March 1, 1932. E. D. WATT 1,847,853

APPARATUS FOR DRIVING INTERNALLY TAPERED PILE SHELL SECTIONS

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FIG.1.

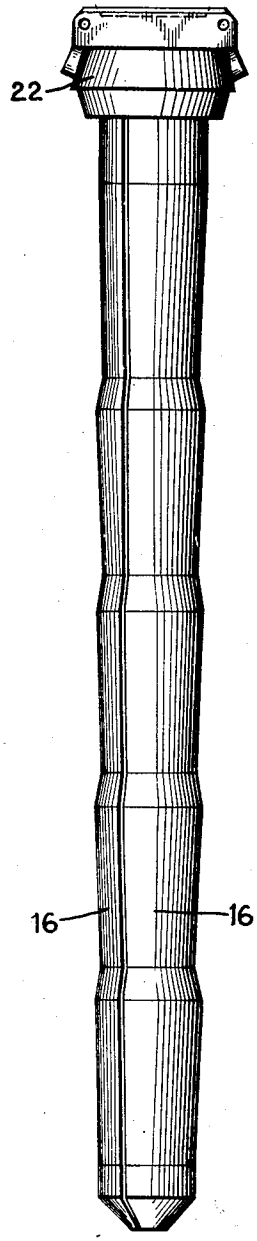


FIG.2.

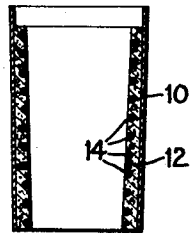


FIG.3.

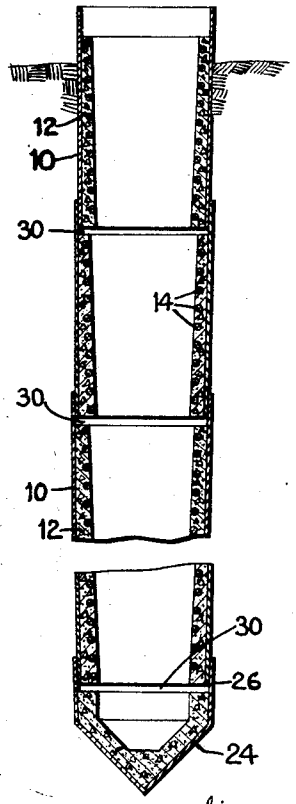
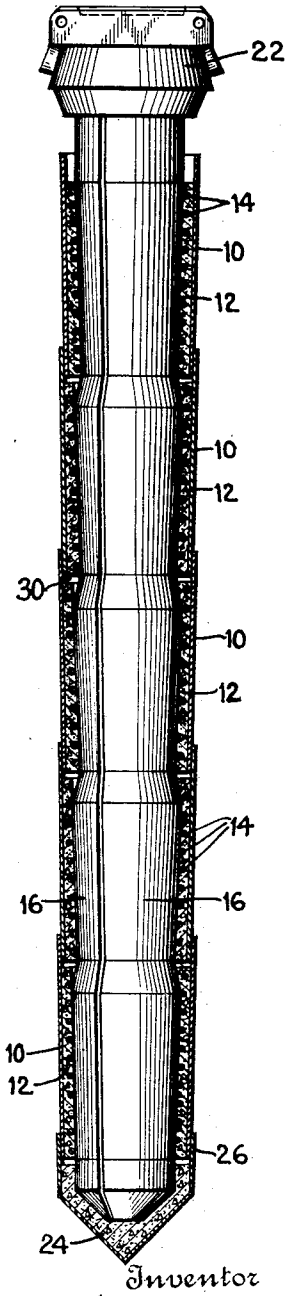


FIG.4.



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FIG.5.

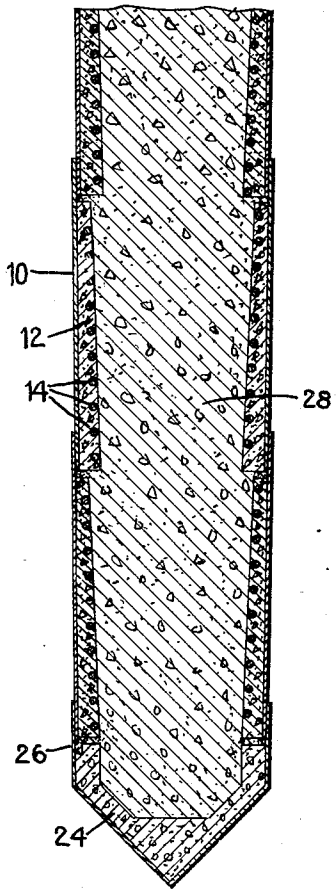


FIG.6.

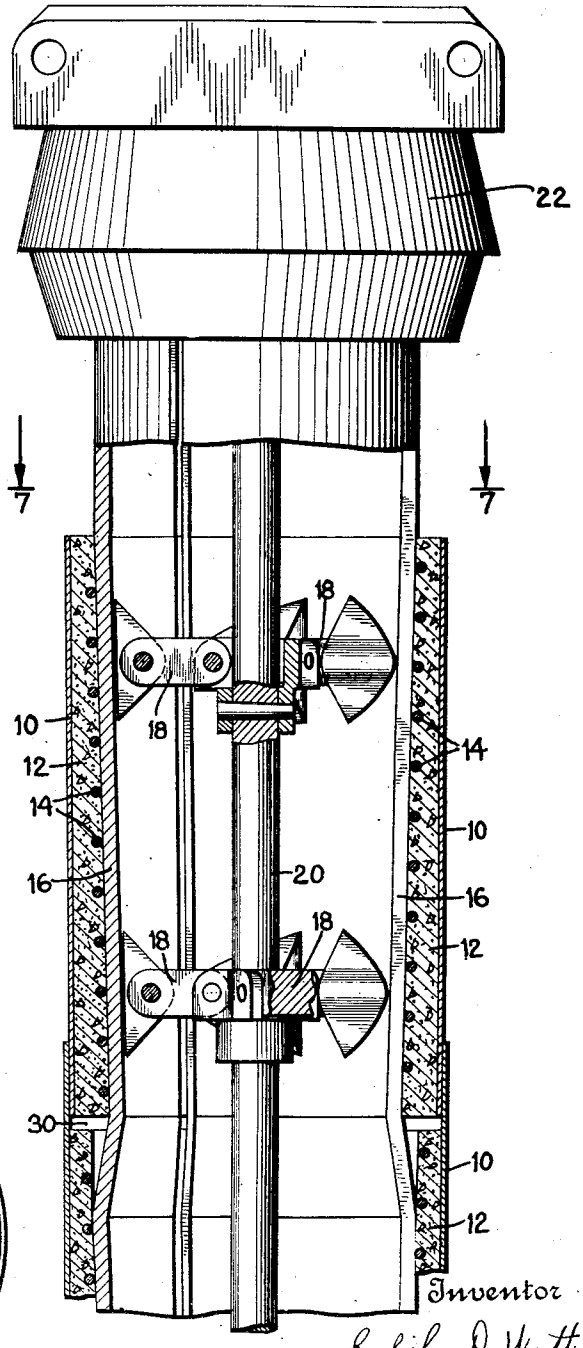
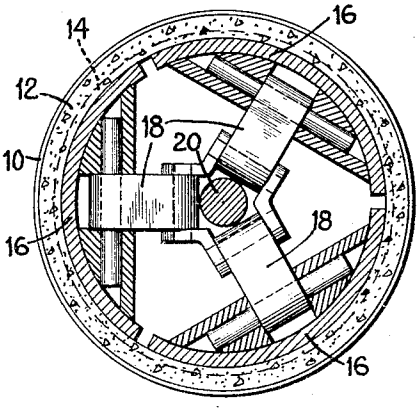


FIG.7.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR DRIVING INTERNALLY TAPERED PILE SHELL SECTIONS

Application filed August 12, 1930. Serial No. 474,744.

This invention pertains to concrete piles, with particular reference to apparatus and method for driving thin concrete shells preparatory to filling them with concrete to form a monolithic pile structure.

The present invention contemplates the formation of a cylindrical (non-taper) pile. Heretofore it has been customary to drive shells for such piles by hammer blows applied to the top of the shell. This required the shell to be of considerable thickness in order to withstand the strains of driving, particularly the crushing strains where the end of shell sections contact with each other.

In order to save transportation and handling costs it is desirable to make the shells as thin as possible. The principal object of the present invention is to disclose ways and means for driving thin concrete shells in such manner as to avoid subjecting them to the above mentioned compressive stresses. To practice the present invention I arrange on a collapsible driving core a stack of similar concrete shell sections, each section being substantially cylindrical on its outer surface and made quite tapered or conical on its inner surface by the insertion of a concrete lining gradually increasing in the thickness of its walls from top to bottom. The driving core is provided along its length with a plurality of tapered surfaces each of which is adapted to accommodate and conform to the inner surface of a shell section. The core is driven from the top and each shell section is driven individually by the tapered core section with which it is in contact.

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

Fig. 1 shows the three-leaved driving core with its head.

Fig. 2 is a cross-section of a preferred form of shell section.

Fig. 3 is a cross-section of a stack of shell sections after driving and before filling with concrete.

Fig. 4 shows the stack of shell sections on the expanded core, preparatory to driving.

Fig. 5 is a cross-section of a portion of a finished pile.

Fig. 6 is an enlarged view, mostly in cross section, showing core and shell.

Fig. 7 is a view on the line 7—7 of Fig. 6.

For the purpose of explaining the invention, a shell section of the type shown in Fig. 2 is used, in which a very thin slightly tapered annular metal casing 10 is lined with a thin layer of concrete 12, reinforced by steel rings 14. The concrete lining of the shell section is made considerably tapered or conical on its inner surface by increasing the thickness of the walls thereof from a point adjacent the top of the section to the bottom thereof, with the small end down, and the upper end of each casing 10 projects above the concrete lining so as to receive and overlap the lower end of the section above it when in assembled relationship, as shown in Figs. 3, 4, 5 and 6.

The driving core is of the collapsible type having three leaves 16, which may be moved outwardly or inwardly by toggles 18 connected to vertical axial shaft or rod 20 adapted for operation in well known manner by mechanism within driving head 22.

The surfaces of leaves 16 are so shaped that when they are assembled to form the core, they provide a series of tapered or conical surfaces, each adapted to engage a shell section of the kind shown in Fig. 2. The core is shown in Fig. 1 without shells, and in Figs. 4 and 6 with shells. In the last named figures the core is expanded to engage a stack of shell sections, each section being engaged by a conical section of the core. Fig. 4 shows the assembly ready for driving, a shoe 24 being provided on the lower end with a casing 26 overlapping the lowest shell section.

It will be appreciated that when the assembly in Fig. 4 is driven by blows or pressure applied to head 22 the driving effect will be transmitted from the core to each shell section individually on account of their tapered inter-relationship, and it will not be necessary to transmit force vertically from shell section to shell section.

After the driving operation is finished the core is collapsed and withdrawn, leaving a hollow shell in the ground as in Fig. 3. This shell is then filled with plastic concrete 28 as indicated in Fig. 5 to form with the shell sections a monolithic pile structure. Any spaces such as 30 (Fig. 3) between sections are filled by the plastic concrete as shown in Fig. 5.

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. A core for driving a stack of similarly dimensioned annular pile shells having tapered inner surfaces, comprising in combination, means for expanding said core to engage said tapered shell surfaces whereby the driving effect is transmitted from core to shell through said surfaces, and means for disengaging said core from said surfaces.

2. Apparatus for driving into the ground a pile shell consisting of a stack of similarly dimensioned annular shell sections each having a tapered inner surface, said apparatus comprising means for simultaneously engaging said tapered shell surfaces, whereby driving of said engaging means will carry said stack of sections into the ground, by virtue of the tapered shape of the engaged surfaces, and means for disengaging said engaging means from said surfaces whereby said engaging means may be removed from said shell to permit filling of the shell with plastic concrete to form with the shell a monolithic pile structure.

3. The invention set forth in claim 2 in which said engaging means comprises an expansible core provided with a plurality of tapered surfaces, each of said surfaces being adapted to fit the inner surface of one of said shell sections, substantially as described.

4. A core for driving a stack of similarly dimensioned annular pile shells having tapered inner surfaces comprising a plurality of connected sections cooperating to form tapered annular surfaces for engagement with the tapered inner surfaces of said shell sections and means for expanding said sections into fitting engagement with the inner surfaces of said shells, whereby a driving force applied to the core is transmitted to each shell through the corresponding surface on the core.

5. In combination, a stack of similarly dimensioned pile shells joined together and having the walls of each gradually increasing in thickness from a point adjacent their upper ends to their lower ends, and an expansible driving core having a plurality of tapered portions constructed to fit the tapered inner surfaces of said shells, together with means for expanding said core into engagement with the inner surfaces of said shells or collapsing said core to permit withdrawal from the stack.

In testimony whereof I hereto affix my signature.

ELIHU D. WATT.