F. L. PRUYN.

METHOD OF FORMING CONCRETE PILES.

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Fig. 4.

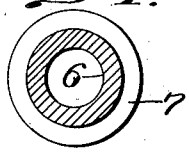


Fig. 2.

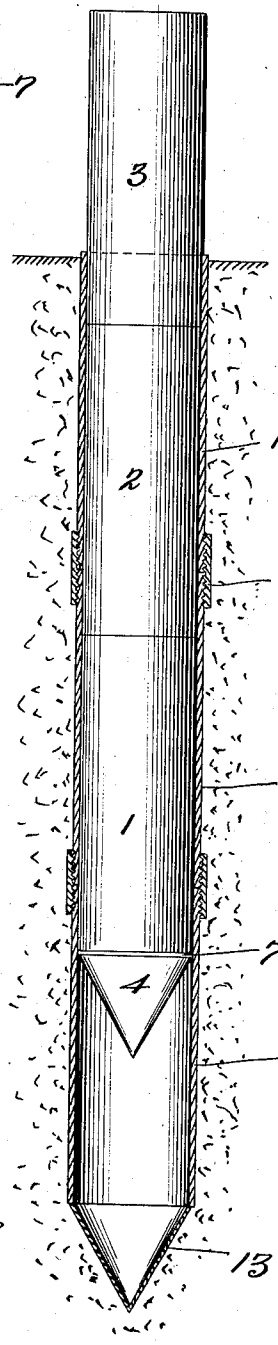


Fig. 5.

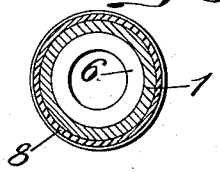


Fig. 1.

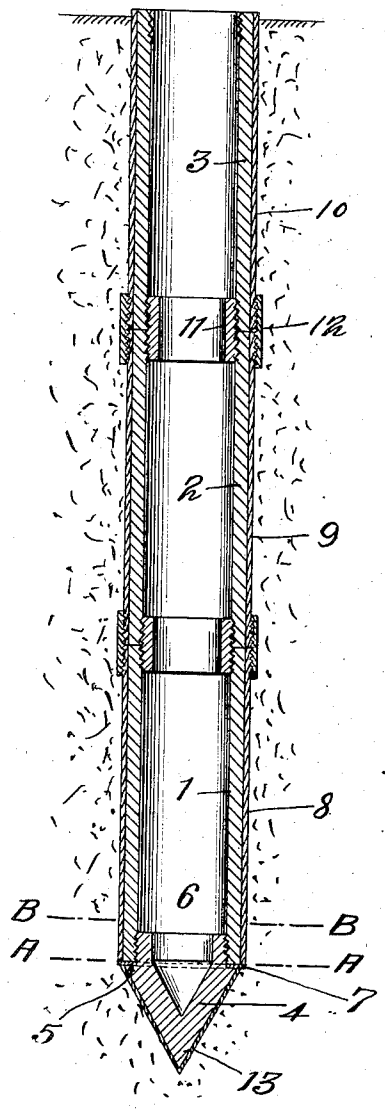
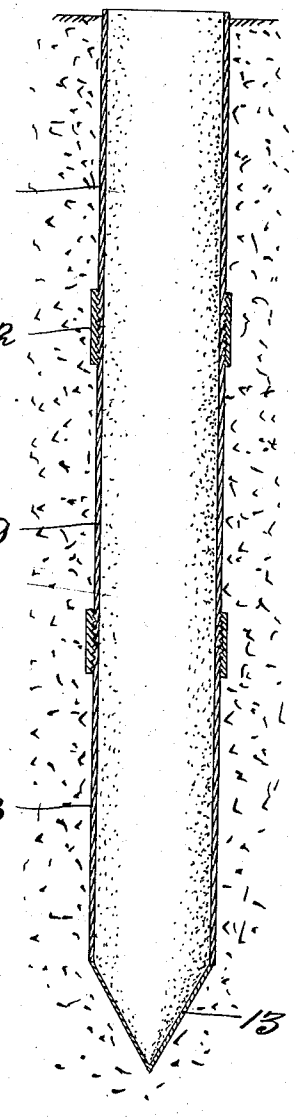


Fig. 3.



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METHOD OF FORMING CONCRETE PILES.

980,436. Specification of Letters Patent. Patented Jan. 3, 1911.

Application filed October 21, 1909. Serial No. 523,741.

To all whom it may concern:

Be it known that I, FRANCIS L. PRUYN, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Methods of Forming Concrete Piles, of which the following is a full, clear, and exact specification.

My invention relates to new and improved methods of forming piles wherein concrete or similar material is employed as the principal element, and has particular reference to the making of such piles in the place where they are desired for use, and my invention consists in the employment of a driving section by which a cavity for the pile is formed and which carries with it a shell designed to receive the mass of concrete after the driving section is withdrawn.

The invention has for its object to provide a method whereby the formation of the pile may be accomplished without the use of a water jet, the employment of a water jet adding to the expense and increasing the time required, and often being dangerous to use by reason of its tendency to disturb the soil and unsettle adjoining foundations.

Another object of my invention is that by its use I am enabled to withdraw and save for future occasions, not only the body of the driving section, but likewise its point.

These and other objects which will appear as the description proceeds, I accomplish in the manner hereinafter set out and by the devices illustrated in the accompanying drawing, wherein—

Figure 1 is a longitudinal section through the shell, core and cone tip, after said parts have been driven to place. Fig. 2 is a similar view of the shell in place, the core and cone tip in full lines being partly withdrawn. Fig. 3 is a similar view of the complete pile. Fig. 4 is a section on the line A—A of Fig. 1; and Fig. 5 is a similar section on the line B—B.

The driving section is composed of a core of cylindrical shape having sections of which three are illustrated, designated 1, 2, 3. These are made of strong material, such as cast iron, which will have sufficient strength to stand the blows of a pile driver, which I preferably employ to drive them to place. Other means may be employed, however, to effect such driving, for instance, a hydraulic or other jack reacting against an overhead weight, such as the wall of a building.

At the lower end of the core and forming part of the driving section is a tip 4, preferably formed of similar metal and in the shape of a cone. This preferably has its outer face flush with the face of the core at the junction of the two and is formed with a shoulder 5, upon which the core rests. An annular, upwardly-extending flange 6 is screw-threaded peripherally and takes into a corresponding thread on the interior lower surface of the core, whereby the two parts are held together.

A soft metal ring 7, shown in detail in Fig. 4, rests upon the shoulder 5 and surrounds the annular flange 6, and projects radially outside of the vertical plane of the outside of the core.

The shell is placed upon the outside of the core and is of lighter material than the core, as it does not take the principal strain in driving. It is preferably formed of metal of sufficient thickness to retain the earth in position after the core is withdrawn. The shell is composed of sections, of which three, designated 8, 9, 10, are shown.

I form the core and shell in sections for convenience in adding additional parts in driving, as frequently the pile is required to be formed in locations where there is not sufficient headroom to accommodate the entire length above ground. The abutting ends of the core sections are threaded interiorly and connected by threaded couplings 11, and the shell sections are exteriorly threaded and connected by threaded couplings 12. The lower end of the shell rests upon the outer projecting part of the soft metal ring 7, for the purpose of reducing the strain upon the shell in driving, as the said ring being supported between the tip and core adjoining the shell will, to a considerable extent, take the strain of compressing the soil and will correspondingly relieve the shell and enable a much lighter shell to be employed.

I have illustrated a shell tip 13, formed of light material such as employed for the shell, or even lighter. This fits closely to the cone tip 4, beneath the extended periphery of ring 7, and is intended to remain in the soil. Its use is optional and it does

not form an essential part of my method. It will be employed principally where the lower end of the pile passes into very moist ground, and will be useful in excluding water and in assisting the formation of the concrete tip and its setting.

The method employed in forming the pile by the aid of said apparatus is as follows: A section of the core 1,—having the cone tip 4 attached and the soft metal ring 7 in place, with a section of the shell 8 surrounding the core and resting on the ring,—is located vertically on the ground at the point where the pile is to be formed and is driven into the soil by blows from a pile driver received upon blocks placed on the upper end of the core. As before explained, other means may be employed to drive the core, for instance, where the pile is to be formed under a building wall, the method of the Breuchaud patent may be employed, and a hydraulic jack acting against the wall be used. The particular means employed to force down the jack do not form part of my present invention. The shell section will be forced down with the core, but owing to the ring upon which the shell rests, less force will be required to sink it than would otherwise be the case.

When the assembled structure has been forced down as far as convenient, additional sections of core and shell may be added and coupled to the preceding sections, and this operation repeated until the proper depth is attained. Pressure is then exerted upon the shell alone, sufficient to force it down on the core, thereby shearing off or otherwise removing the ring and permitting the shell to pass below the ring. This will release the core, which may then be withdrawn, carrying with it the attached cone tip and leaving a cavity which will then be filled with concrete or other desired composition, in the usual manner, and tamped in place so that a solid body will be formed. The shell will surround the body of the pile and will prevent the inflow of water, dirt, etc., and being backed up by the soil, will permit of considerable force being employed in tamping the concrete if desired.

In cases where it is desired that a shell shall surround the tip of the pile as well as the shell, tip 13 may be slipped over the cone tip 4, and will remain in place during the sinking of the structure. After the proper depth is reached, the further sinking of the shell to free the core will likewise sink the shell tip, which is immediately below the sheared-off portion of the ring sufficiently to clear it from adhesion to the cone tip and will leave a structure in the ground which is inclosed at all points by a shell, as illustrated in Fig. 3.

If, for any circumstance, it should be discovered after the shell and core have been driven to place, that it would be desirable to line the tip, the cone tip may be left in place by simply unscrewing the core, in which case it will not be necessary to shear off the ring.

While I have described with particularity the apparatus used with my method, I do not wish to be understood thereby as intending to limit myself to the precise construction described and illustrated. For instance the ring has the function of temporarily supporting the edge of the shell in driving and must then be removed. The performance of this function does not necessarily require that the projection should be in the form of a ring, although I prefer this form, nor is it essential that after the performance of its function the projection should be removed by shearing off as equivalent means of removal would be breaking off, or bending out of the way the shell. I prefer, however, to effect such removal by shearing.

I claim:

1. A method of forming composition piles, which consists in locating a shell outside of a core and tip and resting upon a projection at the lower part of said core, in then forcing said assembled structure to the proper depth, in then further forcing down the shell and thereby removing the projection, in then withdrawing the core and tip and filling the cavity thus formed with concrete or similar composition.

2. A method of forming composition piles, which consists in locating a shell outside of a core and tip and resting upon a projection at the lower part of said core, in then forcing said assembled structure in the soil, connecting added sections to said core and shell as necessary until the assembled structure has been forced to the proper depth, in then further forcing down the shell and thereby removing the projection, in then withdrawing the core and tip and filling the cavity thus formed with concrete or similar composition.

3. A method of forming composition piles, which consists in locating a shell outside of a core and tip and resting upon a projection at the lower part of said core and locating a shell tip outside of said first-mentioned tip, in then forcing said assembled structure to the proper depth, in then further forcing down the shell and shell tip and thereby removing the projection, in then withdrawing the core and tip and filling the cavity thus formed with concrete or similar composition.

4. A method of forming composition piles, which consists in locating a shell outside of a core and tip and resting upon a projection at the lower part of said core and locating a shell tip outside of said first-mentioned tip, in then forcing said assem-

bled structure in the soil, connecting added sections to said core and shell as necessary until the assembled structure has been forced to the proper depth, in then further forcing down the shell and shell tip and thereby removing the projection, in then withdrawing the core and tip and filling the cavity thus formed with concrete or similar composition.

5. A method of forming composition piles which consists in locating a shell outside of and upon a projection on a core or tip so as to fit snugly to said core, said projection protecting the lower edge of the shell in driving, thereby enabling a lighter shell to be employed, in forcing the assembled parts into the soil, in then forcing the shell down over the core and tip, thereby removing said projection from the path of the shell, withdrawing the said core and tip from said shell, permitting the shell to remain in the soil, and filling the cavity thus formed with concrete or other composition.

6. A pile-forming apparatus comprising a removable hollow core, a tip connected thereto, a shell formed of relatively light material snugly embracing said hollow core, so as to be reinforced thereby, and adapted to form a casing for concrete or similar material, a continuous annular projection upon the lower end of said assembled core and tip and underlying said shell so as to protect the edge thereof in driving and removable to permit the withdrawal of said core and tip.

7. A pile-forming apparatus comprising a cylindrical core, a conical tip connected thereto, a removable annular projection interposed between said core and tip and extending outside thereof, a cylindrical shell surrounding said core and resting on said projection.

8. A pile-forming apparatus comprising a hollow sectional core, a tip connected thereto, a sectional shell snugly embracing said hollow core, a removable continuous annular projection upon the lower end of said assembled core and tip and underlying said shell so as to protect the edge thereof in driving.

9. A pile-forming apparatus comprising a cylindrical sectional core, a conical tip connected thereto, a removable annular projection interposed between said core and tip and extending outside thereof, a cylindrical sectional shell surrounding said core and resting on said projection.

10. A pile-forming apparatus comprising a hollow core, a tip connected thereto, a displaceable projection upon the lower end of said assembled structure, a shell resting on said projection, and a shell tip outside of said first-mentioned tip.

11. A pile-forming apparatus comprising a cylindrical core, a conical tip connected thereto, a frangible annular projection interposed between said core and tip and extending outside thereof, a cylindrical shell surrounding said core and resting on said projection, and a shell tip outside of said first-mentioned tip.

12. A pile-forming apparatus comprising a cylindrical core, a conical tip connected thereto by a screw-threaded connection, a removable annular projection interposed between said core and tip and extending outside thereof, and a cylindrical shell surrounding said core and resting on said projection.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANCIS L. PRUYN.

Witnesses:
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HENRIETTA E. WORKMAN.