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F. B. GILBRETH.

APPARATUS FOR SINKING CONCRETE PILES.

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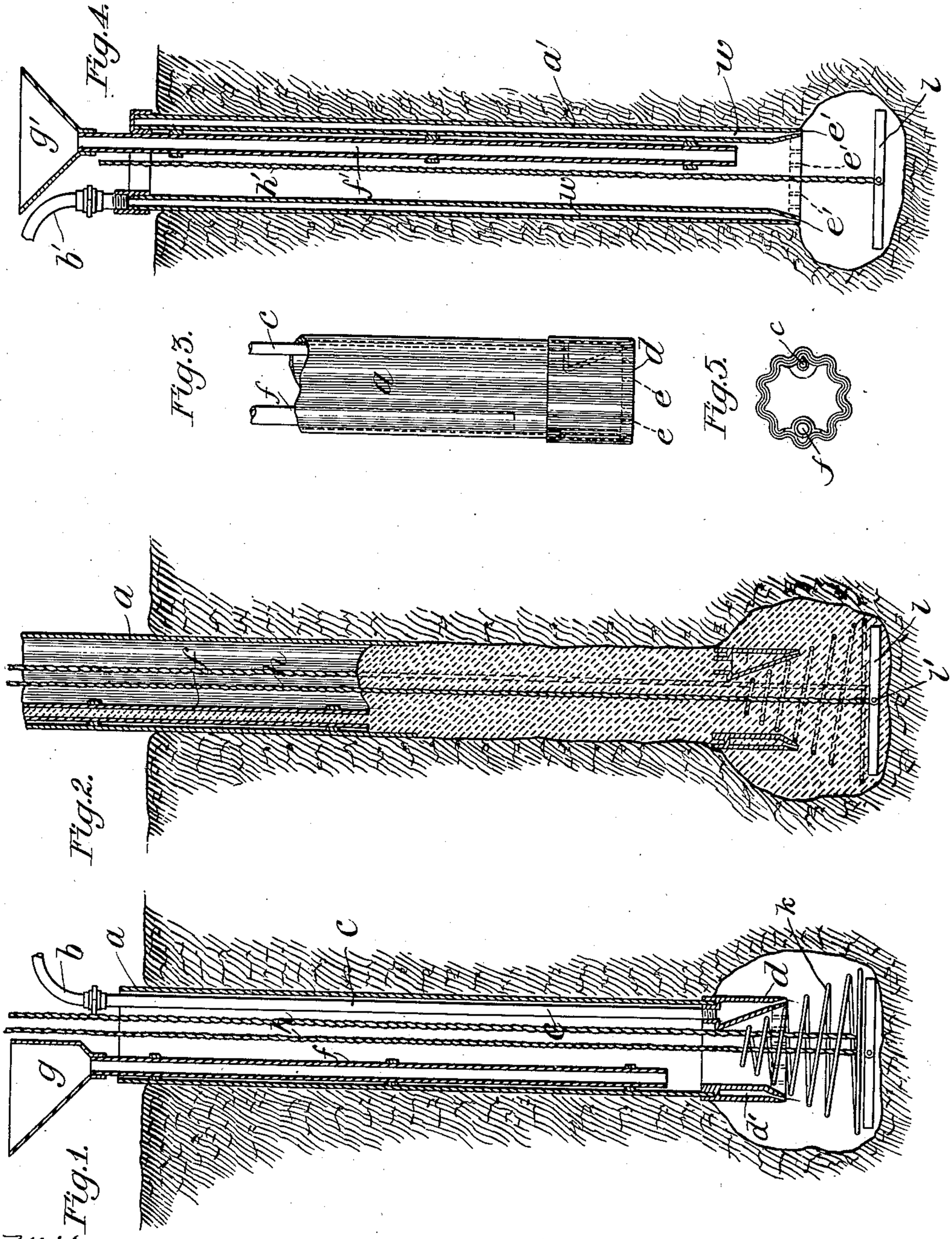

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses:
Louis A. Jones
Horace A. Crossman.

Inventor:
Frank B. Gilbreth
By Emery Booth Powell
Attys

UNITED STATES PATENT OFFICE.

FRANK B. GILBRETH, OF NEW YORK, N. Y., ASSIGNOR TO CORRUGATED CONCRETE PILE COMPANY OF AMERICA, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

APPARATUS FOR SINKING CONCRETE PILES.

No. 890,765. Specification of Letters Patent. Patented June 16, 1908.

Application filed May 5, 1905. Serial No. 259,044.

To all whom it may concern:

Be it known that I, FRANK B. GILBRETH, a citizen of the United States, residing at New York, in the borough of Manhattan and county and State of New York, have invented an Improvement in Apparatus for Sinking Concrete Piles, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention consists in improvements in apparatus for sinking piles by hydraulic means and particularly to thus sinking concrete piles and will be best understood by reference to the following description taken in connection with the accompanying illustration showing one specific embodiment and application thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawing,—Figure 1 is a vertical section taken through the metal sinking shell in its lowermost position; Fig. 2 is a similar section showing the shell partially withdrawn and the excavation partially filled with concrete; Fig. 3 is an elevation of the shell partially broken away showing the excavating shoe attached thereto; Fig. 4 shows a modification of my invention; Fig. 5 shows a plan of the sinking shell.

In the practice of my invention I preferably sink a suitably shaped hole of the appropriate depth in some suitable manner, as by the use of the metal shell *a*, this being forced down into the earth preferably with the assistance of a water jet. The latter may be supplied under pressure from any suitable source (not shown) through the flexible connection *b* to the vertical water pipe *c* connected thereto and passing down through the interior of the shell to the hollow shoe *d* into which it is threaded to permit of easy removal. The shoe is removably held upon the lower end of the shell and is provided at its lower edge with a series of jet openings *e* through which water is forced from the water space *d'* of the shoe during the sinking of the shell carrying the displaced earth up through the interior of the shell and out at the top thereof. By this procedure the shell can be rapidly sunk to the required depth with the use of little or no assisting force other than the weight of the shell and its attached parts.

When the shell has been sunk to the required depth into some such position as is shown in Fig. 1, the water pipe *c*, is withdrawn therefrom and removed from the shell. The grout or fluid concrete is then introduced into the excavation through the casing, this being preferably accomplished by means of the concrete feeding pipe *f* attached in a fixed position to the interior of the shell and carrying at its top the funnel *g* into which the concrete may be poured by any suitable means. As the concrete is entered into the excavation the casing is gradually withdrawn therefrom, the shoe *d* loosened by the withdrawal thereof, dropping to the bottom of the excavation and there remaining as shown in Fig. 2.

It will be observed that the lower end of the feed pipe *f* is held at a fixed distance above the lower end of the casing and, during the placing of the concrete into the excavation, the casing is withdrawn at such a rate that the space between the lower end of the concrete pipe and the open end of the casing will be filled with a body of concrete as shown in Fig. 2, which will act as a seal between the discharge end of the concrete pipe and the lower end of the shell, permitting the concrete to completely fill the excavation as the shell is withdrawn, while preventing the entrance of water or earthy matter into the lower end of the shell and between the top of the unformed pile and the discharge end of the concrete pipe. By this process the formation of a solid pile with a uniform surface is insured. The formation of the pile proceeds as described and as indicated in Fig. 2 until the casing has been entirely withdrawn and the excavation completely filled with concrete.

In the drawings I have shown the pile formed with an enlarged section at its lower end, thus giving a greatly increased stability to the same; the enlarged portion acting not only to give a greater area of bearing surface, but also to tie the structure of the pile more firmly to the earth, which for certain purposes may be a factor of considerable importance. This enlarged section of the pile which is formed at some portion of its length, and preferably at the bottom thereof, is produced by increasing the size of the excavation thereat. This may be accomplished in any suitable way, but may be effected by prolonging the water jet or increasing the force thereof, after the casing has been sunk, to or near the position shown in Fig. 1, thus

producing an enlarged excavation at that point, into which the concrete enters as indicated in Fig. 2.

Any suitable reinforcing means may be located in the tube before the concrete is filled in, as indicated at *h*, *k*, *l* and *l'*.

In the form of pile shown in Figs. 1 and 2 the shoe *d* when released from the sinking shell acts to reinforce the enlargement of the pile to a considerable extent.

By giving the sinking shell suitable formation the pile may be formed into any desired shape; in order to give a large surface for frictional contact with the earth I prefer, however, to give the pile a non-circular cross-section and preferably to impart thereto an undulatory surface. This may be easily effected by preparing a correspondingly fluted sinking shell, such as that shown in Figs. 2, 3 and 5.

In Fig. 4 I have shown a modification of my invention wherein is employed the casing *a'*, the water connection *b'*, and the concrete feed pipe *f''*, all of which are generally similar to corresponding parts in Figs. 1 and 2, but the removable shoe *d* is dispensed with and in place thereof the entire casing *a'* is cored to provide the annular water space *w* to which the pipe *b* is connected, such water space terminating at the lower end of the casing in suitable jet openings *e'* through which the water is forced as through the jet openings in the shoe *d* of the above described embodiment of my invention.

While I have shown and described one form of my invention and one mode of employing the same, it is to be understood that it is not limited to the details described, but that it is susceptible of many modifications and applications not herein referred to, but which fall within the scope thereof.

Claims:

1. A pile sinking device comprising a hollow fluted casing.

2. A pile sinking device comprising a hollow casing having a non-circular cross section and a removable shoe therefor.

3. A pile sinking device comprising a hollow casing and a concrete feeding pipe within said casing and having its discharge at a predetermined distance from the end of the casing.

4. A pile sinking device comprising a hollow casing and a concrete feeding pipe within said casing and having its discharge at a fixed distance from the end of the casing.

5. A pile sinking device comprising a hollow casing, concrete feeding means within said casing and means permitting the maintenance of a body of concrete at the mouth of said casing during the withdrawal thereof from the earth.

6. A pile sinking device comprising a hollow casing and a removable hollow shoe adapted for application to one end thereof, said shoe having a jet opening therein.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRANK B. GILBRETH.

Witnesses:
THOMAS B. BOOTH,
EDITH E. CHAPMAN.