

951,668.

Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

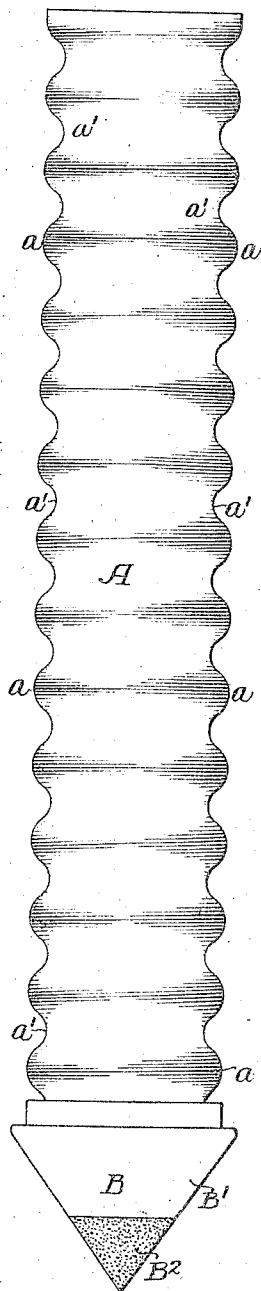


Fig. 2.

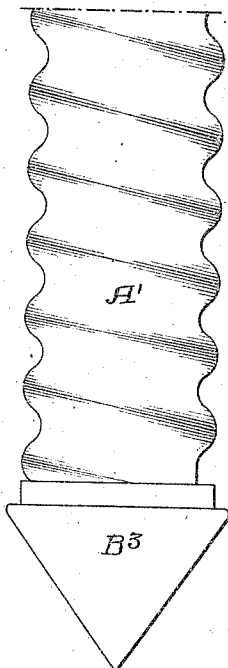


Fig. 8.

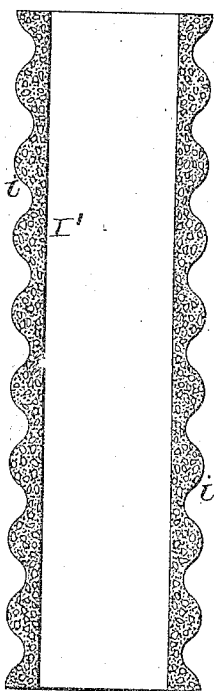


Fig. 6.

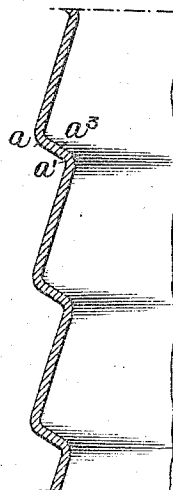


Fig. 9.



Fig. 7.

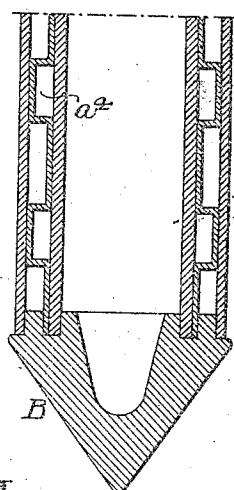


Fig. 10.

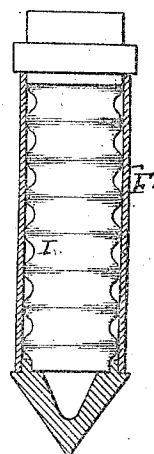


Fig. 11.



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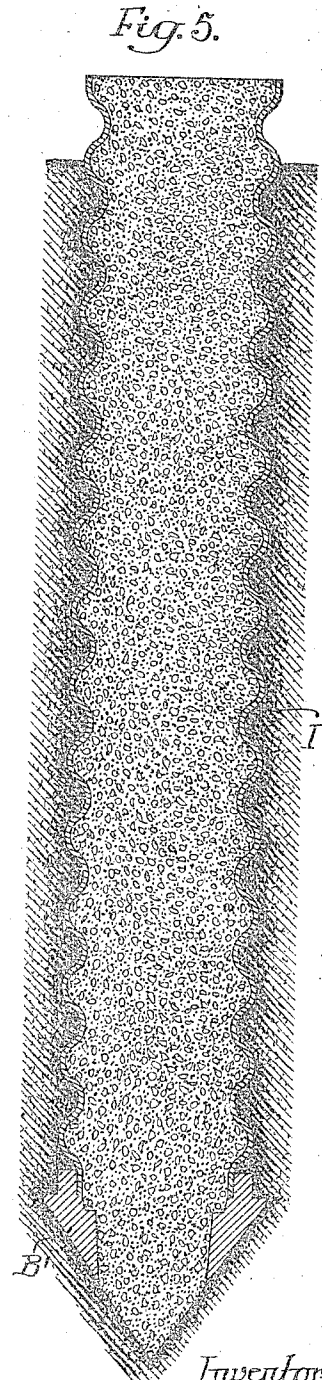
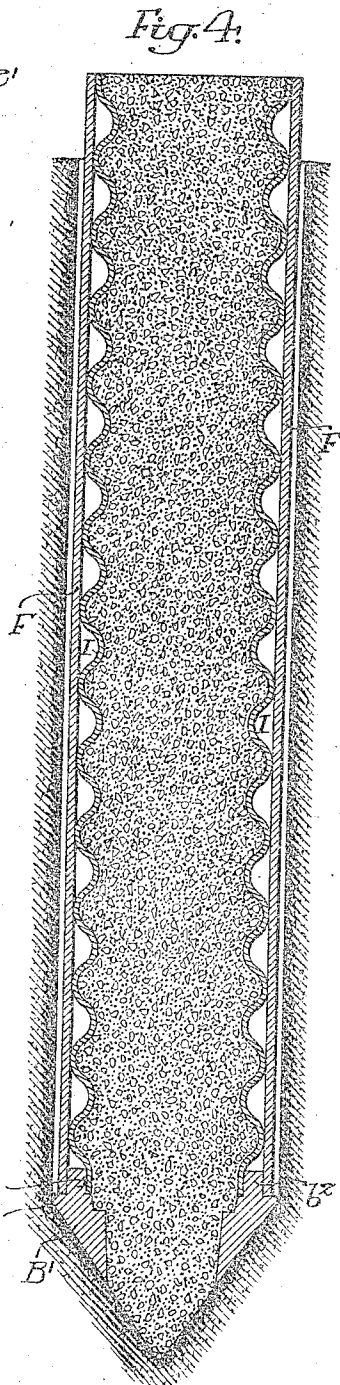
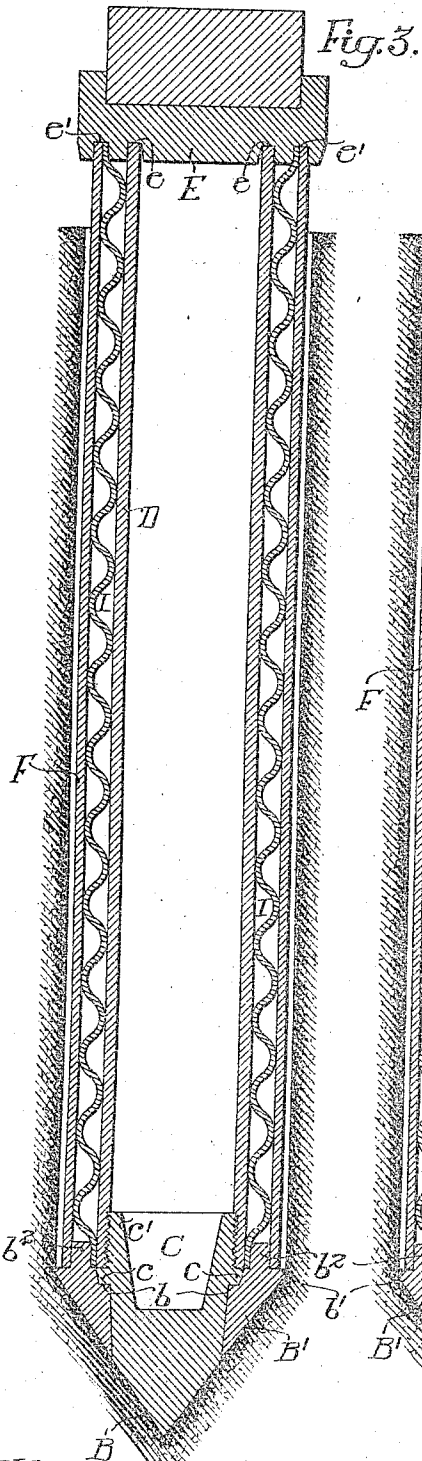
PILE.

APPLICATION FILED FEB. 20, 1909.

951,668.

Patented Mar. 8, 1910.

2 SHEETS—SHEET 2.



Witnesses
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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.

951,668.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed February 20, 1909. Serial No. 479,143.

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 concrete piles, and the object of my invention is to so construct a pile that it will carry a greater load than concrete piles of the ordinary construction, and this object I attain by forming a series of shoulders on the pile which will bear upon the earth at different points, thus materially increasing what may be termed the surface friction.

The pile is particularly adapted for use in ground which has an under strata of quicksand and where it is desirable to utilize the upper strata to support the pile.

In the accompanying drawings:—Figure 1, is a view in elevation of one form of my improved pile, the shoulders being formed by a series of corrugations; Fig. 2 is a similar view to Fig. 1, showing the shoulders in the form of a spiral; Fig. 3, is a sectional view showing the first step in inserting a pile of my improved construction into the ground; Fig. 4, is a sectional view showing the second step in the process; Fig. 5, is a sectional view showing the completed pile within the ground; Fig. 6, is a sectional view showing a modification of the form of corrugations; Fig. 7, is a view of another modification; Fig. 8, is a view showing the corrugations formed in a tubular concrete pile; Fig. 9, is a view showing a modification of the shell illustrated in Fig. 8; Fig. 10, is a view showing a modification of the method of driving the pile into the ground; and Fig. 11, is a view showing only a portion of the pile corrugated.

Heretofore concrete piles have usually been made with a smooth surface and of even diameter throughout their length, or have been made with a smooth surface and tapered. These are the two forms of piles now in common use.

Referring to the drawings A is the body portion of a concrete pile having a series of ribs a alternating with grooves a' ; the ribs, as illustrated in Fig. 1, being of annular form, but in some instances they may be in the form of a spiral, as illustrated in Fig.

2, without departing from the essential features of the invention.

B is the point of the pile which, in the present instance as illustrated in Fig. 1, consists of a metallic section B' and a concrete section B^2 ; the metallic point in this instance being hollow and the concrete of the pile extending through the hollow section and forming the extreme lower end of the pile. In Fig. 2, I have illustrated a solid point B^3 .

The corrugations in Fig. 1, are formed in a curve having the same contour throughout, but they may be formed as shown in Fig. 6, in which the lower edge of the rib a can be abrupt, as shown at a^3 , or they may be formed as at a^4 , Fig. 7, having square corners instead of round corners as shown in Fig. 1. The shape of the ribs may be modified in many ways without departing from the essential features of the invention.

In order to properly insert such a pile into the ground I use the device clearly illustrated in Fig. 3. B is the point, B' is the outer ring section and C is the inner section of the point having a flange c resting on a shoulder b on the ring section B' , as illustrated in the application for patent filed by me on the 29th day of December 1908, under Serial No. 469,834. Attached to this inner section C in the present instance is a tubular driving form D, this form is screw threaded at its lower end and adapted to a screw thread on an extension e' on the inner section of the point B. E is the driving head grooved at e to receive the upper end of the driving form D and surrounding this driving form is a protecting casing F resting on a shoulder b' and held in central position by a flange b^2 on the ring B' in the present instance, and this protecting casing is adapted to a groove e' in the head E. Mounted between the driving form D and the casing F, as illustrated in Fig. 3, is a corrugated tube I and this tube can be made of ordinary corrugated sheet metal bent into form and riveted, or may be made in tubular form in the first instance if desired, or instead of being of corrugated sheet metal this section may be made as shown at I', Fig. 8, of a concrete shell having a corrugated outer face i . The corrugations may be made as shown in Figs. 8 or 9, or may be modified to any form desired. When this corrugated

section is placed in position between the driving form D and the casing F the pile is driven in the ordinary manner and when driven to the depth desired the driving form with the central section C of the point, in the present instance, is removed leaving the interior of the corrugated shell exposed, an inspection can then be made throughout the entire length of the pile, or, on large piles, the earth under the pile can be dug out and properly prepared to receive the concrete as desired, and then a concrete filling is placed in the pile, as indicated in Fig. 4, after which the outer casing F can be removed, leaving the earth to come in direct contact with the corrugations of the pile, and, when one pile after another is driven, the earth is packed tightly against the concrete pile and the earth under each corrugation adds its support to the entire pile, making a very substantial support for the pile and increasing materially its carrying capacity.

It will be readily understood that the concrete shells shown in Figs. 8 or 9 may be used in place of the corrugated metal sections, and that these concrete shells may be reinforced with metal embedded in the concrete and when such a form is used as in Fig. 9, I prefer to make the reinforce also corrugated, so as to add materially to the strength of the structure.

The body of the pile may be reinforced in any manner desirable, and in some instances I may dispense with the inner form and drive entirely by the outer form, or casing F', as illustrated in Fig. 10. In this construction the point section is made solid and the seat for the driving casing F' is of sufficient width to receive the said casing and the corrugated tube may rest within the flange on the point section, so that the driving casing is held firmly between the point and the head.

In some instances the pile may also be corrugated for a portion of its length, as in Fig. 11, and the corrugated portion may be at the lower end, as shown in Fig. 11, or midway or at the top, depending considerably upon the character of earth into which the pile is driven.

While I prefer to introduce the corrugated tubular shell into the ground at the same time the hole is being formed to receive the pile, the shell may be introduced into the hole after it is formed without departing from the essential features of the invention.

While it is not absolutely essential to have the point of greater diameter than the protecting casing, I prefer to make it larger so as to avoid as much as possible the skin friction in driving the pile into the ground, and furthermore by making the point section larger than the casing I am enabled to more readily withdraw the casing after the pile has reached the depth required.

I claim:—

1. The process herein described of introducing a corrugated tube into the ground, said process consisting in providing a substantially smooth-surfaced tubular element forming a combined driving form and protective casing with a point section, mounting within said driving element a corrugated tubular shell, forcing said driving element by impact to form a hole in the ground and simultaneously introducing the tubular shell therein, and then withdrawing the protective driving element and leaving the point section and corrugated shell within the ground.

2. The process herein described of introducing a corrugated tube into the ground, said process consisting in providing a driving form and a substantially smooth-surfaced protective casing with a point section, mounting a corrugated tubular shell between the protective casing and the driving form, forcing said driving form and casing by impact to form a hole in the ground and simultaneously introducing the tubular shell therein.

3. The process herein described of forming a corrugated concrete pile, said process consisting in mounting a driving form and a protective casing on a driving point, introducing a corrugated tube or shell in the space between the driving form and the protective casing, forcing the point section through the medium of the driving form and the casing into the ground, carrying with it the corrugated tube or shell, removing the driving form so as to expose the inner surface of the tube or shell, filling said tube or shell with concrete, then removing the protective casing leaving the corrugated tube or shell within the ground with the body portion of concrete.

4. The process herein described of forming a corrugated concrete pile in the ground, said process consisting in providing a substantially smooth-surfaced tubular element forming a combined driving form and protective casing with a point section, mounting within said driving element a corrugated tubular shell, forcing said driving element by impact to form a hole in the ground and simultaneously introducing the tubular shell therein, filling said corrugated shell with concrete, and then withdrawing the protective driving element and leaving the point section and corrugated shell within the ground with the body portion of concrete.

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

LOUIS E. WELSH.

Witnesses:

JOS. H. KLEIN,
WM. A. BARR.