Nov. 25, 1924. 1,516,640

C. M. MEYER

CONCENTRATOR

Filed April 5, 1923

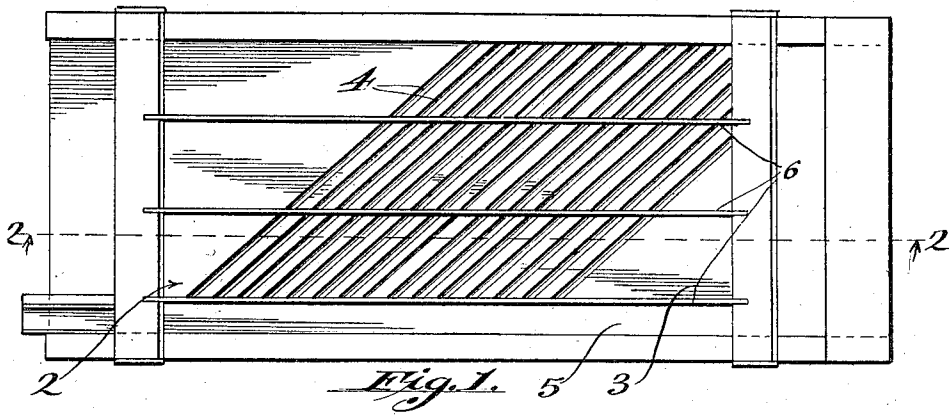

Fig. 1.

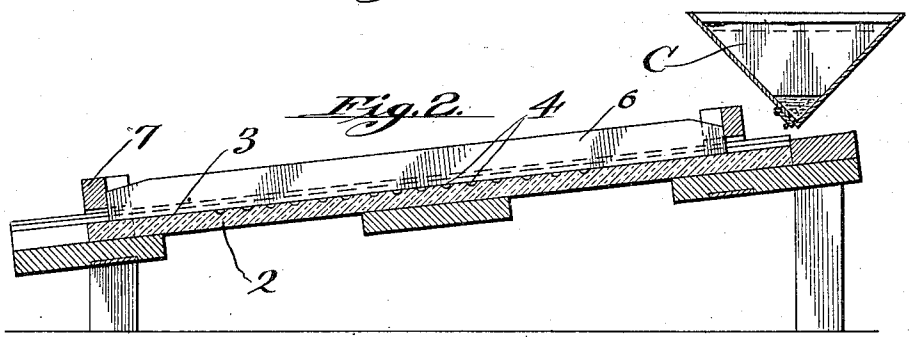

Fig. 2.

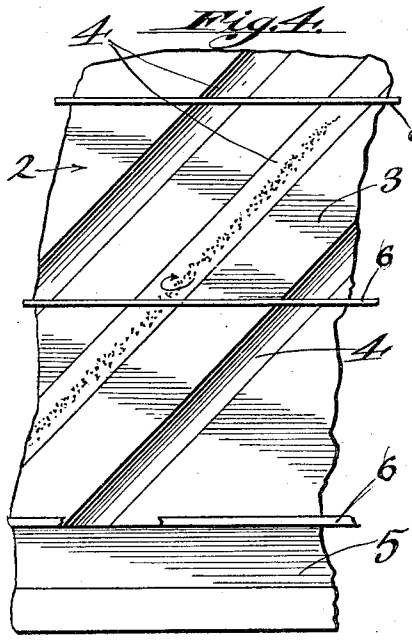

Fig. 4.

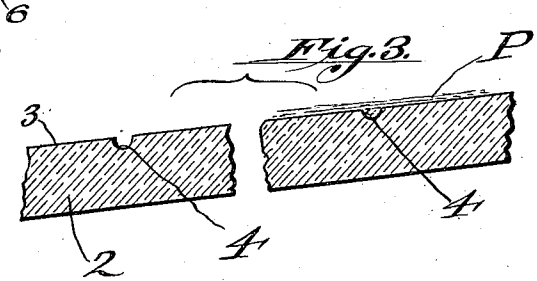

Fig. 3.

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UNITED STATES PATENT OFFICE.

CONRAD M. MEYER, OF LOS ANGELES, CALIFORNIA.

CONCENTRATOR.

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To all whom it may concern:

Be it known that I, CONRAD M. MEYER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Concentrators, of which the following is a specification.

This invention relates to that type of concentrating apparatus in which the separation of heavy valuable mineral constituents from lighter waste material is effected solely by the action of water running over an inclined surface without motion imparted to such surface or any parts attached thereto.

It is an object of this invention to provide a concentrator effectively serviceable in treating fine mill tailings or auriferous sands automatically and at very low cost.

An object is to provide a concentrator including an element having a preferably plane top face which is provided with grooves or channels and is without riffles or upwardly projecting ribs, which channels are of such design as to effectively collect the desired particles of the flowing material being treated. In other words, it is an object of the invention to provide a concentrator including a member having a plane top face over which the pulp or other flowing material may readily descend, and which is provided with grooves or channels which are angularly disposed with respect to the line of flow of the material, and which grooves or channels I have found, by actual and practical use of an embodiment of the invention, are preferably of semi-circular cross section.

I have also found that mineral pulp can be effectively handled and the concentrate collected, if the channels or grooves in the plate over which the pulp passes have a diameter of not more than $\frac{1}{8}$ nor less than $\frac{1}{16}$ of an inch. Such a diameter, the grooves being semi-circular in cross section, therefore results in a depth of from $\frac{1}{16}$ to $\frac{1}{32}$ of an inch of groove in the plate.

A further object is to provide for the effective lateral transfer of the concentrates automatically under the action of the flowing stream of pulp to a discharge duct or canal at one side of the concentrator plate.

A further object is to provide means for creating local eddies in the grooves of a character different from the eddies produced in the grooves by the mere downward flow of the pulp over the plate. To this end, I provide, in combination with a grooved concentrating plate, means for causing, at zones along each of the grooves, local swirling movement of the flowing material for the purpose of facilitating more complete separation of the lighter waste particles from the heavier metallic concentrates.

Other objects and advantages will be made manifest in the following specification of an embodiment of the invention illustrated in the accompanying drawings, wherein—

Figure 1 is a plan of one embodiment of the invention.

Fig. 2 is a vertical section on line 2—2 of Figure 1.

Fig. 3 is a vertical section of the plate transverse to the concentrating grooves.

Fig. 4 is a plan, on a somewhat enlarged scale, of a fragment of the plate, showing diagrammatically an eddy created in one of the grooves at a zone contiguous to one of the longitudinal groove bridge strips.

As shown, the invention is embodied in a plate 2, which may be of any material and design and method of construction, and which is preferably provided with a generally plane top face 3, the plate being adapted to be installed in an inclined position in any desired manner. The degree of inclination from the horizontal varying with the character of the material to be treated.

The plate may be utilized as an adjunct to other systems of concentration and particularly is it useful for a final treatment of the tailings before they are discharged as worthless material, because the process is automatic and without operative cost. On the other hand, the plates can be used as an independent system of concentration for the recovery of black sand and fine particles of gold, platinum, or other valuable minerals.

It should also be noted that whenever it is found that the concentrates from the plates are not sufficiently free from gangue material, a second series of plates can be installed below the first series for the purpose of reconcentrating the discharge from the collecting grooves of the first series in a continuous operation.

From practice, I have found that efficient results may be achieved by providing the top plane face 3 of the plate 2 with grooves 4, and have obtained satisfactory results by

the use of grooves of semi-circular cross section and of from 1/8 to 1/16 of an inch diameter or, obviously, of 1/16 to 1/32 of an inch radius and depth cut into the plate. This type of groove, from investigation, has proved satisfactory for the reason that it eliminates the angular spaces which do not allow the diagonally downward flow of the collected material in the grooves to take place as rapidly or with as much freedom as it does in a semi-circular groove. For instance, in a square or rectangular groove the collected material is forced to make its downward progress while held rigidly against the upper angle of the channel, giving less opportunity to the sorting as well as to the propelling action of the under current. In a semi-circular groove, the material travels in the center of the groove with much greater freedom. Further setting forth the advantages of my semi-circular groove, I will point out that a lesser segment of a circle than a semi-circle would not have the same efficiency for the reason that only a semi-circle or near semi-circle presents sufficient edge to the downflowing stream of water on the plate to create a strong spiral under current for the rapid downward movement of the concentrates in the diagonal grooves. It can therefore be seen that the use of the semi-circular groove has very definite advantages and is a decided improvement in this form of concentrating plate.

By my invention, the heavy values are caught in the semi-circular grooves, and for quickly transferring the caught values to a collecting canal, I arrange the grooves 4 in parallelism, preferably, and obliquely to the plate, and at an angle not less than 40% from the top edge of the plate, as clearly shown in Figures 1 and 4, so that the descending pulp stream P causes a gradual transverse shifting of the particles collected in the grooves 4, until they are ultimately discharged therefrom into a longitudinally extending collecting canal 5 at the lower end of the concentrating grooves 4.

The concentrates collected in the grooves will obviously, at the top of the plate, consist of the heaviest particles, while minerals of less specific gravity pass down towards the lower end of the plate and will fall from the pulp stream into the lower or intemediate grooves. It is possible, therefore, to make a concentration of, and to collect separately at one operation, minerals of different specific gravities.

In the treatment of tailings and auriferous sands in which the proportion of heavy valuable constituents to light waste is comparatively small, it is found that much waste material is carried along in the grooves with the mineral particles. In order to make a cleaner concentrate, I provide means for agitating and re-sorting at intervals the material flowing in oblique grooves 4. This is accomplished by providing bridged zones at intervals. At these points, the material in grooves 4 must pass under bridges 6, and while approaching and attempting to make the passage, it is subjected to the action of eddies created by the partial obstruction offered to the lateral sweep of the downward current by the bridge member 6. These local eddies quickly re-sort the material in the oblique grooves 4 and most of the light material is washed out and only the heavy particles pass under bridges 6.

The bridges 6 may consist of thin, longitudinally arranged strips resting upon the top of the plate 2 with their lower edges extending across the tops of the grooves, parallel to the direction of the downward flowing pulp. The ends of the bridges may be supported in cross pieces 7.

The material to be treated can be fed onto the upper end of the plate in any suitable manner, and as here shown, a form of classifier C is positioned to feed the pulp down onto the head of the table.

This classifier should feed graded pulp over 2/3 of the available working face of the width of the table. The outer 1/3 of the face of the table near the collecting channel 5 should receive clear water from the classifier or other source. This third is devoted to the cleansing with clear water of the concentrates as they approach the collecting groove 5. As shown in the drawing, the last bridge member 6 is placed over the outlets of the oblique grooves 4 into the collecting channel 5 and keeps any of the downward flowing waste pulp from spreading over into the collecting channel.

It is understood that the values will be separately collected from the discharge end of the canal 5, from the tailings discharged from the top of the plate.

Further embodiments, modifications and variations may be resorted to within the principle of the invention.

What is claimed is:

1. In combination, a stationary concentrator plate having obliquely arranged concentrating grooves of approximately semi-circular shape and means consisting of parallel longitudinal strips rigidly secured in position and resting on the top of the plate and extending parallel to the flow thereon, and forming bridges across the top of the grooves, so as to create local eddies in the streams of concentrates passing under the bridges.

2. A concentrating table including a board mounted in an inclined position and without motion and having upon its top face a series of parallel, semi-circular grooves running in a diagonal direction, the table having along one side a longitudinal

collecting channel for the separate discharge of collected concentrates; and a series of parallel bridge members resting upon the top of the table and being parallel with its length and with the flow of pulp down the table, the bridge members crossing the semi-circular grooves at an angle other than a right angle and forming numerous covered passageways at the zones where the bridges cross the grooves whereby local, continuous eddies or ripples are created.

In testimony whereof I have signed my name to this specification.

CONRAD M. MEYER.