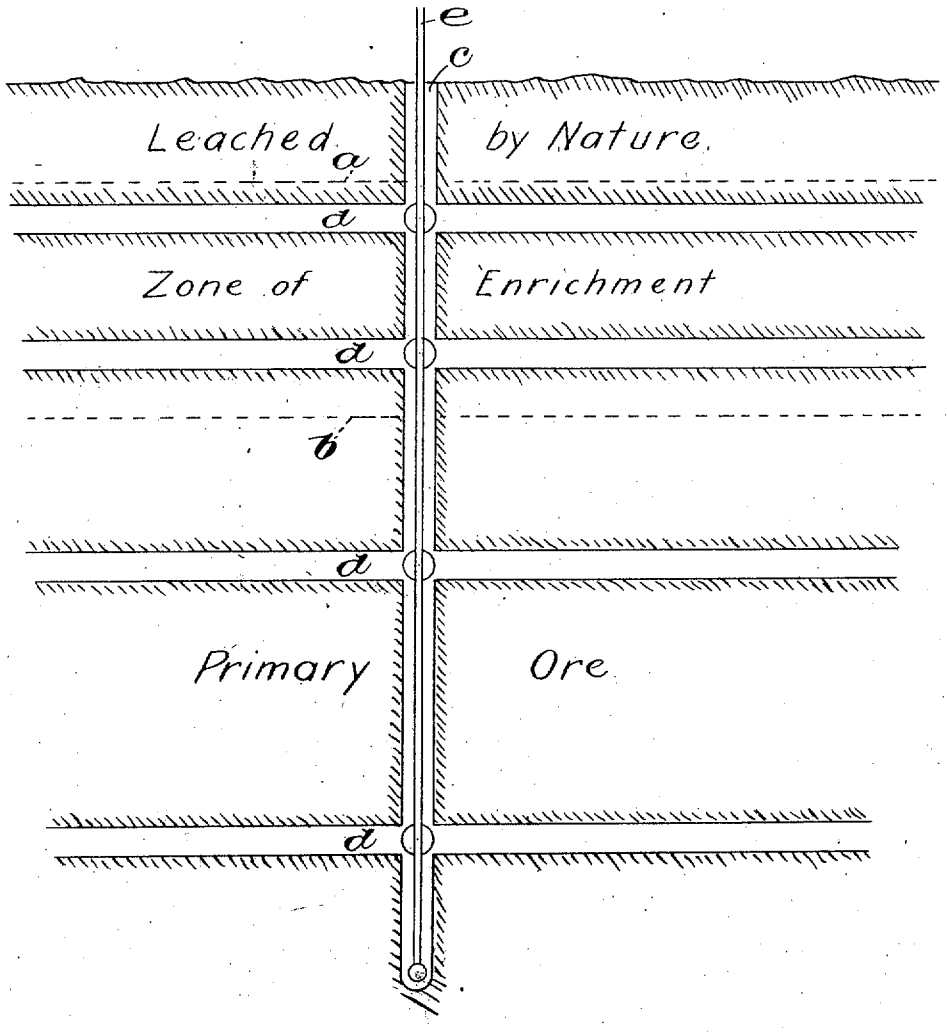
W. L. AUSTIN.

PROCESS OF EXTRACTING COPPER FROM ORE.

APPLICATION FILED APR. 15, 1907.

975,106. Patented Nov. 8, 1910.



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UNITED STATES PATENT OFFICE.

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PROCESS OF EXTRACTING COPPER FROM ORE.

975,106. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed April 15, 1907. Serial No. 368,200.

To all whom it may concern:

Be it known that I, WILLIAM L. AUSTIN, a citizen of the United States, residing in Riverside, in the county of Riverside and State of California, have invented an Improvement in Processes of Extracting Copper from Ores, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a process of extracting copper which is especially applicable in localities where there are minerals which can be rendered soluble, such, for example, as copper minerals, distributed through more or less porous rock.

Such rock as porous porphyry (granite-porphyry) for example, may contain, in the aggregate, a quantity of valuable mineral, although too small a percentage to be worked profitably by ordinary mining operations. The mineral may, however, be profitably extracted by the process which I have discovered, which consists in applying a solvent so as to percolate through the mineral bearing material without removing it by the usual mechanical mining operations from its original location, the percolating liquid extracting the mineral by leaching, and in providing for the collection and subsequent removal of the resulting solutions, from which the metals may then be separated in any suitable or usual manner.

In carrying out the process, an artificial drainage level is created at a point or points below the surface of the rock through which the copper minerals are distributed. This may be accomplished by running levels and cross-cuts at different horizons, and by sinking shafts to a suitable depth, and in so locating these workings that water or any liquid permeating the rock will seek the lower levels and be collected therein. If, therefore, a quantity of water is distributed over the surface of the rock, or through any of the upper levels, it will percolate through the same, leaching out the copper minerals and collecting in the lower workings. The resulting liquids are then removed, as by a pump, for further treatment to extract their metallic contents. It is desirable to carry out the process of extracting the metals from the solutions at or near the location of the ore-body, so that the liquids from which the metals have been separated may, if desirable, be again allowed to pass through the rock. It is, however, immaterial how the water is supplied, it being frequently practicable to divert the water from a running stream, or any reservoir, and to distribute it throughout the upper parts of the ore-body.

The drawing is a diagram, indicating a common formation susceptible of being worked by the process embodying the invention.

The usual formation may be generally described as consisting (1) of a top stratum from which the copper has been gradually leached out by natural processes until it is substantially barren; (2) a substratum which is usually designated as the "zone of enrichment," and which contains copper minerals in paying quantities; and (3) the ore-body in its original state.

The dotted line *a* indicates the upper surface of the zone of enrichment, and the dotted line *b* indicates the top of the zone of primary ore. This dotted line *b* is often the natural drainage level of the locality determined by the topography.

In accordance with my process, I create, at any desired point below the line *a* an artificial drainage level or collecting reservoir, toward which water distributed throughout the mineral bearing rock will flow, as to the point of least resistance. I then supply and distribute, by means of levels, cross-cuts, shafts and winzes, a quantity of water throughout the mineral bearing rock, so that such water percolates the rock and flows toward the collecting reservoir.

In practice, a shaft *c* (or as many shafts as may be desirable) is sunk to any desired level, and a plurality of approximately horizontal tunnels or channels *d* are driven below the leached portion of the deposit to receive and distribute the water. As the water collects in sufficient quantities in the shaft or shafts *c* it is recovered and the copper and other metals in solution or other form are separated by precipitants, or otherwise. The material to be used as a precipitant, when the minerals are removed from the containing rock in this way, may be determined according to circumstances. For example, if the copper in the liquid is in the form of a sulfate or chlorid, the metallic copper will be precipitated by adding iron which replaces the copper, producing sulfate or chlorid of iron and a precipitate of metallic copper.

Claim.

The process of extracting copper from a bed of porous rock, which consists in creating an artificial drainage level below the natural drainage level of the bed; providing the entire bed with cross cuts and winzes at different levels; flushing the entire bed with water, whereby the water percolates through the entire bed above and below the natural drainage level, and collects at the artificial drainage level; and finally pumping out the water accumulated at said artificial level and extracting the copper therefrom.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM L. AUSTIN.

Witnesses:
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