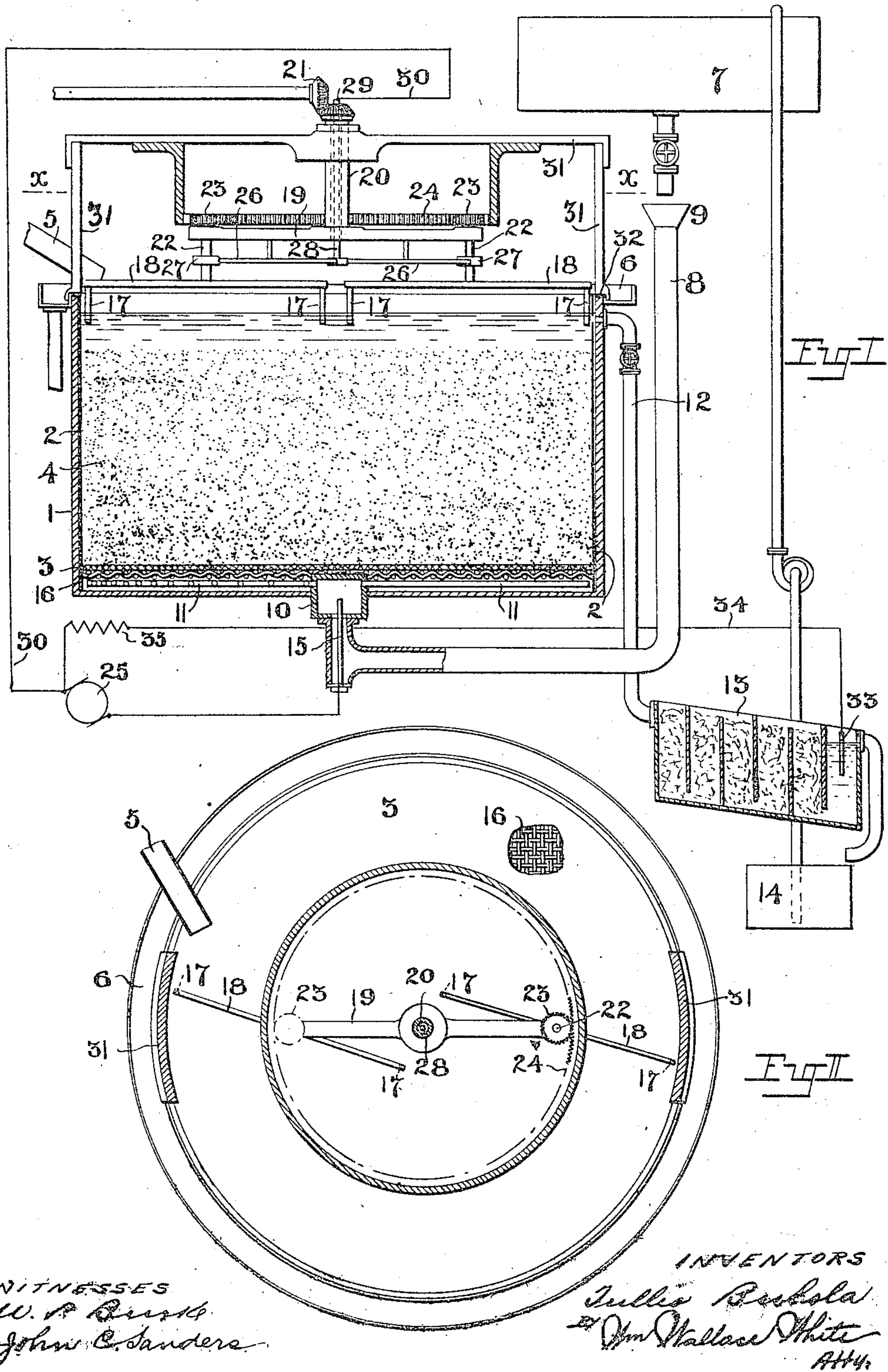


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 APPARATUS FOR ELECTROCHEMICAL TREATMENT OF ORES.
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Patented May 9, 1911.



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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, TULLIO BUBOLA, engineer, an Italian subject, residing at Le Champ D'Or (French) Gold Mining Company Limited, Luipaardsvlei, Transvaal, have invented new and useful Improvements in Apparatus for the Electrochemical Treatment of Ores, of which the following is a specification.

The present invention consists in certain improvements in apparatus for treating gold and other ores for the extraction of their metallic contents by means of an electric current-operating in conjunction with a chemical solvent such as cyanid.

A purpose of the invention is to provide apparatus of this kind of relatively simple construction which is adapted to treat unclassified mill pulp and is readily applicable to existing cyanid plants.

In the accompanying drawings: Figure I is a sectional elevation of apparatus constructed in accordance with this invention; and Fig. II is a partial plan view of Fig. I sectioned on the plane $x-x$.

1 represents a cylindrical vat coated internally with a layer 2 of cement or other non-conducting material.

3 is a filter floor upon which the charge of crushed ore 4 is carried.

5 is a launder for passing the ore to the vat, and 6 an overflow launder for excess water.

Provision is usually made for circulating the treatment liquid upwardly through the ore and through precipitation boxes. For this purpose, there is provided a storage tank 7 from which liquid is delivered to a pipe 8, the mouth 9 of which is raised above the tank. Said pipe 8 connects to a chamber 10 in the bottom of the tank, from which a number of perforated distribution pipes 11 radiate under the filter 3. Near to the top of the vat a draw-off pipe 12 conducts the liquid to the precipitation boxes 13, after passing which it flows to a sump 14, and is pumped back to tank 7.

Speaking conventionally, the current is passed through the ore in the same direction as the liquid; or in other words the anode is placed at the bottom of the vat and the cathodes at the top. The anode 15 is shown positioned in chamber 10. Beneath the filter 3 and supporting the same is a heavy metallic netting 16 which forms a sort of

supplementary anode for distributing the current over the ore. In fact the anode 15 may be omitted and the netting 16 connected directly to the circuit.

The cathodes, marked 17 and several in number, are arranged at the top of the vat to dip into surfaces of the liquid. They are carried upon the extremities of arms 18 having a planetary motion with respect to the axis of the vat. Such motion causes the cathodes in course of time to traverse the entire surface of the liquid and thus cause the current to penetrate every part of the body of ore and act upon every particle of metal therein. Such motion of the cathodes may be brought about by any of the well known mechanisms for this purpose. As illustrated, the arms 18 are rotatably mounted upon a spider 19 which is itself carried upon a shaft 20 disposed vertically in the axis of the vat, and driven by gearing 21. The spindles 22 of the arms 18 are provided with pinions 23 which mesh with a fixed circular rack 24. Thus, upon rotation of shaft 20, the arms 18 are carried around the vat, and also rotated upon their own axes at a rate of rotation considerably in excess of that of the first motion. These two components of their motion are preferably differentiated or made incommensurable to an extent to cause any given cathode seldom to traverse precisely the same path. In other words where an arm of the spider 19 returns to a given position after exactly completing a revolution, the angular position with regard to it of its attached arm 18 will be slightly different from that existing at the commencement of such revolution.

The return circuit from the cathodes to the source of current 25 is made by means of springs or brushes 26 suspended below the arms of the spider 19 and resting upon rings 27 upon the spindles 22. Said springs or brushes connect to a rod 28 passing up the center of shaft 20 and making rubbing contact at 29 with the return conductor 30. The whole of the cathode mechanism is carried in a frame 31 which may be supported by an insulating medium 32 upon the vat 1.

In order to assist precipitation upon the zinc in the boxes 13, a cathode 33 may be suspended in the discharge end of each box. A portion of the current thus passes through the liquid flowing off by pipe 12 and through the boxes 13, returning to the dynamo

through a conductor 34 in which a resistance 35 may be inserted to regulate the amount of the diverted current.

5 It will be understood that in order to obviate leakage of current, the precipitation boxes 13, the sump 14 and the tank 7 and their appurtenances will be insulated from the ground.

10 What I claim in apparatus for electrochemical treatment of ore is:

15 1. The combination of a vat for containing the ore and treating liquid, an electrode in the lower part of the vat, movable electrodes in the upper part of the vat, exposing collectively only a limited area toward the bottom of the vat and mechanism constructed to move said upper electrodes in circuitous paths traversing substantially the entire area of the vat.

20 2. The combination of a circular vat for containing the ore and treating liquid, an electrode in the lower part of the vat, arms disposed above the vat, mechanism for imparting to said arms a planetary motion about the axis of the vat and rod like electrodes depending from the extremities of said arms into the vat.

25 3. The combination of a vat for containing the ore and treating liquid, means for passing treating liquid into the lower part of the mass of ore and over substantially the whole area thereof, means for withdrawing liquid from above the ore, a fixed anode in the bottom of the vat and movable cathodes in the upper part of the vat.

4. The combination of a vat, a filter floor raised above the bottom of the vat, metallic netting incorporated with said filter floor, means for injecting treating liquid below the filter floor, means for withdrawing such liquid at the upper part of the vat, means for passing current into the vat whereby it is distributed by the metallic netting, and a plurality of moving cathodes in the upper part of the vat.

45 5. The combination of a vat for containing the ore and treating liquid, means for circulating liquid through the ore and thence through precipitation apparatus, means for passing current through the ore and liquid in the vat and means for diverting a portion of said current through the liquid passing through the precipitation apparatus.

6. The combination of a vat for containing the ore and treating liquid, means for passing liquid into the lower part of the vat, a precipitation box, means for withdrawing liquid from the upper part of the vat and passing it through said precipitation box, an anode in the lower part of the vat, cathodes in the upper part of the vat and a cathode at the discharge end of the precipitation box.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TULLIO BUBOLA

Witnesses:

ALFRED L. SPOOR,
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