July 5, 1932. E. D. WATT 1,865,658

PILE FORMING APPARATUS

Filed March 4, 1931

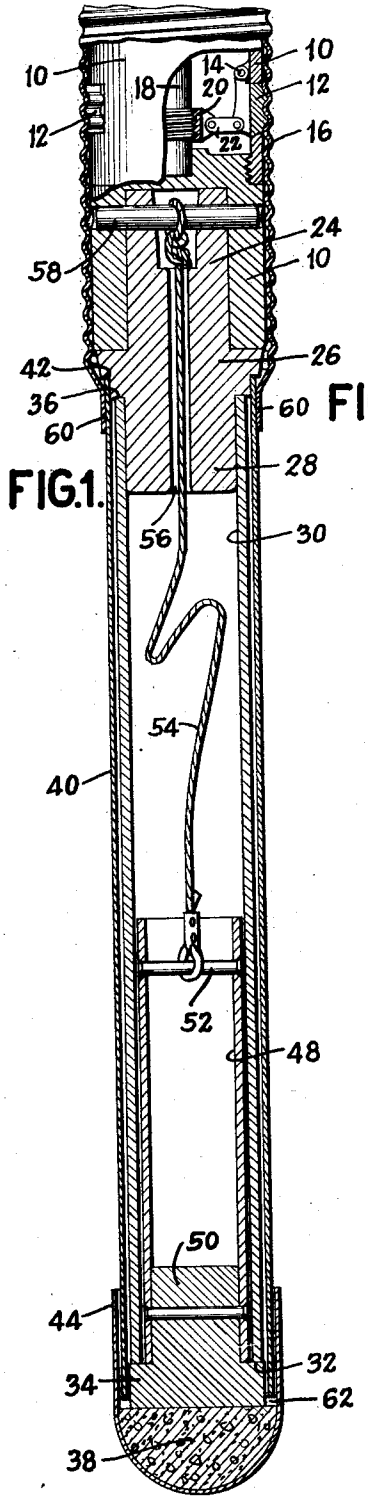


FIG.1.

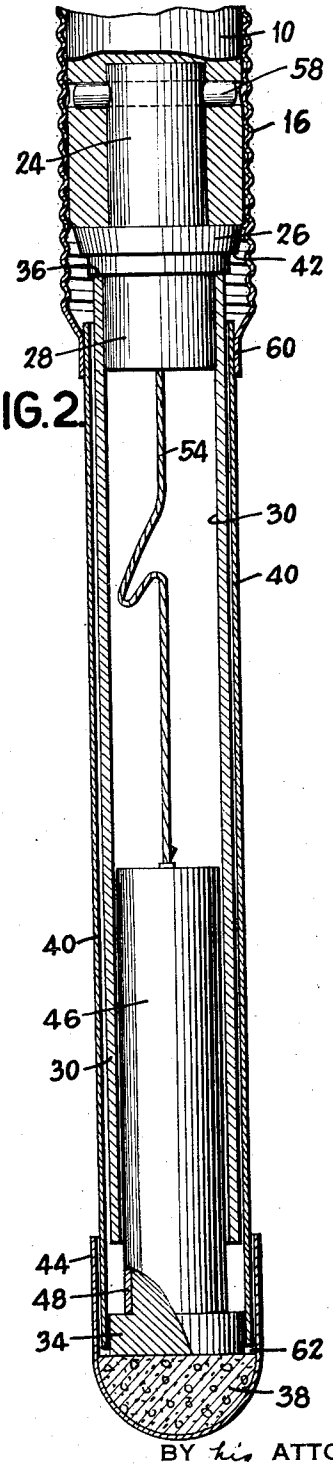


FIG.2.

FIG.3.

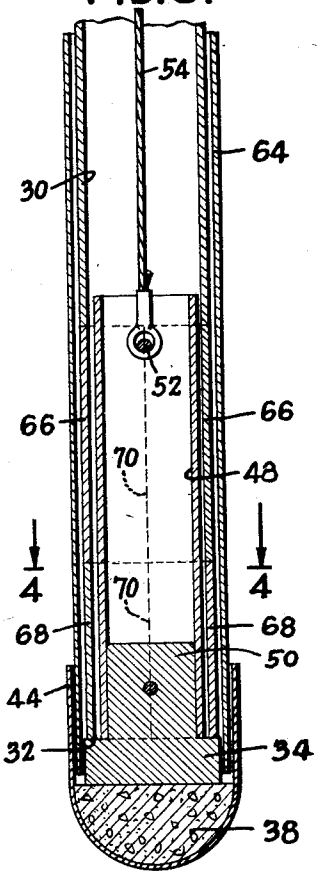
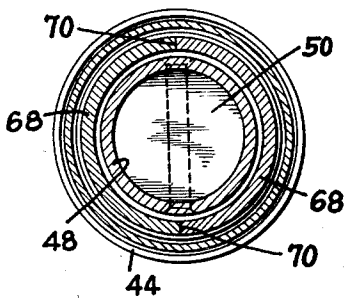


FIG.4.



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Patented July 5, 1932

1,865,658

UNITED STATES PATENT OFFICE

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PILE FORMING APPARATUS

Application filed March 4, 1931. Serial No. 519,921.

In the process of forming concrete piles by first driving a shell and then filling it with concrete it is sometimes necessary to increase the length of the shell. One method of doing so is to add a length of plain steel tubing to the bottom of the shell. The cheapest tubing to use for that purpose would be ordinary commercial pipe, where it not for the fact that such pipe is sold on the market only in random lengths, which in the sizes used for piles may be anything from 18 to 22 feet. In using such pipe it has heretofore been necessary to cut the pipe to exact lengths in order to fit it to the shell driving apparatus. The cutting of the pipe has meant added pile cost, due to the expense of the cutting operation and to the wastage of the pieces thrown away.

The principal object of the present invention is to avoid that extra cost by disclosing apparatus which will handle the random lengths of pipe, just as they come, without cutting.

Further and other objects and advantages will be apparent from the specification and claims, and from the accompanying drawing which illustrate what is now considered the preferred embodiment of the invention.

In the drawing:

Fig. 1 shows in cross-section an embodiment of the invention arranged for driving a short length of pipe.

Fig. 2 shows the driving apparatus of Fig. 1 being withdrawn from the shell after the driving operation is finished.

Fig. 3 shows the lower part of the driving apparatus arranged for driving a longer length of pipe.

Fig. 4 is a cross-section on line 4—4 of Fig. 3.

Referring to Fig. 1, numeral 10 designates the lower end of a hollow driving core provided with spaced blocks 12, each pivoted to core 10 at 14, and each provided with a corrugated outer surface adapted to engage or disengage the walls of corrugated shell 16 when the shell is slipped over core 10. Blocks 12 are operable by rotatable rod 18 through the instrumentality of nuts 20 and links 22 as disclosed in United States Patent No. 1,491,832, issued April 29, 1924 to Maxwell M. Upson.

The solid lower end of core 10 is counterbored to receive the upper end 24 of a coupling-plug 26. The lower end 28 of the coupling enters and is fast to the upper end of the hollow downwardly extending core extension 30, the lower end of which rests on a shoulder 32 of the driving pad 34. The upper end of core section 30 abuts a shoulder 36 on coupling plug 26 therefore the driving impact is transmitted from core 10 through coupling 26 and core section 30 to pad 34, and thence to concrete driving shoe 38.

The random length pipe 40 which is to be driven is placed around core 30 with its lower end surrounding pad 34 and with its upper end in position to be engaged by shoulder 42 on coupling 26. Drive shoe 38 has a thin metal casing 44 which extends upwardly to surround the lower end of shell 40.

Drive pad 34 has a stem 46 extending upwardly within core 30. For convenience, the stem may comprise a tube 48 fitted around and riveted to a boss 50 of pad 34. Through the upper end of tube 48 is a pin 52, to which is attached the lower end of a slack cable 54, the upper end of which passes through a hole 56 in coupling 26 to be attached to pin 58 which serves to lock coupling 26 to core 10. The lower end of shell 16 snugly surrounds the upper end of shell 40 as at 60.

With the parts assembled as above described, the entire assembly is driven into the ground, with shoe 38 and its casing 44 plowing a path for shell 40, which is pushed downwardly by shoulder 42 of coupling 26.

When the driving operation is finished and core 10, coupling 26 and extension 30 are withdrawn, cable 54 serving to withdraw pad 34, leaving in the ground the shell comprising upper section 16, lower section 40, shoe 38 and its casing 44. The withdrawing operation is shown in its early stages in Fig. 2. Stem 46 is long enough to still enter the lower end of core section 30 even after the slack is out of cable 54.

It will be noted that the outer surface of pad 34 is of sufficient height to automatically take care of slight variations of length of

shells 40. That is to say, space 62, between the lower end of pipe 40 and the top of shoe 38, may vary several inches without affecting the operation of the apparatus.

Figs. 1 and 2 illustrate conditions while driving a lower shell 40 of substantially the shortest length which can be handled by the core 30 shown in the drawing. In order to handle shells of longer length such as shell 64 the invention provides for increasing the effective length of core 30 by means of extension rings such as 66, 68 (Figs. 3 and 4). These rings are preferably of the same inside and outside diameters as core 30, and may be split vertically on lines 70 for ease of application and removal. The extension rings are carried on hand in assorted lengths, and one or more are placed between the lower end of core 30 and shoulder 32 of pad 34, so that the lower end of shell 64 overlaps pad 34. Of course the operative length of cable 54 is adjusted to correspond with the increased length of core. It will be noted that the extension ring sections are confined between stem 48 and shell 64 so that they cannot be inadvertently displaced during the driving operation.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. Apparatus for driving a pile shell having a driving shoe comprising, in combination, a core adapted for driving the shell into the ground, and means interposed between the core and shoe and unattached to said core or shell for changing the effective length of the core.

2. Apparatus for driving pile shells having a driving shoe comprising, in combination, an annular core adapted for driving the shell into the ground, and means comprising annular members adapted to be placed in alignment with the core and interposed between the core and shoe for increasing the effective length of the core, said members being unattached to the core or shell.

3. The invention set forth in claim 2 in which said annular members are split longitudinally for ease of application and removal.

4. The invention set forth in claim 2 in which said annular members are split longitudinally for ease of application and removal and in which the members are adapted to be held in operative position by the shell being driven.

5. The invention set forth in claim 2 in which said annular members are adapted to be held in operative position by the shell being driven.

6. Apparatus for driving pile shells, comprising in combination, an annular core adapted for driving a shell into the ground, a stem within said core, and annular members adapted to be placed between said stem and the shell being driven, whereby the effective length of said core may be increased.

7. The invention set forth in claim 6 in which said members are split longitudinally, and in which said stem and the shell being driven serve to hold the split members in operative position.

8. Apparatus for driving into the ground an annular shell and a shoe having an annular casing extending upwardly beyond the body of the shoe, comprising in combination, a cylindrical pad resting on the body of the shoe and adapted to form an annular space between its outer surface and said casing, a driving core resting on the rim of said pad and disconnected therefrom, and means effective on the upper ends of said core and the shell whereby the shell and shoe are simultaneously forced downwardly, the lower end of the shell terminating in the space between said pad and said casing.

9. Apparatus for driving into the ground an annular shell and a shoe having an annular casing extending upwardly beyond the body of the shoe, comprising in combination, a cylindrical pad resting on the body of the shoe and adapted to form an annular space between its outer surface and said casing, a driving core resting on the rim of said pad and disconnected therefrom, means effective on the upper ends of said core and the shell whereby the shell and shoe are simultaneously forced downwardly, the lower end of the shell terminating in the space between said pad and said casing and means interconnecting said pad and said forcing means whereby the raising of said forcing means withdraws said pad from the shell.

10. The invention set forth in claim 9 in which said interconnecting means comprises a flexible cable.

11. Apparatus for driving into the ground an annular shell and a shoe, comprising in combination, a pad, an annular driving core within said shell and freely resting on said pad, a stem within said core and attached to said pad, and means interconnecting said pad and said core whereby said core and said pad may be removed from said shell together.

12. The invention set forth in claim 11 in which said interconnecting means comprises a slack cable within said core.

13. The invention set forth in claim 11 in which said interconnecting means comprises a slack cable within said core, the slack in said cable being insufficient to allow the upper end of said stem to pass out of said core.

14. Apparatus for driving into the ground an annular shell and a shoe having an annular casing extending upwardly beyond the body of the shoe, comprising in combination, a cylindrical pad resting on the body of the shoe and adapted to form an annular

space between its outer surface and said casing, a driving core freely resting on the rim of said pad, a stem within said core and attached to said pad, and a slack cable interconnecting said stem and said core, for the purpose set forth.

15. Apparatus for driving pile shells into the ground comprising a main shell and a main driving core therein, in combination with a driving shoe, a supplemental extension core guided by the main core and interposed between the main core and the driving shoe, a supplemental shell extending below the main shell and surrounding the supplemental core, a driving shoe arranged to contact with a supplemental core and flexibly supported from the main core.

16. Apparatus for driving pile shells into the ground comprising a main shell and a main driving core therein, in combination with a driving shoe, a supplemental extension core guided by the main core and interposed between the main core and the driving shoe, a supplemental shell extending below the main shell and surrounding the supplemental core, said driving shoe arranged to contact with said supplemental core and flexibly supported from the main core, and means on the driving shoe for insuring engagement of the supplemental core with the driving shoe.

17. Apparatus for driving pile shells into the ground comprising a main shell and a main driving core therein, in combination with a driving shoe, a supplemental extension core guided by the main core and interposed between the main core and the driving shoe, a supplemental shell extending below the main shell and surrounding the supplemental core, said driving shoe arranged to contact with said supplemental core, a guiding member carried by said shoe and extending into the core and a slack cable connected to the guiding member and to the main driving core for preventing disengagement of the guiding member from the supplemental core.

18. Apparatus for driving pile shells into the ground comprising a main shell and a main driving core therein provided with means to engage the main shell, a driving shoe, a supplemental extension core interposed between the main driving core and the driving shoe and engaged with the lower end of the main core and the driving shoe, a supplemental shell depending from the main shell, said driving shoe free of said supplemental shell, a guiding member on said shoe slidably mounted within the supplemental core, a slack cable connecting said guiding member and the main core and of such length to prevent disengagement of the guiding member from the supplemental core, and means carried by the shoe for guiding the same with respect to the supplemental shell.

19. Apparatus for driving pile shells into the ground comprising a main shell, a supplemental shell depending therefrom, a main core having means for connection with the main shell, a supplemental extension core depending from the main core and unconnected with the supplemental shell, a driving shoe, means for guiding the driving shoe with respect to the supplemental core, means for guiding the shoe with respect to the supplemental shell, and means for preventing disconnection of the guiding means from the supplemental core said latter means serving to withdraw the driving shoe when the main core is withdrawn.

In testimony whereof I hereto affix my signature.

ELIHU D. WATT.