Some large reinforced concrete cribs have been lately used at Victoria, B.C. These averaged 80 feet long, 35 feet wide, 39 feet high and 2,500 tons launching weight. They were built on a timber pile skeleton wharf and launched on a cradle down a slipway situated at one end of the wharf. Five construction platforms mounted on rollers were used. When a crib was launched the remaining four cribs on the wharf were pulled along one space and the empty platform taken from the crib just launched was towed to the far end of the wharf and pulled up on the tracks by means of a short incline ready to receive the forms and reinforcement for another crib.

At Valparaiso reinforced concrete monoliths 66 feet long, 53 feet wide, 50 feet high, and with a launching weight of 2,300 tons, were used in the construction of a breakwater.

Lighthouses in different countries have been built either in part or wholly of reinforced concrete, which material is specially suitable for such works when properly protected.

Reinforced concrete has not yet entered the field of drydock construction to any great extent. Several docks lately built have their walls or floors reinforced in part, but they are really mass concrete docks into which reinforcing steel has been introduced to take care of some probable tensile stresses. The writer is not aware of any drydock with reinforced concrete walls and floor in the usually accepted meaning of the term, but there is no doubt that such a dock can be and will be built with advantage in due time.

In Halifax Harbor, since 1912, there have been used three types of reinforced concrete construction. The reinforced concrete pile wharf is exemplified by Pier No. 2, the concrete cylinder wharf by the Furness Withy Pier

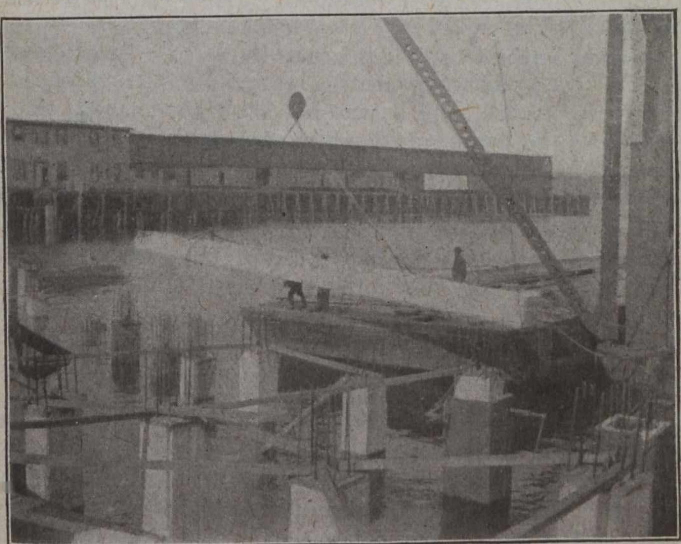

Fig. No. 9—Pier No. 2—Swinging Concrete Pile

and a new type of reinforced concrete hollow-block wall has been successfully used at the Halifax Ocean Terminals.

This last type of construction has been fully and interestingly described by A. C. Brown, resident engineer on the Halifax Ocean Terminals, in a paper read before the Canadian Society of Civil Engineers at Montreal in April of last year and published in the April 12th, 1917, issue of *The Canadian Engineer.*

These hollow cellular blocks are 21 ft. 10 ins. on face, 31 ft. from back to front and 4 ft. 1½ ins. high. They have reinforced concrete walls 8 ins. thick and are divided by internal partitions into twelve cells or compartments. A standard block weighs 62½ tons and is reinforced with 1.49 per cent. of steel. These blocks are set on a prepared foundation and built one on top of another to the required height. The three front compartments and the centre compartments running from front to back are filled with concrete. The remaining compartments are filled with concrete up to the centre of the second block above the foundations, the remainder being filled with dredged rock.

At a level of one foot below low water of spring tides, the blocks are reduced in depth, being set back 4 ft. 8 ins.

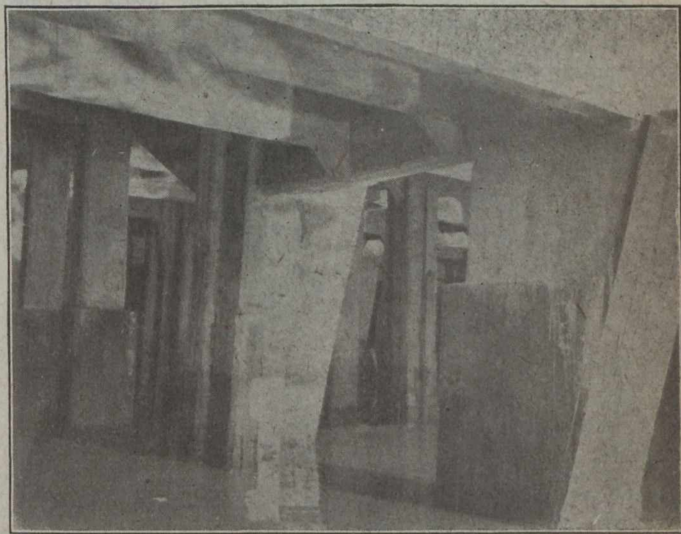

Fig. No. 10—Pier No. 2—View Under Pier Deck, Frost Protection Not Completed

from the face to allow of the building of a granite-faced concrete coping wall. In this type of construction no concrete, plain or reinforced, is exposed above low-water level.

The construction of Pier No. 2 was described by the writer in a paper read before the Nova Scotia Society of Engineers in December, 1914, but it may not be out of place here to mention some of its chief features.

The length of the structure is 800 feet, its width 235 feet and the depth of water alongside varies from 34 feet to 57 feet below low water of spring tides.

All the piles used are 24 ins. square in cross-section, reinforced with eight round rods of size varying from 1 in. to 1¼ ins. in diameter according to the length of the pile. The lengths of the piles ranged from 47 feet to 77 feet and a total of 1,801 piles were used.

These piles were cast at the contractor's yard, seven miles from the site of the pier, and were made of concrete mixed approximately in the proportion of 1 : 1½ : 3, the cement containing not more than 6.5 per cent. of alumina. The alumina content was kept low so as to lessen the chemical action of sea water on the concrete, it being generally held at that time that the magnesium sulphate contained in sea water attacked cements high in alumina much more readily than those having a low percentage.

It is interesting to note here that Messrs. Wig and Ferguson, in their report mentioned above, state that the percentage of alumina in the cement appears to have no effect on the concrete's durability in sea water.

At all times an endeavor was made to procure as dense a concrete as possible. The reinforcement of the piles was designed to take care of the bending stresses when they were being lifted in a horizontal position. In order