L. E. WELSH.

PILE.

APPLICATION FILED JULY 10, 1909.

976,324.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 2.

Fig. 1.

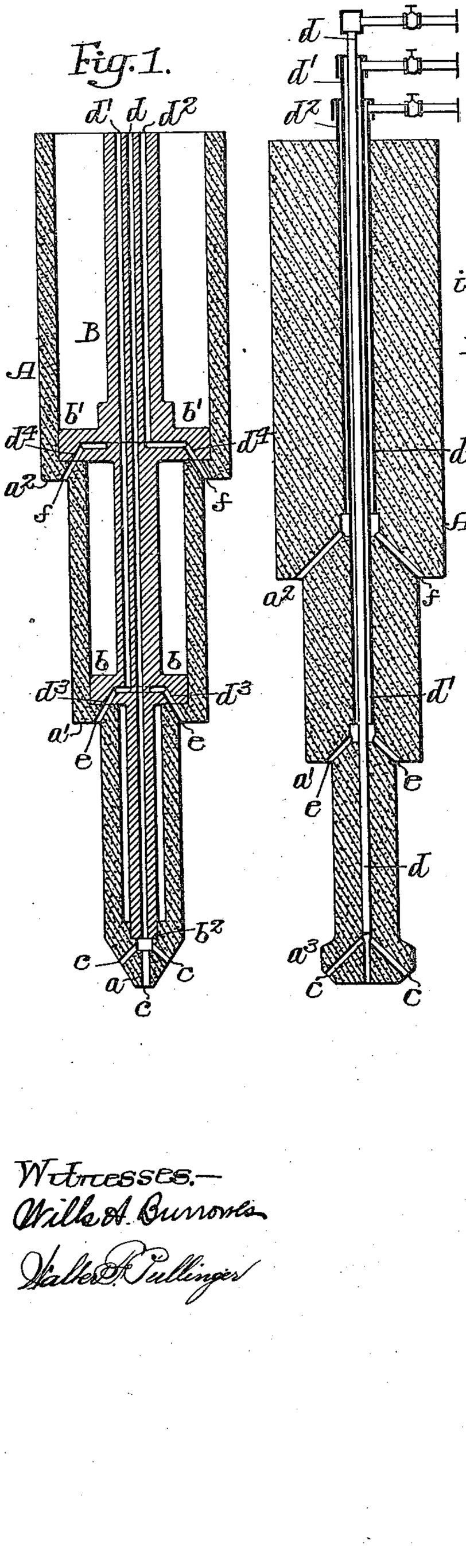


Fig. 3.

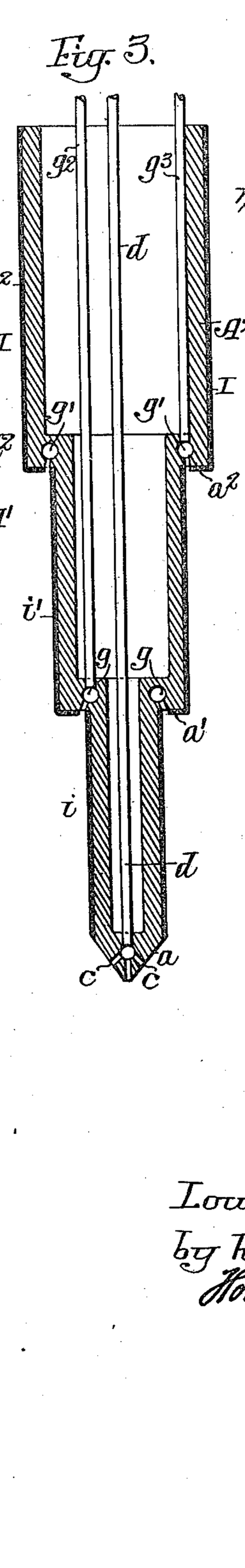
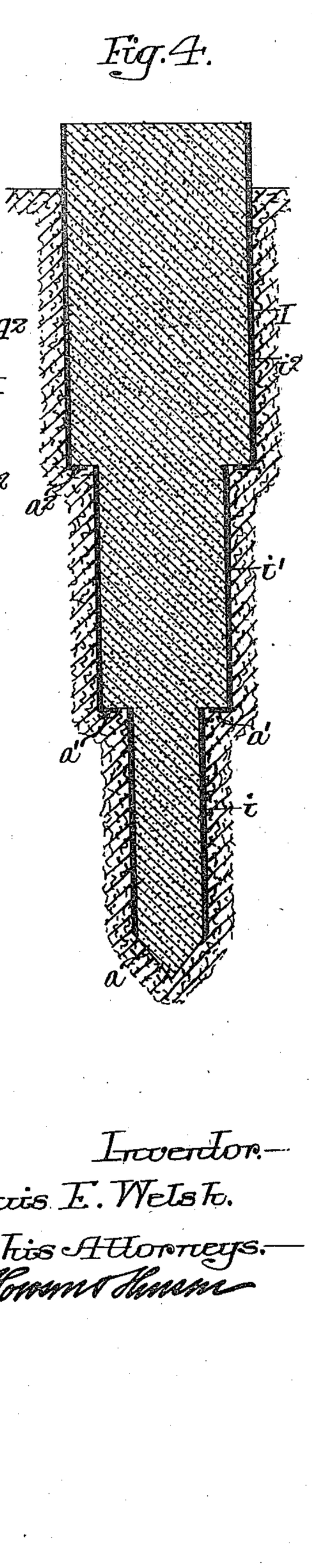


Fig. 4.



Witnesses.—
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2 SHEETS—SHEET 2.

Fig. 5.

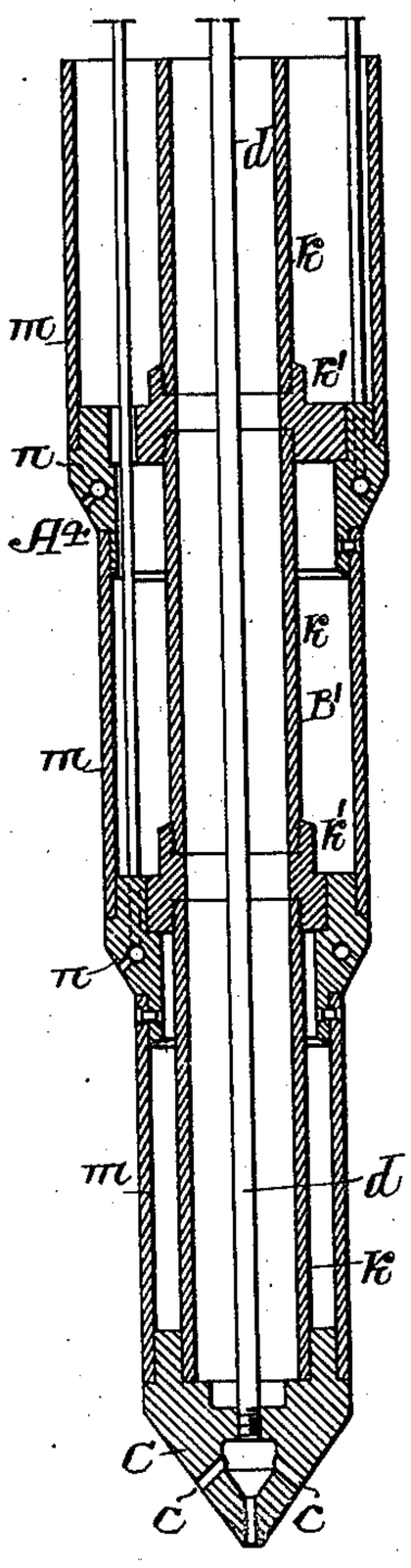


Fig. 6.

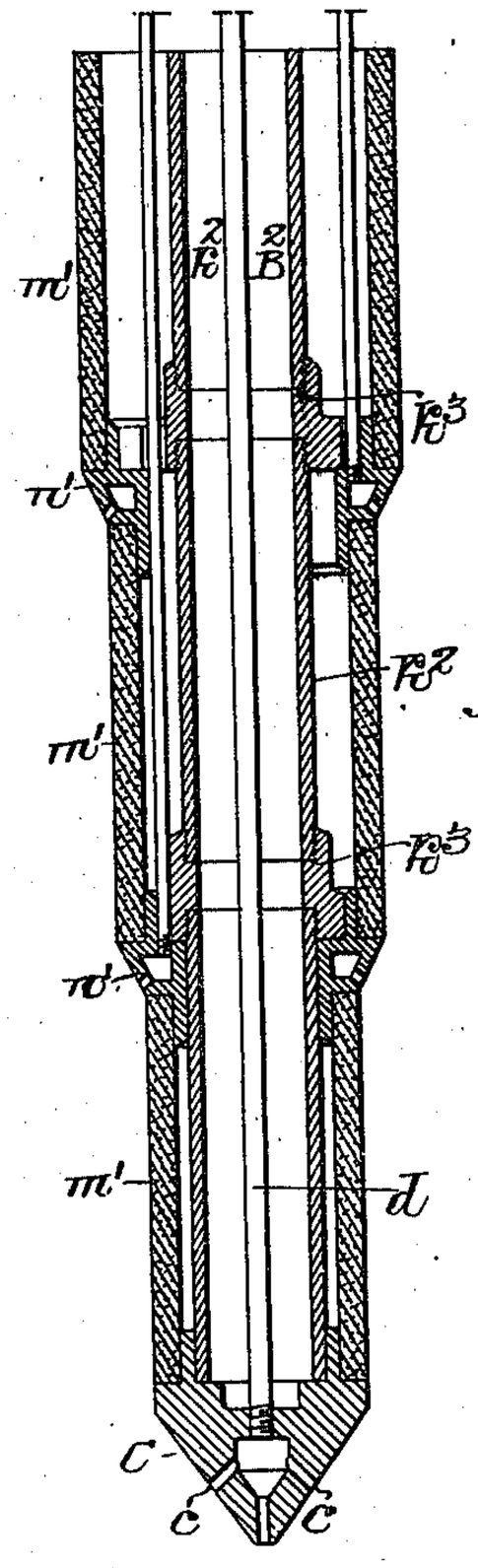
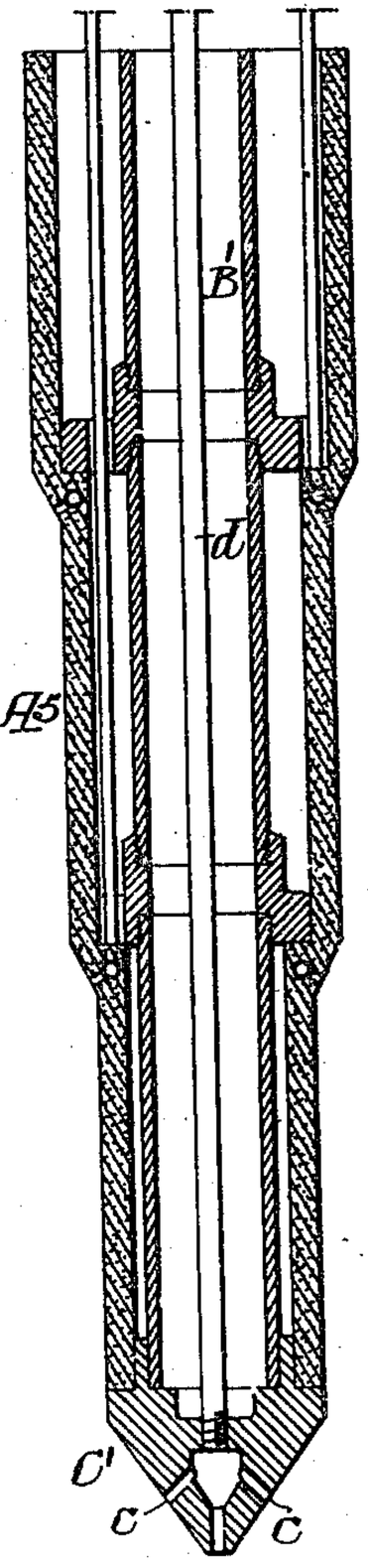


Fig. 7.



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UNITED STATES PATENT OFFICE.

LOUIS E. WELSH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO AMERICAN CONCRETE PILING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

PILE.

976,324. Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed July 10, 1909. Serial No. 506,901.

To all whom it may concern:

Be it known that I, LOUIS E. WELSH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Piles, of which the following is a specification.

My invention relates to certain improvements in piles of concrete, or preparatory piles which are driven into the ground and removed so as to allow the opening to be filled with concrete.

The object of my invention is to provide means for properly jetting a shouldered pile into the ground; the jets of water disturbing the ground at the shoulders as well as at the point of the pile.

In the accompanying drawings Figure 1, is a sectional view of a shouldered pile illustrating my invention, the pile in this case being provided with an inner and an outer form, the inner form being the driving form; Fig. 2, is a sectional view illustrating a solid concrete pile made in accordance with my invention; Fig. 3, is a sectional view illustrating a shouldered driving form and a shouldered casing adapted to be driven into the ground, the driving form being then removed; Fig. 4, is a sectional view showing the driving form removed and the casing filled with concrete; Fig. 5, is a sectional view showing the inner and outer forms, each made of shells connected together by rings; the outer rings forming shoulders and having jet openings; Fig. 6, is a sectional view of a pile in which the outer driving form is made up of concrete shells separated by metallic rings, providing shoulders and having jetting openings at the rings; Fig. 7, is a sectional view showing a pile which can be both driven and jetted simultaneously; the outer form being a continuous shell.

Referring in the first instance to Fig. 1, A is the outer form, B is the inner form. The outer form has a point a and a series of shoulders a', a^2, there may be any number of shoulders, depending upon the length of the pile and the area of its upper surface. The outer form also has inner shoulders upon which rest the flanges b, b', of the inner form, the lower stem of the inner form rests on a shoulder b^2 at the point of the pile. Formed in the point is a series of jet passages c communicating with a central passageway d extending throughout the length of the inner form and at the shoulder a' are jet passages e in the outer form which communicate with passages d^3 in the inner form, which in turn communicate with a passage d' extending to the butt end of the pile, and f, f are jet openings at the shoulders a^2 which communicate with passages d^4 in the flange b' of the inner form B, and these passages communicate with the passage d^2 leading to the butt end of the pile. The flow of water through each of these passages is preferably controlled separately by a suitable valve, as illustrated in Fig. 2 for instance, so that when the pile is driven the passages d' and d^2 are cut off and the passage d opened until the pile sinks to the first shoulder a', then water is admitted to the passage d' as well as the passage d until the pile sinks to the second shoulder a^2, then the third passage d^2 is opened and the pile driven to the proper depth.

I have shown the outer form A made of concrete which may be reinforced in any suitable manner if desired, and the outer form remains in the ground after the inner form is withdrawn and the outer form can be filled with concrete and reinforcing material, although in some instances if the form illustrated in Fig. 1 is used as a preparatory pile and the character of the ground will admit of it, the outer form as well as the inner form can be removed and the hole produced filled with concrete reinforced or not, as desired.

Fig. 2 is a sectional view of a solid concrete pile A', having shoulders a', a^2 and the peculiarly formed head a^3 which is used when the pile is not to be withdrawn, the central passage d in the present instance communicates with passages c, c in the head a^3. The passage d' is formed by a tube which surrounds the central tube d and communicates with the jet openings e at the shoulder a' and the outer passage d^2 is formed by a still larger tube and communicates with the jet openings f at the shoulder a^2. Each of the pipes is provided with suitable valves for regulating the flow of jetting fluid. This pile is jetted into the ground and remains therein, the tubes can be withdrawn if desired or may remain as a reinforce for the pile.

In Fig. 3, I have shown a shouldered pile

having jet passages g, g' formed in the pile itself and tubes g^2, g^3 are attached to the pile so as to communicate independently with said passages, the central tube d, as in the other figures, communicates with the passage c in the point of the pile. Surrounding the outer pile A^2 is a thin metallic casing I and this casing is made in sections i, i', i^2, each section i' and i^2 having in-turned flanges forming shoulders at their inner ends and these flanges stop short of the adjoining section so as to form the jet openings at the shoulders. The passages g, g' communicate with the jet openings thus formed so that fluid will be forced out at the shoulders, allowing the pile to sink. After the casing has reached the depth desired then the form A^2 is withdrawn, leaving the shell I within the ground, as illustrated in Fig. 4, and this shell is filled with concrete, as shown in said figure, in any suitable manner.

In Fig. 5, I have shown a pile in which the outer form A^4 is made up of a series of shells m connected together by shouldered rings n and in these shouldered rings are the jet openings for disturbing the ground at the shoulders. The inner form B′ is made up of a series of tubes k connected together by rings k' which bear upon the inner shoulders of the outer form. The point C has shoulders upon which the inner and outer driving forms rest and also has passages c for the jetting water and an inner tube d communicates with these openings as in Fig. 1. This form of pile can be both driven and jetted simultaneously; water being admitted to the jet openings at the several shoulders as said shoulders reach the level of the ground.

In Fig. 6, I have shown a construction somewhat similar to Fig. 5, with the exception that the shells m' are of concrete and are preferably loosely connected to the shouldered ring sections n' which have jet fluid passageways connected by pipes leading to the butt end of the pile. The inner form B^2 is made up of a series of metal tubes k^2 screwed into rings k^3 which rest against the inner flanges on the ring section n'.

In Fig. 7, I have shown another form of pile which can be driven and jetted into the ground. In this pile the outer form a^5 is made of a continuous tube having shoulders at intervals and jet openings at the shoulders. The inner form is made similar to the form B′, Fig. 5, and there is an independent pipe d to admit fluid to the passages c in the point C′.

In each one of the piles there are jet openings at the shoulders, so that not only is the earth disturbed directly under the point of the pile, but at the several shoulders in order that the pile can be readily inserted into the ground by jetting, yet when the pile is in the ground the earth will pack under the shoulders as well as under the point and against the body of the pile, thus materially increasing the supporting capacity of the pile.

While I have shown the several zones between the shoulders of an even diameter throughout, it will be understood that they may be tapered and, in some instances, the pile may have the lower section of an even diameter throughout and the upper section tapered without departing from the essential features of the invention.

I claim:—

1. A pile having a plurality of shoulders successively increasing in diameter from the point to the butt, said pile having jet passages with outlets opening downwardly through the respective shoulders, the outlets at the different shoulders from the point to the butt being successively farther from the center of the pile.

2. A pile having an inner and an outer form and having inner and outer shoulders on the outer form and flanges on the inner form bearing upon the inner shoulders of the outer form, with jet passages carried by the inner form and communicating with the openings in the outer form at the shoulders.

3. A pile having a form provided with shoulders, and a point, with a casing consisting of a series of shells having in-turned flanges which form shoulders, the said flanges of one section terminating short of the body of the other section so as to form jet openings, and means for admitting the jetting fluid to the several jetting openings.

4. A pile having an outer form with inner and outer shoulders, an inner form, said inner form having flanges adapted to bear upon the inner shoulders of the outer form, and the outer form having independent jet passages leading to the several outer shoulders and to the point of the same, and means for projecting jetting fluid to the several passages, said inner form being capable of being driven so that the pile may be simultaneously driven and jetted into the ground.

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

LOUIS E. WELSH.

Witnesses:
WM. E. SHUPE,
WM. A. BARR.