

2 ft. in diameter was broken away, and as far as we could see the tank lining was just as good as ever.

The material has been tested in strong and weak acid solutions and found to be absolutely unattacked.

From the bottom of the leaching tanks the solution will be removed through eight 6-in. openings equally distributed over the tanks. A filter-bottom, consisting of two layers of 2-in. planks with a layer of cocoamattening between, will be employed. This filter-bottom will be raised 4 in. above the bottom of the tank.

For the main solution circuits, 9-in. and 16-in. lead-lined iron pipe will be used. Open-boot horizontal centrifugal pumps, made of type-metal, will be used for pumping the solutions. The pumps will have a capacity of 550 cu. ft. per minute, elevating to a height of 60 ft.

In the leaching plant the cycle of operation will require approximately six days, of which one day will be occupied in filling the tank, two days in leaching, two days in washing and draining and one day in discharging.

The solutions will be conducted to the leaching tanks by gravity from nine solution-storage tanks placed above the leaching tanks. The dimensions of these solution-storage tanks are as follows:

Two tanks	12 ft. x 130 ft. x 150 ft.
Seven tanks	12 ft. x 70 ft. x 150 ft.

From the strong-solution tank the solution will flow by gravity through the dechlorinating plant, consisting of twenty-one 30-ft. long by 4-ft. inside diameter revolving steel drums lined with earthenware. These drums will be half full of shot copper. From these drums the solution, containing the cuprous chloride in suspension, will flow to seven Dorr thickeners made of concrete and lined with mastic asphalt. The clear solution overflowing will travel by gravity to the electrolytic refinery, while the thickened cuprous chloride, together with approximately 1 per cent. of the original solution, will go to filter presses.

The electrolytic refinery will consist of 510 electrolytic tanks of the following dimensions: 19 ft. long, 3 ft. 6 in. wide, 4 ft. 10 in. deep. They will be made of concrete, lined with mastic asphalt, and will be set through the floor, having inspection aisles underneath and a concrete working platform between the rows of tanks. The tank-house will be of concrete and steel construction.

Of the 510 tanks, 30 will be used for making cathode starting sheets, and the balance, 480 tanks, will be used for electrolytic deposition of the copper from solutions. The tanks will be arranged in five electrical circuits, with 96 tanks to a circuit, and will be divided into 30 solution circuits, the solution in each circuit flowing through 16 tanks placed in cascade.

The anodes, made of magnetite, will be 5 in. wide, 2 in. thick and 4 ft. long, with five to a bar. The cathodes will be 3 ft. wide by 4 ft. deep.

The spent electrolyte, containing about 1.5 per cent copper, will be pumped back to the storage tanks to be used for leaching subsequent charges of ore.

The cuprous chloride from the dechlorinating plant will be smelted and cast into shot copper for use in the dechlorinating drums.

The power plant will consist of a primary power station at the coast, using oil-fired Babcock & Wilcox boilers driving four steam turbines, connected to four 10,000 kw. alternating current generators. The current will be transmitted 85 miles at 100,000 volts to a sub-station located at the mill-site. The sub-station

for the electrolytic refinery will consist of seven motor-generator sets, each of 2,500 kw. capacity.

THE WEIGHT OF RAND STAMPS.

According to the South African Mining Journal South Africa leads the world to-day in stamp milling practice. Here there are employed the heaviest gravity heads erected, and, excepting pneumatic and steam stamps, such as are, for instance, employed at the Dolcoath Tin Mine in Cornwall, and the copper mines of the Lake Superior region, the duty per head is the largest of any mining field in the world. Last year the duty per stamp per day along the Main Reef Series was 8.82 tons, as against 8.39 tons in 1912, 7.88 tons in 1911, 7.19 tons in 1910, 6.79 tons in 1909, and 6.27 tons in 1908.

"This rate of increase in tonnage milled per stamp in 24 hours is likely to be maintained this year, and it is anticipated that the duty for 1914 will work out at nine tons or over. Towards the end of this year the "State Mines" 50,000 tons per month equipment on the Modderfontein Government Areas will be completed, and at a somewhat later date the Modder Deep Levels reduction plant, which will consist of 60 stamps and 6 tube mills, and which will crush 30,000 tons per month, will come into operation. It is probable, too, that the Sub-Nigel will extend its crushing equipment in the near future. This mine is outside the Witwatersrand area, but as it comes under the control of one of the most progressive metallurgical administrations in the world, the subject of a possible extension to the Sub-Nigel mill certainly falls within the scope of this article. In the case of each of the mines mentioned in the foregoing, the stamps will be of "heavy pattern." The Rand's stamp duty has been increased, not alone by the use of coarse screening and the employment of tube mills, as auxiliary fine grinding machines, but by greatly increasing the falling weights of the stamps, that is by adding to the weights of stems, heads, tappets and shoes. Just to what degree extra falling weight has been responsible for the increase in duty, and to what extent coarse crushing in the mortar boxes and subsequent fine grinding in tubes have played their respective parts it is difficult to say; the subject is worthy of inquiry.

"In the middle nineties the duty of five tons per day was considered exceedingly good, and if we recollect rightly, the heaviest heads on the Witwatersrand at that time were the 40 stamps of the New Modderfontein, each of which had a falling weight of 1,250 lbs.

"There are in all erected on the Rand to-day 1,380 stamps of over 1,750 lb. weight, and of these between eleven and twelve hundred are at work. It seems clear that these weights are considerably greater than those of other gold mining fields, whilst the duties, too, are substantially higher. The world's record duty for gravitation stamps will be obtained by the Shamva Co., in the Abercorn district of Mashonaland, but it should be pointed out that these heads are of Nissen pattern, and are not of ordinary Californian type, such as this article is concerned with.

"The stamp weights referred to in the foregoing are substantially heavier than those recorded in respect of United States gold mines. Most of the installations in the United States are from 1,000 to 1,200 lb. per stamp. On the Mother Lode of California they vary from 850 to 1,250 lb., with an average, for 24 mills containing 1,090 stamps, of 1,000 lb. Heavier stamps, 1,400 lb., have been installed in the United States, and last year