MINING.

The Practical Chlorination of Gold Ores and the Precipitation of Gold from Solution.

Referring to the several valuable communications recently published in the *Engineering and Mining Journal* on this subject, allow me to contribute my quota, the record of actual, successful working experience on a large scale.

The chief objection to a plant of 50 tons or more capacity in 24 hours for the Plattner process is its enormous size and the length of time it requires to complete a single operation. Therefore, the problem the engineer has to solve when he attempts to handle low-grade ores that will not concentrate, is to find a process that will handle his ores in large quantities quickly, cheaply, and with as little interruption as possible. It may, therefore, be of interest to some of the profession to hear of one solution of this problem that has been demonstrated beyond a doubt.

In the reduction works of which this article treats in particular the ore is crushed dry in Blake and Gates crushers and two sets of Krom rolls, roasted in Bruckner furnaces of three tons capacity, and chlorinated in barrels of three and four tons capacity.

Crushing.—The first thing to be considered in treating an ore, is to crush it properly; to do this, a series of experiments has to be made to ascertain how coarse the ore may be to give the best result in the after-treatment, with reference to economy, large capacity, and best extraction. The pulp for the best leaching must be in granular condition, and carry as small a percentage of dust or slimes as possible. For this purpose rolls properly managed are especially well adapted.

A few lessons from experience with rolls may not be out of place here. The chief point is to have enough of them to make the reduction in size of particles passed through them, gradual. Two sets are sufficient, but three will do better. The ore should come to the coarse rolls not coarser than $\frac{3}{4}$ inch mesh, and these rolls should be set about $\frac{3}{8}$ inch apart. The middle rolls are set about $\frac{1}{16}$ inch or less apart, and the fine rolls about as far apart as the size to which the ore has to be crushed. If only two sets are used, the coarse are set a little closer than with three, and the fine remain the same.

The springs should be set up so tight that they will not give to the hardest pieces of ore, but will allow a piece of steel or iron to pass through without throwing the belts. The periphery speed of the rolls should be about the same as, or a little faster than, the falling speed of the ore, and the ore should be fed in an even sheet across the surface of the roll; little trouble will then be experienced in keeping the surfaces true, and in producing a granular pulp carrying but a small percentage of dust. If rolls were made of larger diameter and narrower, the result would be a still more gradual reduction, and possibly a greater capacity. I have used those of 39½ inches (1 meter) diameter and 12 and 15 inches face.

Roasting.—The roasting of the ore is one of the most important operations in its influence on the success of chlorination, but as the charateristics of each ore must be studied, none but general rules can be laid down as to how roasting should be done. It is absolutely necessary that the ore be roasted as nearly dead-sweet as possible.

Chlorination.—The chlorination barrel in the works of which I have charge is made also the washing and leaching vessel this is done by placing a supporting diaphragm, for a filtering medium, to form the chord of an arc of the circle of the barrel The diaphragm, or filter as it is called, is made up of plates, corrugated simular to the ordinary filter-press plate, and perforated with holes every 4 or 6 inches square. These plates are supported on segments which are bolted to the shell; on top of the corrugated plates is placed the filtering medium, an open-woven asbestos cloth. It is about as coarse as the ordinary gunysack, but the warp and woof are of much heavier thread. Over this is placed an open grating, and the whole is held in place by cross pieces, the ends of which rest under straps bolted to the inside shell; in this way, while the whole is rigidly held in place, it is very easily and quickly removed when the changing of the asbestos cloth becomes necessary.

Two valves on each end of the barrel above and below the filter are for the inlet and outlet of the wash water and solution respectively.

The barrel is charged by first filling the space under the filter with water, which at the same time is allowed to pass through the filtering medium and wash it; then the required quantity of water is put in above the filter. There are now two methods of charging the pulp and the chemicals, lime chloride and sulphuric acid. In one, the lime is so placed in the ore charge in the hopper over the barrel that it goes in with the ore and is completely buried with it; the acid can then be added with very little danger of generating any gas before the plate on the charging hole can be put on and securely fastened. The other way, which seems to be still better, is to pour the acid first into the water, through which it sinks in a mass to the bottom and does not mix; the ore is then let in, and the lime added the last. The chances of generating any gas are much less than in the first method. I have seen the barrel charged in this way remain open for from five to ten minutes after charging without generating gas; but it has been demonstrated that on the first revolution of the barrel the gas is immediately liberated, and creates considerable pressure. After the chlorination is complete the barrel is stopped, so that the filter assumes a horizontal position; the hose is attached to one of the outlet pipes and conducts the solution to the reservoir tank.

A hose is also attached to the inlet pipe, and water is pumped in under pressure, and the leaching commences.

(To be continued.)