L. B. LANGWORTHY.

CONCRETE PILE AND WALL PANEL.

APPLICATION FILED MAR. 26, 1920.

1,430,820.

Patented Oct. 3, 1922.

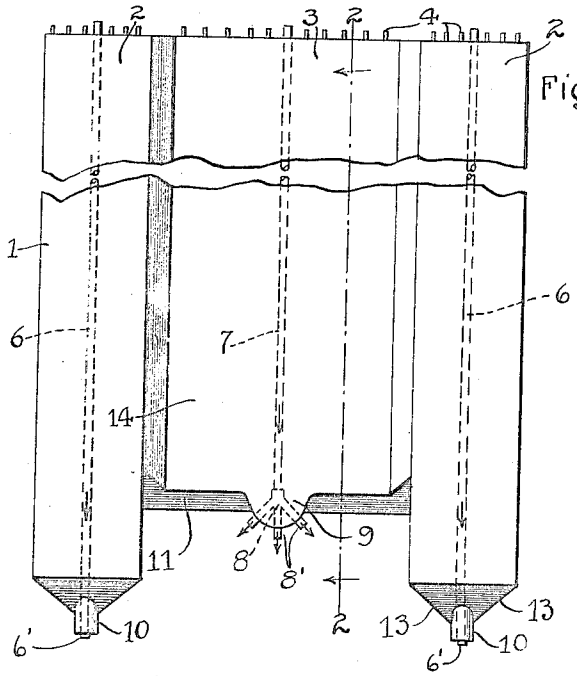


Fig. 1.

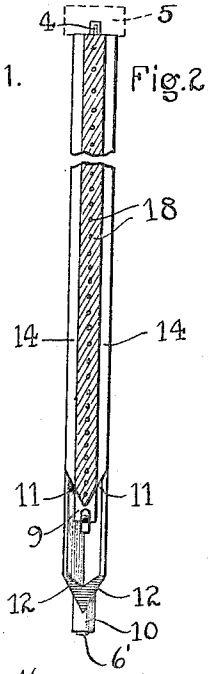


Fig. 2.

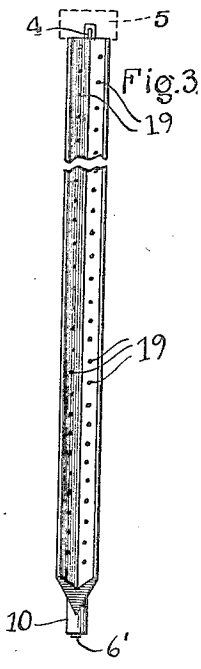


Fig. 3.

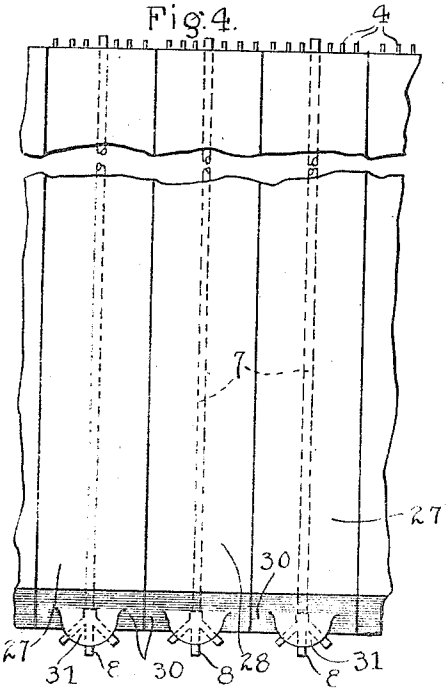


Fig. 4.

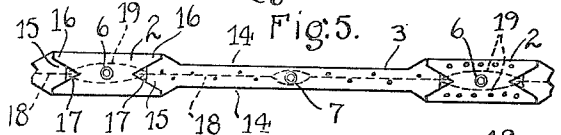


Fig. 5.

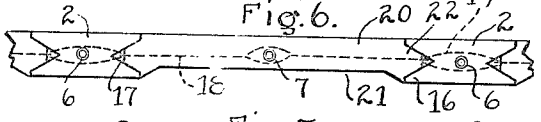


Fig. 6.

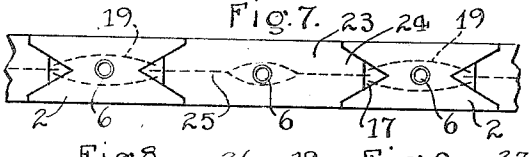


Fig. 7.

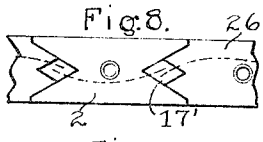


Fig. 8.

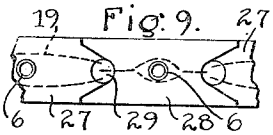


Fig. 9.

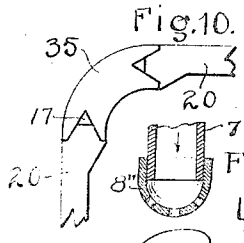


Fig. 10.

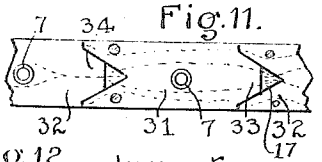


Fig. 11.

Fig. 12

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UNITED STATES PATENT OFFICE.

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CONCRETE PILE AND WALL PANEL.

Application filed March 26, 1920. Serial No. 368,865.

To all whom it may concern:

Be it known that I, LYMAN B. LANGWORTHY, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Concrete Piles and Wall Panels, of which the following is a specification.

This invention relates to reinforced concrete structures of the general nature of the piles and walls set forth in my copending applications, Serial Nos. 362,881 and 362,882, and more particularly to certain details of construction hereinafter described.

The main objects of the invention are to provide an improved form of piles and wall panels of the general character stated; to provide an improved form of joint for connecting the abutting edges of the wall units in a unitary manner for monolithic watertight construction; to provide a more economical construction for the panel members; and to provide an improved form of jetty-head adapted for more efficient operation in sinking the wall units, and more particularly the panel members.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Fig. 1 is a front elevation of a concrete wall comprising alternately disposed piles and panels.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is an edgewise view of one of the piles.

Fig. 4 is a front elevation of a wall composed of reinforced concrete sheet piles.

Fig. 5 is a plan of the wall shown in Fig. 1.

Fig. 6 is a plan of a wall similar to the one shown in Fig. 5, except that only one of the panel faces is depressed, the other being flush with the face of the adjacent piles.

Fig. 7 is a plan of a wall composed of sheet piles, alternate members being provided with tongues and grooves respectively.

Fig. 8 shows a sheet pile wall similar to that of Fig. 7, except as to the form of the recess for the binding key.

Fig. 9 is similar to Figs. 7 and 8, except that the recess for the binding key is of circular cross-section instead of angular.

Fig. 10 is a plan of a wall containing a corner pile.

Fig. 11 is similar to Fig. 7, except that the piles are all alike, each having a tongue on one edge and a groove on the other.

Fig. 12 shows an axial section of a cup-like nozzle for the branched stream jetty.

In the construction shown in Figs. 1, 2, 3 and 5, the monolithic reinforced concrete wall 1, comprises a series of alternately disposed piles 2, adapted for securing a deep anchorage in the ground and relatively short, wide panels 3.

The reinforcing means includes vertically disposed bars 4, the upper ends of which project slightly at the tops of the piles and panels where they are concealed by the coping 5, which is applied after the main wall members are in place.

In order to facilitate sinking the wall members, each pile is provided with an interior jetty 6, and each panel with a jetty 7, the lower end of the latter being provided with a forked head 8, including arms 8′ disposed fan-like, whereby the water may be discharged substantially in a sheet parallel with the main plane of the panel. The nozzle 8 is imbedded and protected by a downwardly projecting spud 9, formed integrally at the center of the lower edge of the panel. In a somewhat similar manner the plain jetty heads 6′ are protected by spuds 10, on the lower ends of the piles 2.

The lower edge of each panel 3, is V-shaped in cross-section, as indicated at 11, on Fig. 2. The lower end of each pile 2, is beveled on the front and rear sides, as shown at 12, on Fig. 2, the right and left sides also being beveled, as shown at 13, on Fig. 1, as a result of which the panels are of pointed character, with the spuds 10, serving as points.

In order to economize material, each panel is formed relatively short and thin, having depressions 14, illustrated in Fig. 2, on both sides.

In order to insure due alinement of the panels with the piles in sinking the former after the latter are in place, the adjacent members are formed with channels and inserts, as illustrated in Fig. 5, where the pile 2 is represented with a groove in each edge and each panel 3, is provided with a tongue 15, disposed between the pile flanges 16. In order to provide an aperture to receive the binding key 17, the grooves are made somewhat deeper than the tongues and the reinforcing members 18 and 19 of the panels and piles respectively, project somewhat into said

apertures, where they are imbedded in the grout of the key members which are formed after the piles and panels are in place.

Referring to the form shown in Fig. 6, the panel 20 is provided with a depression 21 on its back side and the front side is made flush with the face of the adjacent piles 2. The panel tongue 22 fits in the corresponding pile groove. Otherwise the construction is substantially as shown in Fig. 5.

In the construction shown in Fig. 7, the wall comprises a series of alternately disposed grooved piles 2, and tongued piles 23. The tongues 24 are flattened at their tips so as to provide apertures for the keys 17, in which the laterally projecting ends of the reinforcing members 19 and 29 are imbedded.

In the construction shown in Fig. 8, the piles 2 are arranged alternately with piles 26, having togues, the cross-section of which is W-shaped, whereby a larger aperture is provided for the key 17', which in this instance is either square or diamond-shaped in cross-section.

In the construction shown in Fig. 9 the piles 27 and 28 are somewhat similar to piles 26 and 2, respectively, except that the bottom of the groove is rounded and the tip of the tongue is recessed to provide a complementary groove of somewhat circular cross-section, so as to accommodate the cylindrical key 29. The lower edges of the piles 27 and 28 are beveled, as at 30 (Fig. 4), to provide a sharp edge and spuds 31 are provided thereon to protect the forked jetty heads 8, substantially as in Fig. 1.

In the construction shown in Fig. 11 the wall comprises a series of similar piles, 32, each provided with a tongue 33, on one side and a groove on the other, said tongue and groove being so formed as to provide an aperture for the binding key 34.

In case it is necessary to provide an angle in the wall, an angular shaped pile 35, may be provided in combination with any of the piles or panels above described, as illustrated in Fig. 10.

Although the precise shape of the tongues and grooves above described may be varied considerably, they are preferably formed with straight sides disposed at an angle of about 60°, as a result of which the grooves are approximately equilateral in cross-section. In order to avoid danger of breaking the edges of the side flanges 16, the tips are preferably blunt or square, as shown in the several plan views. Square shoulders 15' may also be provided at the base of each tongue to bear the main force of sidewise thrusts from the adjacent member. While V-joints are generally advantageous as being adapted to readily assure a good fit, it is to be understood that other tongue and groove forms may be used to advantage in some cases, and that other sealing material than grout may be used.

The mainly important feature of the reinforcing relates to its projection into the sealing space for engagement with the core 5. Otherwise the design of the reinforcing may be varied in detail as understood in the art.

The method of constructing a wall, embodying my said invention is as follows: The piles proper are first set in place in due alinement, and in spaced relation where panels are to be used. The panels are then sunk into place between the piles with the tongues and grooves in registry, whereby the panel is positively guided and retained in alinement. Sinking of the piles and panels is facilitated by the jetties, the panel jetties serving to loosen the earth and remove same in substantially a vertical plane beneath the lower edge of the panel. After the wall members are in place the sealing core or key 17 of concrete grout or other suitable material is applied under sufficient air pressure to fill all apertures including any joint crevices that may exist beside the tongues. Then the coping 5 is added.

In the form of jet producing device shown in Fig. 12, the pipe 7 instead of having a forked head such as shown in Fig. 1 is provided with a hemispherically chambered shell 8'' having a row of jet outlets disposed radially in a common plane, to correspond with the plane of the pile or wall to be constructed.

Although several specific embodiments of my invention are herein shown and described, it is to be understood that some of the details of the constructions shown may be altered or omitted without departing from the spirit of this invention as defined by the following claim.

I claim:

A wall member of pile-like character, comprising a reinforced concrete body with an interiorly disposed jet pipe, having a branched head disposed fan-like in alinement with the lower edge of said wall member, which is provided with a downwardly projecting spud of corresponding flattened shape wherein said head is embedded.

Signed at Chicago this 23d day of March, 1920.

LYMAN B. LANGWORTHY.