as an alternative the Engineer to the Board, Mr. J. A. McDonald, devised the scheme of carrying out the work from staging (see illustration No. 2) erected on trestles. Illustration No. 1 gives an excellent idea of the reef as it appeared at low tide before blasting.

To take events in their proper sequence it is necessary to begin where the charge is prepared for the actual work. This takes place in a series of three buildings known collectively as the "magazine," situated on reclaimed land, away from all surroundings, and well apart from the working party. As a precaution against accident it may be mentioned that in the construction of these buildings no iron of any description is employed, the whole throughout being fastened with copper or brass nails.

The first building contains the store of gelignite which is the explosive employed, and is designed to contain 300 lbs. The second building is the factory in which the tin "torpedoes" are made. These have a sharp pointed end, and differ in length according to the charge required, which varies from 1lb. to 10 lbs. The torpedoes are of 2in. diameter, and the gelignite which is put up in 1lb. plugs is rammed into these with a wooden rammer. The next building of the magazine is the "fuse house" in which is stored the miles of fuse employed in the blasting, and the store of fusees used for lighting the charges, though this does not count as one of the main buildings. The "primer house" is the building in which the primers are made for firing the charges.

The detonator, which is the medium by which the gelignite is actually exploded is entered on a tube and water-proofed. A length of fuse is then carefully fitted inside the detonator and the latter forced into a plug of gelignite, the whole being tied on to a long wooden lath.

On the actual works, drilling holes in the reef to take the charges is first of all necessary. This work is carried out from staging as shown in illustration No. 2, the uprights shown in the foreground being tubes projecting from finished "bores."

First of all a hollow iron cylinder is put down to the reef which prevents sand from getting into the drill hole, and the drill is kept working inside this cylinder, while every now and then a steam pump is put on to clean out the silt and water. When the holes are drilled to the required depth lengths of galvanised piping, closed at the lower end are inserted in each hole. While placing these in position they are filled with water to ensure that they should reach the bottom of the holes. The torpedoes charged with gelignite are then dropped to the bottom of the tubes, and then the primer attached to the wooden lath is sent down after it, (see illustration No. 3) the end of the lath being pushed down into the charge contained in the torpedo, while the long fuse attached protrudes from the top of the tube ready for lighting.

The times for firing all charges are lunch time and "Knock off" time, so ensuring safety for all the hands. Illustration No. 4 shows well the ultimate result of the operations described, and a careful in-

THE NEW ZEALAND SOCIETY OF CIVIL ENGINEERS (Incorp.)
A Group taken at the Annual Meeting held at Auckland this year.