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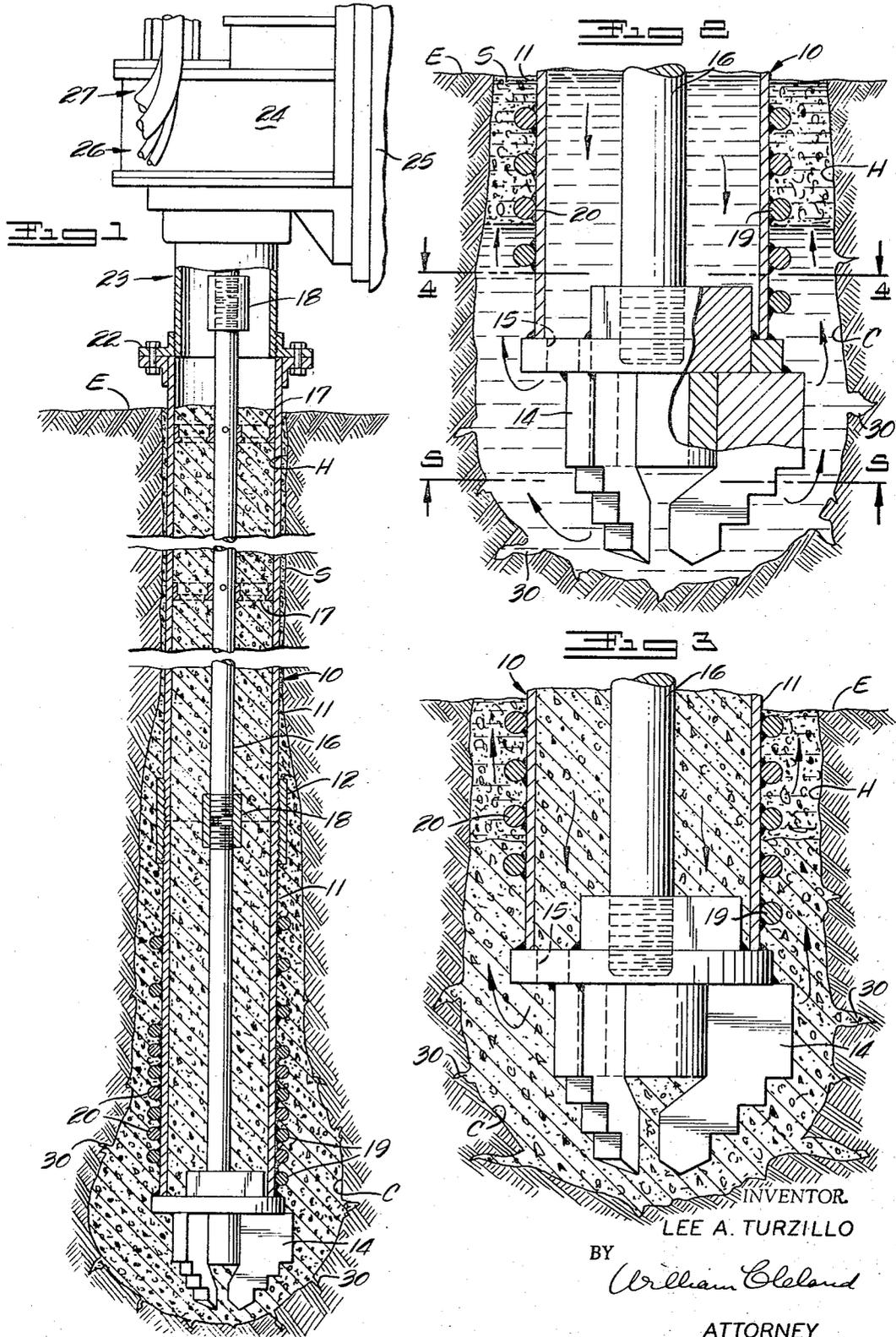
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3,354,657

METHOD FOR INSTALLING ANCHORING OR SUPPORTING COLUMNS IN SITU

Filed May 3, 1965

2 Sheets-Sheet 1



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Fig 4

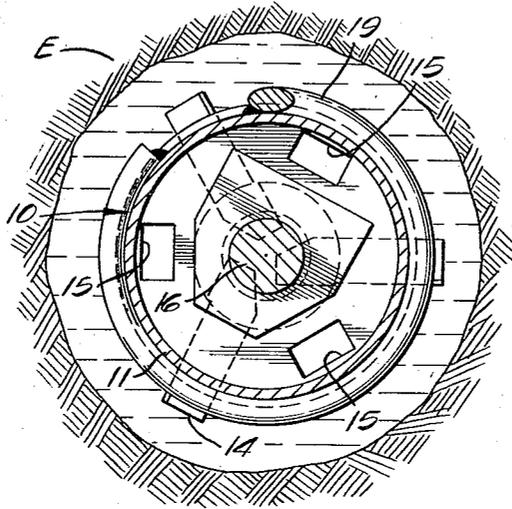
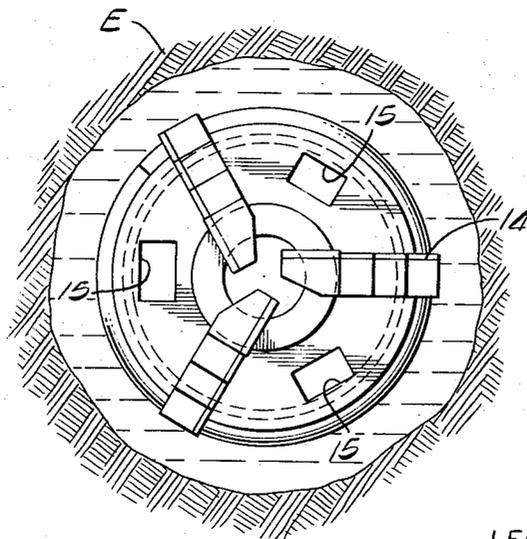


Fig 5



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METHOD FOR INSTALLING ANCHORING OR SUPPORTING COLUMNS IN SITU

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2 Claims. (Cl. 61—53.5)

This invention, generally, relates to forming concrete piles in the earth, and, particularly, relates to a method and apparatus for installing anchoring or like supporting columns in an earth situs.

Heretofore, various methods have been employed for installing diagonal anchoring bars, as for tying back sheet-piling bulkheads, concrete retaining walls, or the like. Such anchoring bars are also useful in cofferdam construction, or for deep excavations where struts extending inside of the cofferdam or excavation would be obtrusive or otherwise objectionable. Certain known pile-forming methods are not entirely suitable for making anchoring or like piles in water-laden soil where the soil of the surrounding situs is not sufficiently self-supporting to prevent cave-in of soil into an augered hole, for example.

One object of the present invention is to provide an improved method and apparatus for installing an anchoring or similar concrete supporting column by which the surrounding earth is retained against interference with completion of the column for its intended purpose.

Another object of the invention is to provide a method and apparatus of the character described, including the use of a casing which is effectively anchored in the situs to become a permanent part of the pile structure.

Still another object of the invention is to provide a method and apparatus of the character described which is self-operative to drill a hole or cavity which is somewhat enlarged or bulbous at the lower end of the casing, whereby a correspondingly enlarged or bulbous concrete formation is provided around the casing to anchor it securely in place.

A still further object of the invention is to provide a method and apparatus of the character described by which an anchoring bar affixed to the casing is solidly embedded in centered relation in concrete likewise anchored within the anchored casing.

Another object of the invention is to provide apparatus of the character described, including screw means on the casing which serves a double purpose of making a drilled hole larger than the casing, and provides an anchoring structure which becomes embedded in concrete and thereby resists outward retraction of the casing with respect to surrounding anchoring concrete.

These and other objects of the invention will be manifest from the following description and the accompanying drawings.

Of the accompanying drawings:

FIGURE 1 is a vertical cross-section, partly broken away, through an earth mass in which a supporting column has been constructed by the method of the invention, and wherein certain portions of the drilling apparatus are fixedly anchored in place in accordance with the invention.

FIGURE 2 is an enlarged fragmentary cross-section corresponding to the lower portion of FIGURE 1, but illustrating an earlier stage in the method of the invention, in which the drilled hole and the drilling equipment are flushed with flushing fluid to remove earth therefrom.

FIGURE 3 is a view corresponding to FIGURE 2, illustrating the procedure replacing the flushing fluid and residual earth with hardenable, fluid, cementitious material.

FIGURE 4 is a horizontal cross-section taken substantially on the line 4—4 of FIGURE 2.

FIGURE 5 is a horizontal cross-section taken substantially on the line 5—5 of FIGURE 2.

Referring to the drawings, generally, and to FIGURE 1, in particular, the numeral 10 designates a cylindrical hollow metal casing, assembled in a requisite number of sections 11, 11 joined together by threaded coupling means 12, according to the depth of the hole required to be drilled in an earth situs. The lower end of the casing may have non-rotatably affixed thereon, as by welding, a drill bit 14, such as a so-called three-wing fishtail, with carbon inserts on the leading and gauge edges thereof, and having one or more openings 15, 15 axially therethrough. Screwed into the bit 14 may be a sectional anchoring rod 16 of required length, held axially centered within the casing, as by means of one or more centering spiders 17. The rod sections may be connected by suitable coupling means 18 (see FIG. 1).

For purposes to be described later, two separate, co-extending metal rod spirals, or threads, 19 and 20 may be stitchwelded to the lower end of the lowermost casing section 11, one spiral being extended to a height of about four feet above said lower end of the casing and the other to a height of about two feet from said lower end.

The casing 10 may be rotated or screwed into the earth mass E, as by being connected through a suitable coupling unit 22 on a driven adaptor 23 of a hydraulic motor 24 which is in turn selectively vertically shiftable on a movable drill rig 25, in known manner. The motor 24 is provided with suitable conduit means 26 for selectively supplying water under pressure to the interior of the casing, as it is screwed into the earth, and through the holes 15 in the drill bit 14 to drill and flush a hole H of requisite depth, as shown in FIGURE 2. Separate conduit means 27 may be provided for supplying fluid grout under pressure to the bottom of the drilled hole, through the casing and the holes 15 in the bit 14, as will be described later in connection with method steps exemplified in FIGURES 1 and 3.

In practicing the method of the invention, the sectional casing 10 is first affixed on the motor 24, as described above, to have the anchoring rod 16 affixed centrally therein, and is adjusted with the drill rig 25 for predetermined batter at the pile driving location in the earth situs E, and with a supply of pressurized flushing fluid, such as water, in readiness.

When proper batter, or angle of the casing 10 on the leads of the drilling rig, is established, drilling is begun while water is pumped through a swivel head (not shown) of the auger motor, the casing, and the bit holes 15 at a rate of approximately 70 g.p.m. and from 100 to 200 p.s.i. pressure, initially to wash out the casing. Drilling and washing is continued until a hole of desired depth is drilled in the earth mass E. In this part of the process the screw threads 19 and 20 enlarge the hole H beyond the diameter of the casing so that the pressurized water displaces the residual earth and mud upwardly in the space around the outside of the casing and also forms a bulbous enlargement or cavity C at the bottom of the hole.

When the residual earth and mud has been sufficiently displaced and removed, and grouting is ready to commence, valves (not shown) are operated to turn off the water and to supply fluid grout, pressurized at full capacity through motor 24, through the casing and bit into the bulbous cavity C, to displace the water from the hole H and then to fill the hole with grout, as shown in FIGURE 1, and in part in FIGURE 3. Three batches of "neat" grout is pumped in first, and then a required quantity of sand grout is pumped in.

At some time during the grouting operation, grout pressure and/or friction on the outside of the casing, will commence to freeze the casing against rotation. Grouting is continued until the casing pressures off at about 400

p.s.i. The grouting is further continued until the casing again pressures off at about 450 p.s.i.

Next, the motor drive 24 is reversed and the top adaptor 23 of the casing 10 is screwed off or otherwise released from the main casing 10. If the adaptor extends partially into the hole H, such reversal of the adaptor is carried out throughout the withdrawal of the adaptor from the hole.

The self-hardening fluid grout, or cementitious material, within the bulbous cavity C, the crevices 30 extending therefrom, the outer space S, and the interior of the casing, will harden within a matter of several hours to anchor the casing and tie-down bar 16 rigidly within the earth mass, after which the motor unit 24 may be disconnected at the coupling 22. In some instances, the casing 10 may be cut or otherwise terminated as necessary at or near the earth's surface. The tie-down bar 16, with or without extensions joined thereto, is then ready for attachment to structures to be supported, anchored, or braced in known manner. The method described, for example, can be utilized for installation of tie-down or anchoring bars at various angles, under wet or dry conditions, as for tying back sheetpiling bulkheads, concrete retaining walls, cofferdams, or barriers for retaining deep excavations. The method is particularly useful for cofferdam construction because the usual necessity for provision of struts within the cofferdam is eliminated.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A method of installing anchoring or like supporting columns at an earth situs, comprising: the steps of rotatively drilling into the situs a hollow cylindrical casing having an apertured bit affixed on its inner end for drill-

ing rotation with the casing, while simultaneously pumping pressurized flushing fluid through the casing and apertured bit, into a hole being drilled; and continuing said drilling and flushing until the hole of predetermined depth is formed in the situs; pumping self-hardenable cementitious fluid under pressure through said casing and apertured bit, into a hole being drilled; and continuing said and occupy spaces and voids around the bit and upwardly between the casing and the surrounding earth along a substantial extent of the length of the casing; and allowing the cementitious material within said hollow casing and said occupied spaces and voids to solidify and thereby fixedly anchor the casing in the surrounding earth of the situs.

2. A method as in claim 1, wherein an anchoring bar secured centrally within said casing prior to the drilling operation, is anchored in solidified cementitious material within the casing.

References Cited

UNITED STATES PATENTS

2,412,329	12/1946	Weber	61—53.58
2,660,862	12/1953	Capblanch	61—63
2,923,133	2/1960	Muller	61—53.58
2,952,131	9/1960	Lyroudias	61—63
3,115,755	12/1963	Siebenhausen	61—53.5 X
3,226,933	1/1966	White	61—39

FOREIGN PATENTS

600,014	11/1959	Italy.
374,819	3/1964	Switzerland.

OTHER REFERENCES

German printed application, 1,104,905, 1961.

35 JACOB SHAPIRO, *Primary Examiner*.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,354,657 Dated November 28, 1967

Inventor(s) Lee A. Turzillo

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 7, cancel "into a hole being drilled; and continuing said" and insert -- to displace the flushing fluid in the drilled hole --.

Signed and sealed this 2nd day of May 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents