Feb. 7, 1950 R. D. FIEDLER 2,496,706

MOBILE PILE DRIVER

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Fig. 1.

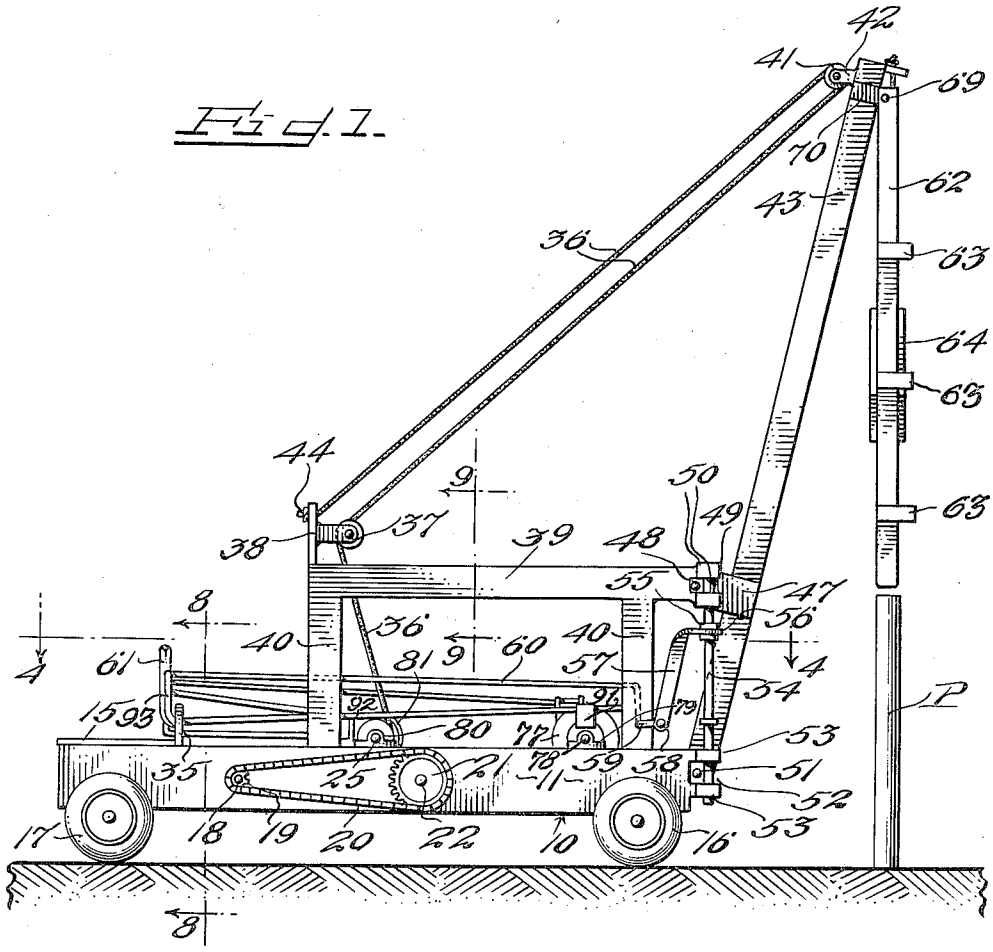
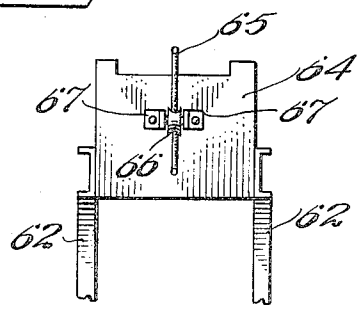


Fig. 3.



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Fig. 2.

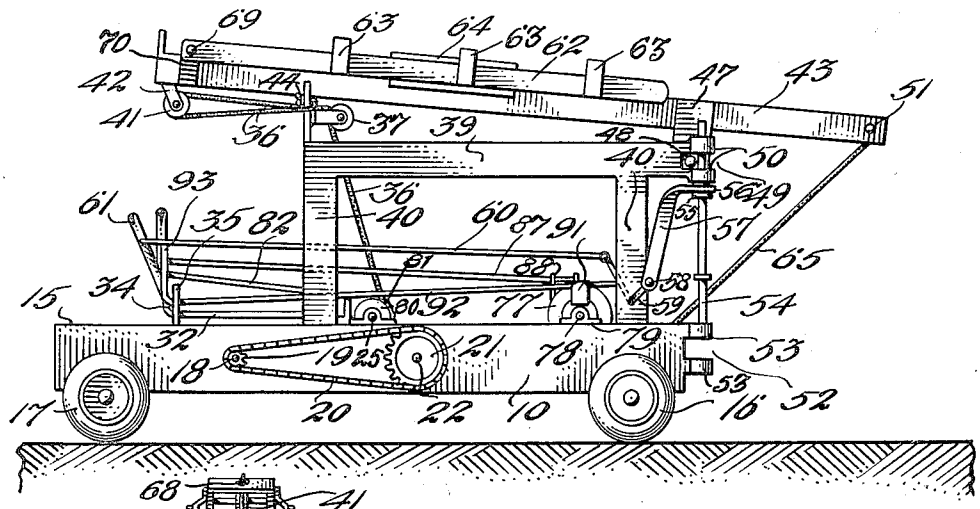


Fig. 3.

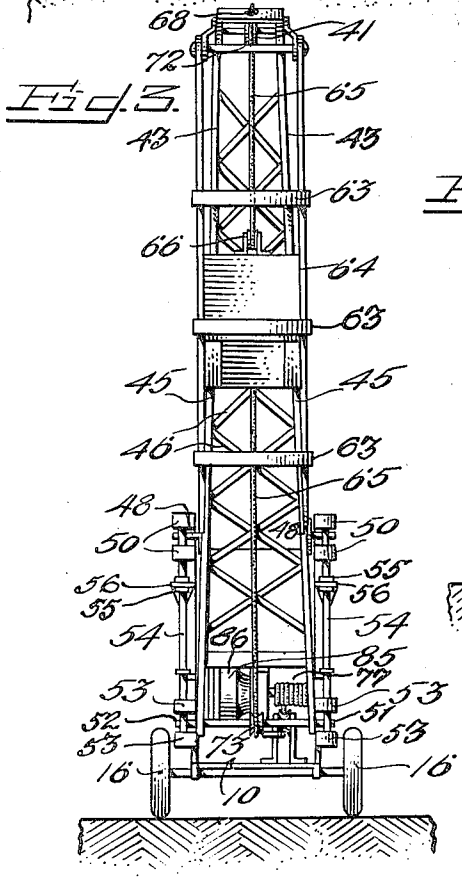
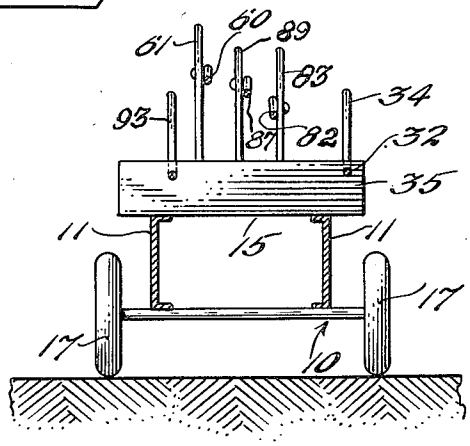


Fig. 8.



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Fig. 4.

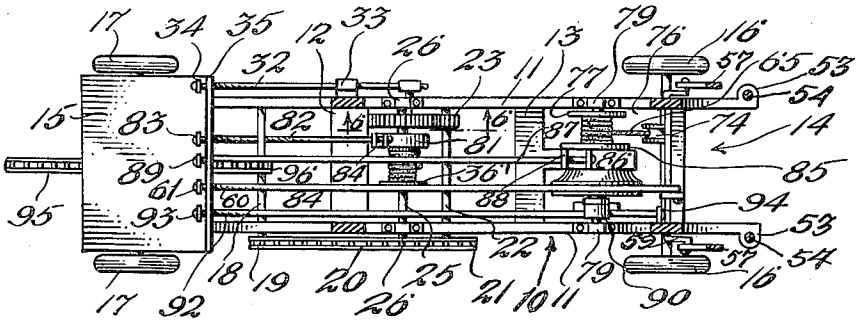


Fig. 5.

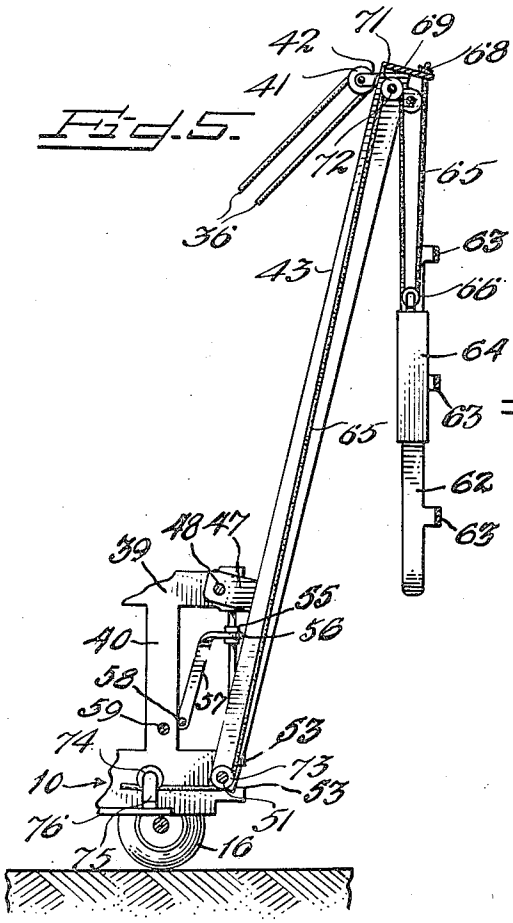


Fig. 6.

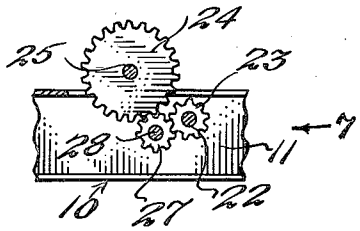
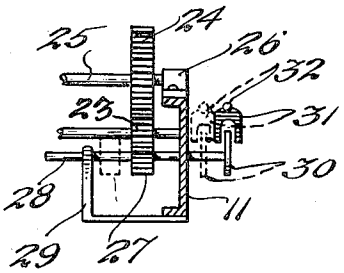


Fig. 7.



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MOBILE PILE DRIVER

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Application August 2, 1946, Serial No. 688,090

4 Claims. (Cl. 61—74)

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My invention relates to a mobile pile driver, and the object thereof is to provide a pile driver, in which the derrick is provided with a folding tower which can be folded to a horizontal position on top of the frame of the machine, which is in the form of a wheeled vehicle, so that the whole machine can be moved from one location to another as easily as a truck, or erected in an upright position when in use for driving piles.

Another object of the invention is to provide a mobile pile driver which is mounted on a wheeled frame provided with a motor or other source of power, by which the machine may be propelled from one location to another for use, and for operating cables for moving the derrick or tower to an elevated upright position for use when driving piles by means of a hammer and carrying a hammer guide, in which the hammer is movable and adapted to be dropped on the piles for driving the same, said derrick including a folding tower adapted to be lowered to a horizontal position upon the top of the machine when device is not in use, so as to easily pass overhead obstructions, underpasses or through viaducts, when transporting the machine from place to place.

Another object of the invention is to provide novel control means for driving the machine and operating the derrick or tower to raise and lower the same for positioning it in operative pile driving position, or lowering the same when not in use, and which includes winding drums, upon which cables are adapted to be wound for raising and lowering the folding tower of the derrick or for raising the hammer and releasing the same in the driving of piles, together with brake means for each of said drums, and means for locking the tower in a raised position, so as to sustain the weight of the hammer guide and hammer operating therein, which may weigh a ton or more, and provided with novel drive means, for operating the drums, in order that the same may be operated from the operator's platform or seat on the truck or wheeled frame of the pile driving machine or from a single point, thereby rendering the controls convenient, expeditious and efficient.

Another object of the invention is to provide a mobile pile driver, which includes a wheeled machine, frame or chassis, and in which power may be taken off of a suitable power take-off device, or from a motor mounted on the machine, so as to move the tower to raised operative or lowered inoperative positions, as well as to raise the hammer and to release the same for operation in driving the piles, from any suitable source of power, such as a motor, mounted on the machine or derived from a tractor or otherwise.

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Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevation of a mobile pile driver constructed in accordance with the invention.

Figure 2 is a similar view but showing the tower thereof folded when not in use, and for transporting the machine or moving it about from one location to another similar to a truck.

Figure 3 is a front elevation of the mobile pile driver as shown in Figure 1 of the drawings.

Figure 4 is a sectional plan view taken horizontally on the line 4—4 of Figure 1.

Figure 5 is a fragmentary vertical sectional view showing the folding tower in an elevated or upright position in connection with the front wheeled end of the machine.

Figure 6 is an enlarged detail sectional view taken on the line 6—6 of Figure 4.

Figure 7 is an end elevation looking in the direction indicated at 7 in Figure 6 of the drawings.

Figure 8 is a transverse vertical sectional view taken on the line 8—8 of Figure 1, and

Figure 9 is an enlarged fragmentary vertical sectional view taken on the plane of the section line 9—9 of Figure 1.

Referring to the drawings in detail, in which like reference characters designate corresponding parts throughout the several views, the mobile pile driver of my invention is shown as comprising a wheeled frame 10 comprising side channel bars or horizontal frame members 11 reinforced by transverse connecting members 12 and 13 and open at the front end as indicated at 14, while the rear end bears the usual form of motor and a platform 15 upon which may be arranged a seat for the operator if desired. The wheeled frame or chassis comprising the longitudinal side bars 11 is provided with front wheels or tires 16 which may be provided with a suitable steering gear, for steering the machine in the usual manner of automobiles or other vehicles, trucks or the like of this class. The rear drive wheels are indicated at 17, the wheels in each instance being preferably provided with pneumatic tires which will also cushion the frame when the device is in use in driving

piles, by reason of the enormous weight supported thereby. The motor is provided with a power take-off shaft 18 at one side, or the same may be the power take-off of a tractor or other machine, from which power is derived, and is provided with a small sprocket wheel 19, for driving through the medium of an endless drive chain 20, a larger sprocket wheel 21, preferably geared to the ratio of 12 to 1 or otherwise, in order that the shaft 22 on the end of which the sprocket wheel 21 is mounted, may be driven at a lower speed than the shaft 18 and sprocket wheel 19. The shaft 22 mounts a gear or pinion 23 adapted to be connected to a larger gear 24 mounted on a driven shaft 25 horizontally journaled in bearings 26 across the frame 10 and resting upon the top flanges of the side bars 11. A pinion or gear 27 is mounted on a shiftable shaft 28 rotatable in a bearing 29 of angular form secured to one side member 11 of the chassis frame and adapted to be shifted in and out through the adjacent side member 11 in connection with the hanger bearing 29, by means of a disk 30 fixed to the outer end by the shaft 28 and engaged by a fork 31 fixed to the adjacent forward end of an operating rod 32 rotatably mounted in a bearing 33 at one side of the frame 10 and operable by means of a lever 34 from the platform 15, at which point the rod 32 extends through an upright support, panel or instrument board 35 at the front of the platform 15. A cable winding drum 36' is also fixed to the shaft 25 for receiving a cable 36 which extends upwardly around a guide pulley 37, in rear thereof, as mounted upon a bearing bracket 38 supported upon an open framework superstructure 39 supported above and parallel to the main chassis frame 10 as by means of side uprights 40 and also preferably comprising channel members similar to the longitudinal side bars 11 of the frame 10.

The cable 36 extends upwardly around a pulley 41 mounted in a bearing bracket 42 at the upper end of a folding tower or derrick 43 and then rearwardly, where it is anchored to the bearing bracket 38, as indicated at 44. The tower or derrick 43 comprises upwardly converging side channel members 45 connected by cross braces 46 and having bearing arms 47 at each side carrying a pivot 48, which projects outwardly therefrom for engagement in slotted bearings 49, formed by spaced upper and lower sleeves 50 disposed in vertical alignment at the front end of the horizontal forwardly projecting upper members of the superstructure or framework 39. The lower end of the derrick or tower carries a similar transverse pivot 51 in a slotted bearing 52 with spaced upper and lower sleeves 53 at each side, to receive vertical lock rods 54 designed to engage the sleeves 50 and 53 and to slide therein for opening and closing the slotted bearings 49 and 52, in order to releasably hold the pivots 48 and 51 of the derrick in position. The rods 54 carry collars or stops 55 engaged by the adjacent horizontally extending apertured arms 56 of links 57 which are in turn connected at their lower ends as indicated at 58, to end cranks of a shaft 59 journaled in the forward upright members 40 of the superstructure frame 39 the shaft 59 having an inner crank arm connected by means of a rod 60 to an operating lever 61 pivotally supported on the bearing plate 35. In this way, by operating the lever 61, the rods 54 may be shifted up and down, to open either one of the bearings 49 and 52, so that the derrick or tower 43 may be released by one or the other, and as shown in Figure 2 of the drawings, may pivot on the upper pivot 48 when the lower pivot 51 is released from the bearing 52, to fold the tower or derrick to a horizontal position back on the superstructure 39, whereby the height of the machine is reduced. Also, the derrick may be heightened, by releasing both of the pivots, and inserting the pivot 51 in the upper bearing 49, or the upper pivot 48 may be released from its bearing 49 and the derrick or tower may pivot on the lower pivot 51.

The derrick or tower 43 which is in the nature of a boom, carries a pile driving hammer guide 62 comprising side members connected by U-shaped braces 63 providing clearance for the pile driving hammer 64 which is in the form of a weight grooved at the vertical ends or edges thereof, to slide on the bars of the frame 62 and formed at the bottom to properly engage the upper end of a pile P as shown in Figure 1 of the drawings. A cable 65 operates around a pulley 66 carried by the hammer weight 64 and journaled in suitable brackets 67 carried by said weight or hammer. One end of the cable 65 is anchored to the upper end of the tower or derrick, as indicated at 68 by means of a bracket 69 at the upper end of the tower or derrick and the guide 62 is pivoted to the tower as indicated at 69 through the medium of suitable bearing brackets 70 at the side bars thereof. When the tower is folded horizontally over the top of the superstructure of the frame, the guide 62 will lie on top of the tower or derrick 43, as indicated in Figure 2 of the drawings. The cable 65 is then extended over a derrick pulley 71 journaled on a shaft 72 beneath the bracket 69 at the upper end of the derrick 43 and then extends downwardly within the derrick and around a guide pulley 73 on the lower pivot 51, from which point it is extended under a guide pulley 74 mounted in a bearing bracket 75 on a suitable bottom cross member 76 extending between the side bars 11 of the frame 10 and bracing the latter for additional strength at this point. The cable is then extended around a drum 77 on a horizontal shaft 78 mounted in bearings 79 on the top flanges of the side bars 11 of the frame 10. The drum 36 is provided with a brake drum 80 engaged by a band 81, one end of which is fixed and the other flexible for connection to a rod 82 connected to a pivoted operating lever 83 for contracting and expanding the brake band 81 on the drum disk 80 to check the rotation of the drum 36. The rod 32 operates through an upright support 84. A similar friction brake drum 85 is provided on the drum 77 and shaft 78 engaged by a band 86 also resilient or flexible and having one end connected to an operating rod 87 which operates through a support 88 similar to the support 84, the opposite end of the rod being connected to a pivoted operating lever 89 on the upright member 35. The drum 77 may be driven in any suitable manner from the shaft 25, so as to raise the weight or hammer 64 and release it in the guide frame 62, for driving the piles P. A suitable clutch 90, preferably of the cone type, is provided for operating the drum 77 by connecting it to the drive connection, and is shifted laterally by means of a fork 91 carried by an operating rod 92 pivotally mounted in the support 35 and capable of oscillation by means of an operating lever 93 also pivotally mounted in support 35 to be operated as are the other control

or operating levers from upon the platform 15. The forward end of the operating rod 92 is rotatably supported in a bearing bracket 94 at the inside of the adjacent upright member 40 of the superstructure or framework 39. Thus, the raising and lowering of the derrick or tower may be controlled by the cable 36, which when the tower is lowered to a horizontal position upon the superstructure, is wound upon the drum 36 so that the cable 65 where it extends around guide pulley 73, will extend upwardly and forwardly from the pulley 74 to the pulley 73 at the forwardly projecting end of the tower or derrick 43 when the lower shaft or pivot 51 is released from the lower slotted bearing 52 and the derrick is swung down in a folded position upon the pivot 48. In extending or elevating the derrick or tower 43, it is swung in the opposite direction by operating the drum 77 to exert pull upon the cable 65, so that the derrick is elevated in the manner shown in Figure 1 of the drawings with the guide frame 62 hanging therefrom in a vertical position. In this position, operation of the drum 77 and the cable 65 around the guide pulleys 74, 73, 71 and 66 will permit the hammer or weight to be raised in its guide frame and then by releasing the brake 86, permit the hammer to drop, to drive the pile P in the well known manner. It may also be mentioned that the brake bands 81 and 86 when released, will permit free rotation of the winding drums and driving means, and when tightened upon their respective brake drums, will hold said winding drums stationary and against rotation.

It will thus be seen that I have provided a mobile pile driver, which is provided with a derrick or tower for suspending the guide frame for the hammer or pile driving weight, in such a manner that the latter can be extended to the desired height for efficient operation and driving extremely long piles, and that the same may be folded to a lowered position so that only an average overhead will be required, in traveling under bridges, viaducts or other overhead structures, thereby greatly facilitating the transportation or movement of the machine from one location to another, as easily as a truck. Also, while the device may be provided with a motor, the shaft 18 may be driven from a suitable endless belt or drive chain 95 as shown in Figure 4 of the drawings, from the power take-off of a tractor or other suitable prime mover, to the shaft 18 by means of a sprocket wheel 96 fixed centrally thereon between the side bars 11 of the frame 10.

In order to operate the hammer, the cone clutch 90 is connected with its sprocket, whereas to raise the derrick, the cone clutch is connected to the drum 36 and when the lower end of the derrick is locked at the open bearing 52 by means of the rods 54 through the medium of the control rod 60 and lever 61, the drum 77 is connected and if desired, the derrick 43 may be caused to lean forwardly to a greater degree or be elevated, and the cable upon the winding drum 77 operated to raise the weight and then to release it for permitting the weight or hammer to drop in its guide frame 62 for driving the piles P.

Thus, I have provided a very desirable form of mobile or portable pile driver, which will efficiently serve its purpose, and which is so constructed as to withstand the enormous strains and weights placed thereon. The derrick or tower when elevated, may be raised to a very high elevation, or lowered to such a point that the overhead height thereof, is reduced to a minimum.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

I claim:

1. A mobile pile driver including a wheeled frame having a superstructure, a derrick pivoted releasably thereon at two vertically spaced points, one of said pivot points being releasable to permit the derrick to be folded on top of the superstructure in a substantially horizontal position to provide a low overhead, a guide frame suspended pivotally from the upper end of the derrick, a hammer slidable therein, drum and cable means for swinging the derrick to folded position, and drum and cable means for swinging the derrick to raised position and for raising the hammer and releasing it.

2. A mobile pile driver including a wheeled frame, a superstructure thereon, having vertical spaced pairs of open bearings, a derrick having spaced transverse pivots engageable in said bearings, manually operable means to selectively open either desired pair of bearings or to close both pairs of bearings to release said pivot from its bearings or to retain both pivots in their bearings, one of said pivots when released from its bearings permitting the derrick to be folded rearwardly over the top of the superstructure.

3. A mobile pile driver including a wheeled frame, a superstructure thereon, having vertical spaced pairs of open bearings, a derrick having spaced pivots engageable in said bearings, manually operable means to selectively open either desired pair of bearings or to close both pairs of bearings to release said pivot from its bearings or to retain both pivots in their bearings, one of said pivots when released from its bearings permitting the derrick to be folded rearwardly to a substantially horizontal position over the top of the superstructure, a hammer guide pivotally suspended to the upper end of the derrick, a hammer slidable therein, and drum and cable means connected to the lower end of the derrick for raising it to an upright position and upon release thereof, to permit pivoting of the derrick to the substantially horizontal folded position, said drum and cable means being connected to the hammer to raise it when the derrick is in an upright position and to release and permit the raised hammer to drop for driving a pile.

4. A mobile pile driver including a wheeled frame, a superstructure mounted on the frame, a derrick means to releasably pivot the derrick to the forward end of the superstructure at different elevations, holding means for holding the derrick at vertically spaced points in an upright position or for releasing it at the lower one of said points whereby the derrick may be swung onto the superstructure in a substantially horizontal folded position, a drum carried by the frame and connected to the upper end of the derrick for swinging the derrick to the folded position, power means for operating the drum, a second drum mounted on the frame, a hammer guide pivotally suspended from the upper end of the derrick, a hammer operable therein, a cable on the second drum and connected to the derrick and to the hammer for elevating the derrick and for raising the hammer when the derrick is elevated with the guide hanging therefrom, means to release the second drum to permit

the hammer to drop, and control means at the rear of the wheeled frame for operating the holding means and for controlling the operation of the drums.

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