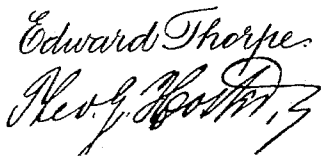


2 Sheets—Sheet 1.

No. 566,607.

Patented Aug. 25, 1896.



INVENTOR
P. H. McGowan
BY Munn & Co
ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

P. H. MCGOWAN.
CONCENTRATOR.

No. 566,607.

Patented Aug. 25, 1896.

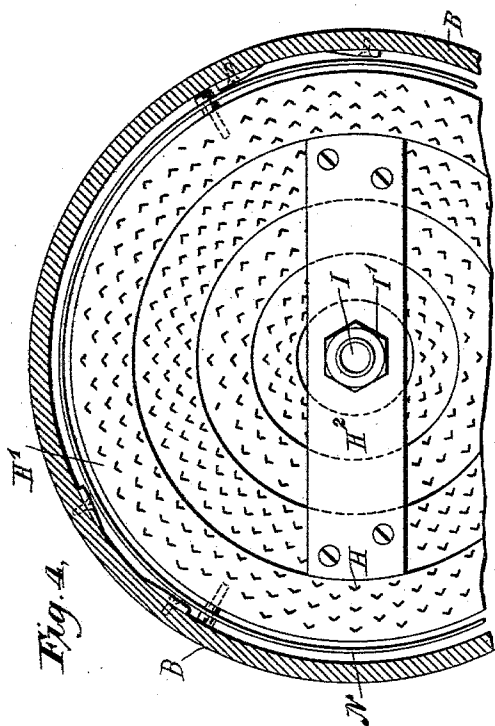


Fig. 3,

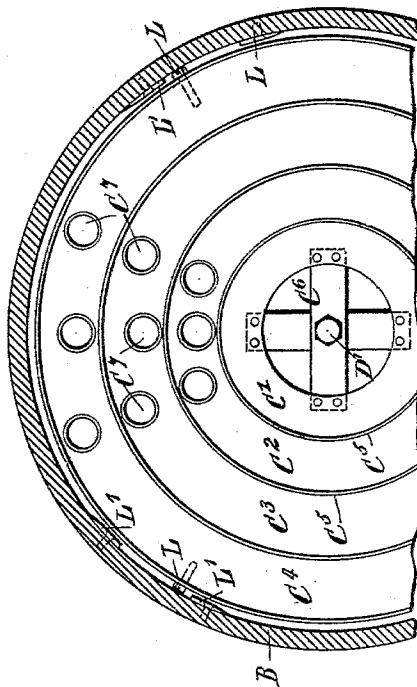
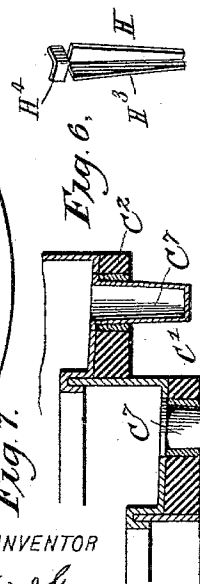
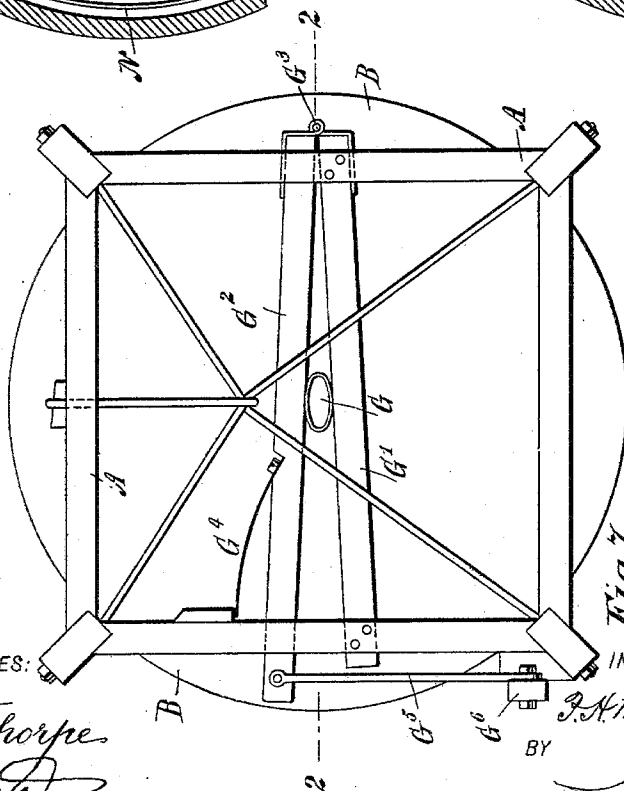


Fig. 3,



WITNESSES:

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PATRICK H. MCGOWAN, OF DENVER, COLORADO.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 566,607, dated August 25, 1896.

Application filed July 8, 1895. Serial No. 555,276. (No model.)

To all whom it may concern:

Be it known that I, PATRICK HENRY MCGOWAN, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and Improved Concentrator, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved concentrator which is simple and durable in construction and arranged for concentrating all valuable minerals having greater gravity than the gangue which accompanies them, especially free milled gold, ores from stamp-mills, auriferous gravel or sand placer dirt, to save all the precious metal contained in the material.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an end elevation of the improvement. Fig. 2 is a sectional side elevation of the same on the line 2 2 of Fig. 3. Fig. 3 is an inverted plan view of the same. Fig. 4 is a broken sectional plan view of the same on the line 4 4 of Fig. 2. Fig. 5 is a similar view of the same on the line 5 5 of Fig. 2. Fig. 6 is a perspective view of one of the agitator-teeth in an upside-down position, and Fig. 7 is an enlarged sectional side elevation of part of the pan.

The improved concentrator is provided with a suitably constructed frame A, supporting a tank B, in which is arranged a pan C, provided with a series of steps C' C² C³ C⁴ made circular, as is plainly illustrated in Figs. 2, 5, and 7. Each of the steps C' C² C³ C⁴ is covered by amalgamating plates, as indicated in Fig. 7, and the said steps are inclined from their inner to their outer peripheries in a downward direction, with the inner edge of each formed with a standing flange or dam C⁵, for retaining the material on the step as long as possible to separate the tailings from the precious metals.

The lowermost annular step C' is supported on a cross or spider C⁶, held between two nuts D' and D², screwing on a shaft D, mounted to turn loosely on a stud E, projecting into the bored lower end of the said shaft D. The stud E is supported on an arm E' held in the tank B. The step C' opens with its central

aperture into a hopper F, provided with an outlet F', passing through the bottom of the tank B to connect at its lower end with a flexible discharge-pipe G for carrying off the material from time to time, as hereinafter more fully described.

Each of the steps C' C² C³ C⁴ is provided with a number of receptacles C⁷, containing quicksilver, the said receptacles being removably connected with the steps. Over each of the steps C' C² C³ C⁴ operate agitators or stirring-teeth H, secured at their upper ends to a step-like disk H', provided with a spider H², held between two nuts I' and I², screwing on a shaft I, made hollow at its lower end to receive the upper end of the shaft D, which thus supports the said shaft I, the latter being mounted to turn at its upper end in suitable bearings formed in a bracket A' of the frame A.

Each of the agitators or stirring-teeth H is made in the form shown in Fig. 6—that is, is made of angle-iron with a shank H³, having the sides of its lower end H⁴ bent in opposite directions, as will be readily understood by reference to Fig. 6. A tooth made in this form more effectually stirs the material in the corresponding pan-steps C' C² C³ C⁴, and passes easily through the material, and, with the upper portion of a tooth bent and placed as it is, has a tendency to force the top material toward the center of the pan, while the lower portion of the tooth has a tendency to withdraw toward the circumference such materials as have settled nearly to the bottom of the step, thus making it impossible for the concentrates intended to be saved to get away. A distributing-cone J is secured to the top of the disk H' carrying the agitators H, and upon this distributor J opens the lower end of a hopper K, supported in a frame A² held adjustable on the frame A, to permit of raising and lowering the hopper K relative to the distributor J, to permit more or less material to pass from the hopper K upon the distributor J. The hopper K is provided with a sleeve K', held loosely on the shaft I, and resting with its lower end on the apex of the distributor J.

In order to impart a forward and backward rotary motion to the shaft I, I provide the upper end thereof with an arm I³, adapted to

be taken hold of by the operator to move the arm forward and backward, so as to cause the shaft I, distributor J, and disk H', carrying the agitators H to move forward and backward over the steps. The movement of the agitators H through the material on the steps causes the pan C to turn, this movement, however, being limited by stop-pins L, projecting from the side of the upper step C⁴ between the stops L', attached to the tank B, as illustrated in Fig. 5. The circular motion of the pan C, being thus suddenly arrested, gives a shock to its contents which effectively advances the heavier materials toward the circumference. An annular flange N extends upwardly from the uppermost step C⁴ above the base of the distributor J, so that the material passing down the distributor J is guided by the said flange N upon the uppermost step C⁴. The material agitated by the agitators H causes the precious metals to settle in the lowermost part of the step C³, while the lighter material passes over the flange C⁵ to the next step C², to be there agitated by the agitators H, and so on, the material being treated on the several steps so that finally but very light particles or tailings pass over the lowermost flange C⁵ into the chute F and to the discharge-pipe G. When a full supply of water or no water at all is used, this discharge-pipe G is held constantly open; but when the work is done with a small quantity of water, then it is held closed and is only opened from time to time. For this purpose I provide a fixed clamp G', operating in connection with a movable clamp G², to press the flexible discharge-pipe G to hold the latter closed. The clamp G² is pivotally connected at G³ to the fixed clamp G' and is pressed on by a spring G⁴. The free end of the clamp G² is pivotally connected by a link G⁵ with a lever G⁶, fulcrumed on the frame A and extending upwardly to be engaged by the arm I³ whenever the latter is moved to the end of its stroke, so that at this time the discharge-pipe G is opened to discharge the tailings.

The operation is as follows: The material, such as screen placer dirt or stamp-mill pulp and the like, is placed in the hopper K, and then the arm 13 is moved back and forth to impart a rotary motion forward and backward to the shaft I, the said distributor J, and the agitator H', carrying the agitators H. In moving the distributor J the material in the lower part of the hopper K passes from the latter upon the distributor and down the same to the guide-flange N, to be finally delivered into the uppermost step C⁴ of the concentrating-pan C. If the stroke given to the arm I³ is long, the feed of the material is greater and the work done in the concentrator is in proportion to the length of the stroke. The material passes down and over the several steps C⁴ C³ C² C' of the pan C with its valuable precious metals, which are retained on the plates or in the receptacles C'. In case water is

used, the tailings are carried off by the stream of water passing out at the discharge-pipe G. If the work is done dry, the tailings are left at one side of the machine, the machine being moved closer to the bank to be worked to make room for more waste.

It will be seen that by the arrangement described the light material in passing from one step to the other operates inwardly against the action of the centrifugal force when the pan C is in motion, while the heavier material near the outer and lower parts of the steps is assisted outward and away from danger of escape by the centrifugal force.

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

1. A concentrator comprising a pan having its bottom composed of a series of annular steps descending toward the center and terminating in a discharge-opening at the center, each step having a standing flange or dam at its inner edge, and a rotary disk provided with depending agitators or teeth operating over the steps of the said pan, a conical distributor forming the top for the said disk and extended to the outer edges thereof, and a feed-hopper opening upon the said conical distributor substantially as shown and described.

2. A concentrator, provided with swinging or agitating teeth, each formed with a shank made of angle-iron and with the sides of the lower end bent in opposite directions, substantially as shown and described.

3. A concentrator provided with a flexible discharge-pipe, a spring-clamp closing the same, and an oscillating disk with agitators, and mechanism connecting the same with the clamp for intermittent automatic discharge substantially as shown and described.

4. A concentrator provided with a flexible discharge-pipe, and a clamping device consisting of a horizontal fixed bar G', a horizontal hinged bar G², a connecting-rod G⁵ attached thereto, a vertical lever G⁶, and spring G⁴, for pressing the said flexible pipe to close the latter and to release the pipe to open the same substantially as shown and described.

5. A concentrator comprising a tank, a concentrating-pan mounted to oscillate loosely in the said tank about a vertical axis, means for limiting the oscillating motion of the said pan, and an agitating-disk corresponding in shape to the concentrating-pan and provided with agitators or teeth arranged to act upon the material in the pan and through said material to turn the pan to a jarring contact with its stops substantially as shown and described.

6. A concentrator comprising a tank, a concentrating-pan mounted to oscillate loosely in the said tank and provided with a series of annular steps descending and decreasing in size toward the center and terminating in a central discharge, means for limiting the oscillating motion of the said pan, and for

communicating shocks to the materials therein contained, and an agitating-disk adapted to be oscillated, and provided with agitators or teeth arranged in step form over the steps of the pan, the said agitators being formed to agitate the material on the steps and to turn the pan, and a conical distributor on the top of said disk extending to the outer edge of the latter for guiding the material to the uppermost step of the concentrating-pan substantially as shown and described. 10

PATRICK H. MCGOWAN.

Witnesses:

GEORGE W. YOUNT,
HARRY D. MCGOWAN.