March 10, 1925. 1,529,113

J. BURNS

CONCRETE PILE

Filed Aug. 23, 1923

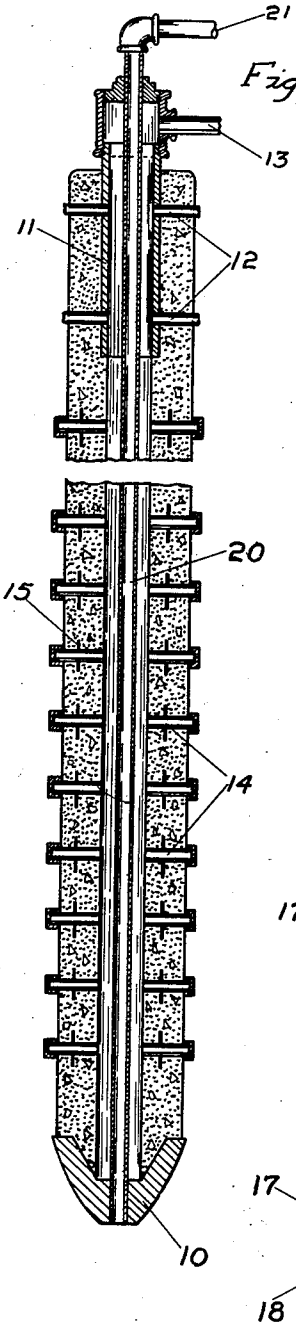


Fig. 2.

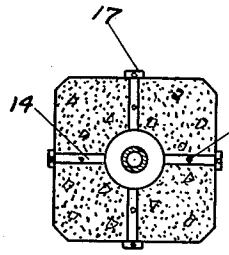


Fig. 3.

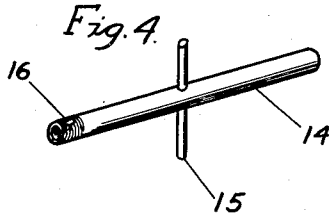


Fig. 4.

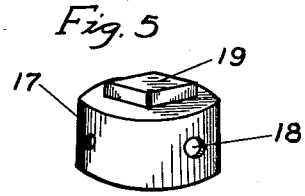


Fig. 5

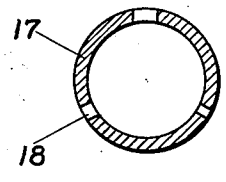


Fig. 6

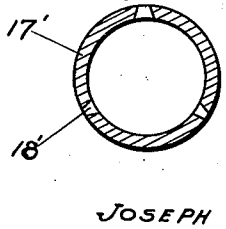


Fig. 7

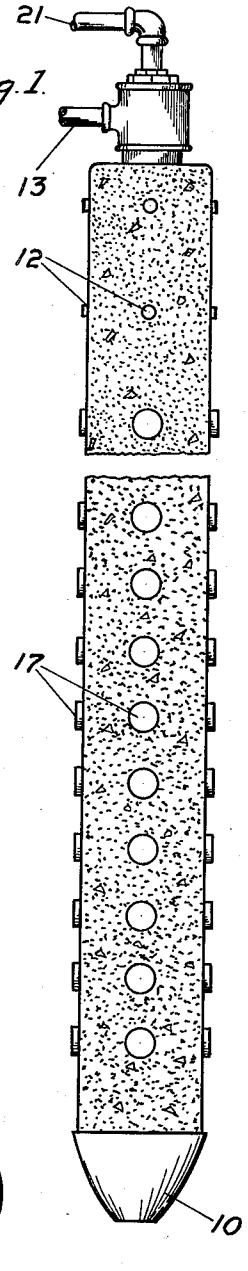


Fig. 1.

JOSEPH BURNS INVENTOR.

BY Emil F. Lange

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Patented Mar. 10, 1925. 1,529,113

UNITED STATES PATENT OFFICE.

JOSEPH BURNS, OF LINCOLN, NEBRASKA.

CONCRETE PILE.

Application filed August 23, 1923. Serial No. 658,976.

To all whom it may concern:

Be it known that I, JOSEPH BURNS, a citizen of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Concrete Piles, of which the following is a specification.

My invention relates to concrete piles, and more particularly to concrete piles of the kind which are sunk into cavities excavated by the action of air or water under pressure.

I am aware that air and water have been used separately and in combination for a great many years, and that piles embodying the broad idea have gone into extensive use. The great difficulty with prior types of concrete piles has been their extremely limited range of usefulness. In general, they have been designed or use only with one or more fluid mediums, but these fluid mediums could not be used interchangeably. Then too, no pile has been developed heretofore in which the volume of the fluent discharged could be varied to suit the special conditions under which the work was to be done.

It is well known that soil conditions vary widely, even in the same locality. A pile which can be sunk easily in one place is apt to encounter conditions a few feet away in which it will be found to be impossible to sink it, merely because of differences in the texture or character of the soils. Then too, there is variation encountered in soils at different depths. It is apparent that a concrete pile which has been designed to be sunk in only one kind of soil will meet with difficulties when another kind of soil is encountered, and that with such a pile the only solution is to force it down at a heavy expense in time, labor, and mechanical power. The main object of my invention is in brief the provision of a pile which can readily, easily, and quickly be adapted to be sunk in any soil where it desired to sink such piles. Other objects will appear in the description.

Referring now to the drawings, in which like reference characters refer to like parts in the following description,

Figure 1 is an elevation view of my concrete pile.

Figure 2 is a longitudinal sectional view of the same pile.

Figure 3 is a cross sectional view of the pile.

Figure 4 is a view in perspective of one of the lateral pipes which I use in my concrete pile, showing both the anchor for the pipe and the outlet.

Figure 5 is a view in perspective of one of the caps which I use in combination with the lateral pipes.

Figure 6 is a cross sectional view of the cap.

Figure 7 is a cross sectional view of a modified form of my cap.

My pile is constructed throughout of concrete, except for some of the features whereby its sinking is facilitated. The bottom is preferably provided with the usual cast iron nose 10 which protects the pile and prevents its crushing under the repeated impacts when it is lifted and dropped. Likewise, the tube 11 at the upper end of the pile is anchored by means of rods or pipes 12 which are secured to the tube 11 and cast into the concrete. With this arrangement, there is no danger of accidentally breaking the connection between the pile and the hoisting mechanism. The pipes 12 give sufficient anchorage to sustain the weight of the pile, but they also prevent the loosening of the parts due to torsional strains encountered during the sinking of the pile. This construction, so far as I am aware, has not heretofore been employed. If desired, the pipes 12 may be left open at both of their ends to thus serve as conduits from the interior of the pile, and if further desired, they may be capped as are the lower horizontal pipes, but in any case their primary function is to serve as anchors.

The pile is provided with a central channel extending from the nose 10 to the top. As before stated, the tube 11 is cast into the pile at the top of the channel, and this tube is provided with connections, including the inlet pipe whereby water, air or other fluid may be forced under pressure into the channel.

At intervals throughout the length of the pile are pipes 14 which serve as exits for the fluid in the channel, which pipes are also cast into the concrete at the time of forming the pile. Each pipe 14 has firmly secured thereto an anchor 15 for preventing displacement of the tube when the tube is subjected to the torsional strains resulting from the adjustments which constitute an important feature of my invention. Each pipe 14 has a screw threaded end which projects

very slightly beyond the outer surface of the pile. This projecting end should be as small as possible in order to avoid or minimize obstruction to the descent of the pile, but also to reduce the liability of damage to the exposed ends of the pipes 14.

Each pipe 14 has an aperture 16 in its upper surface and at its outer end. The cap 17, shown in Figures 5 and 6, is provided for the purpose of adjusting the size of the fluid exits. The caps are internally screw threaded and are each provided with a number of orifices 18. While I do not desire to restrict myself to any particular number of orifices 18, I prefer to construct the caps with three orifices in each cap, the orifices varying in size with the largest having the same size as the opening 16 in the pipe 14. They are arranged circumferentially on the periphery of the cap and are so positioned that they will register in turn with the opening 16 as the cap is being turned on the pipe 14. For facilitating the turning of the cap, I provide a shouldered head 19 to afford means for engaging the cap with a wrench.

The pile is assembled for sinking as shown in Figures 1 and 2. The connections at the upper end of the pile are secured to the pipe 11. The pipe 20 is passed centrally through the channel and terminates at its lower end in the nose, having its single outlet in the nose, the inlet end of the pipe being shown at 21.

Assuming that a stream of water or air is forced under pressure through the opening 21, it will be forced out through the nose 10 and in advance of the pile to excavate a path for the pile in the usual manner. If such a stream is forced through the opening 13 it will emerge through the openings 16 to carry away the soil loosened at the bottom of the excavation.

My invention resides very largely in the means which I have provided whereby water and air may be used interchangeably, and whereby the force and volume of one of the streams may be adjusted to the condition and character of the soil where it is desired to sink the pile. If the nature of the soil is such that the best results can be obtained by the use of water alone and in liberal quantities at the sides of the pile, the adjustment is made with the largest orifice 18 in registry with the opening 16, and water is forced through both inlets 13 and 21. If however the soil is such that smaller streams of greater force are desired at the sides of the pile, then the adjustment is made with one of the smaller orifices 18 registering with the opening 16 of the pipe 14. If the special conditions make it more desirable to use air exclusively rather than water, it is only necessary to connect the inlet pipes 13 and 21 with a source of air under pressure. This is particularly useful when penetrating different strata of soils, since the change from air to water or from water to air can be quickly and easily made.

The adjustable cap 17 with different sized outlets makes it possible for the operator to quickly and easily increase or reduce the flow of water or air by changing the size of the nozzles. In this way the force of the stream of fluid can be varied. In many localities where bridges are to be erected over streams which have a very small flow of water or none at all, the cost of an adequate supply of water for sinking the pile is apt to be prohibitive. In such localities I increase the cutting action of the water by nozzling down the streams of water to thus sink the piles with a greatly reduced supply of water.

When it becomes necessary to use water for tearing away the soil in advance of the sinking pile, but to use air for transporting the loosened soil to the top, the water is forced under pressure through the inlet pipe 21 down to and through the nose of the pile while the air is forced under pressure through the inlet pipe 13 whence it emerges through the predetermined orifice 18. If the soil is such that air will have the greater cutting power and water will have the greater transporting power, then the connections are so made that the air will emerge through the opening at the bottom of the pile while the water will leave through the openings 16 and 18 at the sides of the pile. The point however is that all of these adjustments can be made quickly and easily, and that they can be altered at will as the different strata of soils are encountered.

I have described herein the preferred embodiment of my invention, but it is apparent that numerous variations could be worked out, all falling within the scope of my invention. The important features are first, the provision of a pile wherein air and water under pressure can be used interchangeably either alone or both together; second, the provision of means for adjusting the exits at the sides of the pile; and third, the provision of features whereby the pile will not break under its weight while it is being repeatedly hoisted. The idea of adjustment for the side exits is susceptible of many modifications of the adjustment described above. One of these modifications contemplates the provision of conical orifices 18ª corresponding to the orifices 18, whereby the water or air will be forced out as through a nozzle.

Having thus described my invention in terms which will be readily understood by others skilled in the art to which it pertains, what I believe to be new and desire to secure by Letters Patent of the United States is:—

A concrete pile which is hollow length-

wise from its upper end to a point adjacent its lower end, the hollow portion of said pile being adapted to serve as a fluid conduit, means for conducting a fluid under pressure into the hollow portion of said pile, a plurality of pipes positioned for conveying the fluid from the hollow portion of the pile to the lateral surface thereof, said pipes having outlet openings adjacent the lateral surface of the pile, screw threaded means for adjusting the size of the openings, and means for anchoring said pipes in the concrete pile for preventing the displacing of said pipes during the adjustment of the size of the outlet openings.

In testimony whereof I affix my signature.

JOSEPH BURNS.