become sufficiently solid to permit of being broken into pieces large enough to be mixed with the charge. It was then smelted in the blast-furnace. The lead was then boiled by the "zincing" process, to extract the precious metals in a rough way. The rich lead resulting from this was subjected to cupellation, a process by which the lead is oxidized, and flows off as litharge (the oxide of lead), and the gold and silver remain behind; these were subsequently "parted" by nitric acid, and the gold and silver melted into separate buttons.

Colorado Lead Ore. — This came in bags just as it was sent from the mines. The bags were emptied on the floor, and the ore was here sampled by taking out one bag of every three or four. The process of "cobbing" was the next operation. This consists of breaking up the ore with the sledge hammer into pieces sufficiently small to permit of crushing by the Blake crusher. Here it was broken to the size of walnuts; thence it went to the Cornish rolls, where it was crushed so as to pass through a sieve of twelve meshes to the linear inch. From the rolls it passed to the sampler, where all the ore is caused to pass over a piece of apparatus so arranged as to take a sample automatically. The crushed ore was carried from here by elevator to the sizer, which is a box with a number of sieves of different sizes; i.e., of different numbers of meshes to the linear inch. The ore passed through these various sieves, and by spouts was conveyed to the jigs, where the ore, now of four different degrees of fineness, was concentrated: that is, the heavy particles of galena — the sulphide of lead — settled to the bottom, where it is collected; the lighter portions, containing some galena and some gangue, accompanying rock called "middlings," are collected in a separate place; and the third product, called the tails, the waste product, supposed to be wholly deprived of its ore, was allowed to accumulate by itself, and when it was pronounced "poor" enough was thrown away. The finer products were passed over the Evans table, which, like the jigs, is a concentrating machine, and makes three products: heads or concentrations, middlings, and tailings. The concentrations and middlings were made into bricks with lime, and with a calculated charge were run down in the blast furnace.

New Hampshire Gold Ore. — About a ton of gold-bearing quartz was taken as the subject for work. It was crushed by the Blake crusher, and then sent to the stamp mill. Here the ore was fed in at as fast a rate as the stamping would allow. In the battery — that is, the chamber where are the shoes and dies which are the instruments of grinding by pounding — was placed mercury to amalgamate with the gold, and from time to time small quantities of mercury were added. The ore became powdered by the stamping, and as this was done in the water, the fine ore flowed out through screens on either side of the battery. Then it passed over copper plates, which were coated with silver amalgam to catch any gold that might have escaped from the battery, to the Evans table where the ore was concentrated. Any mercury that was washed from the plates was recovered here, as were the sulphurets which carried some gold. The battery was cleaned out, and the amalgam recovered by panning. This, with the amalgam from the plates, was distilled, and the gold from each plate and from the battery was determined. This gold was afterwards parted from the silver which occurs with native gold.

Vermont Copper Ore. — About half a ton of chalcopyrite was crushed and ground through the Blake crusher and Cornish rolls, and then subjected to repeated roastings in the reverberatory furnaces, in order to form a matte of the copper. After these roastings, which took from eight to twenty hours each, with stirring with an iron hoe every ten minutes, the matte was smelted in the blast furnace, and again roasted, and the result was a matte carrying a considerable quantity of copper. It was attempted to run this matte down to black copper, but the matte was considered the final product.