No. 739,268. PATENTED SEPT. 15, 1903.

F. SHUMAN.

PROCESS OF MAKING CONCRETE PILES.

APPLICATION FILED JUNE 8, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

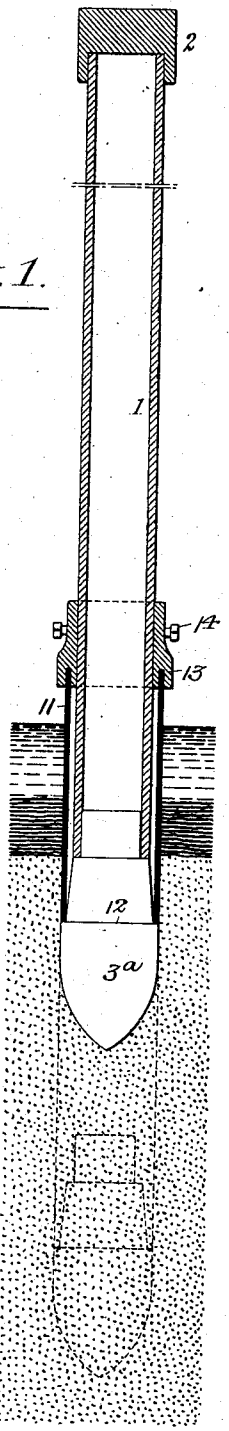


Fig. 2.

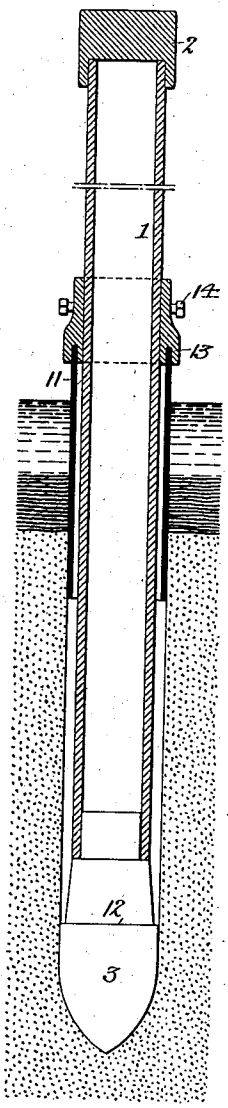
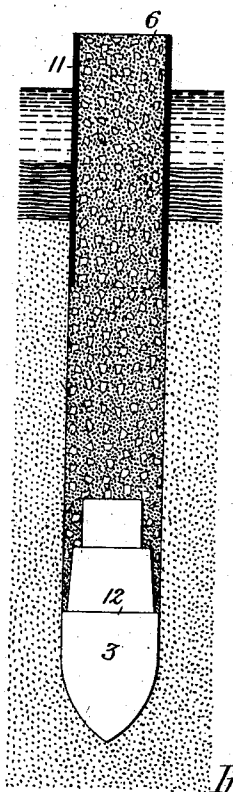


Fig. 3.



Witnesses:

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Inventor:
Frank Shuman,
by his Attorneys:
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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

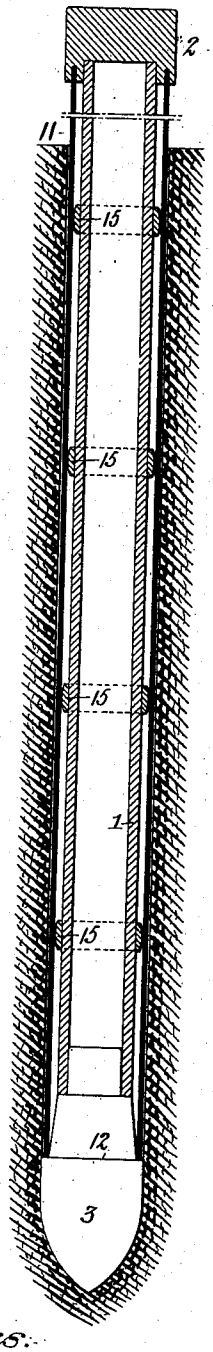


Fig. 5.

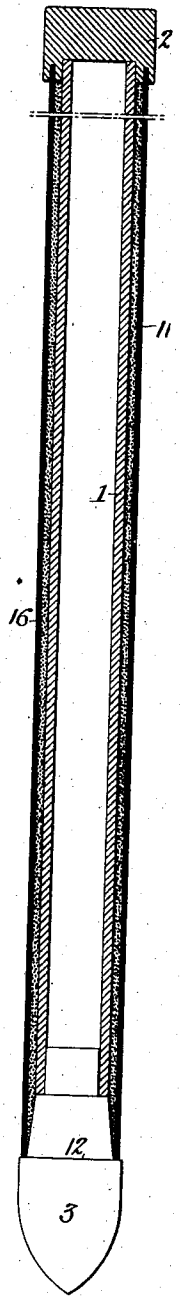
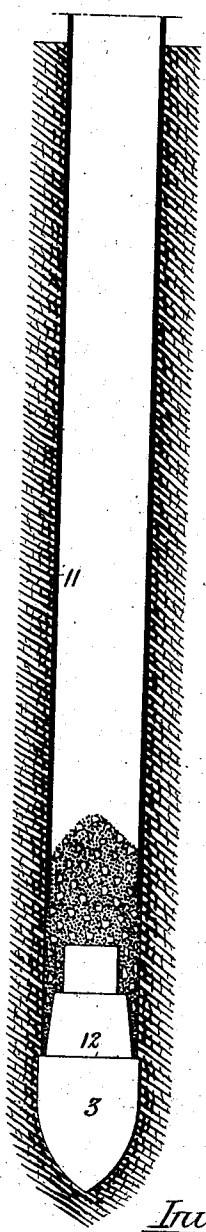


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK SHUMAN, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF MAKING CONCRETE PILES.

SPECIFICATION forming part of Letters Patent No. 739,268, dated September 15, 1903.

Original application filed April 23, 1903, Serial No. 153,974. Divided and this application filed June 8, 1903. Serial No. 160,633. (No specimens.)

To all whom it may concern:

Be it known that I, FRANK SHUMAN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Processes of Making Concrete Piles, (the same being a division of my application, Serial No. 153,974, filed April 23, 1903,) of which the following is a specification.

My invention relates to that method of forming piles of cement or concrete which consists in first driving a preparatory pile into the ground, then withdrawing said preparatory pile, and then filling the opening formed thereby with concrete or cement in fluid or plastic form, which when it becomes set forms the permanent pile.

The object of my invention is to render the removable preparatory pile available for under-water work or for use in unstable ground.

In the accompanying drawings, Figure 1 is a sectional view illustrating the first stage in the formation under water of a concrete pile in accordance with my invention. Fig. 2 is a similar view illustrating the second stage of the operation. Fig. 3 is a sectional view illustrating the final stage of the operation. Figs. 4 and 5 are sectional views of other forms of preparatory pile constructed for carrying out my invention, and Fig. 6 is a sectional view illustrating the preferred method of procedure adopted when such special forms of pile are employed.

Referring first to Figs. 1, 2, and 3 of the drawings, 1 represents the preparatory pile, which, as shown, is in the form of a metal tube, although it may be a solid pile of wood or metal, if desired, this pile being provided at the top with a suitable driving-head 2 and at the bottom with a point 3, which in the present instance is detachable from the pile, and is also of so much greater diameter than said pile 1 that there is no likelihood of the latter coming into contact to any material extent with the walls of the opening formed by driving the pile. By this means the driving of the pile is facilitated, since the sides of the same are free from frictional contact with the walls of the opening, and the withdrawal of the pile is also facilitated, since such withdrawal is not interfered with by frictional hold of the earth upon the pile. The preparatory pile is combined with a coffer-dam for preventing access of water or silt to the opening formed by said preparatory pile in the firm ground beneath or for preventing the caving in of the walls of the opening when the latter is being formed in unstable ground. As shown in Fig. 1, the coffer-dam consists of a tubular casing 11, of sheet metal or other available material, resting at its lower end upon a shoulder 12 of the enlarged point 3 of the pile and of sufficient length to extend from a point above the water-level to a point so far beneath the surface of the firm ground as to prevent leakage around the casing. The upper end of said casing 11 is attached to a tubular clamp 13, which is secured to the pile 1 by set-screws 14 or other suitable means until said pile has been driven so far that the casing 11 projects to the desired extent below the surface of the firm ground, as shown in Fig. 1, whereupon the clamp is loosened, so that the continued driving of the pile, as shown in Fig. 2, can be effected without further downward movement of the casing 11, and when the desired depth of opening has been formed the pile 1 can be withdrawn, leaving the point 3 at the bottom of the opening, such withdrawal effecting no disturbance of the position of said casing 11, which thus serves to keep the opening free from water or mud during the introduction of the concrete into the opening above the point 3 and into the casing 11, as shown in Fig. 3. If the point is attached to the pile, the casing 11 will be sufficiently large to permit of the withdrawal of said point with the pile, and the clamp 13 will be lifted from said casing 11 when in the withdrawal of the pile 1 the point 3 comes into contact with said clamp. In case the ground is of the nature of quicksand or such as to preclude the opening from retaining its shape after the preparatory pile has pulled out the coffer-dam casing 11 may be of the full length of the pile and riveted or otherwise firmly fastened to the point and permitted to remain in the opening with said point when the pile is withdrawn, the casing being preferably slightly less in diameter than the greatest diameter of the point. The casing in a pile of this character should preferably

be supported at different points throughout its length by the pile 1 in such manner as not to interfere with the free withdrawal of said pile. Such support may be provided by means of interposed rings, as shown at 15 in Fig. 4, or the entire space between the pile 1 and the coffer-dam casing 11 may be filled with mineral pitch or other easily-melted material, such as shown at 16 in Fig. 5, which material will retain its solid form and provide the necessary support for the casing 11 during the driving of the pile, but can then be readily melted by forcing steam or heated air into the pile 1 preparatory to the withdrawal of the same. By this means a very thin shell can be driven to a great depth into very bad ground. I prefer in all cases to remove the coffer-dam casing from the opening after the withdrawal of the preparatory pile, so that the concrete of which the permanent pile is composed will directly engage the earthy walls of the opening. Such withdrawal of the coffer-dam casing is permitted even when the nature of the ground is unstable by first filling the concrete into the lower end of the coffer-dam and then withdrawing the latter either slowly and continuously or intermittently a little at a time, so as to permit the concrete to flow out from the lower end of the coffer-dam into the opening above the point 3, sufficient head of concrete being always maintained in the lower end of the coffer-dam to prevent any caving in of the walls of the opening as said coffer-dam is withdrawn.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The method of forming concrete piles, which consists in forming a preparatory pile with a coffer-dam around the same, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, and then filling the hole with concrete and permitting the latter to set, substantially as specified.

2. The method of forming concrete piles, which consists in forming a preparatory pile with a detachable point and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile without the point, and then filling the hole, above said point with concrete and permitting the latter to set, substantially as specified.

3. The method of forming concrete piles, which consists in forming a preparatory pile with an enlarged point and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile and then filling the hole with concrete and permitting the latter to set, substantially as specified.

4. The method of forming concrete piles which consists in forming a preparatory pile with an enlarged and detachable point and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile without the point, and then filling the hole, above said point with concrete, and permitting the latter to set, substantially as specified.

5. The method of forming concrete piles which consists in forming a preparatory pile with a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, continuing the movement of the pile to form a hole below the coffer-dam, then withdrawing the pile and then filling the hole with concrete and permitting the latter to set, substantially as specified.

6. The method of forming concrete piles which consists in forming a preparatory pile with a detachable point and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, continuing the movement of the pile to form a hole below the coffer-dam, then withdrawing the pile, without the point, and then filling the hole with concrete and permitting the latter to set, substantially as specified.

7. The method of forming concrete piles which consists in forming a preparatory pile with an enlarged point, and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, continuing the movement of the pile to form a hole below the coffer-dam, then withdrawing the pile, and then filling the hole with concrete and permitting the latter to set, substantially as specified.

8. The method of forming concrete piles which consists in forming a preparatory pile with an enlarged and detachable point and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, continuing the movement of the pile to form a hole below the coffer-dam, then withdrawing the pile, without the point, and then filling the hole with concrete and permitting the latter to set, substantially as specified.

9. The method of forming concrete piles, which consists in forming a preparatory pile with surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, then filling the hole with concrete and contemporaneously withdrawing the coffer-dam as the concrete accumulates therein, and then permitting the concrete to set, substantially as specified.

10. The method of forming concrete piles which consists in forming a preparatory pile with an enlarged point and surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, then filling the hole with concrete and contemporaneously withdrawing the coffer-dam as the concrete accumulates therein, and then permitting the concrete to set, substantially as specified.

11. The method of forming concrete piles, which consists in forming a preparatory pile with detachable point and surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, without the point filling the hole, above the point, with concrete and contemporaneously

withdrawing the coffer-dam as the concrete accumulates therein, and then permitting the concrete to set, substantially as specified.

12. The method of forming concrete piles, which consists in forming a preparatory plie with enlarged and detachable point and surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, without the point, filling the hole, above said point, with concrete, and contemporaneously withdrawing the coffer-dam as the concrete accumulates therein, and then permitting the concrete to set, substantially as specified.

13. The method of forming concrete piles, which consists in forming a preparatory pile with a detachable point composed of concrete, and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, without the concrete point, and then filling the hole, above said point, with concrete and permitting the latter to set, substantially as specified.

14. The method of forming concrete piles, which consists in forming a preparatory pile with an enlarged and detachable point composed of concrete, and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, without the concrete point, and then filling the hole, above said point, with concrete, and permitting the latter to set, substantially as specified.

15. The method of forming concrete piles which consists in forming a preparatory pile with a detachable point composed of concrete, and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, continuing the movement of the pile to form a hole below the coffer-dam, then withdrawing the pile, without the concrete point, and then filling the hole with concrete and permitting the latter to set, substantially as specified.

16. The method of forming concrete piles which consists in forming a preparatory pile with an enlarged and detachable point composed of concrete, and a surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, continuing the movement of the pile to form a hole below the coffer-dam, then withdrawing the pile, without the concrete point, and then filling the hole with concrete and permitting the latter to set, substantially as specified.

17. The method of forming concrete piles, which consists in forming a preparatory pile with detachable point composed of concrete, and surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, without the concrete point, filling the hole, above the point, with concrete, and contemporaneously withdrawing the coffer-dam as the concrete accumulates therein, and then permitting the concrete to set, substantially as specified.

18. The method of forming concrete piles, which consists in forming a preparatory pile with enlarged and detachable point composed of concrete, and surrounding coffer-dam, sinking said pile and coffer-dam into position to form a hole, withdrawing the pile, without the concrete point, filling the hole above said point with concrete, and contemporaneously withdrawing the coffer-dam as the concrete accumulates therein, and then permitting the concrete to set, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK SHUMAN.

Witnesses:
F. E. BECHTOLD,
WILL. A. BARR.