

pyrites, which is saved by percussion-tables, and sent to the pyrites works for treatment; and it averages from 6oz. to 7oz. of gold per ton. The St. Mungo Company, as well as several others, use the electric light in their battery-house and in the main levels; they consider it a great saving as compared with candles, and gives a much better light. Both these companies have very complete crushing-plants; they are considered the best there are in the Sandhurst District. The former company has a battery of thirty heads and the latter a forty-head battery. As these plants are considered to be the best that there are in Victoria, a full description and plans of the St. Mungo Company's plant will be given further on; and, as they resemble each other, it will be unnecessary to give a separate description of each.

The United Pyrites Company.—This company has the most interesting works in connection with the extraction of gold from the matrix, that I have seen in Victoria. They consist of reverberatory furnaces for roasting or calcining the pyrites, grinding-pans (something in principle to the Spanish arastras) for grinding the roasted material, to which is connected separating pans, so that when the material is ground up to a pulp, it is flushed off into the separator, and the fine globules of quicksilver collected. One of these separators is connected to every three grinding-pans; and in addition to this, there are three large vats for extracting the gold from the roasted material by chlorination. The cost of treatment by the grinding process is £3 per ton, and by the chlorination process £3 10s. per ton.

The roasting or calcining process is done as follows: There is a reverberatory furnace, built on an inclination from the fireplace towards the chimney of about $2\frac{1}{2}$ in. in every foot. The furnace is 46ft. in length and 7ft. 6in. in width, inside measurement; the height of the walls from the floor of the furnace to the springing of the arch is 14in., and the height from the floor to the centre of the crown of arch would be about 20in. At the lower end of this furnace is a fire-box 22in. wide, fitted with fire-bars for burning wood; and there is a low bridge between the fire-box and the furnace. Along the side of the wall of the furnace, and on a level with the floor of same, there are small holes or ports left about 6in. in height, and 10in. long, every 4ft. apart, fitted with iron doors. These ports are made so that the pyrites can be stirred as it comes down the inclined floor of the furnace; the great object in roasting is to desulphurize the pyrites as much as possible, so as to make amalgamation with quicksilver complete. At the upper end of the incline furnace there is a large receiving-hopper placed over the top, capable of holding about from three to four tons of raw pyrites, which dries there, and is fed through a small hopper into the furnace as required. The material to be operated upon is stirred up in the furnace with rakes and slides, so as to allow the fumes from the sulphurets to get away as quickly as possible; and as the stuff gets down the inclined floor of the furnace towards the fire-box it is heated, when at the lower end, to a bright-red colour, and when it is considered to be properly desulphurized a trap-door in the bottom of the furnace is opened and the roasted material drawn out and allowed to cool. When the pyrites is sufficiently roasted or calcined, there is an absence of any fumes, and the material has a different character. When worked with the rake, it turns far more freely, and has not that heavy and clogged nature that it had, when it was emitting the fumes. At the upper end of the furnace there is a short flue leading into a large brick chimney; but there does not appear to be any appliance or apparatus for condensing the fumes and making them a marketable product: they are simply allowed to go up the chimney. A furnace of this dimension is capable of roasting about four tons of ore per day. When the ore is very refractory, a small quantity of salt is mixed with the pyrites, which has the effect of freeing the gold from its oxides, and rendering it easier for chlorination, by removing lead, antimony, or other sulphates obnoxious to the final process.

The roasted or calcined ore is allowed to cool, and thence removed by small trucks to either the grinding-pans or the chlorination vats. The grinding-plant consists of twelve arastras, and four separators. These arastras are about 5ft. 8in. in diameter on the outer edge of pan, and 3ft. in diameter in the inner edge, thus leaving a space of 16in. wide for drags to work and grind up the roasted material to a pulp. There is a cast-iron false bottom in each arastra, loosely fitted in and filled around with Portland cement, and the depth of the sides of the pan, which are vertical, is 15in. A small quantity of the roasted material is now put in with about 40lb. of quicksilver, and a little water. Afterwards the pans are set in motion, having two drags one opposite each other, of about 3cwt. each, and made to revolve at a speed of about twenty revolutions per minute. The first object in grinding is to break up and mix the mercury as much as possible with the material under treatment; and, after that has been done, more water is added, the ore ground to a fine pulp, afterwards flushed into a separator, and the same process repeated. This separator is about 4ft. in diameter, 16in. in depth, and has a carrying arm which comes close to the bottom without touching, driven at a speed of about fifteen revolutions per minute; the object of the separator being to collect the minute globules of mercury together, that has diffused through the material operated on, by the grinding process, and escaped among the tailings and water. When this operation is considered to be sufficiently performed, the sludge is flushed off by water, and the process repeated.

CHLORINATION PROCESS.

If the roasted material has to go through the chlorine process, it is taken after being damped to the chlorine vats. These vats are 10ft. in diameter, 2ft. 10in. high on the sides, and are made of soft wood $2\frac{1}{2}$ in. thickness, having the inside of them coated with an admixture of Stockholm tar and pitch put on hot, or else coated with asphaltum cement. Each vat has a false bottom, which stands about 1in. above the main bottom, made of timber and perforated with holes, and on the top of this false bottom is placed a thin layer of broken quartz, coarse gravel, and on the top of all, quartz tailings or sand, which forms a filter bed about 5in. in thickness, the false perforated bottom being laid on strips of wood along the bottom. The material to be operated on, is then filled in on the top of the filter-bed, to within a few inches of the top of the vat, and the generator set to work. The generator consists of a large earthenware jar, capable of holding about twenty-five gallons of liquid, and into which is placed an admixture of