# UNITED STATES PATENT OFFICE.

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## PROCESS OF TREATING ORES.

SPECIFICATION forming part of Letters Patent No. 509,368, dated November 28, 1893.

Application filed May 16, 1893. Serial No. 474,424. (No specimens.)

*To all whom it may concern:*

Be it known that I, ERNEST C. ENGELHARDT, a citizen of the United States, residing at Deadwood, in the county of Lawrence, State of South Dakota, have invented certain new and useful Improvements in Processes of Treating Ores, of which the following is a specification.

This invention relates to certain new and useful improvements in the treatment of ores, and it has for its object primarily to obtain a higher extraction of the gold from ores and sands at a reduced cost.

It has for a further object to provide for a more rapid and uniform action of the solution upon the gold; the charging of the barrels more rapidly and hence with less injurious effects upon the person in charge; to reduce the amount of slimes so that the gold solution will settle with greater rapidity; to provide for the faster elimination of the free bromine before precipitation, and at the same time obtain richer gold precipitates and increase the fineness of the resulting gold bullion.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be specifically defined by the appended claims.

It is well known that one hundred (100) parts of water will dissolve but from two to three parts of bromine, according to the temperature of the water, and this very slowly. I have found that this when used in large quantities, especially when charged with the ore in a rotating vat or vessel, is too slow. By experiments I have found that one hundred parts of muriatic acid will very readily and rapidly dissolve from thirteen to fifteen parts of bromine; I therefore employ this solution, which will act upon the gold as soon as the barrel has been charged and set revolving.

In carrying out my process the ore is first crushed to the desired fineness in any suitable manner and is then conveyed to a roasting furnace and after being properly and thoroughly roasted (a perfect dead roast is the first condition), it is spread out on the cooling floor and after lying there for about half an hour moistened with water. The roasted ore is then conveyed to the hoppers ready to be charged into the lead-lined barrels. These barrels hold usually from four to five tons of ore and are charged as follows:— Enough water is poured in to produce a semi-liquid pulp with the charge of roasted ore; before the hopper is entirely emptied a small amount of carbonate of sodium is added in powder form and covered with the balance of the charge to avoid a too quick action of the acid upon the soda. Now a solution of bromine in hydrochloric acid is introduced and the manhole of the barrel closed and the barrel revolved for from one to two hours. The gold in the ore or sand is quickly converted into bromide of gold which is soluble in water. The dissolving or leaching of this bromide of gold can be done in the barrel or in leaching vats. The filtered, clear solution is drawn or pumped into a tank in which the gold is precipitated after having eliminated the excess of free bromine. The gold precipitates are collected, dried and refined while the solution, free of gold, runs to waste.

My solution being diluted to some extent by the water in the barrel and evenly divided through the whole mass of ore after a few revolutions of the barrel will at once begin to dissolve the gold and therefore shorten the chemical process very materially. By my process it takes only from one to two hours to yield a high extraction of gold, which will be recognized as a great saving of time as well as of expense. The amount of carbonate of sodium used will depend upon the character of the ore and will have to be determined by the chemist. By the addition of the carbonate of sodium the larger part of the acid will be neutralized. Besides this there will be, if necessary, pressure produced in the barrel, by the action of the acid upon the soda, forming free carbonic acid. In the treatment of some ores the carbonate of sodium may be omitted entirely.

What is claimed as new is—

1. In the treatment of ores, the step which consists in subjecting the same to the action

of a solution of bromine and muriatic acid, substantially as specified.

2. In the treatment of ores the step which consists in subjecting the same to the action of a solution of bromine and muriatic acid, and carbonate of sodium, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST C. ENGELHARDT.

Witnesses:
OTTO KARP,
THOMAS H. WHITE.