

They need only casual supervision, but require a steady, unchanging influx of water and material. That the introduction of these machines into our pyrites-saving establishments would be found highly advantageous we have not the slightest doubt. Borlase's buddle, with Munday's patent scrapers, is, if properly worked, an excellent machine, and perhaps the best that could be used for the saving of pyrites from unclassified material; but it must be evident that even these machines would work better if the stuff to be treated by them was previously classified. For instance, if classification produced three sizes of grain—viz., coarser sand, fine sand, and slime—and three buddles were employed, one for each of these sizes, this would be a better arrangement than if the three buddles worked the material with the sands and slime intermixed.

"With regard to the self-acting jigging machine (one of the most important inventions in ore-dressing in recent times, which has produced quite a revolution in European ore-dressing establishments), we apprehend that the comparative failures of the trials which have been made with it on our goldfields must have been owing partly to want of previous classification of the material, partly perhaps to unacquaintance with some of the main points governing its successful working on certain sizes of grain—viz., length and velocity of stroke of piston and influx of water. One of the writers has seen numbers of these machines at work in the ore-dressing establishments of the Hartz and Saxony, and was greatly surprised at the excellent results achieved with them, even on ores very difficult to concentrate. They produce very pure ore with inconsiderable loss, require little supervision and small motive power, and—what is a great advantage—need not be stopped working in order to be cleared, as the ore collects in receptacles outside the machine.

"In summing up our observations on this subject, and taking into account the price of labour in this colony, we come to the conclusion that if the crushed pyritous material, after passing the usual amalgamating appliances (quicksilver troughs, copper plates, &c.), was, by one triangular double trough and two pyramidal boxes, classified into three sizes of grain—viz., coarser sand, fine sand, and slime—and the first treated by self-acting jigging machines, the other two by Borlase's buddle, it would prove a more satisfactory process for the saving of the pyrites than any at present in use.

"The construction and mode of working of the Tyrolese mills are also described in the pamphlet previously quoted. These mills are excellent amalgamators, easily managed, and require a very small motive power. Messrs. Thomson and Rosales, the renowned managers of the two principal mining companies on Cohen's Reef, Walhalla, use them, as reported, with marked success for the saving of finely-divided mercury and amalgam in roasting the amalgamated roasted pyrites.

"GEORGE H. F. ULRICH.

"J. COSMO NEWBERRY."

MEMORANDUM DESCRIPTIVE OF PLAN OF CONDENSING APPARATUS FOR PYRITES FURNACES.

"1. Every furnace should be provided with vertical spray-pipes, erected over separate water-tanks, as shown on plan; and should also have, wherever sufficient ground is available, a brick ground-flue, with spray-tanks and baffle-walls at intervals along its course, each tank having three cross spray-pipes and three baffle-walls, and baffle-walls being also constructed in the flues alternately on each side, in the spaces between the tanks. There should be two condensing-tanks in each 100ft. of ground-flue.

"2. The number of vertical spray-pipes, and the length of the ground-flue from these to the chimney-stack, will, of course, depend on the extent of the operations carried on, and also on other circumstances, such as the surface contour and the area of available ground; but in all cases vertical pipes and a ground-flue should be provided in at least the following proportion, viz.: For a furnace the area of the floor of which is 150 square feet, or which is capable of treating, say, 15cwt. at each charge, or about 3 tons of material in twenty-four hours, there should be not less than three vertical spray-pipes and tanks, and 200ft. in length of ground-flue, with baffle-walls and four intercepting spray-tanks. Should, however, circumstances prevent the construction of a flue more than 100ft. in length, then three more vertical spray-pipes and tanks should be provided for a furnace of the capacity above mentioned. However many vertical pipes may be provided, in no case should there be less than 100ft. of ground-flue, with the baffle-walls and the two intercepting spray-tanks already described.

"3. If in any case it be found that noxious matter is, from any cause, still discharged with the fumes from the chimney, the number of vertical pipes, or the length of the ground-flue, or both, must be increased until this is entirely prevented.

"4. The vertical pipes should be constructed so as to be easily cleaned; and the brick ground-flue should be large enough to allow of the easy entry of a man for the like purpose.

"5. All the spray water-jets should be kept continually in use and in thorough efficiency whenever the furnace is in operation.

"6. The fumes should be finally conducted into a chimney not less than 50ft. in height, or not less than 70ft. if closely surrounded by dwelling-houses.

"7. The chimney should, wherever practicable, be placed at, or as near as possible to, the top of any hill or other neighbouring eminence.

"8. The chimney should be provided with some appliance (such, for instance, as a plate fixed on its summit, which can be easily lowered for inspection) by means of which it can at any time be readily ascertained if any noxious matter is deposited by the discharged fumes.

"As the water when finally discharged from the condensing tanks will still contain some proportion of arsenic, it should be passed through a filtering medium, composed of the refuse material from which the gold has been extracted, mixed, where practicable, with ordinary quartz-tailings, the filtering-bed being made of considerable thickness. (The refuse material referred to consists largely of oxide of iron, which, by exposure to the atmosphere and the weather, becomes hydrated peroxide of iron; and experiments made with the material in the latter state shows that from water containing as much as $\frac{3}{4}$ gr. of arsenic to the gallon all the arsenic was removed on passing the water through a bed of six inches of the material in question.) As the arsenic-absorbing power of