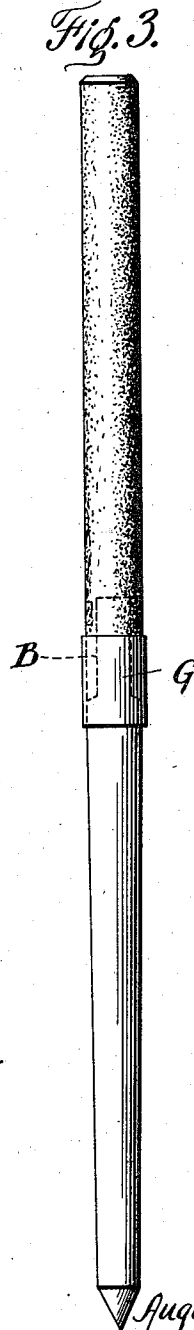
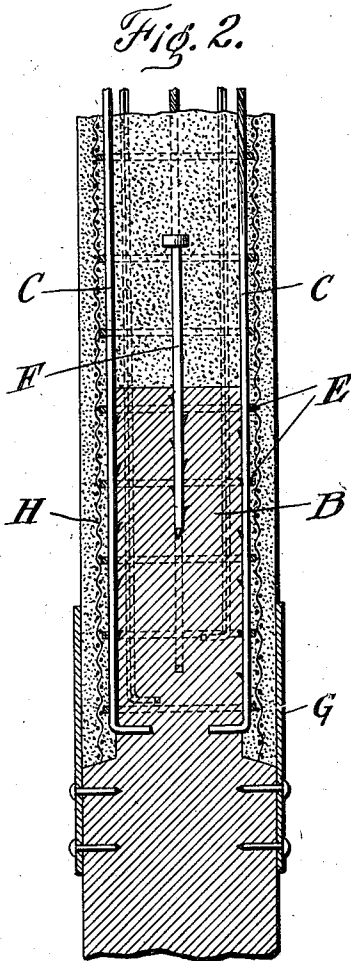
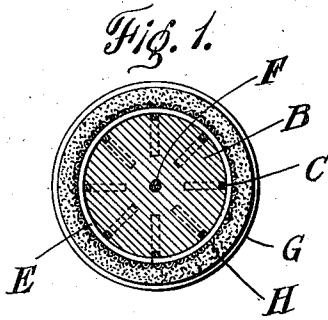


A. GUNDERSEN.  
 PILE.  
 APPLICATION FILED NOV. 27, 1911.

1,019,042.

Patented Mar. 5, 1912.



Witnesses  
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# UNITED STATES PATENT OFFICE.

AUGUST GUNDERSEN, OF CHRISTIANIA, NORWAY, ASSIGNOR OF ONE-HALF TO OLAF HOFF, OF NEW YORK, N. Y.

PILE.

1,019,042.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed November 27, 1911. Serial No. 662,543.

*To all whom it may concern:*

Be it known that I, AUGUST GUNDERSEN, a subject of the King of Norway, residing at Christiania, in the Kingdom of Norway, have invented certain new and useful Improvements in Piles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention consists of a foundation pile of which the lower part is made of wood and the upper part of reinforced concrete.

The object is to construct a pile which possesses the good qualities of a wooden pile, and a reinforced concrete pile as well, and at the same time not subject to the defects of either. The reinforced concrete pile will, when the lower end consisting of wood is driven down below the lowest low water, be just as imperishable as a pile consisting of concrete throughout, at the same time being a great deal cheaper and easier to handle and drive. Such a pile can besides be constructed in very great lengths, and can therefore be used to a great advantage in deep foundations where the ground water is very low, in the building of docks, quays, etc.

One way of constructing the pile is shown in the accompanying drawings, in which:—

Figure 1 is a transverse section through a pile embodying the invention; Fig. 2, a vertical central section; and Fig. 3 an elevation of the complete pile.

The connection between the wooden pile and the concrete pile can preferably be made as shown in Figs. 1 and 2, and the upper end of the wooden pile can preferably be shaped as shown in the drawing. The reinforcing rods C in the concrete, either all or only some of them, are brought down along the shaped end B of the wooden pile. The rods are bent to a right-angle at the lower end and hammered into holes prepared in the wooden pile. These holes are bored of the same dimension, or a trifle smaller than that of the rods so as to make a close driving fit. When more than two reinforcing rods are used the lower ends of these are forced into the wood at different elevations so that the wood will not be weakened too much at any one point.

In order that the reinforcing rods may be fastened to the wood in the best possible manner the smooth iron rods may be provided with barbs on the side next to the wood although this is not necessary. De-

formed reinforcing rods especially with knobs or flat rods provided with teeth may be used to advantage.

In order to hold the reinforcing rods tight against the wooden pile the circular rings E are used and should preferably be made to a tight fit, heated and forced on while hot so that when cooled they will force the reinforcing rods tight against the wood and hold them there, or wire may be wound spirally around the rods and wooden core. In the center of the wooden pile is a long iron rod F which may preferably be provided with barbs as shown and a head on its upper end. This rod or bolt acts principally against shearing off between the concrete and wood. On the lower end of the shaped part of the wooden pile an iron casing G is nailed for the purpose of protecting the concrete at this point; the length of this sleeve along the concrete may be varied, it may reach up to the upper end of the wooden pile or even farther. Outside of the rings E can be placed a layer of wire netting H fastened both to the wood and to the reinforcement. This netting will serve to tie together the concrete cast around the shaped end of the wood so that it will not crack and fall off during driving. The reinforcement of the concrete above the wooden pile is done in the usual manner. The driving of the pile can be done either by jetting or by drop hammer or steam hammer in the usual manner.

It is self-evident that the connection between the reinforced concrete pile and the wooden pile can be made in several other ways beside the one described without affecting the new principle, namely the combination of an upper part of reinforced concrete with a lower part of wood.

What I claim is:—

1. A pile comprising a lower wood portion, and an upper portion of cementitious material reinforced by metallic members that are also anchored in the wood portion.

2. A pile comprising a lower wood member having a reduced, formed upper end portion, an upper member of cementitious material formed around and secured over the formed end portion, and reinforcing members for the cementitious portion that extend along the formed wooden portion and are embedded therein.

3. A pile comprising a lower wood por-

tion, an upper portion of cementitious material reinforced by metallic members that are also anchored in the wood portion, and a central rod embedded in the concrete and anchored in the wooden portion.

4. A pile comprising a lower wood portion, an upper portion of cementitious material enveloping the upper part of the wood portion, and reinforcing members for the cementitious portion anchored in the enveloped part of the wood portion.

5. A pile comprising a lower wood portion, an upper portion of cementitious material enveloping the upper part of the wood portion, reinforcing members for the cementitious portion anchored in the enveloped part of the wood portion, and a sheathing band around the upper and lower portion adjacent their outer junction.

6. A pile comprising a lower wood portion, an upper portion of cementitious material enveloping the upper part of the wood portion, and longitudinally disposed metallic reinforcing members extending along the enveloped portion with lateral projections embedded therein.

7. A pile comprising a lower-wood portion, an upper portion of cementitious material enveloping the upper part of the wood portion, longitudinally disposed metallic reinforcing members extending along the enveloped portion with lateral projections embedded therein, and metal bands encircling the wood and reinforcements and forcing the latter into the wood.

8. A pile comprising a lower wood portion, an upper portion of cementitious material enveloping the upper part of the wood portion, longitudinally disposed metallic reinforcing members extending along the

enveloped portion with lateral projections embedded therein, metal bands encircling the wood and reinforcements and forcing the latter into the wood, and a central metal tie rod embedded in the cementitious material and embedded in the wood.

9. A pile comprising a lower wood portion, an upper portion of cementitious material enveloping the upper part of the wood portion, longitudinally disposed metallic reinforcing members extending along the enveloped portion with lateral projections embedded therein, metal bands encircling the wood and reinforcement and forcing the latter into the wood, a central metal tie rod embedded in the cementitious material and embedded in the wood, and a metallic sheathing band around the pile at the outer line of junction of the two portions.

10. A pile comprising a lower wood portion having an upper formed end part of reduced diameter, an upper portion of cementitious material molded around the formed end part, longitudinally disposed reinforcing members in the upper portion extending along the formed end part with lateral projections inturned into the wood, metallic shrink bands forcing the reinforcements into the wood, a central tie rod embedded in the cementitious portion and anchored in the wood and a metal sheathing band enveloping the parts around their outer line of junction.

In testimony whereof I affix my signature in presence of two witnesses.

AUGUST GUNDERSEN.

Witnesses:

OLAF HOFF, Jr.,  
HENRY BORDEWICH.