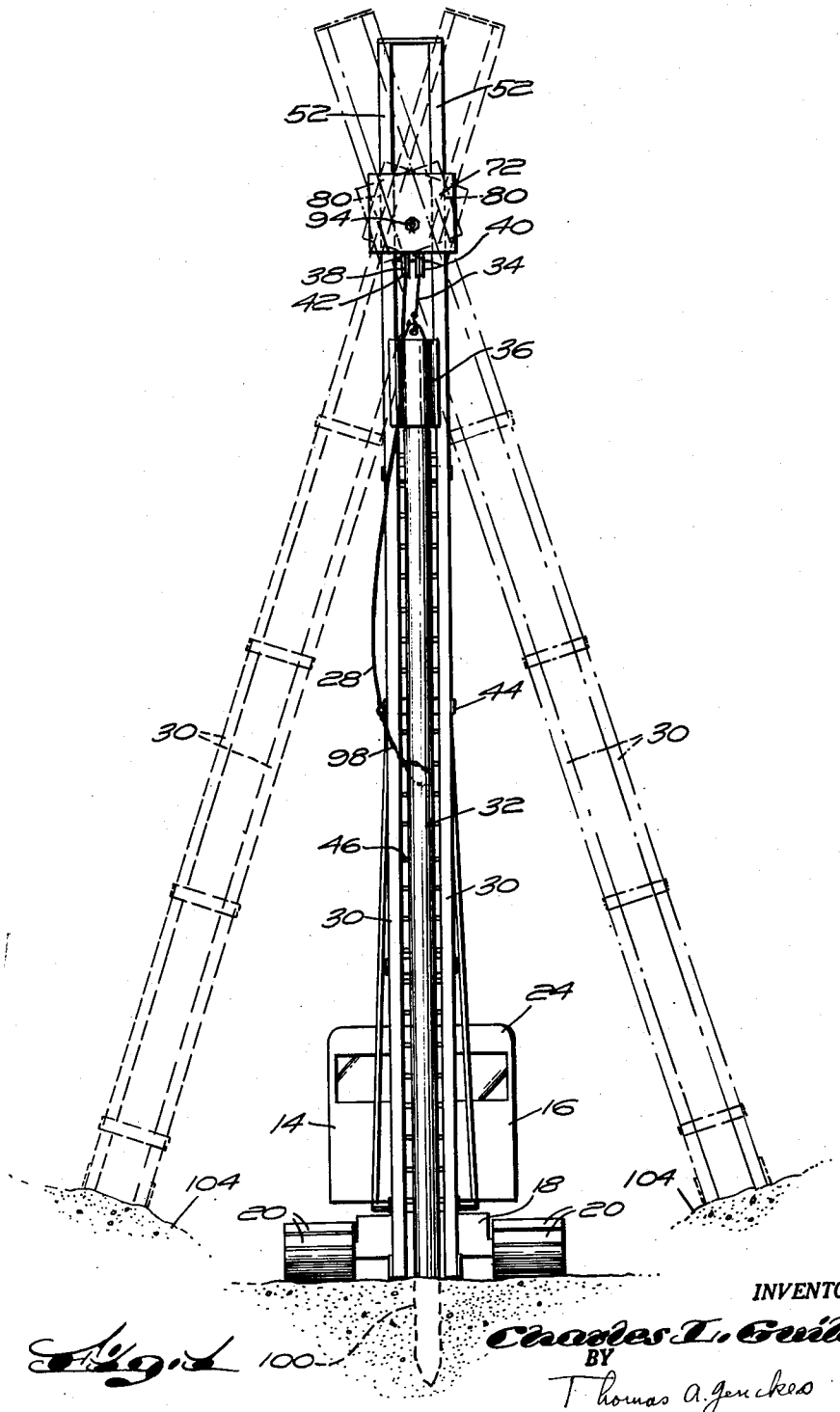
Nov. 4, 1952 C. L. GUILD 2,616,267

PILE-DRIVING ATTACHMENT

Filed Oct. 8, 1946 2 SHEETS—SHEET 1




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PILE-DRIVING ATTACHMENT

Filed Oct. 8, 1946 2 SHEETS—SHEET 2

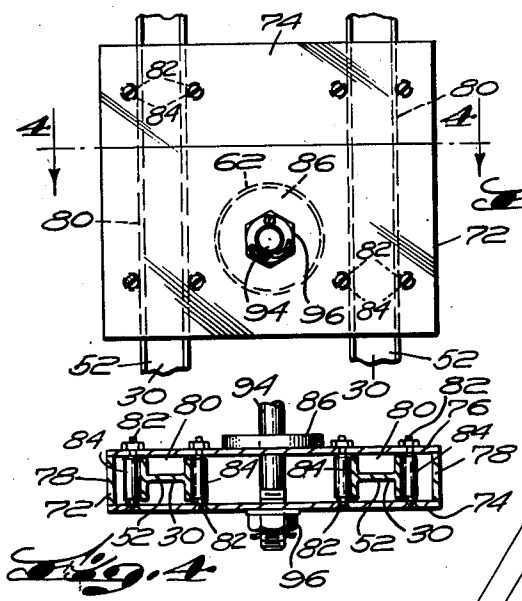


Fig. 4

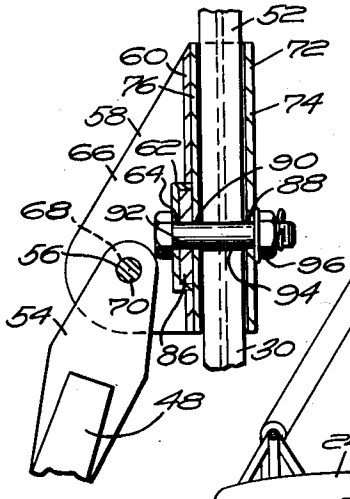


Fig. 5



Fig. 2



Fig. 3

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## PILE-DRIVING ATTACHMENT

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8 Claims. (Cl. 61—74)

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My invention relates to improvements in pile driving attachments for crane booms. In driving piles, it has been customary in the art to provide two spaced bars commonly called leads which are vertically arranged on opposite sides of the pile to be driven, so that the drop hammer may be vertically reciprocated thereon to drive the pile. In the prior art, in most instances these leads have been rigidly mounted on the end of the crane boom which means that in use the weight of the leads and hammer must be supported by the crane boom unless it is possible to lower the boom the exact distance to the ground.

Very often in usage, however, it is impossible to move the leads to a position directly above where the pile is to be driven and it is to this particular circumstance that my invention is particularly designed.

To make it easy to mount the leads anywhere on the ground despite any irregular terrain I universally mount a box-like guiding structure on the upper end of the boom having vertical holes therein for the upper ends of the leads so that the leads may be raised and lowered vertically in the box-like structure thereby making it possible to mount the leads on any type of terrain by initially raising the leads enough off the ground to permit them to be brought into position and then lowering the leads so that the lower ends thereof may rest on the ground and take the weight of the leads off the crane boom.

An object of my invention, therefore, is to provide a simple attachment for pile drivers which will permit the driving of piles on any type of an irregular terrain and prevent any obstacle encountered on the approach preventing the driving of the pile.

A further object of my invention is to provide a simple attachment for this purpose constructed of a minimum number of small simple parts with adequate bearing surfaces.

A further object of my invention is to provide means to universally mount said box-like member on the end of the crane boom so that it may be tilted in a vertical plane forwardly and backwardly substantially in line with the vertical crane of the boom or in a plane normal thereto so that it may be swayed laterally relative to the top of the boom and, if desired, held in these positions so as to drive a pile obliquely.

In the prior art when the pile was driven in so deeply that the top thereof approached the lower ends of the leads held in a vertical position above the ground, it was often necessary to insert a follower pile on top of the pile being driven so

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that the follower pile could be hit with the hammer guided in its reciprocating movements by the leads.

An object of my invention, therefore, is to provide a structure which entirely eliminates the necessity of use of such a follower pile.

A further object of my invention is to provide a device which may be sold solely as an attachment for use with present day crane booms and their present type of leads without changing the leads or the boom, by merely mounting my improved attachment in between them.

These and such other objects of my invention as may hereinafter appear will be best understood from a description of the accompanying drawings, which illustrate an embodiment thereof.

In the drawings, Fig. 1 is front elevation of a a crane having a boom with my invention attached to vertically mount the usual leads carrying the hammer for driving the pile shown therein in full lines in a substantially vertical position, showing in dotted lines how my improved attachment may permit the leads to tilt laterally while they are raised for this purpose to permit their insertion over the irregular terrain shown therein.

Fig. 2 is a side elevation of the caterpillar crane boom and leads shown in Fig. 1 with my invention attached, showing how the leads may tilt forwardly and backwardly in the vertical plane of the crane boom.

Fig. 3 is an enlarged front elevation of my improved lead guiding box.

Fig. 4 is a transverse sectional view therethrough taken along the line 4—4 of Fig. 3.

Fig. 5 is an enlarged vertical sectional view, partially shown in elevation, of the tilting bracket I preferably employ showing the trunnion I preferably employ for mounting the box of my invention thereon.

My invention is adapted to be used with any type of a crane boom. While a crane boom 10 may be mounted on any desired type of support, movable or otherwise, such as a flat car, boat, etc., I have illustrated it in the drawings as being mounted on the front end of a caterpillar tractor crane 14. The crane body 16 is rotatable on its frame 18 which has the caterpillar treads 20 mounted as usual on each side thereof. The crane boom 10 has its lower end pivoted as at 22 on the front end of the crane body. A suitable motor (not shown) is mounted on the cab 24, which actuates the rope 26 for raising and lowering the crane boom 10, the rope 28 which may be used for raising the leads 30 as shown in

Fig. 2 or the pile 32 as shown in Fig. 1 and the rope 34 for raising and lowering the hammer 36, the ropes 28 and 34 passing over the sheaves 38 and 40 of the double sheave pulley 42 on the upper end of the crane.

The usual leads 30 comprise two spaced bars spaced apart slightly less than the thickness of the hammer 36 adapted to receive the grooves 43 in each side of the hammer 36 so that the hammer may be raised on the leads and permitted to drop downwardly thereon against the top of the pile 32 being driven. The leads are connected together at a desired spaced distance by the rearwardly extending U-shaped brackets 44 spaced at intervals on the lower portions of the leads 30 and, if desired, the rear ends of said brackets 44 may have the ladder 46 mounted thereon to extend part way up the leads. With my invention, however, I provide a substantial distance of said leads free of any attaching brackets near the upper end thereof so that the spaced leads 30 may be free to slide in the vertical holes about to be described.

So much of the structure hitherto described is common in crane booms of the prior art. The said crane booms have usually had the leads 30 rigidly mounted on the upper end 48 of said crane booms. As stated, I believe I am the first to provide a novel attachment to universally mount the leads on the upper end of the crane boom so that the upper ends thereof may be able to slide vertically in said mounting means to permit the vertical raising of the leads over any obstacles encountered in bringing the pile driver in position and yet permitting the pile driver to drop to the ground in the desired position on its supporting shoes 50 which may comprise sled-like runners extending forwardly and rearwardly from the lower ends of the leads. For this purpose, I preferably provide a pivotal mounting on the top of the crane above the sheave pulley 42 for pivotally mounting a bracket 58 to pivot forwardly and backwardly in the vertical plane of the crane boom, and I also provide a box-like structure 72 having vertical holes 80 therein for receiving the upper ends 52 of said leads so that they may be free to slide vertically in said box-like structure 72 relative to the upper end 48 of said crane boom, and so pivotally mount said box-like structure 72 on said bracket 58 that the box-like structure 72 may sway laterally in a vertical plane normal to the plane at which the bracket tilts on the upper end of the boom, thereby providing a structure which will tilt in two planes at right angles to each other, a well known type of universal joint.

While this bracket and box, forming part of my invention, may be constructed in any suitable manner, in my preferred embodiment I preferably construct them as follows: I provide the spaced plates 54 which are either welded, bolted, or otherwise secured to each side of the upper end 48 of the boom 10 and I provide these plates with the aligned bearing holes 56 therein, the double sheave pulley 42 being mounted below said plates in the manner hitherto described. I provide a pivot bracket 58 having a front plate 60 preferably having a bearing well 62 centrally thereof having a central hole 64 and side walls 66 extending rearwardly from said front plate within said side plates 54 also having aligned bearing holes 68 therein aligned with the holes 56 in said boom side plates 58 and I provide a strong pivot pin 70 extending through said aligned holes 56 and 68 to pivotally mount said bracket 58 on said plates 54 whereby said bracket 58 may tilt on said boom end substantially in the vertical plane of said boom.

I also provide what I call a guide box 72 having a front wall 74 and a rear wall 76 joined together at spaced distances preferably by the side walls 78 and having the vertical holes 80 therein for the insertion of the upper ends 52 of said leads therein. The front and rear walls 74 and 76 must be of sufficient area to confine the upper ends 52 of said leads laterally adjacent said holes 80 although, if desired, other portions of the box may be left open or comprise merely connecting straps and the end walls 78, if desired, may also comprise mere connecting straps. The guide box 72, therefore, has an open top and bottom, at least adjacent said holes 80, and I provide vertically aligned means 82 on the front and rear of each hole on the top and bottom portions of the box 72 to provide the holes 80 and guides for the vertical movements of the upper ends 52 of said leads 30 in said holes 80. While said means 82 may comprise mere pins, in my preferred embodiment I preferably employ the rollers 84 suitably mounted on suitable pins 82 for the free movement of the upper ends 52 of said leads, which, as I have shown in Fig. 3, may be constructed of steel, and, as shown, the steel H-section I-beams. I may, if desired, provide a trunnion 86 of substantially the size of said bracket well 62 projecting vertically from the rear wall 76 of said box 74 to rotate in said well 62 and I provide the aligned holes 88, 90 and 92 in the front wall 74, back wall 76 and trunnion 86 aligned with the central hole 64 in said front plate well 62 for the insertion of a suitable pivot bolt 94 therein, preferably from the rear forwardly and having a suitable nut 96 on the free front end thereof to pivotally mount said box 72 on said bracket 58 so that it may oscillate or swivel in a vertical plane normal to the plane in which the bracket tilts on the boom to provide a mounting for said box.

It is thus apparent that I have provided a mounting means, including a box-like member, preferably of rectangular shape having vertical holes 80 therein for the sliding of the upper ends 52 of the leads 30 therein pivotally mounted on the upper end of the crane boom member so that it may tilt in vertical planes normal to each other and hence universally.

In practice, a chain 98 is usually mounted on the end of the cable 28 and prior to bringing the crane carriage or caterpillar adjacent the spot 100 into which it is desired to drive the pile, as shown in Fig. 2, the chain 98 may be wrapped around one of the brackets 44 on the leads 30 and the leads 30 raised up the desired distance from the ground to permit them to overlie the support 100 when the cable 28 carrying the chain 98 may be lowered to allow the shoes 50 of the leads to rest on each side of the spot 100 on the ground as shown in Fig. 1 it is desired to drive the pile. The chain 98 may then be wrapped around the pile 32 and the pile 32 brought in the desired vertical position above the spot 100. The hammer 36 is then allowed to drop, being manipulated by the cable 34 at first small amounts until the pile 32 is firmly set in the ground and then the desired pile driving amounts to drive the pile to the desired depth. It is quite obvious that with the leads 30 raised up that the caterpillar 14 may be driven close enough to the spot 100 despite any irregularities in the terrain such as the slight mounds 104 shown in Fig. 1 and Fig. 2. If it be

desired to drive the pile at an oblique angle, the leads **30** may be left in any of the oblique forward or backward positions shown in Fig. 2 or oblique lateral positions shown in Fig. 1. In case it be desired to drive the pile deeply in a hole, the shoes **50** may be mounted in the hole **106** as shown in dotted lines in Fig. 2. It is apparent that when the pile is driven the leads may again be raised by means of the cable **28** so that the boom and leads may be readily removed over the irregular terrain away from the mounds or other obstacles.

It is apparent that I have shown strong pivotal structures which will last without any particular lubricant protection and that the trunnion **86** revolving within the well **62** provides a particularly strong structure for the tilting movement.

In my invention the weight of the leads is entirely supported on the shoes **50** at all times. As the hammer drops it has no weight, when it rests on the upper end of the pile **32**, its weight is on the pile, but as it is raised up the weight of the hammer comes on the pulley **40** on the end of the boom, the weight of the hammer therefore also not being on the end of the boom at all times.

It is apparent, therefore, that I have provided a novel type of attachment which may be readily attached to crane booms without any substantial modification thereof and without any substantial modification of existing leads to provide a strong structure which may be used on all types of terrain to bring the crane boom adjacent the pile to the driven and one which eliminates the use of follower piles and has the other advantages heretofore described. In the claims I employ the words "guide box" to indicate any suitable structure capable of achieving the above purposes even though it has portions of its walls in skeleton form.

It is understood that my invention is not limited to the specific embodiment shown and that various deviations thereof may be made without departing from the spirit and scope of the appended claims.

What I claim is:

1. A pile driving attachment, comprising spaced plates connectable to project upwardly from each side of the upper end of a crane boom, having aligned bearing holes therein and a double sheave pulley mounted thereon below said bearing holes, a pivot bracket having a front plate having a bearing well therein having a central hole and side walls extending rearwardly from said front plate having aligned bearing holes therein aligned with the aligned holes in said boom side plates, a pivot pin extending through said holes to pivotally mount said bracket on said plates, whereby said bracket may tilt substantially in the vertical plane of said boom, a rectangular guide box having an open top and bottom and vertically spaced lead guide rollers mounted adjacent the top and bottom of each side thereof, a trunnion of the size of said bracket well projecting vertically from the rear wall thereof and aligned holes extending centrally through said trunnion and box front and rear walls, and a bolt extending through said holes in said bracket and box having a nut on the free end thereof to pivotally mount said box on said bracket so that it may oscillate in a vertical plane normal to the plane in which it tilts on the boom to provide a mounting for said box, spaced hammer leads having upper ends vertically movable up and down between said rollers and supporting shoes on the lower ends thereof,



ladder brackets projecting rearwardly at spaced distances downwardly from said vertically adjustable upper ends and a ladder mounted thereon to also keep said leads at the desired spaced distance, a drop hammer guided in its vertical movement by said leads, a cable passing over one of the sheaves in said pulley for raising and lowering the drop hammer and a cable passing over the other sheave of the pulley for selectively raising and lowering the upper ends of said leads in said box or bringing a pile into position.

2. A pile driving attachment, comprising spaced plates connectable to project upwardly from each side of the upper end of a crane boom, having aligned bearing holes therein and a double sheave pulley mounted thereon below said bearing holes, a pivot bracket having a front plate and side walls extending rearwardly from said front plate having aligned bearing holes therein aligned with the aligned holes in said boom side plates, a pivot pin extending through said holes to pivotally mount said bracket on said plates, whereby said bracket may tilt substantially in the vertical plane of said boom, a guide box having vertically spaced holes therein and vertically spaced lead guide means mounted adjacent the top and bottom of each hole thereof, and aligned holes extending centrally through said box front and rear walls, and a bolt extending through said holes in said bracket and box having a nut on the free end thereof to pivotally mount said box on said bracket so that it may oscillate in a vertical plane normal to the plane in which it tilts on the boom, spaced hammer leads having upper ends vertically movable up and down between said guide means and supporting shoes on the lower ends thereof, U-shaped brackets projecting rearwardly at spaced distances downwardly from said vertically adjustable upper ends to keep said leads at the desired spaced distance, a drop hammer guided in its vertical movement by said leads, a cable passing over one of the sheaves in said pulley for raising and lowering the drop hammer and a cable passing over the other sheave of the pulley for selectively raising and lowering the upper ends of said leads in said box or bringing a pile into position.

3. A pile driving attachment, comprising spaced plates connectable to project upwardly from each side of the upper end of a crane boom, having aligned bearing holes therein, a pivot bracket having a front plate, having a bearing well therein having a central hole and side walls extending rearwardly from said front plate, having aligned bearing holes therein aligned with the aligned holes in said boom side plates, a pivot pin extending through said holes to pivotally mount said bracket on said plates, whereby said bracket may tilt substantially in the vertical plane of said boom, a rectangular guide box having an open top and bottom and vertically spaced lead guide rollers mounted adjacent the top and bottom of each side thereof, a trunnion of the size of said bracket well projecting vertically from the rear wall thereof and aligned holes extending centrally through said trunnion and box front and rear walls, and a bolt extending through said holes in said bracket and box having a nut on the free end thereof to pivotally mount said box on said bracket so that it may oscillate in a vertical plane normal to the plane in which it tilts on the boom to provide a mounting for said box.

4. A pile driving attachment, comprising spaced plates connectable to project upwardly

from each side of the upper end of a crane boom, having aligned bearing holes therein, a pivot bracket having a front plate and side walls extending rearwardly from said front plate, having aligned bearing holes therein aligned with the aligned holes in said boom side plates, a pivot pin extending through said holes to pivotally mount said bracket on said plates, whereby said bracket may tilt substantially in the vertical plane of said boom, a guide box having spaced vertical holes and vertically spaced lead guide means mounted adjacent the top and bottom of each hole thereof, and aligned holes extending centrally through said box front and rear walls, and a bolt extending through said holes in said bracket and box having a nut on the free end thereof to pivotally mount said box on said bracket so that it may oscillate in a vertical plane normal to the plane in which it tilts on the boom.

5. A pile driving attachment comprising a pivot bracket pivotally mountable on the upper end of a crane boom to tilt forwardly and backwardly substantially in the vertical plane of said boom, having a horizontal bearing well therein and a guide box having spaced vertical holes therein for receiving the free upper ends of spaced hammer guiding leads for free vertical movement thereof therein, having a trunnion projecting rearwardly therefrom within said bearing well, pivotally mounted on the front of said pivot bracket so that said box may oscillate in a vertical plane normal to the plane in which it tilts on the boom, and spaced lead guide rollers mounted in said box walls on opposite sides of said holes.

6. A pile driving attachment comprising a pivot bracket pivotally mountable on the upper end of a crane boom to tilt forwardly and backwardly substantially in the vertical plane of said boom, having a horizontal bearing well therein and a guide box having spaced vertical holes therein for receiving the free upper ends of spaced hammer guiding leads for free vertical movement thereof therein, having a trunnion projecting rearwardly therefrom within said bearing well, pivotally mounted on the front of said pivot bracket so that said box may oscillate in a vertical plane normal to the plane in which it tilts on the boom.



7. A pile driving attachment comprising a pivot bracket pivotally mountable on the upper end of a crane boom to tilt forwardly and backwardly substantially in the vertical plane of said boom, and a guide box having spaced vertical holes therein for receiving the free upper ends of spaced hammer guiding leads for free vertical movement thereof therein, pivotally mounted on the front of said pivot bracket so that said box may oscillate in a vertical plane normal to the plane in which it tilts on the boom, and spaced lead guide rollers mounted in said box walls on opposite sides of said holes.

8. A pile driving attachment, comprising a U-shaped bracket having side plates and a front plate, said side plates having aligned pivot pin openings and said front plate having a pivot bolt opening, a pivot pin in said aligned pin opening adapted to be mounted transversely in the upper end of a crane boom, whereby a pivotal mounting for the bracket is provided for tilting the bracket forwardly and backwardly in the vertical plane of the boom, and a hollow guide box having a front wall, a rear wall, and side walls, said front and rear walls having centrally positioned aligned bolt openings, a pivot bolt extending through said bracket bolt openings and said front plate opening, said pivot bolt connecting said guide box to the bracket, whereby the guide box is pivotally secured to said bracket to oscillate in a vertical plane normal to the plane of movement of the bracket, said rear and front walls having two upper and two lower spaced guide pins in vertical alignment adjacent each side wall, the space between said guide pins being of a width to slidably receive hammer guiding leads.

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