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J. WRIGHT

PILE STRUCTURE AND METHOD OF FORMING SAME

Filed Dec. 26, 1923

Fig. 1.

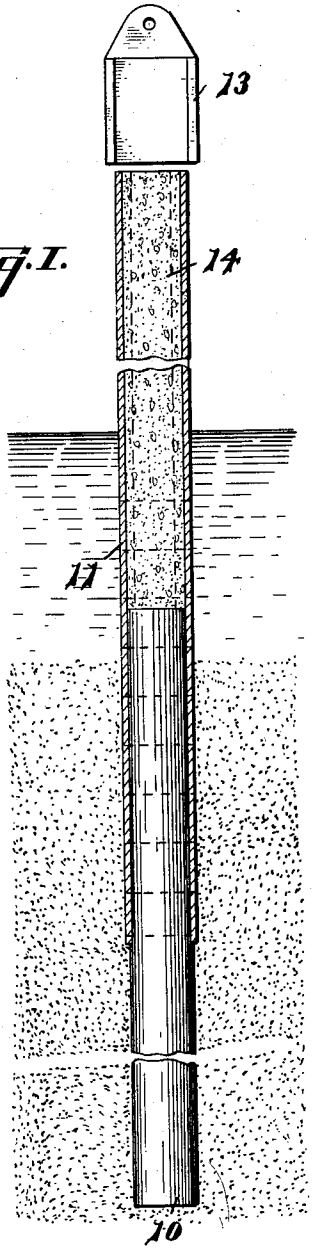


Fig. 2.

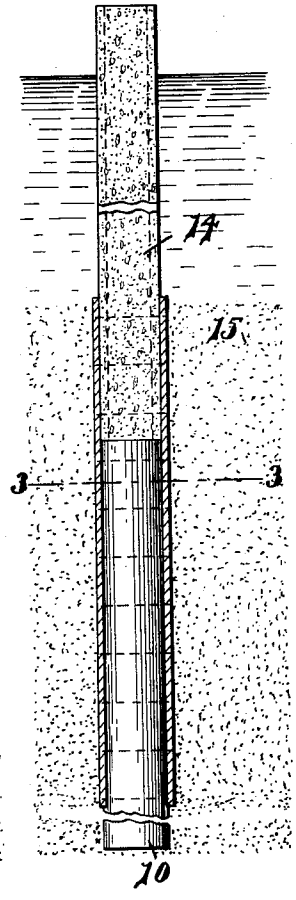
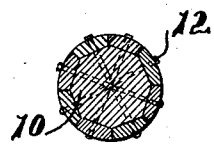


Fig. 3.



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UNITED STATES PATENT OFFICE.

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PILE STRUCTURE AND METHOD OF FORMING SAME.

Application filed December 26, 1923. Serial No. 682,613.

To all whom it may concern:

Be it known that I, JOSEPH WRIGHT, citizen of the United States, residing at the city and county of San Francisco, and State of California, have invented new and useful Improvements in Pile Structures and Methods of Forming Same, of which the following is a specification.

This invention relates to a pile structure and a method of forming the same. More particularly the invention has to do with piles of the type intended for use in water and having a concrete upper portion extending below the mud-line and a wooden lower portion.

The object of the invention is to reduce the cost of constructing a composite pile of this general nature; to facilitate driving of the same, and to render the concrete section more durable.

The advantage of a composite pile having a wooden lower portion and a concrete upper portion has long since been recognized, particularly for marine uses. Wooden piles when used in salt water quickly deteriorate, being subject to attack by marine borers. Solid concrete piles are expensive, and being heavily reinforced with iron they are difficult to handle, and on account of their great weight their load-carrying capacity is considerably reduced. They are also subject to breakage while being driven, and cracks or chips may develop which will expose the reinforcement to the destructive action of the salt water. Such composite piles as have proposed heretofore have been unsatisfactory for various reasons. A composite pile having a precast concrete portion is undesirable, due to the liability of breakage when being driven under the impact of a hammer. Another proposal contemplates driving the ordinary wooden pile and then sinking a wooden form around the same to the required depth and filling the latter with concrete. However, such wooden forms are difficult to drive, due to their light weight and the skin friction which develops within and without the walls thereof. Furthermore, the concrete, being poured after the form is driven into place, cannot be sufficiently compacted to produce a structure of the required density for marine uses.

In the present invention I connect a wooden form directly to the wooden pile by suitable fastening means, and drive the wooden pile by impact on the top of the wooden form, filling the latter with plastic concrete during driving. Thus I am enabled to utilize the weight of the concrete to assist in driving the pile. Also, the concrete, due to the blows of the hammer, is compacted and rendered impervious to the action of the salt water. The pile is driven to a depth which will bring the wooden section below the mud-line. After the concrete is sufficiently set, that part of the wooden form above the mud-line may be removed if desired.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings. in which—

Fig. 1 shows a vertical central sectional view of a composite pile embodying my invention in the initial stages of driving;

Fig. 2 shows a similar view of the same pile after it has been driven into place and the wooden form above the mud-line removed;

Fig. 3 shows a cross-section of the pile, taken on the line 3—3 of Fig. 2.

Referring in detail to the accompanying drawing, I show a composite pile having a lower wooden portion 10, connected with the upper end of which is a suitable form 11, preferably of wooden staves, fastened to the wooden pile. The ordinary wooden pile is cylindrical, and I prefer to shape the upper end thereof octagonal as shown in Fig. 3, and then construct the form of eight wooden staves which are connected to the end of the wooden pile at suitable intervals by cross-bolts, 12. However, the cross-sectional shape of the pile and the form is immaterial.

The wooden pile is driven by impact on the upper end of the wooden form with a hammer 13 or otherwise, and after the wooden pile has been driven a suitable distance, the wooden form is filled with plastic concrete 14. The weight of this concrete will assist in driving the pile, and the blows of the hammer on the form will serve to compact the concrete so as to increase its density and render it impervious to the salt water. The driving is continued until the wooden pile passes below the mud-line 15, as indicated in Fig. 2. Thereafter the wooden form may be cut away above the mud-line for re-use, leaving that portion below the mud-line intact, to serve as a splice.

Among the advantages of a composite pile of the character described may be mentioned

that of weight. In soft mud the dead load of a solid concrete pile ninety feet long is over fifteen tons, whereas a composite pile of the type herein described and of the same length, is but four tons. This would give the composite pile an extra carrying capacity of eleven tons over a solid concrete pile.

A further advantage is that of cost. A solid concrete pile, with its elaborate reinforcement, costs about $3.50 per linear foot driven, as against a cost of about $1.50 per linear foot driven, of the pile of the present invention.

Various changes in the construction and arrangement of the several parts herein shown and described may be employed, without departing from the spirit of my invention as disclosed in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. A method of forming a composite pile for marine work, having a lower wooden portion and an upper concrete portion, which consists in connecting a suitable form to the upper end of the wooden pile, filling said form with plastic concrete, and thereafter driving the pile by impact upon the upper end of the form, whereby the concrete, due to the blows of the driver, is compacted and rendered impervious to the action of salt water, and the wooden portion of the pile is forced below the water level.

2. A method of forming a composite pile for marine work, having a lower wooden portion and an upper portion of concrete, which consists in permanently connecting a wooden form to the upper end of the wooden pile so as to leave a hollow space above the wooden pile of substantially the same cross-sectional area as the wooden pile, filling said form with plastic concrete, and thereafter driving the pile by impact upon the upper end of the form, whereby the concrete, due to the blows of the driver, is compacted and rendered impervious to the action of salt water, and the wooden portion of the pile may be sunk below the water level, and thereafter cutting away that portion of the form projecting above the water level.

3. A composite pile for marine work formed of a wooden lower portion and an upper portion of concrete of substantially the same cross-sectional area, and means for joining the two parts together and providing a form whereby the wooden lower portion may be driven below the water line and the concrete section poured during driving, said means comprising wooden staves securely bolted to the wooden pile and extending above the same, and reinforcing means carried by the staves for imbedding in the concrete, said staves being adapted to be cut away from the concrete portion for some distance below the water level after the concrete has become set.

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