No. 649,151. Patented May 8, 1900.

W. WRIGHT.

APPARATUS FOR EXTRACTING METALS FROM REFRACTORY ORES.

(Application filed Apr. 26, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

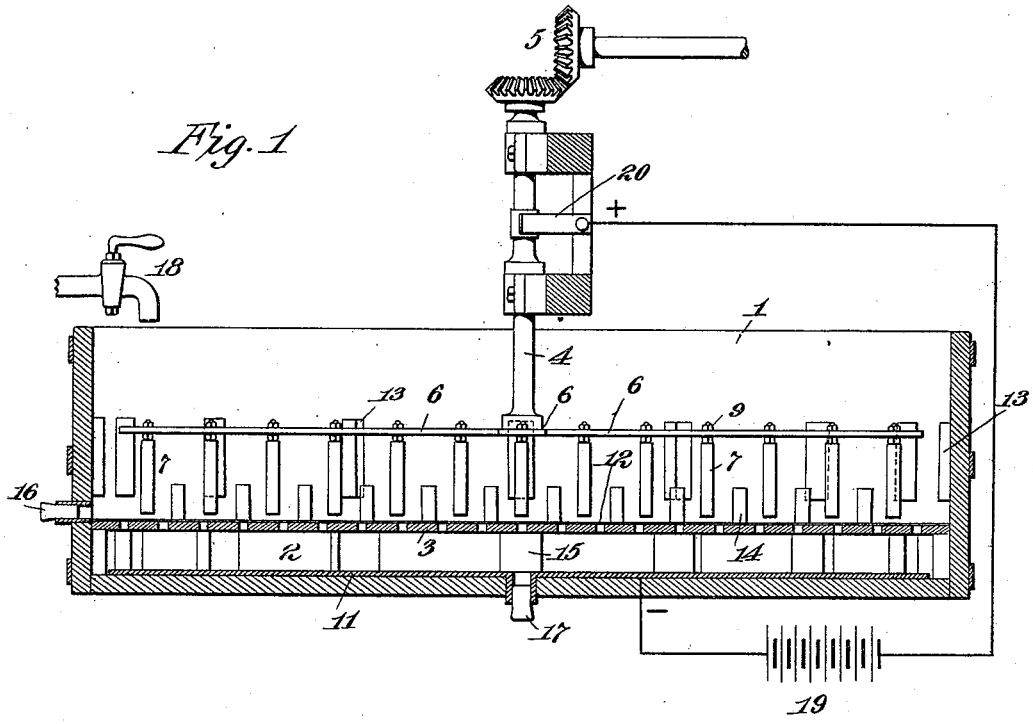

Fig. 2

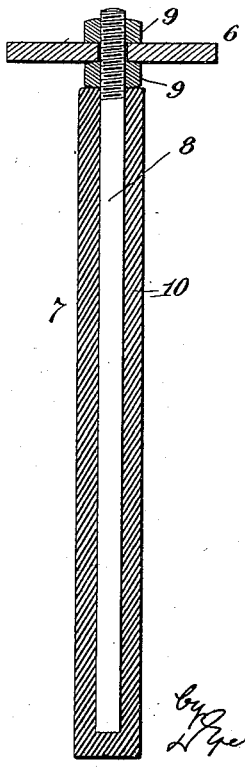

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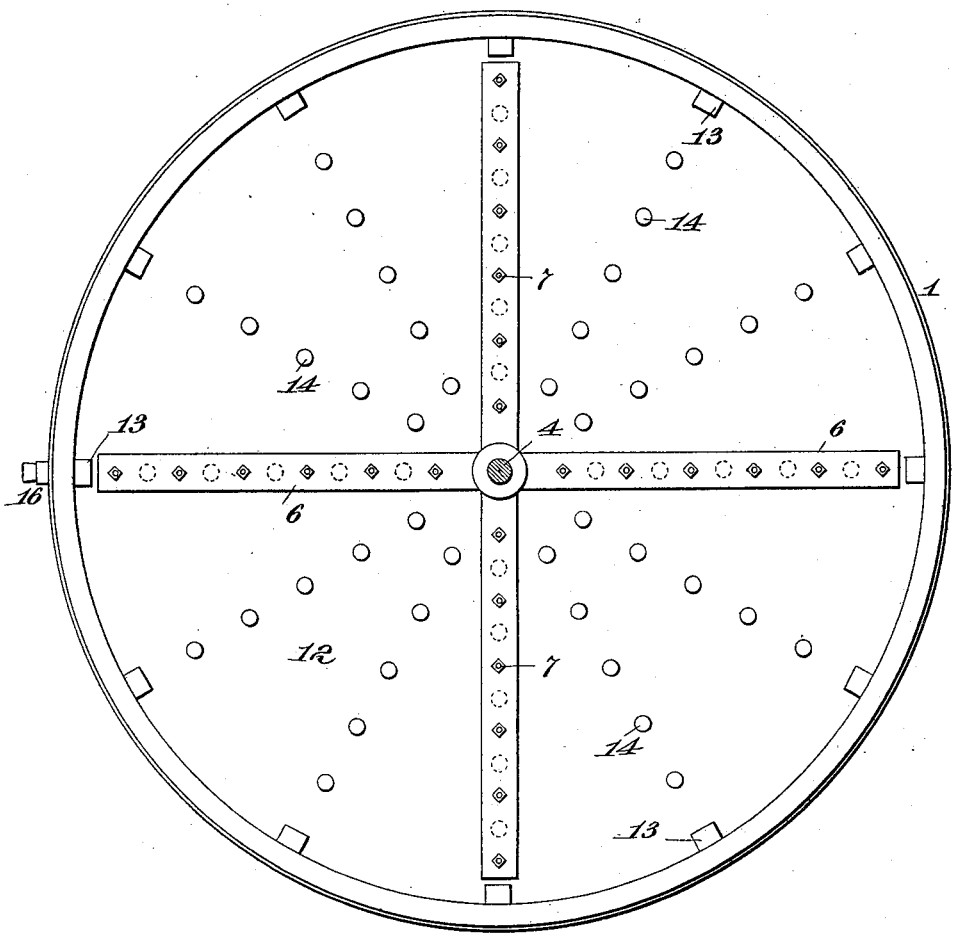
Fig. 3



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR EXTRACTING METALS FROM REFRACTORY ORES.

SPECIFICATION forming part of Letters Patent No. 649,151, dated May 8, 1900.

Application filed April 26, 1899. Serial No. 714,541. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WRIGHT, a citizen of the United States, residing at New York, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Apparatus for Extracting Metals from Refractory Ores, of which the following is a specification.

My invention relates to an improved apparatus for extracting metals from refractory ores.

My object is the provision of a cheap and efficient apparatus for the purpose.

My improved apparatus comprises a tank for receiving a sludge of the ore, a stationary horizontal perforated partition in said tank, forming beneath it a chamber, a cathode on the bottom of the tank within said chamber, a filtering medium carried on the partition, a number of pins arranged in a series of concentric circles projecting upward from said partition, a main driving-shaft, a plurality of anodes carried by said shaft, preferably from a series of radial arms, said anodes working between the series of concentric pins, and preferably a plurality of dash-plates carried by the side of the tank above the partition.

In prior apparatus for the extraction of metals from refractory ores using an electrolytic process difficulty has been experienced because of the fact that the electrolytic action results in a decomposition of the anode and the consequent formation in the apparatus of a varying quantity of an extraneous baser metal. Besides this in said prior apparatus the decomposition of the anode or anodes resulted in a more or less rapid wearing away and weakening of the same, necessitating frequent renewals thereof. In order to overcome these objections, I make my anodes of a non-decomposable material which at the same time shall be a sufficiently good electrical conductor for the purpose. Preferably I employ carbon for these anodes, and to secure the requisite strength thereof I prefer to employ a metallic core around which the carbon is molded or disposed in any other suitable way. Owing to the porosity of carbon, and in order to prevent the solution from reaching the metallic core thereof when used and resulting in a consequent decomposition of such core, I prefer to immerse the electrodes after they have been formed in a bath of a suitable waterproof material, such as melted paraffin, which fills the pores and prevents this objectionable action from occurring.

In order that my invention may be better understood, attention is directed to the accompanying drawings, wherein—

Figure 1 illustrates a preferred embodiment of my apparatus for the carrying out of my improved process; Fig. 2, a vertical section, on an enlarged scale, of the preferred construction of anode; and Fig. 3, a plan view of the apparatus, showing the main driving-shaft in section.

In all of the views corresponding parts are represented by the same numerals of reference.

1 represents a tank or bath of the proper dimensions, made, preferably, of a non-conducting material, such as wood. The bottom of this tank comprises a chamber 2, such chamber being separated from the main portion of the tank by a perforated partition 3, made, preferably, of wood.

4 is a vertical shaft mounted in bearings carried by a suitable supporting-frame, said shaft being rotated by gears 5 of any suitable character. The shaft 4 carries on its end a suitable spider or frame, comprising in this instance the arms 6, which are arranged in any suitable disposition. Suspended from the frame 6 are the anodes 7, the preferred construction of which is shown in Fig. 2. With this preferred construction each anode comprises a pin 8, carried by the frame 6, between the two nuts 9 9, and having an outer covering 10 of a suitable conducting but non-decomposable material, preferably carbon. This carbon may be molded or otherwise secured to the pin 8. Owing to the porosity of the carbon it is preferably immersed in a suitable waterproof substance, such as melted paraffin, whereby all of its pores will be filled and the solution will be prevented from attacking the metallic core. The cathode com-

prises, preferably, a plate 11, of steel or other suitable metal, carried at the bottom of the chamber 2, as shown. The perforated partition 3 is covered with a canvas, blanket, or other filtering medium 12.

In order to prevent the centrifugal movement of the slush, I prefer to employ a series of dash-plates 13, carried by the interior walls of the tank 1, and to use also a series of pins 14, secured to the partition 3 and arranged in a plurality of concentric series, between which the anodes 7 are moved. The perforated partition 3 is carried in any suitable way—as, for instance, upon blocks 15 at the sides thereof. Plugged openings 16 and 17 are provided for the drawing off of the sludge and the clear solution carrying the metal in suspension. Water may be added through a cock 18, as shown. A source of electric supply 19 is used, the positive pole of which connects with the shaft 4 by a brush 20 and the negative pole of which connects with the cathode 11.

Assuming the reduction of a moderately-rich gold ore by a chlorinating process, the operation will be as follows: About two thousand pounds of the ore in a finely-reduced condition is mixed with about twelve hundred pounds of water to form a pulp or sludge, and from twenty to forty pounds of common salt are added thereto. This mixture is introduced in the tank, and the water slowly percolates through the filtering medium 12 to fill the leaching-chamber 2. The desired water-line in all instances in operation is below the top of the carbon surfaces of the anodes, as shown in dotted lines, whereby decomposition of the anode will be prevented. Power is applied to the gearing 5 to rotate the shaft 4, and the anodes engaging with the sludge keep it in constant agitation. The circuit being closed, the current passes from the anode through the sludge and solution to the cathode, and the electrolytic action results in the extraction of the gold in the well-known way. This operation is performed until a test of the pulp or sludge discloses no trace of gold. When this result is secured, the solution carrying the fine metallic particles is drawn off from the chamber through the plugged opening 17, and water is supplied through the cock 18 to maintain the water-level at approximately its former height, thereby carrying down any free metal above the partition. When a test of the solution drawn off through the plugged opening 17 discloses no trace of gold, that opening is closed and the opening 16 is opened, whereupon the sludge will be removed by the agitation of the anodes and is conveyed to the dump. The solution drawn off from the chamber is treated in any suitable way for the recovery of the gold or other metal.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. An apparatus for extracting metals from refractory ores comprising a tank for receiving a sludge of such ores, a stationary, horizontal, perforated partition in said tank, forming beneath it a chamber, a cathode on the bottom of the tank within said chamber, a filtering medium carried on the partition, a number of pins arranged in a series of concentric circles projecting upward from said partition, a main driving-shaft, a plurality of anodes carried by said shaft and working between the series of concentric pins, and a plurality of dash-plates carried by the side of the tank above the partition, substantially as and for the purposes set forth.

2. An apparatus for extracting metals from refractory ores comprising a tank for receiving a sludge of such ores, a stationary, horizontal, perforated partition in said tank, forming beneath it a chamber, a cathode on the bottom of the tank within said chamber, a filtering medium carried on the partition, a number of pins arranged in a series of concentric circles projecting upward from said partition, a main driving-shaft, a series of radial arms supported by said shaft, and a plurality of anodes carried by said arms and working between the series of concentric pins, substantially as set forth.

This specification signed and witnessed this 24th day of April, 1899.

WILLIAM WRIGHT.

Witnesses:
JNO. R. TAYLOR,
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