No. 898,331. PATENTED SEPT. 8, 1908.

W. E. DARROW.

CONCENTRATING APPARATUS.

APPLICATION FILED SEPT. 4, 1907.

2 SHEETS—SHEET 1.

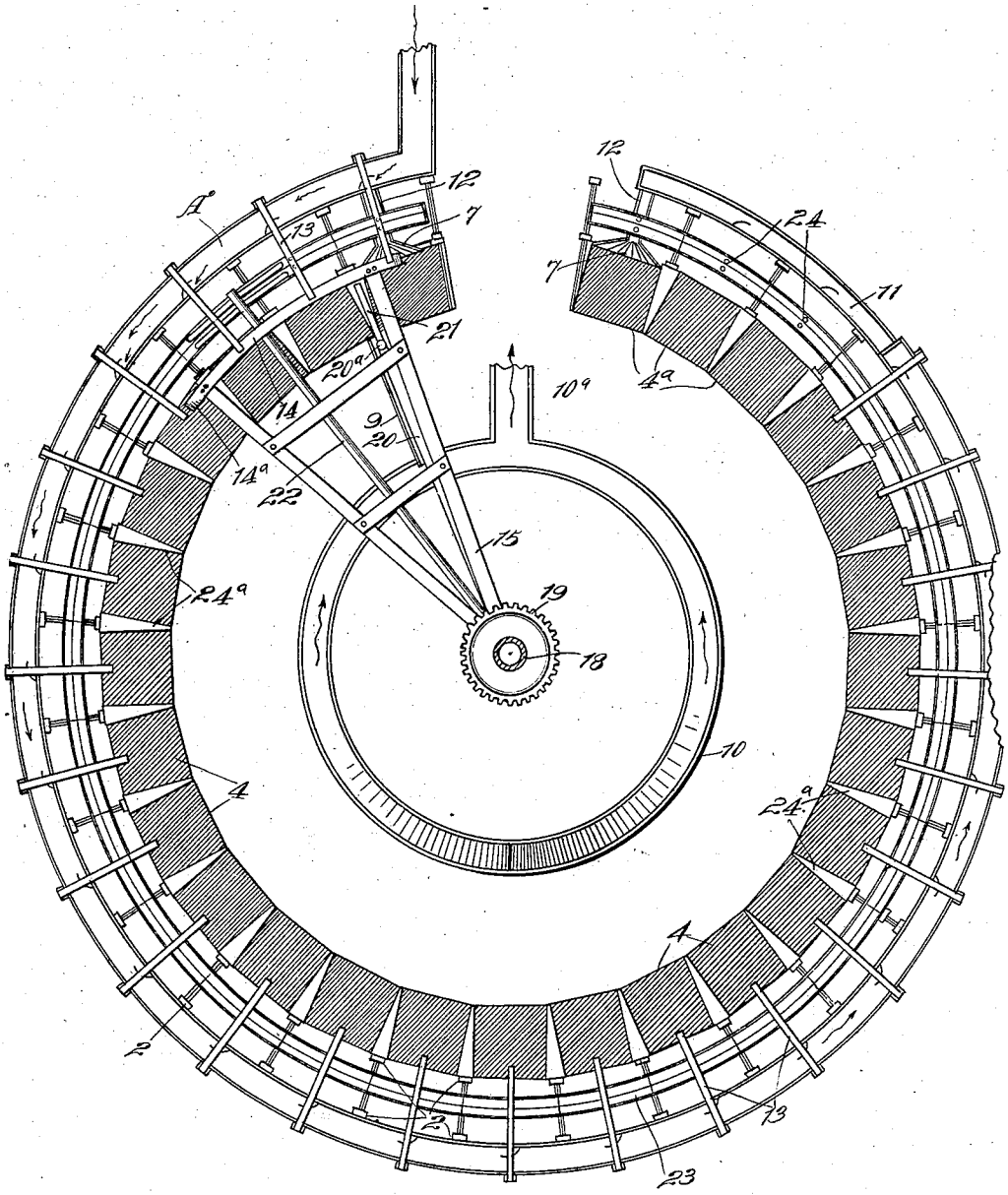


Fig. 1.

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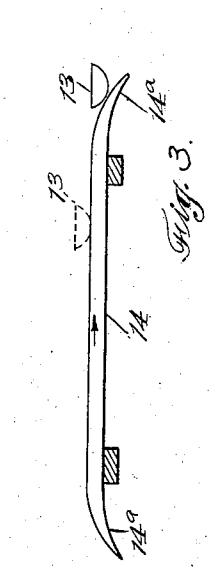


Fig. 3.

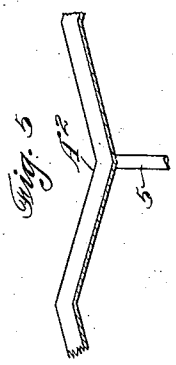


Fig. 5.

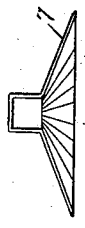


Fig. 4.

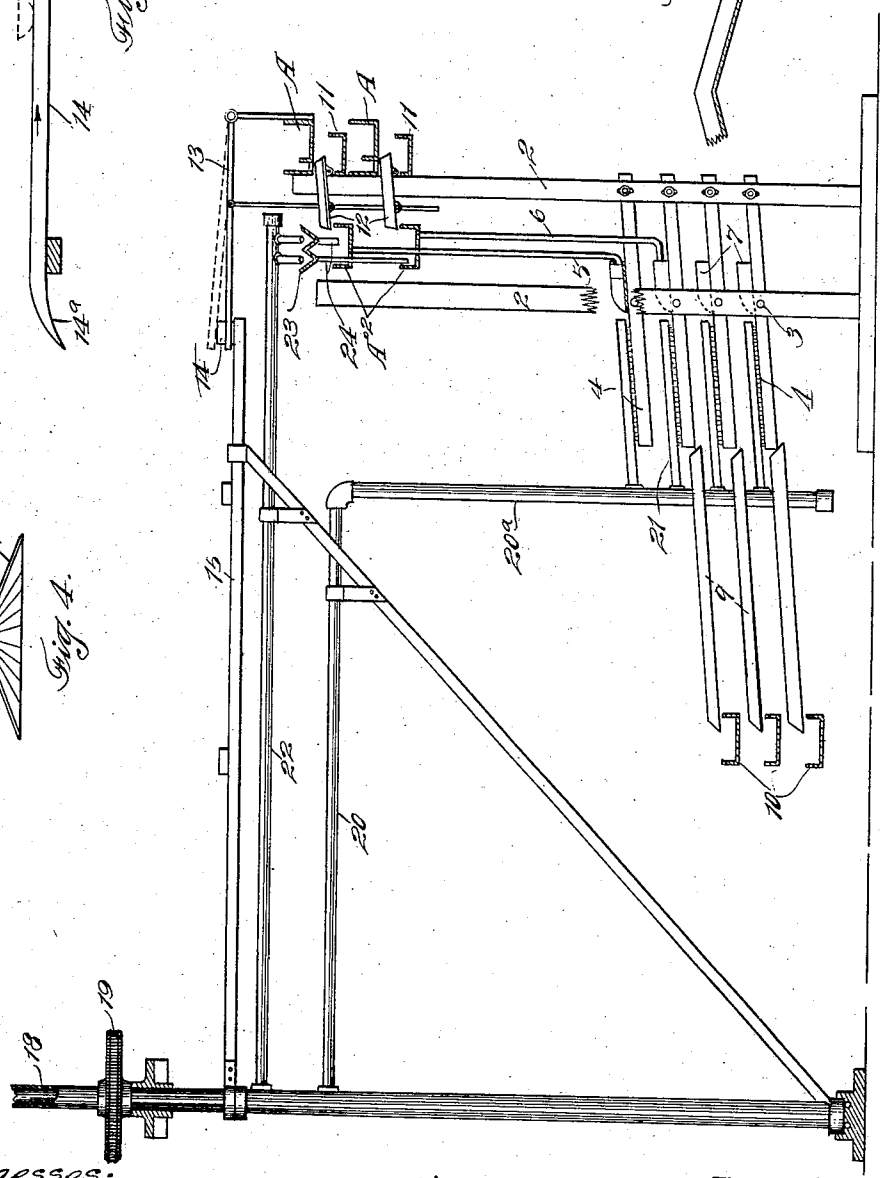


Fig. 2.

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UNITED STATES PATENT OFFICE.

WILTON E. DARROW, OF SUTTER CREEK, CALIFORNIA.

CONCENTRATING APPARATUS.

No. 898,331. Specification of Letters Patent. Patented Sept. 8, 1908.

Application filed September 4, 1907. Serial No. 391,340.

To all whom it may concern:

Be it known that I, WILTON E. DARROW, citizen of the United States, residing at Sutter Creek, in the county of Amador and State of California, have invented new and useful Improvements in Concentrating Apparatus, of which the following is a specification.

My invention relates to improvements in apparatus for collecting and recovering finely divided mineral from wet crushed ores, and is especially based upon that class of plant familiarly known as a canvas plant.

My invention consists of the parts and the constructions and combination of parts which I will hereinafter describe and claim.

Figure 1 is a plan view. Fig. 2 is a cross section. Fig. 3 is a detail drawing of the supplemental sluice-shifting device, Fig. 4 a detail view of a spreader, and Fig. 5 a sectional view of a sluice.

In the wet crushing and concentration of metalliferous ores, a considerable quantity of valuable particles becomes so finely pulverized that it cannot be economically concentrated by the usé of vanners, without first subjecting it to a preliminary rough concentration; and for this purpose canvas or equivalent tables are the most economical of present known appliances. As ordinarily constructed, these tables require a large area of surface, and are too cumbersome for properly housing; while at the same time requiring the constant attention of several operators.

For the successful concentration in this class of apparatus, it is essential that the tailings be classified into two or more grades of material; and each grade requires a different texture of canvas, and a different inclination of the table. The practical rule is that the finer the material, the finer should be the meshes of the canvas used, and the less the inclination of the grade over which the flow takes place. In constructing such a plant to meet these requirements, it is necessary that the tables be made adjustable, and that a part of each complete plant should be assigned to each of the different grades of material to be treated; each grade of material obviously requiring different supply launders, and different collecting launders.

Under my invention the tables may be combined and constructed in various forms to provide a clear traverse space for automatic saving devices.

In the accompanying drawings, I have illustrated a multiple series of tables, arranged in the form of a nearly closed circle.

The apparatus is supported preferably from the out or upper side, and the pulp is distributed from this side, flowing towards the center of the circle, while the washing, collecting and manipulating mechanism revolves around a central point, and is operated by slow-moving mechanism of any desired character.

The main pulp boxes A—A^2 illustrate any number which it may be desired to employ in series. These boxes or sluices are supported upon a suitable frame-work or standards, as at 2, one of which may carry pivot or fulcrum points 3, about which the tables 4 are tiltable; and the outer ends of these tables may be interlocked with the outer standards or supports by means of locking screws or equivalent devices engaging with vertical slots or channels in the supports, so that by loosening the locking devices the tables may be tilted, and any desired angle obtained. These sluices A may be so disposed that the receiving end will be sufficiently high, so that in passing around the circle the opposite end or terminal will be very much lower, or close to the tables.

5 and 6 show flexible pipes which are designed to convey the pulp to fan-shaped spreaders 7 at the head of each table. Only one of these spreaders is shown in detail, in order to prevent confusion of the remainder of the apparatus. In such an installation as is here shown, there may be 108 of these spreaders.

9 are traveling launders which revolve around a circle interior to the table, and so disposed that the concentrates, when removed from the tables by the spray pipes, will be received into these launders and conveyed into circular stationary launders, located within the circle, as shown at 10. These launders are so inclined that the pulp will be discharged through a suitable connection, as at 10^a.

11 are supplemental sluices so disposed with relation to the main sluices A, that by means of short, intermediate, tiltable sluices 12, the discharge may take place temporarily from the sluices A into the sluices 11; this operation taking place while the various sections are being washed and cleaned. These sluices 11 are so disposed as to carry the material temporarily diverted into them, to the

last three of the tables, so that while any one or more of the tables are being cleaned, the pulp will be temporarily diverted from the main supply sluices into these supplemental sluices, and delivered upon the three final tables 4ª; and these tables will take care of the material while the main tables are being washed.

After the washing has been completed, the tiltable sluices 12 will have their position changed, so that the material will be again supplied through the main sluices. The tilting of these sluices is effected by means of fulcrum levers 13, with suitable rods or connections from the levers to the sluices. The inner ends of the levers being arranged in a circle, are in line to receive the contact of devices 14 which are carried upon an arm 15, which swings around a centrally disposed post or support, to be hereafter more particularly described, so that when the actuating member 14 comes in contact with one of the levers, it will tilt the sluice; and when, in the course of its travel, it has moved far enough to disengage this lever, it will be in position to engage another, and thus successively change the tilting sluices, and temporarily cut off the supply to the tables, which may then be washed, and their contents removed. The member 14 is here shown in the form of a substantially horizontal arm or bar having its ends downturned, as shown at 14ª; and when one of these inclined, downturned ends comes in contact with one of the levers, it raises the lever, and depresses the outer end of the short sluice. At the same time, this bar is of such length that just previous to its raising a lever, the rear end will have released the lever of the previous sluice. Thus, the latter will be returned to its normal position, and the supply to its normal channel, before the next following one has been shifted.

The material from the sluices A is conducted to the tables by flexible or equivalent pipes 5—6, which convey the pulp to fan-shaped spreaders at the head of each of the tables 4.

The center upon which the frame and lever actuating device are carried, is here shown as a vertically supported tube 18 having a suitable step at the bottom; and at the top there may be a gear or pinion 19, which may be engaged by a worm, so that by the application of suitable power a slow, revolving motion may take place, which will actuate the distributing change mechanism at the proper rate. This pipe serves to carry a water supply which is delivered through a pipe or branch 20 having a vertical portion 20ª, and spray pipes 21, extending over the tables for the purpose of furnishing the necessary washing means.

22 is a clear water pipe, extending from the supply pipe, and delivering water into a stationary water trough 23. This pipe may have branches, which supply water to the double or parallel trough sections, and from thence to pipes 24. Each of the pairs in the vertical series A are simultaneously supplied with water. This supply pipe may also branch again at the extremities, and thus as many divisions may be made as there are grades of material to be treated. The present device illustrates two.

Water from the trough may be delivered upon the tables after the flow of pulp has been shut off, for the purpose of first washing off the waste gangue left upon the surfaces, before they are traversed by the spray jets, which are used to remove and collect the mineral.

The sluice shifting device is given just sufficient lead to turn off the pulp from one of the vertical sections, before the undulating sluice for that section commences to receive clear water from the wash water pipe 22. It will be seen that this same pipe will have advanced just far enough to pass the rear undulation before the spray pipes have reached that section. The high portion of each of these undulations of the sluice should be at the sides of the table, and the depressed portion comes immediately over the distributers and feeds the clear water into them, to wash the waste material off, as before described.

The canvas or surface material for the tables may be secured by little cleats, as at 24ª, which bind the edges of the canvas to the tables. The canvas only covers a rectangular area, and the strips forming this rectangle necessarily diverge from the inner to the outer ends.

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

1. In a concentrating apparatus, a plurality of superposed annular series of stationary tables having collecting surfaces, stationary annular pulp boxes and means to distribute pulp therefrom to the tables, supports upon which the tables rest with their ends extending radially inward beyond the supports, and a centrally journaled water supply with distributing arms extending outwardly over the tables and contiguous to the supports.

2. A concentrating apparatus having in combination, superposed circularly disposed series of stationary tables provided with retarding and collecting surfaces, supports upon which intermediate portions of the tables are pivotally mounted, said tables having their inner ends extending radially and unobstructedly beyond the supports towards the center of the apparatus, means for changing the inclination of the tables independently, a central water-supply pipe and spraying branches therefrom extending

over the unobstructed inner end of the tables, and means for causing the spraying devices to move transversely over the tables.

3. In a concentrating apparatus, superposed circularly disposed series of stationary tables having retarding and collecting surfaces, supports upon which said tables are pivoted intermediate of their length, with the inner ends projecting radially and unobstructedly toward the center beyond the supports, means including supports for the other or outer end of the tables, for changing the inclination of said tables independently, spraying devices projecting outwardly over the unobstructed inner ends of the tables, a central source of supply, connections between said source and the spraying devices whereby said devices may be caused to move transversely over the tables, and means to segregate and collect the products delivered from the tables.

4. In a concentrating apparatus, superposed circularly disposed series of stationary tables having retarding and collecting surfaces, supports upon which said tables are pivoted intermediate of their length, said tables having inner ends projecting radially and unobstructedly toward the center beyond the supports, means for changing the inclination of said tables independently, spraying devices projecting outwardly over the unobstructed inner ends of the tables, a central source of supply, connections between said source and the spraying devices whereby said devices may be caused to move transversely over the tables, means to segregate and collect the products delivered from the tables, said means including radially disposed launders traveling in unison with the spraying devices, and stationary circular launders into which said traveling launders discharge.

5. In an apparatus of the character described, a plurality of superposed tables arranged circularly and radially in series one above the other, fulcrumed supports upon which said tables rest intermediate of their length, said tables having their inner ends projecting radially and unobstructedly interior to the supports, exterior fixed posts, means for adjustably engaging the outer ends of the tables with said fixed supports whereby the angles of the tables may be independently adjusted, a central revoluble water supply pipe, a branch extending radially therefrom, and spray pipes projecting from said branch above the unobstructed ends of the tables, said pipes being capable of movement in a circle and transversely over the tables.

6. In an apparatus of the character described, superposed series of independently adjustable tables, with retaining surfaces and means for changing the incline of the tables independently, supports for the outer and intermediate portions of the tables, said tables having inner ends projecting radially and unobstructedly beyond the intermediate supports and towards the center of the apparatus, means for supplying material upon the upper ends of the tables, and launders into which the mineral to be saved from the lower ends is received, water spraying devices, means by which said devices are movable transversely of the table, a series of supplemental launders substantially parallel with the supply launders, and transversely disposed tiltable sluices whereby material may be cut off from the first named supply, and transferred to the supplemental launders.

7. In an apparatus of the character described, superposed series of independently adjustable and annularly arranged tables, supports for the outer and intermediate portions of the tables, said tables being pivotally mounted on the intermediate supports and having inner ends projecting radially and unobstructedly therefrom towards the center of the apparatus, correspondingly curved launders with means for delivering material therefrom upon the tables, a second series of launders concentric with the first named launders, transversely pivoted sluices having their ends projecting over each of the series of launders and adapted to receive material from the supply launder, and means for tilting said sluices so that material may be delivered into either of the series of launders.

8. In a concentrating apparatus, a series of circularly disposed stationary tables radial to the center of the circle, fulcrumed supports upon which said tables are independently tiltable to change their grade, said tables extending inwardly and unobstructedly beyond the fulcrums, circular launders and conducting pipes to supply material upon the upper ends of the tables, a centrally journaled stand-pipe having radial branches, one of which extends into line with the supply launders, with passages delivering water thereto, and the other extending radially and having a downwardly depending arm with spray pipes extending therefrom over the surface of the tables, radially disposed launders extending inwardly from the discharge ends of the tables, a circular inclined stationary launder into which said radial launders discharge, and a support upon which said movable parts are carried and turnable with relation to the tables.

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

WILTON E. DARROW.

Witnesses:
WILLIAM A. HERMAN,
ORVILLE C. RANDOLPH.