may be waterborne without subjecting her to stresses as severe as those imposed by launching, the necessary period of delay between the completion of pouring and floating is reduced. The advantages of floating from a dock, however simple or elaborate it may be, as distinct from launching are:—

Launching vs. Floating

(1) The possibilities of failure of the structure during removal from the building berth are much reduced.

(2) The number of berths required to execute in a given time any programme is reduced owing to the fact that the number of ships lying "weathering" on dry land is less.

(3) The ground can be permanently levelled and prepared so as to form the exterior surface of the bottom shuttering, whereas bottom shuttering is always required (at least in a monolithic vessel) where launching is contemplated.

It should be noted that given equal speeds of construction the time from laying of keel to delivery to owners will be the same under either method, if, as is essential, the strength on the maiden voyage is to be the same in both cases. In the future, the choice of method will be determined by the financial considerations governing the acquisition and development of the building site.

In the present early stage of development it is natural to expect that widely differing estimates of weight, both as regards concrete and reinforcement, will be advanced by various engineers for the same ship; any one dealing with reinforced concrete vessels to-day has constant evidence of this. But it is found, as might be expected, that the percentage of reinforcement steadily increases with size of ship. Thus, average figures for percentage weight of steel to total weight of reinforced concrete are, for a 500-ton barge 11 per cent., for a 1,000-ton barge, 14 per cent., for a 6,000-ton steamer 22 per cent. This last figure corresponds to a percentage area of steel to reinforced concrete of about 7 per cent., and when it is recalled that an average figure in land work is about 1 per cent., the much more onerous requirements of marine construction are again emphasized.

Deadweight and Internal Volume

The shipowner is chiefly interested in the loss in deadweight-carrying ability. If a vessel of the same dimensions as the 1,000-ton concrete barge noted above had been built in steel, she would have carried somewhere between 35 and 40 per cent. more deadweight.

The quantity of steel required in this reinforced concrete vessel is less than one-third that used in the steel ship, but the finished hull weight is nearly twice that of the latter, even when allowances have been made for the omission of cement and paint in the heavier ship. Where internal volume is the measure of the carrying capacity of a vessel, this increase of weight, though not without its drawbacks, is not vital, but where deadweight is the governing factor, the advantages are heavily in favor of the steel structure.

A detailed comparison of the technical particulars of the 6,000-ton deadweight steamer mentioned above will be of interest. It is observed, however, that while the figures quoted for the steel ship are probably accurate, the weight of the reinforced concrete hull is purely estimated, represents a much larger vessel than has yet been attempted in the new material, and lacks the confirmation of practice.

	STEEL.	REINFORCED CONCRETE.
Length	375 ft.	375 ft.
Displacement	9,900 tons	9,900 tons
Steel	1,920 tons	680
Concrete	—	2,470 } 3,150 tons
Wood and outfit	400 tons	350 tons
Machinery	570 tons	570 tons
Lightweight	2,890 tons	4,070 tons
Deadweight	7,010 tons	5,830 tons

From the above it will be noted that 1,180 tons of deadweight is lost, or 17 per cent. of that carried in the steel ship; that the bare hull of the concrete ship is 65 per cent. heavier than that of the steel ship, and that the lightweight of the concrete ship is 40 per cent. greater than that of the steel ship.

It is impossible to state exactly to what extent the loss in deadweight will restrict the application of reinforced concrete to the construction of cargo carriers, since the cost of construction in reinforced concrete is still somewhat conjectural, but it can be stated with fair certainty that reinforced concrete will not replace steel for the ordinary cargo carrier unless the hull can be built for considerably less than half the cost of building the same hull in steel.

The Future for Concrete Ships

In spite of this there appears to be a class of floating structures in which reinforced concrete may well replace steel. Where the additional weight is more than counterbalanced by the durability and reduced prime cost of the new material, there is reason to expect that its adoption will naturally follow.

There would, therefore, seem to be a future for reinforced concrete in such structures as lightships, floating docks, landing stages, hulks, depot ships and similar craft, and it may confidently be expected that even when the artificial stimulus to reinforced concrete construction provided by present-day conditions is removed, the industry will still persist on the sound footing of commercial and technical suitability.

HAMILTON ENGINEERS ORGANIZE

At the organization meeting of the Hamilton Branch of the Engineering Institute of Canada, J. L. Weller, formerly chief engineer of the Welland Canal, presided. The meeting was held in the Connaught Hotel and was attended by about forty engineers, including some from St. Catharines and Niagara Falls. The latter attended to protest against the formation of the branch, being under the impression that all members within fifty miles would be forced to join the new branch, whereas they preferred to retain their non-resident membership in the Toronto Branch. They found, however, that the by-laws of the institute do not require members residing further than twenty-five miles from any branch to belong to that branch.

It was definitely decided to organize, and a formal petition was signed to be forwarded to the council of the institute at Montreal. E. R. Gray, city engineer, was appointed temporary chairman, and E. H. Darling, consulting engineer, was elected temporary secretary.

It was suggested by John H. Jackson, engineer of the Niagara Falls Victoria Park Commission, that another branch might be formed at Niagara Falls, Ont.