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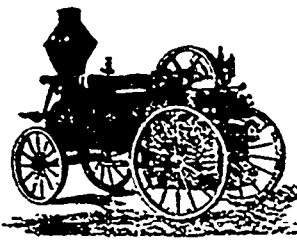
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**GEORGE LAWSON, Ph. D., L. L. D.**  
Fellow of the Institute of Chemistry of  
Great Britain and Ireland.

## MINING.

CHINESE SILVER MINING IN MONGOLIA.

By H. F. DAWES.

From the Engineering and Mining Journal.

(Continued.)

Although the work is slow, the wages are low; and the head-men, by pawning their clothes and stretching their credit, can go through a good deal of unproductive ground. That which gives them the hardest fight and ultimately stops their work is water. Yet they can handle a good deal of water after their own fashion, when the lift is not too great. They place in the incline a series of boxes constructed of planks ripped out by hand and made water-tight with a putty of oil and white clay. These are set in steps about 3 ft. apart, and extend from the sump to a point where the water will run out to the surface. On each of these stands a man who, with a closely woven willow basket, holding about 4 gallons, takes the water from the box on which he stands and empties it into the one above him, and so until it reaches the surface. Bailing goes on rapidly, with intermissions for rest, and when the work is in full swing water enough runs out to fill a 3-inch pipe. This is the hardest work in the mine, and is done by bailers, who are deemed inferior to the miners. The stent for each bailer is 1,000 baskets per shift.

The ore collected in the ore-house is taken out from time to time for treatment, the times depending on the state of the exchequer, the quantity of ore on hand and the time of the year; just before New Year being the time of the greatest activity in the smelting yard. As a rule small lots of about 100 lbs. are treated at a time. All ore is first roasted and then smelted for base bullion, after which the base bullion is refined.

The roasting kilns are circular, built of sun-dried brick set up in open checker work, and about 4 ft. high and 6 ft. in diameter. After erection they are plastered outside and inside with mud mixed with chopped straw, a place being left (to be closed with loose brick) for the removal of the charge. One such furnace lasts through many roastings.

All the brick used are of ordinary clay, rammed into wooden molds with a stone rammer, and dried in the sun. No straw is mixed with them and no water is used in their making, as the clay, when freshly dug, is moist enough to stick together under the rammer. The floor of the kilns is slightly depressed in the center, to collect the lead which is often reduced in them when rich ores are roasted. On the floor is spread a layer of charcoal a few inches thick; on this a few inches of ore, and so on until the ore is charged. The coal is then fired and burns until burnt out. The fire is a hot one and the roasting is of necessity imperfectly done, much of the ore melting and some being reduced. The lumps in the roasted charges are broken and picked over, pieces being put aside for re-roasting, and the rest is then smelted in the blast furnace.

The beginning of a blast furnace is a circular depression in the clay floor of the smelting yard, some 18 in. in diameter and 4 in. in depth, in which sifted wood ashes are pressed to make a shallow cup. Around this a wall is erected of one thickness of mud brick, set on end, and plastered together with clay mixed with chopped straw. The furnaces are conical in shape, with throats about 9 inches in diameter, and stand about 3 ft. high. One tuyère hole is left near the bottom; and above this hole, on the inside of the furnace, wedge-shaped bricks are built into the wall, projecting to the centre of the furnace, so that the descending charge or dropping slag may not clog the tuyère. The funnel is plastered inside and out with clay mixed with chopped straw, and when it has been thoroughly dried and heated by a small fire in the hearth, more charcoal is put in, the wind-box is set in place, and connected with the tuyère, blast is put on and charcoal and roasted ore are added, at the discretion of the head-man. Bolts from the cupel-furnaces are also added, to furnish lead for collecting the silver; and unreduced litharge acts also as a flux for the gangue of the ore. Slag flows from a hole near the bottom, which is kept open as long as the blast is on. Lead often runs out, sometimes from cracks that open in the stack; but the yard is clean and nothing is lost, except, of course, that which is vaporized or passes into the slag. When the lot has been run through, the wind-box is taken away, water is freely dashed in the furnace, and when cool enough it is torn down, the cake of lead is taken out of the bottom and the debris is carefully sorted by hand. All the lead is saved, and part of the charge remaining is put aside to be crushed and washed for re-smelting. The base bullion, beaten and cleaned from adhering slag and ashes, is then ready for refining in a cupelling furnace.

On the floor of the yard wood-ashes are sifted through a horse-hair sieve into a conical heap some 3 ft. in diameter. This is consolidated by pressure of the foot; the top is levelled off and a shallow basin is scooped in it with a wooden hoop; around the base mud-brick are set on their sides in close order, save at a place in front, which is left open to serve as a door. On top of the mound and around the basin are also set mud-brick, but in open order; and across them, so as to cover the basin, are laid mud-brick of full size; just before putting on this cover the base bullion is put in, with paper under it to keep it from bruising the ashes. Inside the little wall around the base charcoal is then piled, and enough is thrown on to give the whole a rounded dome-shape, the top being some 12 in. above the basin cover. The charcoal is ignited at the front near the door, and the whole thing is plastered over with clay mixed with straw, leaving a hole at the top 9 in. in diameter. As the bullion melts, the clay coating becomes baked by the burning charcoal, and as the cupelling continues and the charcoal settles down the dome supports itself and confines and radiates the heat. If there be not sufficient charcoal originally to carry the refining to the end, more is added from time to time through the hole in the top.

(To be continued.)