

(No Model.)

L. PELATAN & F. CLERICI.
PROCESS OF AND APPARATUS FOR EXTRACTING GOLD FROM ITS ORES.
No. 553,816. Patented Jan. 28, 1896.

Fig. 1.

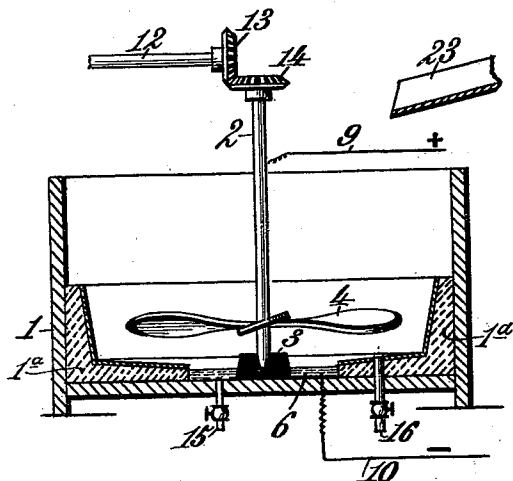


Fig. 2.

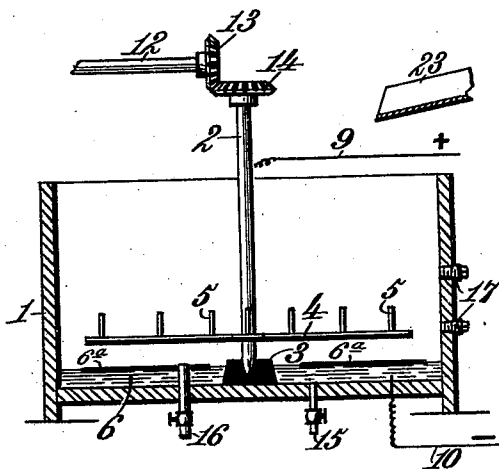
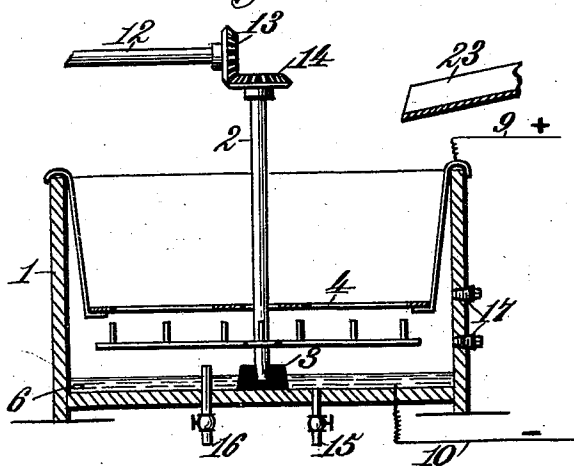


Fig. 3.



Witnesses.
Robert Emmett.
Thos. A. Green

Inventors.
Louis Pelatan.
Fabrizio Clerici.
By *James L. Norris.*
Atty.

UNITED STATES PATENT OFFICE.

LOUIS PELATAN, OF PARIS, FRANCE, AND FABRIZIO CLERICI, OF MILAN, ITALY.

PROCESS OF AND APPARATUS FOR EXTRACTING GOLD FROM ITS ORES.

SPECIFICATION forming part of Letters Patent No. 553,816, dated January 28, 1896.

Application filed June 25, 1895. Serial No. 554,014. (No model.)

To all whom it may concern:

Be it known that we, LOUIS PELATAN, a citizen of the Republic of France, residing at Paris, France, and FABRIZIO CLERICI, a subject of the King of Italy, residing at Milan, Kingdom of Italy, have invented new and useful Improvements in the Process of and Apparatus for the Extraction of Gold from its Ores, of which the following is a specification.

Our invention relates to processes of and apparatus for the extraction of gold from its ores, said invention being allied closely to that for which we filed an application for Letters Patent on the 1st day of December, 1894, Serial No. 530,593.

It is the purpose of our present invention to provide a novel and simple mode of procedure whereby gold and silver may be economically extracted from their ores without requiring an extensive plant or the costly solutions usually employed heretofore in processes of this type.

Our invention also contemplates the use of a revoluble anode adapted to act also as an agitator in the solution, and a cathode formed of mercury, either alone or in conjunction with amalgamated copper plates floating upon said mercury; and said invention consists, to these ends, in the process and in the novel features of construction and in the parts and combinations of parts hereinafter fully explained and then particularly pointed out in the claims which conclude this specification.

To enable others skilled in the art to fully understand and to practice our said invention we will proceed to describe the same in detail, reference being had for this purpose to the accompanying drawings, in which—

Figure 1 is a central vertical section of a panning apparatus incorporating our invention. Fig. 2 is a similar section showing a modification of the cathode. Fig. 3 is a detail section showing a modified form of anode.

The reference-numeral 1 in said drawings indicates the pan, our invention being strictly analogous in the mode of operation to the panning processes employed in the treatment of gold and silver ores. The pan is usually of circular form and constructed of wood or other suitable material, and within it is ar-

anged a central vertical shaft 2, having support upon an insulating-bearing 3. The shaft 2 is provided with an anode 4, of any suitable metal which is electropositive in relation to the metal of the cathode. For example, we may, and preferably do, use iron for the anode, as well as for the shaft which carries it, as both parts may, if desired, be formed in one and the same piece. The radial arms of the anode, which are also adapted to act as agitators, may be formed as propeller-blades, or as straight arms provided with pins 5. The pan may have a lining 1^a of cement, although in using a cathode of mercury such lining may be dispensed with. In this form of the invention we preferably use a cathode consisting of a stratum of mercury 6 lying directly upon the bottom of the pan, with or without amalgamated copper plates floating on the mercury, as shown at 6^a, Fig. 2. Current is supplied through wires 9 and 10 from any suitable source of electrical energy. The vertical shaft carrying the agitator 2 is driven by any suitable means—as, for example, by a horizontal shaft 12 geared to the vertical shaft by beveled gears 13 and 14. An outlet 15 is provided for the mercury, and a separate opening 16 for the sludge, and apertures 17 are provided in the wall of the pan for the discharge of the tailings and solution.

In treating auriferous and argentiferous ores a cyanide solution will usually be employed, though chlorine or bromine solutions may also be used instead, either by themselves or in combination with a cyanide, and especially cyanide of potassium. When a cyanide solution is used upon raw or unroasted ores, it should be comparatively weak, the strength being about one-tenth of one per cent. To impart to such a solution a sufficient electrical conductivity and to intensify the solvent action to the required point, we add to the solution a haloid salt of sodium or potassium, preferably sodium chloride, until the strength of the solution is from one to two per cent., or thereabout. The strength may be varied, however, as circumstances may require, in any individual case. The precious metals dissolved are finally collected by electroamalgamation or electrodeposition, according to

the nature of the cathode, due to the electric current which is caused to pass through the solution, the latter being kept in agitation by the revolution of the arms 4, which also constitute the anode.

Our process has, besides, the great advantage of allowing particles of gold which frequently are to be found in the ores and which are too coarse to be easily and quickly dissolved to be directly amalgamated as they are brought by the simple effect of gravitation in contact with the mercury at the bottom of the pan, the same being always kept bright and active by the action of the electric current, this reaction being similar to the electrodeposition which takes place in plating with the precious metals.

In all forms of this apparatus in which the agitator or the agitator and shaft constitute the anode a proper space must be allowed between the radial arms 4 and the metal of the cathode, in order to prevent the current from passing directly or by the shortest path from one to the other, thereby preventing it from acting in the desired manner upon all parts of the solution.

The entire process of extracting the precious metals, separating them from the solution, and collecting the same is by our invention carried out in one and the same pan by a continuous process, and the simplicity of construction and the reduction in the labor of handling and treating the ores give to our invention a marked advantage in point of economy, both in the initial cost of the plant and the force and material required in operating the same.

By our invention we are able also to treat those ores in which the gangue is composed of or contains so large a percentage of talcose, aluminous, or other earthy or mineral constituents as to prevent the leaching or filtering of the solutions through the same, which has been a serious objection to the process of treatment heretofore employed. All these ores, however, yield readily to the process hereinbefore described, and the valuable metals are separated without difficulty and without material loss. The final step in our process consists in washing the sludge and waste products out of the pan by a stream of pure water, which is introduced by a trough or pipe 23, leaving only the amalgam or the electrically-coated cathode.

When an operation is completed, which requires a period which will vary according to the nature of the ore, or after a certain number of such operations, the mercury in the bottom

of the pan is drawn off and the amalgamated plates are cleaned, or the lead cathode is removed and cleansed or melted for bullion, according to the form of cathode used. The amalgam is separated and retorted in the ordinary way employed for the extraction of gold and silver, either in the process of pan-amalgamation or in any other amalgamation process.

It should be noted that some auriferous ores are of such a nature that the gold is not readily dissolved by the combined solution of potassium cyanide with a haloid salt, such as chloride of sodium. In treating these ores we add to the cyanide solution an oxidizing agent, such as hydrogen binoxide, or potassium, or sodium dioxide, or potassium ferricyanide. The oxidizing agent is generally added at the beginning of the treatment, which is otherwise substantially the same as already described.

What we claim is—

1. A single continuous process for the extraction of precious metals from their ores, and the amalgamation of the same, which consists in treating said ores with a comparatively weak solution of a soluble cyanide, such as cyanide of potassium, adding thereto a peroxid such as hydrogen binoxide, increasing the electric conductivity of said solution by adding chloride of sodium, increasing the solvent power of said solution by passing a relatively weak current of electricity through the same, retaining the sodium chloride in the solution practically without decomposition and continuously revolving the anode in the solution over a fixed cathode of mercury, substantially as described.

2. An apparatus for the extraction of gold and silver from their ores, the same comprising a pan, a revoluble anode centrally arranged therein and adapted to revolve within and agitate the solution, a fixed cathode consisting of mercury spread on the bottom of the pan and amalgamated copper plates floating on said mercury, and a source of electric energy having opposite poles connected electrically to said anode and cathode, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

LOUIS PELATAN.
FABRIZIO CLERICI.

Witnesses:

DELL' AUQUA LUIGI,
ALBINI ERNESTO.