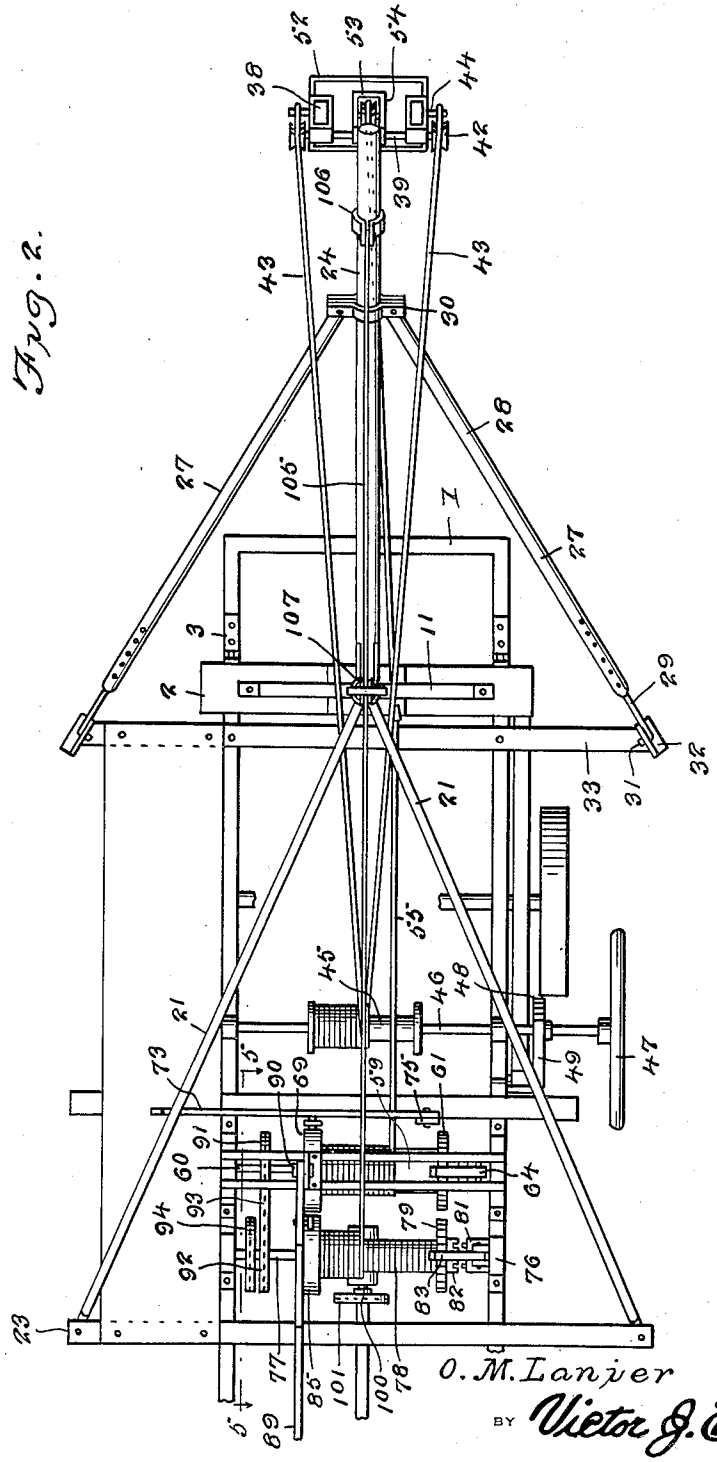
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PORTABLE PILE DRIVER

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Fig. 2.



O. M. Lanier INVENTOR

BY Victor J. Evans

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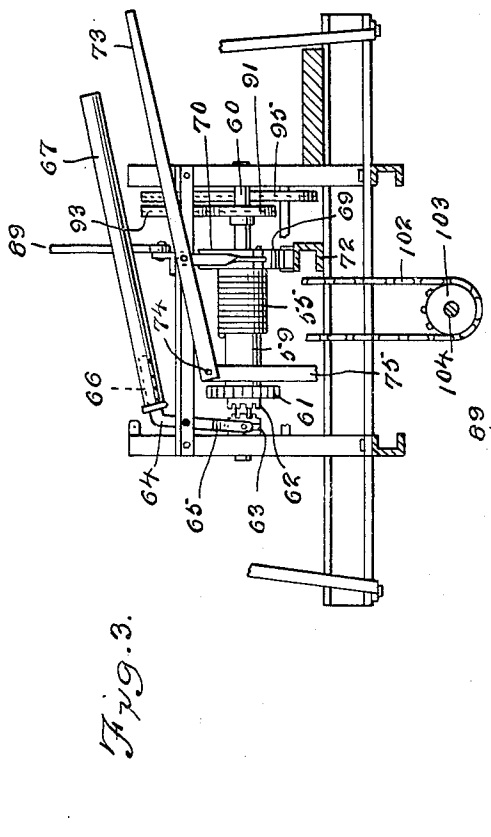
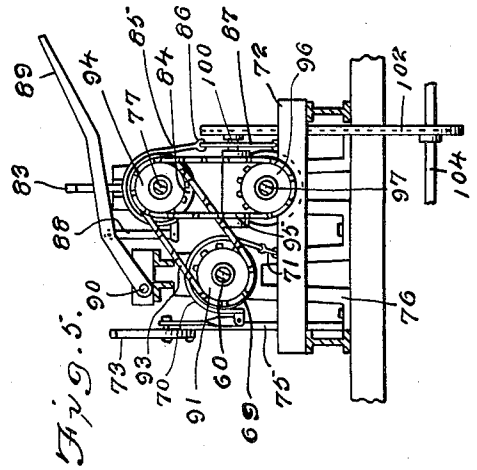


Fig. 3.



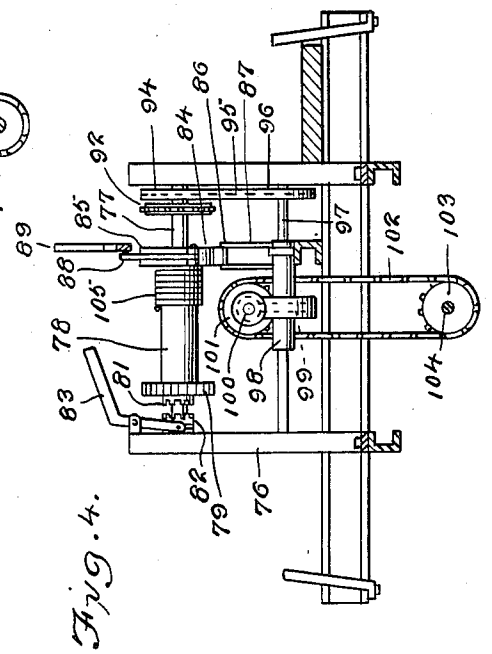


Fig. 4.

O. M. Lanier INVENTOR

BY Victor J. Evans ATTORNEY

Feb. 23, 1932. O. M. LANIER 1,846,973

PORTABLE PILE DRIVER

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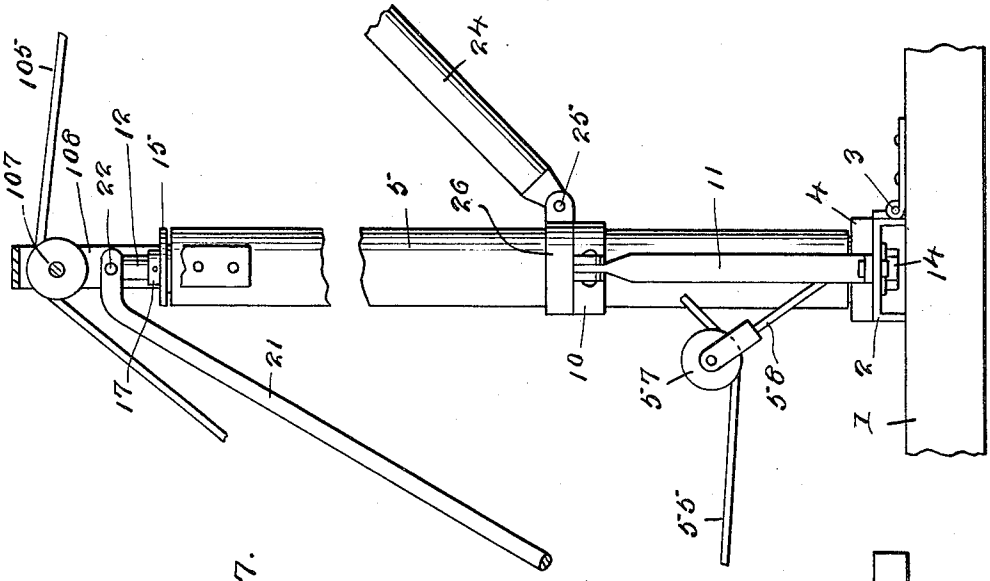


Fig. 7.

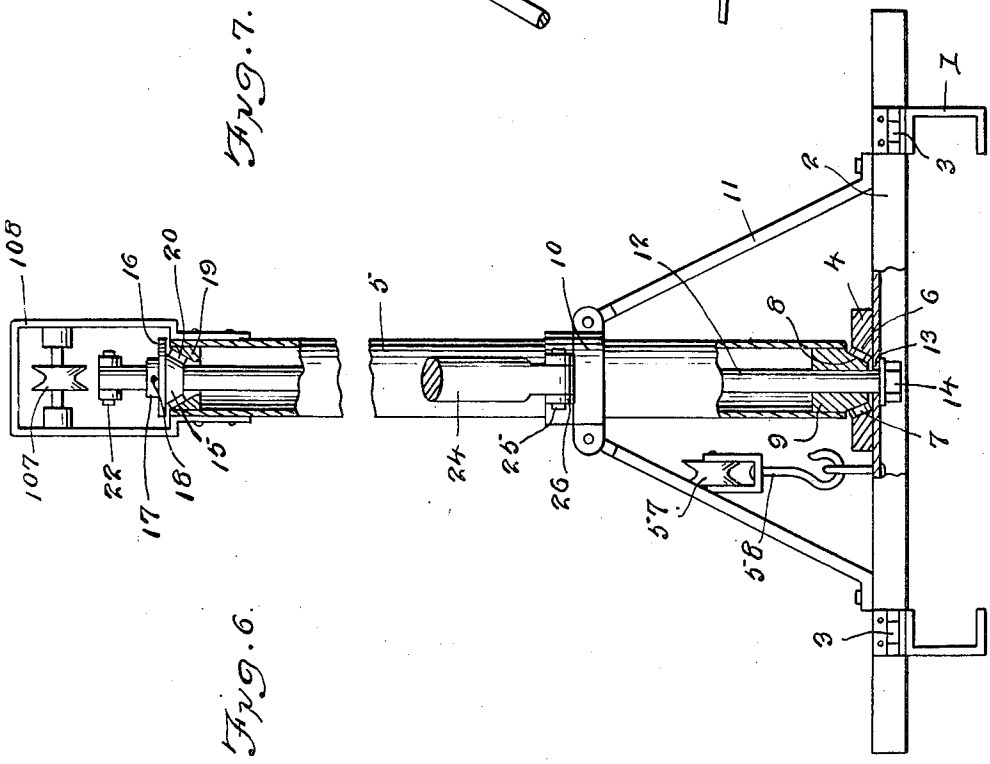


Fig. 6.

O. M. Lanier
INVENTOR

BY Victor J. Evans
ATTORNEY

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PORTABLE PILE DRIVER

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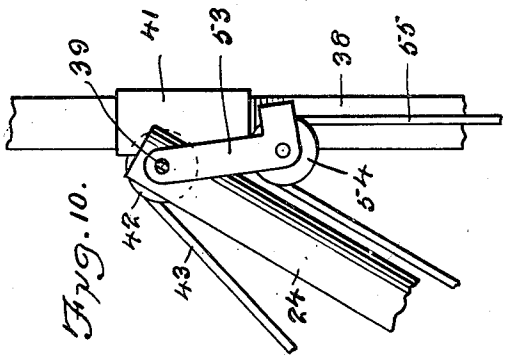


Fig. 10.

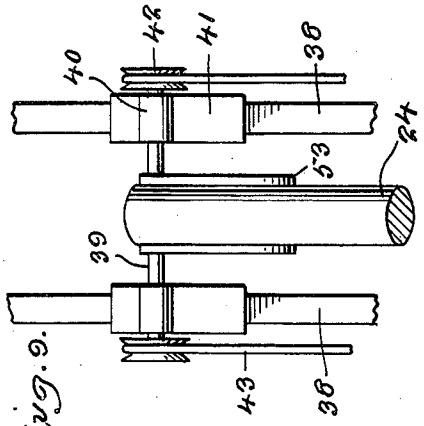


Fig. 9.

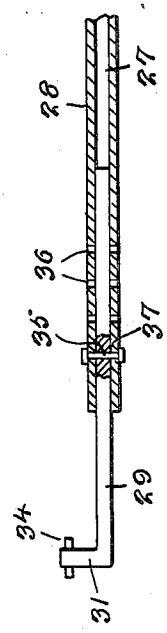


Fig. 11.

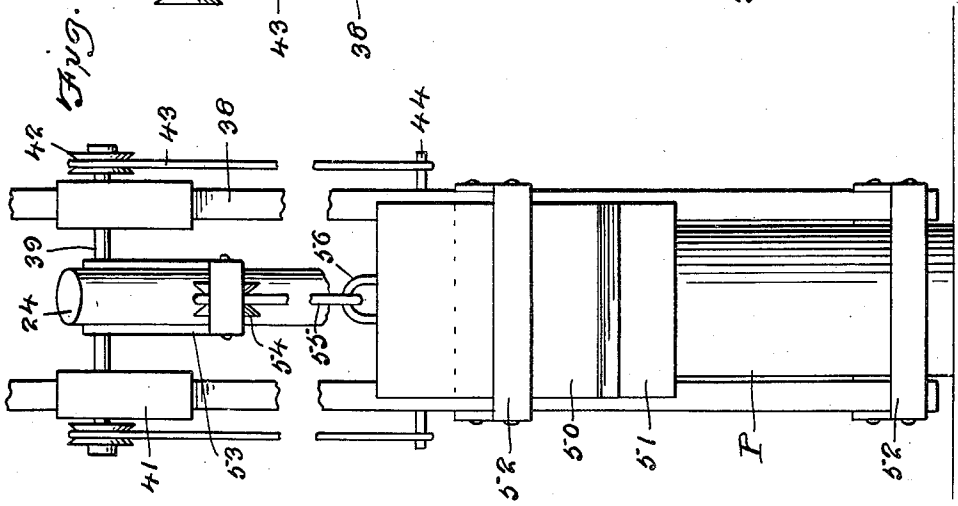


Fig. 8.

O. M. Lanier
INVENTOR

BY Victor J. Evans
ATTORNEY

Patented Feb. 23, 1932 1,846,973

UNITED STATES PATENT OFFICE

OTIS M. LANIER, OF STATESBORO, GEORGIA

PORTABLE PILE DRIVER

Application filed August 4, 1930. Serial No. 472,946.

This invention relates to pile drivers and has as one of its objects to provide a pile driver so constructed that it may be mounted, in its entirety, upon any ordinary motor truck chassis and the component parts thereof readily set up for use and collapsed when it is necessary to convey the mechanism from one point to another.

Another object of the invention is to provide, in a pile driver embodying a mast, a boom, a hammer, and means for elevating and lowering the hammer to drive a pile, a novel means for mounting the mast and boom to permit of swinging movement of the boom to any desired lateral position without in any way interferring with the transmission of motion to the hammer of the mechanism.

Another object of the invention is to provide, in a pile driver embodying the above mentioned parts, novel means whereby the adjustment of the component parts may be readily effected in a minimum space of time.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts, to be hereinafter fully described, illustrated in the accompanying drawings, and specifically pointed out in the appended claims, it being understood of course that minor changes may be made so long as they fall within the scope of the claims.

In describing my invention in detail, reference will be had to the accompanying drawings, wherein like characters denote like or corresponding parts throughout the several views, and in which:

Figure 1 is a view in side elevation of the pile driver embodying the invention.

Figure 2 is a top plan view thereof.

Figure 3 is a vertical transverse sectional view taken on the line 3—3 of Figure 1, looking in the direction indicated by the arrows.

Figure 4 is a similar view on the line 4—4 of Figure 1, looking in the direction indicated by the arrows.

Figure 5 is a vertical front to rear sectional view on the line 5—5 of Figure 2, looking in the direction indicated by the arrows.

Figure 6 is a view partly in elevation and partly in vertical section illustrating the mast of the pile driver.

Figure 7 is a view in side elevation of the mast and the parts associated therewith.

Figure 8 is a view in elevation of the hammer unit of the pile driver.

Figure 9 is a fragmentary view in elevation illustrating a portion of the structure shown in Figure 8.

Figure 10 is a view in side elevation of the structure shown in Figure 9.

Figure 11 is a view partly in section and partly in plan illustrating a portion of one of the adjustable bars for the boom.

As illustrated in Figures 1 and 2 of the drawings, the pile driver mechanism embodying the invention is mounted upon the chassis frame 1 of a motor truck and inasmuch as the mechanism of the invention may be installed upon chassis frames of various construction, a specific description of the frame shown in the drawings is not essential for an understanding of the invention.

Mounted upon the rear end of the chassis frame 1 is a channel iron cross bar 2, and preferably this bar is connected with the frame by means of hinges 3. The numeral 4 indicates one member of a bearing for the lower end of the mast of the pile driver, which mast is indicated in general by the numeral 5 and this member 4 is preferably in the form of a metal plate of considerable thickness which is provided centrally with an opening having an inclined wall which constitutes a bearing race 6 for roller bearings 7 which are arranged between the race 6 and the beveled lower end 8 of a plug 9 which is fitted and secured in the lower end of a mast 5, the said mast being of the tubular form shown in Figure 6. In order to brace the mast 5 so that it will normally maintain an upright position, a collar 10 is fitted to the mast in a manner to permit of rotative adjustment of the mast about its axis and brace bars 11 are connected at their upper ends to the collar 10 at opposite sides thereof and secured at their lower ends to the cross bar 2. A rod 12 is fitted through an opening in the plug 9 and through an opening 13 in the cross bar 2 and a nut 14 is fitted onto the lower

end of this rod. The rod extends upwardly, axially, through the mast 5 and a bearing head 15 is fitted to the upper portion of the rod and is of conical form and provided with an outstanding circumscribing flange 16, the said bearing member also having a collar portion 17 through which a bolt 18 is fitted and adjustable to bind against the rod.

A bearing race 19 is mounted within the upper end of the mast and concentric to the bearing member 15, and roller bearings 20 are arranged between the said bearing members. In order that the mast 5 may be braced in its upright position, brace rods 21 are connected at their upper ends, by a cross pin 22, with the upper end of the rod 12, and, at their lower ends, are secured by bolts 23 to the side rails of the chassis frame 1, these bars being inclined downwardly and forwardly from the said upper end of the rod 12.

The boom of the pile driver is indicated in general by the numeral 24 and is preferably of hollow tubular form and this boom is pivotally connected by a pivot pin 25, at its lower end, to a collar 26 which is rotatably fitted upon the mast 5, this collar resting upon the collar 10 as clearly shown in Figures 6 and 7 of the drawings. In order to brace the boom 24 with respect to the mast and the chassis frame 1 and yet permit of upward and downward swinging of the boom and its swinging movement laterally with the mast, braces, indicated in general by the numeral 27, are employed, and each brace consists of a tubular member 28 and a member 29 which is telescopically assembled with the member 28. The members 28 of the braces are pivotally mounted between the ends of a split collar 30 which is slidably fitted to the boom 24 adjacent the upper end thereof. The member 29 of each brace 27 is provided with a right angularly turned lower end 31 which is pivotally engaged in an opening in the bracket member 32 mounted upon the respective end of an I-beam 33 mounted transversely upon the chassis frame 1, a pin 34 being fitted through the said end 31 so as to maintain the said end in engagement with the respective bracket 32.

The member 29 is formed with a diametric opening 35 and the member 28 is formed with a series of pairs of openings 36, and a pin 37 is adapted to be fitted through the opening 35 and the openings of any of the pairs interchangeable, so as to provide for lengthening or shortening of the bars 27.

Spaced tubular slides, preferably rectangular in cross section, indicated by the numeral 38, are arranged in parallel relation to each other and a shaft 39 is fixedly mounted through the end of the boom 24 and also in bearings 40 on rectangular members 41 in which the slides are slidably fitted. Grooved pulleys 42 are mounted upon the ends of the shaft 39 and cables 43 are connected, each at one end, to a pin 44 extending laterally downwardly at the outer sides of the respective slides and each having a stretch leading downwardly and rearwardly from the respective pulley 42 and connected to a drum 45 mounted upon a shaft 46, this shaft being rotatable, through the medium of a hand wheel 47, so as to effect up and down vertical adjustment of the slides. A ratchet wheel 48 is fixed upon one end of the shaft 46 and a pawl 49 is pivotally mounted upon the chassis frame 1 and rests by gravity in engagement with the said ratchet wheel.

The hammer which is to be moved upwardly and downwardly with respect to the slides 38, is indicated in general by the numeral 50 and the same is of course of metal and preferably enlarged at its lower portion as indicated by the numeral 51 so that it will possess maximum weight, and the underside of the enlarged portion 51 is flat so as to squarely strike against the upper end of the pile to be driven, which pile is indicated in the drawings by the reference letter P. In order that the weight of the slides 38 may be held in proper relation to the pile to be driven, rectangular frame members 52, of strap iron, are arranged in pairs and are of substantially U-form, and have their ends arranged in superposed relation to one another as illustrated in Figures 1 and 8 of the drawings, these frame members being of sufficient size to accommodate the pile P and the hammer 50 and prevent any separation of the slides 38 so that the hammer will be guided in its up and down movement by the engagement of the slides 38 in grooves formed in the opposite sides of the hammer. A bearing bracket 53 is pivotally suspended at its upper end from the shaft 39, and a pulley 54 is rotatably mounted in this bracket and a cable 55 is trained over this pulley and led downwardly, at one stretch, and connected with the eye 56 provided at the upper end of the hammer 50. The other stretch of the cable is led downwardly and forwardly from the pulley 54 and about an idle pulley 57 which is mounted upon a suitable supporting member 58, in turn mounted for free swinging movement upon the cross piece 2.

From the pulley 57, the cable 55 is led forwardly and connected to and wound about a drum 59 which is mounted upon the shaft 60 journalled in bearings upon the chassis frame 1. The shaft 60 is driven in a manner which will presently be described and a ratchet gear 61 is rotatable with the drum 59 and the said gear is fitted with a clutch face 62. The drum is free for rotation with respect to the shaft 60 and a clutch member 63 is splined upon the shaft 60 and shiftable into and out of coacting engagement with the clutch member 62 through the medium of a rock lever 64 having a yoke 65 straddling the said clutch member 63. The lever 64 has a relatively

short extension 66, at its upper end, and a handle member 67 which is preferably of tubular form, is removably fitted to the said extension of the lever 64.

Any suitable pawl device (not shown) may be employed for coaction with the ratchet wheel 61 to hold the wheel and the drum 59 against rotation, when the lever 67 is actuated to disengage the clutch member 63 from the clutch member 62. A brake wheel 69 is rotatable with the drum 59 and a brake shoe 70 is anchored at one end as at 71 upon the frame member 72 mounted above the chassis frame and connected at its other end upon the lever 73 which is pivotally mounted as at 74 upon the upright bracket 75 mounted upon the chassis frame, and it will be understood that, by shifting the clutch member 63 through rocking of the lever 64, and then actuating the lever 73, rotary motion of the drum 59 will be caused to cease, and, the lever 73 may then be actuated to tighten the brake shoe about the brake wheel.

In advance of the shaft 60, there is mounted, in suitable bearings upon the upright frame 76, mounted in turn, upon the chassis frame, is a shaft 77 upon which is mounted a winding drum 78 and a ratchet gear 79 is rotatable with this shaft and corresponds, in effect, to the ratchet gear 61 upon the shaft 60, a pawl (not shown) being suitably mounted to coact with the said ratchet gear, and the gear being provided with a clutch member 81, engageable with the clutch member 82 which is splined upon the shaft 77 so as to be shiftable, by a hand lever 83 corresponding to the lever 64, this lever being operable through the medium of the handle member 67 above referred to. A brake wheel 84 is rotatable with the drum 78 and a brake shoe 85 is anchored at one end as at 86 to an upstanding bracket 87, and to the other end of this shoe there is connected a rod 88 which is pivoted at its upper end to a brake lever 89 pivotally mounted as at 90 upon the top of the frame 76. A sprocket gear 91 is mounted upon the shaft 60 and a sprocket gear 92 is mounted upon the shaft 77, a sprocket chain 93 being trained about the said gears 91 and 92. Another sprocket gear 94 is fixed upon the shaft 77 and a sprocket chain 95 is trained about this gear and about a sprocket gear 96 fixed upon the shaft 97. The shaft 97 is mounted in bearings, one of which is in the form of a gear case 98 and mounted upon the shaft 97 within this gear case is a worm gear 99, a worm shaft 100 is also mounted in the gear case 98 and meshes with the worm gear 99, and a sprocket gear 101 is fixed upon the shaft 100, and a sprocket chain 102 is trained about this gear and about a gear 103 fixed upon the shaft 104 which is driven from the motor of the truck.

A cable 105 is connected to a collar 106 which is fitted to the boom 24 near the upper end thereof, and this cable is led forwardly and over an idle pulley 107 mounted in a bracket 108 upon the upper end of the mast 5, the cable being then led downwardly and connected to and wound upon the drum 78.

From the foregoing description of the invention it will be understood that power is applied from the engine of the tractor by the gear above described, and that by actuating the clutch lever 83, the drum 79 may be thrown into gear so as to wind up the cable 105 and effect swinging adjustment of the boom 24. It will also be evident that power is transmitted from the shaft 77 to the shaft 60 for rotating the drum 59, when the clutch lever 68 is actuated, so as to wind up the cable 55 to effect upward movement of the hammer, when the clutch for controlling the rotation of this drum is actuated and, when the clutch is thrown out, the hammer will, of course, fall by gravity to have impact against the upper end of the pile to be driven.

It will also be understood from the foregoing description of the invention, that by rotating the hand wheel 47, the guides 38 may be raised or lowered through the medium of the cables 43.

It will further be evident that by removing the bolts 23, the mast 5 may, due to the hinged connection 3 of the same with the chassis frame 1, be lowered to horizontal position, carrying with it the boom 24 which is pivotally connected as previously described as at 25, with the said mast 5, the connection of the members 41 with the shaft 49, providing for a folding of the guides 38 with respect to the said boom.

What I claim is:

1. In a machine of the kind described, a support, a cross bar hinged thereto, a mast, a bearing for mounting the mast at its lower end in the cross bar, a pivot rod passed longitudinally through the mast, a conical head on the pivot rod and engaged in the upper end of the mast, a boom carried by the mast, a pulley carried by the mast above the conical head, a pulley carried by the cross bar, driving means suspended from the outer end of the boom, operating cables trained over the pulleys, means connecting one cable to the boom, and means connecting another cable with the driving means.

2. In a machine of the kind described, a support, a cross bar hinged thereto, a mast, a bearing for mounting the mast at its lower end in the cross bar, a pivot rod passed longitudinally through the mast, a conical head on the pivot rod and engaged in the upper end of the mast, a boom carried by the mast, a pulley carried by the mast above the conical head, a pulley carried by the cross bar, driving means suspended from the outer end of the boom, operating cables trained over the pulleys, means connecting one cable to the boom, means connecting another cable with

the driving means, and means connected with the pivot rod for maintaining the same rigid and detachably connected with the support.

3. In a machine of the kind described, a support, a cross bar hinged thereto, a mast, a bearing for mounting the mast at its lower end in the cross bar, a pivot rod passed longitudinally through the mast, a conical head on the pivot rod and engaged in the upper end of the mast, a boom carried by the mast, a pulley carried by the mast above the conical head, a pulley carried by the cross bar, driving means suspended from the outer end of the boom, operating cables trained over the pulleys, means connecting one cable to the boom, means connecting another cable with the driving means, means connected with the pivot rod for maintaining the same rigid and detachably connected with the support, and means for operating the cables.

In testimony whereof I affix my signature.

OTIS M. LANIER.