No. 800,528. PATENTED SEPT. 26, 1905.

N. B. WINTER.

ORE WASHER AND CONCENTRATOR.

APPLICATION FILED NOV. 17, 1904.

2 SHEETS—SHEET 1.

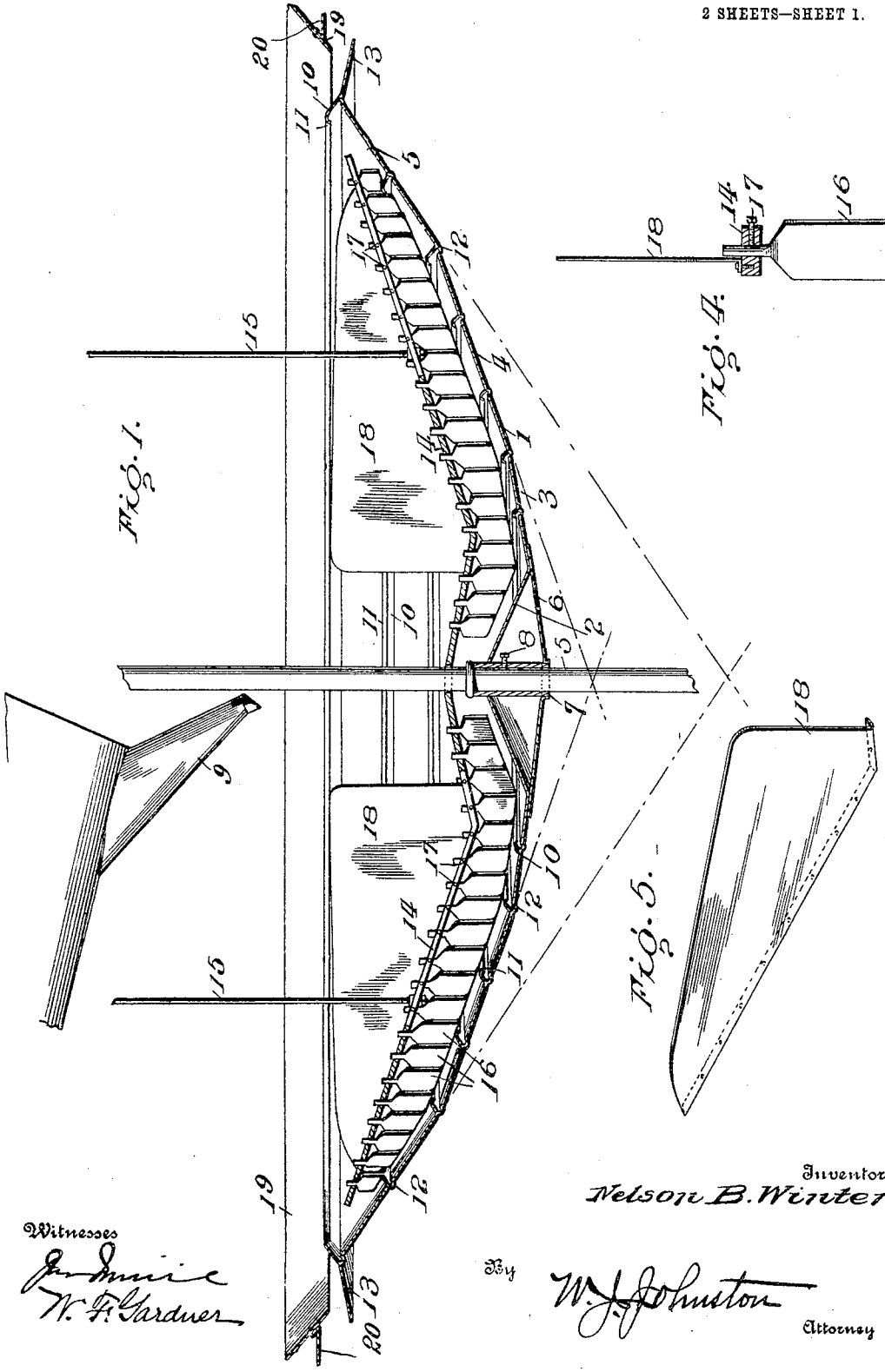


Fig. 1.

Fig. 4.

Fig. 5.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

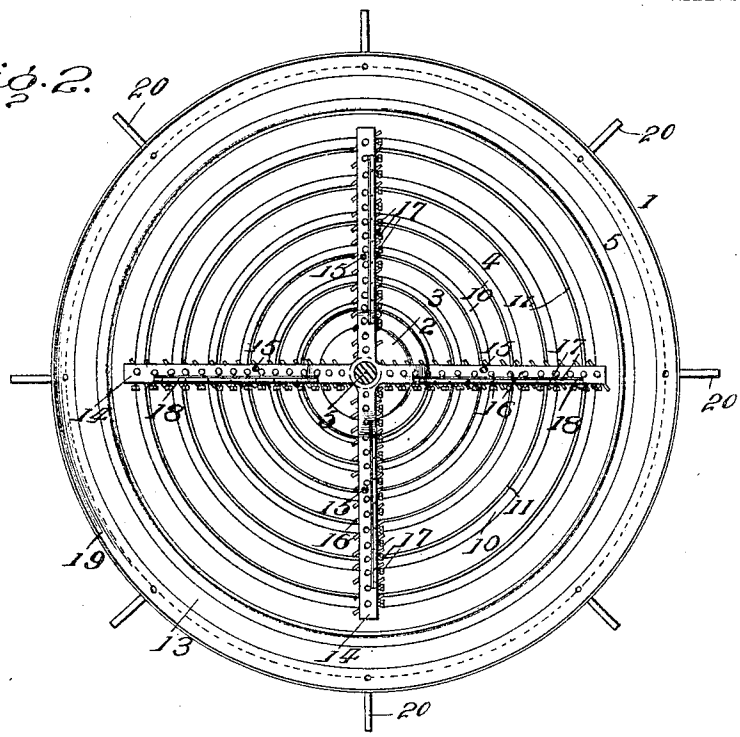
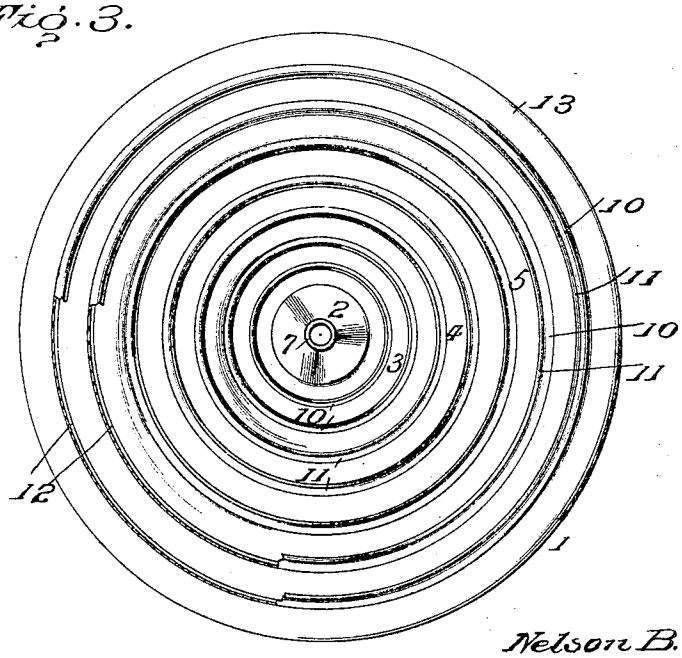


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ORE WASHER AND CONCENTRATOR.

No. 800,528. Specification of Letters Patent. Patented Sept. 26, 1905.

Application filed November 17, 1904. Serial No. 233,167.

To all whom it may concern:

Be it known that I, NELSON B. WINTER, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Ore Washers and Concentrators, of which the following is a specification.

The intent of this invention is to devise a novel mechanism for the separation and concentration of ore by the combined action of centrifugal and gravitative forces, assisted by mechanical agitation and the disintegrating and differentiating action of water upon the slimes or mass.

In its organization the separator embodies a circular concentrating-table of dished form having a central cone-shaped distributer and graded annular inclines or planes which progressively increase in inclination from the center outward to neutralize wholly or in part the effect of centrifugal force and the currents of water on the material, with the result that the latter is more evenly distributed over the surface of the dished concentrating-table and the heavier particles retained, whereas the lighter particles are driven off.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment thereof is shown in the accompanying drawings, in which—

Figure 1 is a vertical central section of an ore-concentrator embodying the invention. Fig. 2 is a top plan view thereof. Fig. 3 is a top plan view of the dished concentrating-table, parts of the annular ribs being broken away. Fig. 4 is an end view of an agitator-bar, showing the manner of attaching a vertical amalgamated plate thereto. Fig. 5 is a cross-section of an agitator-bar, showing a blade in elevation and the means for attaching the latter to said bar.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The concentrating-table upon which the separation of the ore is effected is indicated at 1 and is of circular and dished form and comprises a central portion 2 of conical form and a series of graded inclines or planes 3, 4, and 5 of annular form. The concentrating-table is preferably constructed of plate metal, and the conical part 2 is strengthened by braces 6, which incline in an opposite direction. A sleeve 7 is provided at the center of the table and is connected near its ends to the upper portion of the cone 2 and to the lower ends of the braces 6. The sleeve 7 receives the vertical shaft 5 and is held thereto by means of a set-screw 8. Rotary motion is applied to the vertical shaft 5 from any source of power in any determinate way. The centrally-disposed cone 2 acts as a distributer or a deflector to impart initial outward movement to the material as it is received upon the concentrating-table. A spout 9 is arranged to deliver the ore, slimes, or conglomerate mass upon the center portion of the table. Hence the advantage of the cone 2 for effecting outward movement of the mass in the operation of the separator. The annular inclines or planes 3, 4, and 5 are upwardly flared and are graded, the inclination of each being more pronounced from the center outward to offset the action of the currents and the centrifugal force attendant upon the operation of the separator, so as to retain the native ores and metals and permit the lighter articles—such as gravel, sand, and mud—to pass over the outer edge of the table.

A series of ribs 10 of annular formation have a concentric arrangement upon the concentrating-table and extend from the upper side thereof at an inward inclination, so as to form an acute angle with said table. The ribs 10 gradually increase in height from the center outward, and their upper edges are inwardly deflected, as shown at 11, to form retaining lips or flanges for holding the material upon the table until proper separation thereof has been effected. It is well known that the portions of a rotating part travel proportionately faster according to their relative distance from the center or axis of rotation. Hence the centrifugal action and currents are proportionately greater toward the outer edge of the table, and in order to prevent a too rapid discharge of the material the table is composed of flaring graded inclines or planes, and the ribs 10 are progressively increased in height from the center upward. Annular grooves or channels 12 are formed at the base

of the respective ribs 10 and constitute troughs or pockets in which the concentrates lodge and are out of the path of the material required to be separated and concentrated. These annular pockets or troughs 12 may be formed in any manner by having them arranged at the lower edges of the ribs 10 and at the angle formed between said ribs and the table. The concentrates are positively directed therein and prevented from displacement either by centrifugal action, the currents of water, or the moving of the mass over the table.

A distributer or fender 13 is arranged at the outer edge of the concentrating-table and consists of an annular declining plane which serves to evenly and quickly distribute the material when thrown from the table and at the same time prevents its being drawn under the table toward the center by the undercurrent produced by the revolutions thereof. This distributer or fender may be an integral part of the concentrating-table or may be attached thereto, as found most advantageous.

A series of agitator-bars 14 are arranged above the dished concentrating-table and conform approximately thereto, as indicated most clearly in Fig. 1. These bars 14 have a radial arrangement and in the preferable construction are fixed with reference to the concentrating-table and are supported from any suitable framework (not shown) by means of hangers 15. Each of the agitator-bars is provided in its length with agitators 16, which consist of blades or paddles having rounded shanks fitted into openings of the agitator-bars and held therein in the required position by means of set-screws 17. This construction admits of both vertical and angular adjustment of the agitator or blades 16, as may be required. The agitator or blades have a parallel arrangement and are set at an inclination with reference to circular paths, so as to effect lateral movement of the material upon the concentrating-table in the operation of the separator. The agitators are provided in sufficient number and are disposed at such relative inclination as to overlap, thereby insuring their acting upon every portion of the material upon the concentrating-table. For catching float-gold amalgamated plates 18 are arranged above the concentrating-table and are preferably attached to the agitator-bars 14. The plates 18 have a vertical and a radial disposition and may be of copper or other metal commonly used in ore-concentrators for receiving amalgam, by means of which particles of the precious metals floating in the water are collected. The amalgamated plates are of tapered form to admit of their upper edges being approximately parallel with the level of the water and their lower edges conforming to the outline of the agitator-bars, so as to fit close thereto. Any means may be employed for securing the plates to the agitator-bars, and in the simplest construction the lower edges of the plates are bent laterally and apertured to receive bolts or like fastenings which are let into the agitator-bars.

A collector 19 of annular form encircles the concentrating-tables and is upwardly flared and overlaps the distributer and fender 13 and is amalgamated, so as to catch any float-gold that may escape the amalgamated plates 18. The upper edge portion of the collector 19 extends above the surface of the water in which the concentrator is immersed and operates so as to intercept and gather float-gold which might otherwise be lost. The collector 19 is preferably stationary and is attached to the framework (not shown) by means of arms 20.

In the practical and successful operation of the concentrator the latter is submerged in water contained in a tank or reservoir, and rotary motion is imparted to the shaft 5 from any suitable source of power, the speed being regulated to insure distribution of the slimes, conglomerate mass, or material to be separated, due allowance being made for centrifugal force and the action of the currents of water on the material. The ore is fed to the concentrator through the spout 9 and is received upon the cone 2 and is distributed or moved outward thereby and is further spread over the table by centrifugal force due to rotation thereof. The mass is agitated and stirred by means of the blades or paddles 16 and is disintegrated by the action of the water, the latter also assisting in separating the mass according to the difference in the specific gravity of its constituent element. The flaring graded inclines or planes of the concentrating-table retard the outward movement of the mass proportionate to its distance from the axial line of rotation, the retarding being further effected by the action of the graded ribs 10. The concentrates accumulate near the surface of the table, whereas the lighter particles are carried outward by centrifugal action and finally are thrown from the table, the distributer 13 assisting their discharge and preventing them from being drawn under the table by undercurrents due to rotation thereof. The metal and heavy ore gravitate toward the center of the table, as well as accumulate in the angle troughs or pockets 12, from which they are removed at intervals in the accustomed manner. Any float-gold that may be separated is collected by coming in contact with the amalgamated plates 18 or by the collector 19, as will be readily comprehended.

Having thus described the invention, what is claimed as new is—

1. In an ore-concentrator, a circular concentrating-table of dished form adapted to have rotary movement imparted thereto and comprising a concentric series of annular

planes each inclined outward and upward from the preceding at a greater pitch in progressive order from the center outward, and annular ribs projected upward from said table at the juncture of the respective annular planes and gradually increasing in height from the center outward, and having inner flanges at their upper edges overhanging the outer edges of the adjacent inner planes to form deflecting-lips.

2. In an ore-concentrator, a circular concentrating-table of dished form adapted to have rotary movement imparted thereto and comprising a concentric series of annular planes each inclined outward and upward from the preceding at a greater pitch in progressive order from the center outward, annular grooves in the table at the juncture of the respective annular planes, and ribs extended upward from the inner edges of the respective annular planes about in line with the outer edges of said grooves.

3. In an ore-concentrator, a circular concentrating-table of dished form adapted to have rotary movement imparted thereto and comprising a concentric series of annular planes each inclined outward and upward from the preceding at a greater pitch in progressive order from the center outward, annular grooves in the table at the juncture of the respective annular planes, ribs extended upward from the inner edges of the respective annular planes about in line with the outer edges of said grooves, and having inner flanges at their upper edges to overhang the said grooves.

4. In an ore-concentrator, a circular concentrating-table of dished form adapted to have rotary movement imparted thereto and comprising a concentric series of annular planes each inclined outward and upward from the preceding at a greater pitch in progressive order from the center outward, annular grooves in the table at the juncture of the respective annular planes, ribs extended upward from the inner edges of the respective annular planes about in line with the outer edges of said grooves and inclined inward to overhang said grooves provided at their upper edges with inner flanges.

5. In an ore-concentrator, the combination of a rotary concentrating-table provided at its outer edge with a declining distributer, and an oppositely-inclined annular collector located wholly above and overlapping the said distributer.

6. In combination, a rotary concentrating-table provided at its outer edge with an inner deflecting-flange and an outer declining distributer, and an oppositely-inclined annular collector arranged above and overlapping said distributer and encircling the concentrating-table.

7. In combination, a rotary concentrating-table of dished form comprising a centrally-disposed cone-shaped distributer and a series of flaring graded inclines, radially-disposed agitator-bars located above the table and conforming thereto, and amalgamated plates of tapered form attached to the agitator-bars, substantially as set forth.

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

NELSON B. WINTER. [L. S.]

Witnesses:
WM. W. PEASE,
WILLIAM WIESSLER, Jr.