

No. 640,718.

Patented Jan. 2, 1900.

C. P. TATRO & G. DELIUS.  
PROCESS OF EXTRACTING PRECIOUS METALS.

(Application filed Mar. 27, 1899.)

(No Model.)

Fig. I.

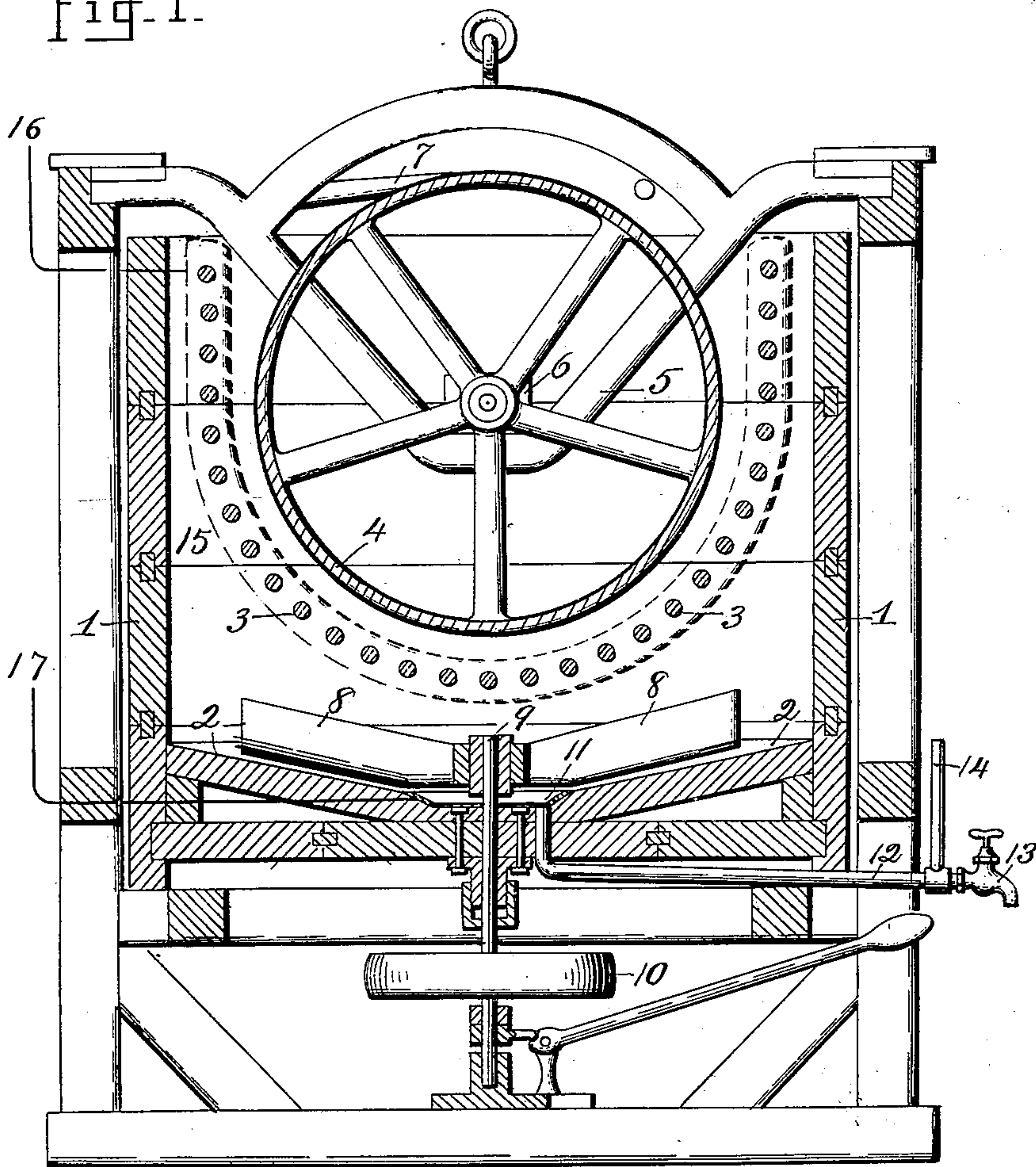
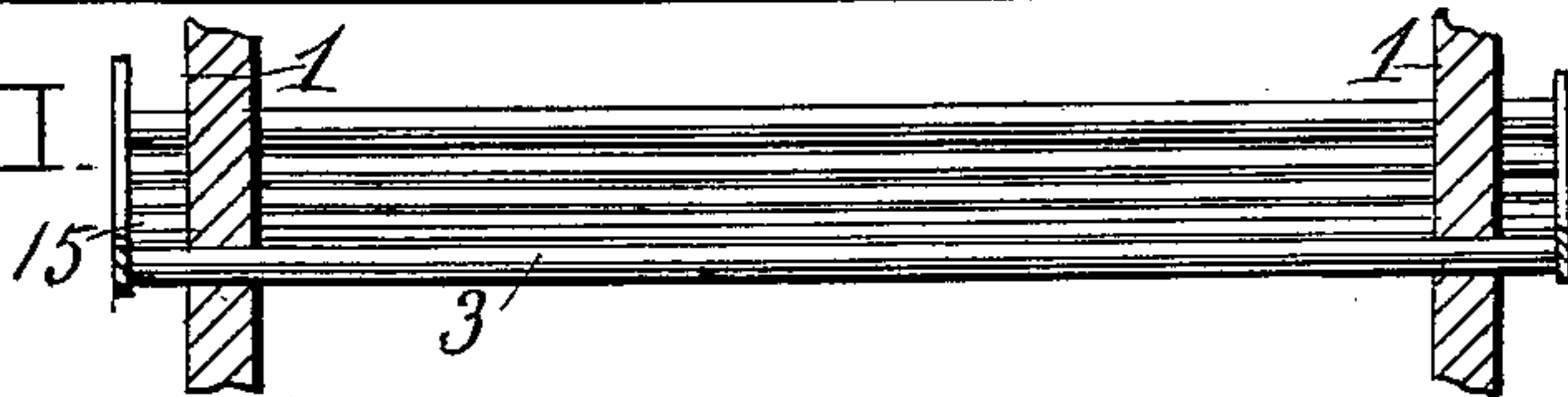


Fig. II.



Witnesses  
*Joseph Blackwood*  
*W. H. Stephens*

Inventors  
*Charles P. Tatro*  
*George Delius*  
by *W. H. Stephens* Attorney



# UNITED STATES PATENT OFFICE.

CHARLES P. TATRO AND GEORGE DELIUS, OF SEATTLE, WASHINGTON,  
ASSIGNORS TO HARRY S. SHARPE, OF SAME PLACE.

## PROCESS OF EXTRACTING PRECIOUS METALS.

SPECIFICATION forming part of Letters Patent No. 640,718, dated January 2, 1900.

Application filed March 27, 1899. Serial No. 710,599. (No specimens.)

*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 Processes of 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 methods or processes for separating precious metals from ores; and its object is to save the largest possible percentage of the precious metals contained in the ore by means involving the least expense.

To this end our invention consists in the combination of certain electrolytical and mechanical steps in the process hereinafter more fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure I illustrates a mechanical device in transverse vertical section, and Fig. II is a fragmental longitudinal section showing anode-rods and their connecting-yokes invented by us for executing the process herein claimed, the said machine being the subject of another application for Letters Patent, Serial No. 710,598, of even date herewith.

In conducting this process the first step is to pulverize the ore in any usual manner to a pulp of suitable fineness, which we think to be such as will readily pass through a screen which is technically termed "eighty-mesh."

Second, to dissolve from the foreign matter the metals in the pulp. This we do by immersing the pulp in a bath comprising an aqueous solution of common salt and such chemical reagents as will unite with the baser metals and precipitate them, leaving in solution in the bath the precious metals only. For example, we use caustic lime with nearly all the ores to precipitate iron, which is almost universal, yet undesirable, in the electrolyte. In treating some ores we may first use in the bath an acid that will dissolve the particular metal that is undesirable in the electrolyte and then precipitate such metal by means of a suitable alkali. A small percentage of bro-

min is added under certain conditions to aid in the solution of gold.

Third, to separate the precious metals from foreign matter. This we do by means of the combined action of electrolysis upon a mechanical cathode and a cathode of amalgam.

Fourth, to mechanically and continuously remove the precious metals from the mechanical cathode.

The device illustrated for accomplishing this is a wooden tub 1, having a centrally-depressed floor 2 and provided with a series of fixed carbon rods 3, which are connected with one pole of a battery to form the anode. The rod-supporting frame 15 and the wire 16 show a means for making such connections.

4 is a metallic cylinder journaled to be revolved in bearings 6 in yokes 5 within the tub. This cylinder is connected with the other pole of the battery and forms a cathode upon which a large portion of the precious metal in the bath is to be deposited.

7 is a scraper located with its edge bearing tangentially against the surface of the drum.

8 is an agitator in the form of a paddle-wheel, mounted on a vertical shaft 9, that passes down through the bottom of the tub to be rotated by a driven wheel 10.

11 is a pan surrounding the shaft 9 and connected with the cathode side of the battery by a wire 17 to hold amalgam.

12 is an outlet-pipe to the pan 11 and provided with a stand-pipe 14 and turn-cock 13. The condition of the amalgam may be examined in the stand-pipe, and the amalgam may be drawn off by the cock 13 when desirable.

In operation pulp containing gold or silver, or both, is to be placed in the tub and the agitator and the drum set to revolving, when electrolytic action will immediately begin depositing the precious metals upon the cylinder or drum, and as the drum revolves the metals will be removed by the scraper 7 mechanically, thus rendering the process of recovering the precious metals continuous and complete without requiring this cathode to be melted down or otherwise destroyed, as is done in some processes. The composition of the bath is intended to dissolve the metal from the various refractory gold or silver



bearing ores—such as tellurids, sulfids, &c., of iron, copper, zinc, and antimony; but no amount of agitation of the bath will bring all of the free gold in contact with the drum.

5 Therefore we have located a secondary cathode, consisting of sodium amalgam, in the pan 11 at the lowest portion of the tub and in the eddy of the agitator, where the gold is most likely to settle. Sodium is continually  
10 deposited by the current upon the mercury and serves to keep the latter bright and in condition to adhere to and amalgamate with the gold when in circuit with an electric battery. The gold gathered by the amalgam  
15 may be drawn off therewith and separated therefrom by any usual means. Though reducing the ore to a pulp is a necessary step in this process, we do not describe nor claim any special method of reduction; but

20 What we believe to be new, and desire to secure by Letters Patent, is the following:

1. In separating precious metals from ores, the process comprising the following steps: first, reducing the ore to a fine pulp; second,  
25 dissolving the metals from the foreign matter by immersing and agitating the pulp in a bath comprising an aqueous solution of common salt, a small percentage of bromin, caustic lime and other reagents for precipi-

tating undesirable metals from the electro- 30 lyte; third, gathering a portion of the precious metals from the bath by revolving a cathode-drum partially immersed in the bath while the latter is in contact with an anode, and at the same time scraping the metallic 35 deposit from the drum; also simultaneously depositing other portions of the precious metals in the same bath upon a cathode of sodium amalgam, an electric current passing through the said anode, cathodes and bath during this 40 third step of the operation.

2. In the process of separating precious metals from ores, the steps comprising electrolytically depositing a portion of the precious metals in the bath upon a drum cathode 45 revolving partially immersed in the bath, at the same time scraping the said deposit from the drum, also simultaneously depositing other portions of similar precious metals in the same bath upon a cathode of sodium amalgam. 50

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

CHARLES P. TATRO.  
GEORGE DELIUS.

Witnesses:

JOSIAH COLLINS,  
LIVINGSTON B. STEDMAN.