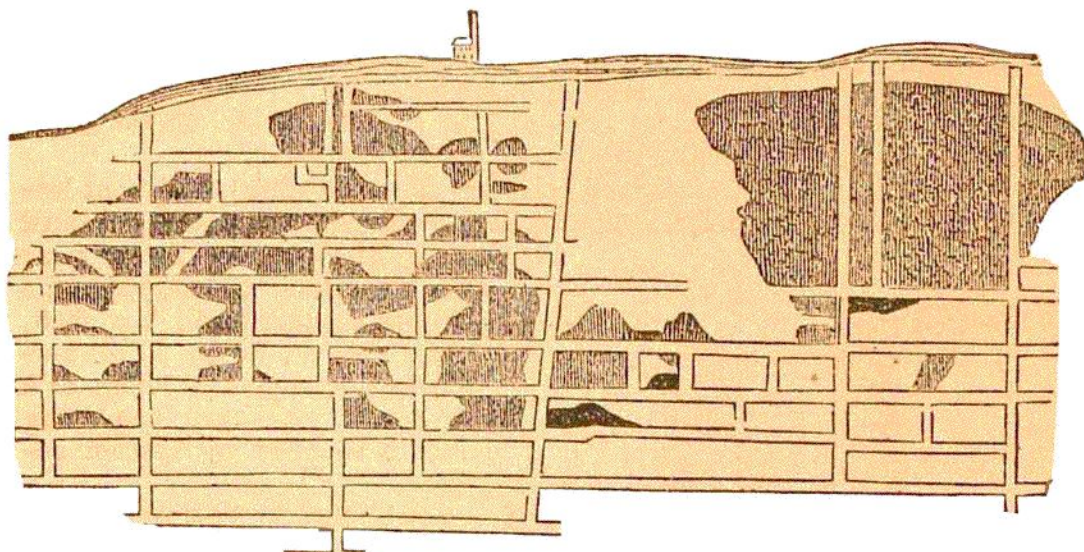


Fig. 417.



passing the larger pieces beneath the rollers again, until they are sufficiently reduced.

Stamping.—Many ores, instead of being crushed by rollers, are pounded into small fragments by huge pestles moved by water or steam power. The pestles usually weigh from 300 to 400 pounds.

Washing.—Though the ores have been thoroughly crushed or stamped, they are not yet quite ready for the furnace. There may be foreign substances mixed with them. These are commonly separated from the valuable parts by washing. The principle of the separation is, that in consequence of the different specific gravities of the ores and refuse matters, the two classes of fragments, if made to fall in water, will settle in different layers; and the most valuable layer, after the water has been poured off, may easily be separated from the others.

The simplest apparatus for the washing of ores is the hand-sieve. It may be compared to a large tub having a sieve at the bottom. The tub is partly filled with the crushed fragments, then it is placed in a large tank filled with water. The tub is speedily filled with water, and by giving it a sort of undulatory motion with the hands, the heavier particles will settle at the bottom, and thus be separated for the metallurgist.

There are other methods of washing the ores by machinery, which are in more general use than the hand-sieves; but they all involve essentially the same principle.

The native metals, such as gold and platinum, which are worked in alluvium, need only to pass through this process of washing to be prepared for use in the arts. But most ores, when they have been carried through the processes already described, must be reduced in a furnace to the metallic state. It is the province of METALLURGY to describe the methods of reduction.

Amount of Metals Mined.

It may be of interest to some to learn the amount of metals that are annually mined in the world. We add, therefore, two tables, the first giving the estimated value of metals obtained by mining in 1854, and the second giving their amount. For these tables we are indebted to *The Metallic Wealth of the United States*, by J. D. Whitney.