No. 779,880. PATENTED JAN. 10, 1905.

C. SHUMAN.

FORMING CONCRETE PILES AND PREPARATORY PILES THEREFOR.

APPLICATION FILED APR. 12, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

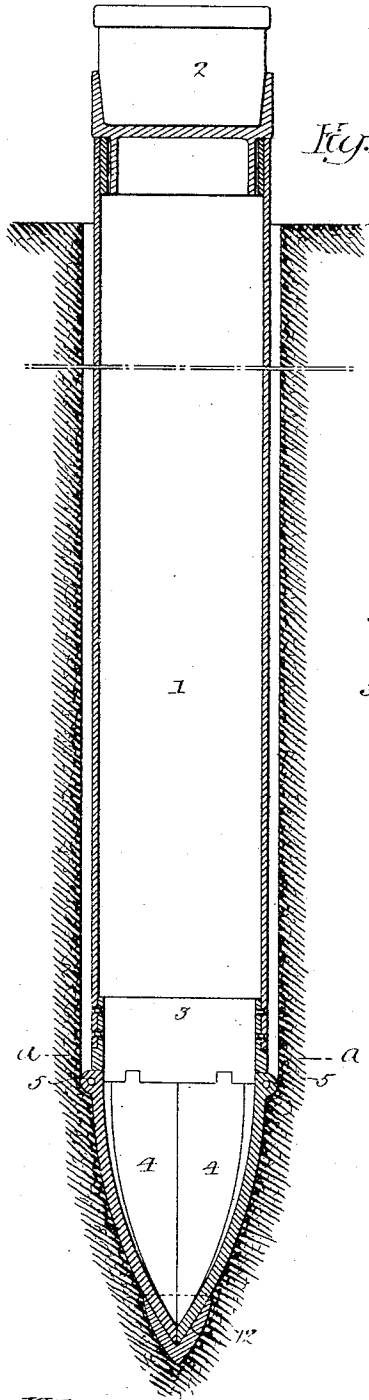


Fig. 2.

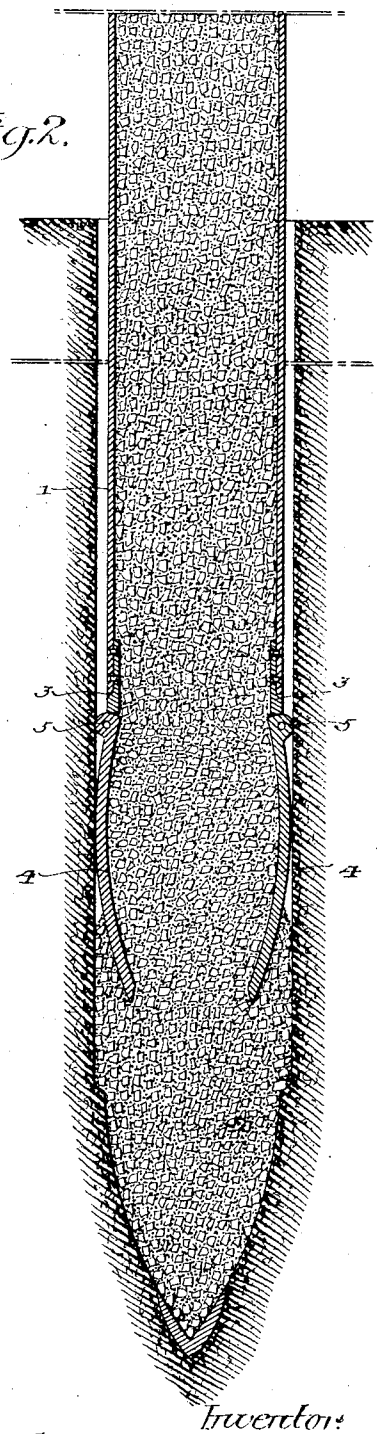
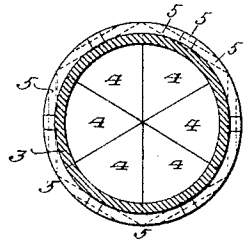


Fig. 3.



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Inventor:
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by his Attorneys,
Howson & Howson

PHOTO-LITHOGRAPHED BY SACHETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

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3 SHEETS—SHEET 2.

Fig. 4.

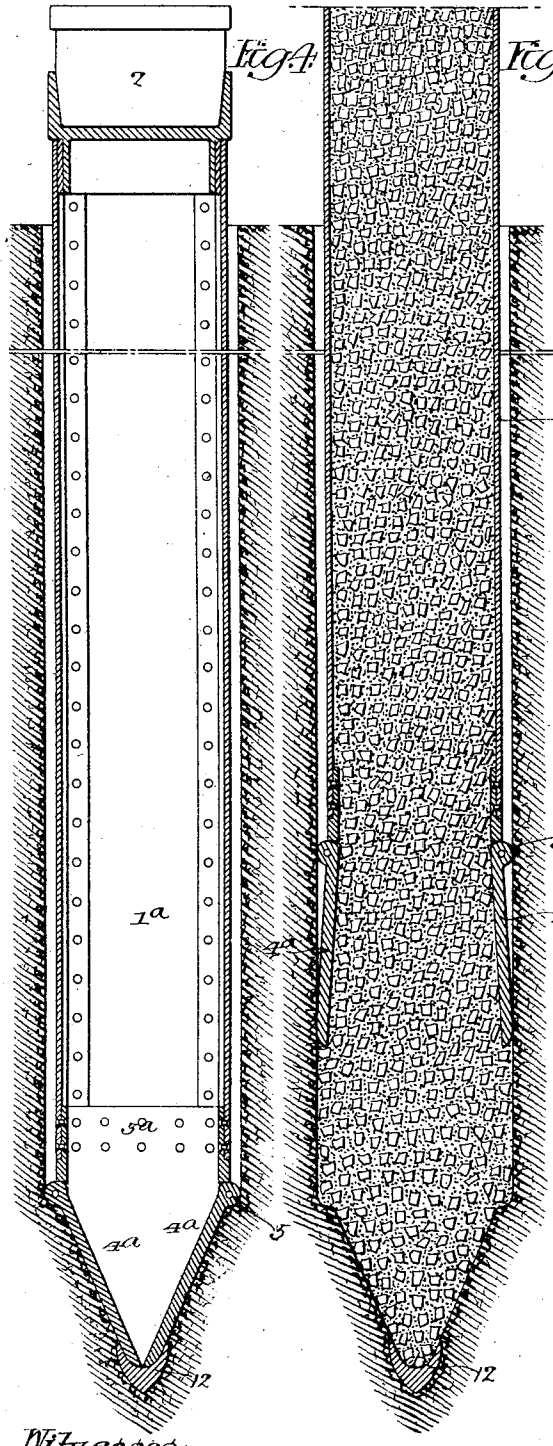


Fig. 5.

Fig. 6.

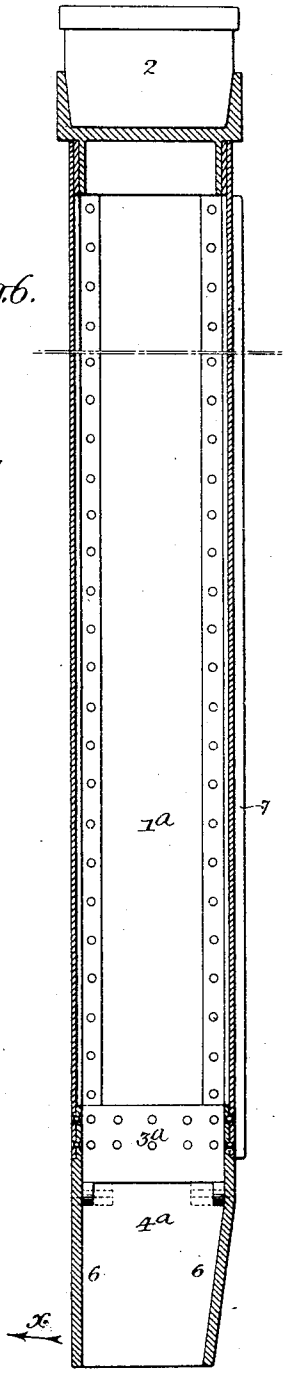


Fig. 7.

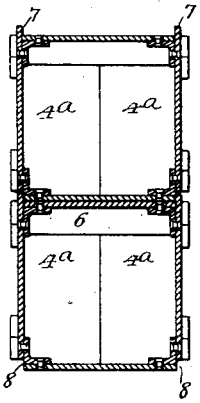
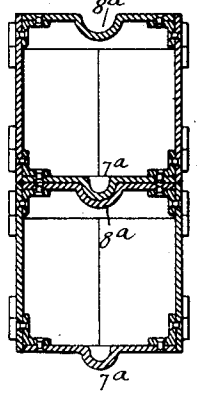


Fig. 7a.



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3 SHEETS—SHEET 3.

Fig. 11

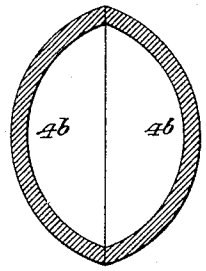


Fig. 8.

Fig. 9.

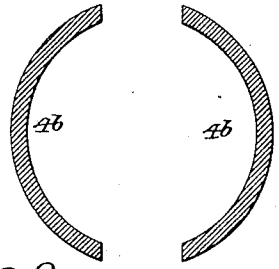
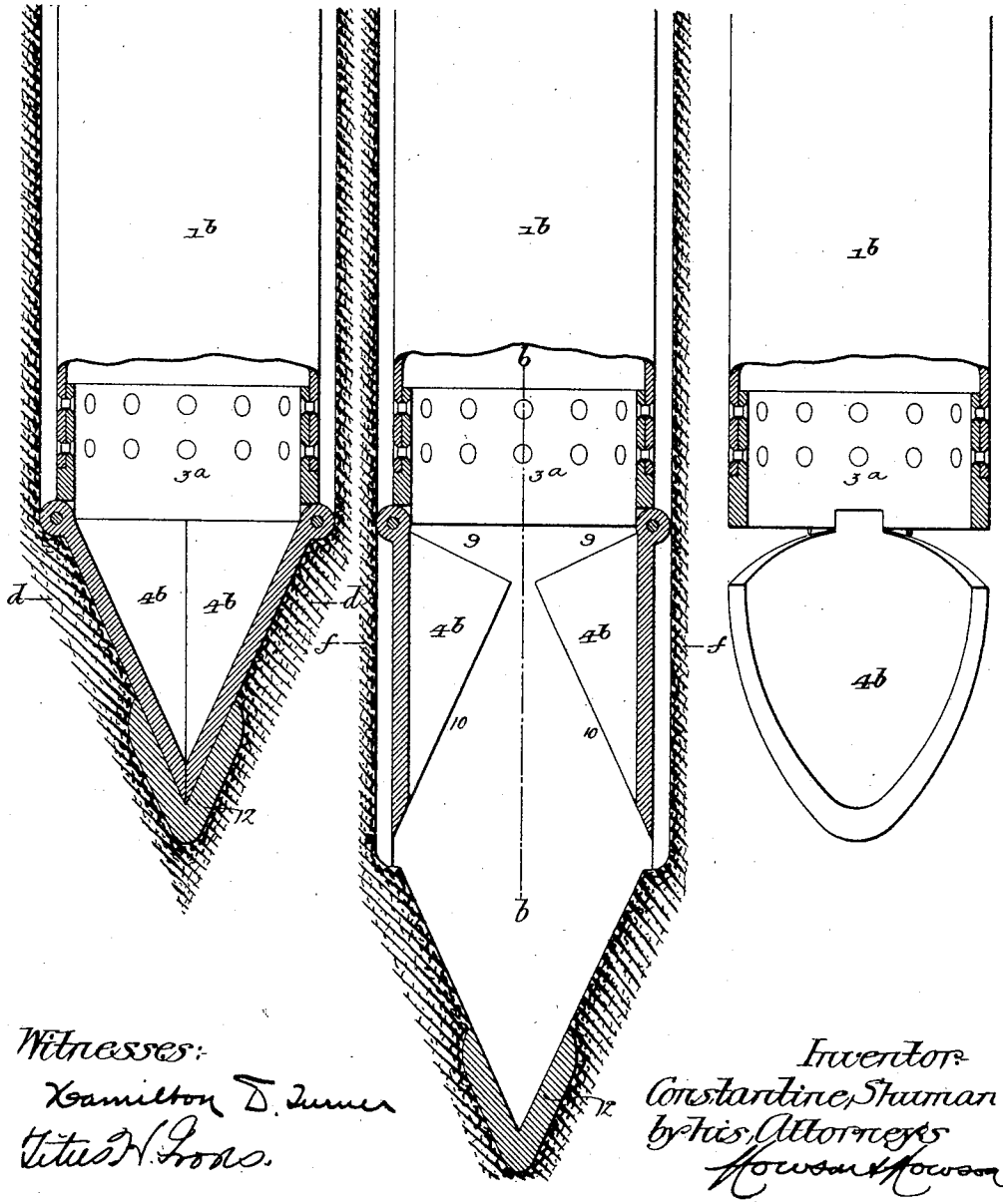


Fig. 12.

Fig. 10.



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No. 779,880. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

CONSTANTINE SHUMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO FRANK SHUMAN, OF PHILADELPHIA, PENNSYLVANIA.

FORMING CONCRETE PILES AND PREPARATORY PILES THEREFOR.

SPECIFICATION forming part of Letters Patent No. 779,880, dated January 10, 1905.

Application filed April 12, 1904. Serial No. 202,875.

To all whom it may concern:

Be it known that I, CONSTANTINE SHUMAN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Forming Concrete Piles and in Preparatory Piles Therefor, of which the following is a specification.

My invention relates to that method of forming concrete piles which consists in first driving into the ground a hollow preparatory pile and then filling the opening thus formed with the concrete of which the permanent pile is to be composed, said concrete being fed into the opening through the hollow pile and said hollow pile being either slowly or intermittently withdrawn as the filling in of the concrete progresses or being withdrawn after it has been completely filled with concrete, so as to permit the latter to flow from its lower end into the opening. Hitherto the hollow preparatory pile has for this purpose been provided with a detachable point at its lower end, said point being permitted to remain at the bottom of the opening when the hollow pile was withdrawn, so that it served as a base or foundation for the concrete pile.

The object of my present invention is to dispense with the use of this detachable point, and this object I attain by the use of a hollow pile having a valved lower end, the leaves or members of the valve being so shaped as to form a closed and preferably tapered point thereon to facilitate the driving of the pile, but being so hung to the hollow pile that when the latter is being withdrawn they can swing outwardly, and thus provide for the free egress of the concrete from the lower end of the hollow pile.

In the accompanying drawings, Figure 1 is a view illustrating the formation of an opening in the ground by means of a preparatory pile having a valved lower end in accordance with my present invention. Fig. 2 is a view illustrating the position of the valve members during the withdrawal of the hollow pile and the filling in of the concrete through the same. Fig. 3 is a sectional plan view of the pile on the line *a a*, Fig. 1. Figs. 4 and 5 are views similar to Figs. 1 and 2, respectively, but illustrating the use of another form of preparatory pile made in accordance with my invention. Fig. 6 is a transverse section of said pile. Fig. 7 is a sectional plan view of two of said piles disposed side by side. Fig. 7ª is a similar view illustrating a modification. Fig. 8 is a view, partly in section and partly in elevation, of another form of preparatory pile embodying my invention, the parts being shown in the relation occupied by them during the driving of the pile. Fig. 9 is a similar view showing the relation of the parts when the preparatory pile is being withdrawn. Fig. 10 is a transverse section on the line *b b*, Fig. 9. Fig. 11 is a sectional plan view on the line *d d*, Fig. 8; and Fig. 12 is a sectional plan view on the line *f f*, Fig. 9.

The hollow preparatory pile 1 (shown in Fig. 1) is of cylindrical cross-section and has at its upper end a suitable driving-head 2 and at its lower end a ring 3, to which are pivoted the upper ends of the various members 4 of the valve which constitutes the point or closure for the lower end of the hollow pile during the driving operation, these members or sections of the valve being so formed that when they are closed together a tapering point or closure for the lower end of the hollow pile will be produced, so as to facilitate the driving of the same into the ground. In order to further facilitate such driving operation, the butts 5 of the hinges whereby the valve members are pivoted to the lower end of the preparatory pile are so formed as to constitute a rib of slightly greater diameter than the pile 1, so as to form, in effect, an enlarged head or point and relieve the sides of the pile 1 from frictional contact with the walls of the opening formed by the driving of said pile into the ground, as shown in Fig. 1. In order to protect the pointed lower ends of the valve members 4 from the shock or strain which would otherwise be exerted upon them during the driving of the preparatory pile, as well as to firmly lock these valve members together during the driving operation, I provide a shoe 12, to which the lower ends of the valve members are snugly fitted, this shoe having any desired external configuration which

will not interfere with the driving of the same into the ground. When the driving of the pile has been completed the concrete of which the permanent pile is to be composed is introduced into the hollow pile and the latter is then withdrawn vertically, the valve members 4 swinging outwardly, as shown in Fig. 2, so as to permit of the free egress of the concrete from the lower end of the hollow pile, said concrete consequently as the hollow pile is withdrawn filling the opening which was formed by the driving of said pile, the shoe 12 remaining at the bottom of the opening, as shown in Fig. 2. The concrete may be gradually fed into the hollow pile as the latter is being withdrawn, or, on the other hand, the hollow pile may be filled with concrete before beginning to withdraw the same.

It will be evident that by providing the hollow preparatory pile with a valve at the lower end in the manner described the use of a detachable point to be left in the opening is rendered unnecessary and the expense of such detachable point is saved, the expense of the small shoe 12 being inconsiderable.

The hollow preparatory pile shown in Figs. 4 to 7 is of rectangular instead of cylindrical cross-section, and its valved lower end or point consists of two members which on the withdrawal of the pile can swing down into line with the sides of the pile to which they are hinged. Hence it is not necessary with a pile of this character to form an opening in the ground of larger size than the pile itself in order to permit of the swinging open of the valve members, as in the pile shown in Figs. 1 and 2. The hinge-butts 5 in this pile project beyond the sides of the pile, and consequently form grooves or channels in the sides of the opening; but it will be evident that the hinges may be so constructed that no portion of the same will project beyond the sides of the pile. The point member 3^a of this pile has but two swinging sides or valve members 4, the other two sides 6 being permanent and the swinging sides or valve members either closing against the edges of these permanent sides if the latter are of the proper wedge shape or swinging between said permanent sides if the latter retain their full width. One of the permanent sides 6 of the point member 3^a of this pile is preferably beveled or inclined transversely, as shown in Fig. 6, so that in driving the pile there is a constant tendency to move the point of the same laterally or in the direction of the arrow x, Fig. 6, a pile of this character being designed especially for being driven closely side by side with another pile of the same character, so that the lateral thrust imparted to the point of the pile by the beveled side 6 of said point tends to cause it to bear firmly against the side of a previously-driven pile and prevent the entrance of earth between the two during the driving operation. In order to lock together and maintain in a straight line a series of these piles which are being successively driven side by side, each pile has at one side projecting edge flanges 7, as shown in Fig. 7, and at the opposite side corresponding recesses 8, so that the flanges of one pile can enter the recesses of an adjoining pile, and thus serve to hold the series in proper alinement, as shown in Fig. 7. In the pile shown in Fig. 7^a a central projection 7^a on one side of the pile and a corresponding central recess 8^a on the opposite side of the pile take the place of the edge flanges and recesses of the pile shown in Fig. 7.

The pile shown in Figs. 8 to 12 is of cylindrical cross-section, and its valved lower end or point is so constructed that its members when open will occupy the same plane as the walls of the pile, and hence can open to the full extent in an opening of the same diameter as the pile itself. Each of these valve members 4^b when open constitutes a segment of a circle of the same diameter as that of the pile 1^b, but has its upper and inner edges 9 and 10 beveled, as shown in Fig. 9, so as to permit of the closing together of the two members, as shown in Fig. 8, after the manner of the two shells of a clam or mussel, the relation of the members when closed being as represented in Fig. 1 and their relation when open being that represented in Fig. 12. In this pile, as in that shown in Figs. 4 to 7, the projecting butts of the hinges whereby the valve members 4^b are hung to the ring 3 form grooves or channels in the walls of the opening produced by driving the pile into the ground; but the hinges may be so constructed as to present no portions projecting beyond the pile, if desired.

In both the pile shown in Figs. 4 to 7 and in that shown in Figs. 8 to 12 the projecting and retaining shoe 12 is employed for the same purpose as in the pile shown in Figs. 1 and 2.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The mode herein described of forming concrete piles, said mode consisting in providing a hollow preparatory pile with valve members normally closing its lower end, driving said pile into the ground, and then withdrawing the same with its valve members, and as it is being withdrawn, introducing concrete through it into the opening which it has formed, said concrete escaping between the open valve members at the bottom of the preparatory pile.

2. The mode herein described of forming concrete piles, said mode consisting in providing a hollow preparatory pile with valve members normally closing its lower end, locking and protecting the lower portions of said valve members by means of a shoe applied thereto, driving said preparatory pile and shoe into the ground, and, as it is being withdrawn, filling

concrete through it into the opening which it has formed, said concrete escaping between the open valve members.

3. A hollow preparatory pile for concrete piling, said pile having swinging valve members which normally close its lower end.

4. A hollow preparatory pile having swinging valve members which normally close its lower end and form a tapering nose or point thereon.

5. A hollow preparatory pile having swinging valve members which normally close its lower end and form a tapering nose or point thereon, and a shoe engaging the lower ends of said valve members, and serving to protect and retain them during the driving of the pile.

6. A hollow preparatory pile having swinging valve members which normally close the lower end of the pile, and which, when open, are substantially in line with the sides of the pile.

7. A hollow preparatory pile having a point structure with opposite stationary sides and opposite swinging valve members which normally close the lower end of the pile.

8. A hollow preparatory pile having a point structure with opposite stationary sides and opposite swinging valve members which normally close the lower end of the pile, one of said stationary sides being inclined or beveled so as to impart side thrust to the point of the pile as it is being driven.

9. A hollow preparatory pile having at its lower end a point structure, one of whose sides is beveled so as to impart side thrust to the point of the pile as it is being driven.

10. A hollow preparatory pile having portions whereby it can be locked laterally to an adjoining pile.

11. A hollow preparatory pile, having portions whereby it can be locked laterally to a pile adjoining the same on each side.

12. A hollow preparatory pile having portions whereby it can be locked laterally to an adjoining pile, and having a point structure with inclined or beveled side which imparts side thrust to the pile as it is being driven.

13. A hollow preparatory pile having portions whereby it can be locked laterally to a pile on each side of the same, and having a point structure with inclined or beveled side which imparts side thrust to the pile, as it is being driven.

14. A hollow preparatory pile having edge flanges or recesses whereby it can be locked laterally to an adjoining pile.

15. A hollow preparatory pile, having edge flanges and recesses whereby it can be locked laterally to a pile adjoining the same on each side.

16. A hollow preparatory pile having edge flanges or recesses whereby it can be locked laterally to an adjoining pile, and having a point structure with inclined or beveled side which imparts side thrust to the pile as it is being driven.

17. A hollow preparatory pile having edge flanges and recesses whereby it can be locked laterally to a pile on each side of the same, and having a point structure with inclined or beveled side which imparts side thrust to the pile, as it is being driven.

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

CONSTANTINE SHUMAN.

Witnesses:

JAMES MCMORRIS,

JOS. H. KLEIN.