Nov. 16, 1937. E. F. STEVENS 2,099,543

CONCRETE INTERLOCKING PILING

Filed Jan. 31, 1936

Fig. 1.

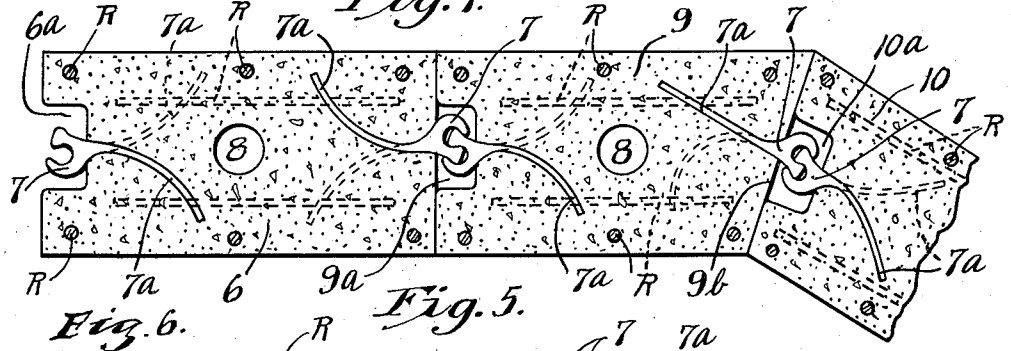



Fig. 6.

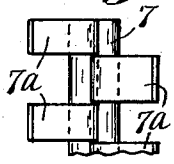



Fig. 5.

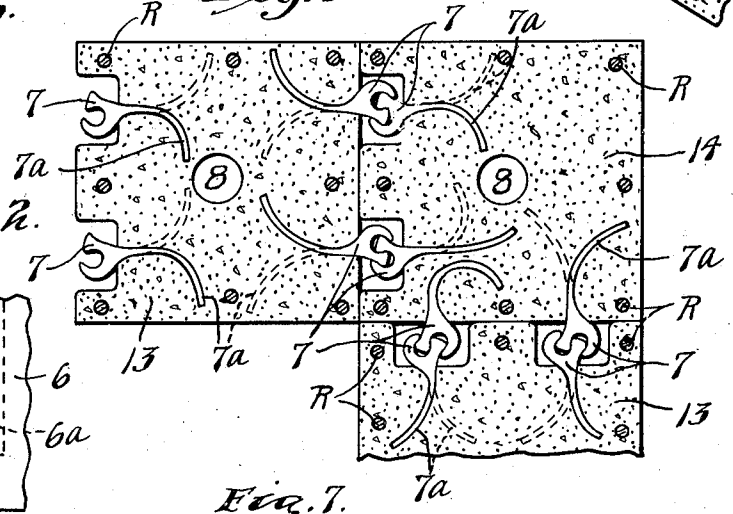



Fig. 2.

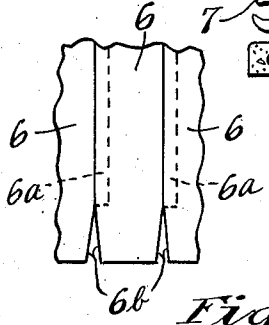



Fig. 7.

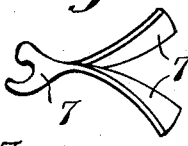



Fig. 3.

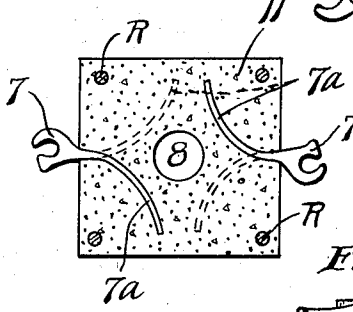



Fig. 4.

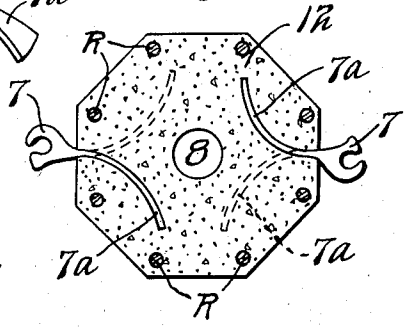



Fig. 8.

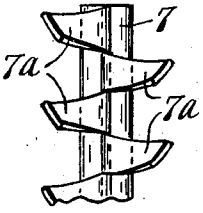
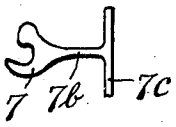



Fig. 9.




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# UNITED STATES PATENT OFFICE

2,099,543

## CONCRETE INTERLOCKING PILING

Edwin Fenton Stevens, St. Paul, Minn.

Application January 31, 1936, Serial No. 61,713

2 Claims. (Cl. 61—59)

My invention relates to piling and particularly to interlocking piles.

Concrete piling having no interlocking connections between the several units have been used for foundations, bents and walls.

It is an object of my invention to provide precast concrete pile units having means for interlocking individual pile units together in making a wall thereof.

Another object is to provide such pile units suited for use in forming corners or angles in walls built of my pile units.

These and other objects and advantages of the invention will be more fully set forth in the following description made in connection with the accompanying drawing, in which like reference characters refer to similar parts throughout the several views, and in which:—

Fig. 1 is a horizontal sectional view of a portion of a wall built of one form of my pile units;

Fig. 2 is a vertical view of a portion of the bottom end part of a wall built of my pile units;

Fig. 3 is a horizontal sectional view of a second form of my pile unit;

Fig. 4 is a horizontal sectional view of a third form of my pile unit;

Fig. 5 is a horizontal sectional view of a corner portion of a wall built of a fourth form of my piling;

Fig. 6 is a view looking toward the inner side of one of the interlocking elements;

Fig. 7 is a plan view looking down on a second form of interlocking element;

Fig. 8 is a view looking toward the inner side of the interlocking element shown in Fig. 7; and

Fig. 9 is a plan view of still another type of interlocking element.

Referring to the drawing and particularly to Fig. 1, a pile unit for use in straight wall construction consists of an elongated member 6 cast in suitable material, such as concrete and having a rectangular cross sectional shape. One of the narrow sides of the member 6 is provided throughout its length with a longitudinally extending recess or groove 6a which may be of rectangular cross-sectional shape, as shown.

Interlocking means is provided for locking a pair of members 6 to each other in parallel relation. For this purpose interlocking elements 7 are secured to the member 6 by suitable means. Each interlocking element 7 is similar to the interlocking elements used on steel sheet piling except that anchoring means suitable for anchoring to concrete is formed integrally therewith and comprises a series of fingers or prongs 7a projecting rearwardly from the interlocking element 7. Some of the anchoring prongs 7 are bent to one side and some to the other side as shown, it being preferable that alternate prongs be bent in the same direction. The interlocking elements 7 are so positioned when the member 6 is cast that material from which the member 6 is cast will surround the prongs 7a to anchor the interlocking elements 7 to the member 6. An interlocking element 7 is disposed in the recess 6a of the member 6 and a second interlocking element 7 is disposed immediately outwardly of the side opposite the recessed side of the member 6, both of these interlocking elements extending through substantially the entire length of the member 6.

The proportions and arrangement of the member 6 and the interlocking elements 7 carried thereby are such that, when two such members 6 are connected together by the interlocking elements thereof, the facing sides of the respective members 6 will abut each other closely but with sufficient clearance to permit longitudinal sliding movement of one of the two members 6 relative to the other.

If desired each pile member or unit 6 may be provided with an axially located longitudinally extending aperture or hollow 8 by means of which lifting or handling devices or other elements may be connected or anchored to the member 6. The lower end of the member 6 may be provided with bevels 6b, if desired, to facilitate driving of the member 6.

Fig. 1 also shows two pile units adapted for use at angles in walls built of units such as the one described above. These units are generally similar to the described unit with the exception that one short side or face of each is disposed relative to the long sides at an angle other than a right angle, as shown. The angles used may, of course, be selected so as to produce any desired angle in a wall.

The left hand side of the pile unit 9 and the recess 9a and interlocking element 7 thereof are identical with corresponding portions of the first described pile unit 6. The right hand face or side 9b of the pile member 9 is disposed at an angle to the wider faces or sides other than a right angle.

Another pile unit 10 is identical with the first described pile unit 6 with the exception that the left hand side or face of the same is disposed at an angle relative to the wider sides or faces other than a right angle as shown.

In building a wall of my pile units 6, 9 and 10,

the same are driven or jetted, one or more at a time in the same manner as ordinary steel sheet piling is driven.

A second form of my piling shown in Fig. 3 is identical with the pile unit 6 of Fig. 1 in all respects except that the pile member 11 thereof is of square cross sectional shape instead of having sides of unequal width.

A third form of my piling shown in Fig. 4 is the same as the pile unit 6 of Fig. 1 except that the pile member 12 thereof is of polygonal cross sectional shape having more than four sides instead of rectangular cross sectional shape. While an octagonal cross-sectional shape is shown it should be obvious that a hexagonal or other polygonal cross-sectional shape may be used as desired. For piles to be used in straight walls polygonal shapes having even numbers of faces should be used. For piles to be used at angles in walls, the particular polygonal shape and the particular faces of the polygon in which the interlocking elements are mounted may be selected in accordance with the angle involved.

In Fig. 5 a fourth form of my piling is shown. In this form the pile member 13 is generally similar to the pile members 6 and 11 of Figs. 1 and 3 with the exception that a pair of spaced parallel interlocking elements 7 is provided wherever a single interlocking element 7 appears on the pile members 6 and 11. In the pile member 14 for use in forming a corner in a wall the respective pairs of interlocking elements 7 are mounted in adjacent faces of the pile member 14 instead of in opposite faces as in the structures of Figs. 1 and 3.

Any or all of the above described forms of my piling may be made with bevels at their lower ends in the manner of the bevels 6b of Fig. 2 and may, of course, be provided with reinforcing rods R embedded therein at the time the pile units are cast.

The anchoring means of the interlocking elements 7 may be provided in various forms. A longitudinally extending flange projecting rearwardly from the rear side of an interlocking element 7 may be split at longitudinally spaced points to form a plurality of rearwardly projecting anchoring fingers 7a which are then alternately bent to one side and the other and appear as shown in Fig. 6. The fingers 7a of Fig. 6 may, if desired, be twisted about their respective longitudinal axes through a small angle to produce the construction shown in Figs. 7 and 8. Also, as shown in Fig. 9, a flange 7b projecting rearwardly of and extending longitudinally of an interlocking element 7 may be welded, integrally joined or otherwise secured at its free edge to the longitudinal center line portion of a narrow, elongated rectangular anchoring plate 7c, preferably in right angled relation thereto as shown.

It is to be noted that the faces of a wall built of either of the forms of my concrete pile shown in Figs. 1 and 5 are entirely of concrete, the interlocking elements 7 thereof being housed in the recesses or grooves of the pile units and hence being concealed. The recesses or grooves may, of course, be filled with concrete, grout or mortar if desired.

My piling construction enables use of pre-cast concrete piles to build walls having strength equalling the strength of walls which are cast in place and yet having the advantage of being adapted for driving in water as in cofferdam construction. Because of the close abutment of adjacent piles in addition to the seal afforded by the interlocking elements 7, walls built of my pile units are highly resistant to leakage of water therethrough.

It is apparent that I have invented a novel and improved type of precast concrete piling well adapted for permanent or temporary construction of cofferdams, walls, dams, bridge piers and abutments, culvert walls and abutments, foundations and other structures.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of my invention, which, generally stated, consists in a device capable of carrying out the objects above set forth and in the novel parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:—

1. Concrete piling comprising a plurality of elongated concrete pile members of polygonal cross-sectional shape, a pair of interlocking elements for each of said members, each of said interlocking elements having a series of anchoring prongs projecting from the inner side thereof, some of said prongs being bent to one side and some to the other side at different levels, said interlocking elements being associated with respective faces of said member and extending longitudinally thereof, the anchoring prongs of said interlocking elements being embedded in said member, one interlocking element of one member being engageable with an interlocking element of a second member to lock said members together in parallel relation.

2. Concrete piling comprising a plurality of elongated concrete pile members of polygonal cross-sectional shape, a pair of interlocking elements for each of said members, each of said interlocking elements having a series of flat anchoring prongs projecting from the inner side thereof, some of said prongs being bent to one side and some to the other side at different levels, said interlocking elements being associated with respective faces of said member and extending longitudinally thereof, the anchoring prongs of said interlocking elements being embedded in said member, one interlocking element of one member being engageable with an interlocking element of a second member to lock said members together in parallel relation and said flat prongs being twisted relative to the vertical.

EDWIN FENTON STEVENS.