the iron is of course limited, the material of the filtering-bed will require to be occasionally renewed in order to keep it effective, and experiments should from time to time be made with the filtered water, in order to ascertain when such renewal is necessary.

"Central Board of Health, Melbourne, 17th July, 1873."

CONCENTRATING MACHINERY.

In addition to the appliances already described for concentrating, there is another in general use in California, which is known as "Frue's Ore-Concentrator," a plan of which is hereto annexed drawing No. 3.

A description of this is given by G. Thureau in his report on mining in California and Nevada in 1879. The same gentleman also gives a description of a "drop"-furnace in use there which is superior to the ordinary reverberatory furnace for calcining pyrites. The following are extracts from Mr. Thureau's report:—

"*Frue's Ore-Concentrator.*—This machine is simply an improvement, in many respects, upon the well-known endless blanket, first brought under notice by Mr. Thomas Carpenter, M.E. Its Californian prototype is on the same principle as a revolving and endless blanket, only the materials used are of greater durability, and show some additional improvements in working, and have aided in the perfection of the machine. Two principal rollers at each end of the machine carry the belt or endless blanket. These rollers are made of galvanized sheet-iron, riveted together, 13in. in diameter and 51in. in length; and a larger roller, 24in. in diameter, is placed midways and a few inches below the line of the lower periphery of the two end rollers, so that the belt 'bands' on the top of the end and beneath the intermediate roller. A fourth roller is provided, made of hardwood, which is geared to a movable plummer-block by a screw. This screw is also used to take up the slack on the belt caused by the weight of the stuff and water, thus preventing the bagging of the belt. This belt is 4ft. wide by 27ft. 6in. long, and it travels on a number of intermediate rollers so as to keep an even surface. It is made of vulcanized rubber and A1 three-ply navy canvas; and it has two rims at the sides raised to 1½in., thus forming an even narrow channel. The sand (crushed or otherwise) is run through a distributor upon this revolving belt in this way, that the belt travels towards the feed; and at the same time an additional supply of water, arranged in irregular drops or jets, is thrown in so as to prevent the sand from forming ridges or grooves. When working, not less than half an inch of sand should cover the belt. And, in order to improve the action of the belt as a concentrator still further, three flat springs are provided, which are worked by cranks off the roller. These springs communicate a quick, lateral motion, about 190 per minute, to the belt, thus inducing a kind of wavy motion, which results in bringing the lighter sand on the belt to the surface, to be washed away. As the belt travels along, carrying the sand, the result is as follows: The concentration takes place just beneath the feed, where the metalliferous and concentrated parts of same are carried in the opposite direction of the feed, whereas the waste remains on the belt until it falls into a launder at the opposite end. The concentrated pyrites on the belt are immersed in the vessel, provided below, in order to be collected. These machines work very easily – one lad can attend to more than half a dozen of them; the only thing that wants regulation being the additional supply of pure water during the process. They may be placed immediately beneath the tailing-shoots, where they can treat from six to ten tons per day. Some kindred concentrators require an inordinate amount of motive-power—in some cases up to three or more horse-power each; but in this instance from a quarter to half a horse power is ample for the purpose. The results of samples of raw sands washed in my presence in San Francisco for concentration, were most satisfactory. Both tailings and black sand, as thrown up by the Pacific Ocean, were tested with equally convincing results as to the capabilities of this concentrator. The black sand, which was mixed with titaniferous ironsand, and was more difficult to separate than fine gold and pyrites from tailings, gave, on systematic tests by assay, an average value of $8·27 per ton of unconcentrated sand, as found *in situ* at the coast. This sand, after treatment in Frue's concentrator, had been enriched to $1,035·43 per ton, with but a slight trace of gold in the tailings. This machine is eminently suited for reworking old tailings."

According to the account that Mr. Thureau gives, this machine is not only a good concentrator for quartz-tailings, but it might be employed to treat the black sand which is found in many places along the ocean-beach on the west coast of the Middle Island.

"*Drop-Furnaces.*—The concentrated sulphurets are roasted dead in these furnaces, which have for a charge one ton of sulphurets at a time. They have an average of 130 square feet, the dome or cover rising but 24in. in the centre above the brick of the floor of the hearth. The sulphurets are delivered through a cast-iron funnel at the top of the first hearth from trucks, cars, &c.; and, when they are fine, a 'dust-chamber' will save as high as 5 per cent. of the ore calcined. With these drop-furnaces from five to six tons of sulphurets can be calcined at the expense of but two cords of soft firewood, in three shifts, or twenty-four hours—a considerable improvement on our reverberatory furnaces capabilities, assuming that in both cases the pyrites are delivered in as dry a state as possible. These drop-furnaces may be worked in distinctly different ways—namely, for producing sulphuric acid as a by-product, and for oxidation and chloridizing calcination. When for the latter, the furnace consists of two hearths, constructed at different levels, or one about 12ft. above the other, and placed end for end. They are connected with each other by means of a vertical flue of the same width as the hearths; and this flue, 12in. deep, is constructed so as to lead to the lower hearth zig-zag fashion, or over a series of terraces built in the flue right down to the bottom hearth. The fireplace, common to both hearths, having been built in front of the lower hearth, the flame therefrom primarily affects the pyrites as separated only from the lower hearth by a low bridge in that hearth; then these flames, &c., ascend through the flue or drop to the upper hearth, subjecting the pyrites there in like manner, finally passing out through the damper into the stack and open air.