No. 887,175. PATENTED MAY 12, 1908.

H. ABBOTT.

METHOD OF FORMING FOUNDATIONS.

APPLICATION FILED NOV. 25, 1907.

2 SHEETS—SHEET 1.

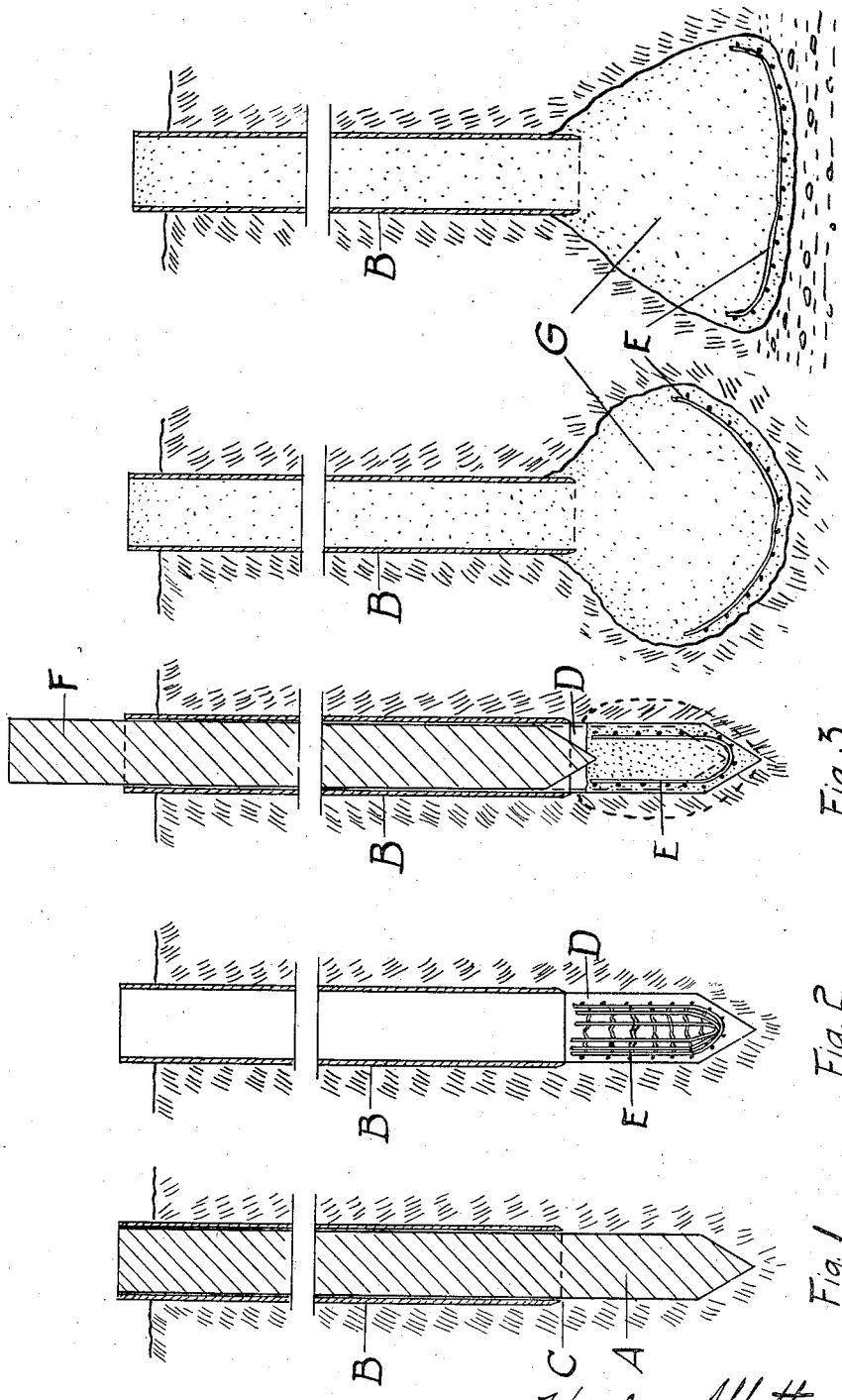


Fig. 5

Fig. 4

Fig. 3

Fig. 2

Fig. 1

Witnesses

E. C. Head.

Richard L. Hatmaker.

Hanley Abbott Inventor

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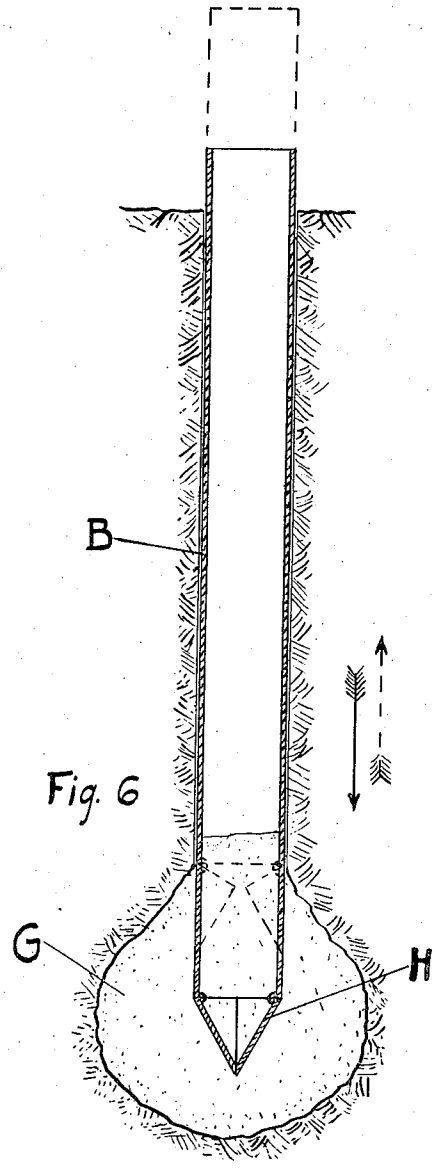


Fig. 6

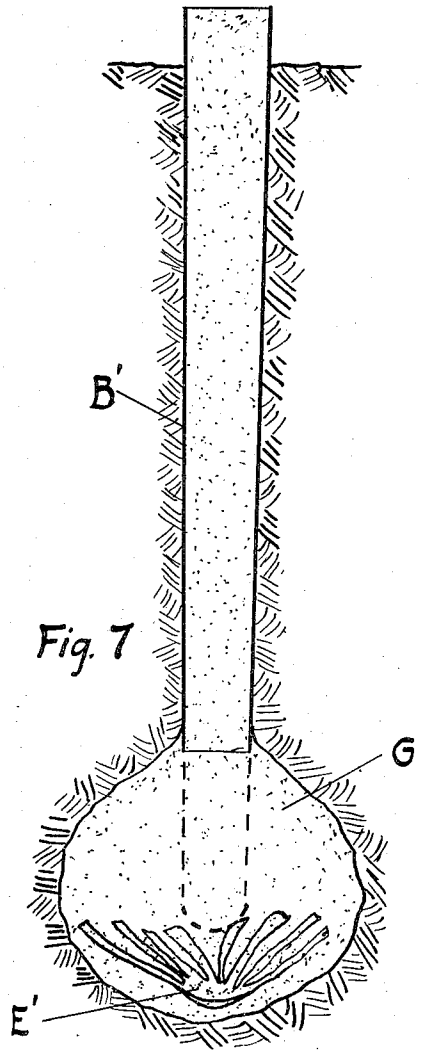


Fig. 7

Witnesses
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HUNLEY ABBOTT, OF NEW YORK, N. Y.

METHOD OF FORMING FOUNDATIONS.

No. 887,175. Specification of Letters Patent. Patented May 12, 1908.

Application filed November 25, 1907. Serial No. 403,815.

To all whom it may concern:

Be it known that I, HUNLEY ABBOTT, a citizen of the United States, residing at New York, New York county, New York, have invented a new and useful Method of Forming Foundations, of which the following is a specification, reference being had to the accompanying drawings, in which like reference characters designate like parts.

My invention relates to improvements in the method of forming foundations in the ground and more especially foundations of plastic material such as cement or concrete or of granular material such as sand, gravel or rock, and has for its object the formation of enlarged footings or pedestals for piles, columns, telegraph poles, anchorages, and the like, whereby the column, pole, pile, anchorage or other structure, is enabled to sustain a greater load in soft, yielding or treacherous soil.

In the accompanying drawings which are merely illustrative of apparatus capable of executing the method. Figure 1 is a vertical sectional view of a shell and core forced into the ground. Fig. 2 is a similar view with core removed. Fig. 3 is a similar sectional view with a portion of the foundation material in place and the rammer descending, the dotted line showing position of rammer and foundation material at the end of the stroke. Fig. 4 is a vertical sectional view through the completed pedestal. Fig. 5 is a vertical sectional view through pedestal showing the modified form taken when the underlying strata is firmer than the strata above. Fig. 6 is a vertical sectional view of a modification showing a reciprocating shell having a movable closure at its lower end. The shell in its downward stroke is shown by full lines, and in its upward stroke, by dotted lines. Fig. 7 is a vertical sectional view of a further modification, wherein the bottom of a closed shell has been cut off and slit to form reinforcing. The dotted lines show the original condition of the bottom of the shell.

A pointed core A surrounded by a shell B the size of the desired pile, column, pole, etc., is forced into the ground to the desired depth, (Fig. 1). The juncture C between the lower end of the shell and the core is made in such a manner as to prevent ingress of the soil but not so as to prevent the withdrawal of the core from the shell. The core A is then withdrawn leaving a cavity D below the end of the shell B. If desired a sheet of reinforcement of mesh metal or rods E may be folded into a cup shape and placed, (closed end down), within the cavity D. A quantity of concrete or other foundation material approximately sufficient to fill said cavity D is placed therein. The rammer F is then inserted in the shell B and forced down into this mass of material, thereby the material is pushed out in all directions and the surrounding soil is forced back and compacted. This operation of placing foundation material and ramming is repeated until the protuberance, pedestal or footing G is of the desired size. It will be seen that the cupped sheet of reinforcing will spread out as the ramming proceeds and will be at the lower side of the pedestal where it will take possible tensile stresses, tie the whole mass of foundation material together and aid it to assume a regular symmetrical form. This reinforcing will usually be embedded in the pedestal to some extent due to the material forcing out between the meshes. If it is desired to more deeply embed the reinforcement a quantity of material is placed and rammed in the cavity before the reinforcement is placed therein. The subsequent ramming proceeds as before stated. It will also be seen that any rock, boulder or gravel in the soil adjacent to the cavity will offer a greater resistance to the ramming and will tend to partially embed itself in the foundation material as the latter is forced out by the ramming, thereby becoming part of the pedestal and increasing its effective size.

In a soil of a uniform density the pedestal formed will be roughly spherical as in Fig. 4 and its effective bearing area may be readily estimated from the quantity of material rammed. In soft soils underlaid by firmer strata the core A may be driven to firmer strata and a pedestal formed in the soft soil just over the firmer. The pedestal will then flatten out on the lower side where it comes in contact with the firmer strata forming a roughly conical shape as in Fig. 5 It is not necessary for the execution of this method to use the exact form of shell and core shown. In lieu of a core the shell may be capped with a detachable plug, the shell forced into the ground and withdrawn a distance to form the cavity. In this case the plug will remain at the bottom of the cavity and become part of the pedestal. Or the bottom of the shell could be provided with a closure H which would prevent the ingress of soil during driv-

ing but which would open up on withdrawing the shell a distance so that by placing loose foundation material within the shell and reciprocating the latter, the foundation material would pass through the closure into the cavity upon the upward stroke of the shell and be rammed by the shell on its downward stroke as the closure would then be shut. See Fig. 6. Thus dispensing with a separate core and rammer. Again, a shell B′ with a closed lower end could be forced into the ground, the said lower end of shell ruptured, cut off and removed or cut off and slit to form reinforcing as at E′ in Fig. 7 and the pedestal formed as hereinbefore described.

After the pedestal is formed the space thereabove may be filled with foundation material also reinforced or not, the shell being left in the ground or withdrawn according to the nature of the soil. Or any suitable connection may be made between the pedestal and the load to be sustained, such as a structural column, anchor rod, post, or pole. A very economical distribution of material is effected, consisting of a slender column or anchorage just large enough to carry the load and a footing enlarged sufficiently to distribute this load over a great area of soil. This enlarged footing gives a bearing area equal to a solid pier of a diameter corresponding to the maximum diameter of the enlarged footing with a consequent saving of foundation material.

It will be seen that this method relates to the formation of underground foundations without the necessity of excavating obviating the attendant trouble, consumption of time, danger and expense..

Formed as it is by driving and compressing the soil this pedestal offers great resistance to both vertical and lateral forces. It may be used as pile footing, column base, telegraph pole or fence post footing, or anchorage to resist other than vertically downward forces as in guys for chimneys or chimney foundations, and the like.

In forming these foundations a number may be developed adjacent to each other so as to merge one into the other so that they unite into one unitary structure and the piles or columns built thereon may be braced together at the top forming a system of great rigidity, offering especially high resistance to lateral forces.

I claim—

1. A method of forming a footing in the ground which consists of forming a cavity therein, void of any lining placing foundation material within said cavity then forcing said material outwardly against the walls of the cavity thereby forcing back and compressing the surrounding soil so that an enlarged footing is formed, substantially as described.

2. A method of forming a footing in the ground which consists of forming a cavity therein, void of any lining placing foundation material within said cavity then forcing said material outwardly against the walls of the cavity, repeating these placing and filling operations, and thereby forcing back and compressing the surrounding soil so that an enlarged footing is formed, substantially as described.

3. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing down a shell into the ground, forming a cavity below the lower end of the shell, placing into this cavity foundation material and ramming, repeating the placing and ramming operations thereby forming an enlarged mass of the foundation material which is the aforementioned pedestal, footing or anchorage, substantially as described.

4. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing down a shell into the ground, placing foundation material below the lower end of shell, ramming the material, thereby forming an enlarged mass of the foundation material, substantially as described.

5. A method of forming a pedestal, footing, or anchorage in the ground which consists in forcing down a shell into the ground, placing foundation material below the lower end of shell, ramming the material, repeating the placing and ramming operation, thereby forming an enlarged mass of the foundation material, substantially as described.

6. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing a form into the ground, so that an unlined cavity is formed placing foundation material within this cavity, ramming this material, and repeating these placing and ramming operations, thereby forcing back the surrounding soil, so that an enlarged mass of foundation material is formed, substantially as described.

7. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing a form into the ground, so that an unlined cavity is formed placing foundation material at the lower end of the cavity, ramming this material, and repeating these placing and ramming operations, thereby forcing back the surrounding soil, so that a mass of foundation material is formed at the lower end of the cavity of greater diameter than the said form, substantially as described.

8. A method of forming a footing in the ground which consists of forming a cavity therein, placing reinforcing metal in the cavity, placing foundation material within said cavity, then forcing said reinforcing and foundation materials outwardly against the walls of the cavity, thereby forcing back and compressing the surrounding soil so that an enlarged reinforced footing is formed, substantially as described.

9. A method of forming a footing in the ground which consists of forming a cavity therein, placing reinforcing metal in the cavity, placing foundation material within said cavity, then forcing said reinforcing and foundation materials outwardly against the walls of the cavity, repeating these placing and filling operations, and thereby forcing back and compressing the surrounding soil so that an enlarged reinforced footing is formed, substantially as described.

10. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing down a shell into the ground forming a cavity at the lower end of the shell, placing into this cavity reinforcing metal and foundation material and ramming, repeating the placing and ramming operations thereby forming an enlarged reinforced mass of the foundation material which is the aforementioned pedestal, footing, or anchorage, substantially as described.

11. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing down a shell into the ground, placing reinforcing metal and foundation material at the lower end of shell, ramming the material, thereby forming an enlarged reinforced mass of the materials, substantially as described.

12. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing down a shell into the ground, placing reinforcing metal and foundation material at the lower end of shell, ramming the material, repeating the placing and ramming operations, thereby forming an enlarged reinforced mass of the materials, substantially as described.

13. A method of forming a pedestal, footing or anchorage in the ground which consists in forcing a form into the ground, placing reinforcing metal and foundation material at the lower end of the cavity so formed, ramming these materials, and repeating these placing and ramming operations, thereby forcing back the surrounding soil, so that an enlarged reinforced mass of foundation materials is formed, substantially as described.

14. A method of forming a pedestal, footing, or anchorage in the ground which consists in forcing a form into the ground, placing reinforcing metal and foundation material at the lower end of the cavity so formed, ramming these materials, and repeating these placing and ramming operations, thereby forcing back the surrounding soil, so that a reinforced mass of foundation materials is formed at the lower end of the cavity of greater diameter than the said form, substantially as described.

15. A method of forming a footing in the ground which consists in forcing into the ground a shell having at its lower end a driving point, removing said point, placing foundation material in the cavity so formed, below the lower end of the shell forcing said material outwardly against the walls of the cavity, thereby compressing and forcing back the surrounding soil so that an enlarged footing is formed, substantially as described.

16. A method of forming a footing in the ground which consists in forcing into the ground a shell having at its lower end a driving point, removing said point, placing reinforcing metal and foundation material in the cavity so formed, forcing said materials outwardly against the walls of the cavity, thereby compressing and forcing back the surrounding soil so that an enlarged reinforced footing is formed, substantially as described.

17. A method of forming a footing in the ground which consists in forcing into the ground a shell having at its lower end a driving point, removing said point, placing foundation material in the cavity so formed, below the lower end of the shell forcing said material outwardly against the walls of the cavity, thereby compressing and forcing back the surrounding soil so that an enlarged footing is formed, then filling the hole formed by the shell with foundation material, substantially as described.

18. A method of forming a footing in the ground which consists in forcing into the ground a shell having at its lower end a driving point, removing said point, placing reinforcing metal and foundation material in the cavity so formed, forcing said materials outwardly against the walls of the cavity, thereby compressing and forcing back the surrounding soil so that an enlarged reinforced footing is formed, then filling the hole formed by the shell with foundation materials, substantially as described.

HUNLEY ABBOTT.

Witnesses:
E. C. HEALD,
RICHARD L. WATMAUGH.