pyrites, with the object of drying it, after which it is fed through the hopper E into the furnace, as required. The ore in the furnace is worked and turned over with rakes, and slides through the openings in the sides, which are fitted with an iron slide-door, to open when required; and as the ore travels down the incline it gets subjected to a greater heat, until it is almost a bright-red colour when it reaches the lower end. When the ore is sufficiently desulphurized it emits no fumes on being stirred up, and is of a loose, fine character when turned by the slides or shovel. Adjoining the bridge there is a flat portion on the hearth, which has a trap-door opening into a pit below, where the roasted ore is hauled out and allowed to cool, before being taken to either the grinding or chlorination process.

GRINDING PROCESS.

The roasted ore, when cool, is taken away in trucks to the machine-house, and stacked on the floor alongside the grinding-pans, which are similar to the Spanish arastras. The arastras are cast-iron pans, as shown on plan, drawing No. 3, Fig. H, which also shows the elevation as well as section of pan with cast-iron false bottom, which are made of hematite iron put in loosely and filled around with Portland cement. A vertical shaft passes through the centre of the pan, which carries two hard-wood arms, 4in. by 3in., to which is attached by chains two cast-iron drags, of 3cwt. each, and driven at a speed of twenty revolutions per minute. Fig. B shows a separator, partly section, with the arms and stocks attached, which revolve at a speed of fifteen revolutions per minute. These stocks are not for grinding; their use is mainly to keep the tailings alive by their motion when the arastras are being flushed off, so that any mercury that may escape from the arastras among the tailings, is separated and collected at the bottom of this pan. When this process is considered to be complete, the outlet holes K are opened and the whole of the water can be run off. One of these separators is used to take the tailings, and water from three arastras.

It may be of interest to give a brief description of the mode of working the arastras, as described to me by Mr. Edwards. First turn on sufficient water from an 1¼-in. cock (placed at each pan) to cover the bottom 1in. deep, then add 30lb. to 40lb. of quicksilver; next put in a bucketful of roasted ore, after which set the drags in motion; then add one or two more bucketsful of ore, and a little more water if there is not sufficient, but not so much as to cover the whole of the quicksilver; then let the drags run for about half an hour, after which turn on more water, as that allows the drags to have greater grinding power on the ore, and likewise allows the small globules of mercury that had previously formed to collect in a body at the bottom of the pan. Let it run in this condition for half an hour longer, then pull out the top plug, which is about 6in. from the bottom, and open the water-cock, keeping the drags still going, when, in about ten minutes, the tailings will be flushed off through the iron shoots into the separator, which is kept going, having the two top holes always open. After the water has been running into the arastra for ten or fifteen minutes, stop the drags and drain off the water through the plug-hole, which is half an inch from the bottom. When the water is all drained off, put in a bucketful of ore, start the drags, and repeat the process as before.

This description will enable any one to get an idea of how the pyrites is treated in the Sandhurst District; but before closing my remarks on the different processes used in Victoria, I will again refer to this subject.

At Mr. Koch's battery at Long Gulley there is a new machine, which is patented by Messrs. Huntingdon and Koch, for amalgamating roasted ore on the same principle as that known as the "Jourdan process." The ore is ground dry, in a bath machine to a fine powder, and passed through a screen having about two thousand holes to the square inch. This dust is then forced up through a column of mercury in the following manner: There is a hollow tube, which forms a vertical shaft having two short hollow arms near the lower end, which revolves in a column of quicksilver about 18in. in depth at the speed of from 250 to 280 revolutions per minute. The arms at the lower end of the hollow shaft have openings on the sides on the same principle as a primitive turbine wheel of the very old type. The great velocity at which the shaft and arms revolve draws in the dust, which is fed through the hollow vertical shaft, and the quicksilver, having the greatest density, forces the lighter particles to the top and retains the gold. I was not greatly impressed with this system, as it is almost impossible to force the refuse through the quicksilver without carrying some of the mercury in fine globules almost in flour, and when this takes place, it carries a certain percentage of gold along with it. However, this was only a small model which was at work, and no trial beyond this has yet been made.

Since writing the above description, Mr. Langtree, in his report on Victorian mines, states that this machine has been publicly tested, and upwards of 100 tons of ore put through, in competition with ordinary appliances, at Sandhurst. The results were, according to the nature of the ores, from 11·32 to 18·2 per cent. more gold than from batteries, tables, riffles, blankets, &c. Sketch of this machine is attached (Drawing No. 4).

There is also another pyrites works in Sandhurst, belonging to Messrs. Roberts and Co., which is a very complete roasting and grinding plant, similar to that of the United Pyrites Company, with the exception that they do not use the chlorination process. Both of these works are spoken highly of by the miners as being very successful in their treatment of pyrites.

Castlemaine.

The thing most worthy of note in this district is the Coliban Water Supply. The machinery employed is of the ordinary type, and no new appliances are used. The water supply in this, as well as in the District of Sandhurst, is brought from the Coliban River, near Malmsbury, where a large reservoir is constructed. The water is brought in conduits and tunnels to Sandhurst, and into supply-reservoirs at Forest Creek and Harcourt, which are used for distributing the water in these districts. The works connected with this water supply are constructed similar to those in connection with the water-races, dams, and reservoirs on the west coast of the Middle Island, only with this exception, that works in connection with the Victorian water supply are constructed on a far more elaborate scale. The total cost of these works has been about £1,000,055.