J. A. MESIROFF.

CONCRETE DOCK.

APPLICATION FILED MAY 31, 1916.

1,318,097. Patented Oct. 7, 1919.

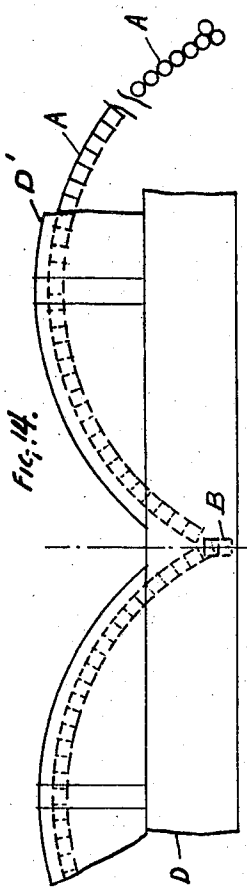


Fig. 4.

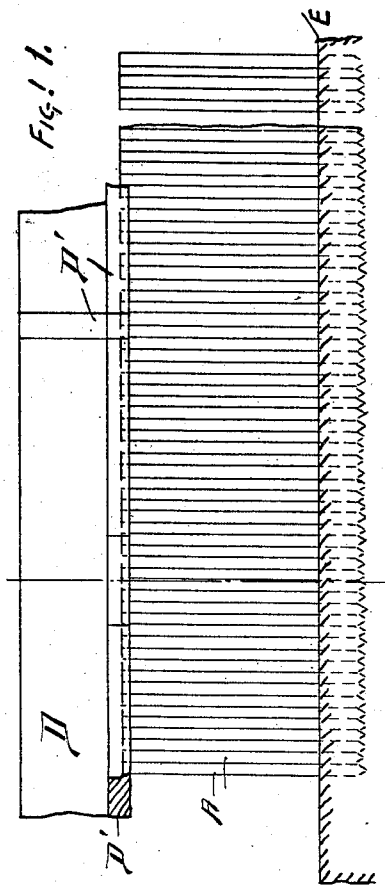


Fig. 1.

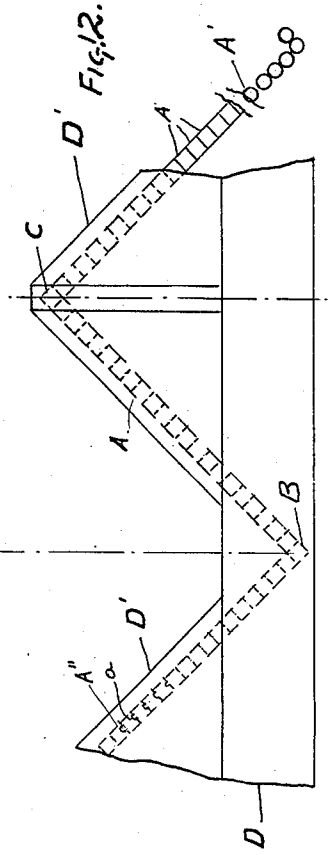


Fig. 2.

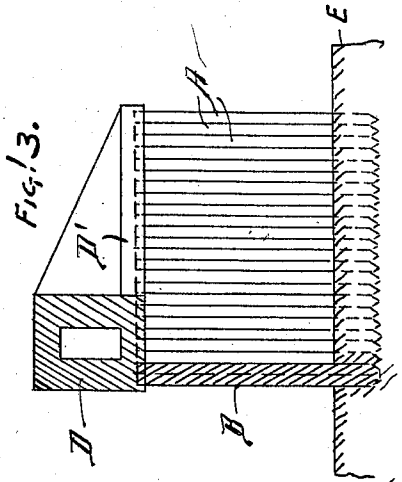


Fig. 3.

Witnesses

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CONCRETE DOCK.

1,318,097. Specification of Letters Patent. Patented Oct. 7, 1919.

Application filed May 31, 1916. Serial No. 100,798.

To all whom it may concern:

Be it known that I, JOSEPH A. MESIROFF, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Concrete Docks, of which the following is a specification.

My invention relates to improvements in concrete docks.

The object of my invention is to provide means whereby docks may be formed along a water front by driving a row of piles in such a manner that their upper ends may be connected with each other by a concrete cap, the piles being arranged in a zigzag row and coöperating with each other and with the earth into which they are driven and also with the concrete cap to form a truss capable of resisting the heavy pressures exerted by the earth or sand against their rear faces. Also to provide a structure in which rearwardly extending anchors or brace piles may be dispensed with, and in which the shearing strains exerted by the back fill against the piles will not be exerted against each pile individually, nor in the direct line of pressure, each pile being arranged to coöperate with each of the others in order to form a resisting wall oblique to the line, or lines, of pressure. A further object of my invention is to provide a structure in which each pile is so reinforced by every other one that shearing cannot take place, owing to the fact that it would be necessary for all the piles to break simultaneously, and to also move longitudinally upon each other while giving way under strain. A still further object of my invention is to provide a structure in which the result of the pressure of the back fill upon the pile will tend to increase the downward pressure upon those piles which are farthest in the water, under conditions which prevent any downward movement of such piles or any tilting movement thereof, it being necessary for the entire structure to tilt bodily, if at all, and bodily tilting movement being impossible without a displacement of substantially all the earth in proximity to the pile, the weight of the earth being therefore utilized to counteract its pressure in the direction of the water front.

In the drawings—

Figure 1 is a front elevation of a dock embodying my invention.

Fig. 2 is a plan view of the same with a portion of the cap broken away to expose the upper ends of some of the piles.

Fig. 3 is a sectional view, drawn on a vertical plane drawn through the apex pile B shown in Fig. 2.

Fig. 4 is a plan view illustrative of a modified form of construction.

Like parts are identified by the same reference characters throughout the several views.

A row of piles A, A, are driven into the earth along a zigzag line, forming a series of trusses having water front apexes at B and rear apexes at C. The piles may be formed of any suitable material and may be of any shape. Ordinarily, however, piles which are square in cross section will be used and I preferably form the piles of concrete, particularly where the water levels change or other conditions tend to produce rapid decay in wooden structures. Under some conditions, and particularly where the filling is of heavy soil, piles which are circular in cross section may be used, as shown at A′ in Fig. 2, but in some instances where the filling has a low angle of repose, or where the character of the material tends to permit it to seep through narrow spaces, I may employ piles A″ having interlocking tongues and grooves *a* upon their meeting faces, whereby each pile will be interlocked with the next, and whereby the pressure of the material will tend to close the joints. My invention, however, is not dependent upon the specific form or contour of the pile.

After the piles have been driven into position, their upper ends are covered by a concrete cap. This cap includes a main beam D, which forms the front of the dock and from which there are preferably rear extensions D′ which cover the rows of piles extending to the rear apexes. I preferably leave the spaces between the rear apexes uncovered in order to reduce expense, but the extent of the concrete cap will of course be determined by the requirements of any given installation.

Referring to Fig. 1, it will be observed that the lower ends of the piles are anchored in the earth from the line E downwardly to their lower extremities. The upper ends of the piles are anchored by being embedded in the material composing the concrete caps. When the concrete composing this cap has set, the entire structure becomes unitary and the pressure of the earth upon the rear

faces of the pile being exerted at right angles to the front of the dock, tends to force the piles together, whereby each pile reinforces the next. It will also be observed that a much larger number of piles can be introduced into a single row, whereby the pressure of the material is distributed to a greatly increased number of piles over that which could be effectively employed in a single straight row. Also owing to the zigzag arrangement of the piles, a wide base or anchorage is secured and by reason of the anchorage in the concrete cap, it is not possible for any of the individual piles to yield. On the contrary, the pressure of the earth tends to push the entire structure into the water in a tipping movement fulcrumed upon the water front apex piles B, the rear piles lifting. The amount of force required to produce such a bodily tipping of the dock forwardly is considerably in excess of the pressure of the earth under any ordinary conditions. The weight of the dock and the downward pressure of the earth, together with the anchorage of the piles in the earth, (which will ordinarily be deepest at the rear), all tend to resist the tipping tendency. Another advantage secured by my improved structure is in the fact that when the river is dredged, the earth will only be removed along the apexes B, leaving the annular spaces between these apexes well filled with earth,—that is to say, the dredging operation does not expose the lower ends of the piles except at the water front apexes.

Referring to Fig. 4, it will be observed that it is not essential that the piles should be arranged in the strictly zigzag form shown in Fig. 1. If desired, they may be arranged to form a series of segments having the form of arches sprung from juxtaposed abutments about vertical axes with the crowns on the land side. But any arrangement whereby the piles are arranged in rows which converge alternately toward the water front and then rearwardly toward or into the land in a continuous series or line of piles, is within the scope of my invention, whether a true zigzag line, a serpentine line or a series of segmental curves is followed.

I am aware of the fact that metal piling in the form of sheets or plates has heretofore been used, in which each individual pile is obliquely positioned with reference to the preceding one to form a zigzag structure. But my improved dock differs therefrom in employing a series of juxtaposed piles in post form having face contact or substantially face contact with each other in each approaching and receding portion of the line, the arrangement being such that each coöperates with the others and with the concrete cap to form a series of trusses, of which each member comprises a row of juxtaposed piles obliquely positioned with reference to the front of the dock.

I claim—

1. A concrete dock, comprising a series of piles arranged along a water front in a line which alternately recedes from and approaches the front or face of the dock, said piles being juxtaposed in both the receding and approaching portions of said line to form a substantially continuous wall, and a concrete cap in which the upper ends of said piles are anchored.

2. A concrete dock comprising a series of piles arranged in the form of a series of rows of posts which alternately recede from and approach toward the front or face of the dock with the ends of adjacent rows meeting to form water front and rear apexes, and means for connecting said piles with each other to form a substantially continuous wall.

3. A concrete dock, comprising a series of piles arranged in a line along the water front which alternately recedes from and approaches the front or face of the dock, and a concrete cap covering and connecting the upper ends of said piles continuously from one end of the dock to the other, the lower ends of said piles being anchored in the earth.

4. A dock, comprising a wall arranged along a water front along a line which alternately recedes from and approaches the front or face of the dock, each receding or approaching portion comprising a series of piles having their lower ends driven into the earth and their upper ends connected by a cap member which forms the dock platform.

5. A dock, comprising a wall arranged along a water front along a line which alternately recedes from and approaches the front or face of the dock, each receding or approaching portion comprising a series of piles having their lower ends driven into the earth and their upper ends connected by a cap member which forms the dock platform, said piles and said cap being composed of concrete and said cap including the relatively thick concrete beam extending in a straight line along the front of the dock and connecting the water front apexes formed by the forwardly converging rows of piles.

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

JOSEPH A. MESIROFF.

Witnesses:

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IRMA D. BREMER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."