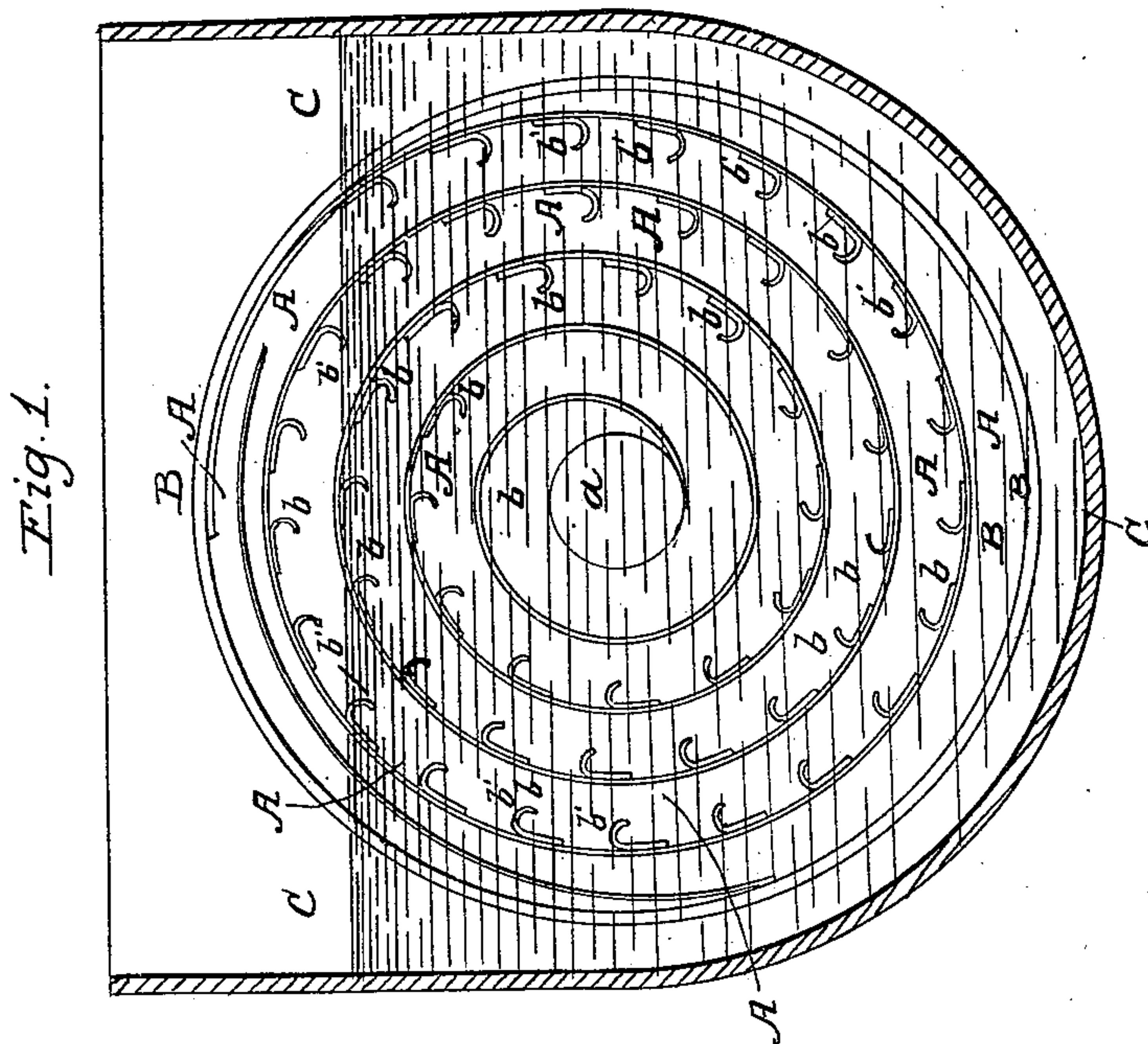
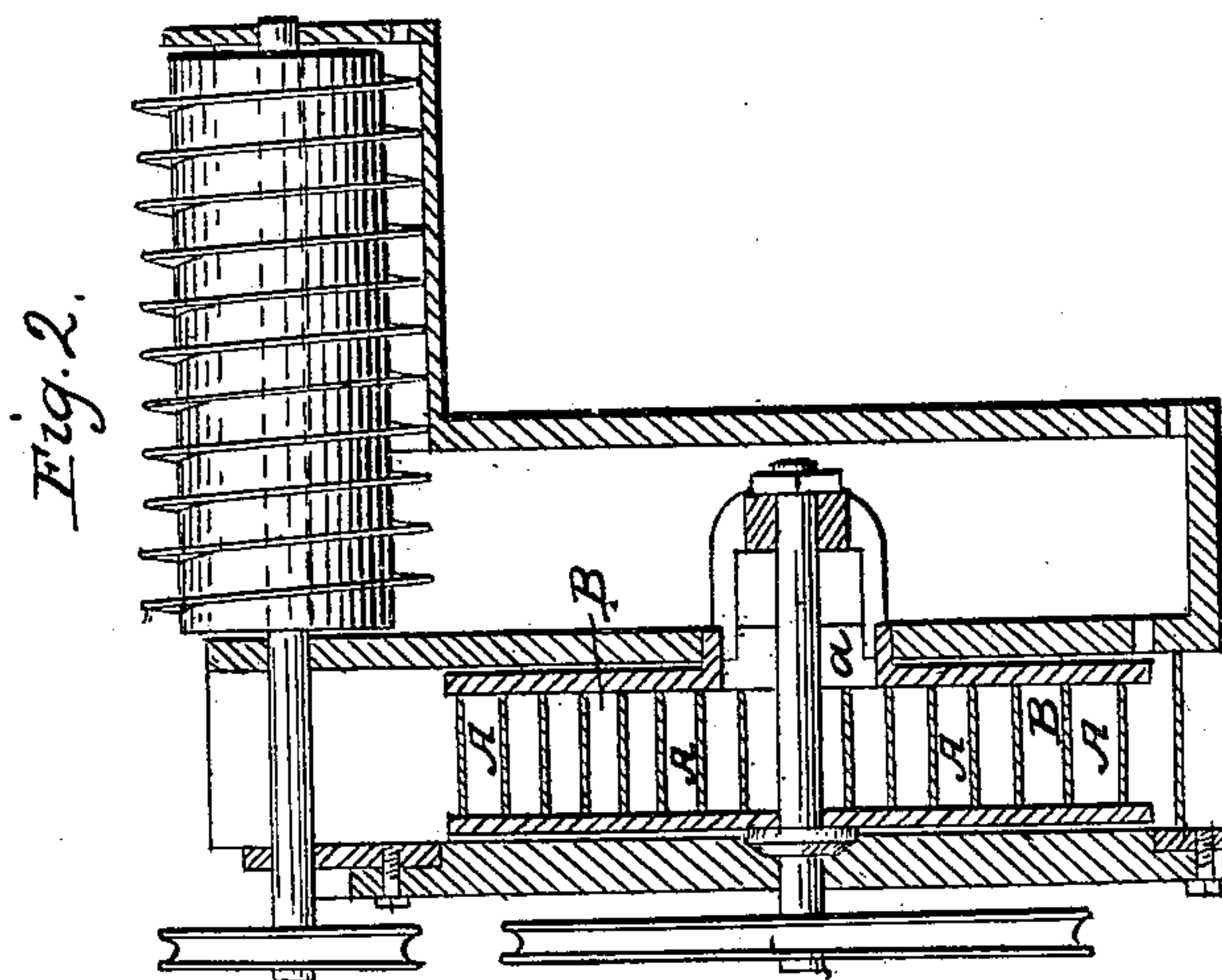


P. W. GATES.
Amalgamator.

No. 50,572.

Patented Oct. 24, 1865.



Witnesses:

R. F. Campbell
E. Schep

Inventor:

P. W. Gates
by his Attorney
Marion Fenwick Lawrence

UNITED STATES PATENT OFFICE.

P. W. GATES, OF CHICAGO, ILLINOIS.

IMPROVED AMALGAMATOR.

Specification forming part of Letters Patent No. 50,572, dated October 24, 1865.

To all whom it may concern:

Be it known that I, P. W. GATES, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Amalgamator; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a view of a scroll-shaped amalgamator having my invention applied to it. Fig. 2 is a vertical longitudinal section through an amalgamating-machine, which shows one practical mode of carrying out my invention.

Similar letters of reference indicate corresponding parts in both figures.

My invention relates to certain improvements of machinery for effecting the amalgamation of gold and silver for the purpose of separating these metals from the ores with which they are associated. In consequence of the great power to give buoyancy of mercury or melted lead, it has been found very difficult to submerge the ores of metals in a state of powder, and to compel the powder to remain a sufficient length of time beneath the surface of the liquid metal to effect a thorough amalgamation of the metallic atoms. For this purpose scroll-shaped buckets have been applied to a rotary wheel in such manner that the ore was compelled to pass as far beneath the surface of the bath as the axis of the wheel, where it was discharged, and screw-blades or paddles affixed to revolving-shafts have been employed; but it is well known that these contrivances fail to immerse the ore very far beneath the surface of the bath, and to keep it in contact with the liquid metal a sufficient length of time to allow this metal to attach itself to the gold or silver.

The object of my invention is to provide for conducting the auriferous or argentiferous ores, in a finely-powdered state, beneath the surface of a bath of liquid metal, and to retain the ores beneath the surface of the bath a sufficient length of time to effect a thorough separation and amalgamation of the pure metals from their gang or lighter impurities, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe the most preferable mode of carrying it into effect.

In the accompanying drawings I have represented my invention applied to a volute or scroll plate, A, which is suitably secured to a circular disk, B, that has a central aperture, *a*, through it for the purpose of admitting of the discharge of the amalgamated metal into a receptacle arranged outside of the amalgamating-chamber, C, as shown in Fig. 2. The volute passage *b* terminates at or near the circumference of the disk B in a receiving-mouth, at which point the disintegrated ore enters the passage *b*, and by a rotary motion of the disk is submerged in the liquid-metal bath in the vessel C and gradually forced toward the center of the disk, at which point the amalgam is discharged. As the coils of plate A gradually diminish in radius toward the center of the disk they submerge the ore deeper and deeper beneath the surface of the bath as the disk is revolved; but, as the tendency of the ore is constantly to rise again to the surface of the bath, it is obvious that the simple scroll-plate A will not compel the ore to descend into the bath beneath the discharge-aperture *a*. The result of this operation is to discharge the precious metal too quickly, or before it is thoroughly intermingled with the mercury or melted lead, whichever it may be found desirable to employ as the separating vehicle.

In order to submerge the powdered ore in the bath of liquid metal, and to carry it below the point of discharge, or, if desirable, to the bottom of the bath, I employ buckets *b'*, which are secured to the scroll-plate A at proper intervals apart, and in such manner that they receive the powdered ore which floats upon the surface of the bath as they successively descend into the bath, and carry this ore down with them beneath the horizontal plane of the axis about which these buckets turn before discharging it. As the buckets gradually tilt or turn to an inverted position again the ore slowly escapes from them and rises in a diffused state through the liquid to a certain point, when it is again caught by other buckets and again carried downward in the liquid until these buckets tilt and discharge it. In this way the buckets *b'*, when applied to a scroll, will repeatedly carry the ore down and discharge it into the metallic bath, until, finally, the amalgam will be compelled to escape from the scroll through the center discharge-aperture, *a*. After the ore

is carried beneath the surface of the bath the precious metal will not again rise to the surface, although it is frequently discharged from the buckets. In rising to the surface of the bath the ore is caught by buckets which are nearer the axis of the scroll, which, in their turn, discharge the ore so that it will be caught by buckets still nearer the axis of the scroll, and so on. The ore receives an upward-and-downward movement beneath the surface of the bath until its metal is thoroughly amalgamized. Without the buckets the ore is submerged in the bath merely in consequence of having a scroll-passage which carries the ore directly downward toward and discharges it through the center of the disk.

Fig. 2 is a longitudinal sectional view of the Scoville and Gates amalgamator patented September 30, 1864, and intended to show one mode of arranging a center-discharge scroll-wheel having buckets applied to it, and combining with it means for conducting off the amalgam.

I have described my invention as being particularly applicable to the scroll-amalgamators, and shown why the operation of amalgamation will be very perfect with such forms; but I contemplate its application to the surface of rotating or oscillating cylindrical surfaces, or to the extremities of spiral or straight blades, or to any other object by which the result, substantially as herein described, can be produced.

Buckets or cups or curved plates constructed substantially as I have shown in the drawings, Fig. 1, and secured to a contrivance by which they can be carried down into a bath and tilted therein, and then drawn out of the bath, will gather and positively hold the powdered ore until the buckets pass beneath a horizontal plane intersecting the axis about which they revolve, and this will be the case what-

ever contrivance may be employed as a means for supporting and moving the buckets.

One great advantage in the use of buckets, in contradistinction to scrolls or flat blades, is that the buckets carry the ore into the bath as far as may be desired, and then allow it to escape therein in a diffused state; hence the fine atoms of precious metals are brought into a more intimate relation with the liquid metal than if the ore was submerged in any considerable quantity at a time.

It will be found very advantageous to employ buckets in the operation of washing gas for the purpose of purifying it, such buckets being arranged to operate substantially as hereinabove described.

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

1. Carrying the ores of metals to be amalgamated into a bath of liquid metal to a point below the axis of the submerging device by means of buckets, which are so arranged about a shaft or axis that they positively hold the ore upon the submerger until they have passed said axis a greater or less distance, and then cease to have any positive hold upon the ore, substantially as described.

2. Dividing both the ore and amalgamating agent in the process of amalgamation by the means and upon the principle substantially as herein described.

3. The combination of buckets with a scroll-conveyer or submerging-machine, substantially in the manner and for the purpose described.

P. W. GATES.

Witnesses:

L. D. TURNER,
J. L. FARGO.