No. 763,786. PATENTED JUNE 28, 1904.

G. A. OVERSTROM.

ORE CONCENTRATING TABLE.

APPLICATION FILED MAY 1, 1902.

NO MODEL.

Fig. 1.

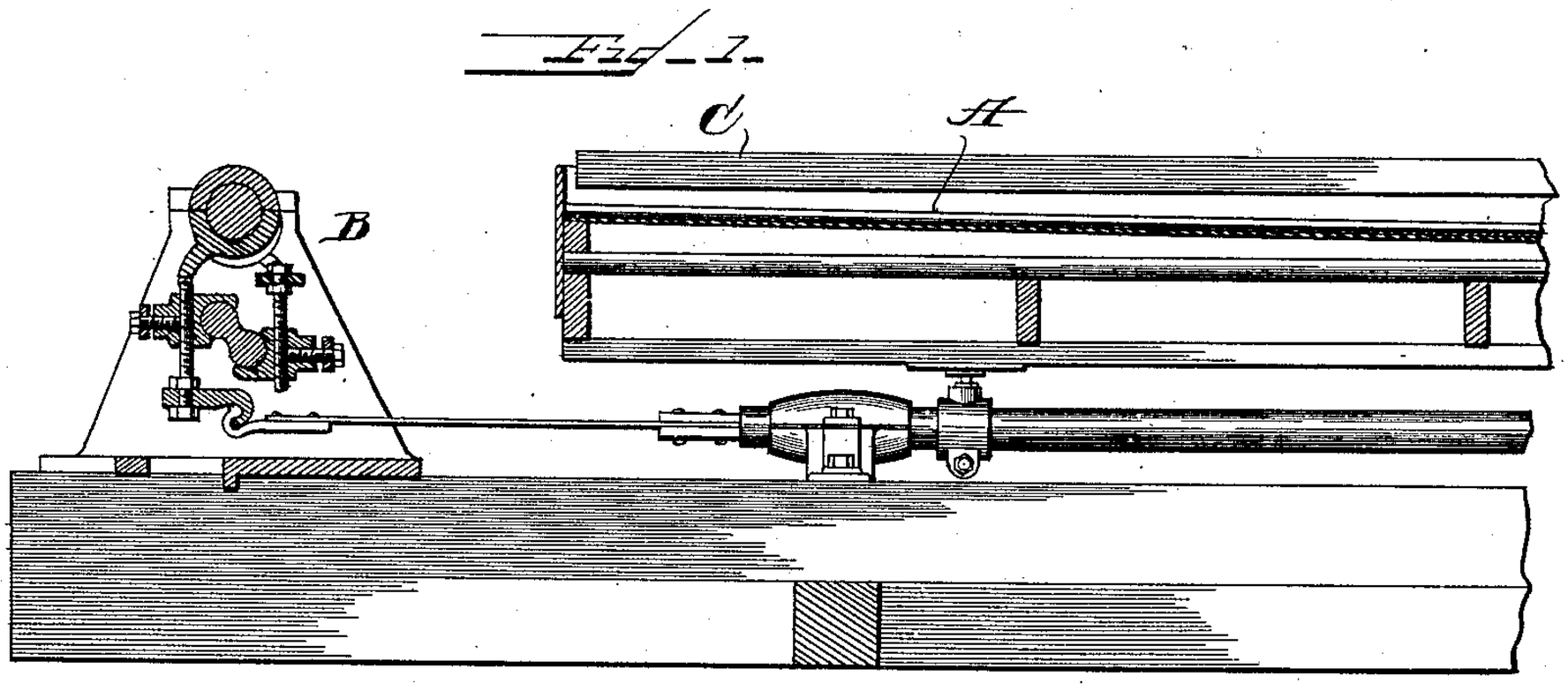


Fig. 2.

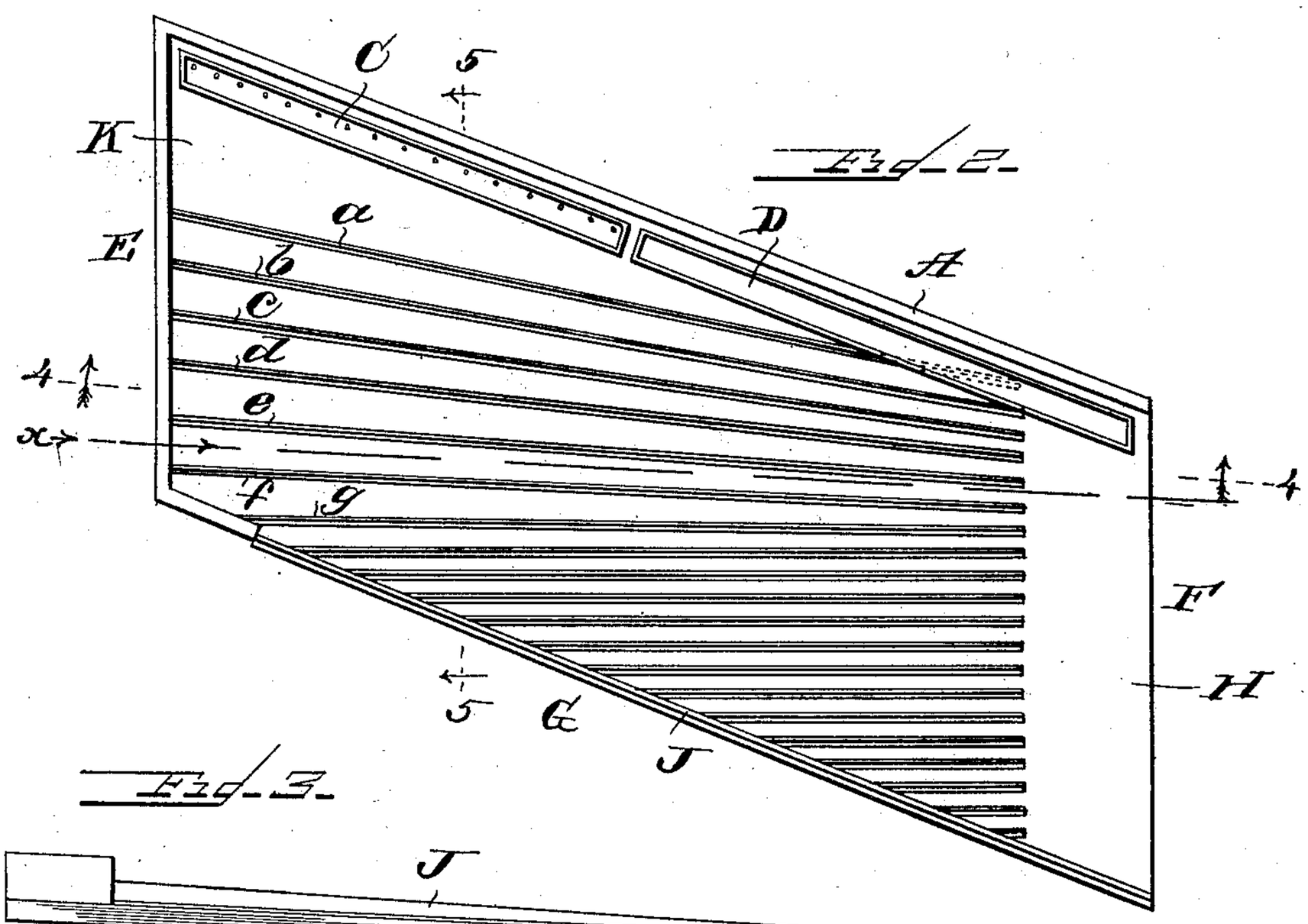


Fig. 3.

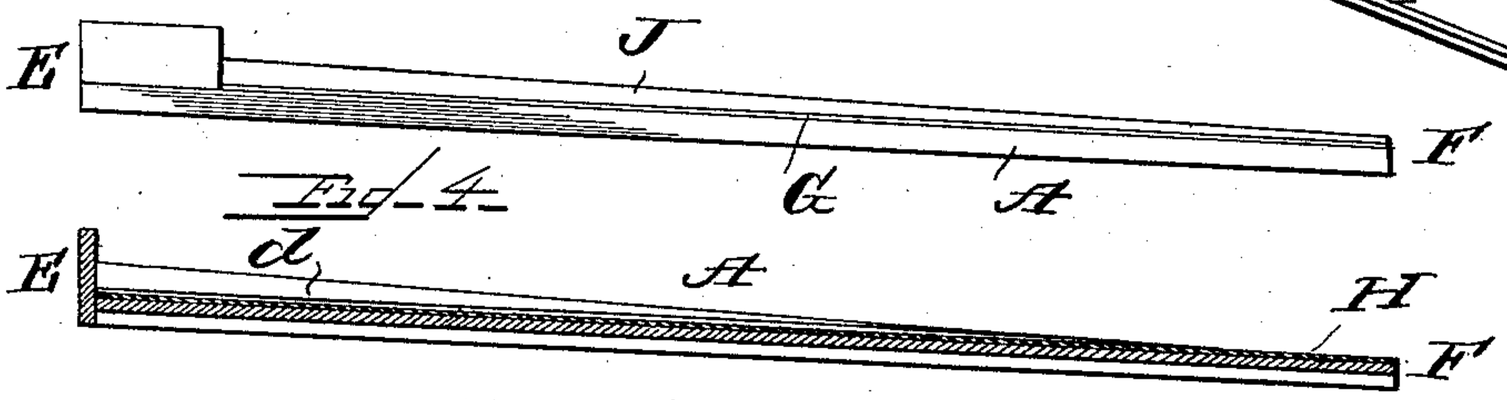
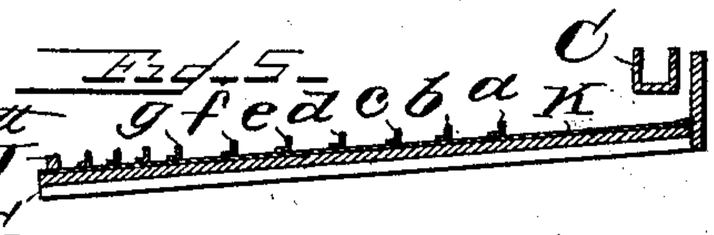


Fig. 4.

Fig. 5.



Witnesses.
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No. 763,786. Patented June 28, 1904.

UNITED STATES PATENT OFFICE.

GUSTAVE A. OVERSTROM, OF ANACONDA, MONTANA, ASSIGNOR TO THE OVERSTROM CONCENTRATOR COMPANY, OF BUTTE, MONTANA, A CORPORATION OF MONTANA.

ORE-CONCENTRATING TABLE.

SPECIFICATION forming part of Letters Patent No. 763,786, dated June 28, 1904.

Application filed May 1, 1902. Serial No. 105,438. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVE A. OVERSTROM, a citizen of the United States, residing at Anaconda, in the county of Deerlodge and State of Montana, have invented a new and useful Improvement in Ore-Concentrating Tables, of which the following is a specification.

This invention relates to ore-concentrating tables.

The object of the invention is to simplify and improve the construction of apparatus of this class and to render the same more efficient in operation.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in section, taken longitudinally, of an ore-concentrating table embodying the principles of my invention and showing a form of actuating mechanism therefor. Fig. 2 is a top plan view of an ore-concentrating table embodying the invention, showing the arrangement of riffles. Fig. 3 is an edge view of the lower or discharge edge or side of the table. Fig. 4 is a longitudinal section on the line 4 4 of Fig. 2 looking in the direction of the arrows. Fig. 5 is a transverse section on the line 5 5 of Fig. 2 looking in the direction of the arrows.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In the operation of ore-concentrating tables of the class to which this invention relates the crushed ore, either with or without subjecting the same to hydraulic or other sizing, is deposited upon the surface of the table and a rectilinear reciprocatory movement is imparted to the table, and at the same time a flow of wash-water is maintained over the top surface of the table and transverse to the line of rectilinear reciprocation. The mineral portion of the ore being heaviest gravitates to the bottom of the mass of ore delivered upon the table, while the rock, dirt, shale, gangue, and the like being lighter will remain on top of the mass, and under the combined influence of the reciprocatory movements imparted to the table and the transverse flow of wash-water the heavier particles of mineral will be advanced in the direction of the reciprocatory movements, while the lighter portions of dirt, rock, sand, and the like will be separated from the mineral and washed away with the wash-water. Under the influence of the combined forces of rectilinear reciprocatory movements and the transversely-flowing wash-water the natural trend of travel or advancement of the material being treated is in the direction of the component of these forces, and hence in a direction somewhat diagonal or inclined with respect to the line of reciprocatory movement. Therefore I have found that the best results are attained by employing a table having substantially parallel sides and substantially parallel ends, but the ends and sides inclined with respect to each other, thereby producing a diagonal table. I have also found that the best results are attained when the line of reciprocatory movements imparted to the table are in a direction substantially diagonal with respect to the surface of the table—that is, substantially at right angles to the ends and inclined with respect to the sides of the table.

In the drawings, reference-sign A designates a table having its sides parallel with respect to each other and having its ends parallel with respect to each other, but with the ends inclined with respect to the sides.

B designates a mechanism for imparting a rectilinear reciprocating movement to the table, and this mechanism may be of any suitable or convenient arrangement so far as the present invention is concerned, which concerns only the construction of the table itself and

the arrangement of riffles thereon, as will be more fully hereinafter pointed out and explained. In practice I have found that the best results are attained when the table is mounted so as to be slightly inclined downwardly from the end of the table to which the reciprocating mechanism is connected toward the opposite or discharge end, as clearly indicated in the longitudinal section in Fig. 4, and also when the table is slightly inclined downwardly in a transverse direction from the upper side or edge thereof toward the lower side or edge thereof, as indicated in the transverse section in Fig. 5.

In apparatus of this nature it is usual to provide riffles upon the upper surface of the table in order to form stops or ledges, which serve to hold and retain the mineral portions, which are heaviest and which sink to the bottom of the mass of ore delivered upon the upper surface of the table, finally reaching the surface of the table.

Reference-sign C designates the feed-box from which the mass of ore is delivered to the table. This feed-box is preferably arranged at the upper left-hand corner of the table as viewed in Fig. 2.

D designates the wash-water-supply launder or box and is preferably arranged along the upper edge or side of the table, as clearly indicated. The general direction of flow or trend of the material delivered upon the table-surface from feed-box C and of the wash-water delivered from wash-water box D is in a transverse direction across the upper surface of the table and over the riffles or ledges, the wash-water carrying with it the lighter rock, dirt, silica, and the like, which is at the top of the mass of material, and the riffles protecting the mineral values and holding the same against the transverse flow of supply and wash-water. Therefore the riffles and the arrangement thereof play a most important part in the work of mineral separation, and the present invention relates particularly to the arrangement of these riffles and is designed to include an arrangement of riffles which in practice I have found to produce the most efficient practical results when combined and arranged in connection with a longitudinal and transversely inclined diagonal table to which rectilinear reciprocatory movements are imparted on a line substantially diagonal with respect to the table-surface, and in describing the arrangement of riffles constituting the subject-matter of the present invention I will designate the head-motion end of the table by reference-sign E, the lower or delivery end of the table by reference-sign F, and the lower or delivery edge or side by reference-sign G. As shown, the riffles are arranged upon the upper surface of the table to extend in a general diagonal direction with respect to the sides or edges of the table, all the riffles terminating practically on the same line substantially at right angles to the line of reciprocations and delivering upon a smooth portion or surface H of the table adjacent to the lower or delivery end F of the table, as clearly shown. The extreme upper riffle (designated by reference-sign *a*) instead of being arranged parallel with the other riffles and also with the line of reciprocatory movement, as indicated by the arrow *x* in Fig. 2, is inclined toward the line of reciprocatory movement from the head end E of the table toward the lower end of the table. The next succeeding riffle *b* is similarly inclined from the head-motion end E of the table toward the opposite end thereof with reference to the line of reciprocatory movement, but to a less degree than the upper riffle *a*, the space between the ends of said riffles *a b* at the head-motion end of the table being greater than the space between the ends of said riffles at the point where they terminate upon the transverse line substantially at right angles to the line of motion. The succeeding riffles *c*, *d*, *e*, and *f* are similarly inclined with reference to the line of reciprocatory movement, but of successively less degree, each succeeding riffle from the upper riffle *a* more nearly approaching parallelism with respect to each other and to the line of reciprocatory movement. In this manner the upper or head-motion ends of the riffles are somewhat spread apart or spread out into substantially fan shape, and finally the riffles, beginning with riffle *g*, attain parallelism with respect to the line of reciprocatory movement, and all the riffles from riffle *g* throughout the remaining riffled portion of the surface of the table are substantially parallel with respect to each other and also with respect to the line of reciprocatory movement. All the riffles are of decreasing height from the head-motion ends thereof toward the point where they terminate upon a common transverse line, and the decrease in height is uniform throughout all the riffles, so that a line intersecting the riffles at any point and transverse to the line of reciprocatory movement of the table will cut all the riffles at substantially the same height, as clearly indicated in Fig. 5. Along the lower edge or side of the table I arrange a raised edge or riffle J, (see Figs. 2, 3, and 5,) somewhat decreasing in height from its upper toward its lower end, and the riffles which cover the lower portion of the surface of the table begin at this raised edge or riffle J and are consequently inclined with respect thereto, as clearly indicated. All the riffles terminate on the transverse line substantially at right angles to the line of reciprocatory movement in substantially a feather-edge. The shape of the riffles in cross-section is immaterial so far as my present invention is concerned, and I do not desire, therefore, to be limited to the angular

form of riffles in cross-section shown in the drawings.

From the foregoing description it will be seen that by the time the mineral values reach the ends of the riffles in the operation of the table such values have been separated from the gangue, silica, rock, dirt, or the like and by the movements imparted to the table are advanced or progressed upon the smooth or unriffled surface H of the table, where the final separation takes place, the mineral particles being advanced or progressed over the upper portion of the end F of the table, while any remaining silica, gangue, or the like is washed down the table-surface and finally over the lower edge or side of the table. The important feature in this regard is the termination of the riffles on the same line at substantially right angles to the length of the riffles as distinguished from the arrangement wherein each succeeding riffle terminates in advance of the preceding riffle, and by spreading out or apart the head-motion ends of the upper riffles, as above explained, I am enabled to secure a more even distribution of the material over the surface of the table when delivered from the feed-box. It will also be seen that the feed-box delivers to an unriffled portion K of the surface of the table above the upper riffle. This also aids in effecting an even spreading out or distribution of the material delivered from the feed-box, and hence avoids danger of loss through banking up of the ore as delivered to the table, the force of the feed-water supplied with the ore serving to spread the mass of material out over the surface of the table.

By the peculiar diagonal arrangement of table, as above described, and by arranging the feed-supply at the upper left-hand corner of the table it will be seen that the table-surface is longest in a diagonal direction from the point at which the feed-supply is delivered upon the table, and consequently in the diagonal direction in which the natural tendency of the material is to travel under the influence of the component of the reciprocatory movement imparted to the table and the transverse flow of wash-water. Consequently the material is subjected for a longer period of time than is possible with other forms and arrangements of table to the action of the wash-water, thereby effecting a more complete separation than is otherwise possible. I am also enabled to secure a delivery of the values over the delivery end F of the table at a point higher up on said end or nearer to the upper edge or side of the table, thus avoiding loss of value and securing a most efficient separation and concentration.

The operation is as follows: Ore is delivered upon the table from the feed-supply box C, and reciprocatory movements are imparted to the table in substantially a diagonal line from the lower left-hand corner toward the upper right-hand corner of the table as viewed in Fig. 2. This movement causes an even spreading out of the ore over the surface of the table, the fan-shape arrangement of the head-motion end of the upper riffles aiding and cooperating with the smooth surface K, upon which the material is delivered, in effecting the even spreading out and distribution of the material over the surface of the table, and the reciprocatory movements effect a progression of the mineral toward the delivery end F of the table. The wash-water supplied through launder D and flowing transversely across the line of reciprocatory movement carries away the lighter rock, dirt, shale, gangue, and the like over the top edges of the riffles, finally discharging the same along the lower edge G of the table. The diminution in height of the riffles toward the end F of the table, combined with the joint effects of the reciprocatory movements imparted to the table and the wash-water flowing transversely thereover, causes an efficient separation of the mineral from the dirt, shale, rock, and the like, the mineral being held and retained by the riffles, while the rock, dirt, shale, silica, and the like are washed away over the top edges of the riffles. If a complete separation and concentration of the mineral has not been effected by the time it reaches the end or terminal of the riffle, any remaining particles of dirt, rock, silica, or the like will be separated on the smooth surface H of the table upon which the riffles terminate. Thus it will be seen that a most thorough and efficient separation of the mineral and concentration thereof is effected.

By terminating the riffles upon the same transverse line substantially at right angles to the line of reciprocatory movement I secure a most important advantage in that the mineral values which have been advanced to the end of any riffle during the operation of the device are not subjected to the disturbing and eddy effect of the wash-water flowing over the end of the next above or higher riffle on the surface of the table, as would be the case if the next adjacent higher or upper riffle terminated in advance of the termination of the lower riffle. This result is due to the effect of the reciprocatory movements imparted to the table, combined with the transverse flow of wash-water, which where the riffles terminate on the same transverse line instead of carrying the flow of water from the terminal of the riffle to be caught by the terminal or end of the next adjacent riffle such water is carried out somewhat diagonally in the direction of the component of the forces of the reciprocatory movement and of the transverse flow of wash-water upon the smooth or unriffled surface H of the table, where it spreads out without forming disturbing eddy-

currents, and hence values advanced from the terminal end of each riffle are not subjected to the disturbing influence of wash-water, which would otherwise tend to carry them toward the lower or discharge edge or lower right-hand corner of the table.

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. A concentrating-table of substantially diamond shape in outline, and having riffles arranged upon the upper surface of such table, said riffles extending diagonally with respect to the table and being of diminishing height in the direction of the length thereof, and terminating upon a smooth or unriffled portion of the table-surface in a line substantially at right angles to the length of said riffles, and means for imparting reciprocatory movements to the table in the direction of the length of the riffles.

2. A concentrating-table having a substantially diamond-shaped concentrating area, riffles arranged to extend diagonally across said concentrating area and terminating on a smooth or unriffled portion of the surface of the table, and on a line substantially at right angles to the length of the riffles, in combination with means for reciprocating the table in the direction of the length of the riffles.

3. A concentrating-table having parallel sides or edges and parallel ends, the ends being inclined with respect to the sides, and riffles on the upper surface of said table extending in a direction inclined with respect to the sides or edges of said table, and all terminating on a smooth or unriffled portion of the table-surface and on a line substantially at right angles to the general direction of length of said riffles, as and for the purpose set forth.

4. A concentrating-table having a substantially diamond-shaped concentrating area, riffles arranged to extend diagonally across said concentrating area and terminating on a smooth or unriffled portion of the surface of the table and on a line substantially at right angles to the length of the riffles, in combination with means for reciprocating the table in the direction of the length of the riffles, the uppermost of said riffles being somewhat inclined toward the line of reciprocatory movement, and the succeeding riffles more nearly approaching parallelism with respect to said line of reciprocatory movement.

5. A concentrating-table having riffles upon the upper surface thereof, and means for reciprocating said table diagonally, the uppermost riffle being slightly inclined toward the line of reciprocations imparted to the table, and each succeeding riffle more nearly approaching parallelism with respect to the line of reciprocatory movement, all of said riffles terminating on a smooth or unriffled portion of the surface of the table and on a line at right angles to their length, as and for the purpose set forth.

6. A concentrating-table having riffles upon the upper surface thereof, means for reciprocating said table in the line of diagonally opposite corners of said table, said riffles extending in the general direction of the line of reciprocatory movement, the uppermost of said riffles having their upper or head-motion ends spread out or apart, each succeeding riffle more nearly approaching parallelism with respect to the line of reciprocatory movement than the preceding riffle, as and for the purpose set forth.

7. A concentrating-table having riffles upon the upper surface thereof, and means for reciprocating said table in the line of diagonally opposite corners thereof, said riffles being arranged generally in the direction of reciprocatory movement, and all terminating upon a line substantially at right angles to the line of reciprocatory movement, the uppermost of said riffles being somewhat inclined toward the line of reciprocatory movement, and each succeeding riffle more nearly approaching parallelism with respect to said line of reciprocatory movement; all combined and arranged, as and for the purpose set forth.

8. A concentrating-table having parallel sides or edges and parallel ends, said sides or edges being inclined with respect to said ends, a feed-supply box and a wash-water-supply box arranged along the upper side or edge of said table, riffles extending from one end and side or edge of said table toward the other end of said table and in a general diagonal direction with respect to the table, all of said riffles terminating upon a line substantially at right angles to the riffles, a portion of said riffles being spread apart farther at one end than at the other end, and means for reciprocating said table on a line with the diagonally opposite corners of the table; all combined and arranged, as and for the purpose set forth.

9. A concentrating-table having diagonal riffles, said riffles terminating on a line substantially at right angles to the length of the riffles and upon a smooth portion of the surface of said table, means for reciprocating said table in the line of diagonally opposite corners thereof, and a raised edge or riffle arranged along the lower edge of the table, and diagonal with respect to the riffles, as and for the purpose set forth.

10. A concentrating-table having sides or edges parallel with respect to each other and ends parallel with respect to each other, a raised edge or riffle arranged along one side or edge of said table and diminishing in height from one end toward the other, in combination with riffles arranged upon the table-surface in diagonal or inclined relation with re-

spect to said raised edge or riffle, said riffles terminating upon a line substantially at right angles to the length of said riffles, and means for reciprocating said table in a line substantially parallel with said riffles; all combined and arranged, as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 24th day of April, 1902, in the presence of the subscribing witnesses.

GUSTAVE A. OVERSTROM.

Witnesses:
J. REUTZ,
C. M. SAWYER.