May 3, 1932. M. M. UPSON 1,856,604

METHOD AND APPARATUS FOR FORMING PILES

Filed May 28, 1931

FIG. 1.

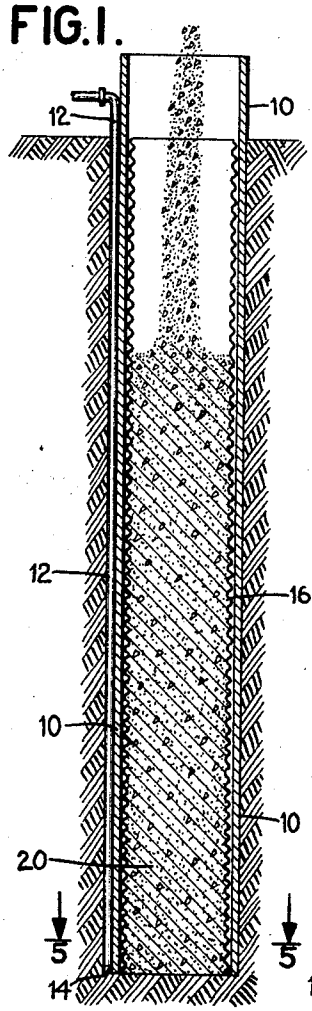


FIG. 2.

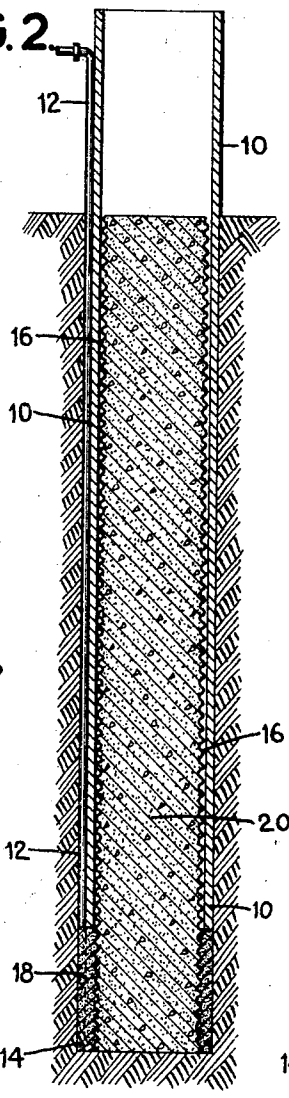
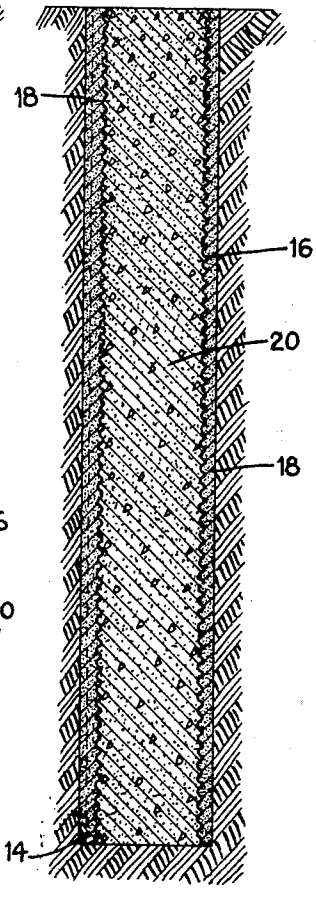


FIG. 3.



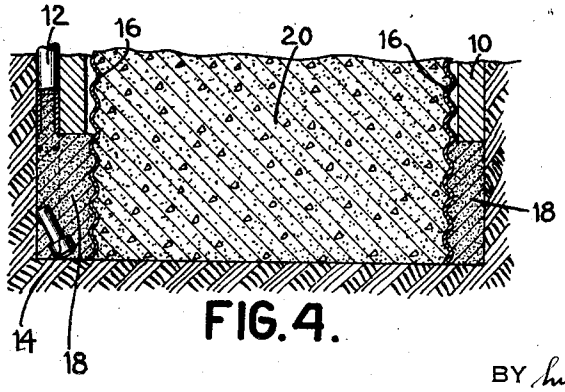


FIG. 4.

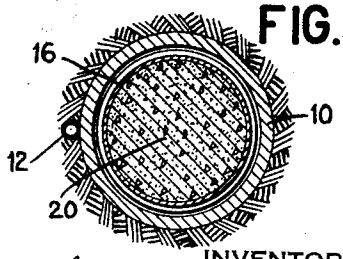


FIG. 5.

Maxwell M. Upson
INVENTOR

BY his ATTORNEYS
Cooper, Kerr & Dunham

Patented May 3, 1932 1,856,604

UNITED STATES PATENT OFFICE

MAXWELL M. UPSON, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO RAYMOND CONCRETE PILE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

METHOD AND APPARATUS FOR FORMING PILES

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It has been proposed to form a concrete pile by a method having the following steps: (1) Sinking into the ground a temporary casing; (2) placing in that casing a permanent casing; (3) filling the permanent casing with concrete; (4) withdrawing the temporary casing; (5) pouring grout between the casings into the annular space vacated by the temporary casing while the temporary casing is being withdrawn.

In practice, it has been found impractical under certain conditions to carry out step (5) of the above described method because the grout has a tendency to arch in the spacing between the casings.

The object of the present invention is to disclose a method of forcing the grout under pressure directly into the space being vacated by the temporary casing, while the temporary casing is being removed.

In the drawings:

Fig. 1 shows the method after steps (1) and (2) have been performed and (3) is in progress.

Fig. 2 shows the method during progress of step (5).

Fig. 3 shows the completed pile.

Fig. 4 is an enlarged view of the lower end of Fig. 2.

Fig. 5 is a cross-section on line 5—5 of Fig. 1.

Numeral 10 designates the temporary casing, usually of substantial plain tubing, which has been sunk to position by any desired method, and the contents removed therefrom. A passage is formed, preferably by welding a pipe 12 thereto, lengthwise of casing 10 on the outside thereof. Until step (5) begins, the lower end of pipe 12 is closed by a snugly fitting plug 14 which serves to exclude dirt from entering the pipe during the sinking of casing 10.

The permanent casing 16 is usually of thin metal and therefore inexpensive, and may be corrugated, as shown.

In the present invention steps (4) and (5) are carried on simultaneously. As soon as the removal of casing 10 is begun, grout, under comparatively high pressure, is supplied through pipe or passage 12. This pressure is sufficient to first blow plug 14 from pipe 12 and to then keep filled with grout 18 the space being vacated by pipe 10 and pipe 12 as they are withdrawn.

The completed pile structure, as shown in Fig 3 comprises shell 16, filled internally with concrete 20 and surrounded externally with the grout shell 18.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. A method of forming a pile in which two casings are employed one within the other, which includes filling the inner casing with concrete and delivering grout under pressure directly to the space being vacated by the outer casing, while withdrawing said outer casing from around said inner casing.

2. The method of forming a pile by employing two casings one within the other, which includes filling the inner casing with concrete, withdrawing the outer casing while directly filling with grout under high pressure the space being vacated by said outer casing, said grout thus occupying a position surrounding said inner casing and forming a distinct layer separate from the concrete within said casing.

3. The method of forming a pile by employing two casings one closely fitted within the other, which includes filling the inner casing with concrete, withdrawing the outer casing while directly delivering grout exteriorly of said outer casing into the space being vacated thereby.

4. The method of forming a pile by employing two casing one closely fitted within the other, which includes filling the inner casing with concrete, withdrawing the outer casing and forcing grout under pressure along the exterior of said casing into the space being vacated thereby.

5. In apparatus for forming a concrete pile, a casing adapted to be inserted into the ground and subsequently removed, in combination with means for directly forcing

grout into the space being vacated by said casing during the removal thereof.

6. In apparatus for forming a concrete pile, a casing adapted to be inserted into the ground and subsequently removed, in combination with a passage on said casing through which passage grout may be forced directly into the space being vacated by said casing during the removal thereof.

7. Apparatus for forming a concrete pile comprising a casing adapted to be driven into the ground and subsequently removed, in combination with a pipe secured exteriorly to said casing through which pipe grout may be forced directly into the space being vacated by said casing during the removal thereof.

8. Apparatus for forming a concrete pile comprising a casing adapted to be driven into the ground and subsequently removed and a pipe secured externally to the casing and extending substantially to the lower end thereof for delivering grout under pressure directly to the space being vacated by said casing through the removal thereof.

In testimony whereof I hereto affix my signature.

MAXWELL M. UPSON.