July 24, 1951 H. JOHANSEN ET AL 2,562,039

GUIDING AND CONNECTING MEANS FOR PILE DRIVING HAMMERS AND PILES

Filed April 16, 1947 2 Sheets-Sheet 1

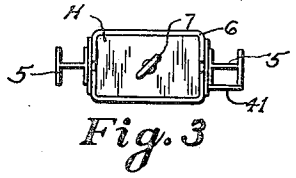


Fig. 3

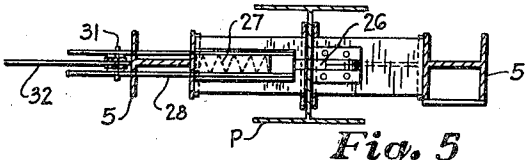


Fig. 5

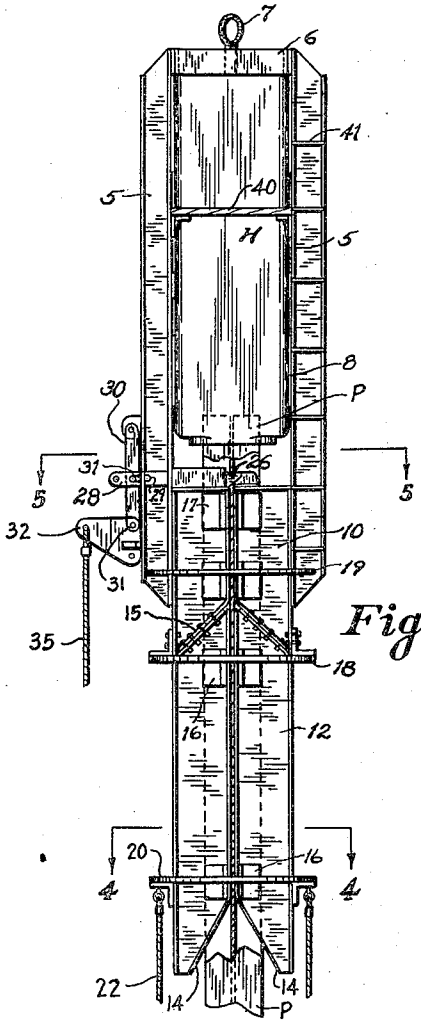


Fig. 1

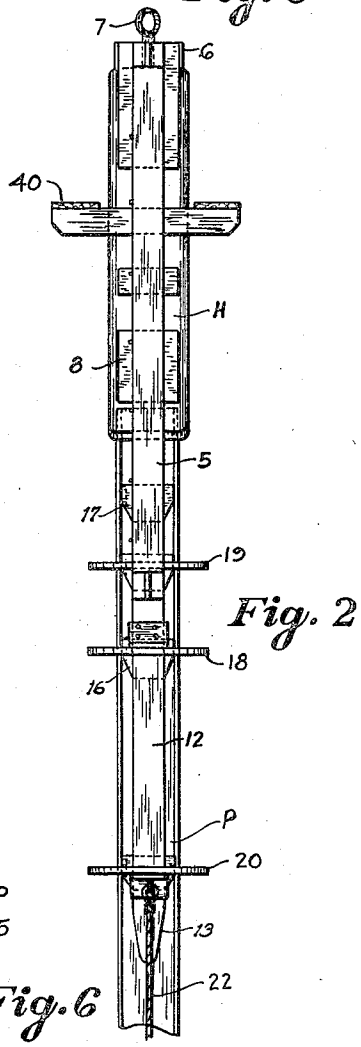


Fig. 2

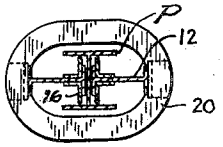


Fig. 4

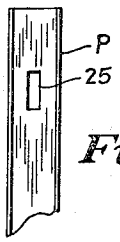


Fig. 6

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July 24, 1951 H. JOHANSEN ET AL 2,562,039

GUIDING AND CONNECTING MEANS FOR PILE DRIVING HAMMERS AND PILES

Filed April 16, 1947 2 Sheets-Sheet 2

Fig. 7

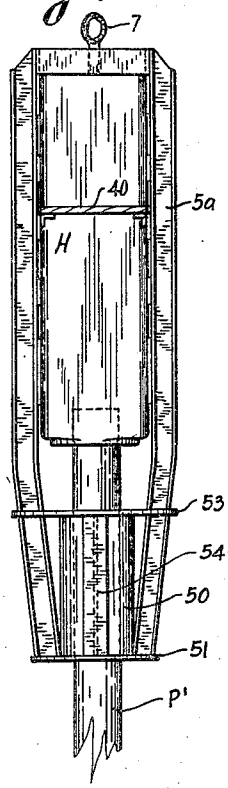


Fig. 9

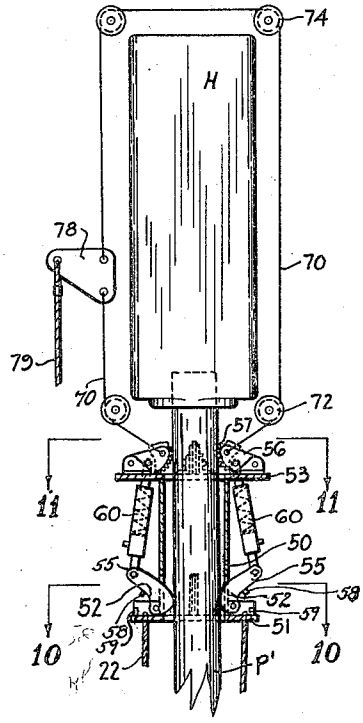
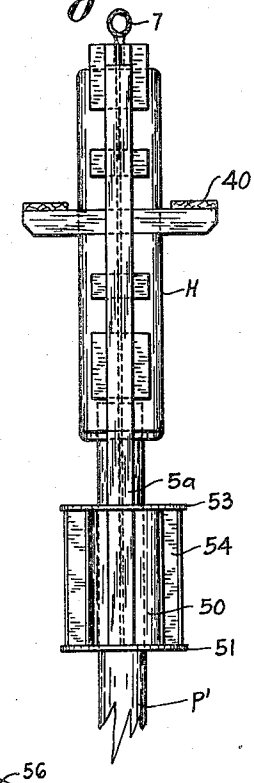


Fig. 8



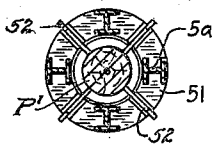


Fig. 10

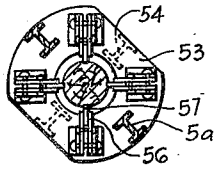


Fig. 11

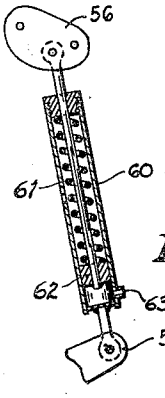


Fig. 12

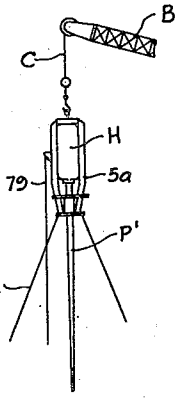


Fig. 14

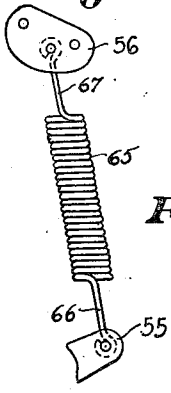


Fig. 13

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GUIDING AND CONNECTING MEANS FOR PILE-DRIVING HAMMERS AND PILES

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Application April 16, 1947, Serial No. 741,800

5 Claims. (Cl. 61—76)

1

This invention relates to a means for connecting a pile driving hammer and pile permitting placing locating handling of the pile and guidingly connecting the hammer during the driving operation.

The essential objects of this invention are to provide such an attachment for a pile driver hammer that an effective alignment between the hammer and pile is established, and the hammer and pile may be lifted by a single cable connection or hook, and permitting the suspending of the pile and hammer in normally vertical position while placing and starting of the driving end which maintains an aligned and positive connection between the casing for the hammer, while the hammer piston may effectively drive the pile in the usual fashion.

Other objects include the arranging of the connection between the pile and hammer casing to maintain an assured alignment during the driving, eliminating the necessity for separate handling and guiding of the pile with its consequent need for using pile leads or a subordinate suspension means.

In carrying out our invention we provide a means for engaging or embracing the upper end of the pile for a considerable distance of its length, and such means is rigidly connected with and maintains the alignment with the hammer casing, and we provide a latching or securing means whereby the pile may be lifted as the hammer and its frame are lifted, and which latching means may be released conveniently a distant point below and away from the pile.

In the use of our invention we avoid necessity for an operator to be positioned or stationed at the hammer itself, and may accomplish accurate placement, and the driving and completion of the driving of the piles by control of the suspending boom, and with the aid of depending ropes or cables, as will appear in the following description.

Specific objects include the simplicity, cheapness of construction of our invention, durability and convenience in operation, as well as adaptability to different forms and shapes of pile section.

Our invention is illustrated in the accompanying drawings to which the following description relates, and other advantages and novel characteristics will appear therein.

In the drawings,

Fig. 1 is a side elevation of our combined hammer and pile attachment;

2

Fig. 2 is another elevation of the same, taken at right angles to Fig. 1;

Fig. 3 is a plan view of the upper portion;

Fig. 4 is a section through the lower portion of Fig. 1, taken on a plane indicated by the lines 4—4 of Fig. 1;

Fig. 5 is an enlarged detail in the nature of a section on a plane indicated by the lines 5—5 of Fig. 1;

Fig. 6 is an elevation of the upper portion of an H-shaped pile, showing the attaching or latching opening;

Fig. 7 is an elevation of the frame and hammer and cylindrical or tubular extension for receiving the upper end of a round pile;

Fig. 8 is a side elevation of the parts of Fig. 7;

Fig. 9 is a somewhat diagrammatic sectional detail showing a latching attachment applied to the arrangement of Figs. 7 and 8;

Fig. 10 is a sectional plan of the parts shown in Fig. 8 being taken substantially on a plane indicated by the lines 10—10 of Fig. 9;

Fig. 11 is a sectional plan taken on a plane indicated by the lines 11—11 of Fig. 9;

Fig. 12 is a detail on an enlarged scale on the connection between the upper and lower gripping members shown in Fig. 9;

Fig. 13 is a detail of a modified form of the connection between the upper and lower gripping members shown in Fig. 9; and

Fig. 14 is a diagram showing the manner of suspending the pile hammer attachment and pile from a single boom.

Referring first to the construction shown in Figs. 1 to 5 which is adapted for the driving of H-shaped pile. Such a pile is designated P.

A steam hammer H, which may be of any suitable construction, is shown as engaging the upper end of the pile in driving position. It will be seen that if such a hammer is suspended, as is customary, by a single hook, that the hammer must be very skillfully handled to preserve alignment and contact during the driving.

The driving of such pile may be under varying conditions such as requiring the suspending of the hammer by a boom on a railroad track or on a barge, and that the boom in order to carry the hammer and pile to position must swing fifty to seventy-five feet above the lower end of the pile, and that many difficulties of placing the pile maintaining the driving contact of the hammer with the pile are the inevitable result.

As stated above, the connecting of the hammer and pile in such a manner as to maintain

alignment and driving position by our invention eliminates many of these difficulties, and greatly facilitates the placing and driving operation.

In the preferred form such a connecting and guiding mechanism is shown as comprising side frame members 5 extending along and embracing the body of the hammer H, and projecting beneath the hammer a considerable distance of, say, two to four feet, depending upon the size of the hammer. These side members are shown as connected by a transverse hoop member 6 at the upper end closely embracing the upper end of the hammer.

A hook engaging eye 7 projects upwardly from the hammer to receive the hook of the suspending cable. The side members are secured to the hammer by connecting plates, indicated at 8, and between the lower projecting ends of the members 5 are supported a pair of pile embracing and guiding members 10, which, as shown, are suitably removably connected as by bolts and flanges at 15 to members 12 which project downwardly several feet below the members 10. These members 10 and 12 are preferably formed structurally, as indicated in Fig. 4, to present webs embracing the web of the H-shaped pile, and having flanges extending outwardly for the greater portion of the distance between the flanges of the H-shaped pile, as appears in Figs. 4 and 5.

The lower ends of the members 12 are provided with upwardly and inwardly sloping surfaces to facilitate engaging the members 12 with the pile to guide it upwardly between them.

Bracing ring members 18, 19, and 20 add to the rigidity of the frame thus described.

These lower ring members provide a convenient point of connecting guide cables 22, which may be used to steady the pile and aid in positioning it.

The H-shaped pile is preferably provided with an elongated opening near one end, as indicated at 25 in Fig. 6. As the guiding and embracing members 12 and 10 are slid over the end of the pile, a latch 26 is first pushed to the left, and is then thrust into engagement with this opening by a spring indicated at 27 (Fig. 5).

Parallel bars 28 extending from and attached to the latch are guided in suitable openings formed in flanges of the member 5, and they embrace a lever 30 shown as pivoted to one of the members 5, and each engages a pin 31 projecting into a slot 29 providing a lost motion connection permitting the latch to be pushed back, and whereby when the lever 30 is swung outwardly, the arms 28 and latch member 26 are drawn outwardly, releasing the engagement with the pile.

As a convenient means for effecting this release, we have shown a triangular lever plate 32, connected by a pivot 31 at the lower end of the lever 30, and held between suitable guides while a rope or cable 35 attached to the outer end of the lever plate 32 may effect this releasing motion.

As the guide members 12 and 10 are slid downwardly over the end of the pile, the additional assurance of alignment is effected by angle plates 16 and 17 which have their sides sloped inwardly to meet the flanges of the members 12, the lower end of which is shown as having a rounded point with sloping sides, as indicated at 13.

At times it is desirable for a workman to oil the hammer or detach the hook, and accordingly we provide a platform member 40 at either side of the hammer body supported by cross members carried on the members 5, while on one of the members 5 may be provided cross steps in the form of small rods 41 welded to the flanges of the I beam forming this member.

Assuming that a pile is stood on end, the hammer is carried by a boom B and cable C, as indicated in Fig. 14, and is lowered over the pile guiding it for this purpose under control of the boom.

As the pile is thus thrust upwardly between the members 12 and 10, it passes the latch 26 which engages the elongated opening 25, and its upper end fits into the driving head of the lower end of the hammer, without the use of lugs and saving one or two more frequently necessary to place the hammer on the pile.

The pile and hammer may now be picked up together, carried to the exact position desired, and be accurately placed, while still using the guide cables 22 if necessary.

As soon as it is placed, the hammer is lowered as usual, releasing its weight onto the pile, and as soon as the pile stops settling, the driving may commence.

With each blow hammer and frame follow the pile downwardly, while being maintained in accurate definite mutual and vertical alignment.

Obviously, the suspending and positioning of the hammer so equipped with the pile carried by the guide mechanism tends to hang normally perfectly straight and as vertical as a plumbline, and this accurate alignment is, of course, maintained until the pile is driven to its final position.

For shorter piles, and under some conditions, it is desirable that the guides should be shorter, in which case the sections 12 may be removed at the parting joints 15, which present sloping surfaces to guide them onto the pile, as before.

A modified form of our invention may be adapted to round pile, such as wood, or the octagonal or nearly round reinforced concrete type in some instances.

In such a case, the hammer H is provided with a suitable driving head to receive the upper end of the pile, indicated at P' in Figs. 7 to 11.

As before, the frame of the hammer is fitted with side rail structural members 5A which extend a substantial distance below the lower end of the hammer, and in this case are shown converging somewhat and connected with the tubular member 50 through ring plates 51 and 53 which are additionally braced by vertical structural members 54.

To grip and center the pile in the tubular extension and maintain the alignment of the pile and hammer, we may provide any suitable camming and latching means mounted on the extended framework. As shown particularly in Fig. 9 (but omitted from Figs. 7 and 8 for convenience and clarity), cam centering and guiding members 52 are shown as pivotally mounted on the lower ring plate 51. These are so shaped as to provide guiding surfaces engaging the piles P', and as having outwardly extending arm portions 55 pivotally connected to a yielding link mechanism, tending to draw the arms upwardly and cause the centering engagement with the pile. The spring tension on these arms at all times effects a centering action, four of these members being shown as indicated in Fig. 10.

Pivotally carried on the upper ring plate 53 are a corresponding number of gripping and centering members, shown as comprising pivoted arms 56, in turn pivotally carrying gripping jaws

57 so shaped as to effect a centering and gripping action on the pile, while permitting it to move relatively upwardly as the hammer is lowered into driving position.

As shown, the arms 56 are stressed downwardly and inwardly by the spring tension members 60, which may be constructed in the form of a sleeve and plunger having a spring 61 acting to effect a tension drawing the ends of the link member 60 together, the upper member having a head 62 slidably fitted within the tubular member, and whereby fluid pressure, such as steam or air, may extend this link upon being admitted through an opening 63 to effect release of the pile gripping members 52 and 57 by extending the connecting links therebetween.

It will be seen that as the arms 55 swing downwardly slightly, the curved surfaces of the centering members 52 are drawn away from the pile surface, and at this time stop members 58 and 59 on the arms 55 and plate 51 limit the downward movement of the arm 55, forming a reaction member causing the extension of the connecting member 60 to push forcibly upwardly on the members 56 releasing the gripping jaws 57.

The connecting link device, as above described, may be constructed similarly to that of the prior patent, No. 2,023,527, granted to H. Johansen, one of the co-inventors hereof.

Still another modification of this link connection which may be used is illustrated in Fig. 13 where a tightly coiled spring 65 has its end members 66 and 67 pivoted to the arms 55 and lever members 56.

Normally, a simple releasing mechanism for both sets of gripping devices 52 and 57 may be provided by using a cable 70 passing over sheaves 72 and 74, and connected to two of the members 56, and including in its connection a tiltable plate 78 provided with a hand line or rope 79, whereby the member 78 may be tilted to shorten the cable 70 and lift the gripping members out of engagement. Lifting the upper gripping members will correspondingly draw upwardly on the arms 55, releasing their gripping action, whereupon the hammer may be lifted from the pile P'.

Referring again to Fig. 14, it will be seen that this mechanism, there simply and diagrammatically illustrated, may be used as with the other form of pile, and the arrangement described in connection with Figs. 1 to 6. That is, the cable and hook may suspend the hammer from the boom B with the pile in position, and which hangs in vertical alignment permitting accurate placement of the pile which may be further assured by using the guide lines 22.

As stated in the foregoing, the form shown particularly in Figs. 1 to 5 may be adapted for any steel piling, and would be especially adapted for use with sheet piling, interlocking pile, and the like, having a flat central web in which case little or no modification of the guiding means is necessary.

Various modifications may be made in the details of construction and to suit different forms of pile without departing from the spirit and scope of our invention as described in the appended claims.

Having thus described our invention, what we claim is:

1. The combination with a pile driving steam hammer of a pile embracing and guiding means comprising longitudinal members secured to the hammer body and projecting a substantial distance below the driving end of the hammer, pile embracing means rigidly carried by said extensions, a latching means carried on said extension for engaging the pile to lift it with the hammer, and means operable from the ground for releasing the latching means.

2. In a device of the character described in claim 1, in which the pile embracing extensions are flanged structural members positioned and spaced to engage and slidably fit the web between the flanges of an H-shaped steel pile.

3. The combination with a steam pile driving hammer, of means for embracing and maintaining axial alignment between a pile and hammer consisting of a frame fixed to the hammer and having rigid fixed flanged longitudinally extending parallel members extending below the hammer and so spaced apart as to embrace the web and engage the flanges of an H-shaped pile, latching means carried by said members for engaging the pile when the embracing means is slid downwardly over the same, said latching means comprising a movable member adapted to project into an opening in the web of the pile.

4. A pile driving, guiding and supporting means for steel pile of the type having a web and side flanges, and comprising a steam hammer, a pile embracing and guiding means secured to the hammer body and projecting a substantial distance below the driving end of the hammer, pile embracing means rigidly carried by said extensions and adapted to engage the opposite sides of a web of the pile and slidably fit between the flanges of the pile, transverse annular bracing members connected to the frame and extensions and adapted to surround the pile, the lower ends of the extensions having surfaces sloping upwardly and inwardly, pile engaging means for holding the pile in the frame and in fixed relation to the hammer with means for releasing the engaging means.

5. The structure described in claim 4 in which transverse supports are fixed to and extend laterally each way from the frame members embracing the hammer body and workmen's supports carried on said latter members.

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ALFRED A. VISINTAINER.

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The following references are of record in the file of this patent:

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