

No. 711,236.

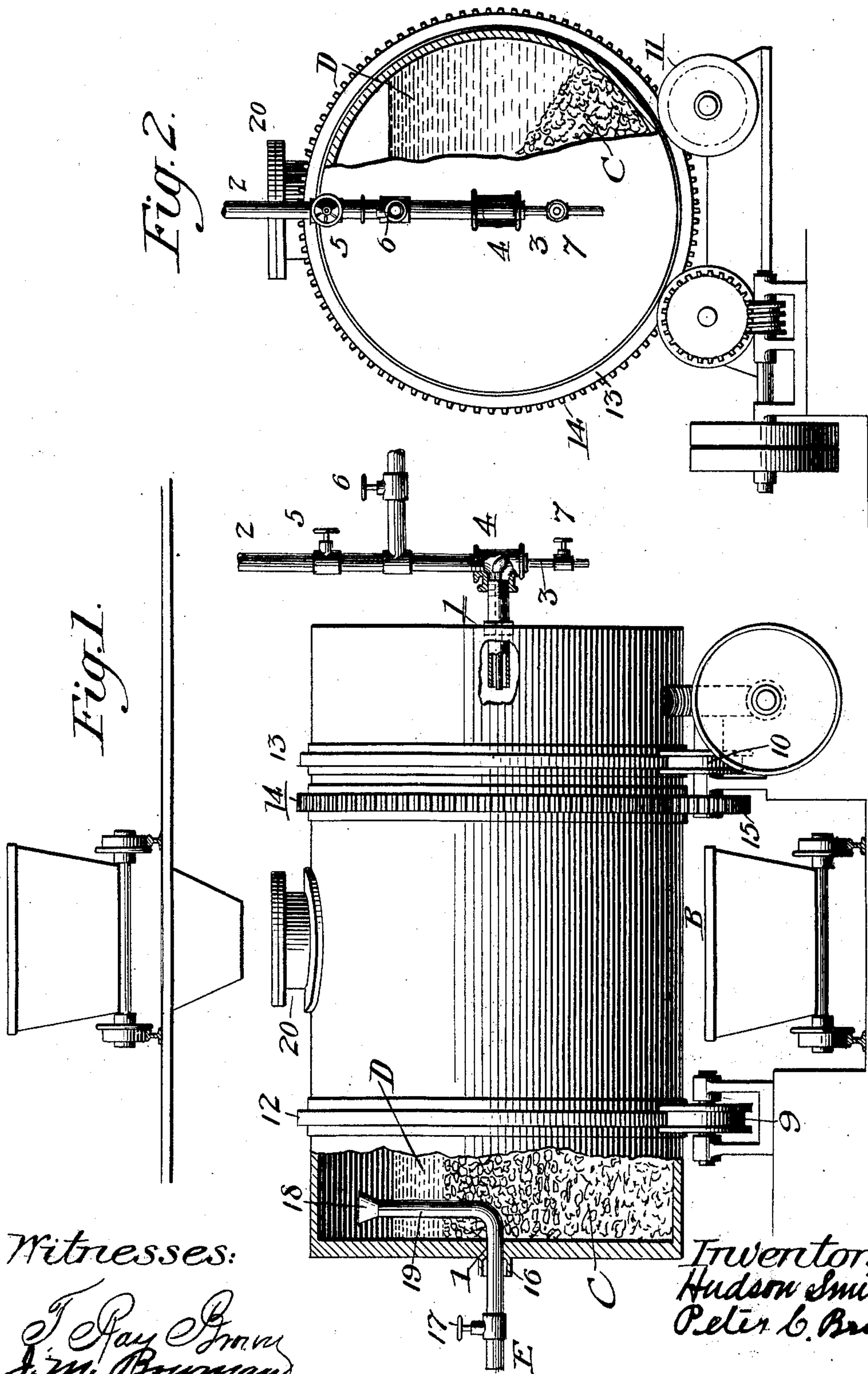
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H. SMITH & P. C. BROWN.

APPARATUS FOR USE IN EXTRACTING PRECIOUS METALS FROM THEIR ORES.

(Application filed May 8, 1901.)

(No Model.)



Witnesses:

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*J. M. Brown*

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*Peter C. Brown*



# UNITED STATES PATENT OFFICE.

HUDSON SMITH AND PETER C. BROWN, OF SALT LAKE CITY, UTAH.

APPARATUS FOR USE IN EXTRACTING PRECIOUS METALS FROM THEIR ORES.

SPECIFICATION forming part of Letters Patent No. 711,236, dated October 14, 1902.

Application filed May 6, 1901. Serial No. 59,047. (No model.)

*To all whom it may concern:*

Be it known that we, HUDSON SMITH and PETER C. BROWN, citizens of the United States, and residents of Salt Lake, county of Salt Lake, and State of Utah, have invented certain new and useful Improvements in Apparatus for the Extraction of Metals from Their Ores by Lixiviation; and we do hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawing.

Our invention relates to the extraction of metals by lixiviation and is accomplished by means of an agitating apparatus, a solvent solution preferably under pressure and in the presence of steam.

Heretofore it has been common in treating ores by lixiviation to do so in stationary open tanks, and much difficulty has been experienced because in that method of treatment the finely-pulverized ore is not brought into uniform contact with the solvent solution, as is essential to the proper oxidation thereof, and accordingly we have found it of benefit to provide means for the gentle agitation of such ores and in this manner obtain a better extraction, particularly when the pulp is very finely crushed or it is clayey or talcky. We obtain these objects by the mechanism illustrated in the accompanying drawing, wherein the same indicating letters and numerals point out the same parts in the figure.

The figure is a sectional view of the revoluble tank A, a part of the end of the tank being cut away to show the internal arrangement by which the ore and the solvent solution become incorporated with each other. At 1 is shown the axis of the inlet by which air or oxygen, as well as the solvent solution and steam, is introduced into the revoluble tank. The axis coincides with the center of the tank and is provided with concentric pipes 2 and 3, the purpose of said pipes being to conveniently feed into the tank. The pipes are concentric as far as the inlet of the tank. At that point there is provided a stuffing-box, by which the inner concentric pipe supplies a continuous inlet for air or oxygen. The valve 5 admits the solvent solution D. Valve 6, preferably at right angles to the valve 5, admits the steam. Valve 7 admits the air, also the oxygen, if it is nec-

essary to use oxygen, as is the case at times when both are admitted at once.

The longitudinal tank B is revoluble on four wheels, three of which, 9, 10, and 11, are shown suitably supported, and moved by friction on the bands 12 and 13. Around the longitudinal tank is provided the cog-wheel 14, intermeshing with the small cog-wheel 15. By means of these bands and cog-wheels the tank is rotated. The tank B is provided with a removable door 20 for the purpose of filling and emptying the tank. The apparatus can be driven at any desired speed. The ore is shown at C and the solvent solution at D. At the end of tank opposite from the inlet is provided a launder E, with a stuffing-box 16 and a cut-off valve 17. The launder E coincides with the axis of the tank B; is provided with the continuous outlet or exhaust pipe or tube 18. After passing through the end of the tank the launder is turned at right angles at 19 and the tube extended upward almost to the internal periphery of tank B, so that upon the admission of steam, solvent solution, air, or oxygen at 4 solvent and extracting process takes place. The solution remains within the tank, and the excess air, oxygen, and steam find their way out through the launder E. Preferably the valves at the inlet and the exhaust are so regulated as to create and continue a constant internal pressure of such tension as experience may determine the different qualities and conditions the ore may require.

In the treatment of ore by this process the ore is first finely subdivided, the amount of subdivision depending on the condition and character of the ore, generally about forty to eighty meshes to the inch, the longitudinal tank is filled to two-thirds of its capacity, and the solvent solution introduced, filling the tank with ore and solution nearly to the top, leaving a sufficient open space at the top to receive the upright end of the launder. The axis of the tank is provided with the concentric inlet for the purpose of admitting the solution and steam or air or oxygen, and the launder provides through the other axis the outlet for air and dead steam. By this means the air and oxygen and steam enter the tank, pass through the interstices in the comminuted ore, while the revolving tank causes



an intimate admixture of ore, solvent, air, and oxygen, and then passes on out after having performed the work of extraction.

We do not confine ourselves to the treatment of any particular ore, for our apparatus may well be applied to different ores—such as gold, silver, or copper—the difference in treatment being in using a different solvent for different ores, such as cyanid of potassium in the case of gold or silver ores, hyposulfite of soda in the case of silver ores, and acids in the case of copper ore.

We are aware that revoluble tanks containing comminuted ore have been employed in the lixiviating of ores and that such tanks have been used in conjunction with solvent solutions and also that steam, air, and oxygen have been from time to time employed in different forms. We therefore disclaim the right to the exclusive use thereof; but

What we do claim, and desire to protect by Letters Patent of the United States, is—

1. In a lixiviation apparatus, a revoluble tank for containing ores, a pipe extending through one end of the tank and extending upward almost to the internal wall, means

for rotating the tank and pipes for supplying a solvent solution, air and steam to the tank as and for the purpose described.

2. In a lixiviation apparatus for extracting the values from ores, a revoluble tank for the ores, means for rotating the tank, means for admitting a solvent solution in intimate admixture with the ore, pipes for admitting steam and air, and an outlet for the expulsion of air.

3. In a lixiviation apparatus, a revoluble tank, pipes conducting a solvent, air and steam to the tank, means for rotating the tank and a pipe in the end of the tank opposite the end containing the supply-pipe, substantially as described.

4. In a lixiviation apparatus, a revoluble tank, concentric pipes conducting a solvent, air and steam to the tank, and an outlet for the expulsion of air.

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Witnesses:

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