

found that the pile would stand where placed without any bracing; as a rule, however, the pile was braced while the hammer was being adjusted on its head.

Separate cushions were used between the concrete of the pile and the ram of the hammer. On top of the pile was placed a 3-in. spruce plank. On this rested a cast-steel follower about 4 ft. high consisting of a hollow cylinder or post with top and bottom flanges. The bottom flange was flat, and in it were eight holes through which the projecting rods of the pile reinforcement passed and were protected. The top flange had cast on its upper side a rectangular depression in which was placed a hardwood block about 15 in. thick, bound round with a steel band. This block received the direct blows of the hammer and had to be frequently renewed; sometimes it would

done to the point, and this damage is believed to have been caused by a projecting rock spalling off a small amount of the concrete.

The bearing power of the piles was tested after driving by one of them being subjected for 3 hours to a load of 120 tons. This caused no settlement whatever.

It is the intention to have two railway tracks extending the length of the pier through the centre of the shed, and two outside, one on each side. The flooring is raised to the car deck level above the tracks to facilitate and expedite the handling of freight. There are two roadway ramps at the Water Street end, one on each side, for the accommodation of dray traffic.

Superstructure on Pier.—The shed will consist of fire-proof material having reinforced concrete walls and floors. It is necessarily of substantial construction as upwards of 3,000 immigrants and their effects will be housed in the building when two large well-filled steamships reach port at the same time. The building is a two-story structure. The ground floor is a plain floor for freight purposes, covering the whole area of the building with a series of railway, steamship and custom offices and storerooms at the shore end and in each side of the two central freight tracks. Along each wall, outside of which are the exterior tracks above referred to, there is

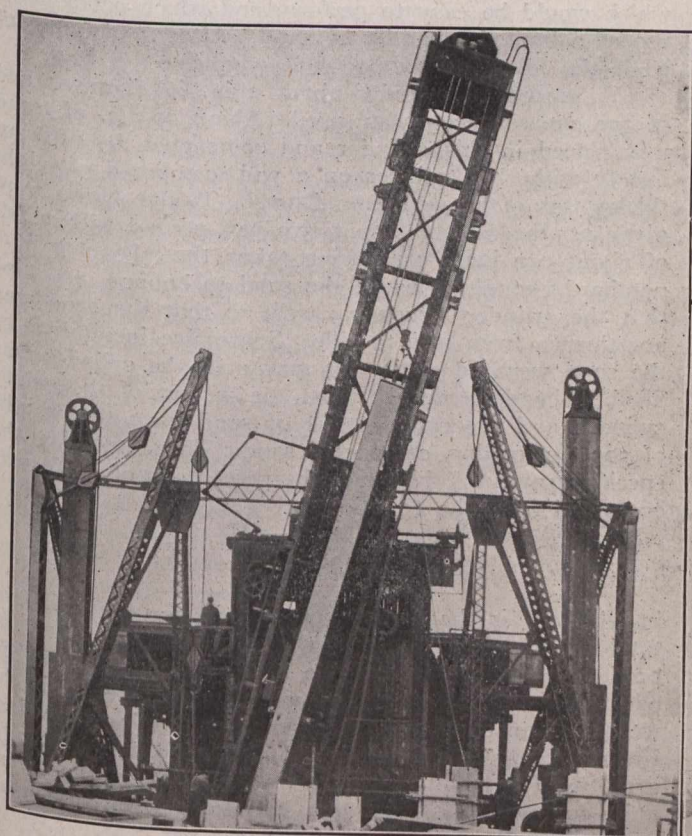


Fig. 7.—Leads of Driver Canted With Brace Pile Ready for Lowering into Position.

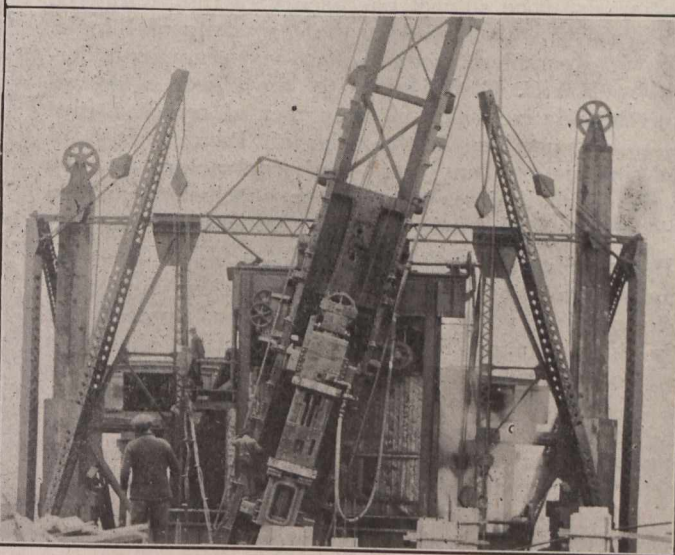


Fig. 8.—Details of Pile Hammer, on Head of Pile and Ready for Driving.

last for two piles only, while at other times it would stand the hammering of twenty. Usually the cause of failure was the breaking of the steel bands, but on one occasion the block was found to be on fire and badly charred owing to the heat generated by the force of the blows.

Where the thickness of hardpan was small the pile would often come to a stop after 200 or 300 strokes, while at other places nearly 1,800 blows would be required. The rate of penetration through the hardpan was small, the advance in the last strip being in many cases not more than $\frac{1}{4}$ in. per blow.

Only two out of 1,550 piles had their heads smashed in driving, and these were among the first dozen driven, the cause being a continuation of the hammering after the pile had reached rock. No harm was done, however, by a few blows after the penetration had stopped. In order to find out what was happening to the point of the piles some of them were pulled out after having been driven to refusal. In only one case was there any damage

a series of overlapping doors of sheeted steel frame construction. These can be slid along to form an opening at any desired place in the full length of the building. The upper story of the building is for passenger purposes exclusively. It is divided into three main sections, baggage rooms on the north and south extending the full length, with the exception of a distance of about 100 ft. at each end, and passenger rooms and offices along the whole length of the central part of the shed and across the whole width of each end. The outer wall of each baggage room will have alternate doors and windows at 36 door centres, so that it may receive passengers and baggage from any part of either two short or one long steamer up to the full length of the pier.

The adoption of the plans for the Deep Water terminal improvements means a general shifting of the railway yard arrangements. Other equally extensive changes will likely be necessitated to bring about a completely harmonious arrangement.