To dredge 450 tons of sand in a day would be a very small matter, and require but a very small power of dredger, if it were possible to get at it conveniently, and every day; but, in this case, such cannot be expected, and it will consequently be necessary to provide appliances and machinery of ample power to do the year's work in much less than a year.

Taking all the circumstances into account, however, it is probable, that by adopting the plan which will presently be detailed, it would be possible to dredge at Timaru, to a fair percentage of efficiency, and in effective situations, during say, about half the year; and, if this were achieved, the dredge need only be capable of lifting say, 1,000 tons in eight hours.

A dredge capable of lifting 1,000 tons in eight hours might therefore possibly be sufficient; but, allowing for interruptions for repairs, and other contingencies, and in view of the magnitude and importance of the interests at stake, it would be desirable to provide machinery and appliances, in this instance, capable, if occasion requires, of lifting and disposing of as much as 1,500 tons in eight hours.

Details of Dredging-plant.

Having very carefully considered, and calculated the cost of, many methods which suggested themselves, or were suggested by your engineer, Mr. Marchant, by which the requisite dredging and conveying of the stuff might be carried out, it appears that the following is the most advantageous one, in view of the various and manifold requirements of the case, and it is therefore recommended for your approval and adoption, namely:—

A pump hopper-dredger, capable of lifting, under favourable circumstances, 400 tons of sand or shingle in an hour, and having hopper-capacity for 300 tons of sand or shingle; with compound surface-condensing engines indicating about 200-horse power. This vessel, while dredging, to lie within the harbour, alongside the breakwater wharf, in the vicinity of the tail of the shingle-bank, as indicated on the plan herewith, and to do its dredging through a pipe and nozzle of the usual form, but supported on a light timber-piled staging, outside the breakwater, as indicated on the plan and longitudinal section herewith. The pipe and staging to follow up the outer margin of shingle-accumulation, to such extent as may be necessary to render the dredging effective. That is to say, in order to dredge only what will be restored again by accruing accumulation, and not merely to make excavations in the interior of the existing shingle-bank, which might not be restored, as that would not be contending at all with the current accumulation.

In order still further to secure the result of only dredging what is necessary—namely, what would otherwise add to the area of accumulation—and also in order to dredge at the cheapest rate practicable, it would be desirable that the dredging, in the first instance at any rate, should be confined to the face of the shingle-bank, and be only carried down to, say, 6ft. below low water, as the shingle below that, when the backing is removed, would probably be cast up by the sea. If so, it could then be dredged at less cost, or, if cast up very high, it might not require dredging at all.

The nozzle of supply-pipe would be guided from staging by means of a hand-crane.

When hopper is filled, the vessel would, of course, go to sea and discharge its load, say, in the vicinity of the Dashing Rocks.

In addition to one or more pipes and nozzles for working on staging, the ship should also be provided with sufficient pipes and nozzles for dredging at sea, or within the harbour, and also with steam-crane jibs or other suitable appliances for guiding such nozzles when at work.

The cost of this vessel and staging, &c., would probably be about £10,000.

The interest, and depreciation in value of machinery, due to that expenditure, would amount, on the average, to, say, 11½ per cent.—namely, to £1,150 per annum.

The cost of the dredging, and depositing the stuff dredged, after making due allowance for contingencies, and including repairs of machinery, and all other expenses, would be about 4d. per ton, and this, for 135,000 tons, would come to £2,250 per annum.

The total cost, for dredging an average of 135,000 tons in each year, would therefore be about £3,400 per annum, and that would be equivalent to 6·04 pence per ton, including interest and depreciation on value of plant.

To describe herein all the other systems of dredging which have been inquired into, would make this report entirely too cumbrous. As it may be desirable, however, that a list of the most favourable ones amongst them should be furnished with the reasons for their rejection, this has been done, in an appendix, hereto attached.

If the machine which is recommended to be procured is approved of, it would be very desirable, in view of its being likely to be required to work continuously and permanently, that the best class of dredge procurable, of its kind, and having all the latest improvements, should be obtained; and, in order that this may be done, it is suggested that the Board should have complete drawings and specifications prepared, defining exactly the existing conditions, and the character and extent of the work required to be performed, and send the same to some qualified expert in London to do the best he can for them under the circumstances; or else, what would probably be the more satisfactory plan, for the Board to send some qualified person from here, whom you can thoroughly rely upon, and who is conversant with all the circumstances of the case, to visit some of the principal manufactories of such articles in England and Holland, and satisfy himself as to which is likely to produce the most satisfactory article, before letting a contract for its construction. One reason, amongst others, why this latter plan would probably be the most satisfactory one to adopt, is, that no matter how complete the drawings and specifications sent to England may be, it is impossible, in practice, to predicate all the questions that may arise, and to supply answers to them in anticipation. To a person unacquainted with the locality also, a machine might appear to be quite suitable, which, to one acquainted with the locality, would be evident at a glance to be unsuitable. Another reason is the rapid improvements now continually being made in these machines, which could not be predicated in any specification sent from here, and which might or might not be necessary or suitable for the Timaru work, and which an expert in England would not consequently