

Plumas County Adventures

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[Back Home](#)

What is an Arrastra?

I frequently investigate gold mines from the 1800's. One style of mining is known as "Quartz Mining." The gold (usually small amounts) is contained in quartz veins and the quartz is underground. Because of this, these mines have tunnels to get to the quartz and some sort of equipment to break the quartz to a powder so the gold can be removed.

The usual equipment is a stamp mill--I have found four of these in my travels. Heavy pieces of steel are lifted vertically by a cam and then suddenly dropped. The stamp "feet" land on the ore and crush it. Any book on mining or gold rush history will have information on stamp mills. You can see a stamp mill at a rest stop on California State Route 70 at Belden (between Oroville and Quincy).

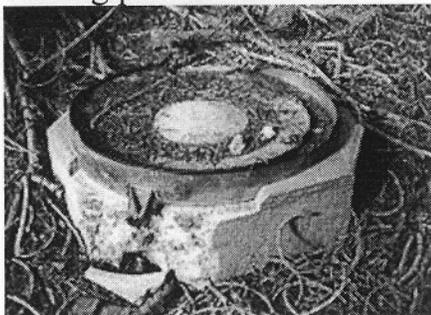
Stamp mills weigh many tons and require a large amount of power to drive them. They are found at the large mines that are fairly close to main roads. Take a side trip to some of these mills.

What about the small mines that are located far from main roads? What did the small fry miner use to break up the quartz? Most used some sort of grinder that could be assembled at the site and powered by water or even by animals.

On three adventures to quartz mines I found devices that can best be described as crude grinders. In different ways each of these can be likened to the mortar part of a mortar and pestle.

Lets look at these "mortars."

The first is about three feet in diameter. It is constructed of concrete and steel and has a spout that the ground material could exit from. There was no indication of what the driving power was.



The second one is also about three feet in diameter (as you can see, much is missing). It is constructed of concrete and stone. It has a center post so the pestle part must have looked like a doughnut. There was a badly decomposed 6 foot water wheel nearby and there was

a ditch about 150 feet above the site that would have provided water power.

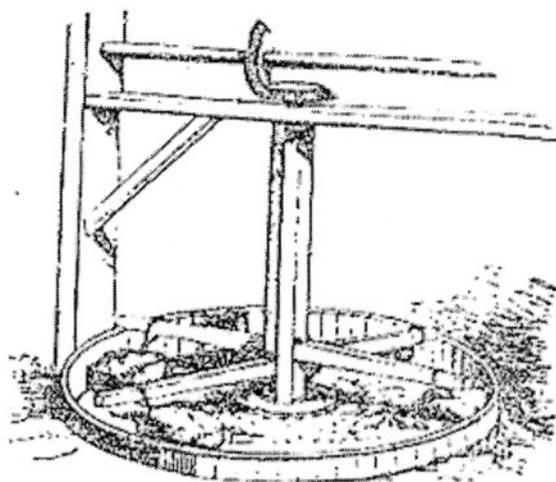


The third is very crude. It is 10-12 feet in diameter and made of posts buried in the ground in a circular fashion. About half the posts are missing as seen in the poor photo below. The bottom was rock lined. There was a ditch in the vicinity that would have provided water. Compare this description to that of the "Mexican Rastra" found below.



I did some reseach and found a bit of information about these crude gold grinders. The best information is from Hutchings and Rosenfield.1858. "The Miner's Own Book." San Franciso and is quoted below:

One of the first used, as well as one of the most useful and most important, is the Mexican Rastra, which is commonly spelled Arastra. Though rude in its construction and simple in its working, it is one of the most effectual methods of saving the gold which has yet been discovered. The Mexican method of constructing these is to lay a circular track of stone tolerably level, with a low wall around the outside of the track; and in the centre a post made of a tree cut off at the required height, and generally just above a crotch or arm; another small tree is then cut in the shape required, for making a horizontal shaft; to this is attached one or more large stones; and these being drawn around by donkey or mule-power, grind the quartz to powder. Of course, as gold is the heaviest it naturally seeks the lowest places, and as quicksilver is always put in with the quartz the gold becomes amalgamated with it.



THE IMPROVED MEXICAN RASTRA.

The Mexican rastra has been improved some little in its construction and adaptation to our wants; and in many cases mule-power has been superseded by steam; but the principle remains about the same.

When the rastra is properly prepared, a "batch" of about five hundred pounds is generally emptied into one about ten feet in diameter; but the quantity is always regulated by the size of the machine. It is then ground very fine by means of the drag-stones attached to arms fixed in the perpendicular shaft, and which are generally given about eight revolutions per minute. At this rate it will require from three to four hours to grind the batch sufficiently; but this is somewhat regulated by the grit and weight of the drag-stones. About three quarters of an hour before the whole is thoroughly ground, a sufficient quantity of quicksilver is added; but the amount is regulated by the richness of the quartz in process of grinding. If, for instance, the five hundred pounds of tailings placed in the rastra is supposed to contain about three quarters of an ounce of gold, about one ounce of quicksilver is generally used--or about twenty-five per cent more of the latter than the former. Some judgment is required in this--too much quicksilver being a disadvantage, inasmuch as the amalgam should be kept hard to make it effectual in saving the gold.

Quicksilver should also be kept very free from grease, as it cannot be too clean, and should invariably be well retorted every time it is used.

About ten minutes before the grinding is finished, about sixteen buckets of water are poured into the rastra, to the quantity named, and the same motion continued, the whole appearing like muddy water. This is then bailed out, or run off quickly. Five hundred pounds more of the quartz are then added, and the process repeated, adding the same portion of quicksilver to every batch.

This is kept on for one, two, three, or even four weeks, according to the richness of the quartz, or the taste and wants of the owner. The larger the amount contained in the rastra, the more gold is there saved, in proportion, to the ton.

The amalgam is then taken out of the crevices in the bottom of the rastra, and carefully panned out, and as carefully retorted. After this, most business men melt the gold into bars or ingots, before sending it to the mint to be coined.

Before commencing to grind again, the crevices between the stones covering the floor of the rastra, about one and a half inches wide, are tightly packed and filled with clay, level with the stone.

This mill as used in Chili, and from whence its origin and name are derived, is nearly as simple in its construction as the rastra, with the walls a little higher, and more regular; and, instead of the "drag stones," a large stone wheel, attached to the horizontal shaft, is used for grinding the rock. Into this mill a small stream of water is constantly running, a portion of which is forced out at each revolution of the wheel. The gold is saved by means of quicksilver on the bottom of the mill, in the same manner as in the rastra.

To make this principle more subservient to the purposes of quartz mining, and better adapted the requirements of a faster age and people, the "improved Chili Mill" was invented. This consists of two heavy cast-iron wheels, from three to five feet in diameter, and from ten to fifteen inches in thickness: these revolve on an axle, moving steadily round in a circular iron basin about 3 foot in depth, into which the tailings from the blanket tables are conveyed, and ground to powder.

As these improved mills are generally worked by steam, the speed attained, and the work accomplished, of course very far exceeds the old process.

The methods of saving the gold which passes over the blankets in the tailings, are almost as numerous as the mills where the quartz is crushed. The principal, however, is to allow the tailings to run down a series of inclined tables, or sluices, at the end of each of which is often placed a wood trough, or iron pan, containing quicksilver, into which they flow, when the gold falls into the quicksilver on the bottom, and is there retained; while the light material floats over the edge of the trough or pan into another sluice, at the end of which is another pan, where the same process is repeated. These sluices, or inclined tables, are generally fitted up with "patent riffles" across the bottom, filled with quicksilver. After the tailings have passed through the whole series of sluices they are sometimes: worked through the improved Chili Mill, or other machine; but are oftener allowed to run into a large vat, from which the water flows off while the tailings settle at the bottom. These are then thrown into a heap and allowed to "rust," preparatory to other processes at some future time.

Other information comes from Websters Unabridged Dictionary:

arrastra same as arrastre: [Spanish arrastrar, to drag along the ground; L, ad, to, and radere, to scrape.] in gold mining, a crude machine formerly used for ore crushing.

Stop 5 - Arrastra

From the traffic turnout, a narrow trail leads down the bank towards the stream. On the very edge of the creek and partially in the water there is a large block of stone about 10 feet long. A circular depression 34 inches in diameter has been cut into the top of the stone.



According to local lore, the first American miners to enter Bullion Canyon in the 1860's found rotted sacks of ore against this boulder. Perhaps earlier miners had milled high grade ore on this device which is called an arrastra.

Arrastras were first introduced into the New World by the Spanish in the 1500's. To use the arrastra, ore was broken into walnut-sized chunks with a sledge hammer and placed into the circular milling area. Three drag stones, chained to a post in the center of the milling area, were rotated by hand or mule. The drag stones crushed the ore into a fine powder and water was added until a thick slurry was produced. Mercury (quicksilver) was then introduced to the mixture which removed and amalgamated any gold found in the ore.

Does the presence of this arrastra tell us that Spanish Conquistadors were in this canyon mining gold two or three hundred years ago? The answer is neither a simple yes or no because archeologists have no way to "date" the arrastra.

If we turn to written history for a clue, we are told that the Spanish were insatiable in their

quest for riches. During the 1600's and 1700's this appetite had driven them to explore most of what was to become the southern half of the United States.

Because they had established a nearby stronghold in New Mexico (1598), it is possible that there were Conquistadors in Utah and maybe even in Bullion Canyon long before the first "official" expedition by the Spanish in 1776.