

upon very rich but complex ore. A low level since then has been constructed for a distance of 1,027ft., cutting the same lode, which gave as high results as that found on the upper level. The lode averages about 6ft. wide. It has been driven on for about 105ft., and is heavily mineralised for the whole distance. It contains a good percentage of galena in combination with copper-pyrites and blende, which proved on assay to be rich in gold and silver. An uprise has been constructed on the lode to connect the lower with Taylor's level, and the same class of ore was carried to the full height—130ft.

In constructing the lower level six different lodes were cut. These varied from 2ft. to 6ft. in thickness, and the whole of them contained complex ore. When this complex, heavy mineralised ore was first met with the workmen considered it of no value, as no free gold could be seen, and consequently it was thrown over the tip amongst the mullock for a considerable time before any assays were made and its value known. A large quantity of ore has thus been carried away by floods in the creek which would have paid to treat at the reduction plant.

An aerial tramway has been constructed from the mine to the crushing plant, at the side of the Tararu Creek; the length of the tramway being about 28 chains. The height of the mine above the battery is not sufficient to make the tramway self-acting—it has to be worked by a Pelton wheel at the lower end. The crushing and concentrating plant is erected so that the ore passes from one stage of treatment to the other by gravitation, which is a great saving of labour. The building for the battery and the ore-dressing plant covers a space of 750 square yards. About 100,000ft. of sawn timber have been used in constructing the buildings, floors, and tramways, and about 30,000ft. in the erection of the plant. Two water-races have been constructed, having a total length of 48 chains. The main race terminates on the opposite side of the creek from the plant, and pipes convey the water from this to a Pelton wheel, which drives the whole of the machinery, the head of water at the wheel being 127ft.

Dr. Scheidel has kindly supplied me with plans of this new plant, and a description of the works. As it is the first plant of this description used in the Australasian Colonies for treating gold- and silver-ores, it will be interesting to those connected with mining, being to all intents a tin-ore dressing plant, similar to that used at Mount Bischoff, in Tasmania. The following is a description by Dr. A. Scheidel:—

“At your request I have the honour to give in the following a brief description of the Sylvia Gold and Silver Mining Company's works and plant, which I erected during the last year.

“I may be allowed, first, to furnish some information on the class of ore the Sylvia Company has to deal with, with the object to make it better understood why such plant, which may be termed ore-dressing or concentrating plant, has been erected.

“The main lode in the Sylvia Mine (the Little Agnes Reef) was worked years ago on and near the surface for free gold, with excellent results. It contains in the deeper levels a high percentage of complex ore, generally called mineral, consisting of galena, zinc-blende, copper, and iron-pyrites, interlaced in veins varying in width through the lode of very friable quartz. As a rule, such complex ore does not show any visible gold, but contains in the runs, nevertheless, invariably a higher or smaller percentage of the precious metals. Particularly the galena is of great value, such ore having been met with occasionally containing as much as 5 per cent. of gold and 15 per cent. of silver. The veins of the mineral are so intimately disseminated through the quartz that a separation by hand can only rarely be carried out to advantage. Neither the usual battery process, nor any grinding and amalgamating process, will save the bullion contained in the mineral. The bulk of the ore leaving the mine is not rich enough to be treated by any smelting or other chemical process in foreign parts, the shipping expenses prohibiting exportation; and the value of the ore is not high enough to warrant the erection of extraction-works on the spot. Careful and continued investigations made it evident that the far greater part of the bullion contained in the mineralised ore is contained in the mineral, and I came consequently to the conclusion to submit the whole ore as it is broken from the lode to a concentration process, with the object of condensing the ore-value into a small compass, by getting rid of the valueless sand, and retaining solely the complex ore which contains the bullion, and is rich enough to pay either for exportation or local treatment. Experiments with the usual concentrating-machines gave unsatisfactory results, as none of them could save the slimes which are unavoidably obtained in every crushing process. The Sylvia ore-slimes invariably contain a higher percentage of very finely-divided mineral, which is very rich in bullion, and a loss of such slimes would amount to a loss of gold and silver of considerable importance; the necessity, therefore, arose to select a concentration system which would save both the coarse mineral and the fine contained in the slimes. The only system that can answer that purpose is that which is based on classification of the crushed ore into classes of certain sizes, as no single concentrating-machine will satisfactorily treat a mixture composed of coarse and fine material.

“The best system of dealing with Sylvia ores appeared to be the German system of ore-dressing, which, based on scientific principles, classifies the various sizes of grain, and deals with each class afterwards by itself. The named system has been perfected and very successfully carried out by H. W. F. Kayser, Esq., M.E., who made the Mount Bischoff Company's mines and works such an extraordinary success by exclusively dealing with his ore on the same principle. The system in question appeared to correspond completely with the requirements of the Sylvia ore, on account of the special attention paid by it to the treatment of the slimes. The Sylvia ore contains always a fair percentage of valuable galena, which is particularly liable to form slimes. I recommended, therefore, the erection of works on the pattern of the Mount Bischoff works, on plans supplied by Mr. Kayser, M.E., of which the construction and the working I propose to describe.

“The plant consists of a ten-head Howell battery, with the usual amalgamating-tables, four classifying-boxes acting as separators of the slimes from the coarse material, six jiggers for concentrating the coarse sand, two large tanks for settling the slimes, twelve rotary tables for concentrating the slimes, and three buddles for the final cleaning-up of the whole of the tailings. A