Aug. 4, 1936. E. D. WATT 2,050,215

APPARATUS FOR DRIVING PILE SHELLS

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FIG.1.

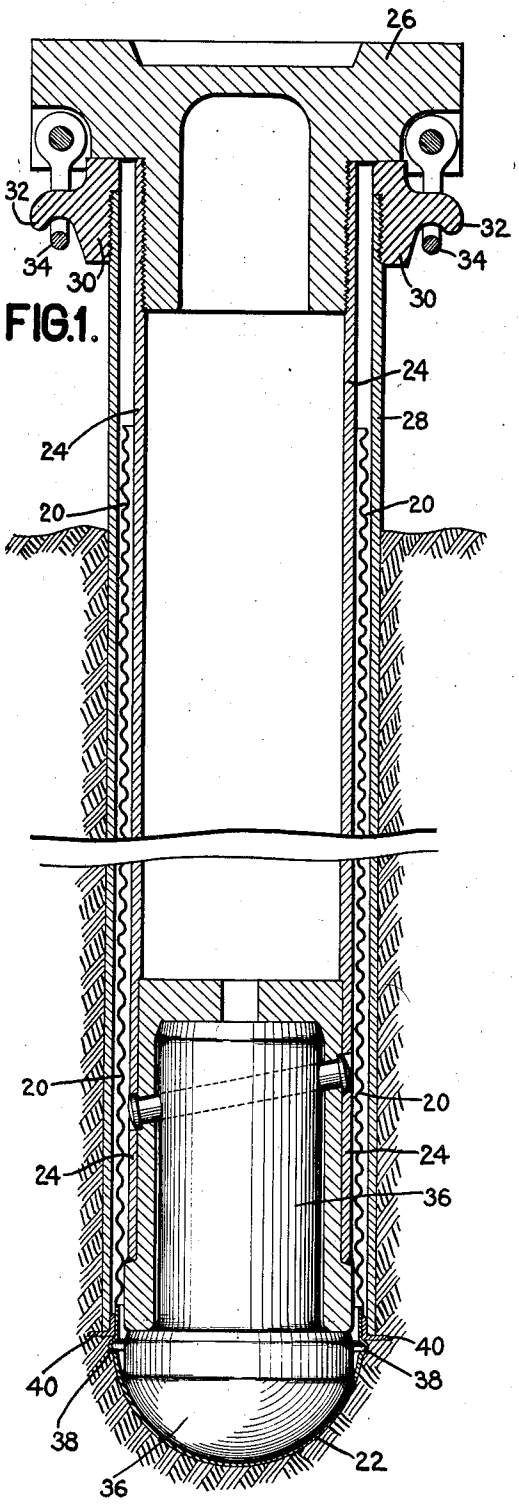

FIG.2.

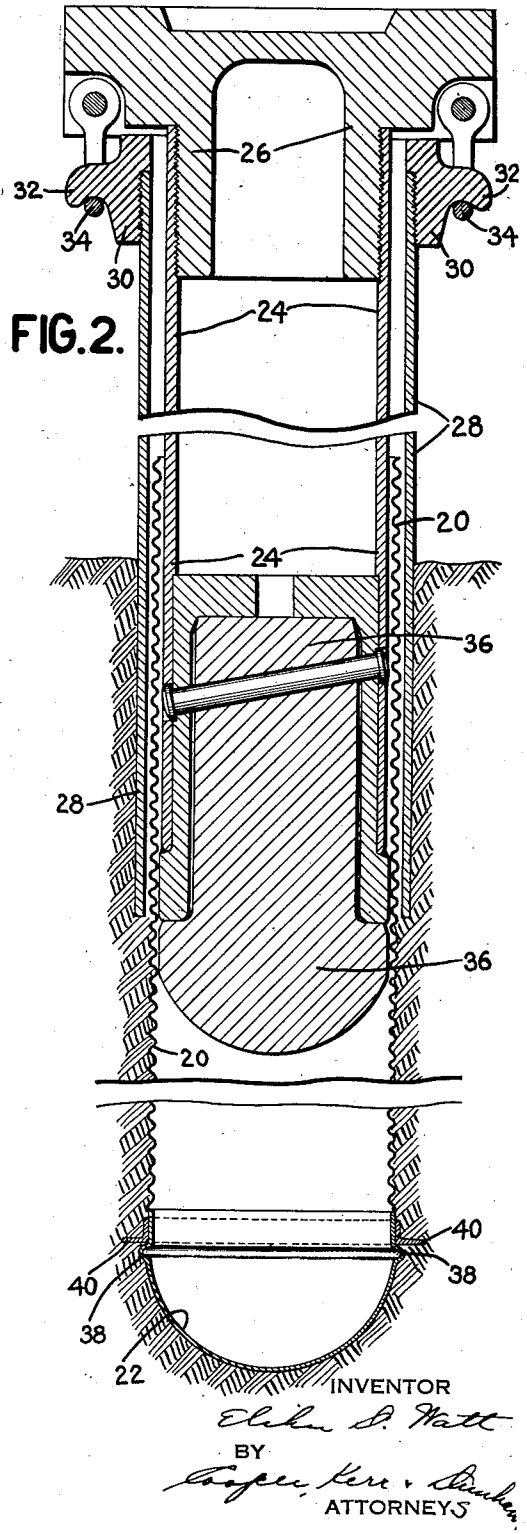

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FIG.3.

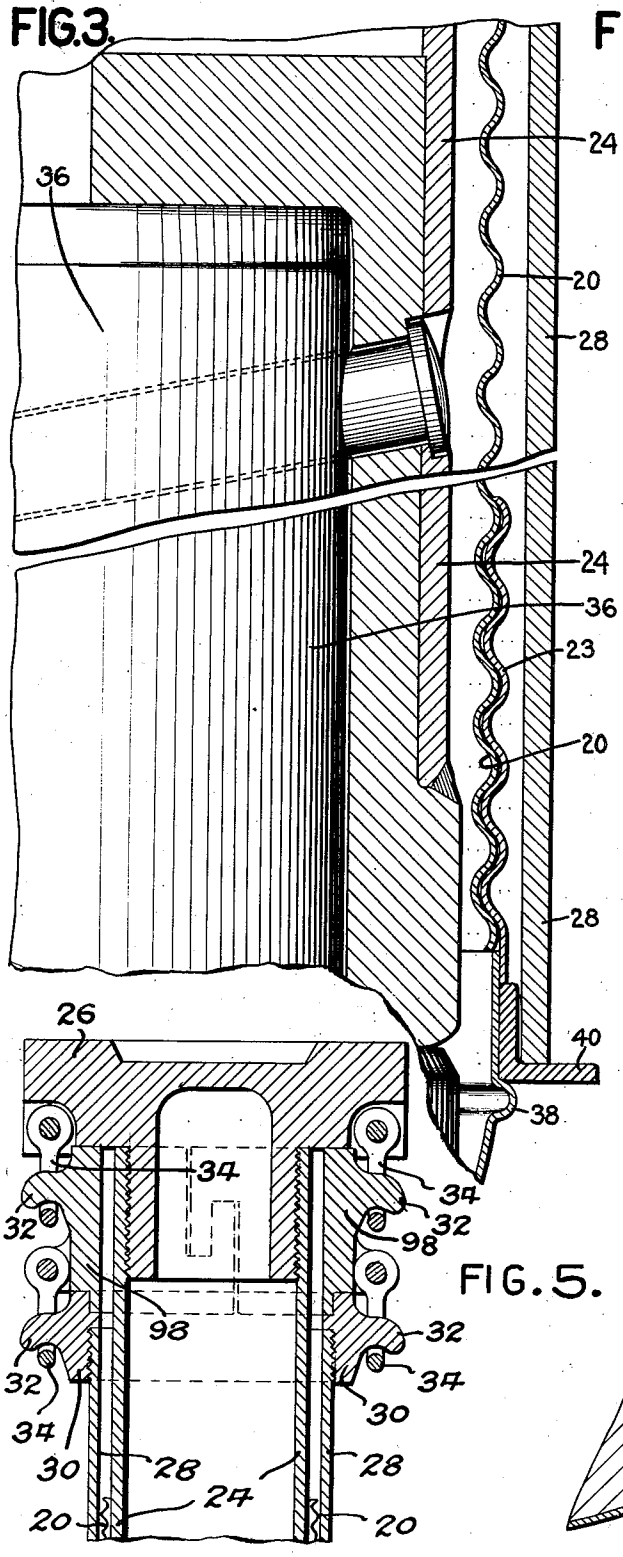
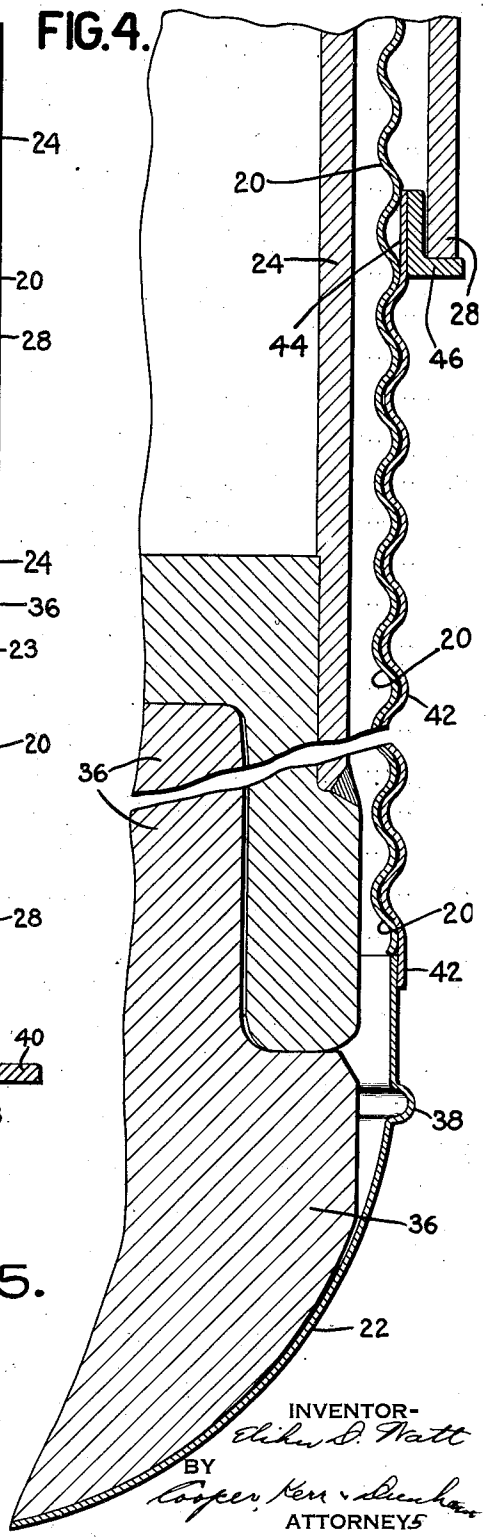


FIG.5.

FIG.4.



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APPARATUS FOR DRIVING PILE SHELLS

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3 Claims. (Cl. 61—78)

This invention pertains to the manufacture of concrete piles in which the thin, comparatively delicate shell used as a permanent mold for the concrete is surrounded and protected during the driving operation by a heavy tubular casing which is subsequently removed. A similar method for protecting the shell is shown in Smith Patent No. 1,890,268, which discloses the method in connection with the formation of the upper sections of composite piles.

An object of the present invention is to extend the use of the Smith method to other and more difficult situations.

One method now in use for forming concrete piles by the use of a protecting casing comprises the following steps:

1. Driving a protecting casing by means of a driving core (a sheet metal boot is usually placed over the lower end of core and casing).
2. Withdrawing the core, leaving the casing in the ground.
3. Inserting a permanent thin shell into the casing.
4. Filling the shell with concrete.
5. Withdrawing the protecting casing.

In the above process, when water or mud leaks past the sheet metal boot into the casing, the concrete is deposited through such water or mud, thus impairing the quality of the job. The protecting casing cannot safely be withdrawn until the shell is filled with concrete because withdrawal of the casing would almost certainly dislodge the empty shell from its proper position. This makes it necessary to keep the driving and hoisting apparatus in position until the concrete is poured, or else to return the apparatus after the pouring, in order to remove the casing. Since the pouring of the concrete takes considerable time, the driving and hoisting apparatus is tied up for considerable periods of waiting when it might otherwise be profitably employed, thus adding greatly to the cost of the work.

In the present invention the boot is attached not to the casing, but to the permanent shell, thus preventing entrance of water or mud, and means are provided for holding the empty shell in position while the casing is withdrawn, thereby obviating the necessity for any lost time in the use of the driving apparatus.

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

Fig. 1 shows a shell, casing and driving core at conclusion of driving operation.

Fig. 2 shows the core and casing of Fig. 1 partially withdrawn leaving the empty shell in position in the ground.

Fig. 3 is an enlarged detail view of the lower part of Fig. 1.

Fig. 4 is an enlarged view of a modification of Fig. 3 in which the casing is shorter than normal, thereby leaving the lower end of the shell exposed.

Fig. 5 shows a modified form of the upper end of the apparatus, a removable ring being inserted between the drive head and the top of the casing.

Referring to Fig. 1, the pile shell, designated **20**, is provided at its lower end with a welded-on sheet-steel boot **22**. In actual practice shell **20** is, for convenience, often threaded into a sleeve **23**, which is in turn welded to the boot (Fig. 3). The hollow drive core **24** within the shell is joined at its upper end to the drive head **26**, while the casing **28** is provided at its top with a ring **30** having hooks **32** adapted for engagement by links **34** hanging from the drive head. During the driving operation collar **30** is in contact with the under surface of the drive head, and after the driving is finished, hooks **32** serve as convenient means for engaging the casing to withdraw it from its position about the shell.

Forming the lower end of drive core **24** is a shoe **36** having its lower surface formed to fit the inner surface of boot **22**. The boot is provided, near its top, with a circumferential bead **38**, and above the bead is an angle ring **40**, fitted as shown, snugly around the top of the boot. The bottom of casing **28** engages ring **40** as shown, and the ring serves, during driving, to prevent entrance of material between casing and shell. During driving, ring **40** serves also as a plow in advance of the casing.

After the driving operation is finished as in Fig. 1, the drive core and casing may be withdrawn together as indicated in Fig. 2, leaving shell **20**, boot **22** and ring **40** in place. During withdrawal, any attempt of shell **20** to follow the casing and core is usually prevented by engagement of the surrounding earth with ring **40**, which in turn engages bead **38** on the boot.

In case the resistance of ring **40** is not sufficient to prevent the shell from following the core and casing during their withdrawal, the arrangement shown in Fig. 4 may be used. In this modification the casing **28** is shorter than usual, leaving exposed a portion of the lower part of the shell above the boot. Since the exposed portion is subject to abrasion during driving, that portion is made of thicker metal than usual, or the

exposed part is reinforced by an external sleeve **42** which may be threaded onto shell **20** and, as shown, may be welded to boot **22**. The top of sleeve **42** is preferably uncorrugated as at **44** to better contact with angle ring **46**, which, like ring **40**, serves to close the space between shell **20** and casing **28**, but unlike ring **40**, does not need to project horizontally beyond casing **28** because in this modification the ring is not relied upon to engage the earth to prevent rising of the shell. The rising is prevented by engagement of the earth with the portion of the shell below ring **46**.

Fig. 5 shows a modification of the arrangement of Figs. 1 and 2, in which, prior to driving, a removable collar **98** split as indicated by dotted lines **99** is placed between drive head **26** and casing collar **30**. After driving of core, shell and casing is completed, collar **98** is removed to permit driving core and shell (without the casing) to an additional depth equal to or less than the height of collar **98**. This affords a convenient means for testing the point resistance. This extra driving causes the lower end of the shell to emerge from the casing, and under some conditions provides sufficient anchorage for the shell (along the lines of Fig. 4) while core and casing are withdrawn. Since the shell is protected by the casing during the entire driving operation until collar **98** is removed, the bottom of the shell is subject to abrasion only during the final driving and does not require the extensive reinforcement shown in Fig. 4.

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 sinking into the ground a pile shell having a boot, comprising in combination, a drive head, a drive core attached to said drive head, a casing surrounding said core and spaced therefrom, and means for detachably connecting said casing to said head for the purpose set forth.

2. Apparatus for sinking into the ground a pile shell having a boot, comprising in combination, a drive head, a drive core attached to said drive head, a casing surrounding said core and spaced therefrom, and removable means interconnecting said head and said casing in spaced driving relation.

3. Apparatus for sinking into the ground a pile shell having a boot, comprising in combination a drive head, a drive core attached to said drive head, a casing surrounding said core and spaced therefrom, a removable split sleeve interconnecting said head and said casing in spaced driving relation.

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