CONCRETE PILING.

The extensive improvements made at the Washington barracks have attracted not a little attention to a system of concrete piling which was there employed with marked success, and which promises to displace, for certain kinds of work, the wooden piles which have been used so long. The work at the Washington barracks presented obstacles which could not be overcome by the use of the ordinary pile—obstacles due to the constantly changing condition of the ground, which was alternately wet and dry as a result of heavy and frequent rains.

Through the courtesy of Mr. Frank S. Shuman, we are enabled to present the following description and the accompanying illustrations of this method of utilizing concrete piles.

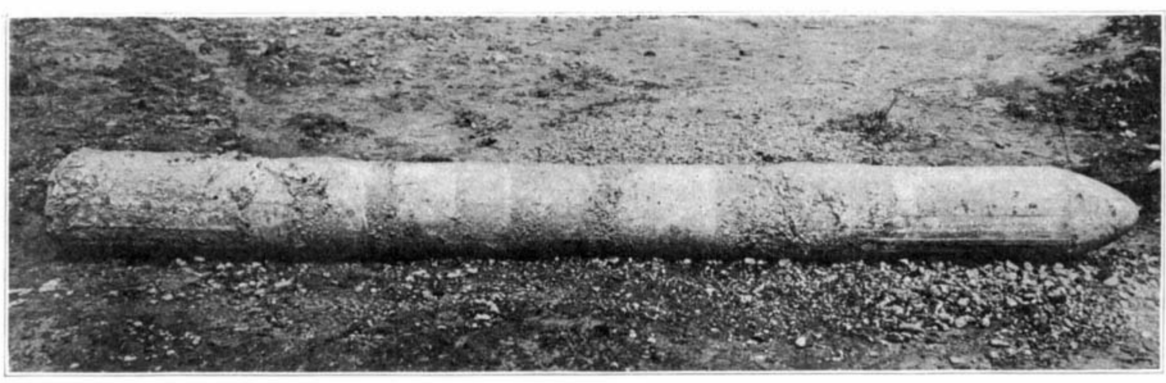
Four different types of piles are employed. The one illustrated in Fig. 1 A, and known as "the preparatory removable pile," is to be used in earth reasonably firm in its texture and free from water. A preparatory tube, consisting of a length of extra heavy iron pipe, fitted with a driving head of oak, and a conical steel point of a somewhat larger diameter than the pipe, is driven into the ground to the required depth, and thereupon withdrawn. The hole formed is filled with well-rammed concrete. Obviously, any desired length of pile can be obtained by driving the outer tube deep enough into the ground; and obviously that outer tube can be removed with but a fraction of the force required in pulling out or planting the ordinary pile. After the rammed concrete has once set, the pile becomes literally a pillar of stone. Fig. 1 B shows the general appearance of the pile after the removal of the outer tube. The frictional hold of the pile is much augmented, because the larger pieces of the aggregate are forced into the sides of the hole, thereby forming innumerable lateral anchors. We are informed that a pile of this type, 14 inches in diameter and 13 feet 2 inches in length, successfully sustained a direct pressure of more than 21 tons of pig iron for a period of ten days without any signs of settling.

It sometimes happens that the fixed steel point cannot be used to advantage. Particularly is this the case where the earth is soft or marshy, or where quicksand or water is encountered. For this purpose, a detachable point of concrete, as shown in Fig. 2 A, is substituted for the fixed steel point, and driven to the required depth. As the pipe is lifted out, concrete is rammed home through the pipe. A head of concrete is maintained inside the pipe while it is being gradually withdrawn. In this manner, all water is displaced, and the closing in of the sides of the aperture is avoided.

In driving piles under water, the system illustrated in Fig. 3 A is employed. The pipe with its concrete point is surrounded by a sheet-iron coffer-dam, which latter is temporarily clamped to the pipe, and is of sufficient length to reach from above the waterline down to the firm underlying ground. The pipe is driven in until the coffer-dam is embedded in the firm ground at a sufficient depth to prevent the possibility of water percolating through. The clamp is then removed, the concrete point is driven further down to the required depth, and concrete is filled in to the desired height. If the completed pile is to form the base of a sea wall, the concrete is filled in only flush with the river bottom (Fig. 3 B), and the sheet-iron coffer-dam is then removed and used for the next pile. If, on the other hand, the pile is required to rise above the water, as for example in the construction of a wharf, the sheet-iron coffer-dam is not removed, but is left in position and filled up with concrete (Fig. 3 C). To lend additional stability to a pile of this construction, a cylinder of 3-inch mesh expanded metal may be embedded in the concrete, and likewise a piece of structural iron, to which the superstructure can be fastened.

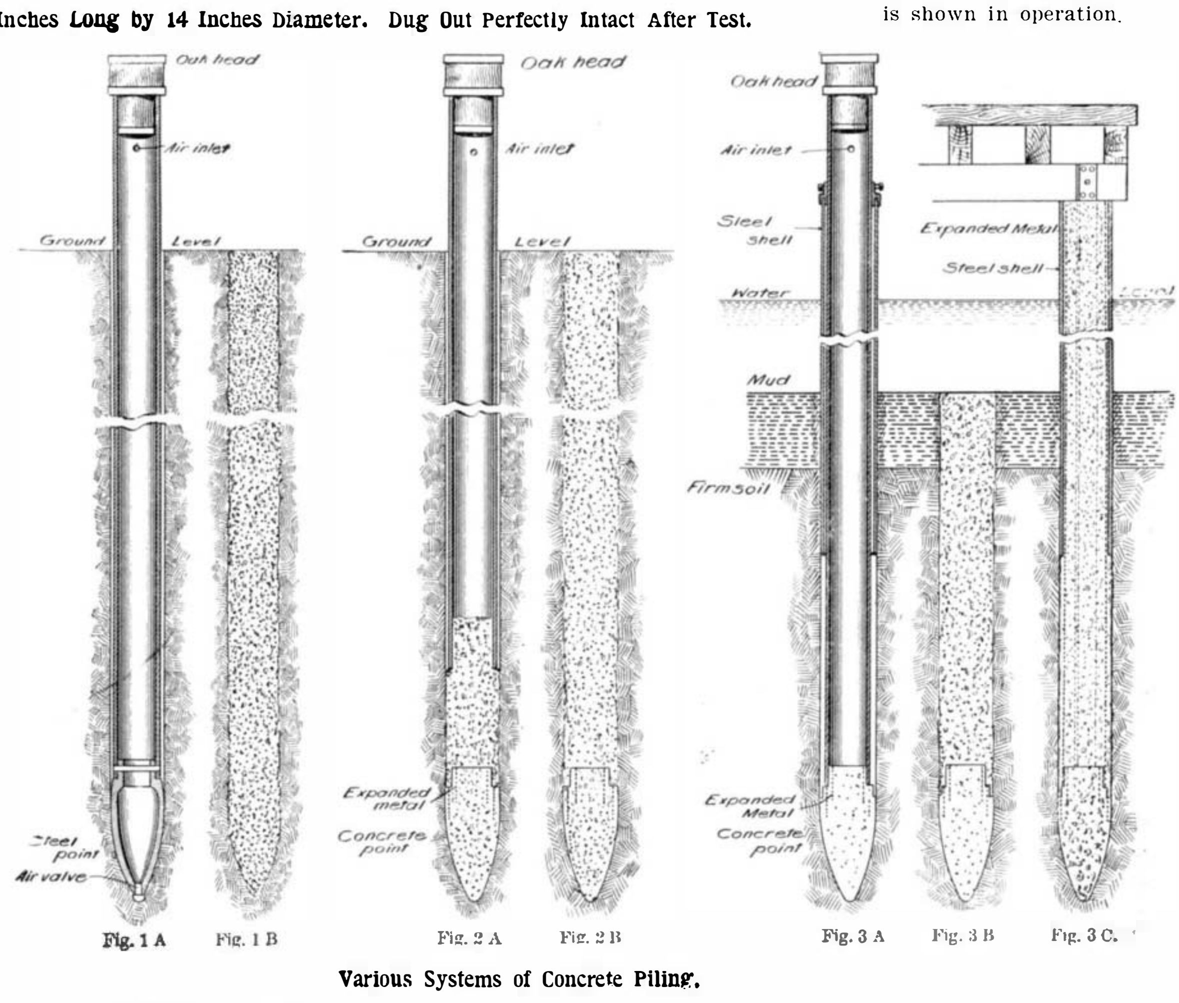
In soil that is alternately wet and dry, these piles are obviously able to provide a permanent foundation, which could not be secured by wooden piles. The system is economical and easy of application.

Concrete Points for Long, 17-inch Diameter Piles. Engineers' School, Washington Barracks, D. C.



Concrete Pile, 13 Feet 2 Inches Long by 14 Inches Diameter. Dug Out Perfectly Intact After Test.

Preparatory Pile Removed, Leaving Hole Ready for Concrete.



Various Systems of Concrete Piling.

CONCRETE PILING.

The First Modern Ship Canal.

In these days of ship canals we hear little or nothing about the earliest enterprise of the kind during modern times, namely, the Berkeley and Gloucester Ship Canal. Although Gloucester is situated on the Severn, access to the port is really afforded by the canal. Owing to the dangerous condition of the river, an Act was obtained in 1793 for the construction of a ship canal commencing at Berkeley, some sixteen miles lower down the Severn, and the works were completed in the year 1827. This waterway follows the Vale of Berkeley, originally commencing with a tidal-basin and lock at Sharpness Point and ending at the docks in Gloucester, where there is another lock communicating with the Severn. The original cost was about £500,000, but within the last forty years considerable outlay has been incurred in opening a new entrance half a mile lower down the river, with additional dock accommodation. These works were finally completed in 1874.

Although vessels of more than 600 tons cannot pass up the canal to the port, ships of 2,500 tons can enter the outer basin, where cargo is transferred to barges. The dimensions of this ship canal may be small compared with more recent developments, but its continuously successful operation has certainly had some useful effect in the encouragement of more ambitious schemes of the same kind.—Builder.

The topography of the Pennsylvania anthracite coal regions is shown at the World's Fair by a large relief map. A model of a mining plant, showing both the interior and exterior works, forms a part of the exhibit. The actual position of coal seams under the surface is shown by means of cross sections. An actual breaker is shown in operation.