

successive charges of molten sulphide or other ore, and extracting the gold from the metallic antimony when it has been sufficiently enriched.

*“Chlorination.”*

“The process of chlorination, though working admirably on a small scale, we do not believe to be adapted for the treatment of the great quantity of pyritous material with which we have to deal.

*“Roasting-furnaces.”*

“So far as we know the furnaces in use in Victoria for roasting pyrites are—

“1. Reverberatory furnace with inclined hearth: the dimensions being—Length, 30ft. to 35ft.; width, 5ft.; inclination, 1 in 7; height, from hearth to arch, 16in. to 18in. This furnace was first erected at Port Phillip Works, Clunes, by Messrs. G. J. Latta and H. A. Thomson.

“2. Ordinary flat-hearth reverberatory furnace.

“3. Flat-hearth reverberatory, with hearth about 6ft. by 6ft. 6in., with flue over fire, like a baker’s oven.

“4. Stetefeldt’s shaft-furnace, especially designed for the chlorination of silver ores. Its dimensions are about 30ft. high, 4ft. to 5ft. square. The ore enters the furnace through a sieve at the top of the shaft, and falls through the ascending current of heated gases from the fire. One of these furnaces has been erected at St. Arnaud. In America it is said to be extensively used for the treatment of pyritous silver ores. It could, no doubt, be applied to auriferous ores. It is claimed for it that with eight men twenty to twenty-five tons may be treated in twenty-four hours.

“Amongst those which have been recommended in other countries, but have not been introduced here, we may mention—

“5. Oxland and Hocking’s revolving cylindrical furnace.

“6. White’s rotating furnace, closely resembling Oxland and Hocking’s. Its dimensions are—24ft. long, 30in. diameter, inclination 1 in 12. The outer shell is cast iron, in lengths 3ft. long, lined with fire-brick. (See *Scientific Press*, No. 17, Vol. XXIII.)

“7. Kerpely’s step-furnace.—A shaft-furnace with inclined steps, over which the pyrites runs in a thin stream.

“8. Gestenhoefer’s shaft-furnace.—A narrow shaft with triangular rests, over which the pyrites falls, resting on each a short time. It is fed by a self-acting hopper. Approximate dimensions—15ft. to 18ft. high; 1ft. to 1ft. 6in. wide; and 10ft. to 12ft. long.

“9. Whepley and Storer’s furnace.

“10. McClew’s furnace.—An inclined hearth, behind which are three fires with blasts. The flues open through the hearth, over which the ore passes.

“11. Küstel’s furnace.—An inclined hearth, broken twice at right angles, so that the highest and lowest points are on one side; the working openings are at the angles, so that the mass of ore is easily shifted. The ore is introduced at the upper end, and distributed on the first hearth, where it is roasted for an hour. It then passes to the second hearth, and finally to the third. The heat is obtained by fires at the angles. It is claimed that no stirring is required. Fifteen to twenty tons are treated in twenty-four hours, with two shifts of three men each. (See *New York Engineering and Mining Journal*, 25th November, 1873.)

“12. Aiken’s furnace.—A modification of Stetefeldt’s. Said to be less costly.

“With respect to the value of classification according to size of grain of the crushed material previous to concentration, the value of the self-acting jigging machine as a concentrator, and that of the Tyrolese mill for the saving of mercury and amalgam, we have to make the following observations:—

“All methods of the mechanical concentration of ores by means of water are, as is well known, based upon the feature that the ore is specifically heavier than the gangue; and the best method can therefore only be that which uses that excess in weight to the best advantage. Both equal size and form of the grains are hereby the principal conditions. As regards the form, we have no control whatever during the process of crushing, and must therefore leave it entirely to chance; but for the procuring of equal size of grain, at least within certain limits—viz., for a systematic classification of the crushed material previous to concentration—a number of contrivances have been invented, and are in successful use in the ore-dressing establishments of European and American mining localities. They are there considered necessary for the concentration of even such heavy ores as galena, tin ore, &c. In the case of our auriferous pyrites, which is much nearer in specific weight to the quartz than those ores are to their gangue, which is more brittle and softer than quartz, and therefore generally crushed to a finer grain than the latter, its small excess in specific weight is liable to be rendered void by the larger size of the quartz-grains; for as both are acted upon by the same stream of water, finer pyrites grains may be, and no doubt are, carried along by the stream, whilst coarser ones of quartz settle down. For these reasons classification must evidently be of considerable advantage.

“The most exact classifiers for finely-crushed material are inclined rotating sieve-drums, into which the material is introduced at the higher end, passing finer and coarser sieves in succession. These machines require, however, a great deal of attention, and for a country where labour is as expensive as here, and where in comparison far larger quantities of material are required to be treated in a certain time than in European establishments, any advantage in using them would be rather doubtful. There are two simple contrivances, however, which, though they do not classify as exactly according to size as the drums, are nevertheless of very great value in the after-concentration of ore from fine sands and slimes, and to which we desire to draw particular attention. These are Rittinger’s ‘Spitzkästen’ and ‘Spitzluten’ (pyramidal boxes and triangular double troughs).\*

\* See description in ‘Observations on the Mode of Treatment of Auriferous Lead and Silver Ores at Schemnitz, Upper Hungary,’ published by the Mining Department. Also models in Technological Museum.