

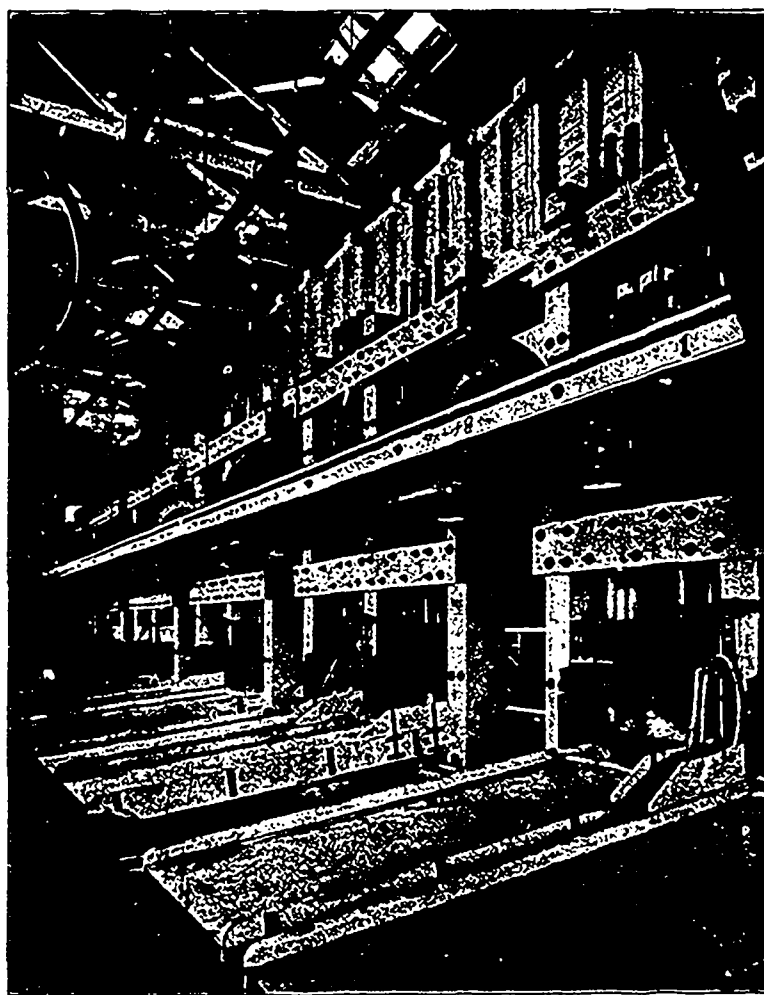
engine was introduced, it was their intellectual ancestors, was it not, who denounced and fought against that invention as a devilish machine which all pious laborers should destroy to save their children from starvation?

MILLING THE GOLD ORES OF THE WITWATERSRAND.*

The mill, in Witwatersrand practice, is but the first stage in the general metallurgical process, preparing the ore not only for its own treatment, amalgamation, but for the second step, the cyanide process, for it must be remembered that, but for the cyanide process, a very small percentage of the mines on the Rand would pay, and that the industry as a whole owes its salvation to this method of gold extraction. To examine the question of milling alone without considering the subsequent cyaniding of the tailings would produce a false impression, conveying the idea that the stamp practice on the Rand, in percentage of gold extracted, compares unfavorably with that of California or other places. The object is to get the greatest extraction at the least cost, by combining the two processes, the tendency being towards a high crushing capacity rather than a

working quartz reefs. The following year several samples of conglomerate were crushed, the highest yield being 8 dwts. per ton. H. W. Struben, in an interesting letter dated January 17, 1893, says: "We milled conglomerates from Vogelstruisfontein, both for ourselves and for others, at our private mill, long before anyone else had a mill."* The state mining engineer's report for 1896 gives the number of stamps for that year on the Witwatersrand at 4,291, and the number of tons crushed at 3,980,682, the yield being £5,346,527, or an average of 26.36 shillings per ton. Including treatment by cyanide and chlorination, the total yield was £7,781,845, or 38.95 shillings per ton, and the average duty per stamp per twenty-four hours 4,392 tons. Eight hundred and sixty stamps have been dropped since 1896.

There are few mills of less than 60 stamps on the Rand today and those of 100 and more are in the majority. The tendency of the newer mills, for large claim area, is toward 200 stamps, those of the Crown Deep, Rose Deep, Nourse Deep, Jumpers Deep, and Robinson Deep having this end in view, while the new mill at the Simmer & Jack Proprietary Mines, Ltd., has 280 stamps erected and in place, and the combination mill of the Angelo and Dreifontein Con. mining com-



60-STAMP MILL, NOURSE DEEP.—STAMPS GROUPED BY TENS.

high extraction by amalgamation at the expense of crushing, relying on amalgamation for a fair percentage of the catch, and increasing the extraction by the subsequent cyanide treatment. While it is usual on the Rand to amalgamate in the batteries, less attention is paid to the practice than is common elsewhere. The easily amalgamated gold is caught on the outside plates, and the more refractory portion is treated by cyanide. Coarser crushing would be the rule, were it not necessary, in order to secure the best results in cyanide treatment, to have the ore crushed fine. The first mill, a battery of five stamps, at which any of the banket of the Witwatersrand was crushed, was erected in 1885 by H. W. & Fred. Struben, about ten miles from the place where Johannesburg now stands, for the purpose of

panies, now nearing completion, is to have 220. The older mines on the outcrop have mills with 60 to 160 stamps.

In the more recently constructed mills of the Rand the "banket" is delivered into the mill, after having been sorted and crushed, either at a central station or at stations at the shaft's mouth, and is fed from the ore-bins, by mechanical feeders, to the stamps, where, in the majority of the mills, a preliminary amalgamation takes place in the mortar box. The pulp flows over copper plates for further amalgamation, and in a few instances is delivered to true vanners for concentration, the tailings going to the cyanide works, but the general practice of the Rand mills is to deliver the pulp direct from the amalgam plates to tailing wheels, or, sometimes, to pumps, to be elevated

*Abstracted from an article by H. H. Webb, and Pope Yeatman, in the *Engineering Magazine*.

** "Diamonds and Gold in South Africa," by T. Reunert.