H. T. WELTY & F. J. McCAIN.

MARINE PILE DRIVER.

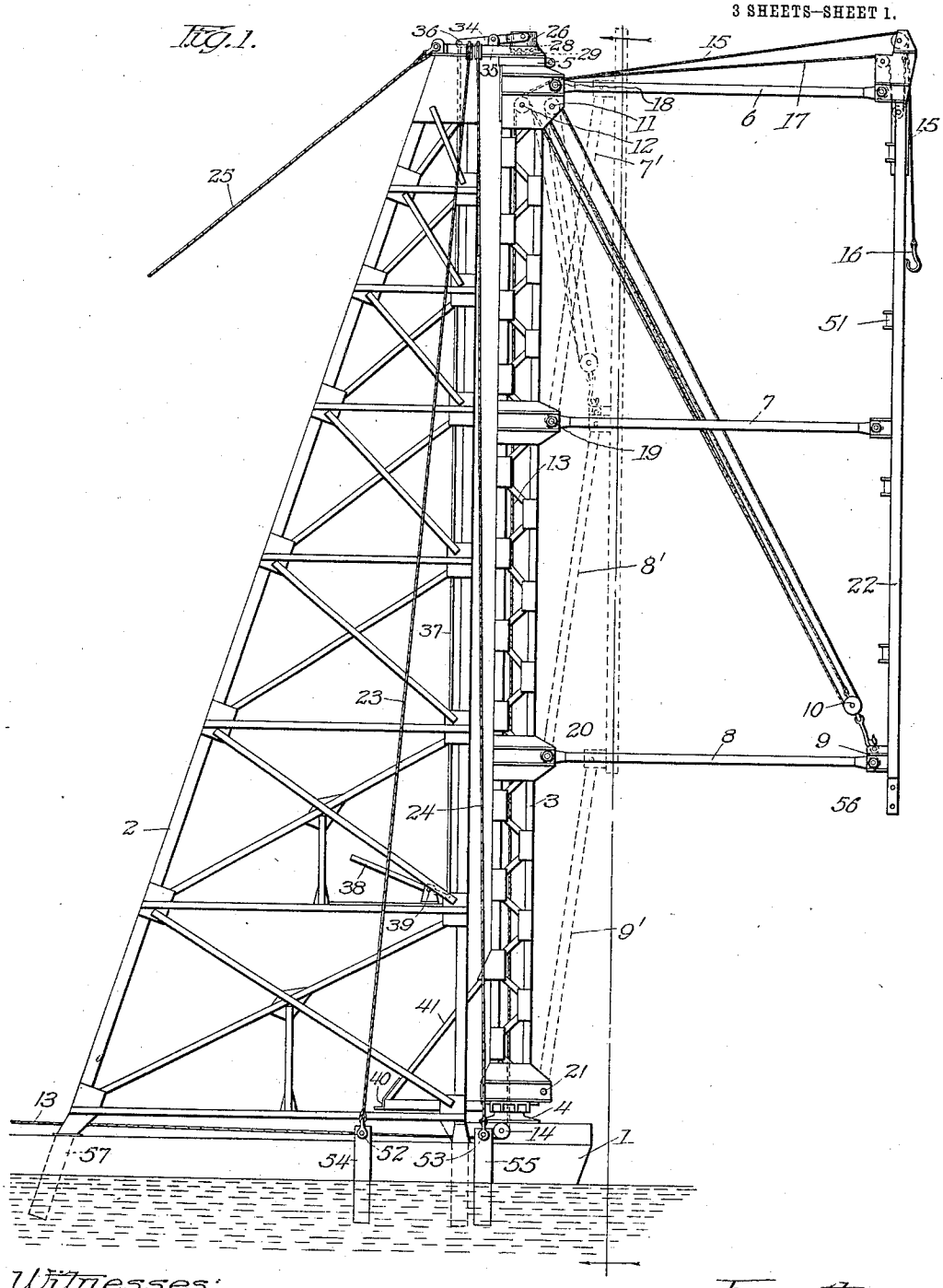
APPLICATION FILED APR. 24, 1912.

1,043,886.

Patented Nov. 12, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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3 SHEETS—SHEET 2.

Fig. 2.

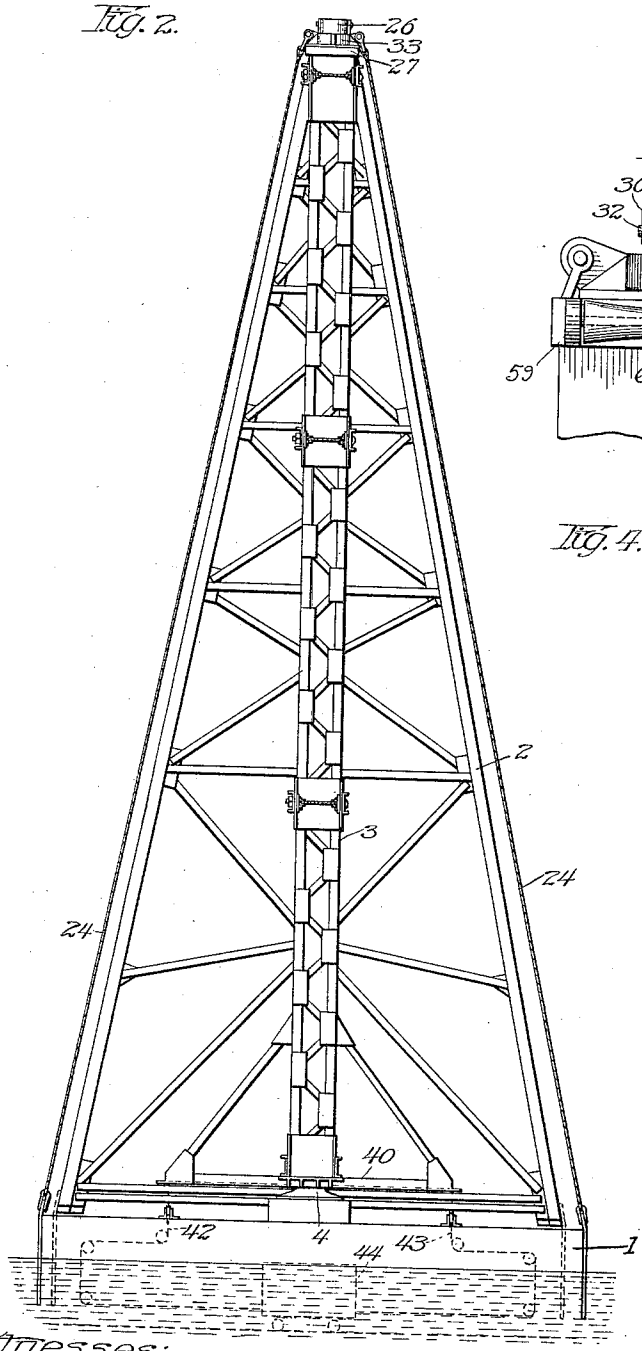


Fig. 3.

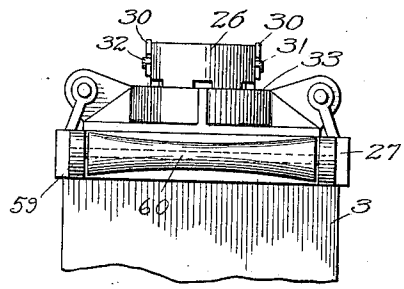
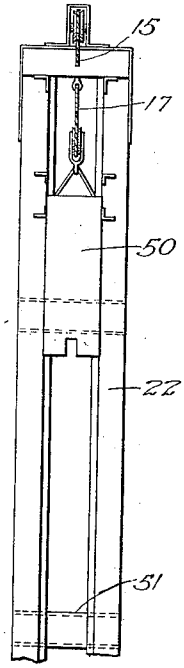


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

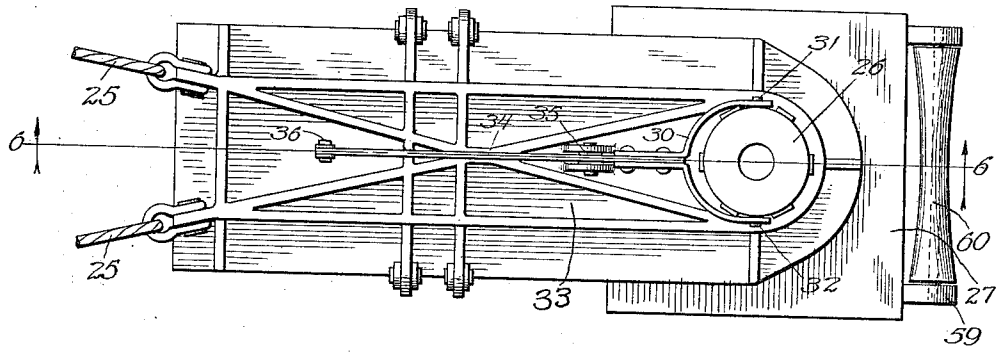


Fig. 6.

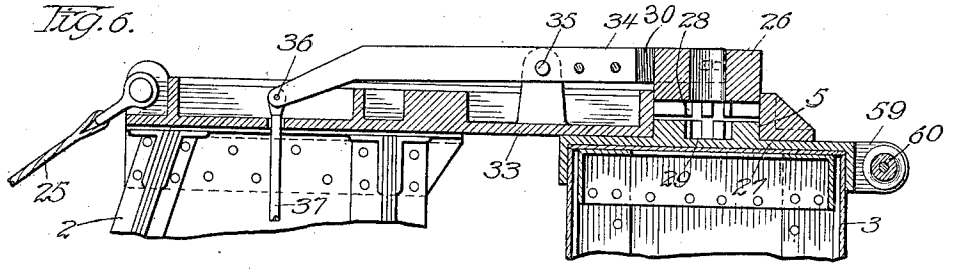
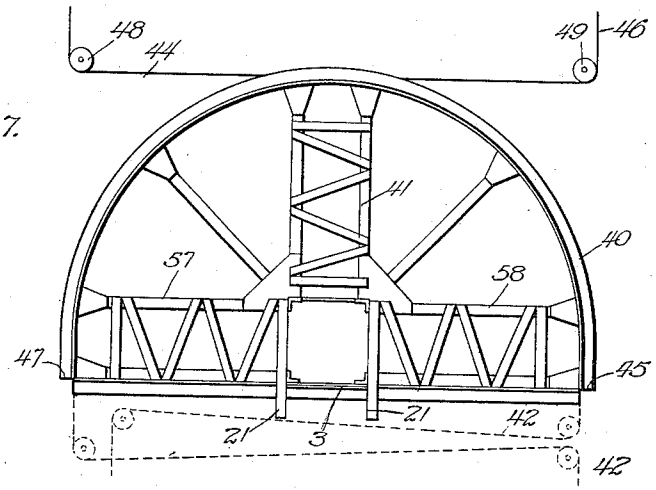


Fig. 7.



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UNITED STATES PATENT OFFICE.

HARRY T. WELTY, OF YONKERS, NEW YORK, AND FRANK J. McCAIN, OF WEEHAWKEN, NEW JERSEY.

MARINE PILE-DRIVER.

1,043,886. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed April 24, 1912. Serial No. 692,842.

To all whom it may concern:

Be it known that we, HARRY T. WELTY, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, and FRANK J. McCAIN, a citizen of the United States, residing at Weehawken, in the county of Hudson and State of New Jersey, have jointly invented certain new and useful Improvements in Marine Pile-Drivers, of which the following is a specification.

This invention relates to marine pile drivers, and one of its objects is the provision of apparatus of such character that piles may be driven or removed within a wide area without changing the position of the scow on which the pile driver is mounted.

Another object of the invention is to provide a pile driver which may be adjusted to permit the removal of one or more single piles from a nest of the same without removing any in front for the purpose of making a pathway.

A further object of the invention is to provide a releasable clutch for the mast to resist torsion on the latter, particularly when piles are being pulled out while the lead extends at an angle with respect to the forward portion of the scow.

More particularly it is the object of the present invention to provide collapsible struts between the main mast and the forward lead in which the hammer moves, the lowermost strut being removable, and to provide means for oscillating the mast to various positions in arcs of circles and for moving the lead and struts to various radial positions, and also to provide a clutch at the top of the mast to resist torsional strain on the latter.

Referring to the accompanying drawings, Figure 1 shows our improved pile driver mounted on a scow floating on a body of water; Fig. 2 is a front elevational view of the bracing tower and mast and shows diagrammatically a scow counterbalance; Fig. 3 is an enlarged view of the top of the mast; Fig. 4 is a front view of the upper portion of the lead, showing the hammer in its uppermost position; Fig. 5 is a plan view of the clutch mechanism for the upper end of the mast; Fig. 6 is a longitudinal sectional elevation of Fig. 5 on the line 6—6, looking in the direction of the arrows; and Fig. 7 is a plan view of the bull wheel by which the mast is oscillated.

Referring more particularly to Fig. 1, 1 designates the scow floating on a body of water, to which scow is fixed the bracing tower 2, at the forward portion of which is pivoted the mast 3 between the pivot 4 at the lower end and the pivot 5 at the upper end. 6, 7, 8 designate the struts, which are movable on pivots from horizontal to nearly vertical positions, as shown by the dotted lines 7′, 8′ and 9′. These struts are movable from the horizontal positions shown in full lines to the nearly vertical positions shown in dotted lines by means of the block and tackle 10, which is connected between the point 9 on the lead 22 and the pulleys at 11 near the upper end of the mast 3. The rope or cable from the block and tackle also runs over the pulley mounted on the fixed bearing at 12 at the upper end of the mast and thence extends down through the center of the mast to the pulley 14 on a fixed bearing, from which the cable extends horizontally at 13 to the hoisting engine which is mounted at the rear end of the scow in the usual and well known manner. An additional cable or rope extends from the hoisting engine to and up through the center of the mast and around the pulley 12 horizontally as shown at 15 to the hook or other device 16, by which a pile may be gripped and pulled out of place or lifted into place for the driving operation. Another cable or hoisting rope extends from the hoisting engine up through the center of the mast over the pulleys 12, and thence as indicated at 17 over the pulleys at the upper end of the lead 22, and thence to the hammer 50 as indicated in Fig. 4. There are also cables 44 and 46 which extend from the bull wheel to the hoisting engine for the purpose of oscillating the mast. This will be more fully explained hereinafter. The hoisting engine may be of the usual well-known construction with the hoisting spools independently operated so that at any time the mast may be oscillated to the desired position or the struts between the mast and the lead may be lifted and lowered as desired, or the hammer may be operated to drive piles, or the lifting mechanism may be operated to lift the piles into proper position or exert force on a driven pile to remove the same.

By referring to Fig. 1 it will be seen that

the struts 6, 7 and 8 are pivoted respectively to the mast at 18, 19 and 20. The lowermost strut is not shown in full lines because it is removed, and so also is the lowermost section of the lead 22. Such lowermost section of the lead 22 may, however, be connected to the lead at 56 when piles are to be driven. When the lowermost strut is in place it is pivoted to the mast at 21 and will occupy the position shown in dotted lines at 9′ when the lead 22 occupies its vertical position nearest the scow 1. The struts 6, 7 and 8 may also each be made removable, but in most instances it is found that it is necessary to have only the lowermost strut removable and in some instances both the lowermost strut and the one next above the same. It is desirable to have the lowermost strut removable in order that single piles may be removed from a nest of the same without providing a pathway in front thereof for the lead 22. When a pile is to be removed from a nest of piles back from the outside, the lowermost strut may be removed and the lead with the lowermost section thereof adjusted to the proper position so that the hook 16 may grasp the pile and force be exerted on the hoisting rope or cable 15 to remove the pile at once and without the delay and expense of providing a pathway through the nest of piles. A new pile may then be lifted into place and the hammer in the lead operated to drive the pile into proper position. In such case the lowermost section of the lead may be connected to the latter at 56 when desirable.

In Fig. 7 the bull wheel is shown. At the points 45 and 47 are connected the cables 44 and 46, which extend to drums on the hoisting engine after being properly directed by such direction pulleys as indicated at 48 and 49. The bull wheel is connected to the lower end of the mast 3 by a suitable frame including the rear brace 41 and the side braces 57 and 58. The mast 3 is shown at the central lower portion of Fig. 7. At 21, 21 are shown the points at which two struts may be pivoted so as to lie parallel to each other.

The counterbalance mechanism is shown in Figs. 2 and 7 and comprises a heavy weight 44 mounted on wheels to roll from side to side of the scow as the mast and derrick tend to tilt to one side or the other due to the angle at which the lead and struts are placed. The weight 44 is connected at its ends by properly directed ropes or cables 42 and 43 to the lateral front ends of the bull wheel near the points 45 and 47, as shown in Fig. 7. Therefore when the mast and lead are turned toward the right and the weight of the strut, hammer and lead and parts connected thereto tend to tilt the scow to the right, the weight 44 is moved to the left to counterbalance or counteract such tendency. In a similar manner when the struts, lead and hammer are moved to the left, the counterweight will be moved to the right, thus at all times keeping the scow in substantially horizontal position.

The bracing tower 2 may be securely fastened to the scow in any suitable manner. In this instance we have shown a rigid connection between the tower and scow at 57, and have shown lateral cables 23, 23 and 24, 24 extending between the top of the tower to the fastenings 52 and 53 on the respective anchorages 54 and 55, which are located on both sides of the scow. There is also a rearwardly extending bracing cable indicated at 25. The tower illustrated and the means for holding it in place are not specifically of our invention. However securely the tower may be braced and however firmly the bull wheel may be held by the hoisting engine from permitting the lower end of the mast to twist vertically, there is a tendency for the upper end of the mast to twist when the struts and lead extend at an angle from the front of the scow, particularly when extended sidewise, and a pile is being pulled out from its place where it has been firmly driven. There is also a tendency for the upper end of the mast to twist when a heavy pile is being lifted into place. In order to resist this tendency to produce torsion in the mast we have provided a clutch 26 for holding the upper end of the mast firmly in any position to which it has been adjusted. In Fig. 6 we have shown the upper end of the mast 3 as provided with a square cap plate 27, in the center of which are the clutch teeth 29. The latter coöperate with the clutch teeth 28 in the clutch 26. To the upper end of the tower 2 is connected the top plate 33, which extends forward over the top of the mast 3 and surrounds the center circular portion of the cap 27 to form the upper pivot 5 of the mast 3. The clutch 26 is provided with laterally extending pins 31 and 32 which are engaged by the yoke 30. The yoke 30 is rigidly connected to the arm or lever 34 which is pivoted at 35 on the top plate 33 of the tower 2. To the rear end of the lever 34 is connected at 36 the vertical actuating rod 37, which extends downwardly to the lever 38 which is pivoted at 39 at any convenient location where the lever 38 may be manually operated. We have shown the clutch 26 as manually operated, but it may be automatically operated if desired. When the lever 38 is depressed, the clutch 26 will be moved downwardly and the clutches 28 and 29 will intermesh and the upper end of the mast 3 will then be held firmly in adjusted position. Whenever the mast is to be oscillated, however, the clutch 26 must first be lifted so as to permit the upper end of the mast 3 to oscillate freely. As before stated, the oscillation of the mast 3 is accomplished by means of the cables 44

and 46 which extend between the bull wheel and the hoisting engine. The cables 44 and 46 when properly connected to the hoisting engine may be depended upon to hold the bull wheel and the lower end of the mast in secure or rigid position after being adjusted. The clutch 26 may be depended upon for holding the upper end of the mast rigidly in adjusted position so as to resist torsion of the mast particularly when a pile is being moved from some distance and the lead is not immediately above the pile. This may happen when the pile to be removed is out of the direct range of the apparatus, and it is not desired to change the position of the mast in order to save time, or when a pile is being taken from some distance and hauled as well as hoisted to the position where it is to be driven. The clutch is also desirable at the upper end of the mast to hold the struts and lead in adjusted position when there is a tendency for the latter to be moved out of adjusted position by reaction on the bull wheel and the cables connecting the same to the hoisting engine.

It should be particularly noted that our apparatus is especially adapted for marine work because it takes considerable time to change the moorings of the scow in moving it from place to place. By arranging the apparatus so that piles may be driven over a large area for a given position of the scow, considerable time and expense is saved and the work is done efficiently. The collapsible form of struts between the mast and the lead also permits the removal of the pile from the interior of a nest of the same in a small space of time as compared with what would be required if the piles had to be removed in front to provide a pathway for the lead. This is also true with respect to driving additional piles back of piles already driven in place. Furthermore, the clutch mechanism at the upper end of the mast makes the structure sufficiently rigid and durable to permit the lifting, hauling or removal of piles throughout a large area without changing the position of the scow.

In moving the lead 22 to the position indicated by the dotted lines in Fig. 1, it is evident that the ropes or cables which pass over the pulleys at 12 and 18 would bind against the end of the cap 27, thereby abrading and wearing the cables unless some means were provided to prevent it. The forward end of the cap is therefore preferably provided with perforated ears or lugs 59 in which the roller 60 is mounted. When the lead 22 is raised the cables will then engage the roller 60 which prevents the sharp edges of the cap member 27 from wearing and weakening the strands of the cable.

Obviously those skilled in the art may make various changes in the details of construction and arrangement of parts of the specific apparatus shown and described without departing from the spirit and scope of our invention as defined by the claims, and we therefore do not wish to be restricted to the precise construction exemplifying our invention.

What we claim and desire to secure by Letters Patent of the United States is:

1. In a marine pile driver, the combination with a tower, of a scow for carrying the same, a mast pivoted to said tower at its upper and lower ends, a lead or guideway, a pile driving hammer movable up and down in said guideway, and a plurality of struts pivoted to said mast and to said lead or guideway, and means for lifting and lowering the outer ends of said struts to move said lead to various radial positions.

2. In a marine pile driver, the combination with a tower, of an oscillatable mast, a lead or hammer guideway connected to said mast, and means for holding the mast in adjusted position.

3. In a marine pile driver, the combination with a tower, of an oscillatable mast pivoted to said tower at its upper and lower ends, pile driving mechanism, and a clutch at the upper end of said mast for holding the mast in adjusted position.

4. In a marine pile driver, the combination with a tower, of a mast pivoted thereto, a plurality of parallel struts in substantially the same vertical plane but different horizontal planes, a lead or hammer guide-way connected to the outer ends of said struts, means for moving said lead to various radial positions by lifting or lowering said struts, and apparatus for oscillating said mast to move the lead to various positions in arcs of circles.

5. In a marine pile driver, the combination with a tower, of a plurality of struts pivotally connected to said tower, a lead or hammer guide-way pivotally connected to said struts to occupy a substantially vertical position at all times, the lowermost strut being removable, means for moving the struts to place the lead in position at various distances from the tower, and pile driving mechanism associated with said lead.

6. In a marine pile driver, the combination with a tower, of an oscillatable mast pivoted to said tower at its upper and lower ends, a plurality of parallel struts in substantially the same vertical plane but different horizontal planes, the lowermost strut being removable, a vertical lead or hammer guide-way pivotally connected to said struts, a clutch at the upper end of the mast to hold the latter firmly in position to resist torsion and movement out of adjusted position, apparatus for oscillating said mast, struts and lead, and means for releasing said clutch when said oscillating apparatus is operated.

7. In a marine pile driver, the combina-

tion with a tower, of a lead or hammer guide-way, a plurality of struts connecting said lead and tower at different elevations, means for moving said guide-way into different positions to and from said tower while said struts maintain said guide-way in substantially vertical position, and pile driving mechanism associated with said tower and guide-way.

8. In a marine pile driver, the combination with a tower, of a vertical mast pivoted thereto, apparatus for oscillating said mast, a hammer guide-way, a plurality of struts connecting said mast and guide-way, and pile-driving mechanism connected to said guide-way.

9. In a marine pile driver, the combination with a tower, of an adjustable lead, block and tackle for moving said lead radially to various vertical positions, means for always maintaining said lead in vertical position, and pile driving mechanism connected to said lead.

10. In a marine pile driver, the combination with a tower, of a mast oscillatably connected thereto, a vertical lead, a plurality of struts pivotally connected to said mast and to said lead, block and tackle for lifting and lowering said lead and struts, means for oscillating said mast, struts and lead, and pile driving mechanism connected to said lead.

11. In a marine pile driver, the combination with a tower, of a lead, parallel struts connecting the tower and the lead, block and tackle connected between the upper portion of the tower and a lower intermediate portion of said lead, for lifting and lowering the struts to move the lead to various positions toward and from the tower, and pile driving mechanism.

12. In a marine pile driver, the combination with a bracing tower, of a vertical mast pivoted thereto, a vertical lead, a plurality of struts pivotally connected to said mast and to said lead, means for raising and lowering said lead and struts, pile driving mechanism comprising cables which pass through the mast, and means at the top of the mast to engage the cables to prevent their abrasion when the said lead is raised.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 20th day of April A. D. 1912.

HARRY T. WELTY.
FRANK J. McCAIN.

Witnesses:
H. W. NICHOLS,
ANNA E. PRIEBE.