

This is the plan of defence which I consider well adapted for the harbors of New Zealand, provided it is designed so as to be carried out by degrees. Measures to be taken, at once, for placing the colony in a position to resist the attack of one or two cruisers, and in the future, the scheme to be extended to afford protection against more formidable attacks. In this manner the burden would be adjusted to the resources of the country.

In order that the reasons which have led me to this conclusion may be clearly understood, it is desirable to consider briefly the several means and appliances at present available for defensive purposes.

First, with regard to defensive works :—Where expense has not to be specially considered, it is advisable to provide a few guns completely protected against the enemy's fire, supported by other pieces, mounted *en barbette*. The first plan involves the employment of bomb-proof chambers or casemates, constructed with fronts either wholly of iron, or of masonry combined with iron shields. In both cases the guns fire through ports, and there are bomb-proof roofs over them. Unless these roofs, and the fronts of the casemates, are destroyed, the guns cannot be silenced. When guns are so protected they can be placed near to the level of the sea with perfect security. The cost of this mode of construction, however, is so great as to render it inapplicable to the defence of the New Zealand harbors.

Description of means and appliances at present available for defensive purposes.  
Defensive works.

The *barbette* principle of mounting ordnance is much less expensive, and admits of the guns being placed at a higher level above the water, so as to compensate largely for the loss of complete cover by the increased difficulty which the ship experiences in replying to their fire. By this method, which I propose to adopt, the guns fire over earthen parapets, and the lateral range of each piece is greatly increased, thereby reducing the number of guns and gunners required. At the same time considerable protection is afforded against the enemy's fire, by placing the guns about 90 feet apart and providing high parapets in front, which completely screen the gunners from view, except when actually in the act of loading and sighting. The large traverses of earth between the guns isolate each piece in separate pits or emplacements, and give cover for expense magazines to contain the ammunition for the battery.

The reduction in the number of the men required for each battery is a point of great importance, as it lessens the cost of providing garrisons for the defences.

Under the protection of the guns in the works on shore, submarine mines or torpedoes should be placed in those channels by which an enemy must pass in order to enter the ports. There are three kinds of fixed or defensive torpedoes :—the *observation*, the *electro-contact*, and the *mechanical*. All these kinds are laid in the water at varying depths, according to the purpose they are intended to serve. Their charges are proportioned to the depth from the surface at which they are placed. The mines may be *buoyant* (*i.e.*, floating in the water), or *ground* (*i.e.*, laid on the bottom). They are generally distributed in three or more rows across the channel, and they may be fired by observation, that is to say, at the will of two observers on shore—situated at convenient distances apart, and in telegraphic communication

Submarine electrical mines.