good bottom, absence of disturbing influences from heavy seas, &c., it is quite evident that efficient and reliable torpedo defences could not be established without the most careful preparation, and without the services of a large body of men thoroughly trained to the work.

But the difficulty lies not so much in the application, as in the maintenance, of a system of defensive torpedoes when established. This will be more fully appreciated if the several modes, by which an enemy may destroy them, are considered. It is obvious that any plan, offering a prospect of success for clearing a passage through the torpedo defences of a port, must, in a great measure, depend upon the amount of active and passive resistance to be encountered. It would be unwise not to assume that an enemy would come provided with all the appliances necessary for the undertaking. On the part of the defenders, the great object to be attained is to keep the enemy in ignorance of the exact position of the mines; and it is indispensable, as I have already stated, that the channel should be sufficiently swept by artillery fire. In such cases the enemy would be driven to operate under cover of darkness, or after the defender's fire had been subdued.

Modes of attack likely to be adopted by an enemy to remove the mines.

The three modes of attack likely to be adopted are by countermining, creeping, or sweeping. Countermining is the term applied to the operation of destroying the defenders' mines by the explosion of heavy charges in their proximity. Creeping is the process of removing electrical cables, mines, &c., by dragging for them along the bottom by means of grapnels. Sweeping is employed to ascertain the position of mines by dragging a rope up or down a channel. These operations might be counteracted or rendered more difficult by providing an advanced system of mines—or by dummy mines—and by other obstructions in the water; but it would also be necessary to protect the approaches by guard boats, especially at night, and to illuminate the channels with electric lights. These measures would add largely to the expense of maintaining the defences in time of war.

If the question under consideration were that of defending only one harbor, such as Wellington, I should be inclined to recommend the adoption of defensive torpedoes, as that city is the seat of Government, and the head quarters of the telegraph system of the colony. There would consequently be less difficulty in establishing a reliable organization for the purpose.

Cost of submarine defences.

But when all points are carefully weighed, and it is borne in mind that there are other harbors of equal importance to be dealt with, I am led to the conclusion that it would not be practicable, at the present time, to maintain in a state of efficiency complete systems of submarine defences at each place, excepting by an expenditure of money entirely beyond the power of the colony to afford. I estimate that £20,000 would be required for the establishment of complete systems of defensive mines at Auckland, Wellington, Lyttelton, and Port Chalmers, inclusive of works, torpedo stores, and equipments, but exclusive of the cost of laying the mines in time of war. A torpedo corps, numbering at least 150 men, would have to be raised; buildings for the reception of