ICE-BREAKERS.

It will be noticed on Plate 7, that the two middle piers are to be defended by ice-breakers. These are 100 feet long and 30 feet wide, and are constructed independent of the masonry of the piers, so that they may settle, or be partially undermined or destroyed without affecting the piers.

The main body of each breaker (see Fig. 3, Plate 9) above high water-line forms a roof, both slopes being armed with railroad bars fastened down lengthwise; but the point of the breaker has the shape of a half-pyramid, the two sides being well defended by railroad bars. An inclined sharp edge is thus presented to the floating masses of ice; they will slide up the incline, and will be broken and cut in two by their own weight and momentum. No accumulation or gouging of ice can therefore take place; on the contrary, large and compact fields, as they strike the breakers, will be cut in two and floated off.

It is not contemplated to go down to the rock with these breakers; they can be made sufficiently secure by driving down piles of fifty to seventy feet long. Previously to piling, the sand should be excavated by dredging, say ten to twenty feet deep. Crib-work is then to be sunk around and between the piles and filled with loose rock. Heavy timber sheeting will be secured to the crib-work outside, in such manner that repairs can be made, should the work be damaged.

Not only will the safety of the piers be greatly secured by these breakers, but the foundation-work will be much facilitated and rendered secure by their previous erection. It is proposed to construct the ice-breakers first, before commencing with the foundations.

In the second part of this work, I shall give plans for the foundations, such as can be safely executed under all circumstances; and as the ice-breakers will form an important feature of these plans, it is not important to speak of them more in detail at present.