

CLASSIFYING TAILINGS BEFORE CONCENTRATION.

Messrs. W. Bettel and J. H. Johns have been carrying on at the Ferreira Mill some novel experiments on behalf of the Chamber of Mines, Johannesburg. It was believed that better results could be got by classifying the pulp previous to concentration; but the anticipations were not realised. The experiments were in the direction of roughly classifying by means of spitzluten and spitzkasten, and of passing that pulp alone which came from the spitzluten over the vanners. It was found that under these conditions the vanners have not caught their usual percentage of metal.

The explanation offered may be thus summarised: (1.) Overloading. (2.) To a principle which has hitherto not been recognised on these fields, but is well known on the diamond-fields—that minute particles of high specific gravity will subside through a shallower layer of pulp suspended by agitation in a turbid medium (such as a mixture of coarse and fine sand, pyrites, and clay) more readily than through a classified pulp, consisting of coarse particles suspended in clear water. This may be explained by assuming a reduction of surface tension in the former case. (3.) The proportion of fine gold escaping in sands and slimes is increased when an excess of water (over normal) is present in the pulp. (4.) With spitzluten, an increased clear-water supply carries off fine gold and floured amalgam in considerable amounts in slime-pulp. (5.) The scouring action of the coarse sands, &c., from the spitzluten (free from slimes) prevents the collection of floured amalgam on the shaking amalgamated plates on the vanners, and this amalgam so lost is not wholly recovered in the concentrates collected.

The pulp (consisting of slime and finest sands) delivered by the spitzkasten is imperfectly concentrated on the third vanner, such pulp requiring a large area equal to a very shallow layer of liquid for efficient concentration. The finest slimes (solid matter in effluent from spitzkasten) are very rich in gold. This is attributed to the presence of suspended floured amalgam and free gold of extreme tenuity, probably coated with films of grease or sulphides, which cause the particles to exert an increased surface tension sufficient to overcome the action of gravity to a very considerable extent.

The results obtained are, however, extremely interesting, and may, under other circumstances, have a distinct commercial value. When Frue vanners are used for concentration, previous classification, in the opinion of the experimenters, would not be advantageous, but where any other concentrator, not having a vanning motion, is employed they would recommend a previous classification of the battery-pulp.

GOLD-EXTRACTION FROM REFRACTORY ORES.

Mr. Hiram S. Maxim is the patentee of an improved process of extracting gold from refractory ores. He takes the advantage of the affinity existing between gold and lead when both are at a high temperature, and subjects the ore to the action of molten lead in the presence of a reducing gas or atmosphere. Whilst in the presence of a reducing gas or atmosphere the ore and molten lead are pounded, and the mass is slowly rotated or stirred. The apparatus comprises a strong rotary retort of cast iron or mild steel located in an inclined position within a furnace, and provided with a cylindrical extension, which extends through the backwall of the furnace, and is carried in bearings supported in strong pedestals. The end of the extension is furnished with a toothed wheel, which gears with a pinion mounted on a driving-shaft revolved from any motor. In order to counterbalance the weight of the retort and its charge the cylindrical extension may be formed with a considerable mass of metal near its outer end. The mouth of the retort is provided with a cover. The earths to be acted upon are placed in the retort in a pulverised condition together with the lead. A number of loose balls of iron may be placed within the retort, together with the earths and lead. The inner surface of the retort is provided with longitudinal ribs, so that when the retort is revolved the balls will be raised by the ribs, and allowed to fall again to the mass at the bottom of the retort, thereby grinding the earth to a still finer condition and at the same time causing the molten lead to come into very intimate contact with the gold contained in the earths. During the process a current of carburretted hydrogen, such as coal-gas, or, still better, petroleum vapour, is allowed to pass into the retort through a pipe, the said gas or vapour expelling the atmospheric oxygen and also taking up any oxygen that may be set free. As the retort slowly revolves the molten lead, under the action of the heat and the pounding of the balls, is finely divided and distributed throughout the mass within the retort without becoming oxidized, and is therefore constantly brought into intimate contact with the gold contained in the earths. The process may be continued until all or nearly all of the gold has been taken up by the lead. The rotation of the retort is then arrested, the heat diminished, and the contents of the retort are discharged into water. The lead is then separated from the lighter earths by suitable means, and is then subjected to a high temperature in a furnace and in the presence of atmospheric oxygen until it becomes wholly oxidized, when a "button" containing the gold will be found in the cupel of the furnace. By this process the molten lead is always preserved in a bright metallic condition, the presence of the carburretted hydrogen completely preventing the oxidation of the surface of the lead and keeping it untarnished at a high temperature. In some cases finely-divided animal and vegetable charcoal or other carbonaceous materials may be mixed with the earths before or during their treatment with the molten lead. The cylinder may be placed at an inclination with one end partially open, and then revolved, a hot reducing flame of gas being directed into the open end of the cylinder. The contents of the cylinder will thus be heated to a higher temperature than the cylinder itself, and in the presence of a reducing flame.