July 9, 1935. E. D. WATT 2,007,668

CONCRETE PILE WITH ENLARGED BASE

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FIG.1.

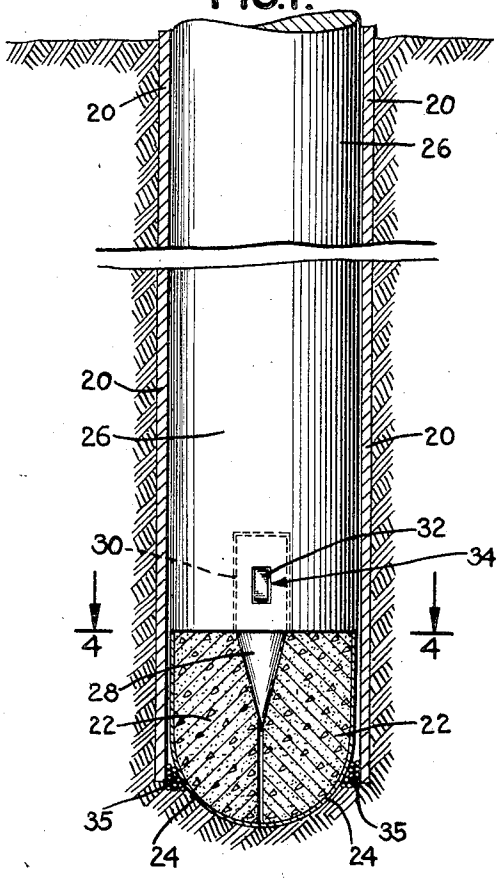


FIG.3.

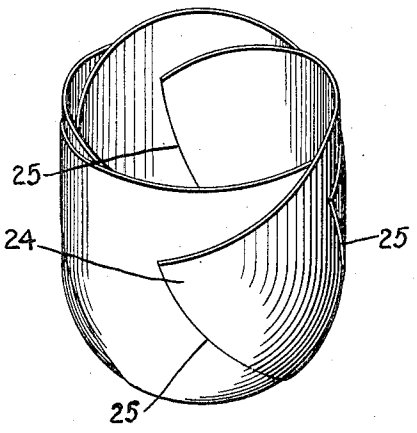


FIG.2.

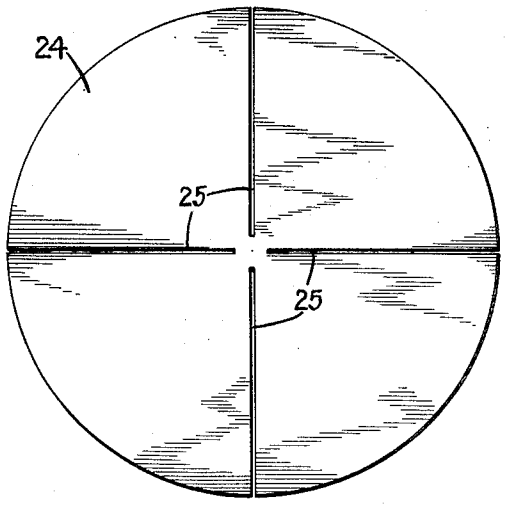
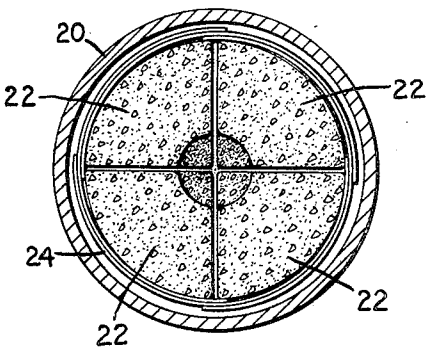


FIG.4.



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FIG.5.

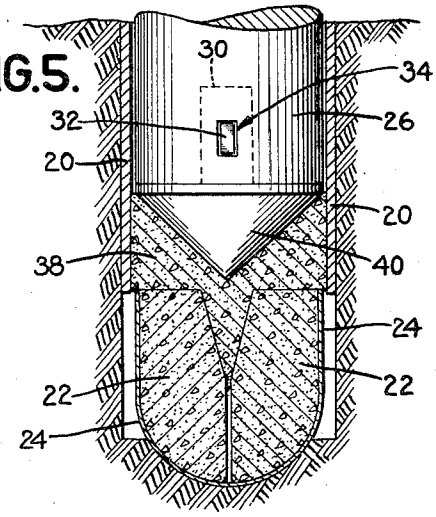


FIG.6.

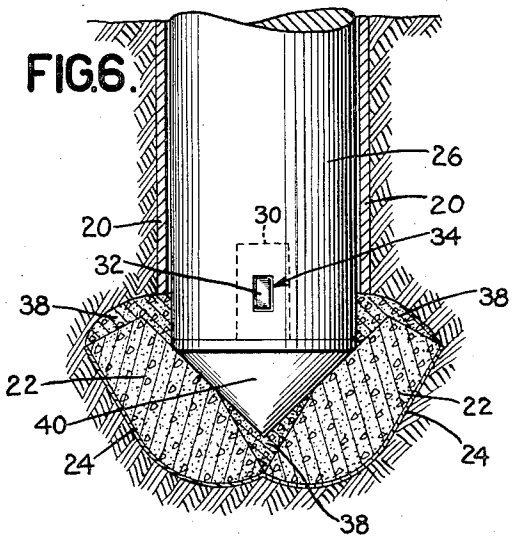


FIG.9.

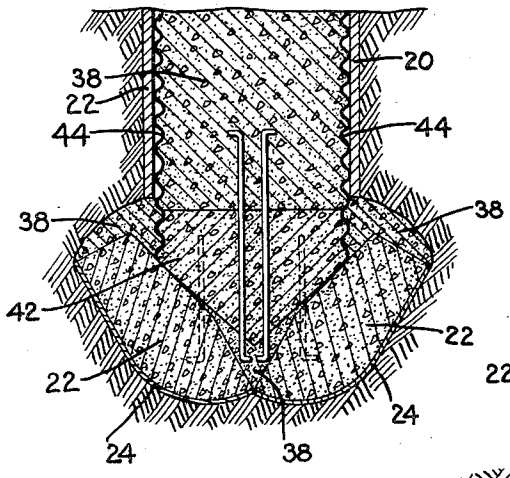


FIG.7.

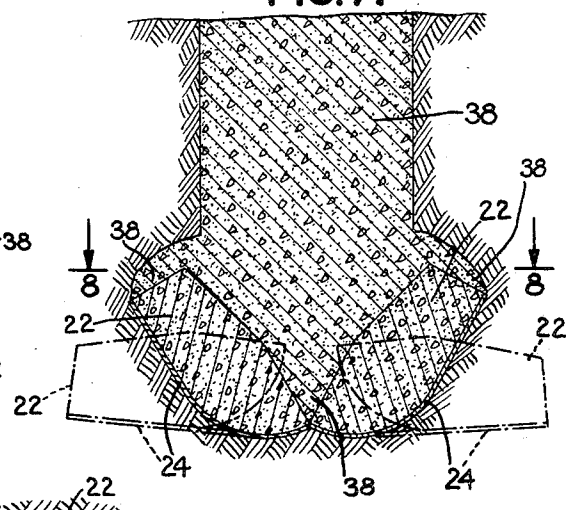
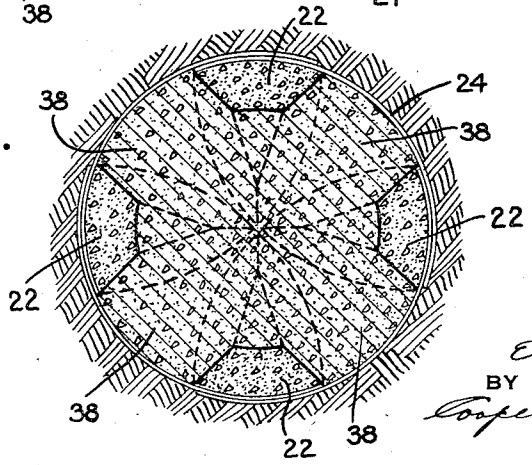


FIG.8.



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CONCRETE PILE WITH ENLARGED BASE

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Application June 12, 1933, Serial No. 675,379

18 Claims. (Cl. 61—57)

In the formation of concrete piles it is sometimes desirable to enlarge the base of the pile in order to provide increased load bearing area. Attempts have been made to accomplish the result by sinking a casing into the ground for the purpose of shaping the pile proper, and then extruding plastic concrete from the lower end of the casing in the endeavor to form a bulbous concrete mass below the casing, with the idea that this mass would become an integral part of the finished pile structure, thus creating a pile with an enlarged lower end. Such attempts have not been very successful in practice, because of the absence of means for controlling the flow of the extruded concrete, which would, of course, follow the line of least resistance and was therefore just as likely to flow sidewise or upwardly as to concentrate in a mass of the desired shape and location. In any event there was no way of knowing what shape the extruded material would assume, nor where it might be with relation to the body of the pile.

An object of the present invention is to solve the problem by disclosing ways and means for forming enlarged pile bases of controlled shape and location.

The invention contemplates placing in the ground a casing within which the body of the pile is to be formed, the casing having in its lower end an assembly of members forming a sectional drive point, the point being encased in a cup-shaped sheet metal boot having overlapping leaves. Then the casing is partially withdrawn, the members comprising the drive point are spread apart in spoke-like formation to cause the boot to form a cavity of predetermined shape and dimensions below the casing, and then plastic concrete is supplied through the casing to fill the cavity, thus forming (with the sections of the drive point) an enlarged base for the pile. The casing and sectional point may be driven simultaneously, or the casing may be driven first and the drive point lowered later, after the contents of the casing have been removed.

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 the casing with the sectional drive point in the bottom of the casing, and the driving follower resting on the point.

Figs. 2 and 3 show the sheet metal boot before and after it is shaped to encase the drive point.

Fig. 4 is a view on line 4—4 of Fig. 1, showing the casing, the sections of the drive point and its boot with its overlapping leaves.

Fig. 5 shows the next step of the operation after Fig. 1, the casing having been raised to the top of the drive point, plastic concrete having been poured into the casing on top of the drive point, and the follower having been provided on its lower end with a conical spreader.

Figs. 6 and 7 show the steps following Fig. 5 to complete the enlarged base and the body of the pile.

Fig. 8 is a cross-section on line 8—8 of Fig. 7.

Fig. 9 shows a modified embodiment of the invention.

Referring to Fig. 1, 20 is a casing which has been sunk into the ground by any convenient means, and 22 are sections of the drive point in the bottom of the casing. Sections or members 22, as shown, are of concrete, and there are four of them (Figs. 1 and 4). The sections are encased in a boot formed from a disc of sheet metal 24 (Figs. 2 and 3) cut radially as at 25 to form leaves which (Figs. 3 and 4), when they encase members 22, overlap each other as shown. A follower 26 rests on top of members 22 and has a conical guide member 28 entering a conical cavity formed in the sections of the drive point in order to hold the drive point assembly in proper alignment. The upper end of guide member 28 is seated in socket 30 in the lower end of follower 26 and is held therein by key 32 passing through key slot 34. If the casing and boot are driven simultaneously, a rope seal 35 may be used to prevent entry of water and dirt between boot and casing.

With the drive point held in position by follower 26 and guide member 28, the casing is then raised until its lower end is at the top of the drive point; follower 26 is removed; a batch of plastic concrete 38 is poured into casing 20 on top of drive point 22; and the follower is lowered into the casing on top of concrete 38, the guide member 28 formerly on the bottom of the follower being now replaced by a spreader cone 40. The parts are then as shown in Fig. 5.

The follower is then driven, with the result shown in Fig. 6, in which spreader 40 has pushed outwardly the sections of the drive point, thus enlarging the diameter of the boot, at the same time embedding members 22 in the plastic concrete 38. If necessary, additional batches of concrete 38 may be introduced and the driving repeated until sufficient enlargement of the boot has occurred. The degree of enlargement of the boot is indicated to the operator by the location (depth) of

spreader 40. Under certain conditions the spreading may continue until sections 22 have reached the dotted positions of Fig. 7.

During this base-forming operation, ground water is excluded by the overlapping leaves of boot 24.

Following the operation of Fig. 6, follower 26 is withdrawn and the body of the pile is poured, casing 20 being withdrawn as the pouring proceeds or afterwards, if and as desired.

The modification shown in Fig. 9 differs from the arrangement described above, in replacing the metallic spreader point 40 by a concrete spreader point 42 which becomes a part of the permanent pile structure. This concrete point has reinforcing bars projecting downwardly into the concrete of the base and upwardly into the concrete of the column, and has attached to it an upwardly extending shell 44 which also becomes a part of the finished structure. Shell 44 is usually corrugated and screwed onto spreader 42.

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 base for a concrete pile comprising in combination, a plurality of radially projecting members, and a filling of concrete between said members to form a circumferentially continuous base of larger diameter than the column of the pile.

2. A base for a concrete pile comprising in combination a plurality of radially projecting preformed concrete members, and a filling of concrete between said members to form a circumferentially continuous base of larger diameter than the column of the pile.

3. A concrete pile comprising in combination a column portion and a circumferentially continuous base portion; said base portion comprising a plurality of radially projecting preformed members and a filling of concrete between said members, said filling being integral with said column and with said members.

4. A base for a concrete pile comprising in combination a plurality of radially projecting members, a boot enclosing said members, and a filling of concrete within said boot to form with said members a base of larger diameter than the column of the pile.

5. A concrete pile comprising in combination a column and a base; said base comprising a plurality of radially projecting preformed members, a boot enclosing said members, and a filling of concrete within said boot, said filling being integral with said column and said members to form a base of larger diameter than said column.

6. A concrete pile comprising in combination, a column and a base; said base comprising a plurality of spaced preformed concrete members and a filling of concrete between said members, said filling serving to form with said members a circumferentially continuous base of greater diameter than said column, and also serving to bind said base to said column.

7. In the method of forming an enlarged base for a concrete pile, the steps of radially displacing a plurality of members into spoke-like formation having an outer diameter greater than the pile column, and filling with concrete the spaces between said members and forming a circumferentially continuous base for the pile.

8. In the method of forming a concrete pile with an enlarged base, the steps of forming a hole in the ground for the column of the pile, placing at the bottom of the hole a plurality of preformed members, spreading said members radially beyond the diameter of the hole, and filling with concrete the spaces between said members while embedding said members in concrete and forming a circumferentially continuous base for the pile, substantially as described.

9. In the method of forming a concrete pile with an enlarged base, the steps of forming a hole in the ground for the column of the pile, placing at the bottom of the hole a cup-shaped boot, enlarging the diameter of said boot, and filling said enlarged boot with concrete.

10. In the method of forming a concrete pile with an enlarged base, the steps of forming a hole in the ground for the column of the pile, placing at the bottom of the hole a cup-shaped boot, enlarging the diameter of said boot, and filling said enlarged boot and the hole with concrete.

11. In the method of forming a concrete pile with an enlarged base, the steps of placing in the ground a casing having in its lower end an assembly of preformed members, partially withdrawing said casing, spreading said members apart below said casing, and filling with concrete the spaces between said members while embedding said members in concrete and forming a circumferentially continuous base of greater diameter than said casing.

12. In the method of forming a concrete pile with an enlarged base, the steps of placing in the ground a casing having in its lower end a cup-shaped boot, partially withdrawing said casing, enlarging the diameter of said boot, and filling said boot with concrete to form a base of greater diameter than said casing.

13. In the method of forming a concrete pile with an enlarged base, the steps of placing in the ground a casing having in its lower end a cup-shaped boot, partially withdrawing said casing, enlarging the diameter of said boot, filling said boot with concrete to form a base of greater diameter than said casing, and filling said casing with concrete.

14. In the method of forming a concrete pile with an enlarged base, the steps of placing in the ground a casing having in its lower end a cup-shaped boot, partially withdrawing said casing, enlarging the diameter of said boot, filling said boot with concrete to form a base of greater diameter than said casing, filling said casing with concrete, and withdrawing said casing.

15. In the method of forming a concrete pile with an enlarged base, the steps of placing in the ground a casing having in its lower end an assembly of preformed members, partially withdrawing said casing, forcing an element into said assembly to spread said members apart below said casing, embedding said members and said element in concrete to form a base for the pile, attaching to said element a shell extending upwardly within said casing, and filling said shell with concrete to form the pile column.

16. A concrete pile comprising in combination, a column and a base; said base comprising a plurality of pre-cast concrete members, a pre-cast concrete element holding said members in spaced-apart relationship, said members and said element being embedded in concrete; said column comprising a filling of concrete and an upright shell attached at its lower end to said spreading element.

17. A concrete pile comprising in combination,

a column and a base; said base comprising a plurality of pre-cast concrete members, a pre-cast concrete element holding said members in spaced-apart relationship, said members and said element being embedded in concrete; said column comprising a filling of concrete and an upright shell attached at its lower end to said spreading element; and reinforcing bars extending from said spreading element into said embedding concrete and into said column.

18. In the method of forming a concrete pile with an enlarged base, the steps of forming a hole in the ground for the column of the pile, placing at the bottom of the hole a cup-shaped boot having therein an assembly of preformed members, spreading said members radially beyond the diameter of the hole and enlarging the diameter of the boot, and filling said enlarged boot with concrete.

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