

accessible the cost of the buildings would be but small ; but after a careful survey, and taking every thing into consideration, I estimate that the total cost of the works will not exceed say £6500, of which sum £2296 19s. 9d. is the cost of the apparatus and lantern in England, and their freight to Dunedin.

PENCARROW HEAD LIGHTHOUSE.—While engaged in the survey of the Strait to ascertain the best line for the Telegraph Cable I happened to pass this Lighthouse at night, and as the light seemed very poor, at Captain Kennedy's suggestion we landed to examine it. We found the keeper duly on watch, and everything beautifully clean and in good order, but the flame of the lamp though very white and clear was miserably low, being only $1\frac{1}{2}$ inch from the burner to the top, whereas the standard height is from $3\frac{1}{2}$ to 4 inches. This fully accounts for the poorness of the light, as if the lamp be in its proper position only the mere ragged upper edge of the flame is sent seaward through the central or lenticular part of the apparatus, all below being wasted on the sky, while if the lamp has been raised to remedy this defect the upper and lower prisms must from necessity by their construction be entirely useless. The whole of the optical arrangements, including the lamp, require a thorough examination and readjustment, and it would be very desirable to bring the trained Light-keeper, so wisely brought out by the Otago Government, to this station for a month at least to instruct the keepers in the really difficult art of maintaining a high but clear flame.

TORY CHANNEL LIGHT.—It having been suggested that a light might advantageously be established at the entrance to this narrow Sound I took a favourable opportunity for examining the locality, and in company with Captain Kennedy fixed upon a very good site on the South Head, at an elevation (guessed) of nearly 200 feet above the sea. There can be no doubt that a light at the entrance to Tory Channel would much facilitate the general navigation of Cook's Strait, and would be invaluable to the mail steamers—as it would not require to be seen to a very great distance, a third order fixed red light with a three wick burner fountain lamp, similar to Tairoa's Head would be sufficiently powerful and would run no risk of being mistaken for either Pencarrow or Mana light, while it would also almost entirely remove the danger of these latter being confounded.

There is an awkward low projecting rock just abreast of the site proposed for the Lighthouse on which it would be very advisable to erect at the same time a simple barrel beacon. Should it be decided to erect a Lighthouse on Tory Point, I would propose a timber framed tower 30 to 35 feet high, covered with galvanized iron, and timber dwellings, and the whole works could be completed in a few months so as to be ready to receive the optical parts immediately on their arrival, even if ordered at once. Without going into details it would be impossible to make a correct estimate of the cost of these works, but I should think that the whole establishment complete—including the proposed beacon would not exceed £4000, and would probably be considerably under that sum.

THE BROTHERS.—During the survey of the Strait we steamed round these rocks as close as seemed prudent and examined them carefully. It seemed probable that a landing might be effected on the northernmost in very fine weather, but even with the moderate swell running when we were there, it would have been quite impossible. A lighthouse might certainly be erected on this rock, but the expense would be very great—probably not less than that of five or six ordinary lighthouses—and I am not quite certain that it would be wise to do so, even setting aside the question of cost ; sailing craft should not be encouraged to work too much on that shore of the Strait, as it is full of dangers, while in any weather in which even a steamer could with propriety run close to the shore, the Brothers themselves, being bold rocks upwards of 230 feet high, can always be made out.

Under these circumstances, I consider that the Marine Board has shown wisdom in at least delaying to erect a lighthouse there, and the Mana light seems both useful and well placed, in as much as it is on the "clean" side of the Strait, is "steep to," and has good anchorage for north-west winds under its lee. The next light that should be established in the Strait is certainly that on Tory Point, and should another afterwards be called for, I incline to think that Cape Jackson would be the best place for it, though I am not at present prepared to express a decided opinion on the question. There can, however, be no doubt that the Colony would not at present be justified in undertaking expensive works at the Brothers—in after years and with greatly increased shipping traffic, it may be found necessary to re-open the question.

The nucleus of a lighthouse establishment having thus been formed, it is obvious that it must gradually increase *pari passu* with the prosperity of the Colony, and it becomes of the utmost importance that such discipline should be established in the service as shall ensure the due exhibition of the lights to the best advantage, combined with all proper economy of stores. With this view proper regulations should be drawn up and promulgated and in no case departed from, and it should especially be understood that instant dismissal is to follow drunkenness on duty, or the extinction of the light if arising from any neglect of the keeper on watch. A scientific inspection of every lighthouse should also be made at least once a year. This system was adopted by the Scotch Lighthouse Board when first established, in 1791, and the result has been that Scotland has ever been in the van in the adoption of all improvements, and that the Scotch lighthouses are stated in the Report of the last Commission of Investigation in 1861, to be the best in the Kingdom, and, as they also state British lights to be unsurpassed, by inference the best in the world.

COMPASS CORRECTION.—During my examination of the various lighthouse sites referred to above, I had occasion to take from the "Sandfly" a number of compass bearings, and was surprised to find that, even when corrected by the steering cards, they differed very greatly from those measured on the Admiralty charts. In consequence, on our return to Port, I got the vessel "re-swung," but afterwards found that the corrected card did not agree with the readings taken at the time she was swung, and as this seemed a very palpable error, I investigated the whole subject with care, and collected a number of other steering cards, on most of which there were curious and, in some cases, very grave discrepancies, which seemed of such vital importance as to compel me, in the interest of the public, to bring the