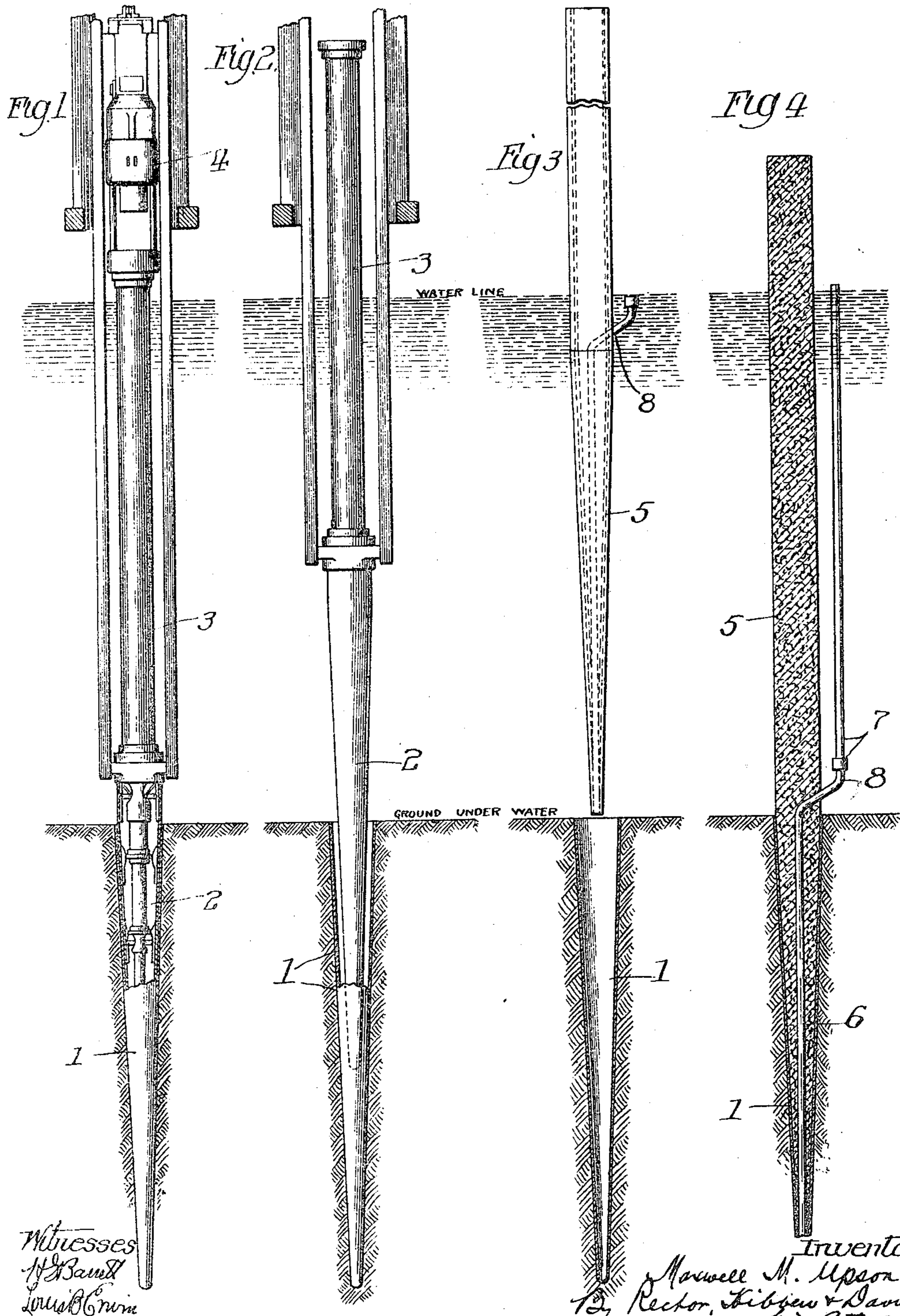


M. M. UPSON.
 CONCRETE PILE AND METHOD OF FORMING THE SAME.
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UNITED STATES PATENT OFFICE.

MAXWELL M. UPSON, OF NEW YORK, N. Y., ASSIGNOR TO RAYMOND CONCRETE PILE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

CONCRETE PILE AND METHOD OF FORMING THE SAME.

No. 903,246.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MAXWELL M. UPSON, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Concrete Piles and Methods of Forming the Same, of which the following is a specification.

My invention relates to the art of forming piles made from cement, concrete, or the like and the same consists in the production of a pile of this character and in the new and useful method or process of forming such piles.

My invention has particular relation to the forming or placing of concrete piles in water and, speaking in general terms, my method consists in driving or sinking a shell into the ground below water by means of a collapsible form or core, withdrawing said core and subsequently introducing or fitting into said shell an already-formed or cast concrete pile or at least the lower end thereof in case it is desired that the pile shall project upwardly in the water or indeed above the water line.

My invention also contemplates the making of the contact between the shell and the pile most intimate by grouting the space between the pile and the shell or at least grouting the base of the pile.

The various features of advantage and utility of my invention will be apparent from the description hereinafter given.

In the accompanying drawing I have illustrated a form of apparatus suitable for carrying out my new and useful method and for producing the concrete pile referred to.

In this drawing, Figure 1 is an elevation of the shell driven into the ground, such shell being broken away to expose the form of core which is used in such driving or sinking of the shell, such figure also showing in elevation the driving extension for driving such core and the lower portion of the pile hammer mechanism; Fig. 2 a similar view, but showing the core and said extension partially withdrawn from the shell, which remains in the ground under the water; Fig. 3 a sectional view of the shell in the ground and an elevation of the completed or cast concrete pile in the act of being lowered into said shell; and Fig. 4 a vertical section of the shell and concrete pile in position therein.

For the sake of a clear and definite de-

scription of my invention, I will describe it in connection with the particular mechanism or apparatus illustrated in the drawings, although as will be understood, my method may be practiced and the concrete pile may be produced by apparatus of other constructions. However, the apparatus herein shown will be found suitable and very efficient in actual practice.

In the practice of my method I first take a shell 1 which is preferably, although not necessarily, conical and made of any suitable material, preferably thin sheet metal. This shell is driven into the ground in accordance with the well known Raymond process, as set forth in Raymond patents Nos. 589,026 and 845,120, dated February 26th, 1907, and to this end, I employ a collapsible form of core 2 in the manner and with the results as set forth in said patents. However, the process differs somewhat from the regular Raymond system of placing concrete piles, in that the operation is carried on from the surface of the water and the shell is driven into the ground below the water. In order that the form or core may be driven under these circumstances, I provide an extension piece 3 which forms an upward continuation of the form or core, this extension piece extending upwardly above the water line and the same is of such length that when the form or core has reached the desired penetration in the ground, its upper end still projects above the water line. This extension piece thus permits the working of the pile driver hammer 4 entirely above the water line and transmits the force or effect of the blow to the form or core. The shell having been driven into the ground to the desired degree of penetration, the core is collapsed in the well known manner and the same withdrawn from the shell, which is now left in the ground, as illustrated in the drawing. There is thus formed an incased hole in the ground at the bottom of the water. Into this hole is now placed or introduced an already-formed concrete pile 5 which is preferably reinforced, and which has the same taper as the shell 1. It is evident that as soon as the core is withdrawn the shell fills with water and in order that such water may escape when the concrete pile is introduced or fitted into such shell, I provide a longitudinal passage 6 in such pile, the same extending from the lower

end or point thereof to a point intermediate the length of the pile and at such distance from the bottom that it will be above the upper edge of the shell when the pile is fully introduced into the shell. It is apparent that when the pile is lowered into the shell the water confined therein will escape upwardly through said passage 6, thereby permitting such pile to be easily introduced into the shell and to permit of its fitting the shell properly. In order to insure against possible settlement, I prefer to raise and drop the pile into position once or twice and then gently tap the same with the hammer.

The passage 6 is capable of performing an additional function in that after the pile is placed in position, a grouting hose 7 may be attached to the pipe 8 which extends from the pile and communicates with said passage 6, with the result that grout may be forced into said passage and into the base of the pile, in order to grout all spaces or intervals between the pile and the shell and thereby increase the intimacy of the contact between said parts.

It will be understood that the shell may be of any suitable length, but it will be found sufficient to merely extend to the bottom of the water when the desired penetration is reached, although if desired, it may extend some distance above the bottom or lower water line. Consequently, in the preferred form only the lower end of the pile is incased in the shell. It will also be understood that the pile may be of any desired length according to the desired point of the top of the completed pile.

My method is particularly well adapted to water work and has manifest advantages in the rapidity of work, which of course means decreased cost in every respect, including cost of construction.

I claim:

1. The method of forming concrete piles below the water line which consists in sinking a shell in the ground below the water, and then introducing into said shell a pile proper having a passage for the escape of water from the shell during such introduction of the pile proper; substantially as described.

2. The method of forming concrete piles below the water line which consists in sinking a shell in the ground below the water, introducing into such shell a pile proper having a passage for the escape of water from the shell during such introduction of the pile proper, and grouting the space be-

low the pile and shell; substantially as described.

3. The method of forming concrete piles below the water line which consists in sinking a shell in the ground below the water, introducing into such shell a pile proper having a passage for the escape of water from the shell during such introduction of the pile proper, and grouting the space between the pile and shell by forcing grout through said passage; substantially as described.

4. The method of forming concrete piles below the water line which consists in driving a shell into the ground below the water by means of a core, withdrawing said core, introducing into the shell a completed pile proper substantially corresponding in shape to said shell and permitting the water to escape from the shell through a passage in the body of the pile; substantially as described.

5. The method of forming concrete piles in water which consists in driving a substantially conical shell into the ground below the water, and then introducing into said shell the lower correspondingly conical end of a complete pile proper from whose lower end there extends upwardly a passage for the escape of water during the operation of introducing the pile into the shell; substantially as described.

6. A pile comprising a shell adapted to be driven into the ground below the water line, and a completed pile proper fitting into said shell and having a passage extending to its lower end, whereby the water in the shell may escape when the pile is introduced therein; substantially as described.

7. A pile comprising a shell adapted to be driven into the ground below the water line, and a completed pile proper fitting into said shell and having a passage entering its body intermediate its length and terminating at its lower end for the escape of water from the shell and the introduction of grout; substantially as described.

8. A pile comprising a shell adapted to be driven into the ground below the water line, and a completed pile proper whose lower end is fitted into said shell and which is provided with a passage entering its body at a point above the upper edge of the shell and terminating at the lower end of the pile proper; substantially as described.

MAXWELL M. UPSON.

Witnesses:

H. R. MOYER,
I. A. FISK.