

only the designing of the pits, but the alteration of the fittings. The new designs not only give good protection, but have been found to increase the rapidity and accuracy of fire very considerably, and the whole of the details of the system have been worked out very successfully. The pits, magazines, and all details for the new-type guns are entirely original. A general design for a pit was received from England, but too late to be of assistance; it was also imperfect, and unsuited to the class of work here required, and would also have necessitated a considerable increase of cost. Capital drawings of the gun and carriage were furnished by the makers, and from these I was able to design the work. The pits and magazines for some of these guns are complete, and have been thoroughly tried. The foundations and general design of the pits have been found thoroughly suitable. The arrangements for the storage and supply of the ammunition admit of absolute safety and ample rapidity of supply. These guns as now mounted are thoroughly protected from all kinds of fire, can be as easily worked and rapidly fired as any ship's guns, and, by reason of their rigidly-immovable platform, excellent system of mounting and sighting, great range, and wonderful accuracy of fire, form as perfect a defence of the kind as could be desired.

*State of Artillery Defences.*—The muzzle-loading guns, with the exception of one (temporarily dismantled), are all mounted and fitted, provided with all necessary magazine and store accommodation, and available for service. Four of the new guns have arrived, and are ready for service. Five more are expected during the next month, and will be mounted immediately on arrival. Pits and magazines are ready for six more of these guns. When these have arrived the defence of the colony will be in a forward and efficient state.

*Machine-guns.*—The Nordenfeldt guns have unfortunately not yet arrived; the pits are, however, all ready for their reception, and they will be placed in position within a couple of days of their being landed. Until they are received the defence of the mine-fields cannot be satisfactorily carried out; but four are being landed and six more are daily expected, and the delivery of the remainder cannot be delayed more than a month or two longer.

*Submarine Defences.*—The submarine mining defences are in a very forward state. The whole of the mines, cables, and electrical gear, with the exception of some small wire, is to hand, and is of the very best description. The torpedo stations are all completed. There are all necessary appliances, as well as launches and boats necessary for laying down the mines rapidly, to hand. The work of loading and preparing the mines for actual service has been commenced; the firing- and observing-stations and test-rooms are all being got ready for service, and are in some instances complete.

*Electric Lights.*—Very powerful electric lights have been provided for the three ports that require them. The lights provided for Auckland and Wellington give a light estimated at 60,000-candle power, and are, I believe, the most powerful yet provided for any defence works. They are of the very best workmanship, and work most satisfactorily. These two lights are permanently erected and complete in every particular. The Lyttelton light has not been erected, as the shell-proof chamber for its reception is not completed; it is, however, itself, complete, and has been tried, and proved very satisfactory. It could be erected in one of the sheds of the submarine mining dépôt at Ripa Island in a few hours, and worked therefrom if necessity arose.

*Brennan Torpedo.*—In the original scheme of defence proposed, the Brennan torpedo was recommended as an additional defence for Wellington and Lyttelton. The orders for these torpedoes have been counter-ordered by the Government. I am of opinion that if the Brennan is not provided, additional submarine mining-plant of the value of £7,500 is necessary. At the same time I would not recommend it as an efficient substitute. The patent rights for this (Brennan) torpedo have now been purchased by the British Government; and for the class of work required, both at Wellington and Lyttelton, there can be no doubt that it is exactly the weapon that is wanted. Submarine mines can never be quite successfully employed at these places, both on account of the width of the channel and the exposure to the ocean swell. I beg to point out the advisability of coming to a decision in the matter at as early a date as possible.

*Telegraphic Communication.*—It is necessary to provide telegraphic communication between the several forts at each place, to enable the officer in command to direct the defence to the best advantage. In all cases where the erection of the line has helped the construction of the works, the line has been erected; in the other cases it has been left until the work was thoroughly completed. A complete system of telegraphic communication has been worked out; all instruments, cable, &c., not obtainable in the colony have been obtained from England; and the system can readily be completed, and will be carried out concurrently with the other work. The most advanced fort will also be connected to the signal-station of the port.

*Whitehead Torpedo Boats.*—Since the date of my last report twenty Whitehead torpedoes have been received, and two of the boats have been fitted with dropping-gear to fire these torpedoes. The other two boats will shortly be fitted with the gear by the artificers. These boats would be valuable in time of war for patrolling the water in front of the mine-fields. In the case of Dunedin, I do not consider a boat necessary or useful there; and this is, I believe, also the opinion of the naval authorities on the station. The torpedoes could be fired equally well from the shore, and the boat would then be available for the Wellington defences, where it is greatly needed. In addition to the guard-boats, it would be necessary at Wellington and Lyttelton to employ guard-vessels in war time, and at all the ports it would be necessary to arrange a system of hydrographic signals and rules to prevent surprise by day or night. I have carefully considered the subject, and could, with the assistance of officers of the Marine and Customs Departments, arrange a scheme that would effect the purpose without unnecessarily impeding navigation during war time.

*Protection of Cables.*—The protection of cables in war time is an integral portion of the defences of the colony, and requires to be provided for. At present there are no less than four cable-stations, and to efficiently protect the cables would be a matter of considerable expense. The only economical solution of the question is to run the main cable direct to Wellington, and defend