

fitting the gold mining industry in general, has enabled them to claim "the heaviest stamps and the highest average stamp duties of any gold mining corporation in the world;"²⁰ and to Messrs. R. M. Catlin, H. H. Webb, and H. C. Behr and their staffs for greatly appreciated encouragement and suggestions during the progress of the experimental work detailed.

A MODERN MINING PLANT ON THE RAND.

The following extract from the South African Mining Journal, describing the plant on the Simmer Deep-Jupiter, is most interesting. The reader will notice that many new features are incorporated in the equipment:—

"This plant has the distinctive feature of being entirely driven by electricity from the stamps right down to the last pumps in the extractor house. The 300 stamps, each of which weighs 1,670 lbs. when new, are driven in lots of 10 by separate three-phase motors of about 50 h.p. The drop is about 8½ ins. The pulp, after passing over the amalgam tables, is pumped to 12 classifiers. The underflow from these goes to four tube mills, 22 ins. by 5 ft. 6 ins., driven by separate 125 h.p. three-phase motors. The overflow from the classifiers gravitates to 12 conical sands separators. Here a complete separation of the slimes from the sands takes place. These sands separators are 6 ft. in diameter by 6 ft. 6 ins. They are provided with a movable diaphragm about 2 ft. from the nozzle to regulate their action. The underflow from these separators is pumped to a set of eight conical de-watering cones, 8 ft. 6 ins. by 9 ft. deep. The overflow from these cones passes to two others, the underflow from which gravitates back to the mill tailings launder, and the overflow goes to the slimes plant. It is being found that four of these cones are sufficient when run in conjunction with the two cones last referred to. This part of the plant was in the nature of an experiment, the outcome of which was more or less assured.

"The underflow from the de-watering cones, containing about 33-35 per cent. of moisture, is delivered on to the two continuous vacuum filters that are the feature of the plant, and were from the design of Mr. W. A. Caldecott, the consulting metallurgist to the Consolidated Gold Fields Group of Mines. These filters are in the form of circular tables, 29 ft. in diameter, the filter bed being 2 ft. 6 ins. wide, giving an area of 137 square feet, and make one revolution in about three minutes. Thus, a 1½ in. layer of sand is run on to the bed. A pump, giving a vacuum of about 7½ ins. of mercury, by withdrawing the air and water from below the bed, reduces the moisture in the sand to 16-17 per cent. A plough arrangement removes the dried sand from the bed. There are two of these filters at work, and they treat from 1,200 to 1,400 tons of sand per day. The filter bed is made by placing coir matting on slats about 4½ ins. apart. Unbleached calico is placed on top of the matting. The filter has to be renewed once in 24 hours, the time taken being about 45 minutes. The dried sands are mixed with a .025 to .030 per cent. KCN solution, and pumped to one of 8 sands tanks, 8 ft. 3 ins. by 50 ft., where they are distributed by the 'Butter and Mein' apparatus. These tanks are capable

of holding 750 tons of dry sand. The overflow from these tanks goes back to be mixed with more dried sand. The sand is given from two to three days' treatment, this being facilitated by applying a vacuum pump, the solution being finally delivered to two storage tanks of the same size as the sands tanks prior to going to the extractor house. When these tanks have been drained the sand is removed through holes on to shuttle belts 32 ins. wide, which in turn deliver to the two main belt conveyors 28 in. wide. There are six of these shuttle belts, but only three are used per tank at a time. The belt conveyors take the sand to ten sands leaching tanks (Blaisdell distributors being used), the first solution applied being about .12 per cent. KCN and the final about .025 per cent. KCN. From here the sands are taken by 20 cubic ft. trucks to the dumps. The circuit of the sand from the mill to the dump is only about 6½ days. From the time the sands are delivered from the mill to the time the sands are charged into the sands tanks is only about two hours. The advantage of this system is therefore obvious. The ordinary time taken is almost ten days for sands treatment.

"There are 16 tanks at the slimes plant, these being 70 ft. by 12 ft. to 17½ ft. deep at the centre, and are about the largest at present in use. Their capacity is about 400 tons of dry slime. A 12-in. centrifugal pump with 16 ins. suction and delivery can transfer 400 tons of dry slime with 43 per cent. of moisture in about 50 minutes. There are two of these pumps. A notable feature of this slimes plant is that the whole of the operations can be overlooked from a small building in the centre of the plant. All the solution from the slimes plant is passed through filter presses, of which there are three of 48 frames, 32 ins. by 32 ins., to remove any calcium carbonate and other matter that would interfere with or foul the precipitation. There are eight zinc boxes for the slimes solutions, and these treat about 2,500 tons of solution per 24 hours. There are 12 zinc boxes on the sands side of the extractor house, but only a portion of them are in use. About 66 per cent. of the dissolvable gold goes into the .025 per cent. KCN solution first mixed with the sand. This solution usually runs from 1.8 to 1.9 dwt. per ton, and only assays .01 dwt. on leaving the boxes. Separate boxes are kept specially for this solution. The sands themselves usually run about 3-3½ dwts. per ton. Other boxes are, of course, kept separate for the strong and the weak solutions. Three more tube mills will be installed shortly, as well as three new slimes settling tanks, two of which are in course of erection. This extension of the slimes plant has been found necessary from the increased length of time required to settle the slime in winter, and especially that from the dump rock now being partially milled. Next winter, when it is expected only fresh rock will be milled, the plant as extended will be capable of treating the 66,000 tons per month—its nominal capacity."

ELECTRICAL POWER FOR RAND MINES.

The project for producing electrical power at the pitheads of the local coal mines in the neighbourhood of Johannesburg is one which promises commercial success in consequence of the contracts entered into with the Eckstein, Consolidated Gold Fields of South Africa, General Mining and Finance, Messrs. Goerz & Co., and other groups for a period of 20 years. The

²⁰ See Annual Report of the Consolidated Gold Fields of South Africa, Ltd., 1908, p. 30.