and in the manner in which they are attached to the shaft. The Blanton cam is deservedly popular; there are no keys, the cam being fastened to the shaft by means of a circular wedge, which is prevented from slipping by the short pins dropped into recesses in the cam shaft. This causes great saving of time in attaching cams and in replacing broken cams on the shafts. The George Goch has introduced for trial on one battery a cam which, instead of having a circular opening, has a decagon fitting on a cam shaft of the same section.

The drop of the stamps ranges from 7 to 9 inches, the average being about 8 inches. There is, perhaps, less variation in speed, this running from 92 to 104, the average being about 96. The order of drop is usually 1-3-5-2-4, although 1-4-2-5-3 and some others are employed.

The amount of water used in crushing ranges from 8 to 9 tons per ton of ore crushed. This does not mean that that amount of make-up water has to be supplied, as the water is used over and over again, the only loss being due to leakage, evaporation and absorption by the tailings. This loss, or make-up, is estimated at 25 per cent.

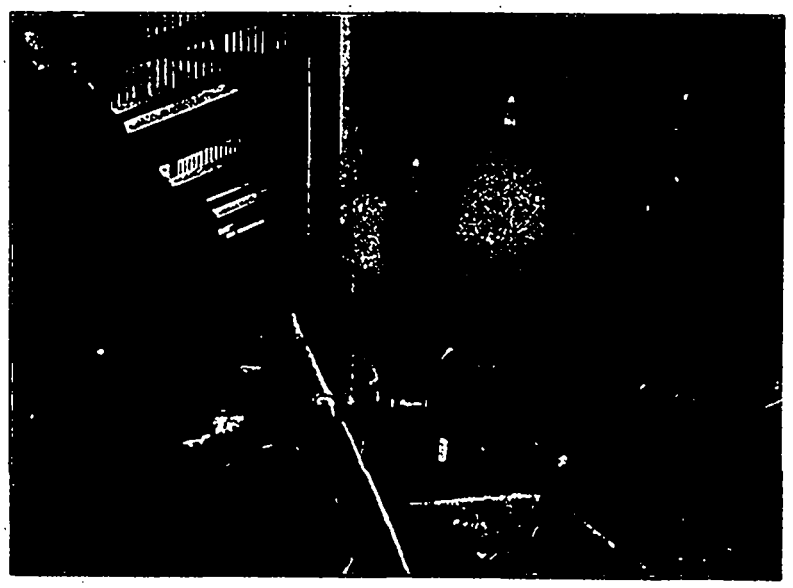
Apron copper plates are universally adopted. Inside the batteries both back plates and chuck plates are used, but the former are the most common. In some mills lip and splash plates are used. Apron plates are from 10 to 12 feet long, and from 4½ to 5 feet wide, and incline from 1 inch to 1¾ inches to the foot. Sometimes they are broken, but usually continuous. Back plates are from 7 to 11 inches wide, and chuck plates from 3 to 6 inches. The copper plate used is from ⅛ to 3-16 of an inch thick. They are rarely silver-plated, and, when a new mill starts up, considerable time elapses before the plates cease to absorb large amounts of gold.

One of the points of great difference in the Rand Mills is in the arrangement of the line shafts. These are either coupled directly to the mill engine or driven by rope-transmission. The latest mills erected by the Rand Mines, Ltd., employ direct coupling with the engine at one end. The new Simmer and Jack mill uses rope-transmission with two line shafts, one for each side of the mill. In the old Simmer and Jack mill, where the batteries were in line, the mill engine was placed in the middle, with fifty stamps on each side and with direct coupling. The Witwatersrand mill has the engine in the middle, but the line shaft is driven by rope-transmission. At the Geldenhuis Deep one line shaft is coupled directly, while the second is driven from the first by rope-transmission. Direct coupling works exceedingly well. Between the line shaft and the cam shaft various forms of belt tighteners are used. In many of the later mills patent clutch pulleys are employed, doing away with the tightening gear.

Very excellent power installations are the rule. In many instances the engine drives not only the mill itself, but also the tailings wheel, the electric light plant, the electric precipitation plant, the shops, and sometimes the crushers. Both vertical and horizontal engines are used, but the latter are in the majority. The usual type is the horizontal compound condensing engine with Corliss valves. To avoid delays an auxiliary engine is sometimes installed. This, of course, is a much cheaper engine than the main engine, and, while not compound condensing, is so made that it can be compounded if desired. The mills are well supplied with mercury traps made of wood, or, preferably, of iron, and have large and well-constructed launders with ample grades. One or more overhead crawls are used along each line of stamps for the rapid handling of the heavy parts of the batteries. The use of electricity for lighting is almost universal, and the old-fashioned, badly-lighted mill has become a thing of the past.

The clean-up room is well supplied with benches and the usual appliances for cleaning up. A pan, barrel, or batea run by machinery is used for the clean-up from the mortars. During operation the outside plates are rubbed every four hours, and the amalgam removed once a day. The general clean-up is made once a month. The percentage of extraction by amalgamation varies, but the average is from 55 to 65. Retorting and melting are not done in the mills, melting being done mainly in the assay office.

The amount of labor used is considerable, and, where one white man is employed in other parts of the world, at least one white and one native are employed on these fields. The labor employed at 100-stamp mill is as follows: 4 amalgamators per shift of 8 hours, 12; 1 engine driver per shift of 8 hours, 3; 1 blacksmith 9 hours shift, 1 carpenter 9 hours shift, 1 fitter 9 hours shift, 1 hoisting engineer 9 hours shift, 1 greaser; total whites, 20; 10 natives, assisting amalgamators, shift of 12 hours, 20; 10 natives assisting mechanics, 10 natives hoisting and dumping; total natives, 40.



ORE-SORTING FLOOR, FERREIRY GOLD MINING CO

Where lifts of more than 40 feet are necessary, plunger pumps are commonly used. The latter have given good service where the proper arrangements have been employed to apply clear water to the plungers to prevent scouring. However, for lifts of less than 40 feet the tailings wheel is most satisfactory, requiring but little power and little or no attention. These wheels are patterned after those used at the concentration works of the Lake Superior copper mines. The temperature being so mild, there are no troubles due to freezing. Tailings wheels, launders, spitzkasten, etc., need no shelter.

The mill of the Simmer and Jack Proprietary Mines being the largest gold mill in existence, and a type of modern mill construction, a description of it is given here: Built on level ground, as are most of the mills on the Rand, the approach to the ore-bins is a raised earthen embankment having a 2½ per cent. grade, over which are drawn, by locomotives, trains made up of trucks of 20 tons' capacity each, which supply the mill with ore from the different shafts of the property, where sorting and crushing have already taken place. The mill building is 269 feet long by 100 feet wide, exclusive of the engine room and boiler