

Apr. 17, 1923.

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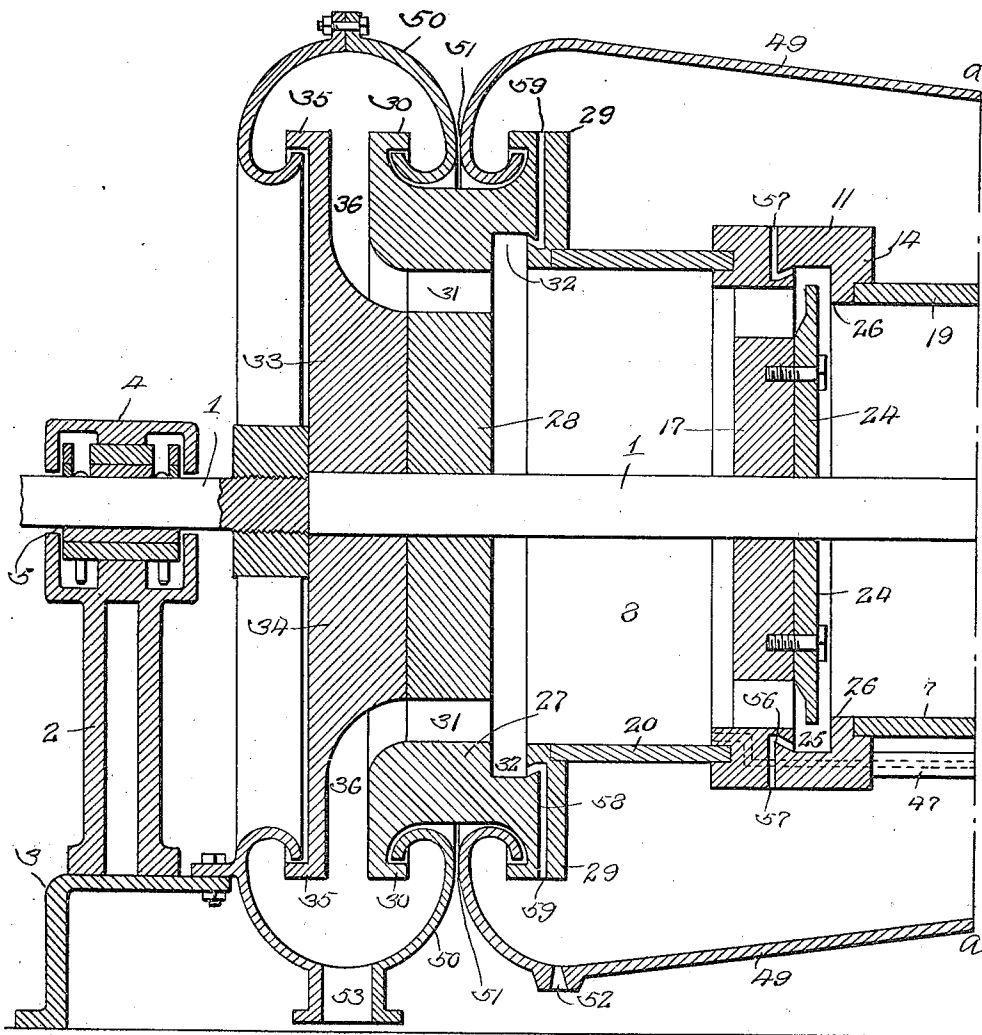
R. J. BUTLER

CENTRIFUGAL AMALGAMATOR

Filed June 23, 1922

2 Sheets-Sheet 1

Fig. 1.



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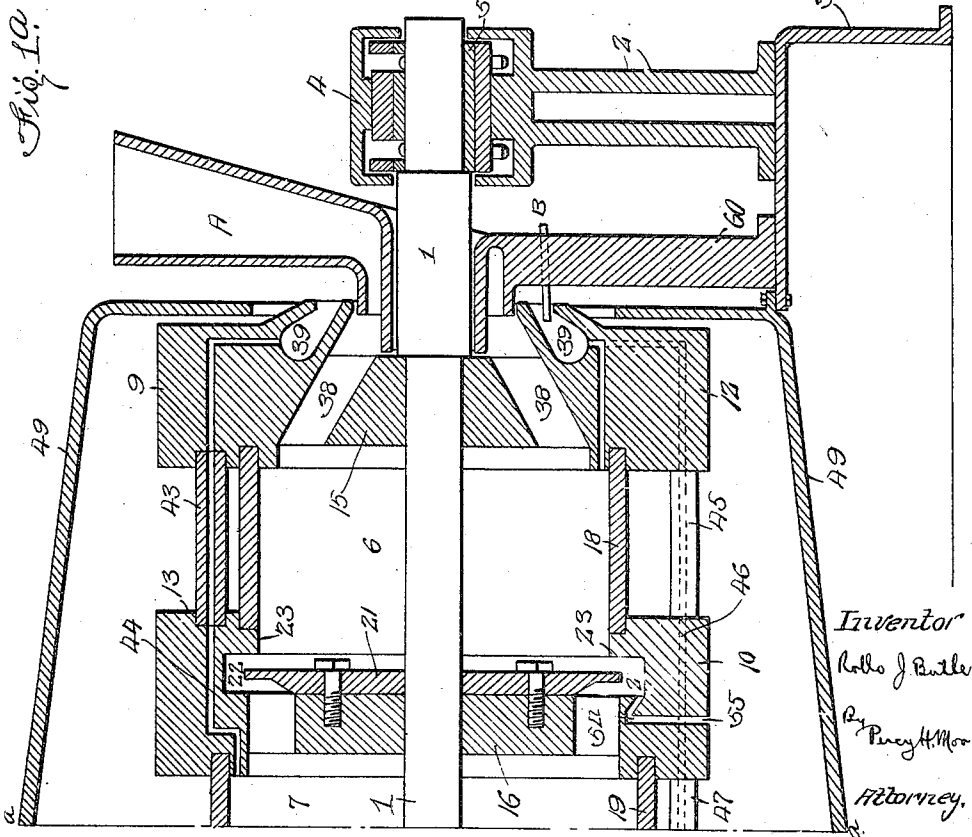
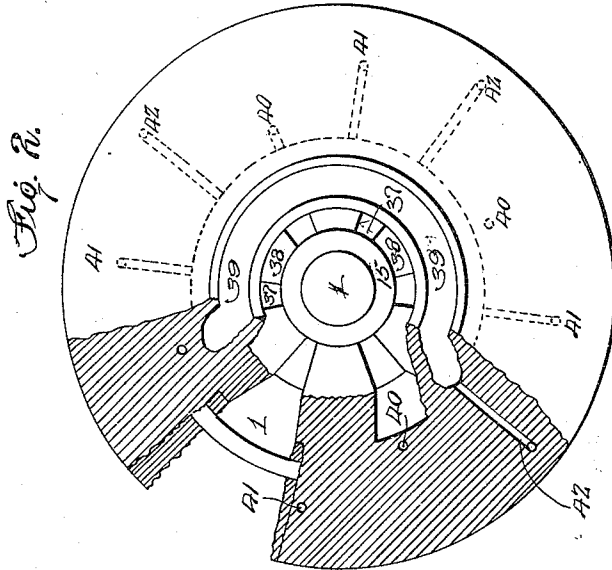
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE.

ROLLO J. BUTLER, OF TONOPAH, NEVADA.

CENTRIFUGAL AMALGAMATOR.

Application filed June 23, 1922. Serial No. 570,356.

*To all whom it may concern:*

Be it known that I, ROLLO J. BUTLER, a citizen of the United States of America, residing at Tonopah, in the county of Nye and State of Nevada, have invented certain new and useful Improvements in Centrifugal Amalgamators, of which the following is a specification.

This invention relates to an improvement in "centrifugal amalgamators" adapted for general use but especially to the extraction of precious metals from ores and sand, by means of separating the metals from the ores or sand and bringing them into contact with amalgamated surfaces and the surface of mercury by the action of centrifugal force.

An important object of the invention is the provision of means for injecting mercury into and removing it from the device so that the mercury may be treated by any known means to make it nascent as by the addition of some electro-positive metal, such as by adding metallic sodium, or by treating it in an electrolytic cell with an electrolyte of sodium chloride, hydrate or carbonate with the mercury as a cathode, or by other means. Due to the relatively short time taken by the materials in passing thru the device it is necessary that the mercury have its maximum affinity for the precious metals in order to prevent them from passing thru into the tailings.

Another important object of this invention is to subject the material to sufficient centrifugal force to overcome surface tension of the water or mercury; to cause any fine particles carried in suspension in the water to be forced into contact with the amalgamated surfaces or the surface of the mercury; and to bring any fine metal particles such as float gold, floured mercury or mercury that is finely divided; into contact with the amalgamated surfaces or the surfaces of the mercury.

A still further important object is to provide a particular design for the amalgamating surfaces which allows the material to be spread over the same in a thin even layer and allows regulation of the time when the materials are acted upon by the centrifugal force, and in addition the amalgam of metal

is removed from the device without dismantling the same.

The invention will be better understood from the following specification taken in conjunction with the accompanying drawings which are a part of the same.

Figure 1 is a lengthwise cross section of one end of the device;

Figure 2 is an end view of a spider with certain parts broken away for purposes of illustration; and

Figure 1<sup>a</sup> is a lengthwise cross section of the other end of the device.

It will be understood from the drawing that for practical purposes the device has been separated along the line *a-a* and that in the device as a whole one end (Fig. 1) is an integral continuation of the other end (Fig. 1<sup>a</sup>).

In the drawing the numeral 1 designates a revolving shaft provided at its ends with two similar supports 2 that are vertically erected at proper distances apart on a suitable base 3, and provided at their upper ends with boxes 4 within which the shaft is journaled as at 5 thus positioning said shaft in a horizontal direction. Either end of the shaft may be extended and the extension provided with a pulley to which a belt is attached for revolving or turning the shaft. Obviously any well known turning or revolving means may be utilized for the purpose.

The drawing shows three separated circular tubes 6, 7 and 8 of different succeeding diameters, but each one of uniform diameter, mounted on said shaft by means of wheel-like or spider members 9, 10 and 11 having respectively rims 12, 13 and 14; spokes and hubs 15, 16 and 17 respectively. The axis of the tubes coincide with the axis of the shaft and are adapted to rotate with the same. Each of the tubes are respectively provided with amalgamating surfaces 18, 19 and 20 and are formed of copper or other suitable metal, with the amalgamating surfaces in a direction parallel and concentric with the axis of the shaft and if desired they may be reinforced on their outer sides with steel in order to gain mechanical strength.

The hub 16 is provided with a circular

baffle member 21 whose rim is positioned in a circular trough 22 provided in the rim 13 having a circular ledge 23. The hub 17 is provided with a circular baffle member 24 whose rim is positioned in a circular trough 25 provided in the rim 14 having a circular ledge 26.

The end of the tube 8 nearest the support 2 in Fig. 1 is mounted and secured on the shaft 1 by a wheel-like member 27 having a hub 28 and rims 29 and 30 and between the said hub and rims the wheel-like member is provided with spokes between which are openings 31. The rim 29 is provided with a circular trough 32.

Attached to and mounted on said shaft 1 and hub 28 is a wheel-like member 33 having a hub 34 and rim 35. The wheel-like member 33 is so designed and connected to the shaft 1 and hub 28 as to leave a circular opening 36 between the rims 30 and 35 which opening coincides and is in continuation of the openings 31.

Referring to Fig. 2 the wheel-like member or spider 9 in addition to the hub 15 has spokes 37 separated by openings 38. Extending around the spider 9 is a circular trough 39. Around the inner circumference of the trough 39 there is provided a plurality of holes or openings 40, 41 and 42 spaced apart from each other and preferably in alternate positions. The openings 40 extend thru the rim 12 and empty into the tube 6. The openings 41 extend thru the rim 12, empty into pipes 43, pass thru aligned holes 44 in the rim 13 and empty into the tube 7. The openings 42 extend thru the rim 12; empty into pipes 45, pass thru holes 46 in the rim 13, extend thru pipes 47, thence thru passageways 48 in the rim 14 and finally empty into the tube 8.

The tubes 6, 7 and 8 with their supporting wheel-like members are rotatably enclosed in a stationary circular housing 49 supported by the base 3 or in any suitable well known manner. The rims 30 and 35 are rotatably enclosed in a circular housing 50 suitably supported by the base 3. Housings 49 and 50 may be suitably connected to each other at points 51. The lower portions of the said housings are respectively provided with outlets or openings 52 and 53 for a purpose hereinafter set forth.

The trough 22 has ports or openings at 54 radially distributed around thru the rim 13 and which discharge into the housing 49 as at 55. In like manner the trough 25 has ports or openings 56 which discharge into the housing 49 as at 57. So also, the trough 32 has ports or openings 58 which discharge into the housing 49 as at 59. These ports are so designed as to be positioned above the bases of the troughs 22, 25 and 32 in order to maintain a constant level of mercury in said troughs.

The circular opening 36 discharges into the housing 50.

One end of the device is provided with a hopper A suitably supported on the base 3 as at 60.

B designates a pipe thru which mercury is fed into the trough 39. Obviously any well known means may be utilized for so introducing the mercury into the trough.

In a general way the operation of the device is as follows:

A is the hopper thru which the ore or sand, ground to a suitable fineness, and the proper amount of water and mercury may be injected into the device, (the quantity of material being regulated by any known method); the material passes thru the openings 38 onto the amalgamating surface 18. The materials are then thrown by centrifugal force against the baffle 21 and into the trough 22. The stream of material in passing over the ledge 23 will cause a partial vacuum which will tend to break up the stream and turn it over as it falls. The mercury being of higher specific gravity than the ore and sand will remain in the trough until a sufficient quantity has been injected to cause it to overflow. The materials then pass under the baffle 21, thru the spokes of the wheel-like member 10 onto the amalgamating surface 19 of the tube 7 where the mercury and the heavier particles in the ore and water will tend to separate and come into contact with the surface 19.

The materials then pass over the surface 19 and are thrown against the baffle 24. In passing over the ledge 26 the materials will cause a partial vacuum which will tend to break up the stream of materials and turn them over as they fall. The mercury being of higher specific gravity than the ore and sand, will remain in the trough 25 until a sufficient quantity has collected when it will overflow and pass out the openings 57. The materials then pass under the baffle and thru the spokes of the wheel-like member 11 onto the surface 20. After passing over the surface 20 the mercury will gather in the trough 32 while the tailings will be discharged thru the openings 31 and 36 into the housing 50 and thence thru the opening 53 by gravity.

The purpose of the increased diameters of the tubes 8 and 7 over each other and the tube 7 is to give the required head or pressure to force the materials under the baffle and over the contact surfaces.

The radially distributed ports or openings around thru the rims of the wheel-like members allow the gathered mercury in the troughs to escape and be thrown into the housing 49 where it escapes thru the opening 52 by means of gravity. The mercury in coming out of the opening 52 can be introduced to a launder and be conveyed to any known means for removing the amalgam

of metal or to an electrolytic cell or other means for charging the mercury with an electropositive metal. The mercury is then pumped or otherwise introduced into the pipe B or both the pipe B and the hopper A. The quantity to each can be regulated as required by any known means.

Nascent mercury is placed into the trough 39 by means of the pipe B. From the trough 39 the mercury is introduced into the tube 6 by means of the openings 40; it is introduced to the tube 7 by means of the openings 41 as heretofore described and it is introduced into the tube 8 by means of the openings 42 as heretofore set forth.

What I claim is:

1. A centrifugal separator comprising a shaft, rotatable wheel-like members mounted on said shaft, a plurality of circular tubes connected to said members, the rims of said wheel-like members positioned in a circular

housing and provided with radially distributed openings for the discharge of mercury into said housing.

2. A centrifugal separator comprising a shaft, rotatable wheel-like members mounted on said shaft, a plurality of circular tubes connected to said members, the rims of said wheel-like members positioned in a circular housing and provided with radially distributed openings for the discharge of mercury in said housing and said housing provided with means for the discharge of the mercury while the separator is in operation.

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

ROLLO J. BUTLER.

Witnesses:

N. K. GIBSON,  
CHAS. A. DE FLON.