

THE IMPROVEMENT OF THE NORTH RIVER WATER FRONT, NEW YORK CITY.

When, in the year 1626, the West India Company purchased Manhattan Island from the Indians for sixty guilders, a sum equal to twenty-four dollars of the present day, no one could have foreseen the immense expense to which the city would eventually go to increase its area. While recently action has been taken to increase the area of the city by the annexation of many square miles of territory, work has been carried on for three centuries, almost unsuspected by the general public, in the increasing of the area of Manhattan Island proper by filling and making artificial ground extending on both sides into the Hudson and East Rivers respectively.

In former times the island was very much narrower than it is now, and old maps show the lower part of the island extending in width barely from Broadway to the present Pearl Street. Since olden times filling has gone on along the water edge for generation after generation until many blocks have been added and the island has been increased by the addition of area on its outer periphery precisely in the place where the addition counts the most. Originally the junction of Pearl Street and Maiden Lane marked the entrance of a wide canal, and another wide canal ran up Broad Street, beginning at Front Street and extending nearly to Wall Street. These facts indicate the narrow limits of the old city.

The rapid currents of the Hudson and East Rivers, especially the latter, had to be guarded against, and as early as 1654 it was resolved to drive planks into the shore to make uniform "sheet piles" between Broad Street and the City Hall for the lower part of the city, and many other ordinances touching on the subject of the water front were passed. The act of 1654 is the first formal attempt to construct a statutory bulkhead.

The map which we publish will serve to give a good idea of the enlargement of the city area. It is only within modern times that the limit of enlargement has been fixed and bulkhead and wharfhead lines located to determine the extent to which filling and dock building operations could be carried out. The map in its shaded portion shows the limits of the lower ends of the island, while in outline are given the additions up to the present time.

On the Hudson River front the city, since 1871, has been working to improve the street and wharfage facilities and has gradually been constructing an unequalled river street, which it is proposed to have extended in time from the Battery far to the north. One of our cuts shows a view of West Street, which is the name of the street running along the North River, presenting a portion where it has not been widened. The illustration serves to show how congested traffic is, and also brings out another point, as to how many wharves are involved in the traffic, and what large portions of the street are occupied by wagons standing to receive their loads.

The general arrangement, following the plan of 1871, provides for a bulkhead wall about 180 feet west of the old bulkhead line, the latter an irregular one cut into by slips. The proposed improvement, now in active progress, increases the width of the street from an average of about 70 feet to the uniform width of 250 feet. We have described fully in a preceding issue engineering features of the work, especially of the bulkhead whose construction is shown in two cuts. In one case it is shown as established on a sloping bed of rock, concrete in bags being used to provide a level bed. Construction of this type is applicable below Barclay Street and above Thirty-fourth Street in places; elsewhere the entire structure must be built upon piling, which in many cases cannot be driven deep enough to reach solid ground, so that what is defined by the engineers as a genuine case of mud flotation is exemplified in numerous places. Wherever the wall has settled in such parts, it has gone down so evenly that no harm has been done.

The concrete blocks which go at the base of the bulkhead wall, and which weigh some 70 tons apiece, are made in moulds and handled by the great floating derrick of the dock department. The operation of moving the blocks is illustrated in another of the cuts.

public. Another view shows the scene at a busy hour on the widened street, illustrating very clearly how a great improvement has been effected in facilitating traffic.

The exceptionally wide street, it is anticipated, will divide itself into three longitudinal sections. Fifty feet back of the bulkhead line will probably be devoted to sheds used in connection with the pier service. The next 80 feet, it is thought, may be used for the storage of heavy commodities which will not suffer by exposure to the weather. This disposition will leave 120 feet clear for traffic. It is the arrangement recommended by the consulting engineer of the department of docks of the city of New York, and is accompanied by the recommendation that the whole street be put under the control of the dock department.

Besides the bulkhead wall and the filling in of the area back of it, the city has done a great deal of work upon the piers proper. It has obtained a title to much of the land; of the lower 2½ miles, 1½ miles belongs to the city. The city leases docks and thereby obtains revenue for its investment. The permitting tenants of the docks to encroach for 130 feet upon the wide street makes the docks more valuable, bringing in a higher rental, and is not in the direction of overlooking encroachment.

Pier 1, on the North River, is a stone structure and an example of what can be done if deemed desirable, but the practice adopted has been to build the piers on the most modern lines yet at less expense; they represent the best practice of timber docks. The tenants build upon them sheds, in some cases two stories in height, and the ferry companies have

built their ferry houses outside the bulkhead lines also. The engineers reporting on the subject advocate strongly the use of bridges across the street for the use of the ferry passengers, in order to leave the street as little interrupted in its uses by pedestrians crossing as possible. The commissioners of the department of docks of New York City

appointed as a board of consulting engineers to report on the work the following representative men: late Gen. Thomas Lincoln Casey, Chief of Engineers, United States Army; Mr. George S. Morison and Prof. W. H. Burr, all distinguished members of the American Society of Civil Engineers.

We are indebted to their report, which has recently been rendered, for much of the information in this article. The work has been executed under the late Gen. Geo. B. McClellan and Mr. G. S. Greene, Jr., his successor. As regards the future operations, the most striking feature advocated is the construction of immense graving docks for the accommodation of ocean steamships of the largest size. In the territory between Forty-ninth and Fifty-third Streets is a site for three docks parallel with each other, about 800 feet long within the bulkhead line, with possibility of extension beyond the bulkhead line to about 1,000 feet. Their recommendation is to have one of the docks of the maximum size and the others smaller. It would seem also that the acquirement by the city of title to the entire front should be included in the scheme. As it is now, the city owns comparatively little property below Barclay Street.

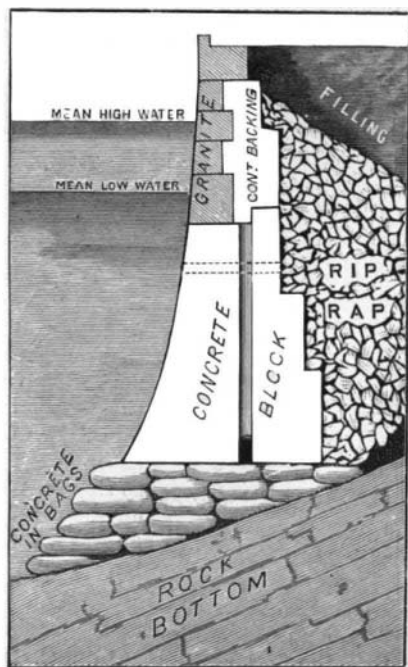
In a late paper in the Comptes Rendus on the products of combustion of an acetylene burner, and explosive mixtures of acetylene and air, M. M. Grehant states that the combustion of acetylene gas in an ordinary fishtail burner is complete, the products not comprising the least trace of a combustible gas containing carbon. With mixtures of acetylene and air, the most violent explosion was produced when the volume of air was nine times that of the acetylene.

At a recent meeting of the Paris Academy of Sciences M. Balland presented a memoir describing an analysis of a sample of rice over a century old. He found the rice only slightly deficient in fat.

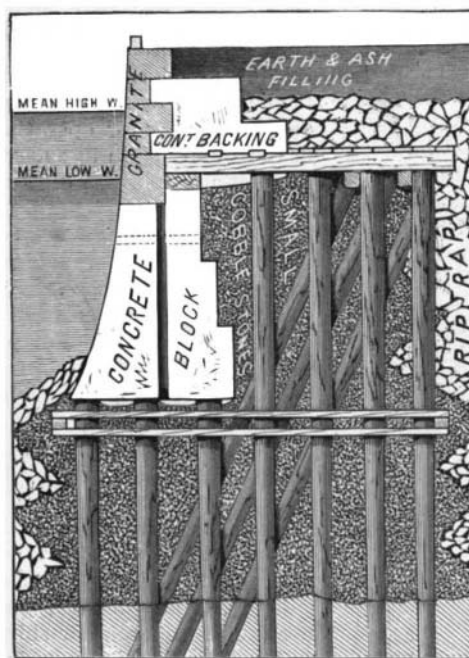


MAP SHOWING ENLARGEMENT OF MANHATTAN ISLAND BY FILLING.

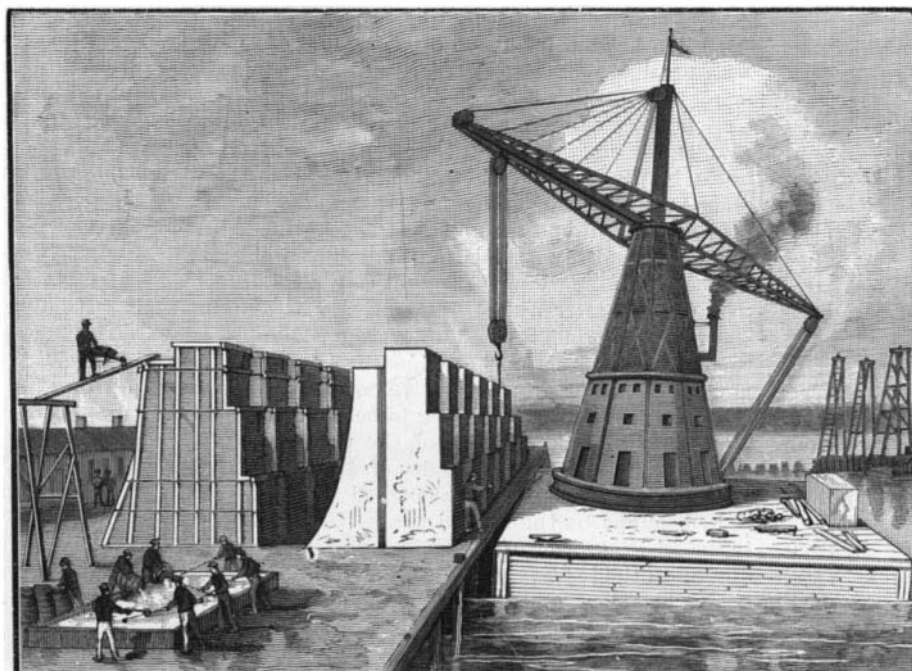
Another of the views shows in bird's eye projection what is to be accomplished eventually. On this cut is seen a portion of the old street on which the improvements have not been effected, and on the same cut can be traced the new Hudson River front, where West Street has been widened and is occupied by the



BULKHEAD WALL ON ROCK.



BULKHEAD WALL ON PILES.



THE GREAT DERRICK OF THE DOCK DEPARTMENT.