C. F. PAIGE.

CONCENTRATOR.

APPLICATION FILED JULY 8, 1915.

1,185,129.

Patented May 30, 1916.

2 SHEETS—SHEET 1.

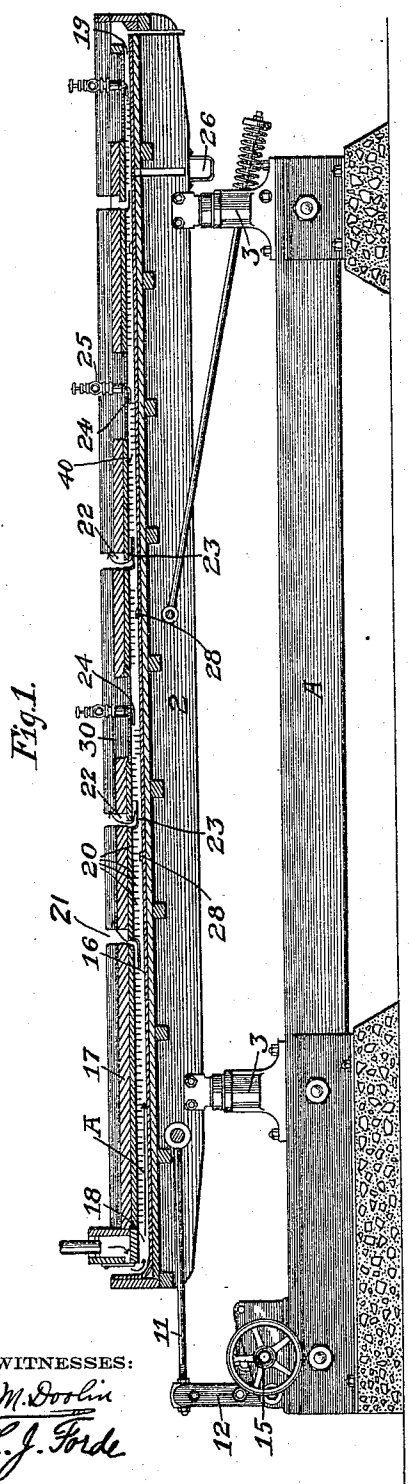


Fig. 1.

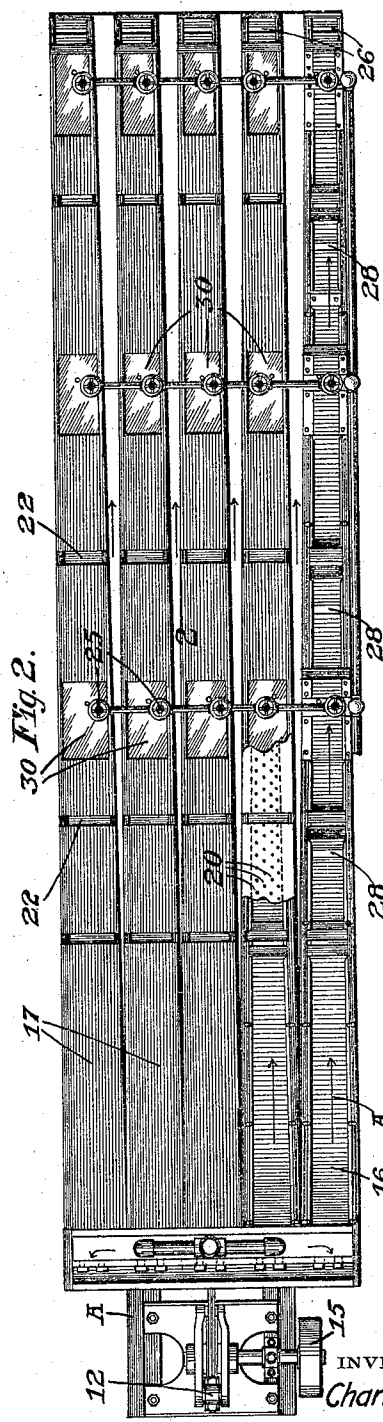


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3

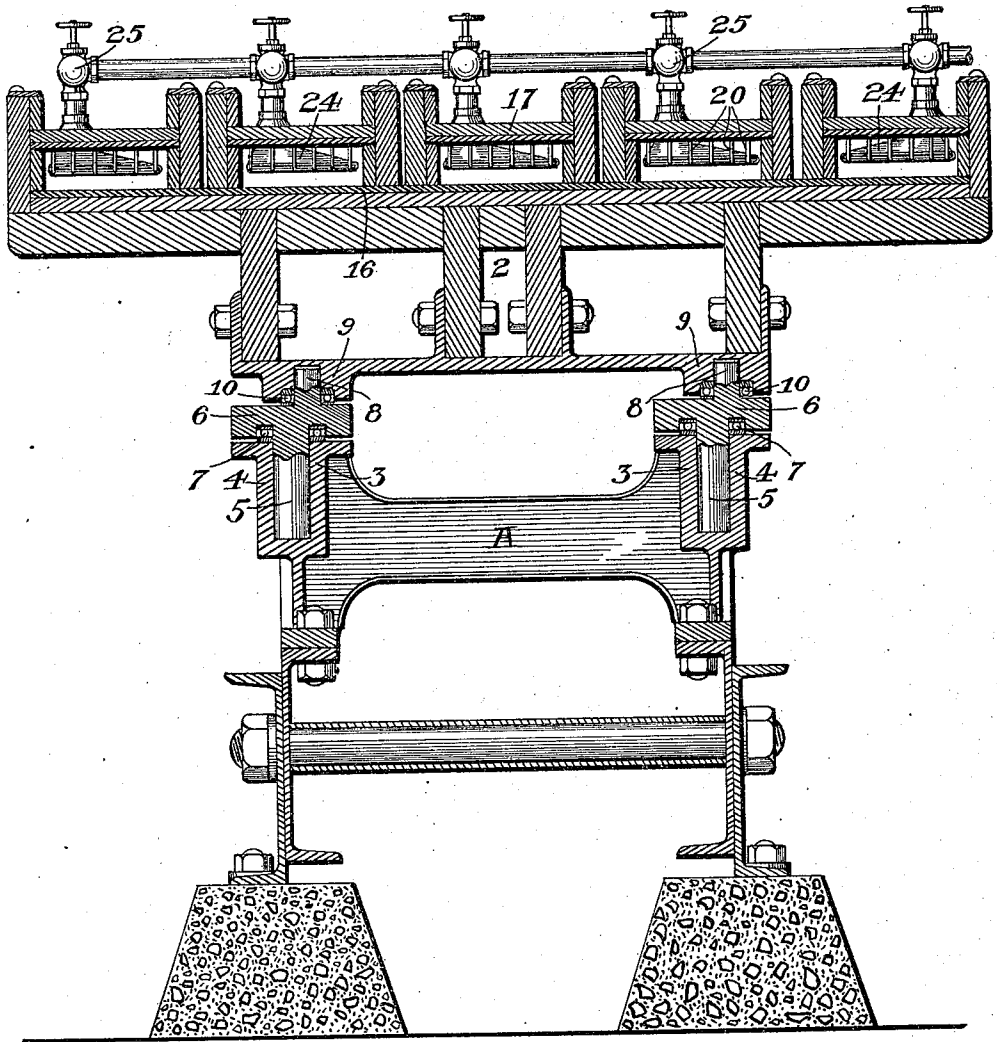
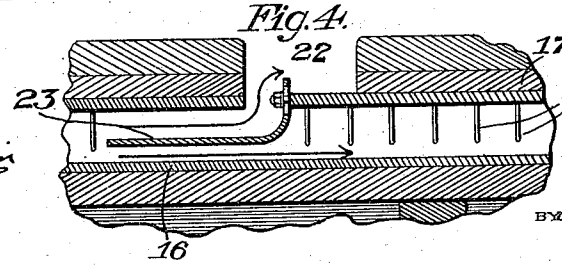


Fig. 4.



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CHARLES F. PAIGE, OF OAKLAND, CALIFORNIA, ASSIGNOR OF ONE-THIRD TO ADOLPH W. JONES AND ONE-SIXTH TO HARRY B. DE MOOY, OF OAKLAND, CALIFORNIA.

CONCENTRATOR.

1,185,129. Specification of Letters Patent. Patented May 30, 1916.

Application filed July 8, 1915. Serial No. 38,701.

To all whom it may concern:

Be it known that I, CHARLES F. PAIGE, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Concentrators, of which the following is a specification.

This invention relates to concentrators.

One of the objects of the present invention is to provide a concentrator suitable for handling all kinds of ores and material containing substances of different specific gravities; to provide means for producing an absolute separation of values from the gangue; and to provide means for classifying and separating the materials of varying specific gravities.

Another object of the invention is to provide adjustable skimmers and counter-currents to assist separation and removal of gangue, and to provide a novel means whereby all values contained in slimes may be quickly and positively precipitated.

Further objects will hereinafter appear.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a central longitudinal section of the concentrator. Fig. 2 is a plan view of same. Fig. 3 is a cross detail sectional view. Fig. 4 is an enlarged section.

Referring in detail to the drawings, A indicates a main frame provided for the purpose of supporting a concentrating table 2. the table being carried by standards 3 which are constructed as follows: 4 indicates a bearing member, in which is turnably mounted a pin 5 having a shoulder 6 formed thereon, between which and the bearing 4 a ball-bearing 7 is interposed. Formed integrally with the shoulder or collar 6 and positioned crankwise with relation to pin 5 is a pin 8 which extends up into a socket member 9 secured on the lower side of the table; a ball-bearing 10 being interposed between collar 6 and socket member 9 to reduce friction to a minimum.

Four standards constructed as described support the table, and the table thus mounted may be vibrated or shaken by means of a connecting link 11 which is operated by means of a pivoted arm 12 oscillated in any suitable manner from a shaft having a pulley 15. The peculiar mounting of the table and the shaking mechanism employed does not, however, form any important part of the present invention.

The concentrating table proper is preferably faced with linoleum, such as indicated at 16, and is provided with a cover section 17 which covers the entire surface of the table; the space between the cover and the face of the table being such that it gradually decreases, being largest at the feed end 18 and smallest or most contracted at the discharge end 19. Secured in the cover section 17 is a plurality of pins 20 which are preferably staggered with relation to each other. The purpose of these pins will hereinafter be described. Formed in the cover section at suitably spaced intervals is a plurality of discharge openings, such as indicated at 21 and 22, and adjustably mounted with relation to each discharge opening is a skimmer plate 23 which is adapted to project down into the pulp body passing between the cover section and the face of the table. The skimmer plate, positioned in the discharge opening 21, faces the flowing pulp and is provided for the purpose of skimming off or removing the light material or worthless gangue contained in the pulp, the flowing action of the pulp being sufficient to cause the discharge at this point.

The skimmer plate mounted in opening 22 is reversed in position, when compared with the first mentioned skimmer plate, and means is, therefore, necessarily provided for the purpose of causing a discharge through opening 22. This is accomplished as follows: 24 indicates an elongated discharge nozzle connected with a source of water supply under pressure, the flow of which is controlled by a valve 25. This water, when turned on and discharged through nozzle 24, causes a counter-current in the pulp, having sufficient momentum to force the top layer of gangue over the skimmer plate 23 and out through the discharge opening 22.

A plurality of discharge openings 22 is arranged along the flow surface of the table and each of said discharge openings, with connected counter-current producing means, is provided for the purpose of gradually removing the gangue from the pulp as the contents of the pulp become classified or concentrated. The gangue is thus gradually

removed and a clean concentrate obtained and discharged through a spout 26 at the rear end of the machine.

If it is desired to classify and separate the concentrates into materials of different specific gravities it is only necessary to provide a plurality of discharge spouts 26. The heaviest material may in this manner be removed at the beginning of the table and the materials of lighter specific gravities will correspondingly settle and discharge at different points along the table. A perfect classification and separation of the concentrates may in this manner be secured.

The pins, indicated at 20, form one of the important features of the present invention and they are provided for the purpose of causing a quicker settling or precipitation of the concentrates, particularly those contained in the slimes of the pulp. The action of these pins will be as follows: With the pulp flowing or traveling in the direction of arrow A' and with the pins projecting down into the flowing mass of pulp, it will be seen that an eddy will be formed behind each individual pin. The creation of a great number of eddies in the body of the pulp permits the fine concentrates contained in the slimes to settle down on the rear side of the pin, thus producing the given result and action desired. It has also been found that in crushing the ore to pulp by means of a stamp mill or like machinery that small air bubbles are created in the pulp which have an affinity for the mineral body of the pulp, particularly such minerals as are contained in the slimes. The minerals thus collected about the air bubbles in the pulp will not settle when passing over an ordinary concentrating table and are therefore lost. This is, however, overcome in the present instance, as the air bubbles are broken up by impinging against the downwardly projecting pins 20. The concentrates collected about the bubbles are thus liberated and permitted to settle by reason of their own specific gravity and also by the eddy action created by the pins.

The provision of the several discharge openings 21 and 22 arranged at spaced intervals with relation to the flow surface of the table causes a gradual removal of the gangue or worthless material contained in the pulp, thus gradually decreasing the body of pulp flowing over the table. The reducing of the space between the cover 17 and the surface of the table is, therefore, necessary to maintain the pins 20 submerged with relation to the flowing pulp.

For the purpose of raising the pulp to a point where it can be most efficiently acted upon by the nozzles 24 a plurality of strips 28 extending crosswise of the flow surface of the table has been provided. These strips act as dams which have a tendency to raise the pulp surface closer to the counter-current creating nozzles 24 or into a position where they are more efficiently acted upon. Each dam strip 28 is, therefore, preferably introduced in the rear of each nozzle. The skimming strips 23, as previously described, are preferably adjustably mounted. This adjustable mounting is produced in any desirable manner. For instance, the upper end of the skimming plates may be slotted and secured by bolts. The adjustable mounting is of considerable importance as it permits the gangue to be gradually removed as it becomes separated from the mineral contents of the pulp, thus eliminating any danger of losing any of the values or mineral contents.

While the table here shown is particularly efficient and adapted for handling pulps containing a considerable percentage of slimes, I wish it understood that it is capable of handling practically any kind of ore or material whether it be a sulfid, a free milling ore, or any other substance containing materials of different specific gravities. The cover 17 may be provided with glass sections 30 which are positioned directly above and forward of each nozzle. These are provided for the purpose of permitting continuous observation of the counter-current or nozzle action.

The materials and finish of the several parts of the concentrator are such as the experience and judgment of the manufacturer may dictate.

I wish it understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claims and that I do not wish to limit myself to the specific design and construction here shown.

For the purpose of producing swirls or eddies in the counter-current between the nozzles 24 and the adjacent discharge openings, one or more baffle plates, such as indicated at 40 (see Fig. 1) may be provided; the object of the swirling motion being to help liberate or free the gangue from the concentrates.

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

1. In a concentrator, a table, a flow surface formed on the table over which the pulp is adapted to travel, means for shaking the table to cause the pulp to travel in a certain direction, a cover section having a plurality of discharge openings formed therein inclosing the flow surface of the table, and a skimming plate secured to the cover section adjacent to each discharge opening to carry the light material up through the opening and up over the top of the cover.

2. In a concentrator, a table, a flow sur-

face formed on the table over which the pulp is adapted to travel, means for shaking the table to cause the pulp to travel in a certain direction, a cover section having a plurality of discharge openings formed therein inclosing the flow surface of the table, a skimming plate secured to the cover section adjacent to each discharge opening to carry the light material up through the opening and up over the top of the cover, and means for raising or lowering the skimming plates with relation to the traveling pulp.

3. In a concentrator, a table, a flow surface formed on the table over which the pulp is adapted to travel, means for shaking the table to cause the pulp to travel in a certain direction, a cover section having a plurality of discharge openings formed therein inclosing the flow surface of the table, a skimming plate secured to the cover section adjacent to each discharge opening, and a water discharge nozzle positioned in front of one or more of the skimming plates.

4. In a concentrator, a table, a flow surface formed on the table over which the pulp is adapted to travel, means for shaking the table to cause the pulp to travel in a certain direction, a cover section having a plurality of discharge openings formed therein inclosing the flow surface of the table, a skimming plate secured to the cover section adjacent to each discharge opening, and a plurality of dam plates extending across the flow surface of the table and arranged on top of the latter.

5. In a concentrator, a table, a flow surface formed on the table over which the pulp is adapted to travel, means for shaking the table to cause the pulp to travel in a certain direction, a cover section having a plurality of discharge openings formed therein inclosing the flow surface of the table, a skimming plate secured to the cover section adjacent to each discharge opening, a plurailty of dam plates extending across the flow surface of the table and arranged on top of the latter, and a plurality of downwardly extending pins secured on the inside of the cover, said pins being staggered with relation to each other and adapted to extend down into the pulp.

6. In a concentrator, a table, a member thereover having a discharge opening, a skimmer plate having a vertical part connected to the member and projecting up into the opening and having a horizontal part extending between the table surface and member in spaced relation to each to carry the light material up through the opening and over the top of said member.

7. In a concentrator, a table, a member thereover having a discharge opening, and a skimmer element for the discharge opening arranged to carry the light material up through the opening and over the top of the member.

8. In a concentrator, a table, a member thereover having a series of discharge openings, a skimmer for each opening arranged to carry the light material up through the opening and over the top of the member, and an inlet for the table, the skimmer adjacent the inlet facing the latter and the remaining skimmers facing the table discharge.

9. In a concentrator, a table, a member thereover having a series of discharge openings, a skimmer for each opening arranged to carry the light material up through the opening and over the top of the member, an inlet for the table, the skimmer adjacent the inlet facing the latter and the remaining skimmers facing the table discharge, and water discharge nozzles for the remaining skimmers facing the latter.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES F. PAIGE.

Witnesses:
W. W. HEALEY,
M. E. ERVING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."