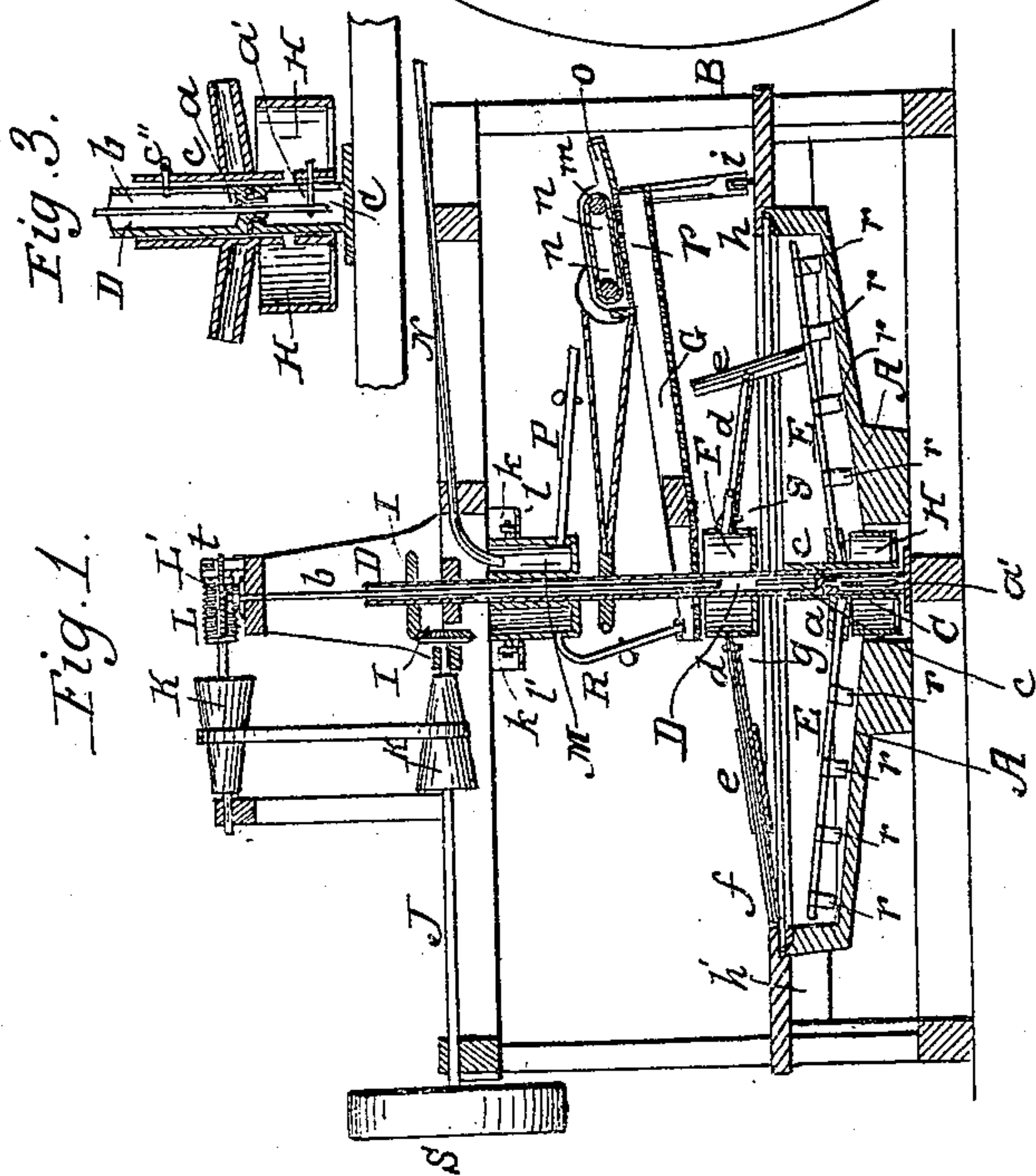
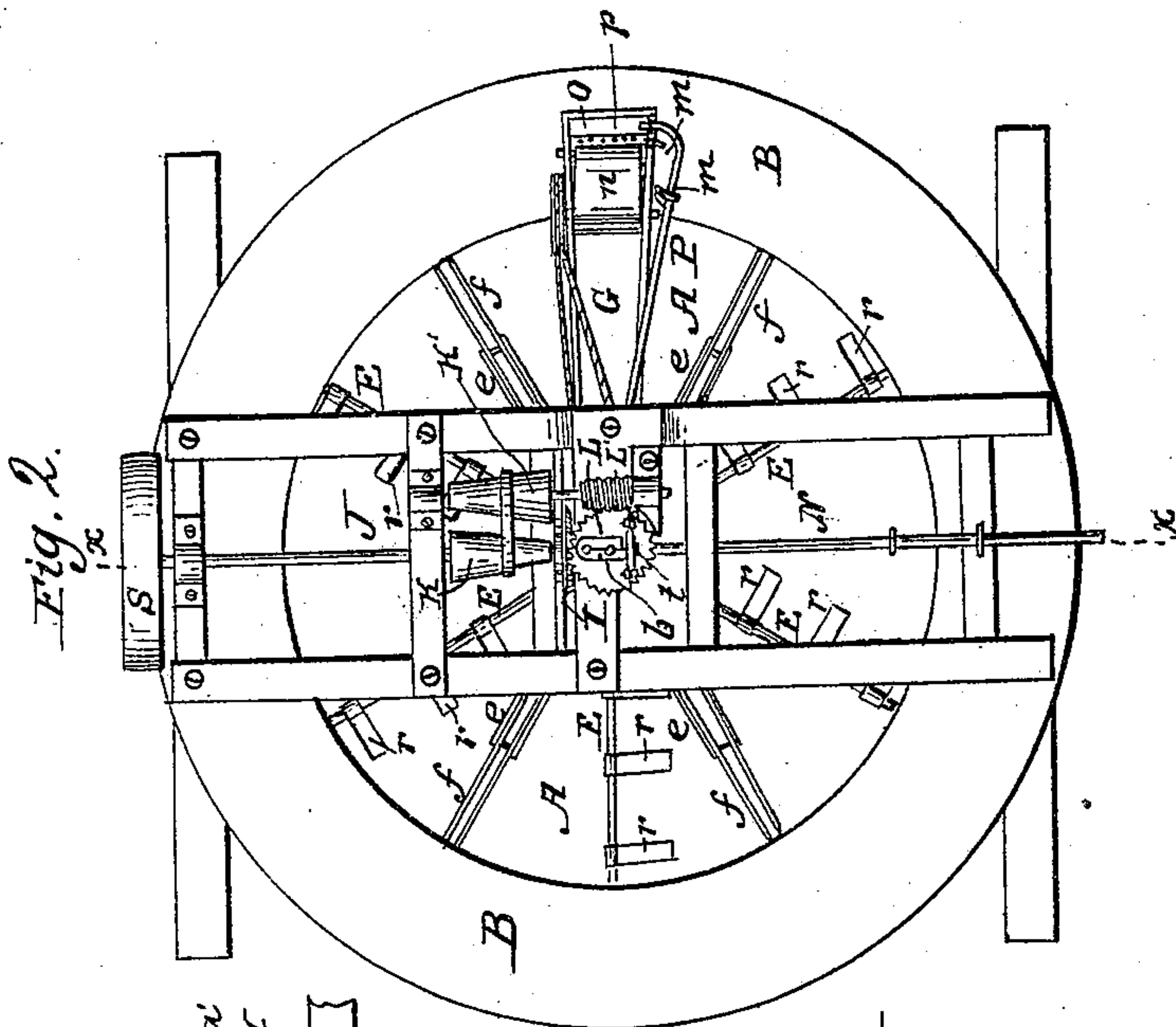


PAINE & STEPHENS.
Ore Separator and Concentrator.

No. 70,603.

Patented Nov. 5, 1867.



Witnesses:
Geo. H. Story
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Inventors:
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United States Patent Office.

THOMAS N. PAINE AND SAMUEL STEPHENS, OF GRASS VALLEY, CALIFORNIA.

Letters Patent No. 70,603, dated November 5, 1867.

IMPROVED ORE-SEPARATOR AND CONCENTRATOR.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, THOMAS N. PAINE and SAMUEL STEPHENS, of Grass Valley, county of Nevada, State of California, have invented an improved Separator and Concentrator for saving precious metals; and we do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use our said invention or improvement without further invention or experiment.

The nature of our invention is to provide an improved separator and concentrator for saving the sulphurets contained in ores or minerals, by depriving them of the sand and debris which remain after crushing and amalgamating, and furnishing the sulphurets in a pure or nearly pure state, to be treated by the usual methods for their reduction into bullion.

To do this, we construct a pan, circular in form, with a concave bottom. A ledge is made around the flange of the pan, on which is placed a copper amalgamated plate, with a circular rim resting on the top of the flange, which forms a recess upon which the ore or pulp is first received from revolving distributing-spouts leading from a reservoir, which is placed around a vertical shaft, and which revolves with it. This reservoir is fed by a trough, into the upper end of which the tailings are introduced, together with sufficient water to make a very thin pulp. A set of light revolving brushes is so arranged as to constantly agitate the surface of the pulp, rising gradually, as the pan fills, so as to always remain upon the surface, while a central ring, fitting the bottom of the pan, also rises at a slow rate, thus preventing the discharge of anything but the lighter particles of the pulp.

To more fully explain our invention, reference is had to the accompanying drawings, furnishing part of this specification, of which—

Figure 1 is a side sectional elevation taken through X X.

Figure 2 is a plan.

Similar letters in each of the drawings indicate like parts.

A is the pan or separator, the upper edge of which comes up to a level with the floor B of the mill. Through an opening in the centre of the pan the shaft C rises, being stationary and firmly fixed to the supporting timbers. The upper part of this shaft has a step, *a*, in which the shaft D revolves and is supported, a groove around the edge of each, with balls between, serving to make it work easily. Both these shafts are made hollow, and a small rod, *b*, passes down through them to near the bottom, the use of which will be presently explained. A sleeve, *c*, encircles the joint of the two shafts, and has a set-screw, *c'*, or bolt entering a slot in the upper or movable shaft, by which it receives motion, while it can be raised or lowered, the bolt working in the slot. This sleeve has sockets radiating towards the circumference of the pan, and carrying arms E E. These arms have light brushes, *r r r r*, of canvas, or other suitable material, which agitate the surface of the pulp. Above the sleeve *c*, and attached to the shaft D, is a reservoir, F, which receives the pulp from the spout or feeder G, and distributes it to the circumference of the pan by the adjustable spouts, which are composed of three parts, *d*, *e*, and *f*. These spouts are raised and lowered by the adjusting-screw *g*, so that they discharge their contents into the copper-lined recess at the edge of the pan, shown at *h*, where any free mercury and amalgam in the pulp may be saved, and from which the pulp passes down the inclined bottom to the central opening. A ring or cylinder, H, is fitted closely to the edge of this opening, and is moved slowly up by the rod *b*, which has its lower end connected with H by a pin, *a'*, this pin being allowed to move up and down by the slot shown in the stationary shaft C. The main shaft D is moved by the bevel-gear I I. The driving-shaft J has a cone-pulley, K, upon it, which is connected with the cone-pulley K' by a belt, and this moves the endless screw L, which raises the rod *b* by turning the toothed wheel L'. This wheel rests in a socket on the top of the frame, and has a clasp-nut, *t*, on the top, which operates on the thread cut in the rod *b*, thus raising it slowly as the wheel revolves. The feeder G has one end supported by the tank or reservoir M, and the other or outer end can be moved about the periphery of the pan, working on the rollers *i*. The tank M is also supported on the rollers *k*, which works on the plate *l* when the spout G is turned. Two rollers, *m m*, carry the belt *n* with light brushes, and, as the pulp is fed into the box at *o*, the brushes assist in passing it through the perforated plate *p*, after which it runs down into F. The pipe N conducts water into the tank M, from which it passes through the pipe P to the box

o, while working, but when it is desired to wash out, a stop-cock closes this pipe, and by another the water is allowed to pass down through R and wash out the reservoir G and the distributing pipes.

When working, the machine is set in motion by means of the pulley S, shaft J, and gears I I, thus causing the shaft D to revolve, carrying with it the reservoir G and the distributing pipes and the stirrers *r r r r*. The tailings and sulphurets to be separated, being fed into the box o, are passed through the plate *p* and down the feeder G into the reservoir F, from which they are distributed through the pipes to the copper recess at the circumference of the pan, from whence they run down to the centre, being agitated all the time by the stirrers. To prevent their escaping, the ring H is slowly raised by the rod *b*, which passes down through the hollow shaft C and D, being worked by the endless screw L. The stirrers are raised at the same time, so that they only agitate the surface. When the work is completed the ends *f f* of the distributing pipes are taken off, and the parts *e e* are turned up at an angle, as shown on the right, fig. 1. The water being shut off in the pipe P, it is turned into the reservoir G through the pipe R, so as to wash it thoroughly, the water passing off through the central opening. The ring H may be lowered by opening the clasp-nut *t*, shown on top of the machine, thus allowing the rod *b* to be lowered to its first position.

The great object of all concentrators is to thoroughly separate the lighter and worthless part of the tailings of a mill from whatever mercury, free gold, and amalgam have been unavoidably lost in the process of amalgamation, and principally from the valuable sulphurets, which require a separate treatment; these being heavy, can all be settled, and the mercury and gold may be saved by any of the numerous amalgamating devices, while the sulphurets must undergo further treatment.

Some of the points in which we claim a superiority for our concentrator are—

First. Its great size, (being from eighteen to twenty-four feet in diameter,) and the automatically rising ring H, and the connected mechanism by which the apparatus may be run for ten hours or more, without cleaning up, for, as the bottom is covered, the ring rises, and the sulphurets may be deposited to a considerable depth before stopping.

Second. The movable feed-trough G and reservoir H, by which the labor of conveying the tailings to be worked to any particular spot is avoided.

Third. The distributing-spouts, which convey the pulp to the copper amalgamating-rim *h*, and which, after the work is finished, may be used to wash out the inner layer of valueless settlements by turning the part *e*, as shown at the right in fig. 1, the ring H having been lowered previously, and water having been turned through the pipe R, while the valuable sulphurets around the outside are being thrown out on the floor B.

Fourth. The use of the light brushes *r*, in strips, on a rolling-arm, E; by which, first, there is no wave made in revolving, which would carry off the sulphurets, and the brushes may be easily rolled up by simply turning the arms E around in their sockets. By rolling up these brushes they can be adapted to any kind of work, whether light or heavy, and thus avoid the necessity of a number of sets of brushes.

Having thus described our invention, we do not wish to claim broadly a concentrating-pan with distributing-spouts and stirrers in all their forms, neither the movable ring, when raised by hand; but what we claim, and desire to secure by Letters Patent, are—

1. The pan, constructed with the copper-lined recess *h* at its top, to save the gold or amalgam, substantially as herein described.
2. The adjustable distributing-spouts, constructed with the parts *d*, *e*, and *f*, and having the adjusting-screw *g*, the whole operating substantially as and for the purpose herein described.
3. The round arms E, with the separated brushes *r r r r*, for agitating the surface of the pulp, operating substantially as herein described.
4. The ring rising automatically, and the rod *b*, together with the endless screw L and the cone-pulleys K and K', when used for raising the ring H, substantially as herein described.
5. The movable feed-trough G and the reservoir M, supported by the rollers *k k* and the plate *l*, operating substantially as and for the purpose described.
6. The revolving belt *n*, with its brushes and the perforated plate *p*, when used in the feed-trough G, substantially as herein described.
7. The two-part shaft, constructed with a hollow stationary slotted shaft, C, and the hollow movable slotted shaft D, when constructed with the balls and the grooves in their ends to prevent friction, operating substantially as and for the purpose herein described.

In witness whereof we have hereunto set our hands and seals.

THOMAS N. PAINE. [L. s.]
SAMUEL STEPHENS. [L. s.]

Witnesses:

E. W. ROBERTS,
A. S. SLACK.