

United States Patent Office.

NATHANIEL HASKELL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO HIMSELF AND JOSEPH F. STEEN, OF SAME PLACE.

Letters Patent No. 101,009, dated March 22, 1870.

IMPROVEMENT IN EXTRACTING COPPER FROM ITS ORES.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, NATHANIEL HASKELL, of the city and county of San Francisco, State of California, have invented a new and improved Method or Process for Extracting the Metals from their Ores; and I do hereby declare that the following description distinctly and correctly describes said method or process, giving such directions and explanations that others skilled in the art or science to which it most nearly appertains can accomplish the same without further invention or experiment.

My invention relates to an improved method or process to be employed in extracting metals, and more particularly copper, from their ores, without the necessity of handling the ores after they have been taken from the mine, thus enabling the operator to extract the metals at a very small cost, and making it possible to work ores of a very low grade profitably.

To carry my process into operation, the ore is taken from the mine and placed in heaps in some suitable location where the ground is not porous, preferably upon a hillside, or some spot where the lay of the ground is upon an incline.

The heaps of ore are made of suitable and convenient sizes, no particular quantity being required in each pile, for the proper working of the after-process; but the larger the amount of ore in each pile the cheaper it can be worked.

I then dig a ditch or trench around the heaps of ore, and to a short distance below them, where it terminates in a large reservoir or series of tubs.

Water is then led, by means of pipes or otherwise, upon the pile, and passed slowly through the heap of ore, so as to saturate every part, the surrounding trench or ditch collecting the water and conveying it into the reservoir or tubs.

When a sufficient quantity of water has been passed through the heap of ore to fill the reservoir it is shut off, and the ore allowed to stand exposed to the action of the atmosphere.

In passing through the ore-pile the water dissolves the sulphates of copper, and a weak solution of copper and sulphuric acid results, from which metallic copper can be produced by precipitation in the usual way.

After the ore-pile has remained exposed to the air for three or four days, the water in the reservoir or tubs is then pumped or otherwise conveyed back, and again slowly passed through the pile, the acid in the water attacking the ore, and greatly aiding in its disintegration.

This process of re-drenching the pile with the water which has previously been used is continued, at intervals of three or four days, until, by the united action of the acid solution and oxidation by exposure to the atmosphere, all of the copper has been extracted and carried off with the water, to be precipitated in the usual way at any stage of the process desired.

After the water has been passed through the ore two or three times an artificial heat will be generated in the pile, which greatly assists the process of disintegration.

The solution of copper in the reservoir or tubs can be utilized by inserting the poles of a battery, and, by a course of electroplating, deposit the copper upon various metals and articles, and manufacturing copper goods and materials, thus carrying on the two processes of extracting the copper, and electroplating and manufacturing various articles at the same time.

By using the above-described process, copper and other ores which will not pay when worked by the ordinary roasting and acid process, can be thoroughly separated, and the metals extracted with very little trouble and with great profit.

What I claim is—

1. Extracting metals from crude ores without roasting, by passing water at intervals through the ore-pile, substantially as above described.
2. Introducing the poles of a galvanic battery into the solution resulting from the passage of water through the ore-pile, for the purpose of electroplating and manufacturing, substantially as herein described.

In witness whereof I have hereunto set my hand and seal.

NAT. HASKELL. [L. S.]

Witnesses:

E. T. STEEN,

E. J. SALISBURY.