

sections of the stamps. This engine was considered necessary in order to insure the mill being continuously worked in dry weather when water was not available for motive-power. There are tables fitted to each battery of five stamps, each table being 6 ft. in width and 10 ft. in length, covered with Muntz-metal plates, and silvered. From each of these tables the crushed pulp is led in a chute on to two vanners, which concentrate the ore, the concentrates being collected in a box at or near the head of each vanner, while the tailings pass into a main chute, and are carried away with water into nine sets of Cornish buddles. Each set of twelve vanners is driven by a Pelton wheel; the berdans are also driven in two divisions, with a Pelton wheel for each division. A tram-line is laid down all the length of the battery building, and the concentrates from the vanners are filled into trucks, which are run along this line and lifted in a cage worked by a hydraulic lift to the level of the top of the percolating-vats, where there are two lines of rails, and the concentrates are dumped into the vats, to be treated with cyanide solution. A Pelton wheel is also used to work the vacuum pump, and for pumping the solution from the sumps into the mixing-tank, where it is again made up to the proper strength required to use again. The steam-engine is of the compressed condensing tandem type, manufactured by Davey, Paxman, and Co., the high-pressure cylinder being 17½ in. in diameter and the low-pressure cylinder 34 in. in diameter, provided with automatic expansion gear, special governor, and jet-condenser, with air-pump fitted with indiarubber valves. The engine travels at a piston speed of 400 ft. per minute, and is capable of developing 240-horse power. Steam is supplied by two of Babcock and Wilcox's boilers, which are tested up to a pressure of 300 lb. per square inch each. It is found that this class of boiler is far more economical in the consumption of fuel than either the Lancashire or multitubular boilers, while the cost in the first instance is less. Care, however, has to be taken that water charged with mineral substances is not used. Attached to the battery building is a retort and assay-room, and every convenience for the working of the mill, while the whole building is lighted with electric light, produced by a 200 incandescent lamp dynamo, each lamp being 16-candle power. The dynamo is erected in the engine-room with switchboard, so that any light can be turned out when not required, and it is driven by a separate Pelton wheel. The foundations of the battery are very massive and strong. The mortar-logs were each 18 ft. in length, 5 ft. 3 in. by 2 ft. 6 in., all in one piece. These are set on a cross-log resting on a solid concrete foundation. It was difficult to get down to solid rock in one of the sections of the battery, and the contractor got the option of either sinking down to the solid rock or driving two rows of piles, and placing a thick bed of concrete on the top of these before laying down the bed-log for the mortar-blocks to rest on. The latter system was adopted, and the foundations are of so stable a character that there is very little vibration to be felt when the stamps are running at their full speed—namely, 95 drops per minute. The whole of the mill is of the most approved American design, and it may be said to be the most complete wet-crushing mill in the district. It was erected under contract by Messrs. Price Brothers, of the Thames, on designs approved by H. A. Gordon, the general manager of the company, and the electrical insulation was done by Messrs. Chambers and Sons, of Auckland. The mill commenced crushing, with thirty heads of stamps, in February last, and up to the end of April 2,220 tons of ore was crushed out of the mine, which yielded on the plates only gold to the value of £2,500 9s. 9d. The other thirty heads of stamps were only completed in April. The contractor could not complete his contract until the County Council laid down a new water-main to supply water for motive-power and for the tables of this section of the mill. In addition to the gold obtained from the plates, there is 190 tons of concentrates on hand, having an assay-value of £694. The concentrates have not yet been treated. It has been found that the gold the concentrates contain cannot be extracted until subjected to a roasting operation. The large quantity of sulphurous acid generated by a rapid decomposition of the concentrates and the particles of pyrites enclosing the gold is not acted on to any extent when in a raw state. This acid, although neutralised considerably by the use of caustic soda, prevents the cyanide acting on the gold. Mr. Park, who has charge of this part of the process, had to take 100 tons of concentrates out of the vat, after it had been subjected to cyanide solutions for one month, without extracting but very little of the bullion. The whole of the concentrates are now being stacked, awaiting the erection of a reverberatory furnace.

New Alburnia Mine (Area, 63 acres 3 roods 20 perches; owners, New Alburnia Gold-mining Company, Limited).—The chief work carried on during the year was further sinking of the shaft, which is now 550 ft. in depth; opening chambers, and cross-cutting to the reef, which varies from 2 ft. to 12 ft. in width; driving on the reefs, and stoping out quartz. 3,744 tons of quartz was crushed, for a yield of 1,771 oz. of gold, valued at £1,717 12s. 9d. Forty-five men were employed.

Darwin Mine.—Two men were employed working on a reef 10 in. in thickness. Seven tons and a half of quartz yielded 4 oz. 2 dwt.; value, £11 10s.

Fearnought Claim.—A party of two men are driving the surface prospecting levels, but as yet no good results have been met with. Two tons of quartz was crushed, for a yield of 1 oz. 14 dwt. of gold.

Tudor Mine.—A winze has been sunk on the Bendigo Reef. The reef is some 18 in. in thickness, and 14 tons of stone yielded 32 oz. 3 dwt. of gold.

Operations were also carried on in the New Whau, Orlando, Moanataiari North, and Alburnia East Claims.

Grahamstown.

Victoria Mine (Area, 41 acres 3 roods 10 perches; owned by the Victoria Gold-mining Company).—The work carried on during the year was on the Victoria leader, between No. 1 and No. 2 levels. The quantity of quartz mined and treated was 604 tons, for a yield of 653 oz. of gold, valued at £1,764 9s. Nineteen men were employed.

Cardigan Mine (Area, 64 acres 2 roods).—The work engaged in at this mine has been altogether of a prospecting nature, and the five men employed are now driving on the Cardigan reef. No returns are recorded.