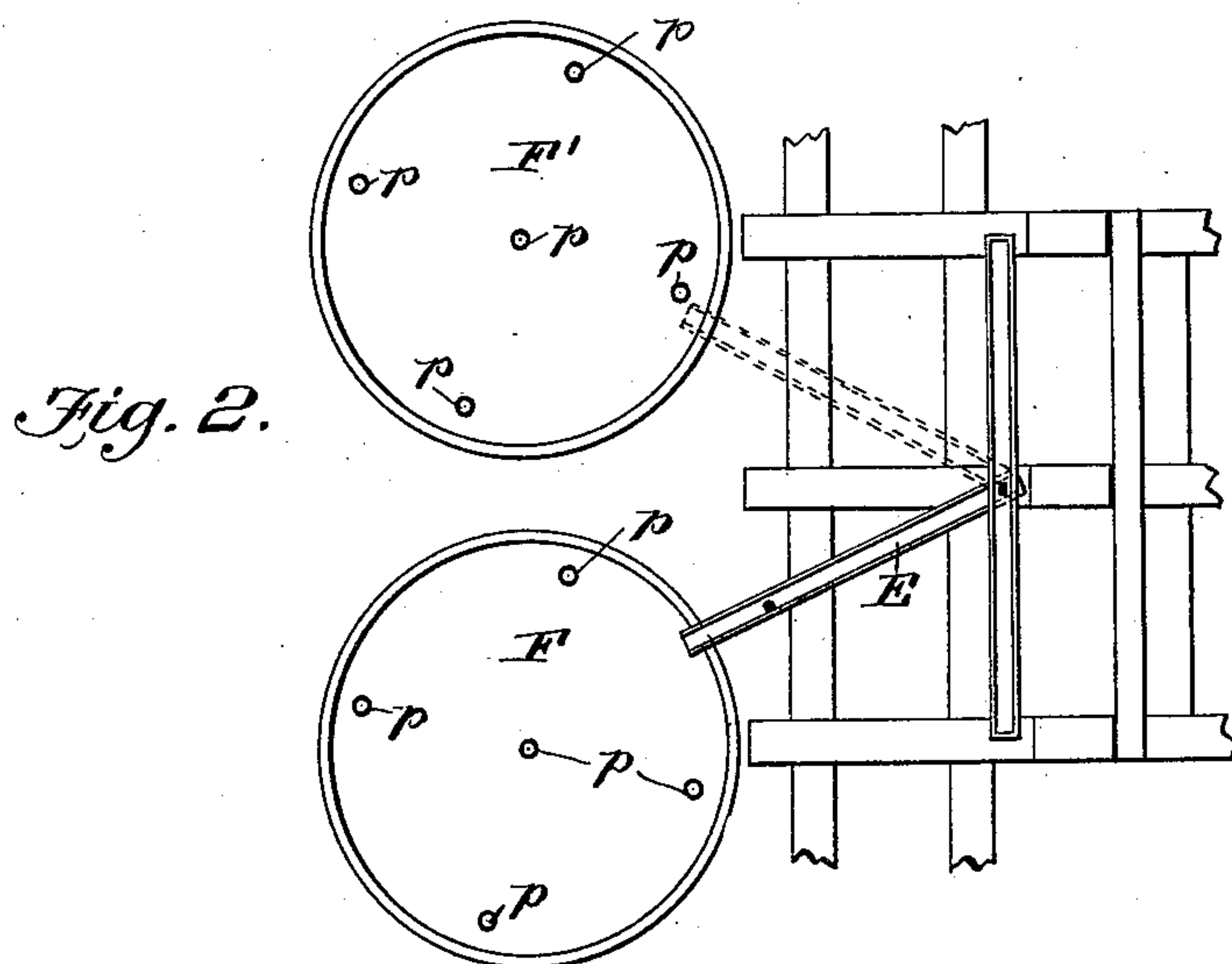
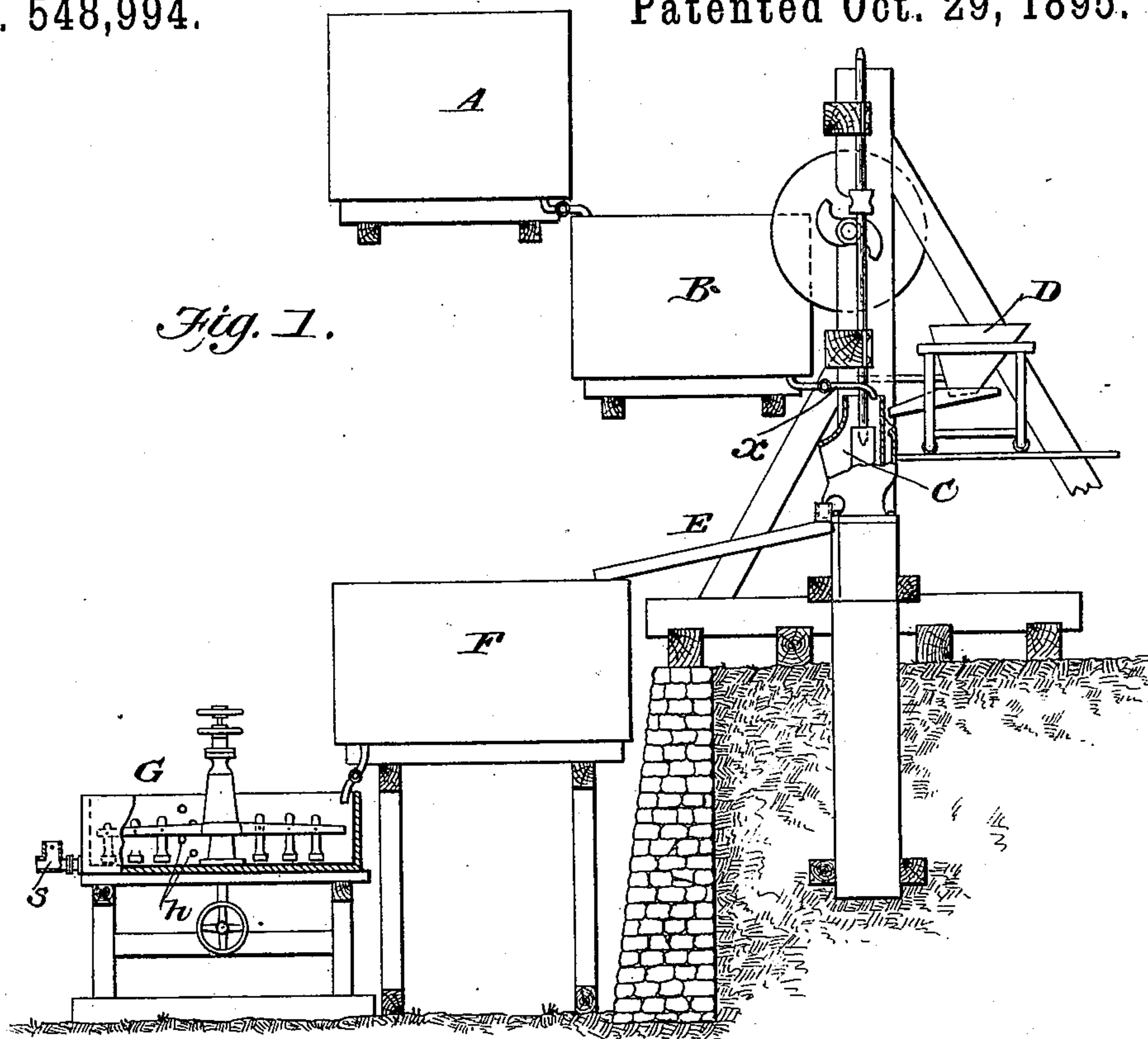


(No Model.)

J. A. KEATING & F. A. C. AMCOTTS.
EXTRACTING METALS FROM THEIR ORES.

No. 548,994.

Patented Oct. 29, 1895.



WITNESSES:

M. D. Blouall
Edw. W. Byrn.

INVENTORS:

John A. Keating.
Frederick A. C. Amcotts.

BY

Munn & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN A. KEATING AND FREDERICK A. C. AMCOTTS, OF RADERSBURG,
MONTANA.

EXTRACTING METALS FROM THEIR ORES.

SPECIFICATION forming part of Letters Patent No. 548,994, dated October 29, 1895.

Application filed November 1, 1894. Serial No. 527,662. (No specimens.)

To all whom it may concern:

Be it known that we, JOHN A. KEATING and FREDERICK A. C. AMCOTTS, of Radersburg, in the county of Jefferson and State of Montana, have invented a new and useful Improvement in Extracting Metals from their Ores, of which the following is a full, clear, and exact specification.

Our invention relates to improvements in extracting metals from their ores; and the object of our invention is to produce a cheap, simple, and efficient method of extracting gold and silver from their ores, and especially from pyritic or other refractory ores. The method may also be used to advantage in working concentrates to effect the separation of metals.

To this end our invention consists of a method of extracting metals from their ores which will be hereinafter described and claimed.

In carrying out our invention the raw ore is ground in a suitable mill, with quicksilver and a solution of acetic acid or acetate of sodium, to a fineness of not less than one-hundred mesh, thus causing the gold and silver to be thoroughly incorporated and amalgamated with the quicksilver.

In carrying out our invention we use one pound of acetic acid or a corresponding equivalent of acetate of sodium to twenty-four gallons of water. By the action of this reagent the evil effects of sulphur and certain gangues contained in pyritic and other base gold-bearing ores are counteracted, the quicksilver is kept clean and active, and the amalgamation is largely effected while the ore and solution are together. We are aware that acetic acid has been heretofore used in preparing ores for future amalgamation, and we make no claim to such step broadly.

The grinding or crushing of the ore in the presence of the acetic acid and quicksilver effects not only a thorough mechanical admixture of the reagents, but the acetic-acid bath thoroughly saturates the ultimate particles of the ore and enables the quicksilver to take hold of and amalgamate the gold and silver. After this step of the operation is complete, the solution is then drawn off into a settling-tank, where, after it settles, it is

pumped back into a standardizing-tank, and when it is standardized it is used over again.

When the solution is drawn off from the mill, clear water is introduced and the pulp flowed off into a series of settling-tanks until the gangue or waste rock is all driven off and nothing but the gold and silver bearing pulp remains. The pulp is then drawn from the bottom of the various tanks into an amalgamating-pan and with clear water is agitated with a muller till the entire residue of gold, amalgam, and floured quicksilver is caught on the copper plates of the pan-bottom. A solution of concentrated lye or cyanide of potassium may be added to the solution to promote amalgamation on the copper plates of the pan-bottom, the lye or potassium acting in the usual way to clean the quicksilver.

Figure 1 is a side elevation of an apparatus for carrying out our process, and Fig. 2 is a plan view of the two settling-tanks.

A is a tank in which the acetic-acid solution is mixed and standardized.

B is the solution-supply tank, which is fed from A at intervals through a valved pipe and discharges continuously through a valved pipe *x* into the mortar or stamp-trough C of a stamp-mill or other crushing, grinding, or comminuting apparatus. The raw ore is fed through hopper D. In the bottom of the mortar or trough C is placed the requisite quantity of quicksilver. The ore that is crushed fine in the presence of the acetic-acid solution and quicksilver passes out of the mortar through the screens, or through the place of discharge in any sort of grinding-mill, and the solution or liquid that escapes with the ore will be carried through the sluice E to one of two settling-tanks F or F', with either of which sluice E may be connected. When one of these tanks F is full of pulp, the sluice will be changed to the other tank F' and the solution drawn out of the disconnected tank after the pulp has settled. This solution and all the overflow solution, while the tanks are being filled, will be conveyed by a sluice (not shown) to some convenient point and thence pumped into tank A and standardized for use again. After tank F has been filled with settled pulp and the solution all drawn off, clear water is introduced into tank F to flow

off the waste rock, &c. The residue of pulp containing the metals will be drawn out through a pipe into the amalgamating-pan G. The sluice E is again connected to tank F, and
5 tank F' is washed and discharged of its contents in a similar manner.

To help the discharge of the tanks F and F' and the washing of the contents, and flowing off of the waste rock, water is introduced
10 through five one-half-inch pipes *p*, Fig. 2, which open through the bottom of the tanks F and F', and these pipes are provided each with upwardly-opening check-valves to prevent the pulp from passing down them.
15 Through these pipes water under pressure is introduced.

The amalgamating-pan G, in which the amalgamation of the precious metals with the quicksilver is completed, has copper sides and
20 bottom, with a revolving stirrer having four arms rotating about twelve to fifteen times a minute. Each arm has shoes on it, made of wood, which run as close as possible to the bottom without touching it. This pan also
25 has overflow-holes *h* in its sides and a quicksilver-siphon *s*.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

The process herein described of extracting 30 gold and silver from their ores which consists in comminuting the ores in the presence of quick-silver in a solution of acetic acid or its described equivalent, then drawing off the solution into a settling tank and standardiz- 35 ing it for use again, then flowing off by clear water the lighter portions of the pulp containing the gangue or waste rock and finally removing the heavy pulp containing the precious metals and completing their amalgama- 40 tion and recovery substantially as shown and described.

JOHN A. KEATING.

FREDERICK A. C. AMCOTTS.

Witnesses to the signature of John A. Keating:

FRANK WELLS,

G. B. CLARKE.

Witnesses to the signature of Frederick A. C. Amcotts:

WARREN B. HUTCHINSON,

JNO. M. RITTER.