No. 839,954. PATENTED JAN. 1, 1907.

A. A. RAYMOND.

PILE AND METHOD OF FORMING THE SAME.

APPLICATION FILED SEPT. 3, 1902.

Fig. 1.

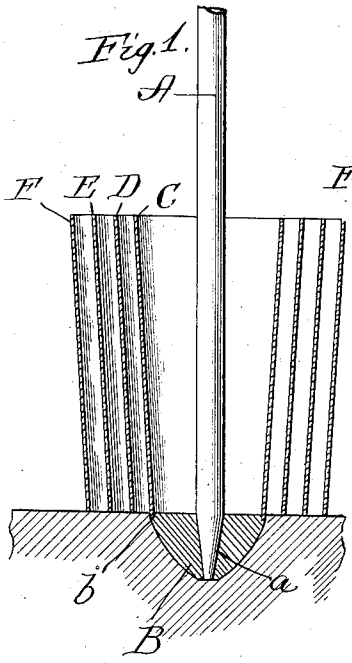


Fig. 2.

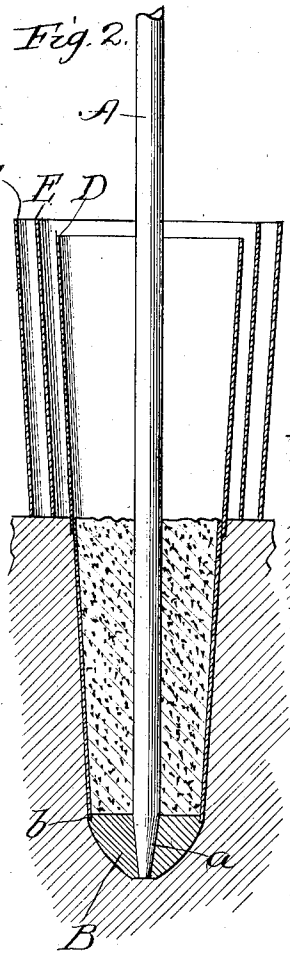
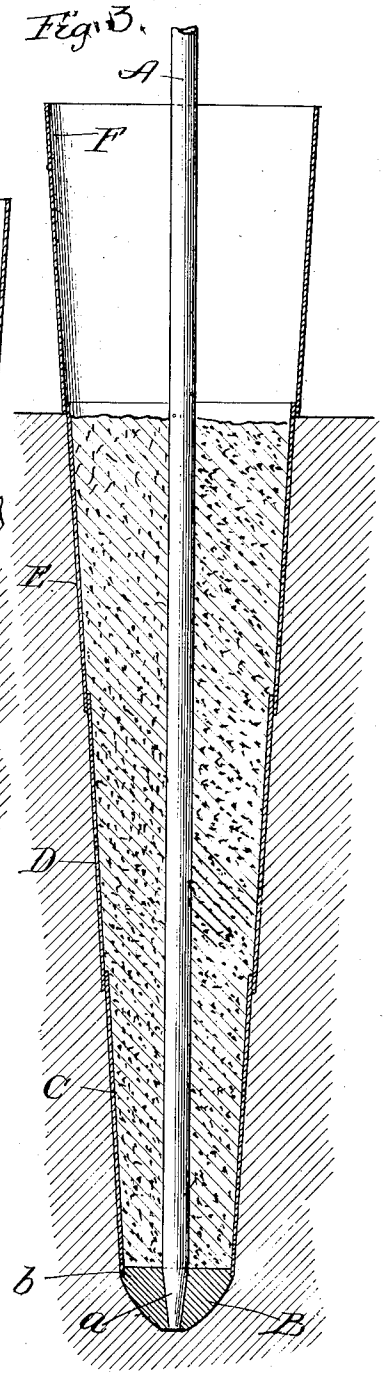


Fig. 3.



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ALFRED A. RAYMOND, OF CHICAGO, ILLINOIS, ASSIGNOR TO RAYMOND CONCRETE PILE COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PILE AND METHOD OF FORMING THE SAME.

No. 839,954. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed September 3, 1902. Serial No. 121,935.

To all whom it may concern:

Be it known that I, ALFRED A. RAYMOND, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Piles and Method of Forming the Same, of which the following is a specification.

My invention relates to piles or foundations made from cement, concrete, or the like; and it consists of a new and useful method or process of forming piles of this character, (which method will be readily understood from the description and drawings,) and also consists of the new pile resulting from the practice of such method.

In the accompanying drawings, Figure 1 is a section of a series of shell-sections and tip employed and representing one of the first steps of the process, and Figs. 2 and 3 similar views representing subsequent steps in the formation of the concrete pile.

In the present instance I have illustrated the sinking of the pile by means of a fluid-jet, and I will for convenience, therefore, describe my method or process in connection with such manner of sinking the pile.

As herein shown, a pipe A, forming a conveying-passage, is provided at its lower end with a tip B, which is more or less pointed and has a tapering jet-opening *a*, forming a nozzle, although the nozzle proper may be formed on the end of the pipe itself. This tip may be connected to or formed upon the end of the pipe, so that it constitutes practically an integral part thereof, so as to perform the desired purposes.

The pipe and tip are set at the point where it is desired to sink or form the pile, and the same are surrounded by a series of concentric tapering shell-sections C, D, E, and F, more or less in number according to the desired length of the pile. These shell-sections are temporary in character, like those of my prior patent, No. 700,707, dated May 20, 1902, being made of suitable material—such as sheet metal, papier-mâché, fiber, and the like.

The lower end of the innermost shell-section C is of the same diameter as the top face of the tip B, which is in the present instance cut back as to its upper edge to form a shoulder *b*, so that the end of this inner or first shell-section may rest thereon and be flush with the outer surface of the tip, as clearly shown in the drawings.

The different shell-sections are of such diameter and so related that they are capable of forming a continuous tapering shell or tube when longitudinally extended or distributed, and to this end the diameter of the upper end of the inner or first shell-section C is slightly greater than the diameter of the lower end of the second shell-section D, and so on, in order to provide for interlocking engagement of such shell-sections.

Assuming the parts to be in the relative position shown in Fig. 1, the fluid-jet through the pipe A is started and the soil below the tip thereby displaced, causing a sinking of such pipe and its tip, as well as of the innermost shell-section C, resting on such tip. Preliminarily to the starting of the jet the first shell-section C may be filled with cement or concrete or other suitable filling, or such filling may be done simultaneously with the sinking of the tip B and shell-section C, or such filling may be done after the shell-section C has been sunk into the ground. In every instance the filling may be said to occur during the sinking operation.

When the top of the inner or first shell-section C has reached the ground-line, on which the shell-sections are here shown as resting, it will engage or interlock with the lower end of the second shell-section D and draw it into the ground, as shown in Fig. 2, thereby forming, with the first shell-section, a continuous tapering shell or tube. The second shell-section is filled at either one of the three times, as above explained, and its top end will engage or interlock with in like manner the lower end of the third shell-section E and draw it into the ground. This third shell-section is also filled with concrete or other suitable filling, whereupon the pile, at this stage of formation, appears as shown in Fig. 3.

The fourth and last shell-section F, according to the present illustration, remains, and this shell-section is itself engaged by the shell-section E and the pile completed by the sinking and filling of such last shell in the manner above described. To form a pile longer than the one herein described, the length of the shell is increased section by section and the same filled until the desired length of pile is obtained. These shell-sec-

tions, which may be of any suitable height and of the proper number, according to the desired length of the proposed pile, are arranged around the pipe and tip B in nested or telescopic fashion. Moreover, while I have herein shown the shell-sections and the completed shell or tube as circular in cross-section, yet it will be understood that they may be of any desired shape and dimensions, depending upon the particular shape and size of pile required.

The pile resulting from the practice of my method is a solid and tapering one, and in the course of time the shell-sections, which are intended for temporary use only, will rust or rot away. The fluid-jet pipe remains in the center of the pile and serves to strengthen the same, but, if desired, arrangement may be made to withdraw the pipe after the pile is formed. By a fluid-jet I contemplate not only a water-jet but an air-jet or any other jet of a fluid.

Inasmuch as the filling occurs at the same time or substantially the same time as the sinking of the shell, a comparatively thin shell may be employed without any danger of the collapsing thereof.

My present invention therefore provides for the sinking in any desired manner of a series of shell-sections arranged to interlock when longitudinally extended to form a complete or continuous shell or tube which is filled with a suitable filling material at the desired time to make the pile proper, in the present instance the shell or tube being sunk or caused to descend, section by section, by fluid-jetting and being filled during the sinking operation, preferably section by section.

I claim—

1. The method of forming a pile consisting in sinking a shell and filling such shell with concrete or the like during the sinking operation; substantially as described.

2. The method of forming a pile consisting in sinking a tapering shell into the ground by means of a fluid-jet and filling such shell with concrete or the like during the sinking operation; substantially as described.

3. The method of forming a pile consisting in sinking a body or tip on which is arranged a tapering shell, filling such shell with concrete or the like, continuing said sinking, and attaching a second shell to the first shell and filling it also with concrete and adding shells and continuing sinking until the desired length of pile is obtained; substantially as described.

4. The method of forming a pile consisting in arranging around a body or tip to be sunk a series of sections of tapering shell, which sections engage each other to form a continuous shell or tube, sinking said tip and shells and filling said shell or tube with a suitable filler; substantially as described.

5. The method of forming a pile consisting in arranging around a body or tip to be sunk into the ground a series of tapering sections adapted to telescope into each other and to form a tapering shell or tube, sinking said tip and thereby extending the telescoped sections into a completed tube, and filling said sections during the sinking operation; substantially as described.

6. The herein-described pile consisting of a temporary shell or covering, a suitable filler therein, a tip arranged at the lower end of such shell and a pipe connected to such tip and extending longitudinally through the filler; substantially as described.

7. The herein-described pile consisting of a temporary and tapering shell or covering, a suitable filler therein, a tip arranged at the lower end of such shell and having a tapering jet-opening forming a nozzle, and a fluid-jet pipe connected to such tip and communicating with the jet-opening thereof, said pipe extending longitudinally through the filler; substantially as described.

8. The method of forming a pile consisting in sinking a body or tip on which is arranged a shell, and filling such shell with a suitable filler simultaneously with the sinking operation; substantially as described.

9. The method of forming a pile consisting in sinking by means of water-jetting a body or tip on which is arranged a shell, attaching another shell or shells to the first shell according to the length of pile required, and filling said shells with a suitable filler during the operation of sinking the tip and shells; substantially as described.

10. The method of forming a pile consisting in arranging around a body or tip to be sunk a series of sections of a shell, which sections are arranged to engage each other to form a continuous shell or tube, sinking said tip and shell-sections by fluid-jetting, and filling said shell or tube with a suitable filler; substantially as described.

11. The method of forming a pile consisting in sinking a series of shells and filling the same shell by shell during the sinking operation; substantially as described.

12. The method of forming a pile consisting in sinking a series of shells and filling the same shell by shell and simultaneously with the sinking operation; substantially as described.

13. The method of forming a pile consisting in sinking a series of interlocking shell-sections and filling them with a suitable filler during the sinking operation.

14. The method of forming a pile consisting in sinking a sectioned shell, section by section, and filling said shell with a suitable filler.

15. The method of forming a pile consisting in assembling a series of tapering shell-sections adapted to form a tapering shell, sinking the innermost one of said sections

and thereby extending the sections into a complete shell, and filling said sections with a suitable filler.

16. The method of forming a pile consisting in sinking, by fluid-jetting, a series of shell-sections, section by section, and filling the same with a suitable filler.

17. A pile consisting of a shell and a suitable filler therein having a conveying-passage extending longitudinally thereof.

18. A pile consisting of a shell composed of a series of longitudinally-distributed sections, and a suitable filler therein having a conveying-passage extending longitudinally thereof.

19. A pile consisting of a shell, a suitable filler therein, and a conveying-pipe in mechanical engagement with the lower end of said shell, whereby the soil beneath said shell may be removed.

20. A pile consisting of a shell or covering composed of a plurality of nested sections adapted for longitudinal distribution and interlocking engagement when so distributed, and a suitable filler within such shell.

21. A shell for piles comprising a plurality of nested shell-sections arranged for interlocking engagement when longitudinally distributed, in combination with means for effecting the removal of soil to permit longitudinal distribution of the sections in the earth.

22. A shell for piles comprising a plurality of nested shell-sections arranged for interlocking engagement when longitudinally distributed, in combination with a conveying-pipe in mechanical engagement with the innermost section whereby soil beneath said section may be removed to effect longitudinal distribution of said shell-sections.

23. A shell for piles comprising a plurality of nested shell-sections arranged for interlocking engagement when longitudinally distributed, in combination with a tip connected to the innermost shell-section.

24. A shell for piles comprising a plurality of nested shell-sections arranged for interlocking engagement when longitudinally distributed, in combination with a tip connected to the innermost shell-section, and means of fluid-jetting.

25. A shell for piles comprising a plurality of nested shell-sections arranged for interlocking engagement when longitudinally distributed, in combination with a tip connected to the innermost section, and a jet-pipe connected to and supplying a jet through the tip.

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Witnesses:
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