C. P. PRIEST.
PROCESS FOR EXTRACTING PRECIOUS METALS.
APPLICATION FILED AUG. 21, 1919.
1,352,832.

[Diagram of the process]

Inventor
Charles P. Priest
By
R. A. Sourick
Attorney
UNITED STATES PATENT OFFICE.

CHARLES P. PRIEST, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS FOR EXTRACTING PRECIOUS METALS.

1,352,832.


To all whom it may concern:

Be it known that I, CHARLES P. PRIEST, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Processes for Extracting Precious Metals, of which the following is a specification.

This invention relates to processes for extracting precious metals from ores and sand and has for its object the provision of a process whereby the metals will be extracted by an electrolytic amalgamation, a mercury salt and a sodium salt being employed and electrolyzed to form nascent metallic mercury and sodium which possess, in this condition, their maximum affinity for the precious metals.

The process also involves the use of hydrogen which is liberated in the amalgamator or sluice partly by the electrolytic decomposition of water passing therethrough and partly by the action of the water on the metallic sodium formed by the electrolytic decomposition of the sodium chloride introduced with the "slime." The function of the hydrogen which is of course in a nascent state, is to remove objectionable oxides and sulfurous coatings from the particles of precious metals to facilitate their amalgamation with the mercury.

An important object is the provision of a process which involves continually passing the "slime" and solutions over an amalgamated copper plate forming one element of an electrolyzing bath whereby the process will be continuous and rapid.

It is possible to carry out the process with different varieties of apparatus, though for purposes of illustration I have shown a satisfactory apparatus for the purpose in the accompanying drawing which shows a somewhat diagrammatic elevation.

In carrying out my process, the sand or ore is mixed with sodium chloride solution and ground to the proper fineness, in some instances to as fine as 200 mesh. Solutions of hydrogen and mercury salt, such as mercury bichloride, are then added to the "slime" and the whole is thoroughly mixed and then flowed through an electrolyzing sluice in which is provided a copper plate amalgamated with mercury upon which the particles of precious metal will be deposited.

In the drawing, the numeral 10 designates an ore grinder of conventional type driven by suitable means and having an inlet 11 into which the ore or sand is fed into into which is supplied the sodium chloride or common salt solution. Disposed in position to receive the ground material discharged from the grinder 10 is a mixing device 12 of any ordinary construction and of either the horizontal or vertical type. At the point 13 whereby the slime or pulp from the grinder enters the mixer there is introduced by any suitable means, a solution of mercury bichloride and a water solution of hydrogen. The purpose of introducing the hydrogen, which is in the molecular state, is to saturate the slime or pulp with hydrogen for a purpose to be described. The slime or pulp, after being thoroughly mixed with the solution in the mixer 12, is discharged into the sluice 14 within which is disposed a plurality of swinging anode plates 15 connected in an electric circuit with a suitable cathode plate 16.

In carrying out the process the sodium chloride in solution is broken up into its constituents, metallic sodium and chlorin, which being in the nascent state, are highly active. The chlorin acts as a cleansing agent and assists in removing objectionable coatings from the particles of precious metal. The mercury bichloride is broken up into metallic mercury and chlorin and the metallic mercury is of course deposited upon the plates. The nascent metallic sodium formed by the breaking up of the salt solution unites with the metallic mercury to form mercury and sodium amalgam which has a great affinity for the precious metals. The metallic sodium furthermore is acted upon by the water of the solution and forms sodium hydroxid and hydrogen gas. Sodium hydroxid is a cleansing agent and will therefore act advantageously upon the particles of precious metals. The hydrogen liberated is in a nascent state and consequently highly active and will go to the mercury and sodium amalgam and greatly increase the activity thereof so that as the particles of precious metal passing through the sluice come in contact with the plates they will be deposited thereon and amalgamated therewith. It might also be stated that some of the hydrogen will assist in removing oxides from the precious metals and make them clean and bright to facilitate their amalgamation.
The preliminary saturation of the solution with hydrogen prevents the hydrogen liberated from being absorbed.

The combined use of the three powerful amalgamating agents, mercury, sodium and hydrogen forms a perfect amalgam which is soft, smooth, elastic, tenacious, yet plastic and which will not crumble. The hydrogen-sodium-mercury amalgam is chemically pure and has such an affinity for precious metals that the particles of the latter will be attracted even under the most adverse conditions, such as the presence of silicious, arsenical, greasy, sulfurous or rusty coatings.

I claim:
1. A process of extracting precious metals from ores or sands consisting in grinding the ores or sands in a solution of a sodium compound, then mixing with a hydrogen solution and a mercury compound solution, and then electrolyzing the slime whereby to effect amalgamation.

2. A process for the extraction and recovery of precious metals from ores or sands consisting in grinding the ores or sands in a solution of sodium chloride, then adding hydrogen and a solution of mercury bichlorid, and subsequently effecting amalgamation by electrolysis.

In testimony whereof I hereto affix my signature.

CHARLES P. PRIEST.