

of fine sand, and has to pass through various and complicated processes to free the pure mineral or minerals from each other, and from waste products, and then, in all probability, the separated mineral has to go through several chemical processes, equally varied and complicated, to obtain the metal or metals before it leaves the mine.

Underground are required air compressors and drills, ventilators, miles of tramways worked by animal power perhaps, (but very soon to be worked by electricity,) hoisting machinery, both for raising this 500 tons and also for lowering and raising several hundred men to and from a depth of 500 to 1000 feet or more.*

Pumps also will certainly be required, perhaps to pump 1000 gallons a minute to a height of 500 feet. All this will require 300 horse power or more, which must be supplied by steam or water power in connection with electricity. On the surface a small system of railways will be required to carry the different products to the different places. The ore has to be crushed and then stamped, and then put through the various washing processes to free it from the waste stuff, all of which means a great deal of machinery, requiring at least 500 horse power. Then come the smelting processes, which form a department of themselves, but which come under the head of the general term "Mining Engineering." Thus we require at least 800 horse power, and this must be supplied by steam or water power. If there is no coal mine near, or if wood is not over-plentiful or cheap, then if water power can be had within 20 miles, it would be best to use the water power and electricity. This entails a good deal of hydraulic work, dams, canals, sluices, etc. To keep all this in order are required machine shops, carpenter shops, smithies, and a sawmill, etc., and to work the whole affair there may be 1000 men or more, with, say, 2000 depending on them, and all these have to be housed; this, and much more, comes into the work of the mining engineer.

The mining engineer has had to know all about the geology of the place before sinking his shafts and driving his adits. He has to erect houses for his work and his men, and shops and mills to supply his materials. If electricity is not used, steam engines of all kinds will be required for hauling, hoisting, pumping, air compressing, locomotives, and for driving general machinery; he has to erect these, and, in all probability, to teach his men how to use and look after them; he has an air-compression system to devise, and erect besides systems of haulage and of ventilation. On the surface, all his buildings to design and erect, and a system of tram-lines to design, overhead or otherwise, and his crushing and stamping

*The deepest mines in the world are in Pzribrain in Bohemia.

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