May 9, 1950 J. W. LEVASSEUR 2,507,259

PILE

Filed March 26, 1947

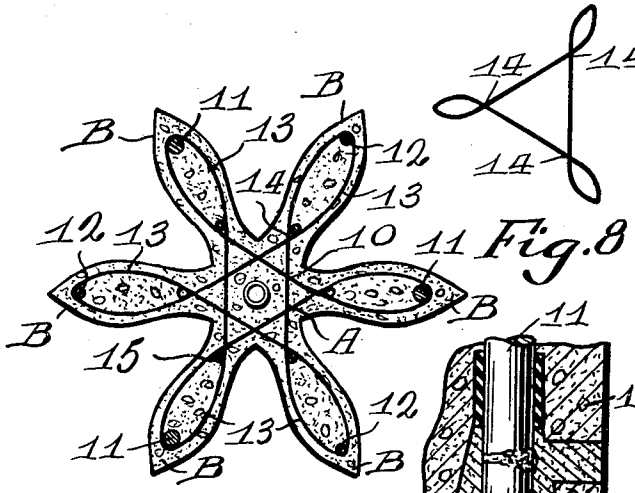

Fig. 1

Fig. 8

Fig. 5

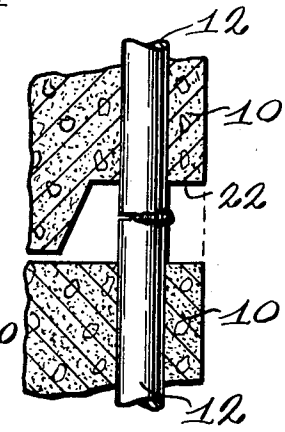

Fig. 4

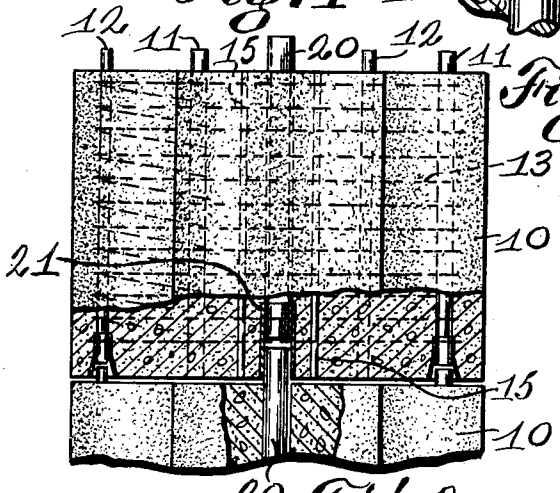

Fig. 2

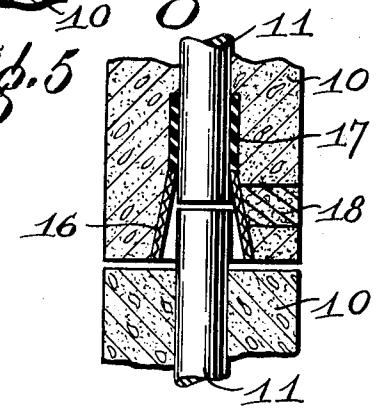

Fig. 6

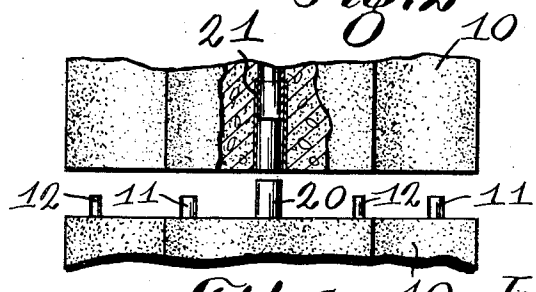

Fig. 3

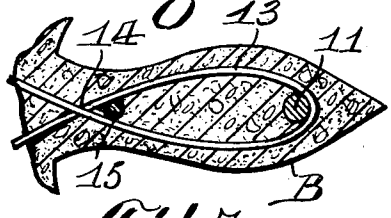

Fig. 7

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UNITED STATES PATENT OFFICE

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PILE

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1 Claim. (Cl. 61—56)

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The present invention relates to foundation piles and, more particularly, to sectional re-inforced concrete piles for supporting structures above soft ground.

In certain localities where it is desirable to build heavy structures it has been found that the ground is soft, being sometimes composed of clay that extends downward for over 100 feet before reaching even a sandy or gravel bed. Such ground is unable to support heavy structures such as stone buildings without the building sinking. Likewise piles driven into such strata are unable to assist in supporting the structure because a rock bed cannot reasonably be reached. It is therefore necessary to employ a piling which will frictionally engage the surrounding stratum and will thereby be retained from further downward movement when a weight less than a given measure is placed thereon.

The principal object of the present invention is to provide a piling formed from pre-cast connected sections having a relatively large ground engaging surface for the size of its overall diameter.

A further and important object of the invention is to provide a piling formed from economically produced pre-cast reinforced concrete sections that can be permanently attached, with one section on top of the next, during the driving of the piling into the ground.

A still further object of the present invention is to provide a piling which can be assembled from short sections to form the equivalent of a monolithic unit of great rigidity and resistance against bending stresses.

Other objects of the invention will be in part obvious and in part hereinafter pointed out as the description continues. In order that the invention and its mode of operation may be readily understood by persons skilled in the art, I have in the accompanying drawings and in the detailed following description, based thereupon, set forth an embodiment of the same.

In the drawings:

Fig. 1 is a top cross sectional view through one of the pile sections showing the shape and arrangement of the metal reinforcements.

Fig. 2 is a side elevation of two sections of the pile, partly in section showing their connection to one another.

Fig. 3 is a partial side view of two sections in position for assembly.

Fig. 4 is an enlarged sectionalized detail view of the welding aperture for the small reinforcing rods.

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Fig. 5 is an enlarged sectionalized detail view of the welding aperture for the large reinforcing rods filled with a cement grout.

Fig. 6 is an enlarged sectionalized detail view of the welding aperture for the reinforcing rods during the formation thereof.

Fig. 7 is an enlarged cross-section through one of the ogival sections or arms of the pile; and

Fig. 8 is a top view of one of the preformed reinforcing armature rods.

Referring now more particularly to the drawings wherein like and corresponding parts are designated by similar reference characters throughout the several views, numeral 10 refers generally to one of the sections by which the pile can be formed into any desired length by mounting corresponding sections 10 one on top of the other and joining them together.

Said section 10 is preformed before use in a suitably shaped mould to have a longitudinally extended hub A from which radially extends six arms B which are also longitudinally extended, but, which when seen from the top or in a lateral cross-section, have an ogival shape as shown in Figs. 1 and 7.

During the formation of each section 10, three large diameter metal rods 11 are each vertically positioned in the end portion of the section of the mould forming alternate arms B and similarly three smaller diameter rods 12 are each vertically placed in one of the remaining sections forming the balance of said arms B.

A series of metal armature rods 13, each bent into the configuration shown in Fig. 8 and spot welded where parts thereof overlap as at 14, are positioned horizontally and spaced one above the other with their curved ends around three of said small rods 12. The triangular sections of the rods 13 are thereby positioned in the center or hub A section of the mould. These layers of rods 13 extend substantially from the bottom to just short of the upper end portion of each rod 11 and 12.

Each rod 11 and 12 is maintained a short distance from the mould floor by a conical collar 16 made from corrugated paper or the like which also prevents cement from getting under these ends of said rods. Said rods 11 and 12 also have asbestos sleeves 17 mounted thereon above each collar 16.

A plug of wood or porous wall-board is also positioned against each collar 16 and extends to the side wall of the mould.

A metal pipe 20 is centrally located through the hub section and positioned on a metallic bushing

21 mounted on the mould floor thereby spacing the lower end of said pipe 20 from the bottom of the mould. The purpose of this pipe is to permit applying a water pressure under the pile being driven, allow soil water to escape therethrough and, generally, to help strengthen the pile sections.

Concrete poured into the mould fills the space around said rods, but due to said collars 16 and plugs 18 leave a recess 22 about the lower end of each rod 11 and 12 in their respective arms B. Similarly said metallic bushing 21 forms an opening in the central lower face of said section 10. The length of each rod 11 and 12 and pipe 20 is sufficient to make the upper end portions extend above the top of section 10 as shown.

In use an initial section 10 is driven into the ground by known means and while it is moving downward a second section is placed on top of the first with the respective rods 11 and 12 and pipes 20 of each section in line and adjacent one another. Each pipe 20 fits into the metallic bushing 21 of the section above continuing with the downward movement of the pile the adjacent ends of said rods 11 and those of rods 12 are welded together with the welder operating through each recess 22. Said asbestos sleeves 17 protect the adjoining cement against heat during the welding operation and also absorb the expansion of the rods thereby preventing a cracking of the concrete.

The cross sectional configuration of a pile thus formed of sections 10 provides a maximum of frictional surface for a given mass thereby providing a piling capable of supporting exceedingly heavy loads in soft ground solely by friction with the surrounding strata.

Under compression, a pile formed as described is tremendously strong and can stand enormous weights. When such a pile is assembled to a considerable length, the benching stresses may

exceed the strength of a simple concrete monolith with only vertical reinforcements and therefore the armature rods 13 are necessary to reinforce the pile against this force.

Manifestly, the construction herein shown is capable of considerable modification and such modifications as come within the scope of my claim, I consider within the spirit of my invention.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent is:

An improvement in piles comprising a plurality of superimposed elongated concrete sections, each section formed with radially extending arms, each of said arms having a rod positioned longitudinally thereof, each arm further having a recess formed at its lower edge with the end of the corresponding rod extending therein, a plurality of asbestos sleeves each positioned around one of said rods adjacent said lower end thereof and immediately above the recess of the arm, the upper end of each of said rods extending from the top of its respective section into the corresponding recess of the section thereabove and means connecting the corresponding ends of said rods positioned in each of said recesses.

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