J. STEWART.

PILE.

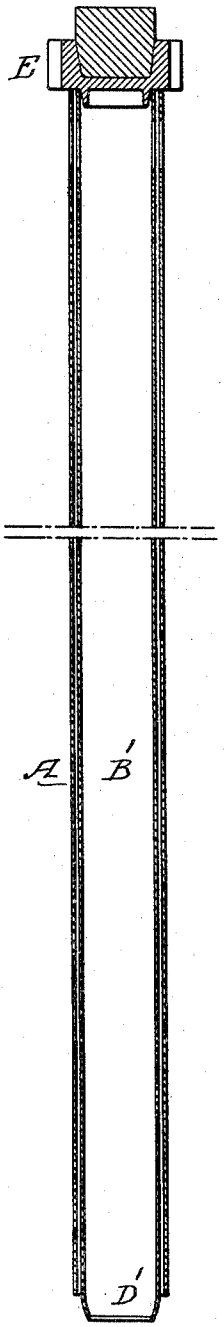
APPLICATION FILED MAY 31, 1912.

1,249,850.

Patented Dec. 11, 1917.

2 SHEETS—SHEET 1.

Fig. 3.



Witnesses—
Walter Chism
Wills A. Burrows.

Fig. 1.

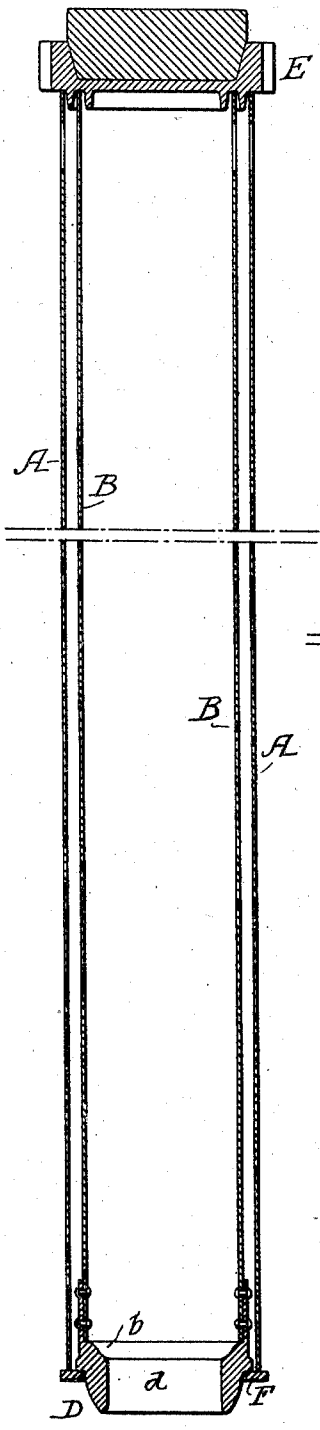
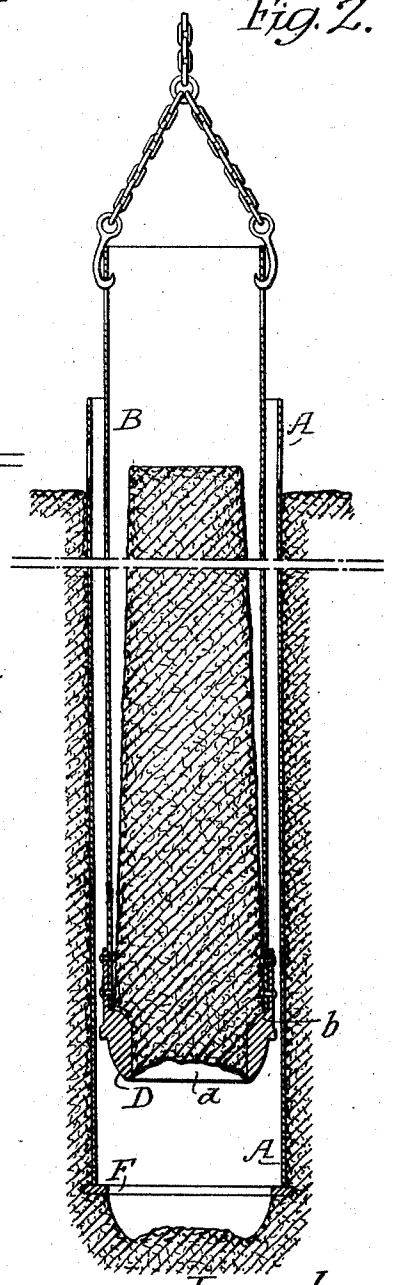


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

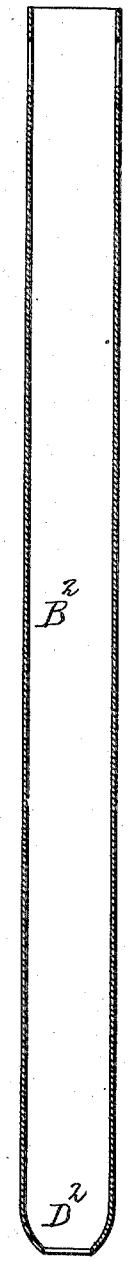


Fig. 5.

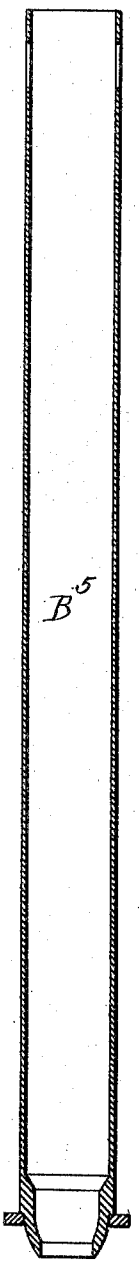


Fig. 6.

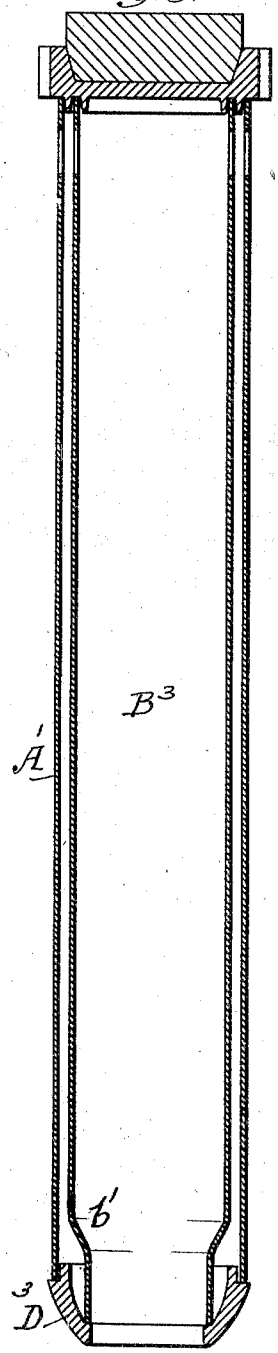
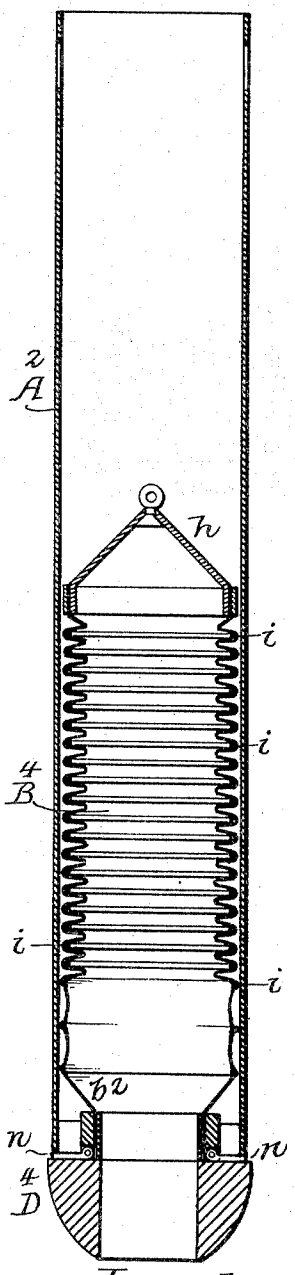


Fig. 7.



Witnesses.—
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UNITED STATES PATENT OFFICE.

JOHN STEWART, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO THE SIMPLEX CONCRETE PILING COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF THE DISTRICT OF COLUMBIA.

PILE.

1,249,850. Specification of Letters Patent. **Patented Dec. 11, 1917.**

Application filed May 31, 1912. Serial No. 700,810.

To all whom it may concern:

Be it known that I, JOHN STEWART, a citizen of the United States, residing in Washington, District of Columbia, have invented certain Improvements in Piles, of which the following is a specification.

The object of my invention is to provide means for forming in the ground concrete piles of large diameter, without the use of heavy and expensive apparatus; said piles thus formed possessing the advantage over piers built in the usual way in that the earth surrounding the pile is compacted to any degree desired; thus combining the great diameter and massive strength of the pier with the very desirable compression features of the pile.

This object I attain by so constructing the pile form that a portion of the earth displaced by the form will be driven into the walls of the opening, while the balance of the material will pass into the pile form and can be removed on the withdrawal of the form from the opening.

By using a form of this construction, I can materially increase the diameter of the opening for the reception of a pile as only a portion of the earth is compacted into the walls of the opening, while the remainder is removed.

When the present method of driving piles is employed, it is not possible without the use of exceedingly heavy and costly apparatus to drive a pile beyond a diameter of about twenty inches and a pile of this size would not be sufficient to support a heavy structure alone. Consequently, the present method is to drive a group of piles of comparatively small diameters and cap the group to afford sufficient support for a heavy structure.

By my invention I am enabled to increase the diameter of a pile to such an extent that one pile will carry the desired weight.

In driving a solid point pile, of large diameter, the compression of the earth would be more than a pile form would stand. By my invention, however, a pile of large diameter is driven into the ground with no more compression of earth than is found necessary and which will be practical.

In the accompanying drawings:—

Figure 1, is a vertical sectional view of a pile form illustrating my invention;

Fig. 2, is a sectional view showing the pile form driven to the desired depth and illustrating the inner form lifting the core;

Fig. 3, is a vertical sectional view illustrating the inner form and having an integral perforated point;

Fig. 4, is a vertical sectional view showing a single form having a contracted perforated point;

Fig. 5, is a vertical sectional view showing a single point and a loose ring surrounding the point;

Fig. 6, is a vertical sectional view showing a pile having an inner and an outer form, with a detachable perforated point; and

Fig. 7, is a view showing a metallic outer driving form and a flexible inner form to carry the core.

Referring in the first instance to Figs. 1 and 2, B is the inner form and A is the outer form. E is a head which extends over both the inner and the outer forms and is provided with a block through which the pile is driven by the ordinary pile driver. Near the upper end of each form are holes for the hooks, which are used to pull the forms out of the opening. At the lower end of the inner form in the present instance is a point D, perforated at *d*, and above the perforation within the inner form is a shoulder *b*. The outer form is preferably plain at the lower end. The point of the inner form has an exterior shoulder and a loose ring F extends around the point under the shoulder and under the outer form. The ring is preferably of a greater diameter than the outer form.

When the entire apparatus is driven into the ground, the ring F is carried with it and when the form B is pulled out, the ring F remains in the ground. Said ring serves the purpose of enabling the outer form A to be pulled out more readily, due to the fact that a larger hole has been formed in the ground than the outside diameter of the form A. It also makes the driving of the entire apparatus easier as the enlarged opening prevents the contraction of the ground around the outer form.

Thus it will be seen that as the forms are driven into the ground, a core of material will pass through the opening *d* in the point D and into the inner form B. All of that part of the earth passing through the opening and pushing up into the said form B is

a core, while the ground between the edges of the opening d in the point and the outside of the ring F is compressed outward into the surrounding earth forming the wall of the opening.

When the two forms A and B are driven together to the desired depth, the inner form B is raised and the core of earth pushed within the inner form B is of less diameter than the inside of the inner form and will not jam therein, so that when the inner form has been lifted and inverted, the core will be quickly discharged from said form.

In Fig. 3, I have shown the plain outer form A and the inner form B′ extended beyond the outer form and contracted to produce the perforated point D′. The outer surface of this point compacts the earth into the side walls, while the inner portion of the point forms the shoulder for retaining the core.

While I preferably employ an apparatus using an outer and an inner form, I may, in some instances, use a single tubular form B^2, as illustrated in Fig. 4, in which the end D^2 is reduced and shaped to form a point having a perforation at the center less in diameter than the inner diameter of the tube so as to produce a shoulder within the tube. This form may be used in firm ground.

In Fig. 6, I have shown an outer form A′ and an inner form B^3; the said inner form being reduced in diameter to form a shoulder b'. D^3 is a detachable perforated point, which is driven into the ground by the action of the driver upon both the inner and outer form and remains in the ground when the forms are removed. Upon the removal of the inner form, the core which has been projected into the form is engaged by the shoulder b' and removed with the inner form.

In Fig. 7, I have shown a modification in which the inner form consists of a collapsible tube B^4 of canvas or other flexible material, preferably reinforced with hoops i at intervals and provided with hinged lugs n, or other means, at the lower end to retain it in position when the pile form A^2 is driven into the ground. The lugs n extend between the end of the pile form A^2 and the detachable head D^4, which is notched at the upper end to allow the lugs to extend under the driving form A^2.

At the upper end of the tube B^4 is a cap h, which is lifted by the core as it is projected through the opening in the point D^4 when the pile form has been driven to the depth desired; the form A^2 being finally raised to release the lug n and the extended collapsible tube with the core therein resting upon the shoulder b^2 is removed from the tubular form A^2, after which the concrete is placed within the form and finally the form itself is removed. The cap is provided with a ring or other suitable device to be engaged by the lifting mechanism for removing the collapsible tube with the core.

In the use of forms above noted, when the inner forms have been removed, it will usually be found that a small quantity of loose hard pan will be left in the bottom of the opening. I preferably take a rammer of large diameter and pound the earth so as to form a solid bottom. The concrete is then discharged into the outside form and as the amount of concrete increases the outside form is raised, leaving in the ground a pile of large diameter, which will sustain great weights.

Thus the concrete may be rammed as the outside form is withdrawn, if found desirable. In other cases, I may fill the entire outer form with concrete and then remove the outer form.

It will be understood that these large diameter piles may be reinforced to any extent desired.

In Fig. 5, I have shown a single tubular form B^5 having both an inner and an outer shoulder at its lower end, and encircling the point directly under the external shoulder is a detachable ring F′ similar to the ring F in Fig. 1. This ring is of greater diameter than the tubular form so that the hole is made larger than the form and consequently the form can be driven and removed much easier than if there was no projection at the lower end.

I claim:—

1. The combination of an outer form and a hollow inner form, said inner form extending beyond the end of the outer form and having a large opening at its lower end communicating with the interior of the form, the said inner form having an internal shoulder near its lower end so that a core of earth passing through the opening will be held by the shoulder.

2. The combination of an outer form and an inner form, said inner form extending beyond the end of the outer form and having a large longitudinal opening therein, said inner form having an annular shoulder and an outer tapered displacing surface extending below the outer form.

3. The combination of an outer form and an inner form, said inner form extending beyond the end of the outer form and having a reduced perforated portion and an external shoulder; and a detachable ring resting against said shoulder and against the end of the outer form.

4. The combination of an outer and an inner form; means for driving both forms at the same time, the inner form extending beyond the outer form and having a driving point; a longitudinal opening in said point of a less diameter than the inner diameter of the inner form; and a shoulder at the

lower end of the inner form to retain the core of earth which passes into the inner form when the pile forms are driven.

5. The combination of an outer and an inner driving form, said inner form projecting beyond the outer form and having a reduced opening therein forming a shoulder within the inner form; a loose ring surrounding the lower portion of the inner form and extending under the outer form, said ring being greater in diameter than the outer form; and means for driving both forms simultaneously.

6. The combination of a tubular form having a perforated point at its lower end and arranged to receive a core of earth and having an internal and external shoulder; also at the lower end; and a detachable ring encircling the point of the pile below the external shoulder so that as the form is driven into the ground it will drive the ring with it but, when the form is removed, the ring will remain in the ground.

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

JOHN STEWART.

Witnesses:

FRANK SHUMAN,

W. C. BURKHOLDER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."