

No. 706,436.

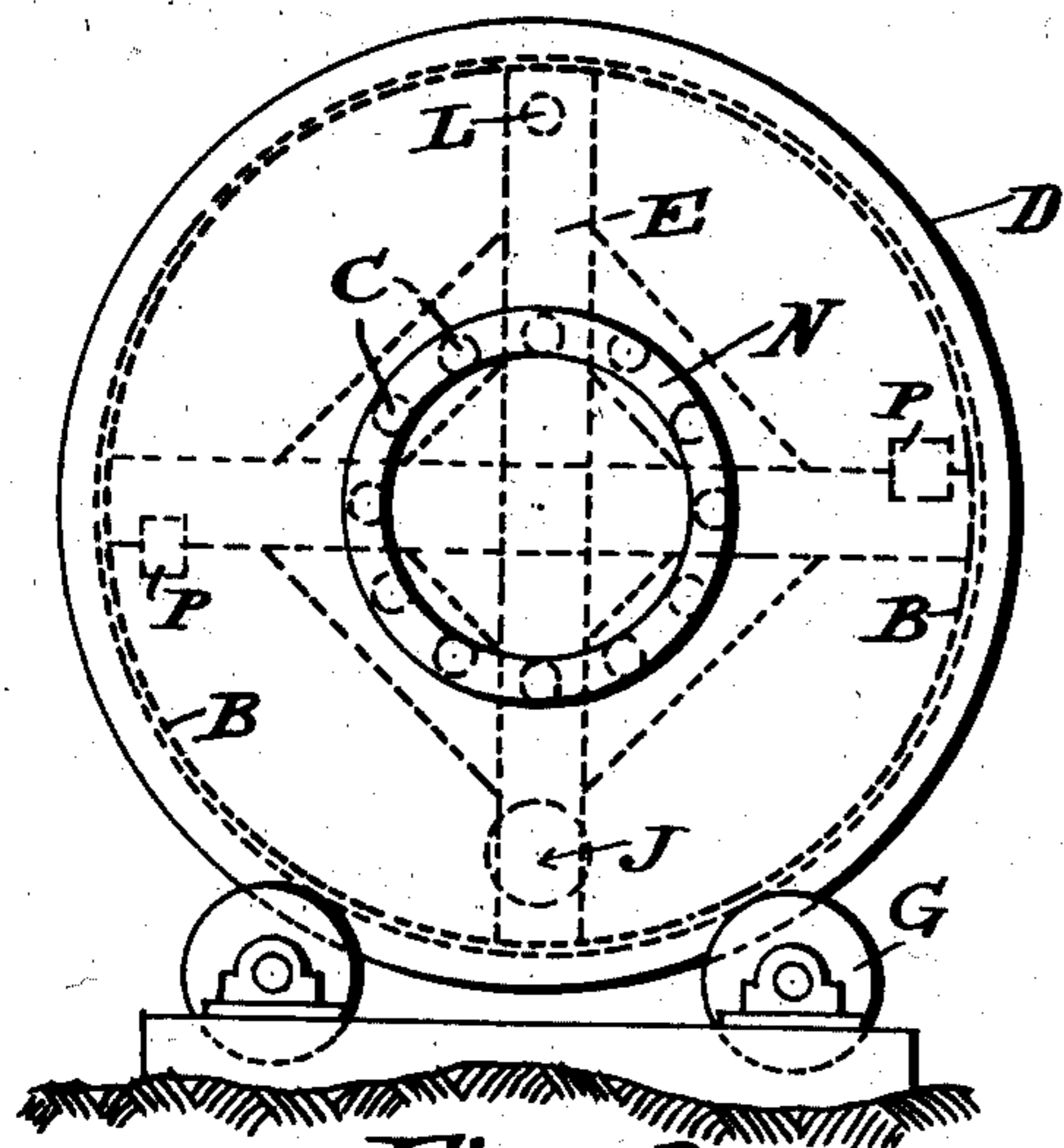
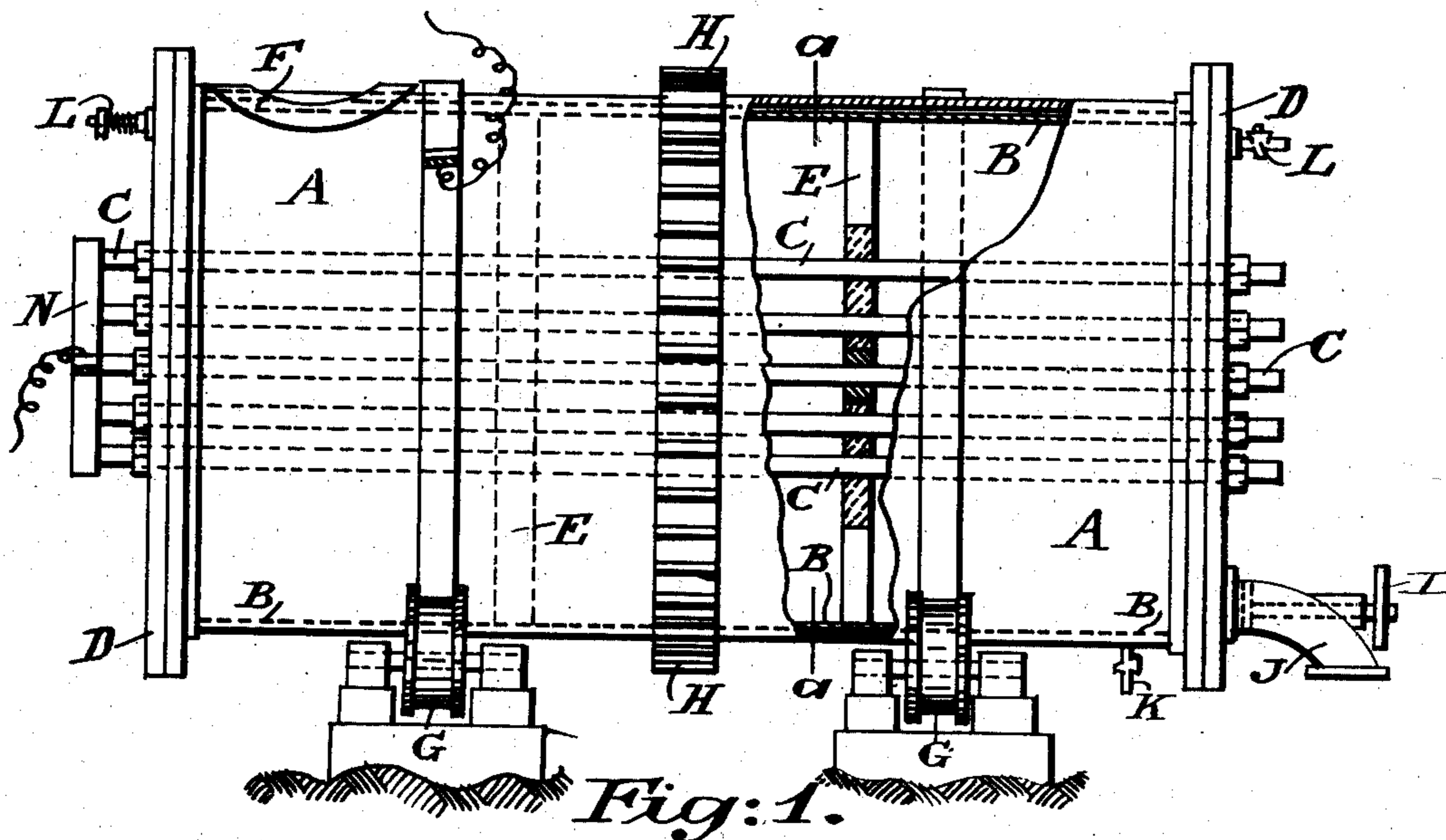
Patented Aug. 5, 1902.

F. T. MUMFORD.

APPARATUS FOR THE ELECTROLYTICAL TREATMENT OF ORES OR SLIMES.

(Application filed Sept. 30, 1901.)

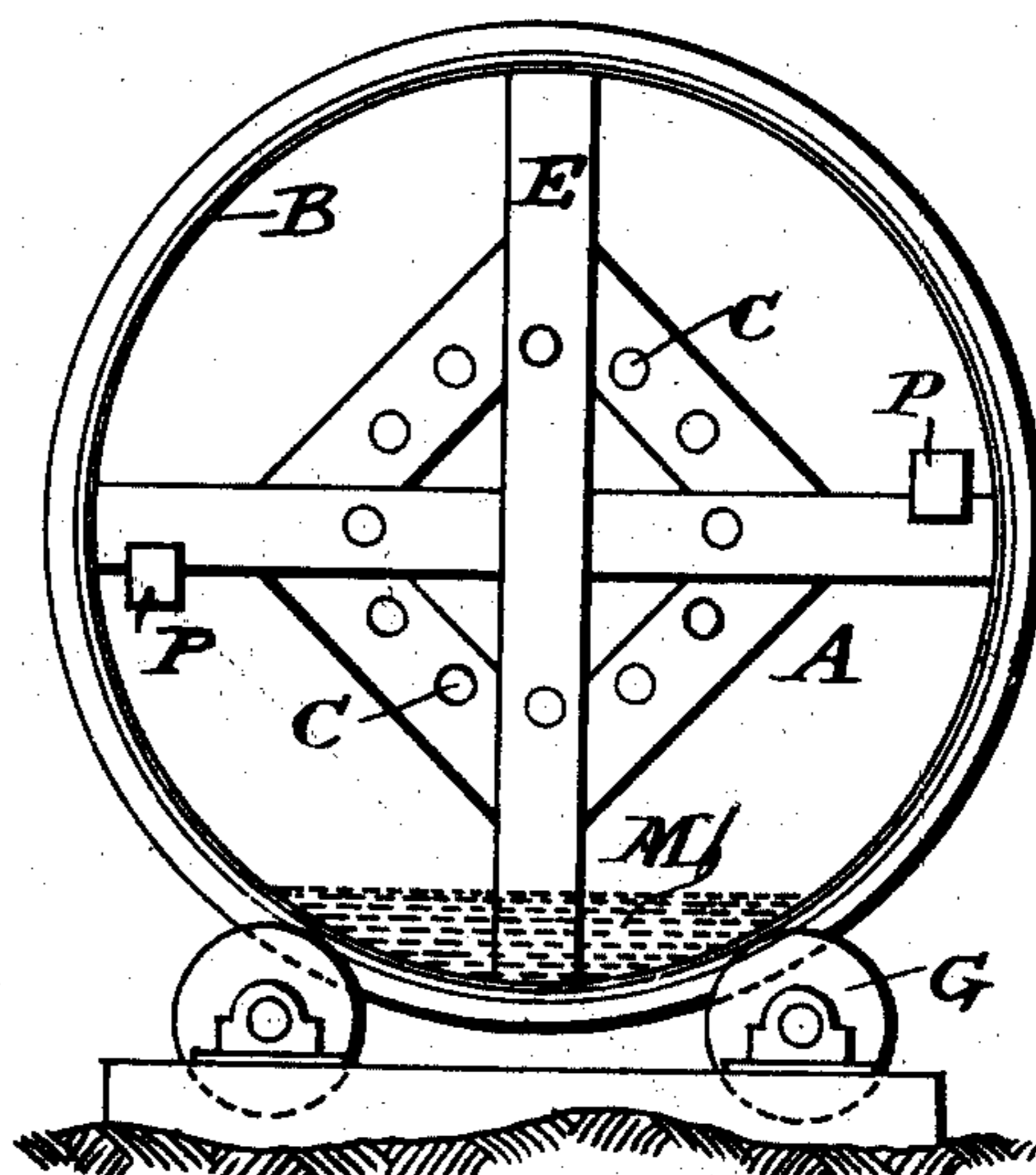
(No Model.)



Witnesses

Attest

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE ELECTROLYTICAL TREATMENT OF ORES OR SLIMES.

SPECIFICATION forming part of Letters Patent No. 706,436, dated August 5, 1902.

Application filed September 30, 1901. Serial No. 77,077. (No model.)

To all whom it may concern:

Be it known that I, FRANK TOWNSEND MUMFORD, metallurgist, of Kalgoorlie, Western Australia, Australia, have invented certain
5 new and useful Improvements in Apparatus for the Electrolytical Treatment of Ores or Slimes for the Recovery of Precious Metals Therefrom; and I do hereby declare the following to be a full, clear, and exact description
10 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 letters of reference marked thereon, which form a
15 part of this specification.

This invention relates to an apparatus for the treatment by electrolysis of ores and slimes for the extraction of precious metals, particularly gold, therefrom, whereby the solution
20 of the precious metals from the ore and its deposition are effected by the aid of mercury in an easily-recoverable condition.

The apparatus is applicable for the treatment of any auriferous ore, but is especially
25 valuable in the case of a slimy and clay-like ore or an ore which requires very fine crushing.

In order to obtain a rapid and complete precipitation of the gold from a mercury cathode,
30 it is necessary that the surface of the mercury should be frequently renewed. By my invention I secure this essential result by passing the cathode (which is composed of amalgamated copper plate or any other suitable
35 metal) through or submerging it in a bath of mercury, as afterward described, and I thereby obtain an automatically and continuously renewed clean surface to act upon the precious metals, so resulting in a high or
40 maximum degree of amalgamation.

The electrolyte may be a solution of cyanid of potassium or sodium, chlorid or bromid of sodium, or other suitable salt either jointly
or separately.

45 The construction of the apparatus for effecting the process is shown in the accompanying drawings; but such construction is not arbitrary, as it may be altered in detail without departing from the vital features of
50 this invention.

In the drawings, Figure 1 is a side view of

the apparatus. Fig. 2 is an end view of same, and Fig. 3 is a transverse section on line *a a* of Fig. 1.

For the purpose of my invention I employ
55 a cylinder A, made, preferably, of steel and lined on the inside with sheet-copper B and which may be electroplated for amalgamation purposes. The said lining is amalgamated, and mercury is then poured into the cylinder,
60 thereby forming a continuous bath at the bottom of same. The bars C, which constitute the anodes, are of carbon or iron and may be of any section running the length of the cylinder and are supported by the ends D, as
65 shown, and also at desired positions of their length, as by means of the frame E, and such connections and anodes are suitably isolated from the cylinder. The cylinder is provided with a manhole F and is mounted on rollers
70 G and rotated by means of the spur-wheel H and suitable gearing in the ordinary manner. The cylinder is provided with a valve I, closing a port J for filling and discharging purposes, and also with a plug-valve K for drawing
75 off the mercury and with an air-escape cock, as L. The body of mercury is shown in Fig. 3 by the letter M.

To work the apparatus, the cylinder is charged through the port J with crushed ore
80 and electrolyte and is then revolved slowly. The current is conveyed to the anode-bars C, which are connected outside the cylinder by a copper ring N, to which the current is conveyed by brushes or such like means. The
85 electric current then passes through the pulp containing the crushed ore, and the electrolyte, to which may be added a salt capable under electrolysis of yielding oxygen or an oxidizing agent to accelerate the solution of
90 the gold or other precious metal, or a salt may be added to lessen the resistance of the electrolyte or to keep the mercury at its maximum condition of efficiency. The pulp is kept in agitation by the revolving of the cyl-
95 inder, the anodes acting as agitators to break the pulp. If required, bars P, of wood or suitable material, may be placed from end to end of the cylinder, so as to act as vanes for additional agitation. The anion generated at the
100 anode may dissolve the gold or other metal or it may be in a state of solution previously

to entering the cylinder, in any of which cases it is deposited on the amalgamated lining of the cylinder, which is kept bright and in an efficient condition by being continuously submerged or passed under the mercury-bath lying at the bottom of the cylinder. Any coarse particles of gold would be immediately amalgamated by contact. An alkaline amalgam may also be formed which greatly facilitates amalgamation.

The feed and discharge valve is placed in the cylinder end at a short distance from the copper lining of the cylinder, so as to allow mercury to remain at the bottom while the slimes are being discharged. When filling, the position is reversed, so that the port J would be at the top of the cylinder.

The pulp may be emptied into a settler, so as to settle and recover any mercury which it may contain.

The mercury is drawn off through the cock K, and which mercury may be squeezed and the amalgam then retorted.

The amalgamated lining can also be scraped for amalgam, entrance to the cylinder being obtained through the manhole F.

The same apparatus as described may be made with a circular hole at the center of both cylinder ends, one hole being larger than the other. The pulp containing the ore and the electrolyte may then be led in at the smaller hole and allowed to flow through the cylinder and out at the other end, the cylinder being revolved all the time. Several cylinders of suitable size may be used in this way, the pulp passing from one to the next in succession or by any other suitable arrangement, so as to obtain a continuous flow

through the cylinders. For example, a solution of cyanid of potassium containing soluble gold from percolation-vats might be passed through the cylinder in a continuous stream, in which case the gold would be deposited on the mercury cathode, as described previously.

Having thus described my said invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. An apparatus for the extraction of metals from their ores and slimes, comprising a metallic drum, a copper lining therein, means to maintain said lining continually amalgamated, a trailing electrical contact for the drum, a plurality of conductive bars passing longitudinally through the drum and insulated therefrom, and means to rotate said drum, substantially as described.

2. An apparatus for the extraction of metals from their ores and slimes, comprising a rotatable cylindrical metallic drum, a copper lining therein, a body of mercury in the drum to maintain the lining amalgamated, a valve-controlled inlet and outlet, and a relief-valve at one end, a plurality of conductive rods insulated from and passing longitudinally through the drum, a metallic ring connecting the bars, trailing electrical contact for the drum and one for said ring, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FRANK TOWNSEND MUMFORD.

Witnesses:

W. BAIRD,

HENRY A. JUDD.