

all the lodes in shots and ledges; and in New Zealand these shots do not, as a general rule, extend for a great distance along the lodes, and between these shots the lode, although not actually barren as regards bullion, contains so small a quantity that it will not pay for working. Therefore, although the lode where cut through in the Canadian ground,—which is the place where the lowest adit was constructed by the Te Aroha Gold and Silver Company,—did not prove to be payable for working, it may be found payable underneath the workings in the New Find Mine, about 400ft. further to the southwards.

The more one examines the country in this locality the more one is impressed of the probability of rich shots of auriferous and argentiferous ore being found in different places in the main lode, which can be traced along the range for a distance of nearly three miles. When Messrs. Firth and Clarke sold their plant and ground to the Te Aroha Gold and Silver Company, it was thought to be a good thing for the district, as it was the means of a large expenditure being made in the locality, and it was anticipated that the main lode would be prospected in different places; but instead of being a blessing it has proved a curse, and put back the development of the field for many years. The company referred to did no prospecting. They employed an American metallurgist to erect a most expensive plant, one which was not suitable to deal with the class of ore on this field. When the plant was completed this proved to be the case, and the company, after expending some £60,000, had to suspend operations without prospecting their mining property, which will one day yet prove a valuable investment to those who hold it. The class of ore there was to deal with is quite different from any the American experts had been accustomed to treat, and they were as much at sea in reference to the proper method of treatment as our mill-men would be with American ores. It is a strange thing, but nevertheless true, that, notwithstanding the many mining experts we have had from America, which is the largest mining country in the world, all of them have proved failures in dealing with our ores.

The large reduction, concentrating, and smelting plant erected by the Te Aroha Gold and Silver Company is a thing of the past. The smelting and roasting furnaces have been taken down, the concentrating plant removed, and only twenty heads of stamps are now used where formerly sixty heads were erected. About twelve months ago all this property was sold to Messrs. Adams and Wicks for the sum of £3,200. The former of these gentlemen purchased his partner's interest, and formed the whole into a local company or syndicate. In addition to the New Find Mine they hold the ground formerly held by the Silver King Company as an ordinary claim, and have four men employed in it, and they are getting some very fair ore, containing about 1oz. of gold and 20oz. of silver.

*Battery and Plant.*—The battery and plant belonging to the Te Aroha syndicate consists of twenty heads of stamps, nine cyanide leaching-vats, and four solution-tanks, together with the zinc precipitating boxes and one berdan. The stamps are said to be 900lb. in weight, having a drop of 9in., and making sixty blows per minute, which require a power =  $\frac{900 \times 20 \times 45}{33,000} = 24.5$ -horse. These stamps are driven by a Pelton water-wheel, 6ft. in diameter, having a jet of 1½in. in diameter under a pressure of 98lb. per square inch, which is equal to a hydrostatic head of 225ft. The theoretical power of the water would therefore be as follows: The jet is capable of discharging 1.878 cubic feet of water per second, therefore  $\frac{1.878 \times 60 \times 62.5 \times 225}{33,000} = 40$  theoretical horse-power and  $\frac{24.5}{48} = 51$  per cent. of the theoretical power of the water. This is by far the lowest percentage that any Pelton wheel gives in the district, and shows that the water must be throttled in the valve which would account for this.

The ore as it comes from the mine is dumped on to a grizzly, and what will not pass through the bars of the grizzly goes into a rock-breaker, and is reduced to a maximum of 2in. in diameter, when it falls into a hopper which feeds four Challenge ore-feeders. The screens used are made of charcoal-iron, and punched, but the holes are as fine as a 40-mesh grating. The pulverised material on coming through the gratings flows over copper-plates coated with mercury for a distance of 4ft., and then flows into vats, which are used for leaching with a solution of cyanide of potassium, each vat being 10ft. by 10ft. by 5ft. There is a filter-bottom made on a false bottom of the vat, on the top of which is placed a coarse cloth, and Mr. Adams found by conducting this process that better results were obtained by placing a layer of coarse quartz-sand on the top of the cloth, as that prevented the slimes from getting down, and tended to make the cloth pervious to filtration. He runs the tailings into the vat to a depth of about 20in., and allows the water to filter through previous to putting in any cyanide solution. As soon as the water has filtered out of the tailings he digs the sand over, as though he were digging ground, for the purpose of loosening it and also of mixing the slimes thoroughly through the pulverised sand. He then closes the taps of the pipe below the false bottom, and puts on a six-tenth cyanogen solution to a depth of 6in. all over the vat, and allows it to saturate for, say sixteen hours; after which he opens the tap in the pipe below and allows the liquor to filter through the sand and through boxes containing zinc shavings. This liquor runs into a tank, and is again pumped up into the vat and leached through the sand a second time, after which the sand is washed with water, so as to get the whole of the cyanogen solution out of it. Mr. Adams states that the first solution, containing 0.6 per cent. of potassium-cyanide, after it is leached out, contains about 0.35 per cent. of this chemical; and the strength of the second solution is only perceptibly affected by the second leaching, inasmuch that it brings with it portion of the cyanogen left in the ore after the first leaching.

The value of the material he is leaching varies from 8dwt. of gold and 2oz. silver to the ton to a considerably less quantity of bullion, and the percentage of bullion saved varies considerably. Mr. Adams cannot account satisfactorily for this, but thinks a great deal is due to sufficient care not being taken in conducting the operations. The actual cost of leaching, he states, is about 6s. per ton. The quantity of solution used is one ton and a half to between seven and eight tons of ore.