

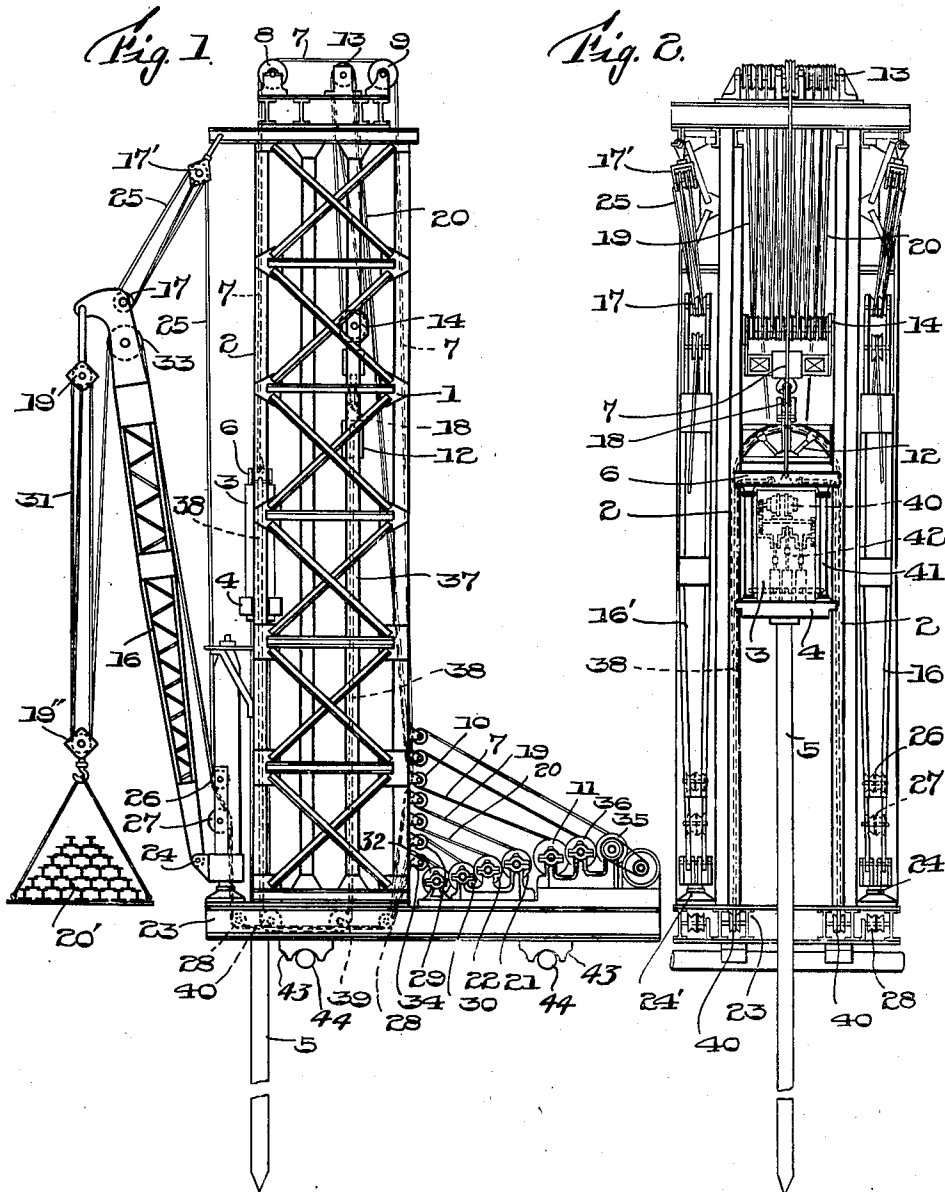
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APPARATUS FOR DRIVING PILES WITHOUT NOISE AND VIBRATION

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APPARATUS FOR DRIVING PILES WITHOUT NOISE AND VIBRATION

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4 Claims. (Cl. 254—29)

The present invention relates to a process and apparatus for driving piles, especially without noise and vibration.

One of the features of this process is to employ a motor-operated hydraulic press and a winch, firstly to push down the hydraulic press as it rests on the head of a pile and thus wind up a rope around the winch to drive a portion of the pile into the ground and next to supply a current to the motor for operating the hydraulic press and thus actuate the piston of its water ram and press down the remaining portion of the pile into the ground.

The other feature is to use an arm hinged to the base of a tower by means of a universal joint in a piling operation and prevent the shaking of the tower due to the reaction of the piling by means of a ballast suspended from the said arm.

The object of this invention is not only to press down a pile quickly and easily by employing a hydraulic press and a winch together, but to survey the condition of a stratum with a piezometer and also prevent the shaking of a tower by controlling an equilibrium ballast simply, thus greatly improving a process of noiseless piling.

Referring to the appended drawing which shows an example of a tower for use in carrying out this process into practice,

Figure 1 is a front view and

Figure 2, a side view.

In the drawing, 1 is a tower and 2, a guiding pole at either side of its front. 3 is a motor-operated hydraulic press movable up and down along the said guiding poles 2 and has its base 4 resting on the head of a pile 5, while its upper frame 6 is connected with the drum 11 of a winch through a rope 7 and pulleys 8, 9 and 10.

Further, a plunger frame 12 which moves up and down along the guide poles 37 relatively with regard to the frame 6 of the hydraulic press 3 is connected to the frame of a movable pulley block 14 by means of a connection device 18. The movable pulley block 14 comprises a pair of pulley groups and is connected with a stationary pulley block 13 comprising a pair of pulley groups by means of a pair of ropes 19 and 20, the pair of pulley groups of said stationary block 13 being connected with the drums 21 and 22 of the winch through said ropes 19 and 20 respectively. The rope 38 connected with the upper frame 6 of the hydraulic press 3 at its one end is passed over the semi-circular member of the plunger frame 12 and reconnected with said

upper frame 6 at its other end through the pulleys 39 and 40.

The tower 1 and in fact, all of the machinery and appurtenances making up the apparatus are mounted on a base or carriage 23, which is of very rigid construction and may be, for example, a steel frame bed having a plurality of sliding blocks 43, 43 secured to the bottom thereof and resting on rails or rollers 44, 44. The apparatus can thus be slid into position along said rails by a truck if the rails are first laid on the ground adjacent to the site where the piles are to be driven.

To the front end of the carriage or base 23 of the tower 1 is hinged a pair of arms 16, 16' by a pair of universal joints 24, 24' in such a manner that they can rock up and down and right and left. The arm 16 has its upper end connected with the drum 30 of the winch by a rope 25 through a pulley block 17, 17' and the pulleys 26, 27, 28 and 29. Also, the arm 16 has a ballast 20' suspended from it by means of the other pulley block 19', 19''. A rope 31 passed over the pulley block 19' and 19'' is to be drawn by the drum 32 of the winch through the pulleys 33, 26, 27, 28 and 34. Similarly, the other arm 16' and the ballast suspended from it are controlled by winding up or unwinding the ropes around the drums 35 and 36 of the winch in the same manner as mentioned above.

In the present invention, firstly the hydraulic press has been lifted by winding up the rope 7 around the drum 11 of the winch and then the rope 20 is wound up around the drum 22 through the pulley blocks 13, 14 and at the same time the rope 7 is loosened. Then, the frame 12 is lifted up along the pole 37 to slide down the hydraulic press 3 along the guide pole 2 in such a manner that it comes down as the whole to ride on the pile 5. Next, draw the rope 13 further, and then the pile 5 will be pushed into the ground. If the motor 40 on the hydraulic press 3 is turned by supplying a current to it at a suitable time, it actuates the piston of the water ram 41 through a transmission device 42, so that the hydraulic press is moved down, pressing the head of the pile to drive the pile into the ground. During the operation of the hydraulic press it is possible to examine the nature of a stratum with its piezometer. By the way, since in this piling work the reaction is apt to overturn or incline the tower 1, a considerably large ballast must be furnished to prevent it. Thus, an arm which rocks up and down and right and left is used, suspending it by means of pulley blocks and

moving it easily with the winch. In this way, the piling work may be done, resisting the reaction.

Furthermore, when several adjoining piles are to be driven, the operation may be carried out by moving the tower alone while holding the ballast in a certain position. Therefore, this apparatus is easy to handle and a piling may be done quickly and noiselessly and most effectively. Further, according to this invention, since the plunger frame is suspended through the stationary and movable pulley blocks and also each block comprises a pair of pulley groups, the pressing power of the drawing rope is advantageously increased for piling and also its speed is considerably increased.

I claim:

1. Apparatus for driving piles without vibration and noise, which comprises a tower carriage movable along the surface of the ground, a tower disposed on said carriage and having a pair of front and a pair of back guide posts erect thereon, a movable frame movable up and down along the front pair of guide posts and having a motor operated hydraulic press mounted thereon, a movable plunger frame movable up and down along the back pair of guide posts and with respect to the first movable frame, a rope passing down toward said carriage past pulleys and connecting the first movable and plunger frames so that one frame ascends when the other descends and vice versa, a pulley block connected with said plunger frame and consisting of movable and stationary pulley groups, a drawing rope passing over these pulley groups and a set of drums for winding up said rope, a winding drum and a rope connected with the plunger frame having the hydraulic press and drawn by said winding drum, a pair of universal joints disposed upon the front portion of said tower carriage, a pair of derricks connected to said universal joints in positions to swing freely up and down and to the right and left, a ballast weight suspended from the top of each derrick, a pulley block for moving each derrick, a drawing rope associated with each said pulley block for suspending the ballast weight, and a winding-up drum for each drawing rope.

2. Apparatus for driving piles without vibration and noise, which comprises a tower carriage movable along the surface of the ground, a tower disposed on said carriage and having a pair of front and a pair of back guide posts erect thereon, a movable frame movable up and down along the front pair of guide posts and having a motor operated hydraulic press mounted thereon, a movable plunger frame movable up and down along the back pair of guide posts and with respect to the first movable frame, a rope passing down toward said carriage past pulleys and connecting the first movable and plunger frames so that one

frame ascends when the other descends and vice versa, a pulley block connected with said plunger frame and consisting of movable and stationary pulley groups, a drawing rope passing over these pulley groups and a set of drums for winding up said rope, a winding drum and a rope connected with the plunger frame having the hydraulic press and drawn by said winding drum, a universal joint disposed upon the front portion of said tower carriage, a derrick connected to said universal joint in a position to swing freely up and down and to the right and left, and a ballast weight suspended from the top of said derrick, a pulley block for moving the derrick, a drawing rope associated with said pulley block and suspending said ballast weight, and a winding up drum for said drawing rope.

3. Apparatus for driving piles without vibration and noise, which comprises a tower carriage movable along the surface of the ground, a tower disposed on said carriage and having a front guide post and a back guide post erect thereon, a movable frame mounted for movement up and down along the front guide post and having a prime mover operated hydraulic press mounted thereon, a movable plunger frame mounted for movement up and down the back guide post and with respect to the first movable frame, a rope passing down toward said carriage past pulleys and connecting the first movable and plunger frames so that one frame ascends when the other descends and vice versa, a pulley block connected with said plunger frame and consisting of movable and stationary pulley groups, a drawing rope passing over these pulley groups and a set of drums for winding up said rope, a winding drum and a rope connected with the plunger frame having the hydraulic press and drawn by said winding drum, a universal joint disposed upon the front portion of said tower carriage, a derrick connected to said universal joint in a position to swing freely up and down and to the right and left, and a ballast weight suspended from the top of said derrick, a pulley block for moving the derrick, a drawing rope associated with said pulley block and suspending said ballast weight, and a winding up drum for said drawing rope.

4. Apparatus for driving piles according to claim 3, wherein a pair of universal joints are disposed upon the front portion of the tower carriage and a pair of derricks are connected to said universal joints in positions to swing freely up and down and to the right and left, while a ballast weight is suspended from the top of each derrick, and wherein a pulley block is included for moving each derrick with a drawing rope associated with each said pulley block for suspending the ballast weight, and a winding drum is likewise included for each drawing weight.

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