

No. 633,544.

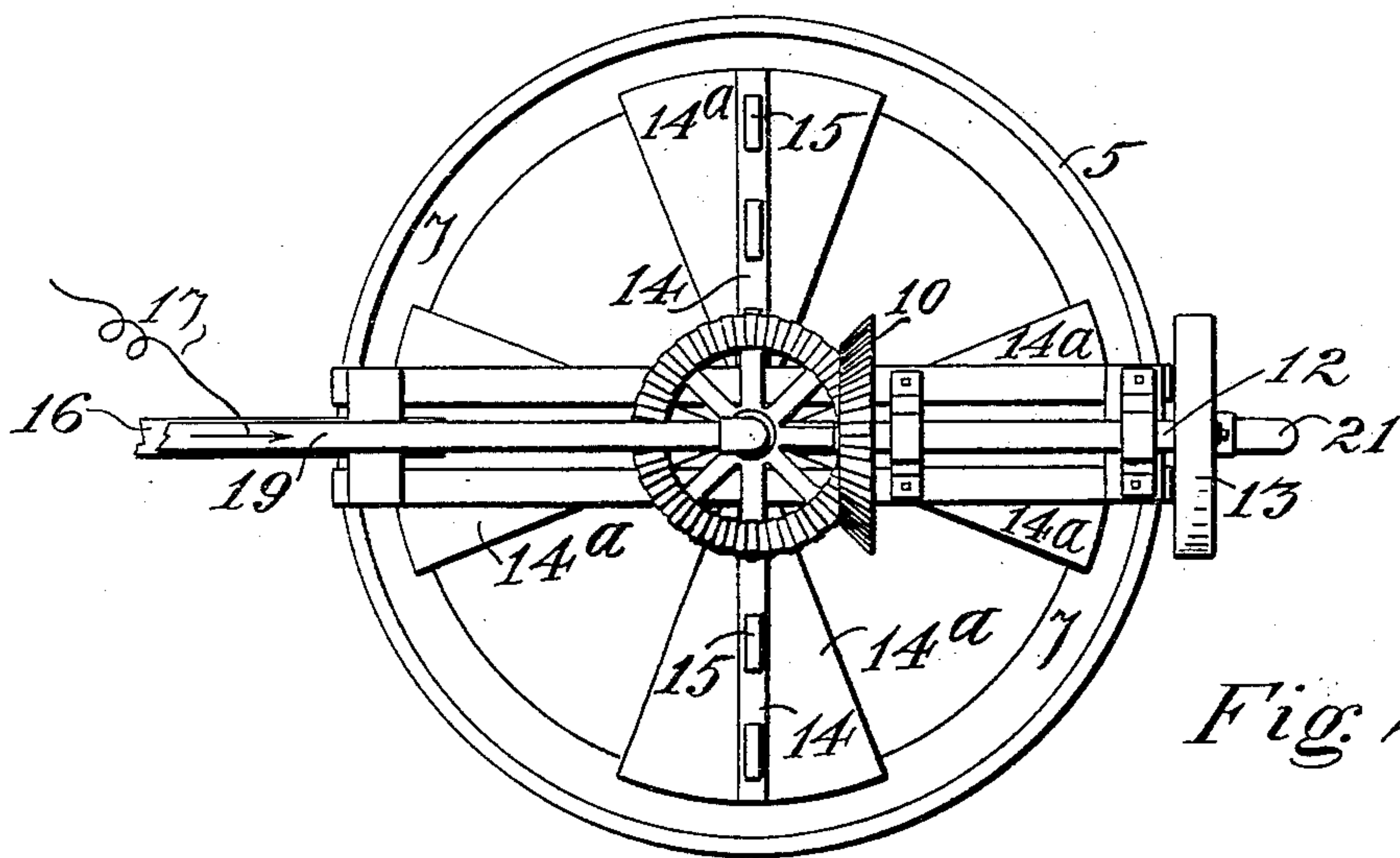
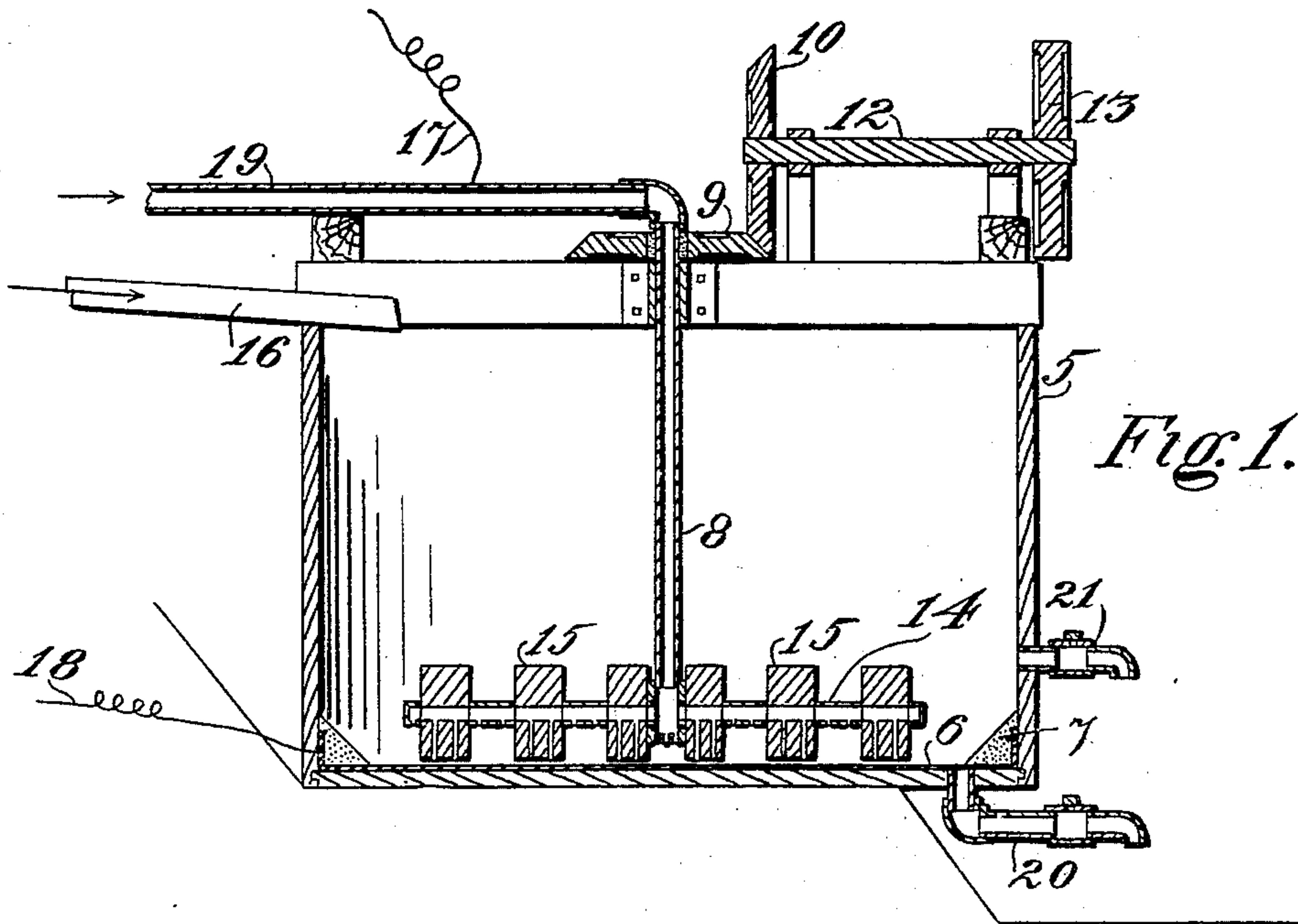
Patented Sept. 19, 1899.

H. S. BADGER.

ELECTROLYTIC APPARATUS FOR PRECIPITATING METALS.

(Application filed Feb. 17, 1899.)

(No Model.)



Witnesses
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By *[Signature]*
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UNITED STATES PATENT OFFICE.

HARRY S. BADGER, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO
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ELECTROLYTIC APPARATUS FOR PRECIPITATING METALS.

SPECIFICATION forming part of Letters Patent No. 633,544, dated September 19, 1899.

Application filed February 17, 1899. Serial No. 705,928. (No model.)

To all whom it may concern:

Be it known that I, HARRY S. BADGER, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Electrolytic Apparatus for the Precipitation of Metals; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in agitating-tanks in which the metals are precipitated by electrolysis upon a copper plate placed in the bottom of the tank and coated with mercury.

The improvement is specially applicable to tanks in which a solution of cyanid of potassium is employed to dissolve the metals which are precipitated upon the mercury-coated plate through the agency of the electric current. In these tanks as ordinarily constructed the agitation is not sufficiently thorough to prevent the gangue from settling upon the copper plate and materially retarding the deposition of the precious metals thereon. My object is to overcome this difficulty, and I accomplish it by delivering air or other suitable vapor in jets or currents upon the copper plate in the bottom of the tank. The direct action of the air or other vapor upon the plate, together with the agitation resulting from the upward passage of the air through the pulp, accomplishes the function heretofore stated.

My improved agitating-tank will now be described in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a vertical section taken through my improved tank. Fig. 2 is a top or plan view of the same.

Similar reference characters indicating corresponding parts in these views, let the numeral 5 designate the body of the tank, in the bottom of which is located a copper plate 6, covered with mercury. To prevent the escape of mercury from the tank, a quantity

of cement is placed in the corner formed by the bottom and the vertical wall of the tank. In the center of the tank is hung a revoluble hollow vertical shaft 8, to whose upper extremity is made fast a bevel gear-wheel 9, meshing with another similar gear 10, fast on a shaft 12. Journaled in suitable bearings attached to the top of the tank is a shaft 12, to which is made fast a pulley 13, which may be connected with any suitable motor. To the lower extremity of the hollow shaft 8 are attached hollow arms 14, whose open inner extremities communicate with the opening in the hollow shaft 8. These arms are provided with horizontal fan-shaped agitating-wings 14^a. The parts 14 and 14^a are preferably composed of iron. The outer extremities of these arms are closed, but they are provided with perforations formed in their lower sides through which the air issues, as hereinafter explained. Attached to these arms 14 are pins or vertical blocks 15, preferably composed of wood, which are passed through the arms and perforated from the arms downwardly to permit the escape of air where these pins are located, as well as between the pins. These pins project nearly to the copper plate 6, and it is desirable to deliver the air jets or currents as closely as possible to the copper plate.

In using the tank the ore, in a properly-pulverized state, is discharged by way of a chute 16 into the tank, which contains a solution of cyanid of potassium and such other reagents as may be found necessary or advantageous to facilitate the dissolving of the precious metals. These dissolved metals are precipitated by the electric current, which is passed through the solution by means of conductors 17 and 18, the one being connected with a pipe 19 and the other with the copper plate 6. The pipe 19 is connected with the hollow shaft 8 in such a manner that the shaft is allowed to rotate freely while the pipe remains stationary. The pipe, as well as the shaft 8 and the arms 14, is composed of metal and forms a conductor for the electric current which must pass through the pulp formed of the pulverized ore and the cyanid solution in order to reach the copper plate and complete the circuit by way of the conductor 18.

Hence the metals in the pulp are deposited on the amalgamated copper plate by electrolysis. The air for keeping this plate free from gangue is introduced through the pipe 5 19 and passes thence through the hollow shaft 8 to the arms 14, and thence in the form of a series of currents through the perforations in the arms 14 to the copper plate, subsequently rising through the pulp and aiding materially 10 in keeping the gangue in a state of suspension and the copper plate and mercury free for the deposition of the precious metals.

Experience has demonstrated that the ordinary mechanical agitating devices are not 15 sufficient to keep the plate 6 free from gangue and in proper condition for the metallic deposition which the process of electrolysis is designed to produce. Hence the plate in the absence of the air jets or currents becomes 20 clogged with gangue, which prevents to a large extent the saving of the metallic values, which are therefore lost with the tailings. The introduction of the air, however, as heretofore described, changes these conditions 25 and keeps the plate free from gangue and the mercury in an active condition for saving the deposited metallic values. The deposited values in the form of amalgam are drawn off from the tank by way of an outlet-pipe 20, 30 provided with a suitable cut-off valve. The gangue is drawn off through an outlet 21, also provided with a suitable valve or cut-off.

Having thus described my invention, what I claim is—

1. A precipitating-tank of the class described comprising the tank-body having a mercury-coated surface in its bottom, a revoluble hollow shaft suspended in the tank and provided with hollow arms having perforations on their lower sides to deliver air or vapor in proximity to the said surface, means 40 for rotating the revoluble devices, means for introducing air or vapor to the hollow shaft and its connections, and an electric circuit in which the hollow shaft, agitating-arms and 45 mercury-coated surface are located.

2. A precipitating-tank comprising the tank-body having a mercury-coated surface in its bottom, a revoluble shaft suspended in the tank and provided with hollow arms having perforations on their lower sides to deliver 50 air or vapor in proximity to the said surface, means for rotating the revoluble devices, means for introducing air or vapor to the hollow arms, and an electric circuit in which the 55 shaft, agitating-arms and mercury-coated surface are located.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY S. BADGER.

Witnesses:

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