

No. 640,717.

Patented Jan. 2, 1900.

C. P. TATRO & G. DELIUS.
ELECTROLYTIC APPARATUS FOR EXTRACTING PRECIOUS METALS.

(Application filed Mar. 27, 1899.)

(No Model.)

Fig. 2

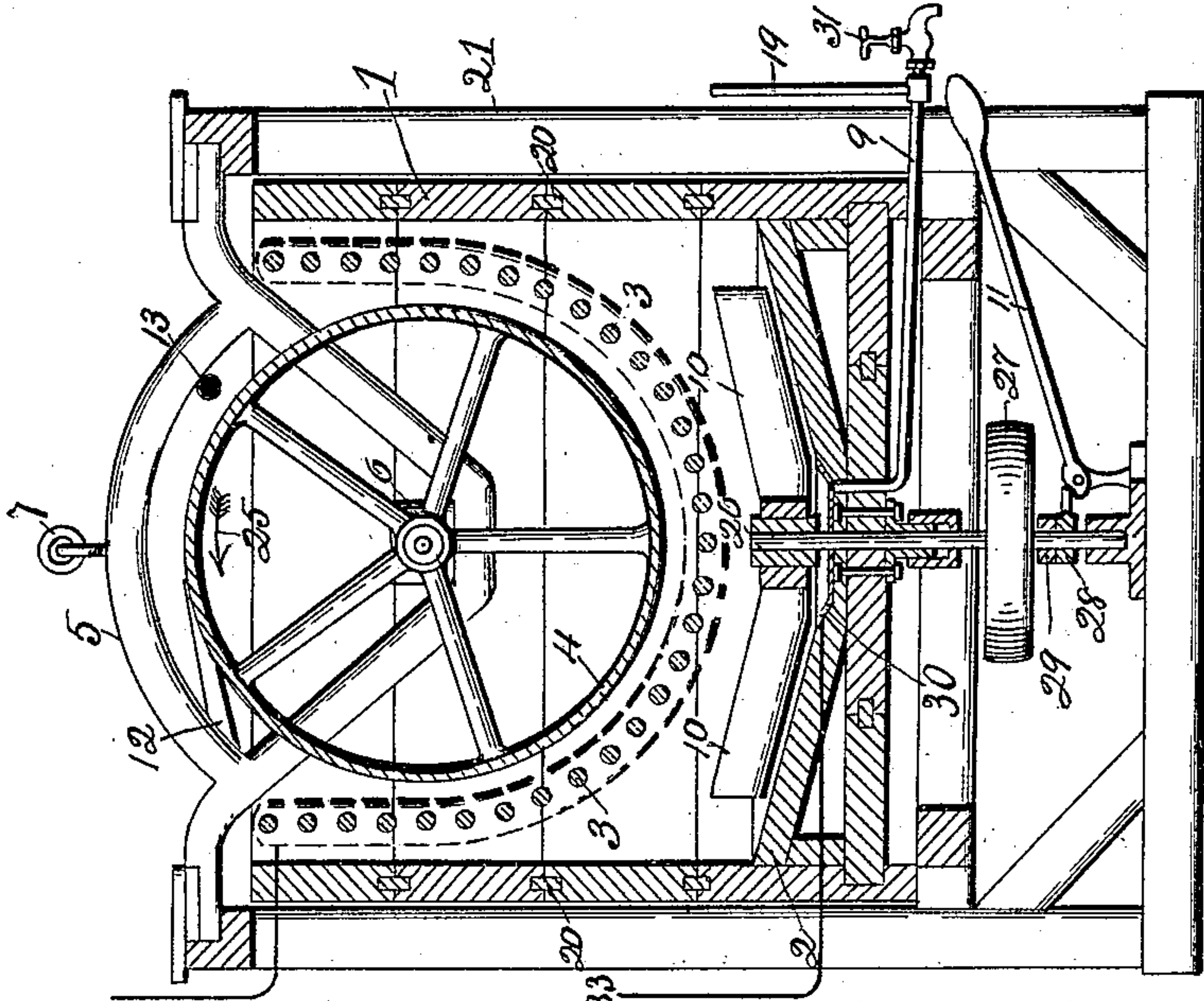
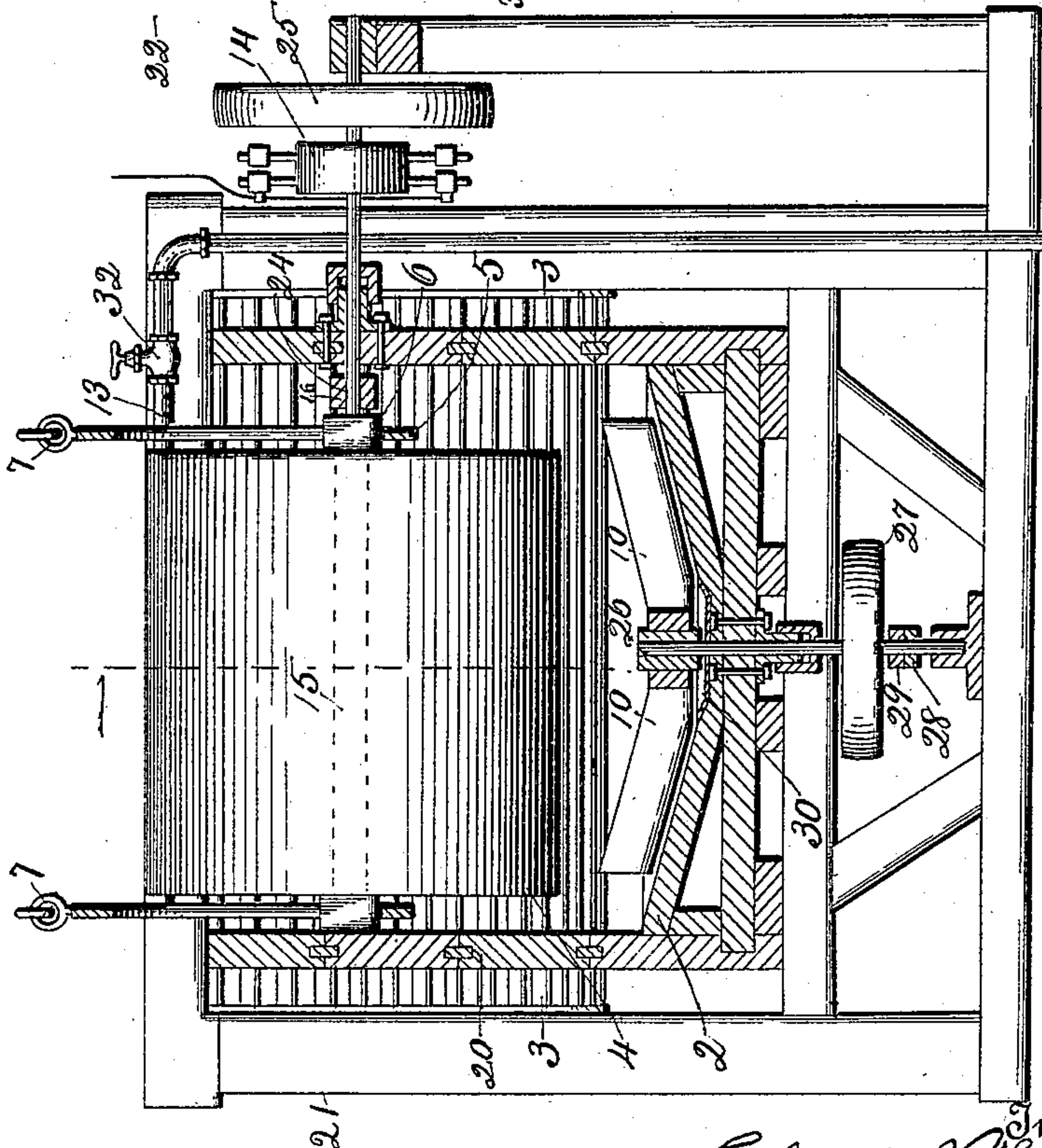


Fig. 1.



Witnesses
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UNITED STATES PATENT OFFICE.

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ELECTROLYTIC APPARATUS FOR EXTRACTING PRECIOUS METALS.

SPECIFICATION forming part of Letters Patent No. 640,717, dated January 2, 1900.

Application filed March 27, 1899. Serial No. 710,598. (No model.)

To all whom it may concern:

Be it known that we, CHARLES P. TATRO and GEORGE DELIUS, citizens of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Improvement in Electrolytic Apparatus for Extracting Precious Metals; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings.

This invention relates to mechanism for separating the precious metals—gold and silver—from the ore; and its object is to render these separation complete, economical, continuous, and to a large extent mechanical.

To this end our invention consists in electrolytic apparatus for extracting precious metals hereinafter more fully described, and particularly pointed out in the claims.

In the drawings, Figure I represents in longitudinal vertical section electrolytic apparatus for extracting metals from ores according to our invention, and Fig. II is a central transverse vertical section of the same.

1 represents a tub to hold the bath and pulp that are to be operated upon. The tub is of wood, having tongue-and-groove joints 20 for tightness and stiffness and supported in a frame 21. The floor 2 is slanted at all sides toward the center to direct the settlings to that locality.

3 represents a series of rods extending longitudinally through the tub and located around a drum 4. These rods are of carbon or any material suitable for an anode, for which purpose they are connected, as by the wire 22, with a generator of electricity. The drum 4 is of metal, such as copper or iron, with a perfectly cylindrical surface and journaled in bearings 6 in bails 5, which rest on the frame 21, each having an eye 7, to which a hook may be attached for lifting the drum out of the tub. The shaft 15 of the drum is parted at 24 and provided with a coupling 16, which may be slid longitudinally to disconnect the parts of the shaft to permit the removal of the drum.

25 is a pulley for revolving the shaft 15 and with it the drum 4. The drum is connected, through its shaft 15 and a wire 14, with the generator.

12 represents a scraping-blade stationarily fixed with its edge tangent to the surface of the drum, which revolves in the direction of the arrow 25.

10 represents an agitator in the form of a paddle-wheel mounted on a vertical shaft 26, that extends down through the bottom of the tub, to be revolved by a pulley 27. The blades of the agitator are vertical; but each blade rises from the shaft outward about parallel with the slant of the floor of the tub, so that revolving the agitator forms rising currents in the bath against the revolving drum, with the object of preventing settling of the gold away from the drum as much as possible, and the down-current is at the center, where there is least agitation.

28 is a collar loose upon the shaft 26, but bearing upward against a shoulder or fixed collar 29 on the shaft and actuated by a lever 11 to raise and lower the shaft and therewith the agitator 10.

30 represents a pan surrounding the shaft in the bottom of the tub to contain mercury or some amalgam which, coming directly in contact with the shaft, serves as a packing to prevent leakage at its joint with the tub; but that is a secondary consideration. The mercury or amalgam is located in this pan chiefly to gather the precious metals that settle from the central down-current, and the pan is connected with the electric generator by a wire 33, so that the mercury or amalgam in the pan serves as a secondary cathode.

9 is a discharge-pipe for the pan 30, having a standing portion 19 in which the condition of the mercury may be observed. This stand-pipe rises above the level of the pan 30 enough to hold the mercury at a height that will over-balance the higher but lighter bath, and 31 is a cock through which the amalgam may be discharged. While electrolysis deposits metal upon the surface of the mercury, the amalgamation of that metal with the mercury proceeds continually by the shaking of the machine until the mercury becomes loaded and sluggish or "sick," technically, which can readily be seen by its movement up and down in the stand-pipe. Then it should be drawn off and replaced by fresh mercury. A water-pipe 13 is located above the drum and perfo-

rated to send thereon a shower, whose force may be regulated by a cock 32, to wash all loose matter from the drum back into the bath.

The operation is as follows: Gold and silver bearing ore pulverized to pulp, mixed in a bath with suitable solvents, is to be placed in the tub, a current of electricity turned on, mercury or some amalgam placed in the pan 30, and the drum and agitator set to revolving. The usual electrolytic action being set up, the precious metals are gradually deposited upon the drum, and as that revolves the deposit meets the blade 12 and is thereby mechanically scraped off from the drum. As the surface of the drum is left clean by the scraper, its next revolution through the bath offers new attraction to the polarized metal, and this process may be continued indefinitely or until the bath requires replenishing with pulp; but as the bath gradually weakens the operation would become unprofitable before all the gold and silver were extracted were it not for the amalgam, which exerts a double attraction for the precious metals by its amalgamating affinity and the electrolytic action. This being located in the eddy at the bottom gathers the heavy particles that have refused to rise to the drum, thus saving economically what might otherwise have gone into the tailings. By means of the cock 31 the amalgam may be drawn off when it begins to appear sick—that is, too thick to continue running well—and the precious metals may be separated therefrom in any usual manner. By means of the lever 11 the agitator may be held high at first, when the pulp is thick in the bottom of the tank. Then as the operation gradually disturbs and raises the pulp into circulation the agitator may be lowered until it clears the heavy matter entirely away from the bottom. Mechanically separating the deposit from the drum, whereby the process may be rendered continuous and the cathode is preserved for an indefinite term of service, the form of the tub-bottom and of the agitator-blades, and the location of an amalgam cathode in a settling-eddy at the lowest level in the tub render this apparatus effective

and economical. The composition of the bath and of the amalgam and the method of separating precious metals illustrated in this apparatus being the subject of an application for a patent of even date herewith, Serial No. 710,599, on a process of extracting precious metals, the ingredients are not herein named nor the steps of the process claimed.

Having thus fully described our invention, what we believe to be new, and desire to secure by Letters Patent, is the following:

1. In electrolytic apparatus for extracting precious metals, a bath-tub having in it a series of rods as an anode; a drum journaled to revolve partially immersed in the tub and connected as a cathode, the said rods being parallel with the drum; a scraper located tangent to the surface of the drum, and an agitator upon a vertical shaft and having upward-slanting arms located to revolve below the said anode-rods, substantially as described.

2. In electrolytic apparatus for extracting precious metals, a bath-tub having a bottom slanting downwardly toward its center; an agitator mounted on a vertical shaft in the center of the tub and having vertical, upward-slanting radial blades; a lever located beneath the tub and having free connection with the said vertical shaft for raising and lowering the agitator; a drum journaled in bails which are suspended in the tub; a scraper for the drum; a perforated water-pipe located above the drum; rods of carbon or electrically similar material located in the tub, around the drum; a pan containing mercury or amalgam located in the bottom of the tub around the agitator-shaft and an outlet-pipe for the pan, having a stand-pipe portion and a stop-cock; and electrical connections for a generator with the carbon anodes and the drum and mercury or amalgam cathodes.

In testimony whereof we affix our signatures in presence of two witnesses.

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Witnesses:

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