March 15, 1927. E. BIGNELL 1,621,232

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Filed April 2, 1923 2 Sheets-Sheet 1

Fig. 1.

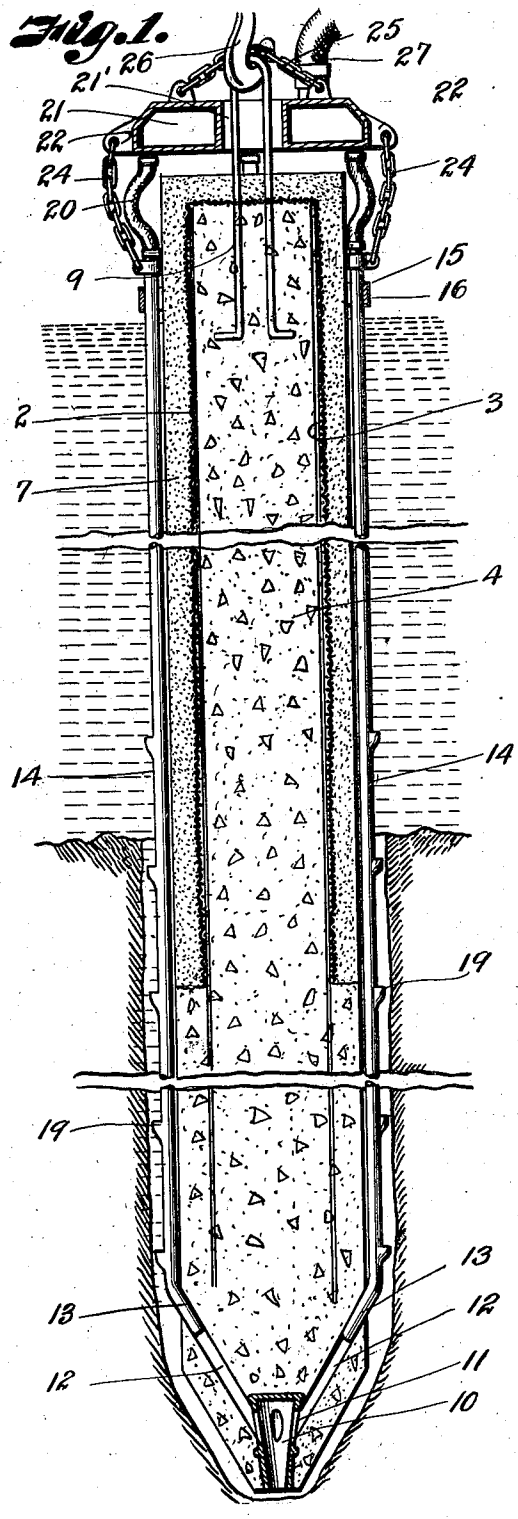
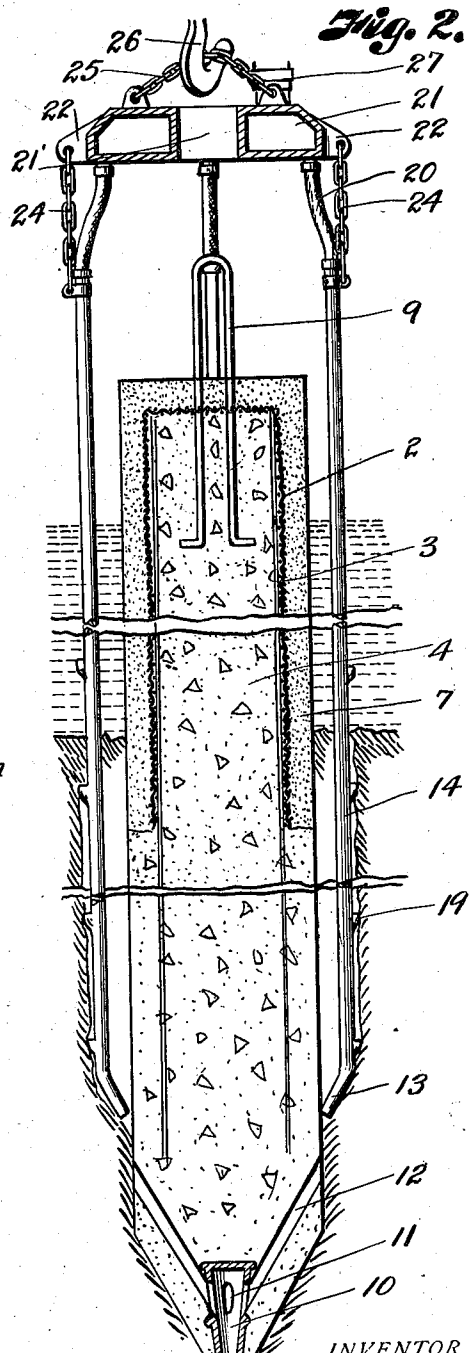


Fig. 2.



INVENTOR
Edward Bignell
BY Arthur L. Brown
ATTORNEY

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PILE

Filed April 2, 1923 2 Sheets-Sheet 2

Fig. 3.

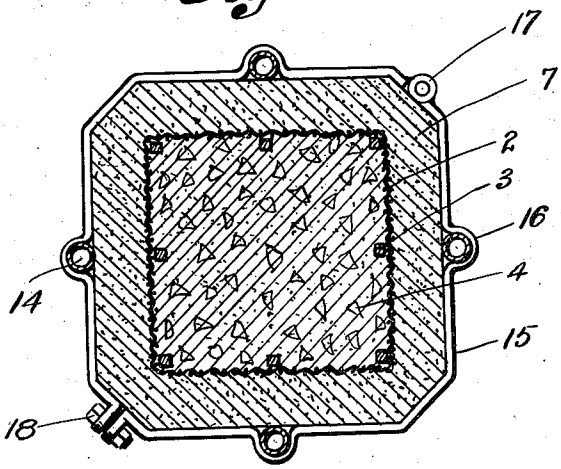


Fig. 4.

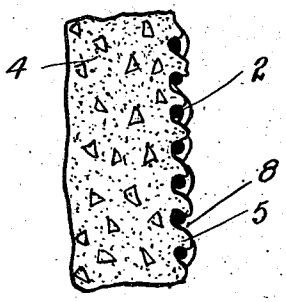


Fig. 5.

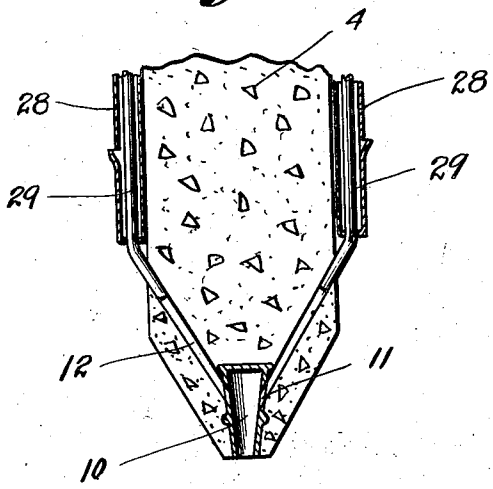
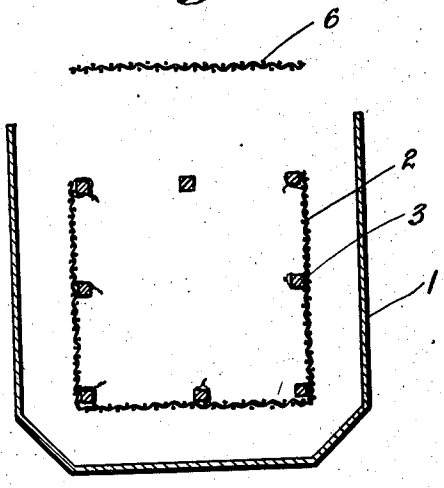


Fig. 6.



INVENTOR
Edward Bignell.
BY
ATTORNEY.

Patented Mar. 15, 1927. 1,621,232

UNITED STATES PATENT OFFICE.

EDWARD BIGNELL, OF LINCOLN, NEBRASKA, ASSIGNOR TO CONCRETE PILING CO., OF SEWARD, NEBRASKA, A CORPORATION OF NEBRASKA.

PILE.

Application filed April 2, 1923. Serial No. 629,446.

This invention relates to piles and the primary object thereof is to provide an improved form of pile which will efficiently resist attacks by salt water.

Concrete piles have been used extensively on the Pacific coast but they have proved unsatisfactory because they deteriorated rapidly due, it is supposed, to the action of the salt water. In order to make a commercial concrete pile the cost must be kept down and the material of which the ordinary pile is made, while having sufficient strength, is not capable of resisting the erosion of the water. Waterproof cements are known but the costs are high, so high in fact as to render them prohibitive for commercial use in constructing piles.

My invention contemplates the construction of a pile which will have all of the advantages of one constructed of water-proof cement at a very much lower cost and to this end I construct a composite pile made up of an inner core of relatively inexpensive cement or concrete with an enveloping sheath of relatively high grade cement or concrete, the two materials being so combined as to form, in effect, a homogeneous mass.

I have shown the pile as a self-sinking pile and I have shown means for causing the pile to sink into the earth. In the present instance the pile is self-sinking due to the fact that a submerging device is adapted to be detachably associated therewith so that the earth may be jetted so as to provide the necessary hole or opening for the pile.

The submerging or jetting device is shown as comprising a frame which is adapted to be so associated with the pile that the earth will be removed to permit the pile to sink and then the submerging or jetting frame can be removed from the pile to be used in connection with another pile.

In a pile of the class contemplated by my invention it is important that the same not be subjected to blows or severe external strains, particularly shocks, because these might injure the pile. For this reason I prefer to submerge the pile in the manner illustrated or in an equivalent manner, it being obvious that the exact details illustrated in this invention need not be followed for all purposes.

The construction of the invention as well as the novel advantages thereof will be apparent by reference to the following description in connection with the accompanying drawings, in which—

Fig. 1 is a vertical, longitudinal, sectional view of a pile constructed in accordance with my invention showing the submerging frame in place.

Fig. 2 is a similar view showing the frame removed.

Fig. 3 is a cross sectional view through the pile.

Fig. 4 is an enlarged view showing the coarser material interlocked with the mesh wall which separates the coarser material from the finer material.

Fig. 5 is a modified form of pile-submerging device, and

Fig. 6 is a cross sectional view of the mold or form by which the concrete can be formed into a pile.

In carrying out my invention I prefer to construct a trough-shaped form 1, in which may be positioned a trough-shaped, foraminous or reticulated core covering 2, about reinforcing rods or wires 3 which run longitudinally of the form. Into the core covering or inner form 2 is poured the core 4 of relatively inexpensive concrete, the concrete being poured at such a consistency that it will extrude slightly through the meshes of the screen to provide projections 5, the mesh of the screen being such that these projections may extend through the opening. The core will, therefore, be reinforced by the rods 3 and by the core cover 2. Then a top screen wall 6 is placed on the core within the outer form 1 and a final sheet 7 is poured into the outer form so that there will be a sheathing 7 of uniform thickness about the core. The sheathing will consist of high grade concrete impervious to moisture and well adapted to resist the erosive action of the water as well as to resist the borers in the water.

In the use of the word concrete I contemplate any plastic material adapted to serve the purpose of my invention.

When the outer sheathing is poured into the outer mold or form 1, it will fill in the spaces 8 between the projections 5, the spaces receiving similar projections on the sheath-

ing. Therefore, the sheathing and core will interlace or, since the sheathing is poured while the core is still wet, there will be a blending together of the two kinds of cement or plastic compositions so that an integral mass results, the covering of which is of a high grade material adapted to resist the action of the water and the borers in the water, while the core is of a lower grade material, the principal virtue of which is strength.

The rectangular, tubular core covering assists in knitting together the core and the sheathing so that there will be no liability of the sheathing warping or breaking from the core.

The high grade material need not extend entirely to the bottom of the pile; just so it extends far enough below the line of scour of the river in which bed it is placed. Therefore, attention is called to Figs. 1 and 2 in which it will be seen that the outer sheathing 7 may extend just far enough to protect the core of low grade material from the action of water or the borers above referred to. It will be seen that the sheathing 7 constitutes a waterproof covering for the inner core of the pile and that all exposed portions of the pile will be of high grade cement.

When the pile is being formed, I may introduce a loop 9 of wire therein, the loop portion of which projects beyond the top end of the pile so that a hook or other securing device may find means for supporting the pile when it is desired to transport the pile from place to place.

The lower end of the pile is provided with a metallic nozzle 10, having a plurality of openings 11 therein, communicating with inclined radial passages 12 in the toe portion of the pile, the nozzle 10 having its outlet at the bottom of the pile, as will be clearly seen by reference to Figs. 1 and 2. The respective passages or openings 12 are adapted to receive the discharge ends or nozzles 13 of a plurality of jetting pipes 14, the inbent portions 13 being received in the passages 12 and the pipes themselves being fastened by a frame 15, which is shown as comprising a band having offset portions 16 for the pipes, the band being hinged intermediate its ends as at 17 and secured together by the bolt 18. The band 15 will hold the pipes 14 close to the pile while the pile is being sunk.

The pile is provided with a plurality of nozzles or jets 19, which are adapted to erode away the sand or dirt so that the pile can sink into the cavity made by the eroding action of the jets issuing from the nozzles 19.

The respective pipes 14 are connected by flexible connections 20 to a manifold or hollow head 21, the hollow head or manifold 21 having outstanding ears 22 by means of which the pipes 14 can be secured through the medium of the chains 24. The chains 24 are not long enough to allow the flexible connections to become broken when the manifold is raised. It will be observed by reference to Figs. 1 and 2 that there is a chain 25 connected to the manifold or head 21 so that it can be engaged by a hook 26 of a block and tackle or hoist to permit the frame to be drawn to the position shown in Fig. 2, and finally pulled out of the hole. The manifold has a central opening 21′ through which the loop 9 projects when the pile is being sunk or when the hook 26 engages the loop 9. This will be apparent by reference to Figs. 1 and 2.

The manifold or box-like casting 21 is supplied with water through the pipe 27.

When it is desired to sink the pile, the submerging frame is placed on the pile as shown in Fig. 1. The hook 26 is then hooked under the loop 9 and the pile raised and conveyed to the point at which it is to be submerged. The point having been located, the pile is lowered until the point reaches the earth. Water is then turned on so it may flow through the pipe 27 into the pipes 14, through the passages 20 and through the nozzle 10. At the same time that the jets 19 are starting to spout water to wear away the wall of the hole being made so that the pile may be submerged into the earth a sufficient distance, the water passing through 12 and through the nozzle 10 will cut away the bottom while the nozzles 19 will erode away the sides of the opening. When the pile has been sunk to a sufficient depth, the hook is released from the loop 9 and introduced across the chain 25. Then the operator may pull on the chain 25 after having removed the band 15, whereupon the pipes 14 will disassociate themselves from the pile. Then the frame can be reapplied to another pile.

In Fig. 5 I have shown a slightly modified form in which outer tubes 28 corresponding to tubes 14 are used for the jet tubes, and separate inner tubes 29 are used for the nozzle tube for feeding water to the nozzle 10. In other respects the construction shown in Fig. 5 conforms generically to the invention described in connection with Figs. 1 to 4 and 6.

It will be apparent from the foregoing that a pile constructed in accordance with my invention will be impervious to the action of water, that the borers cannot tear down the outer protective skin or sheathing in a manner such as is quite common with present day concrete piles constructed of the ordinary material, that a pile having the protective sheathing of high grade cement or plastic material makes a very high grade pile, and since the pile is self-sinking, it is obvious that there is no danger of the

concrete being loosened or jarred loose as would be the case in some instances where it was subjected to heavy blows.

What I claim and desire to secure by Letters-Patent is:

1. A pile having a toe portion with radial, downwardly inclined passageways surrounding a nozzle chamber with which they communicate, in combination with a submerging frame comprising a plurality of detachable pipes adapted to surround the pile and discharge into the passageways.

2. A pile having a toe portion with radial, downwardly inclined passageways surrounding a nozzle chamber with which they communicate, in combination with a submerging frame comprising a plurality of detachable pipes adapted to surround the pile and discharge into the passageways, a manifold for the supply pipes, and flexible connections between the manifold and the pipes.

3. A pile having a toe portion with radial, downwardly inclined passageways surrounding a nozzle chamber with which they communicate, in combination with a submerging frame comprising a plurality of detachable pipes adapted to surround the pile and discharge into the passageways, a manifold for the supply pipes, flexible connections between the manifold and the pipes, and chains connecting the inlet ends of the pipes to the manifold, the chains being of less lengths than the lengths of the flexible connections.

4. A pile having a loop extending from one end thereof, the free ends of the said loop imbedded in the pile, a manifold having a central opening through which the loop projects, a plurality of pipes flexibly connected to the manifold, and means for securing the pipes to the pile so that the pipes can erode the earth about the pile to provide a hole into which the pile may sink.

5. A pile having a loop extending from one end thereof, a manifold having a central opening through which the loop projects, a flexible member carried by the manifold extending across the central opening so that the loop and the flexible member may be suspended from a common support, a plurality of pipes connected to the manifold extending along the sides of the pile, and inturned ends on the pipes to be received in openings in the pile so that the pipes will be removably but rigidly held against the sides of the pile.

In testimony whereof I affix my signature.

EDWARD BIGNELL.