

(No Model.)

R. R. WAITZ.
ORE AMALGAMATOR.

No. 251,008.

Patented Dec. 13, 1881.

Fig. 1.

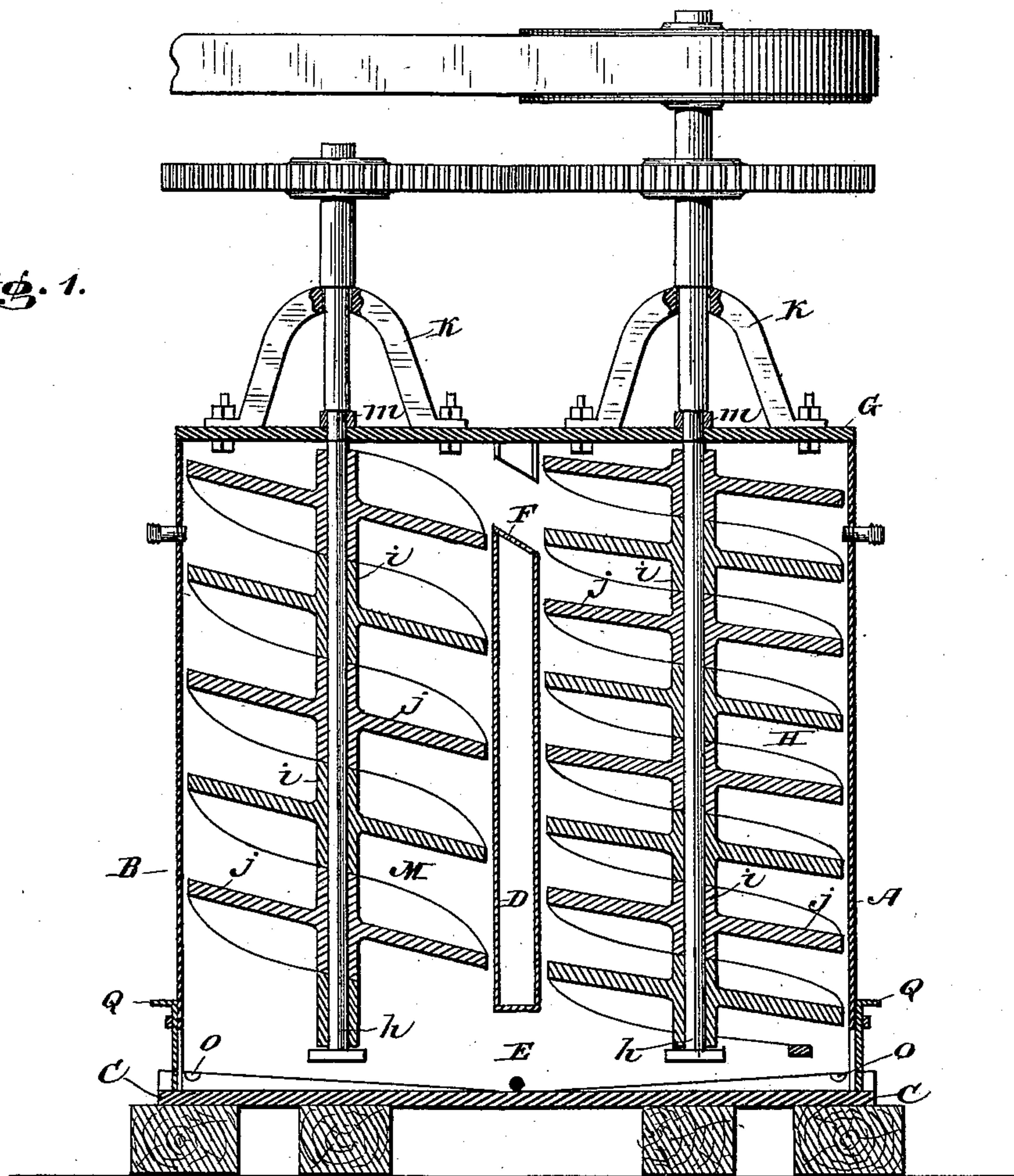
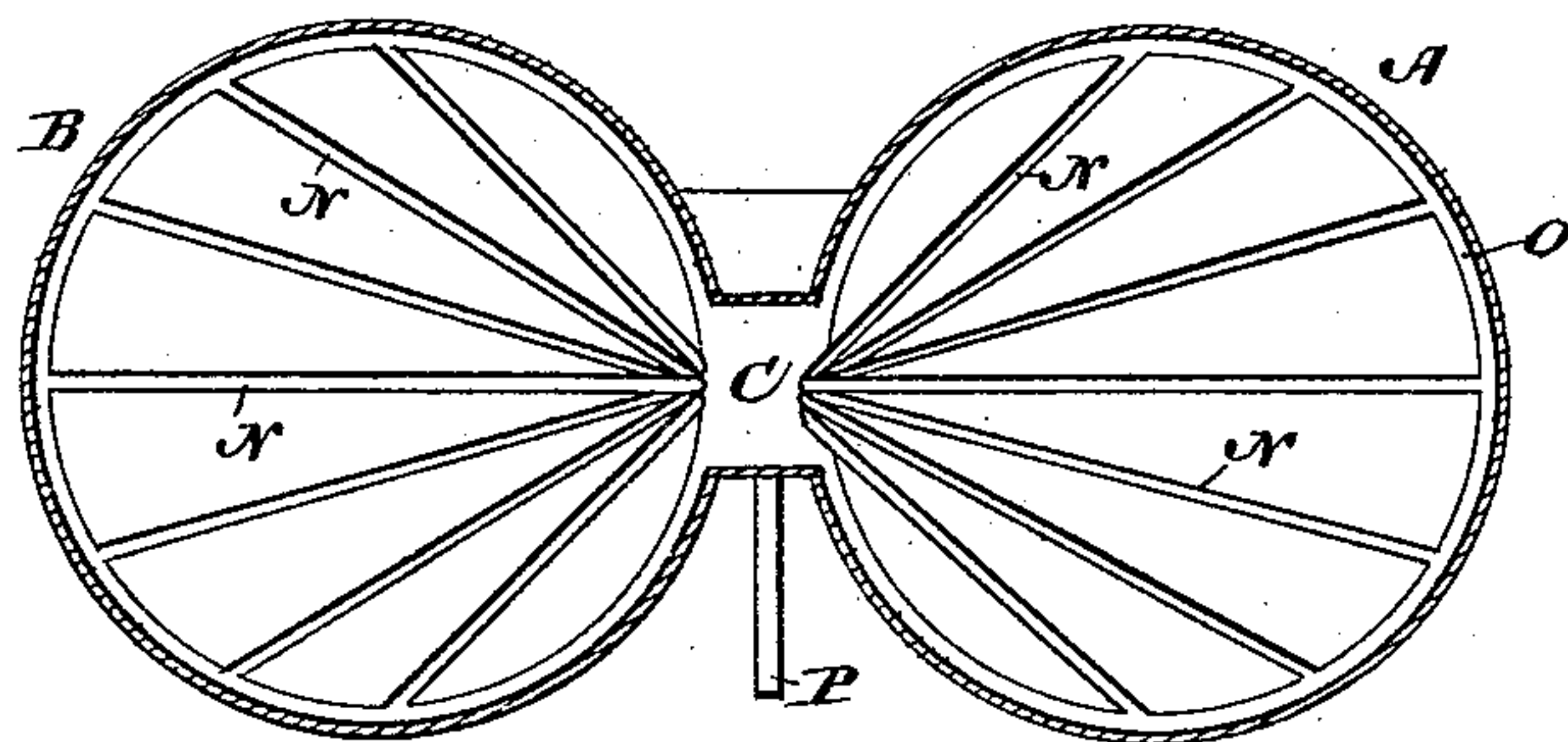


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

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ORE-AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 251,008, dated December 13, 1881.

Application filed August 5, 1881. (No model.)

To all whom it may concern:

Be it known that I, ROBERT R. WAITZ, a citizen of the United States, residing at Rosita, in the county of Custer and State of Colorado, have
5 invented certain new and useful Improvements in Ore-Amalgamators; and I do hereby 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
10 had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The present invention relates to that class of
15 amalgamators for gold and silver bearing ores in which the "pulp" receives a circulating motion, so that it shall constantly return and pass over the same points until exhausted of its precious metals.

20 The object of my invention is to effect the thorough amalgamation of the ores, and to cause the mercury to become atomized or thoroughly mixed with the pulp, whereby I attain advantages and results not possible with amalgamators heretofore devised.

The invention consists in the construction and combination of parts, which will be more fully described hereinafter, and then set forth in the claims.

30 In the drawings, Figure 1 is a vertical sectional view of an amalgamator constructed according to my invention. Fig. 2 is a cross-section thereof.

The letters A B designate two vertical cylinders or shells, which are constructed of cast-iron or other appropriate material not affected by the action of mercury. The two cylinders are arranged parallel with each other, and are secured to a bottom or bed plate, C; or they
40 may be made in one piece with said bed-plate. A vertical partition, D, serves as a wall for separating the cylinders into two distinct chambers having no communication with each other, except at the top and bottom, as is fully
45 shown in Fig. 1. An opening, E, made in or located at the bottom of the partition, serves to permit the passage of the ore-pulp from one chamber or cylinder into the other, and an opening, F, made in the top of the partition,
50 constitutes the upper communicating-passage between the cylinders. A cover or end head, G,

firmly secured to the cylinder, serves to entirely close the same at the top, except at the side of one of the cylinders, where the cover is apertured and provided with a suitable lid for
55 charging the apparatus with the pulp and mercury.

A suitable hopper (not shown) is arranged in proper relation to the feed-opening of the cylinder A. The latter may be termed the
60 "feed-cylinder," as the pulp is first admitted into the same. It contains a vertical screw, H, constructed preferably of a square or angular shaft, *h*, on which are fitted a series of hubs or collars, *i*, formed with spiral flanges or blades
65 *j*. These sectional hubs and flanges, when fitted together, constitute a "spiral conveyer" having an unbroken or continuous flange from top to bottom thereof.

The shaft *h* is made square or angular, so as
70 to prevent the conveyer-sections from turning thereon, and obviously the hubs *i* are provided with corresponding sockets for receiving said shaft. A bottom enlargement or shoulder of the shaft serves to support or hold the conveyer-sections thereon, and suitable set-screws
75 or other fastening devices may also be resorted to for locking the various sections to the shaft. A suitable yoke or spider, K, rising from the top of the cover G, forms a bearing for an upper cylindrical prolongation of the shaft *h*, and
80 a stuffing-box or boss, *m*, on the cover constitutes the bearing of said shaft at the point of its entrance into the cylinder.

The two bearings herein shown will generally suffice to maintain the shaft of the screw-conveyer in a proper operative position; but
85 even if other bearings are required, the shaft is never stepped or journaled in the bed-plate of the apparatus.

The cylinder B also contains a vertical screw or spiral conveyer, M, which is in all respects constituted and arranged like the screw H, except that the pitch or windage of the spiral flanges on the screw M is greater than on the screw
95 H. In other words, the flanges on the screw M are farther apart than on the screw H, for the object hereinafter stated. The bed-plate C is constructed or provided with a series of inclined channels or grooves, N, which radiate
100 or diverge from the bottom opening in the partition to the walls of the cylinders, where they

lead into a concentric or circular channel or groove, O, as is fully shown in Fig. 2.

A tube, P, located at some point between the lower or adjoining ends of the two sets of channels, which convey from the walls of the cylinders, serves for the discharge of the mercury and amalgamated metals.

Suitable openings, closed by gates or valves Q, are arranged at the sides of the cylinders for discharging the pulp therefrom.

The two screw-conveyers herein shown are designed for operation in reverse directions, and for this object they are geared together so as to cause one to turn to the left and the other to the right.

The gearing may be of any desired construction which will answer for imparting a rotary movement to two shafts in opposite directions.

The operation of the apparatus is as follows, viz: The mercury for effecting the amalgamation of the ore having been fed into the apparatus, it will naturally gravitate or settle toward the center of the bed-plate and fill or partly fill the bottom opening in the partition-plate. The ore-pulp, after its admission into the feed-cylinder, is carried downward through the medium of the screw H, and is forcibly propelled through the bottom opening in the partition plate or wall. This forcible propulsion of the pulp will obviously take place through the stratum or body of mercury at the bottom of the apparatus, and cause said mercury to become atomized or incorporated with the pulp in a finely-divided state, whereby it will more readily and thoroughly amalgamate with the precious metals than if the pulp were brought in surface contact with a body of mercury covering a large area.

The screw in the second cylinder will serve to elevate or carry the pulp to the top of the same and force it out through the top opening back into the first cylinder. In this manner the pulp can be made to constantly return and pass over to the same points until exhausted of its precious metals. The increased pitch of the flanges of the conveyer which carries the pulp in an upward direction will serve to readily perform this result with the two conveyers rotating at the same rate of speed.

It has been stated that the mercury is atomized, divided, or comminuted by forcing the pulp through the same, which is in contradistinction of a "churning" of the mercury by me-

chanical devices dipping into the same. The churning which takes place in my apparatus will simply cause a violent commotion of the pulp, so as to cause it to become intimately mixed with the particles or globules of mercury carried into the pulp by forcing the latter through a stratum or body of mercury at the bottom of the apparatus. The globules or particles of mercury which have become mixed with the pulp will gravitate to the bed-plate and enter the inclined channels thereat, so as to be readily carried back to the center of said bed-plate, which, as will readily be observed, is narrow or contracted, and is located directly under the bottom opening, through which the pulp must pass in order to enter the second cylinder.

I am aware that it is not new to amalgamate gold with mercury by circulating pulverized auriferous ore combined with water upward through a body or column of mercury, the circulation of the ore being effected by means of a jet of steam.

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

1. The process of amalgamating precious metals, consisting in forcibly propelling the ore through a shallow stationary stratum or bed of mercury, for causing the latter to penetrate the ore-pulp in an atomized or finely-divided state, the atomization of the mercury being effected through the medium of the pulp itself, substantially as herein set forth.

2. An amalgamating-vessel having two vertical compartments, connected at the top and bottom, and oppositely-revolving spiral conveyers or screws, journaled at the top of the amalgamating-vessel and terminating near the bottom thereof, substantially as and for the purpose set forth.

3. The amalgamating-vessel having a bed-plate provided with inclined channels or grooves, in combination with the two cylinders, the partition having top and bottom openings, and the screw-conveyers or pulp-forcing devices, substantially as herein set forth.

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

ROBERT R. WAITZ.

Witnesses:

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A. W. LONG.