James Bishop, C.E., and the water-supply tables, &c., by Mr. Thomas Jones, and constructed by Mr. James Brown, of Kumara. It is intended to work the ground with four central plants, consisting of fixed elevators, driven by steam-power, either directly or with electro-motors, obtaining their power from a central station. The elevators will be sunk in paddocks close to the sea; the sand, &c., will be sluiced to them; and, after being lifted 40ft. and panned over the tables, will be sent away by a deep-sea tail-race. The first of these plants is now in position, and will be at work in a few days if the fine weather continues, all that remains to be done being to extend the tail-race 40ft. or 50ft. into the sea, so as to get beyond the action of the breakers. The present elevator plant consists of a 42ft. ladder, carrying thirty-six buckets, having a capacity of 1½ cubic feet each, and is driven by the converted engine-power of the Priestman grab. A powerful Marshall's engine is used for driving the centrifugal pumps, which serve the double purpose of draining the ground and supplying water for washing purposes. In connection with the water-supply, two large dams and a considerable length of race have been constructed, principally with the object of trapping the surface-waters and saving the pumping-power. The dams are connected with the table by some 10 chains of 2ft. by 2ft. substantially-constructed fluming, mounted on trestle work. The tables are what are known as "Jones's novelty," and are an improvement and adaption of the American undercurrent system The blankets cover a space of 600 square feet. The tail-race, 4ft. by 2ft., is some 5 chains in length, and, when completed, will deliver into the sea well under low-water mark. The working of the present plant will be carefully noted, and any improvements that suggest themselves will be effected in the other three."

GOLD-MILLING.

The reduction and treatment of auriferous ores is a question of the deepest interest to those engaged in gold-mining, and one which does not receive the attention it deserves. Very few mine-proprietors have yet adopted the practice of assaying the ore as it comes from the mine, but seem quite content to treat it by the method in common use, so long as that method leaves sufficient to pay the cost of working the mine. The loss of gold is looked upon as something that cannot be avoided, and yet, if proper care and appliances were used, a far larger percentage would be saved, especially if the gold is in a free state; and when it is combined with pyrites, the system generally now adopted for extracting it cannot be expected to give good results. The question of extracting a large percentage of the gold in the ore at a cheap rate is one which has not yet been solved, and, even were a process found to treat certain ores which would give 95 per cent. of gold at a small cost, it could not be expected to be suitable for every class of ore. The character of the ore determines the mode of treatment, and this necessitates that those in charge of milling operations should have some knowledge of metallurgy.

At the present time the loss of gold at some of the milling plants is something appalling. If average assays were made of the ore as it comes from the mine it would be found that in some instances not more than 33 per cent. of the gold was saved, as, for instance, at the Try Fluke mill, at Kuaotuna, where a large percentage of the gold flows away in suspension amongst the water, and does not lodge among the tailings. There are certain portions of a milling plant common to every class of ore, such as pulverising machinery, but even then it becomes a question as to fineness. The ore has to be pulverised before the whole of the gold is liberated from the quartz sands. If the gold is coarse fine screens are not required, and the probability is that, if the coarse gold is in a free state, a fair percentage of it will be saved by careful amalgamation, but, if it is extremely fine, such as that found at Kuaotuna, the ore has to be pulverised very fine before one can expect to get the minute particles of gold free from the quartz sands; or, if there is a large percentage of auriferous pyrites in the ore, it becomes a question as to the fineness or coarseness of the screens. It will be found more economical to use coarse gratings, letting the pulverised pulp from the mortar or pulverising-machine after passing over the amalgamated copper plate on the apron run on to concentrators to collect the pyrites, leaving the waste material from the concentrators to be reground in pans and amalgamated. Pyritous ore should be crushed to such a degree of fineness as only to liberate all the pyrites, and then to have it separated from the gangue previous to grinding the sand into a fine pulp suitable for amalgamation.

There is a great want in most of the mills in New Zealand in not having complete crushing machinery. The ore is brought from the mine and dumped on the same floor as the mortars, hand-feeding being generally adopted, the stamps being used for both crushing and pulverising. The effect of this is that large pieces of rock are fed into the mortar, the fall of the stamp first breaks up these pieces into cubes, which fly with a great force against the screens, causing undue breakage, and leaving too great a depth of material on top of the dies. The crushing-capacity of a stamp battery reaches its maximum when the feed is so regulated that there is only sufficient material on top of the dies to keep the stamps from bumping. Where there is more than this the force of the blow is destroyed by the depth of material in the mortar forming a cushion for the stamp. In order that feeding may be done uniformly the ore should all be broken up to about 1½in. cubes before it is delivered into the stamps. This applies to both hard and soft ores, for, although the soft ores do not damage the screen to the same extent as the hard while being broken, a great depth of material on the dies destroys the pulverising-power of the stamps.

The use of rock-breakers in a mill cannot be overestimated, as the wear-and-tear on these machines is much less for the duty they perform than on any other machine now employed, but the difficulty in using rock-breakers at quartz-mills is that the machinery of the mills is not arranged in such a manner as to enable the use and benefit of rock-breakers to be as advantageously adopted as they should be. Every quartz-mill should be constructed so that the ore from the mine can pass through all the stages of treatment by gravitation. This necessitates the mill being built with several floors. The quartz should be first dumped on to a grizzly, the bar of which should not be more than 1½in. apart, the fine stuff going through the grizzly falling into an ore-bin, having the large pieces of quartz going over the grizzly, passing through a rock-breaker to be reduced to 1½ cubes, thence falling into the ore-bin, which should be constructed in the form of a hopper. From this hopper the ore should pass into automatic ore-feeders to feed the stamps.