

Aug. 1, 1944.

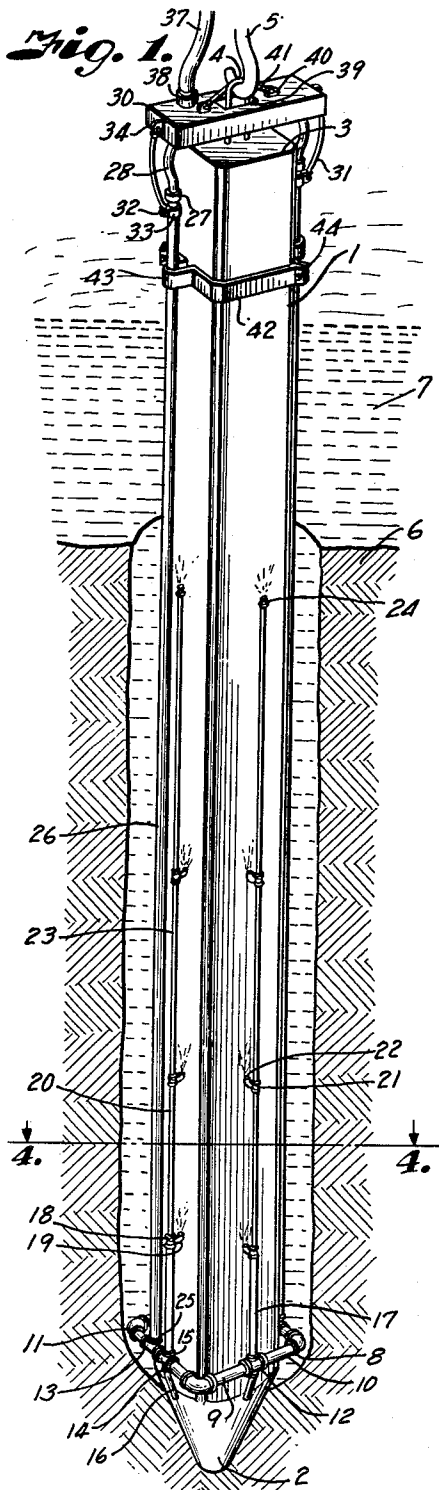
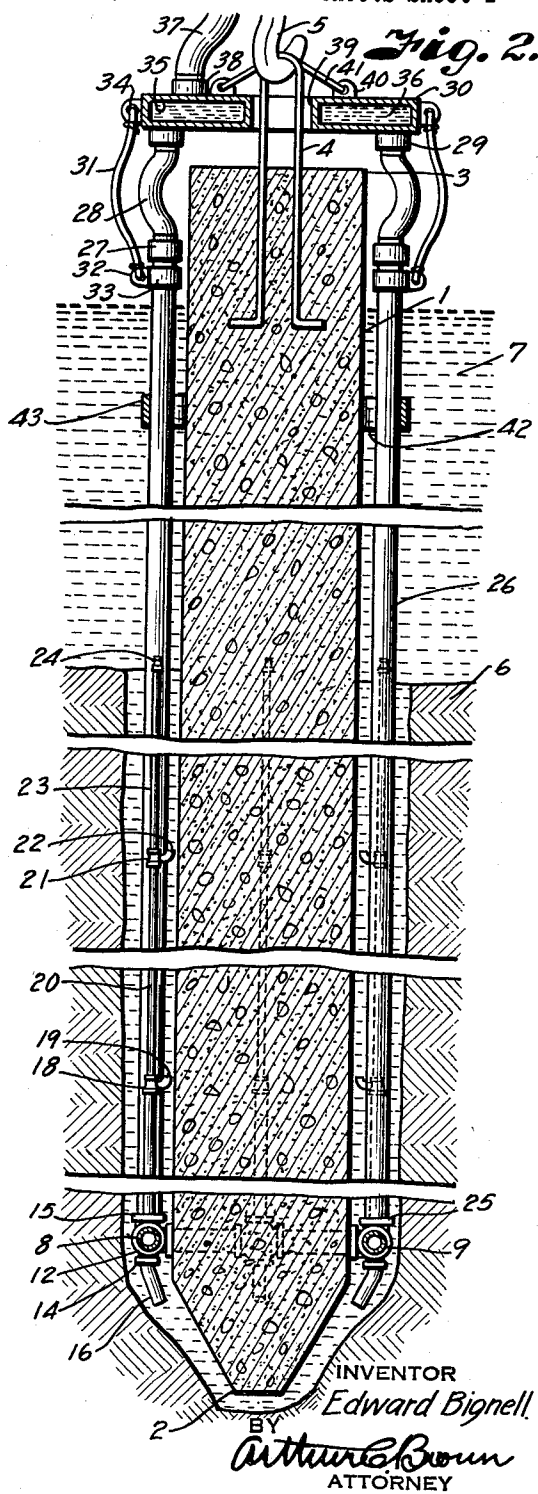
E. BIGNELL

2,354,936

APPARATUS FOR SINKING PILES

Filed Dec. 15, 1941

2 Sheets-Sheet 1



INVENTOR
Edward Bignell
BY
Arthur Brown
ATTORNEY

Aug. 1, 1944.

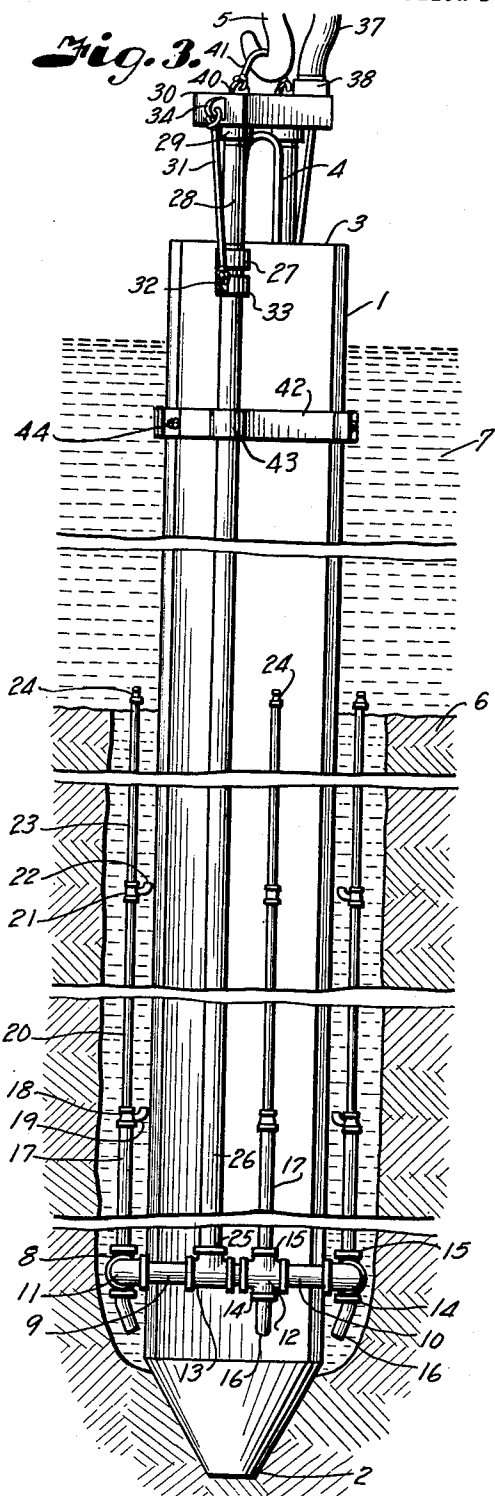
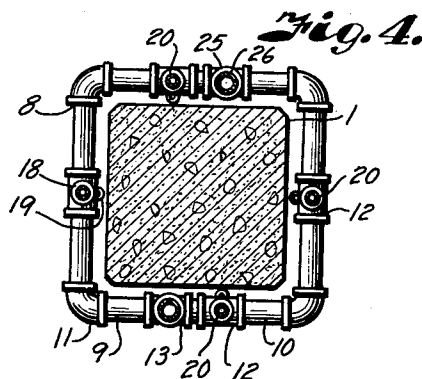
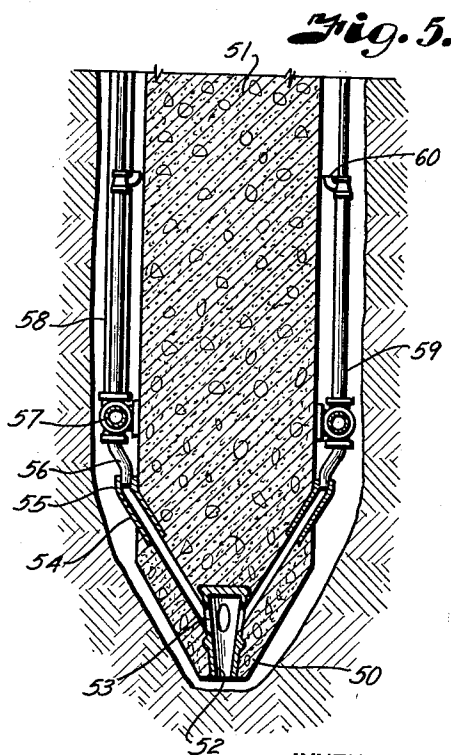
E. BIGNELL

2,354,936

APPARATUS FOR SINKING FILES

Filed Dec. 15, 1941

2 Sheets-Sheet 2



INVENTOR
Edward Bignell.
BY
Arthur Brown
ATTORNEY

UNITED STATES PATENT OFFICE

2,354,936

APPARATUS FOR SINKING PILES

Edward Bignell, Los Angeles, Calif., assignor to
Emma C. Bignell, Los Angeles, Calif.

Application December 15, 1941, Serial No. 423,028

6 Claims. (Cl. 61—80)

This invention relates to an apparatus for sinking piles in the earth, especially below a body of water in such a manner, for example, as to adapt the piles for supporting a foundation for piers, wharves, bridges, dams and the like, in, on or related to such a body of water; the principal objects of the present invention being to provide a convenient, relatively economical and highly efficient pile sinking apparatus.

Other objects of the invention are to provide for applying a pile sinking medium relative to the pile and a portion of the earth into which the pile is being sunk at a point of maximum effectiveness for facilitating sinking of the pile; to provide for maintaining substantially constant effective pressures upon the pile sinking medium; to provide for lubricating the pile and washing upwardly particles of earth progressively loosened during sinking of the pile by the pile sinking medium; and to provide improved elements and arrangements thereof in a pile sinking apparatus of the character and for the purposes specified.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings wherein:

Fig. 1 is a perspective view of a pile to which apparatus embodying the present invention is applied, the same being shown being sunk into the earth below a body of water.

Fig. 2 is a vertical cross-sectional view through the pile and pile sinking apparatus illustrated in Fig. 1.

Fig. 3 is a side elevational view of the pile and pile sinking apparatus, the pile sinking apparatus being shown in partially elevated relation to the pile.

Fig. 4 is a horizontal cross-sectional view through the pile and pile sinking apparatus substantially on the line 4—4, Fig. 1.

Fig. 5 is a vertical cross-sectional view through a modified form of pile showing my improved pile sinking apparatus applied thereto.

Referring more in detail to the drawings:

1 designates a pile comprising a body portion having a toe portion 2 at one end thereof and a heel portion 3 at the other end thereof. The body of the pile at the heel portion thereof is preferably provided with a loop 4 suitably embedded in the pile and arranged for engagement by a hook 5 of a suitable hoisting device (not shown) in such a manner as to support the pile in a body of water, in dry ground, or when it is desired to transport the same from place to place.

In order to provide for sinking the pile into the earth 6 below a body of water 7, I preferably arrange a manifold 8 about the pile preferably adjacent the lower end and/or toe portion 2 thereof.

The manifold 8 is preferably made up of sections 9 and 10 of pipe joined at their outer ends by L's 11 and at their inner ends by crosses 12 and T's 13.

The crosses 12 are preferably arranged on each of the sides of the rectangular manifold so formed and the crosses 12 are further preferably provided with oppositely disposed outlets 14 and 15. The outlets 14 are each preferably arranged to open downwardly relative to the manifold and are provided with downwardly and inwardly directed jet pipes 16 preferably of less inner diameter than the manifold pipe sections 9 and 10. The outlets 15 are preferably directed upwardly and are provided with pipe sections 17 that are preferably of less diameter than the manifold pipe sections 9 and 10. Each of the upwardly directed pipe sections 17 is preferably provided with a reducer 18 having an inwardly directed elbow outlet jet 19 for emitting pressure medium contained in the manifold 8 from the pipe sections 17.

Projecting outwardly from each of the reducers 18 is a pipe section 20 preferably of less inner diameter than the section 17, the upper ends of each of which are provided with reducers 21, elbow outlet jets 22, that are directed upwardly, and upwardly directed pipe sections 23 preferably of less inner diameter than the sections 20. The upper ends of the pipe sections 23 are each preferably provided with a reduced jet nozzle 24 for emitting pressure medium passing from the manifold 8 through the sections 17, 20 and 23, preferably directed upwardly. The jets 19, 22 and 24 are all directed upwardly and against the surface of the pile forming a film of water passing upwardly covering the entire surface of the pile or structure being sunk.

In order to supply the manifold 8 with pressure medium ultimately to be furnished the downwardly directed jets 16 and/or the upwardly directed jets 19, 22 and 24, the T's 13 are preferably arranged on two oppositely disposed sides of the manifold, the inlets 25 of such T's 13 being directed upwardly and being fitted with pipe sections 26, preferably of approximately the inner diameter of the manifold pipe sections 9 and 10. The pipe sections 26 serve as supply ducts for the manifold 8 and extend upwardly approximately to the heel portion of the pile at which point they are preferably provided with unions

27 to which preferably flexible conduits 28 are connected at their lower ends. The upper ends of the conduits 28 are suitably connected, as indicated at 29, preferably with a manifold 30. The supply pipe sections 26 and the manifold 30 are preferably interconnected by flexible cables or the like 31, as by connecting the ends of the cables at their lower ends with ears 32 on stop collars 33 fitted onto the upper ends of the pipe sections 26 below the unions 27. The upper ends of the cables 31 may be connected with ears 34 suitably provided on and projecting from the manifold 30.

The interior 35 of the manifold is preferably supplied with fluid pressure medium, such as water indicated at 36, as by a flexible pipe 37 connected at one end thereof with the inlet 38 to the manifold 30.

The manifold 30 is also preferably provided with a substantially centrally arranged opening 39 by which the manifold may pass over the loop 4 in such a manner to allow engagement of the loop by the hook 5. The manifold is also preferably provided with upstanding ears 40 preferably oppositely disposed relative to the opening 39 in the manifold. A cable or the like 41 is also preferably provided, the ends of which are engaged with the ears 40 in such a manner that the hook 5 may also engage the cable 41 in order to lower the pile and pile sinking apparatus simultaneously.

In order to support the upper portion of the feed pipes relative to the pile, particularly on long piles, I provide a clamp 42 formed of a bar bent to fit the sides of said pile and provided with loops 43 to receive the pipes. The clamp is preferably split, to aid in the application of the pile, bolts 44 being used for fastening the clamp on the pile.

The operation of an apparatus constructed as described is as follows:

When it is desired to sink the pile, the pile sinking apparatus, inclusive of the manifolds 8 and 30, together with the supply pipes and the pressure medium jetting devices, forming parts thereof, is arranged about the pile as shown in Figures 1 and 2. The hook 5 is then applied to the loop 4 and cable 41 and the pile and pile sinking apparatus are raised and conveyed to the point at which the pile is to be submerged and sunk into the earth. The point having been located, the pile is lowered until the lower end or toe portion thereof, reaches the earth. Pressure medium, such as water is then applied to the pile sinking apparatus in such a manner that it flows from the pipe 37 through the manifold 30 and flexible conduits 28 into the supply pipes 26 and ultimately to the manifold 8, whereupon jets of water issue from the jets 16 downwardly around the toe portion of the pile to form a hole in the earth into which the pile sinks. The pressure medium also issues upwardly from the elbow jets in progressively finer streams to lubricate the pile during sinking thereof and to remove debris or particles of earth produced by the downwardly directed jets in making the hole in the earth. When the pile has been sunk to a sufficient depth, the hook is released from the loop, but maintained in engagement with the manifold cable 31, whereupon the pile sinking apparatus may be disassociated from the pile by drawing upwardly on the apparatus.

The pile sinking apparatus may then be applied to another pile and the operation, just above described, may be repeated.

In Figure 5 a modified form of the invention is illustrated, wherein the lower end or toe portion 50 of a pile 51 is provided with an internal downwardly directed and opening nozzle 52 having radially arranged passages 53 that are inclined upwardly and open out of the pile through tubular jackets 54 provided with upwardly directed ends 55. Downwardly directed jetting pipes 56 have their lower ends mounted in the portions 55 of the jackets 54 and their upper ends connect with a manifold 57 provided with supply pipes 58 and upwardly directed jetting pipe sections 59, together with elbow jets 60 associated with the pipe sections 59 substantially of a character and for a purpose similar to that described in connection with the preferred form of invention.

The operation of the modified form of invention is substantially similar to that described in connection with the preferred form of invention, with the exception that the jetting nozzles 56 are removably mounted in the jetting jackets in the pile and are removed from such jackets upon withdrawal of the manifold, supply pipes and jetting pipe sections, from the pile after the pile has been sunk to a sufficient depth.

It is apparent therefore, that I have provided a convenient, relatively economical and highly efficient pile sinking apparatus that is admirably suited for carrying out the objects for which it was designed.

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

1. In an apparatus of the character described, a manifold loop removably mounted about the toe portion of a pile, means for supplying the manifold with fluid pressure medium, downwardly directed jetting nozzles in the manifold for causing the fluid pressure medium to form a hole in a portion of the earth in which the pile is to be sunk, and upwardly directed means mounted in the manifold, said means having nozzles therein for causing the fluid pressure medium in the manifold to force particles of the earth upwardly from said hole as the pile is being sunk in said hole.

2. In an apparatus of the character described, the combination of a pile having a toe portion and a heel portion, a manifold loop removably mounted about the pile adjacent the toe portion thereof, means for supplying the manifold with fluid pressure medium, downwardly directed nozzles mounted in the manifold, upwardly directed pipe sections mounted in the manifold having portions of progressively less diameter, and outlets from the respective portions having upwardly directed nozzles.

3. In an apparatus of the character described, the combination of a pile having a toe portion and a heel portion, a manifold loop removably mounted about the pile adjacent the toe portion thereof, means for supplying the manifold with fluid pressure medium, downwardly directed nozzles mounted in the manifold, upwardly directed pipe sections mounted in the manifold having portions of progressively less diameter, outlets from the respective portions having upwardly directed nozzles and means for removing the manifold and supply means from the pile.

4. In combination with a pile having a toe portion provided with a downwardly directed nozzle and radially arranged channels, a manifold arranged adjacent the toe portion of the pile, nozzles in the manifold removably engageable with the pile in said channels thereof, means for

supplying the manifold with fluid pressure medium, upwardly directed means on the manifold having nozzles for directing a portion of the fluid pressure medium upwardly exteriorly of the pile, and means for removing the manifold from the pile.

5. In an apparatus of the character described, the combination of a pile having a toe portion and a heel portion, a manifold loop removably mounted on the pile adjacent the toe portion and extending around said pile, means for supplying the manifold with fluid pressure medium, downwardly directed nozzles mounted on the manifold for causing the fluid pressure medium to form a hole in the portion of the earth in which the pile is to be sunk, upwardly directed means mounted on the manifold, means for restricting flow through the upwardly directed means, and upwardly directed nozzles in the upwardly directed means causing a flushing flow of fluid pressure medium in the manifold to move particles of earth upwardly from said hole as the pile is being sunk in said hole.

6. In an apparatus of the character described, the combination of a pile having a toe portion and a heel portion, a manifold loop extending around the pile adjacent the toe portion thereof,

said manifold being larger than said pile and slidable thereover, a manifold adjacent the heel portion of the pile, pipes arranged along opposite sides of said pile, means adjacent the heel portion of the pile for removably securing said pipes to said pile, means for supplying the second named manifold with fluid pressure, flexible conduits connecting said second named manifold with the upper ends of said pipes, the lower ends of said pipes being connected with the first named manifold for supporting same and supplying fluid pressure thereto, downwardly directed nozzles mounted on the first named manifold for causing substantially all of the fluid pressure in said first named manifold to be directed downwardly around the toe portion of the pile to form a hole in the portion of the earth in which the pile is to be sunk, upwardly directed means mounted on the manifold, means for restricting flow through the upwardly directed means, and upwardly directed nozzles in the upwardly directed means causing a flushing flow of fluid pressure medium in the manifold to move particles of earth upwardly from said hole as the pile is being sunk in said hole.

EDWARD BIGNELL.