Oct. 2, 1923. 1,469,611

H. R. ASSERSON

CONCRETE PILE AND THE LIKE

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Fig. 2.

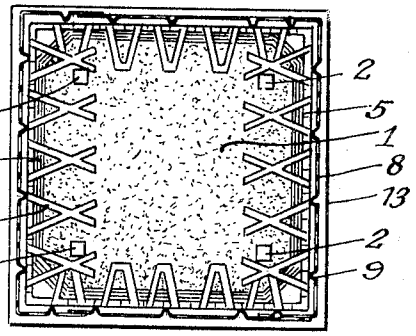


Fig. 1.

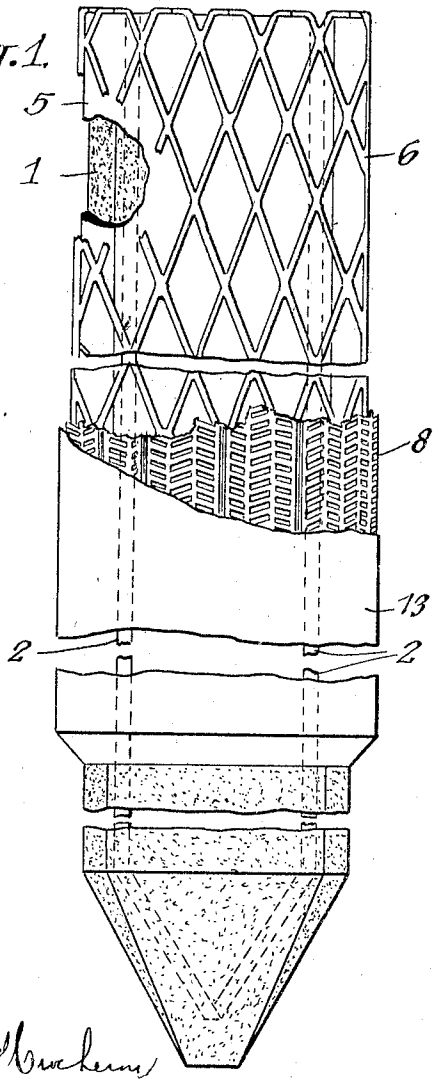
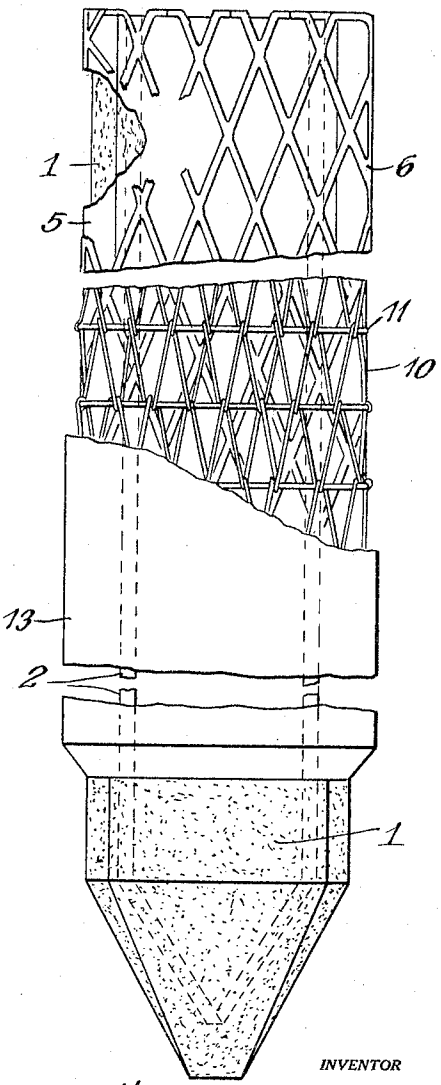


Fig. 3.



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Fig. 4.

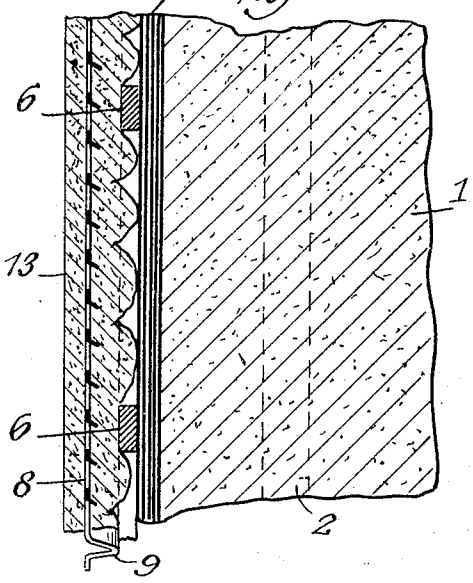


Fig. 5

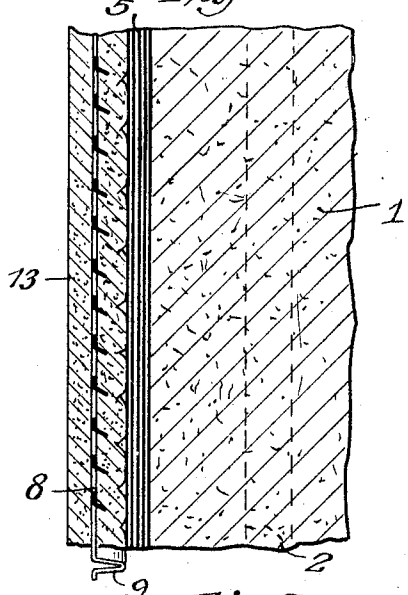


Fig. 6.

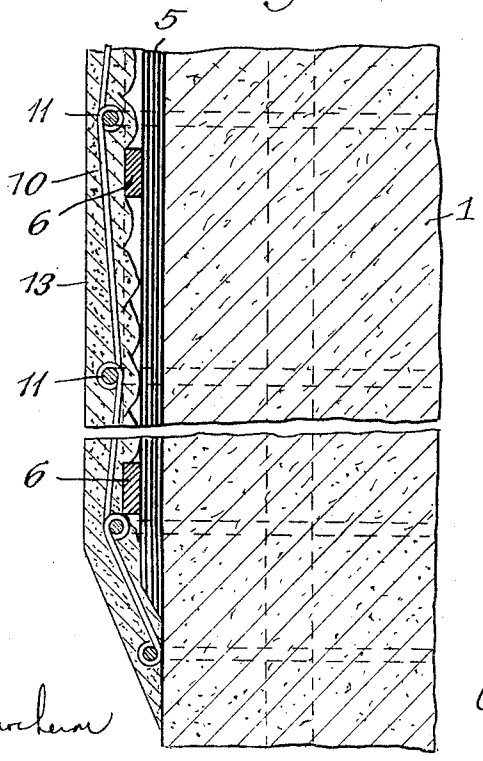
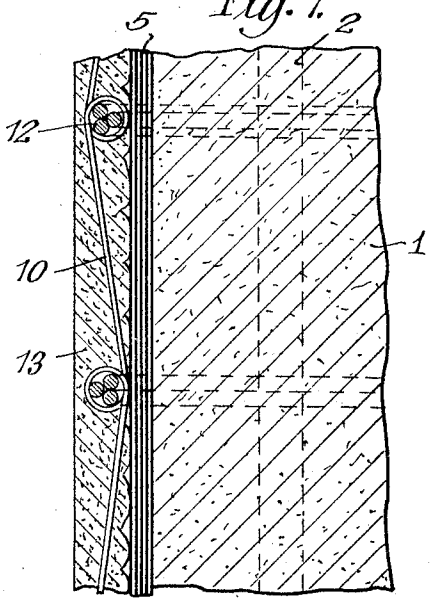


Fig. 7.



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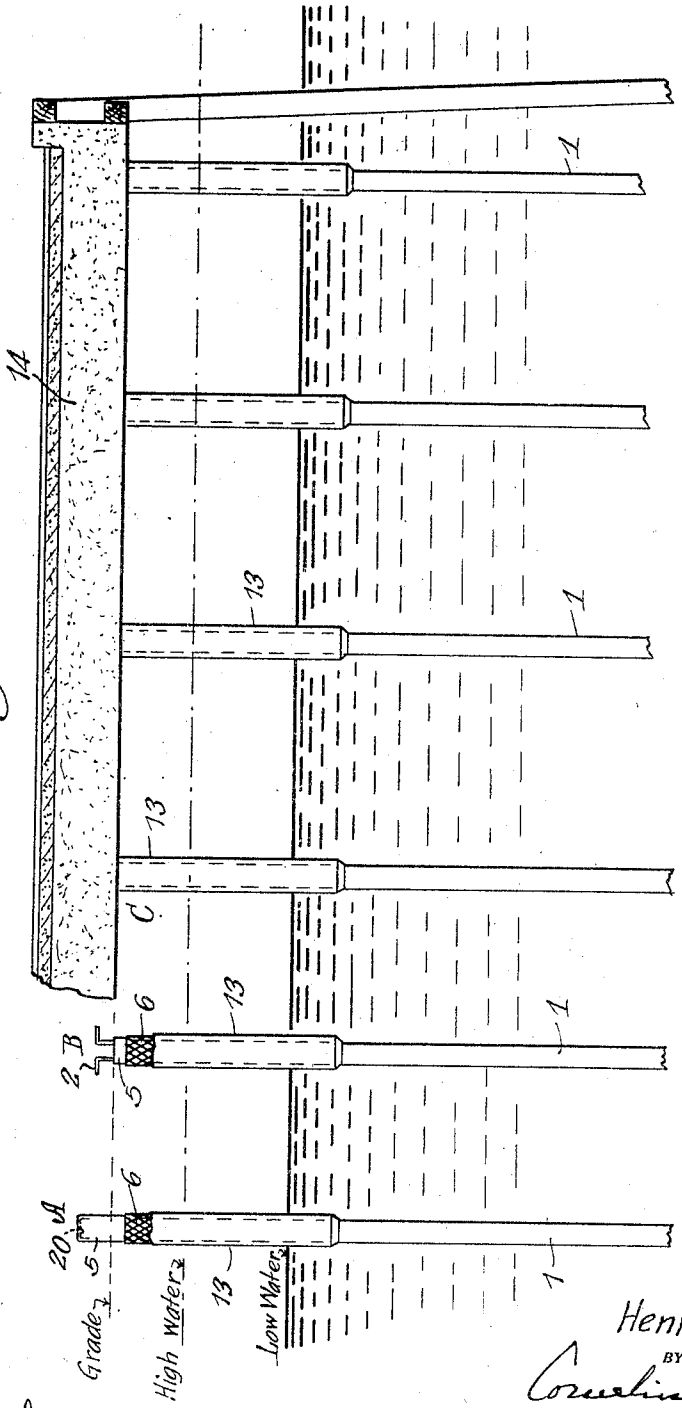
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Fig. 8.



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Patented Oct. 2, 1923. 1,469,611

UNITED STATES PATENT OFFICE.

HENRY R. ASSERSON, OF NEW YORK, N. Y.

CONCRETE PILE AND THE LIKE.

Application filed March 10, 1921. Serial No. 451,414.

To all whom it may concern:

Be it known that I, HENRY R. ASSERSON, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Concrete Piles and the like, of which the following is a specification.

My invention relates especially to concrete piles and the like built up in such a manner as to resist the deleterious influence of the acids of dissolved sulphates contained in sea and tidal waters, and also built in such a manner as to prevent decomposition by said acids combined with frost and ice to that portion of the concrete piles, which extend between the limits of high and low tide.

One of the objects of this invention is to produce concrete piles and structures which will withstand the damage and deterioration from sea and tidal water in either hot, temperate or cold climates. Another object of this invention is to produce a pile or the like having a skin or outer portion formed of such material that sea water, or sea water in combination with frost or ice, will be prevented from injuring or decomposing the cement ingredient of the concrete contained in the inner portion or central part of the concrete pile or structure. Another object is to provide a structure of this character which shall be economical to manufacture and install, and which shall be convenient to repair in case of injury or wear. Other objects and advantages of the invention will be obvious as the description proceeds.

The invention will be understood from the description in connection with the accompanying drawings, which illustrate embodiments of the invention, and in which the same reference characters refer to the same parts in the respective views. Changes and modification in the forms, proportions and ingredients may be made without departing from the spirit and scope of the invention.

In the drawings:

Fig. 1 is a side view partly in section showing a pile.

Fig. 2 is a plan view of the same.

Fig. 3 is a side view partly in section showing a modification.

Figs. 4, 5, 6 and 7 are sectional views on an enlarged scale showing details.

Fig. 8 is a side view showing several piles with an overhead structure partly broken away.

Reference character 1 indicates the main body or central portion of a concrete pile which may be formed in the usual way with re-enforcing rods 2 extending therethrough. This central portion 1 of the pile is preferably composed of one part cement, one part sand and two parts of broken stone consisting of trap rock, granite or the like, the broken stone being from about one-half inch to one inch in size. The concrete is preferably of a very wet consistency and the number and size of the reinforcing rods 2 will be chosen according to the strength requirements.

In the manufacture of my invention I first form a core of concrete 1 and then apply thereto layers of water-proofing material 5 from near the top of the pile to a short distance below the point that low tide water will reach after the pile has been installed. The water proofing material consists of a series of alternate layers of felt and woven fabric, such as burlap, between which layers is applied asphaltum or hot coal tar pitch, the woven fabric being preferably of large mesh so that it is saturated with the water-proofing material. Each layer of felt and fabric should be coated on both sides, at the time of laying, with hot pitch or asphaltum or similar waterproofing material. The hot pitch or asphaltum or similar waterproofing material should be mopped on the outside surface of the concrete 1, and the felt and fabric should be laid alternately and thoroughly rubbed and pressed so as to insure sticking over the entire pile surfaces and to each other, the edges of the felt and fabric being made to overlap. The outer layer preferably of felt should also be thoroughly coated with hot tar or asphaltum or other waterproofing material.

A protective layer or layers of metal are then applied on the outside of the waterproofing layers. For this purpose expanded metal 6 may be used, having its upper end 7 bent over the top of the pile. I prefer to have two protective layers of metal, one being the expanded metal 6 and another being a reticulated metal 8 having ribs 9, as shown in Figs. 1 and 4, or a wire mesh layer 10, as shown in Figs. 3 and 6. The inner layer 6 of expanded metal protects the waterproofing

layers, and the outer protective layer 8 or 10 provides better and additional bond for the mortar that is to be applied as the outer skin or layer of the pile. It is obvious that different arrangements of protective metal or meshes may be used with advantage. Each one of the metal layer coverings should be firmly secured or tied together at their meeting edges, either by means of wire twisted through the meshes or by welding the edges together electrically, or they may be fastened in any other convenient way. The inside metal layers 6 should closely fit the waterproofing layers, and the outside metal layers 8 or 10 should closely fit the inside ones. The horizontal wires 11 of the woven wire metal layer 10 afford a convenient means for firmly binding the metal layers to the waterproofing layers. A plurality of horizontal wires or number of convolutions of the horizontal wires 12, as shown in Fig. 7, may be used for the wire mesh, if desired. The waterproofing layers 3, 4 and 5 may be lapped, as indicated near the lower part of Fig. 6, so as to taper gradually.

Instead of having two metal layers, one metal layer, as indicated in Figs. 5 and 7, may be employed with good results. After the metal layer or layers have been applied, I apply a special mortar which may be made of the material known in the trade as pozzolon, Portland cement and sand. When the first mixture is used the pozzolon should be as finely ground as the cement, and one part by weight of the same should be mixed with two parts by weight of the cement. The mixture thus formed should be mixed with two parts of sand by volume, so as to form a mortar upon addition of water.

When hydrated lime is used, about 10 per cent by weight of the same should be mixed with Portland cement, and this mixture should be mixed with about two parts of sand by volume and the mortar formed by adding water. The mortar of either of these mixtures is applied to form the outer skin or coating 13 of the concrete pile by troweling the same through the meshes of the metal layer, or by applying the mixture by means of a cement gun. This mortar skin or coating 13 should be of such thickness as to extend to the outside waterproofing layer 5 and should cover entirely the metal layers 6 and 8, or 6 and 10, so as to completely embed the same.

In cases where the piles can be sunk to the proper depth, as for example by the use of the water-jet, without the use of a pile driving hammer, the pile can be manufactured complete before being put in place and the tops covered by bending over the upper edge of the metal sheet 6, as indicated in Fig. 2. In cases where the earth material under the water is of such character as to prevent thus installing the piles, and use of a pile hammer is necessary, the mortar layer 13 and the metal layers should be left off for a short distance from the top of the pile, although the waterproofing layers may be continued to the top of the pile. In the end of the pile there may be embedded a metal mesh 20 or protected in any other well known way to prevent the end from being shattered while the pile is being driven.

As it is difficult if not practically impossible to drive the pile to the exact grade, I have devised the following method of operation, when the piles are to support the concrete floor or superstructure 14 as indicated in Fig. 8.

The pile is completed with the waterproofing layer 5 to its top, the metal layer 6 is not carried quite to the top of the pile, and the layer of mortar 13 extends not quite over the metal layer 6 so as to leave a portion of the metal layer exposed, as indicated at A in Fig. 8. The pile is then driven and cut off to grade as indicated in Fig. 8, the material of the pile above grade being removed, leaving extending only the re-enforcing rods 2 which are bent over as required in a position similar to that illustrated at B in Fig. 8, to engage with the concrete of structure 14. The upper end of the pile is thus out of the water and is built up adding the metal and concrete layers which have already been described to complete the pile as at C in Fig. 8.

From this description it will be clear that my invention provides a built-up concrete pile or similar structure which is provided with an impervious layer of waterproofing material which will prevent sea water between high and low tide from reaching the steel reinforcement and the cement constituting the core. In this way decomposition of the core with resulting deterioration of the pile is avoided. This waterproofing layer is protected by means of protective layers of metal having mechanical strength so that injury to the waterproofing material does not arise when the pile is handled or after it has been installed. The waterproofing layer is thus also protected from injury due to vessels or other objects that may strike the pile. The pile is further protected by an outer skin or layer of mortar that is exceedingly resistive to the action of sea water, so that deterioration does not take place rapidly. The outer skin of water-resistant material may also be readily renewed if it is injured, or if it shows signs of deterioration. The outer skin of water-resistant material is also effective in producing a pile of pleasing appearance.

I claim:

1. In a concrete structure, a core of concrete, a layer of waterproofing material, a metallic protective sheet, a second metallic

sheet surrounding said protective sheet, and a covering of water-resistant material.

2. In a concrete structure, a core of concrete, a layer of waterproofing material, a metallic protective sheet, and a second metallic sheet surrounding said protective sheet, said metallic sheets being embedded in water-resistant material.

3. In a concrete structure, a core of concrete, a layer of waterproofing material, a metallic protective sheet, and a second metallic sheet surrounding said protective sheet, said metallic sheets being embedded in water-resistant material comprising lime, Portland cement and sand.

4. In a concrete structure, a core of concrete, a layer of waterproofing material, a metallic protective sheet having its edge extending over the top of said core, and a covering of water-resistant material.

5. In a concrete structure, a core of concrete, a layer of waterproofing material, a metallic protective sheet having its edge extending over the top of said core, and a covering of mortar.

6. In a concrete structure, a core of concrete, a layer of waterproofing material, layers of fibrous material embedded in said layer of waterproofing material, a metallic protective sheet, and a covering of water-resistant cement embedding said metallic protective sheet.

In testimony whereof I affix my signature.

HENRY R. ASSERSON.