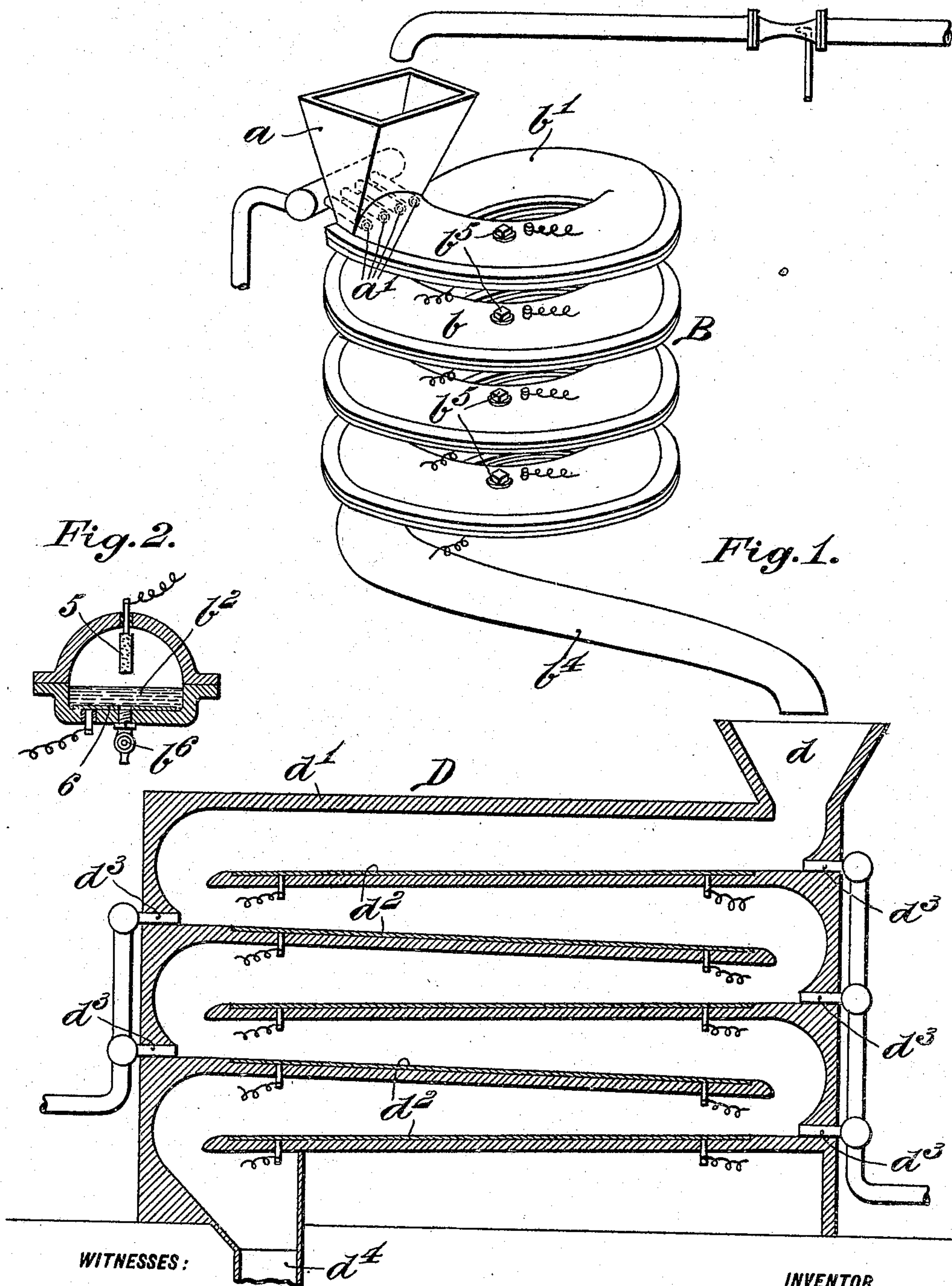


R. LUCKENBACH.  
 PROCESS OF AMALGAMATING AND SEPARATING METALLIC ORES.  
 APPLICATION FILED SEPT. 3, 1907.

937,033.

Patented Oct. 12, 1909.  
 2 SHEETS—SHEET 1.



WITNESSES:  
 Thomas M. Smith  
 Gertrude M. Connerston.

INVENTOR  
 Royer Luckenbach,  
 BY  
 J. Walter Douglas  
 ATTORNEY.

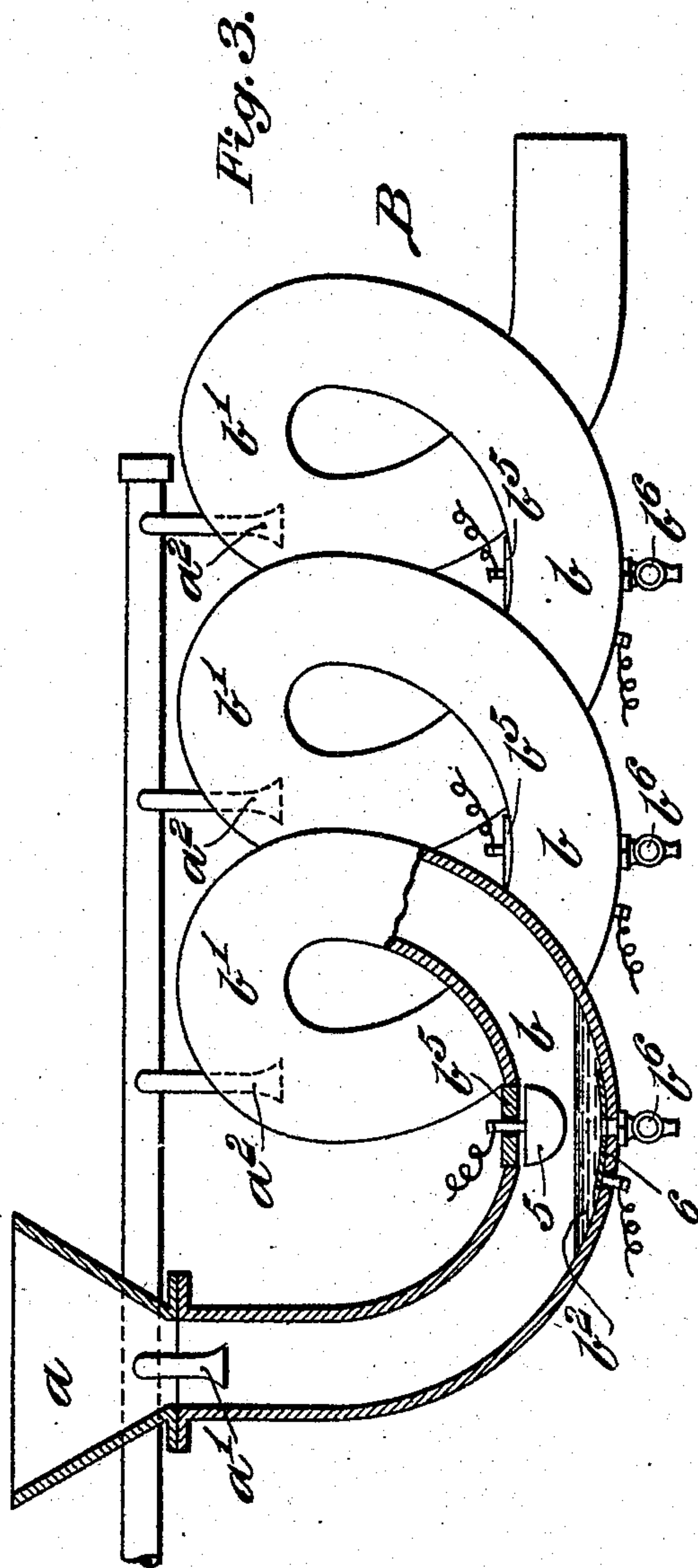
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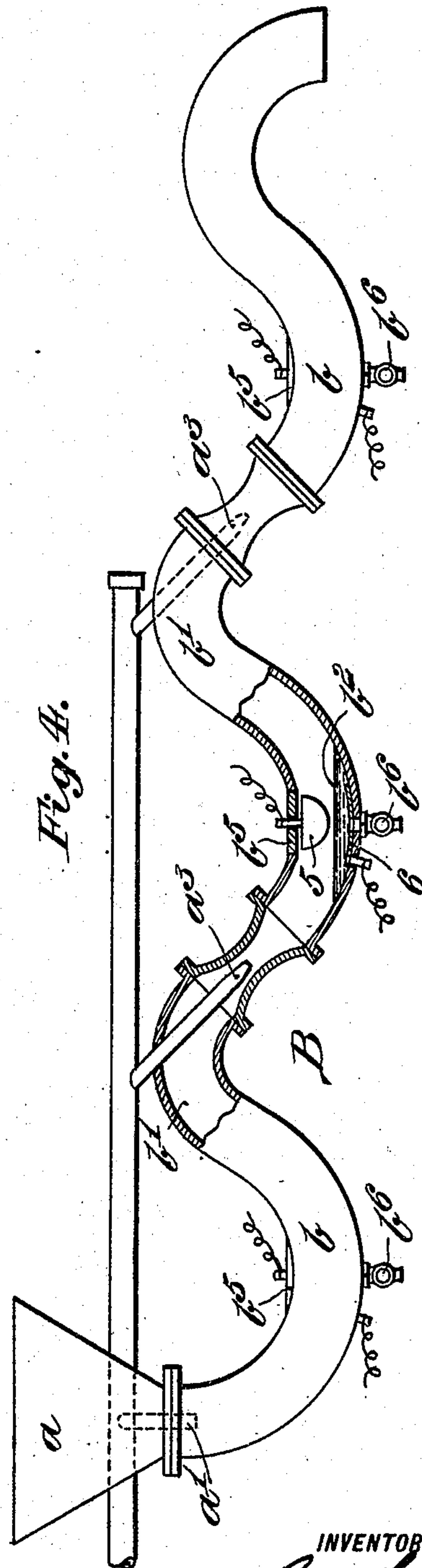
Patented Oct. 12, 1909.

2 SHEETS—SHEET 2.



**WITNESSES:**

Thomas M. Smith.  
Genevieve M. Connerston.

**INVENTOR**

Roger Luckenbach,  
 BY J. Wallis Dwyer  
 ATTORNEY.



# UNITED STATES PATENT OFFICE.

ROYER LUCKENBACH, OF COLWYN, PENNSYLVANIA, ASSIGNOR TO BORINDUM EXTRAC-  
TION COMPANY, A CORPORATION OF ARIZONA TERRITORY.

## PROCESS OF AMALGAMATING AND SEPARATING METALLIC ORES.

937,033.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed September 3, 1907. Serial No. 391,204.

*To all whom it may concern:*

Be it known that I, ROYER LUCKENBACH, a citizen of the United States, residing at Colwyn, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Process of Amalgamating and Separating Metallic Ores, of which the following is a specification.

My invention has relation to the art of amalgamating or separating metallic ores, in finely divided or pulverized cohering and non-cohering conditions, containing gold or silver, either dry or wet, while the ores in said conditions are in transit and so that entrained values of the ores can be economically and effectually separated and at the same time tailings or gangue carried therewith thoroughly removed during the amalgamating or separating of the values of said ores.

My present invention stated in general terms, consists of an economical method of amalgamating or separating metallic ores containing principally gold and silver in and about an attracting body in the path of the ore in travel in finely divided or pulverized cohering and non-cohering conditions, which attractive body acts upon entrained values of the ores whether in a wet or in a dry condition to separate such from the tailings or gangue and at the same time with all the tailings or gangue liberated therefrom free from the values of the ore matter.

In the accompanying drawings are illustrated several different forms of apparatus found suitable for carrying into effect the defined method of my said invention, whereof—

Figure 1 is a perspective view of an apparatus suitable for the defined purposes of my invention, with the addition of an appliance adapted to be connected therewith as shown in longitudinal central sections wherein are provided amalgam plates or tables along which the tailings travel to cause such to be thoroughly freed of the values of the ores by amalgamation or separation of such in transit with the tailings over the plates or tables thereby conserving all traces of said values from the waste product or gangue. Fig. 2 is a vertical sectional view through one of the chambers of the said apparatus as shown perspectively in Fig. 1, the said view show-

ing the detail arrangement thereof. Fig. 3 is a side elevational view of another form of amalgamating and separating apparatus of my invention partly in section and while arranged in horizontal plan is of convoluted form; and Fig. 4 is a longitudinal sectional view partly in elevation through another form of said apparatus.

Referring to the drawings more particularly to Fig. 1, the finely divided or pulverized cohering and non-cohering metallic ores are deposited in a hopper *a*. In this hopper, in the throat thereof, is arranged a nest of small tubes *a*<sup>1</sup>, which nest of tubes is in connection with a source of air or water supply, not shown. The hopper *a*, is connected with an amalgamating or separating apparatus B, consisting of a series of joined tubes *b* and *b*<sup>1</sup>, arranged in superposed relationship to each other, with one portion of the coil connected with another portion of said coil, so that the finely divided or pulverized metallic ore impelled by either air or water issuing through the tubes *a*<sup>1</sup>, will be caused thereby to take circuitous courses into and through each of the connected coils or convolutions of the apparatus meeting in the bottom of each of the series a body of amalgam or mercury *b*<sup>2</sup>, which acts upon entrained values of the ores in their transit, intensified by the force or pressure of the air or water, setting up circulatory or whirling actions therein of the finely divided ore matter, whether in a dry state or in a wet condition and causing the finely divided entrained ore values of said matter in its transit to be attracted to and enveloped by the mercury or amalgam bodies *b*<sup>2</sup>, and by the action set up through the cathode 5 and anode 6, from a source of electric energy, not shown. The finely pulverized or divided cohering and non-cohering metallic ores under the forced draft or stream of water entering from the tubes *a*<sup>1</sup>, are conveyed through the series of coiled or convoluted chambers over the electrified field or bodies of amalgam or mercury *b*<sup>2</sup>, of the series of the amalgamator or separator B, depositing on and in these bodies the values of the said ores while tailings or gangue is carried on mechanically and liberated from the last of the series of coiled chambers of the apparatus through an outlet conduit *b*<sup>4</sup>, onto a dump or into a hopper *d*, of a tailings separator D. This separator consists of an oblong housing *d*<sup>1</sup>, having a



series of amalgam plates or tables  $d^2$ , slightly inclining with respect to each other and having a series of small tubes  $d^3$ , arranged about each plate or table, for the introduction therethrough of air or water, as an impelling means for the tailings or gangue so that recovery of all possible traces of values on the amalgam plates or tables, carried along with the impelled tailings can be had prior to discharge of the tailings or gangue through the conduit  $d^4$ , onto a dump.

In the practice of my invention I have found by passing finely divided ores containing values of differing conditions under forced draft or water and with circulatory or whirling actions through the series of chambers of the separator B, owing to the affinity of the amalgam or mercury bodies for such values, that separation of the values from the ore materials can be greatly expedited.

In Fig. 3 the apparatus is the same as in Fig. 1, save that it is arranged horizontally for producing the circulatory or whirling actions of the pulverized ore matter and is provided with a slightly different arrangement of the pipes for admitting air or water to each chamber of the separator B, which in this instance is by means of bell-shaped pipes  $a^2$ , extending into each chamber of the apparatus, but in other respects the apparatus is the same as hereinbefore fully explained.

The apparatus of Fig. 4 is arranged in curvilinear form with tubes  $a^3$ , shown in inclined positions for admitting air or water into each chamber and containing in the bottom of each chamber an intensified amalgam body  $b^2$ , which intensity of the attractive force of such body is increased by means of an electric current from a source of energy through the anode 6, and cathode 5, in order

that entrained values of the ores in their transit can thereby be completely recovered from the gangue or valueless resultant product of the amalgamating actions in the apparatus.

In the apparatus in the several different forms are provided inlets  $b^5$ , for introducing the amalgam to form the attractive bodies of the apparatus and there are also provided outlets  $b^6$ , as clearly shown in Figs. 2, 3, and 4 to permit of removal of the amalgam with contained values recovered from the ore matter in transit through the apparatus in the different forms thereof by the foregoing actions and which bodies  $b^2$ , can be periodically removed from the apparatus through the said outlets  $b^6$ .

Having thus described the nature and objects of my invention, what I claim as new and desire to secure by Letters Patent is:—

The process of amalgamating, consisting in projecting by fluid currents pulverized ores tortuously over a series of electrified bodies of mercury, held in the portions of the path of the material beyond each turn to which the centrifugal force developed by the turn will force the heavier material, and projecting fluid currents into the material carrying currents in advance of each mercury body, in a direction to impinge upon material in immediate proximity to the mercury surfaces, substantially as and for the purposes described.

In witness whereof, I have hereunto set my signature in the presence of two subscribing witnesses.

ROYER LUCKENBACH.

Witnesses:

J. WALTER DOUGLASS,  
THOMAS M. SMITH.