

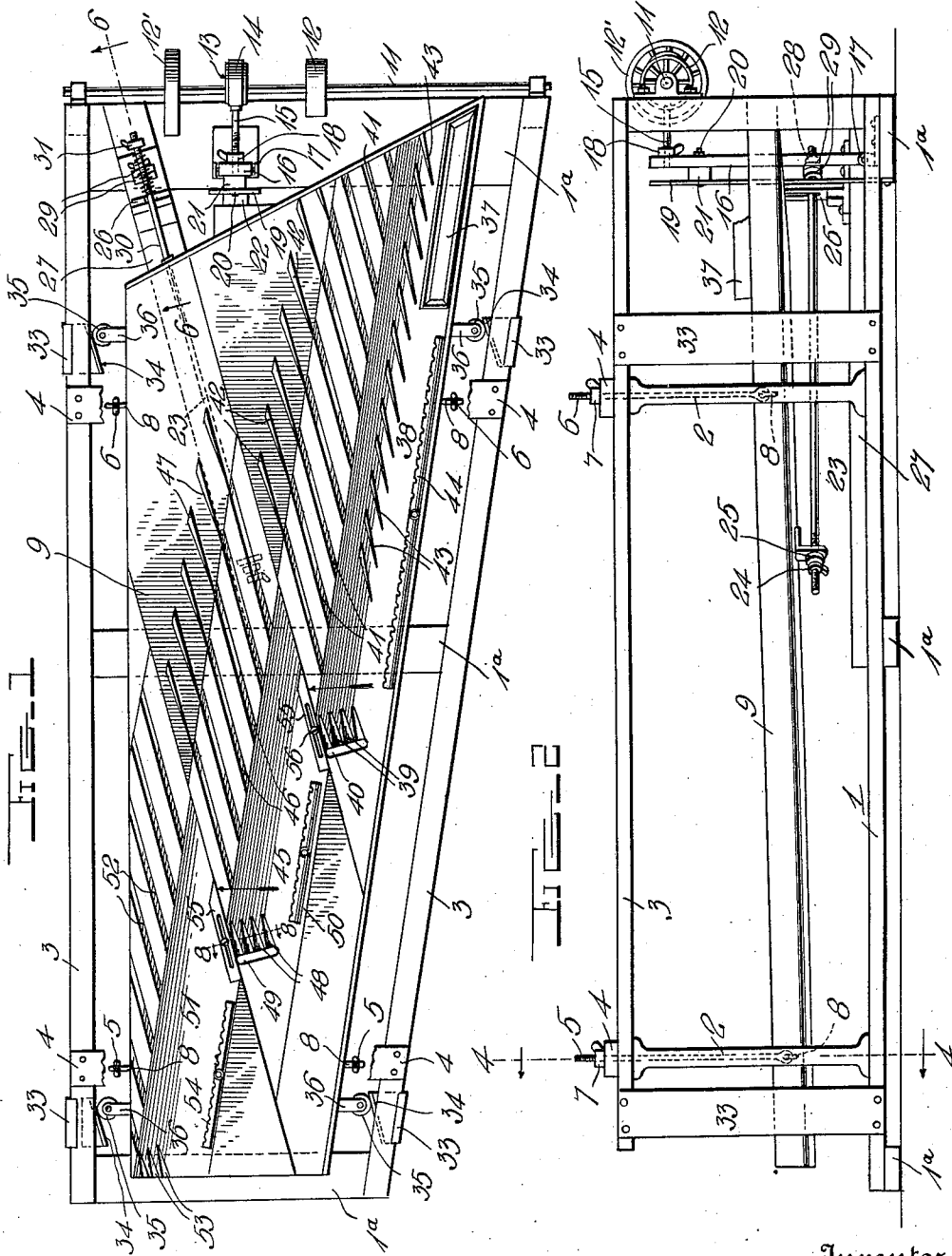
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ORE CONCENTRATOR.

APPLICATION FILED JUNE 20, 1910. RENEWED JUNE 22, 1911.

1,013,205.

Patented Jan. 2, 1912.

3 SHEETS—SHEET 1.



Witnesses

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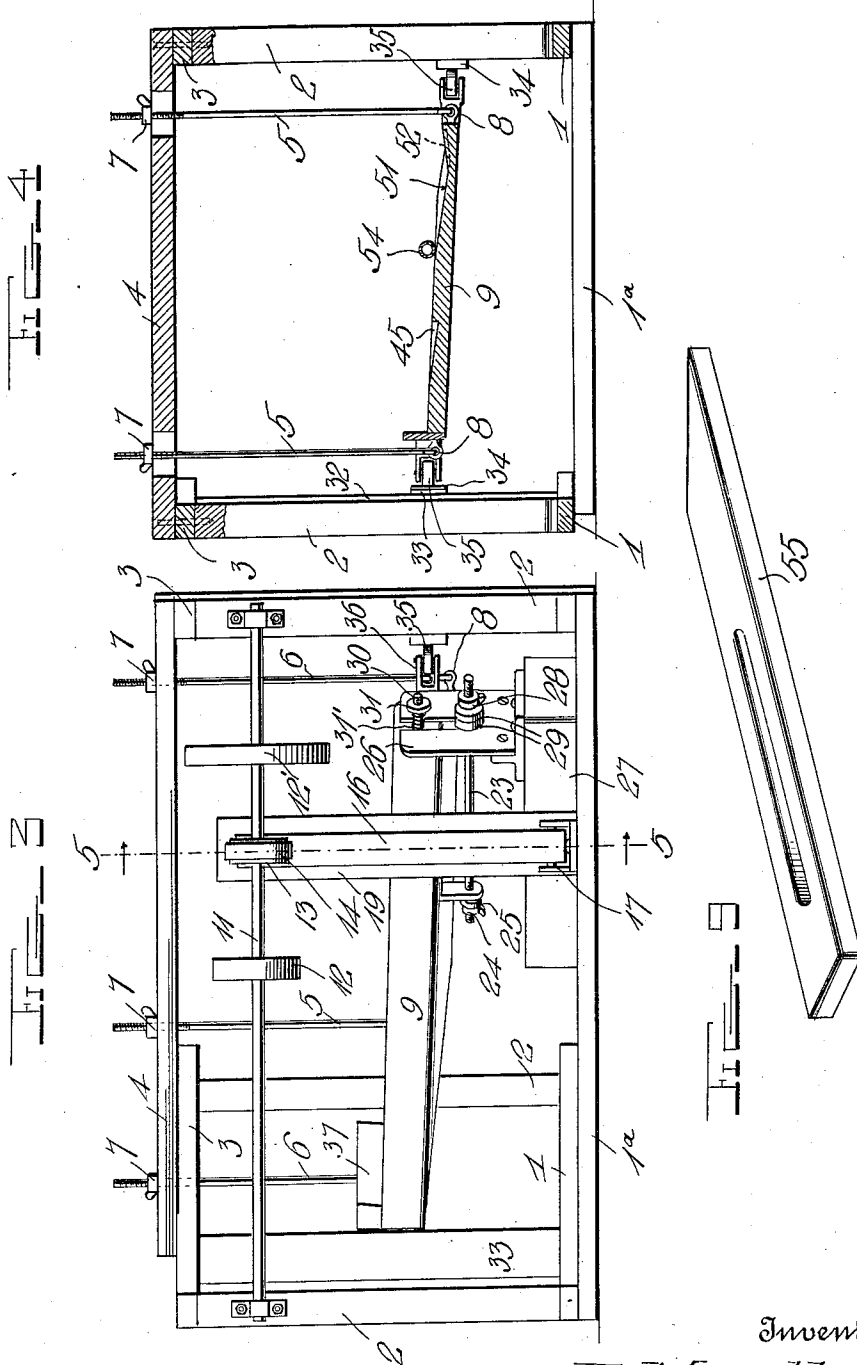
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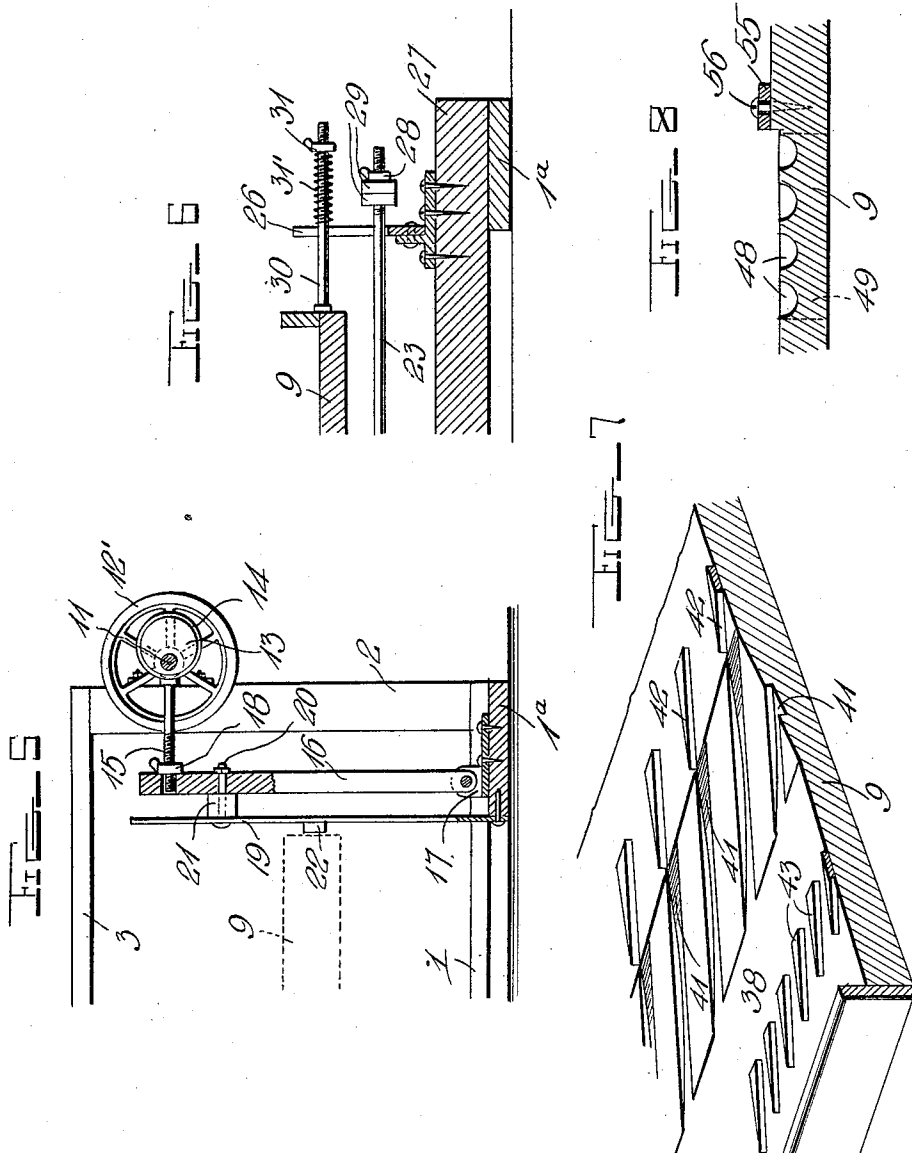
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UNITED STATES PATENT OFFICE.

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ORE-CONCENTRATOR.

1,013,205.

Specification of Letters Patent.

Patented Jan. 2, 1912.

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To all whom it may concern:

Be it known that I, IRA F. MONELL, a citizen of the United States, residing at Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in ore concentrators.

One object of the invention is to provide an ore concentrator having a table provided with an improved construction and arrangement of riffles whereby the greater part of the sand or pulp is continuously passed between the riffles and only a sufficient quantity is retained to cushion the mineral caught by the riffles.

Another object is to provide an arrangement of riffles whereby the mineral will be separated into three or more grades on a downward inclination from the movement of the table.

A further object is to provide an improved construction of operating mechanism for imparting the proper movement to the table.

With these and other objects in view the invention consists of certain novel features of construction combination and arrangement of parts as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1 is a plan view of my improved concentrator, parts being broken away; Fig. 2 is a side view of the same; Fig. 3 is an end view thereof; Fig. 4 is a vertical section taken on the line 4—4 of Fig. 2; Fig. 5 is a vertical section taken on the line 5—5 of Fig. 3; Fig. 6 is a similar view on the line 6—6 of Fig. 1; Fig. 7 is a sectional perspective view of a portion of the table; and Fig. 8 is a detail section of the table on the line 8—8 of Fig. 1. Fig. 9 is a detail perspective view of a stop finger.

In the embodiment of the invention I provide a supporting frame comprising longitudinal sills 1 which are connected together by a series of cross sills 1^a. At the opposite corners of the base portion of the frame formed by the sills 1 and 1^a are secured standards or uprights 2 which are

connected together at their upper ends by longitudinal side bars 3. The bars 3 are connected together adjacent to their opposite ends by cross bars 4. To the cross bars 4 are connected the upper ends of hanger rods 5 and 6 which are arranged at opposite corners of the frame and table. The hangers 5 are provided to support and balance the table on the line of its movement and also to hold the table at the proper endwise inclination. The hangers 6 are provided to support the table at the proper side-wise inclination. The hanger rods project through slots formed in the cross bars 4 and have their upper ends threaded to receive tail nuts 7 whereby the rods may be adjusted to support the table at the proper endwise and sidewise inclination. In the lower ends of the rods 5 and 6 are formed eyes or loops which are adapted to be loosely engaged with suitable supporting hooks 8 secured to the sides of the table 9 as shown.

The table operating mechanism comprises an operating shaft 11 which is revolubly mounted in suitable bearings on the main frame of the concentrator and on said shaft is mounted a suitable drive pulley 12 or other means whereby power is applied to the shaft. On the shaft is also preferably mounted a fly wheel 12'. Fixedly mounted at a suitable position on the shaft 11 is an eccentric 13 around which is arranged an eccentric strap 14. To the strap 14 is connected an eccentric rod 15 the opposite end of which is adjustably connected with a table operating lever 16 which is pivotally mounted in a suitable bearing bracket 17 secured to one of the cross sills of the base frame. The end of the eccentric rod which engages the lever 16 is threaded and on said threaded end is arranged a tail nut 18 whereby the movement of the lever 16 by the eccentric rod 15 may be adjusted. Fixedly secured at its lower end in any suitable manner to the base portion of the main frame is a buffer spring strip 19, the upper end of which is connected to the upper portion of the table operating lever 16 by a connecting bolt 20 on which, between the strip and the lever 16, is arranged an elastic cushioning block 21. Secured to the outer side of the buffer spring 19 adjacent to and in position to engage the end of the table is an elastic cushioning block 22. By thus arranging the table operating mechanism, the table will be pushed forwardly by the lever

16 and the buffer spring 19 when the eccentric is turned in the proper direction.

In order to bring the table to a sudden stop when pushed forwardly by the eccentric and its connecting parts and thus impart to the table the necessary jar or concussion, I provide a concussion rod 23 the inner end of which is threaded and passed loosely through a fixed part of the table and has on its threaded end an adjusting nut 24 between which and the fixed portion of the table through which the rod extends is arranged a cushioning washer 25. The outer end of the concussion rod is also threaded and passes through a concussion bracket 26 secured to the concussion block or beam 27 which is arranged on the base portion of the main supporting frame and securely fastened to the cross sills thereof in the line of movement of the table as shown. On the threaded outer end of the concussion rod is arranged an adjusting nut 28 between which and the adjacent side of the bracket 26 are arranged one or more cushioning washers 29. By means of the concussion rod and the concussion bracket the table 9 is interrupted in its forward swinging movement, imparted thereto by the eccentric operating mechanism hereinbefore described, and a sudden jar is thus imparted to the table when the latter has reached the limit of movement or play of the concussion rod. By providing the adjusting nuts on the opposite ends of the concussion rod the length of its movement and the movement of the table is regulated. The cushioning washers 25 and 29 on the concussion rod are provided to take up and relieve the table of unnecessary vibration. The table 9 after having been moved or swung in one direction as just described is brought back in the opposite direction by means of a retracting rod 30 one end of which is connected to the end of the table while the opposite end of the rod is slidably engaged with the upper portion of the concussion bracket 26 as shown. The outer end of the retracting rod 30 is threaded and on said threaded end is secured a spring holding and adjusting nut 31 between which and the upper end of the bracket 26 is arranged a coiled retracting spring 31'. The spring 31' when thus arranged will be compressed on the forward movement of the table by the operating lever 16 and its eccentric operating mechanism, and after the eccentric has reached the end of its stroke said spring will retract the table and bring it into position to be again acted on by the operating lever and eccentric. When the table is thus brought back by the spring 31' the end of the table will strike the concussion block 22 on the buffer spring strip 19 thereby relieving the table of a rigid shock. The reducing of the shock occasioned by the retracting or return of

the table is a very essential and important feature in connection with the operation of my improved table.

Connected with the base portion 1 and side bars 3 of the supporting frame are vertically disposed guide posts 33 which have their inner sides arranged at an angle parallel with the movement of the table and on said inner sides of the bars are arranged sheet metal wear plates 34 which are adapted to be engaged by suitable guide rollers 35 mounted in brackets 36 secured to the opposite sides of the table as shown. By means of the guide posts and rollers the table is directed in its proper longitudinal movement and is also thereby prevented from moving laterally.

The table 9 is preferably of the shape shown in the drawings and has arranged in one corner thereof a feed box or hopper 37. Arranged in and on the upper side of the table are three sets of separating and grading devices the first set or series of which is arranged at the side and end of the table having the feed box 37. The first set of separating devices comprises a wide shallow trough 38 the bottom of which on the outer side thereof inclines gradually from the front side of the table and is preferably about 12 inches wide while the rear side of the trough inclines gradually upward from the inner end of the front side and is preferably about seven and one half inches wide. The center or deepest part of the trough is preferably about one-fourth of an inch in depth. The trough extends slightly more than one-half of the length of the table and has formed at its lower end a series of mineral discharging grooves 39 which are substantially V-shaped and communicate with a mineral discharge opening 40 formed in the table as shown. The trough 38 extends parallel with the front side or edge of the table while the mineral discharging grooves 39 are arranged diagonally thereto and parallel with the line of movement of the table. In the table beyond the rear side of the trough 38 are formed a series of narrow channels 41 which extend into and across the rear inclined bottom of the trough 38 to near the center or deepest part of the same as shown. Arranged on the table beyond the rear ends of the narrow channels 41 and connecting with the lower side of each of said channels are a series of short open riffles 42 which project a suitable distance above the table and are preferably tapered from their rear toward their forward ends as shown. The channels 41 and riffles 42 are arranged diagonally to the length of the trough 38 and are parallel with the line of movement of the table.

Arranged on the forward side of the inclined bottom of the trough 38 are short dewatering or pulp retarding riffles 43 which

are arranged in a series in line or parallel with the feed box, each individual riffle being arranged parallel with the channels 41 and riffles 42 and in a direction parallel
 5 with the line of movement of the table. The riffles 43 are provided to prevent the pulp from washing too rapidly down the inclined bottom of the front side of the trough 38 and to permit the excess of water to pass
 10 through and over the same. By providing the riffles 43 a much larger or longer feed box may be employed.

Arranged along the front edge of the table above the front side of the trough 38 is a
 15 fresh water discharge pipe 44 whereby fresh water is supplied to wash the pulp across the trough 38 and narrow channels 41 into which the mineral will settle while the pulp and sand will be washed over the short open
 20 riffles 42 to the rear side of the table. The riffles 42 serve to hold back sufficient sand to form a cushion for the mineral along the rear ends of the channels 41 and to break up any excessive currents of pulp and water
 25 thus preventing the mineral therein from being carried over or out of the channels. The mineral settling into the channels after the sand has been washed therefrom in the manner described will be gradually jarred
 30 along in the channels toward the discharge end thereof and will enter the mineral grooves 39 and be conducted thereby to the discharge opening in the table through which the mineral will pass into suitable
 35 troughs or receptacles arranged to receive the same.

The first set of separating devices just described terminates in an oblique line across the table parallel with the line of
 40 movement thereof. At the termination of the first set of separating devices begins a second set the members of which are constructed and arranged in the same manner as the members of first set and comprise a
 45 main channel or trough 45 corresponding to the trough 38 but set back a suitable distance therefrom as shown. Cut into the table and the rear side of the trough 45 are a series of
 50 narrow diagonal channels 46 which correspond with and are formed in the same manner as the channels 41 of the first set. Connecting with the rear ends of the channels 46 are a series of short open riffles 47 which
 55 correspond with the riffles 42 of the first set. The second set of operating devices are also provided with mineral discharge grooves 48 and an opening 49 corresponding to the grooves 39 and opening 40 of the first set. The second set of separating devices is also
 60 provided with a fresh water discharge pipe 50 as shown.

The separating devices of the third and last set are constructed and arranged similarly to the members of the first two sets and
 65 are set back a suitable distance therefrom to-

ward the rear edge of the table as shown. The last set of devices comprises a main
 trough 51 corresponding to the troughs 38 and 45 of the first sets and in the table and
 70 rear side of the trough 51 are formed narrow obliquely arranged channels 52 which correspond with the channels 41 and 46 of the first and second sets. It will be noted that the rear side of the trough 51 is cut off
 75 or gradually tapers and becomes narrower toward the rear end of the table and that the last set of separating devices have no riffles corresponding to the riffles 42 and 47 of the first two sets. The riffles are omitted from
 80 the last set of devices and the rear side of the main channel 51 is narrowed as shown to provide for a rapid discharge of the sand at this end of the table, the sand thus dis-
 85 charged passing into the tailings trough of the table. The last or third set of devices is provided with mineral receiving grooves 53 which connect with the discharge end of the table and, consequently, are not provided
 90 with a discharge opening as the mineral passes therefrom over the end of the table and into a trough or receptacle provided to receive the same. The last set of separating
 95 devices is provided with a fresh water supply pipe 54 corresponding to the pipes 44 and 50 of the first sets.

At the rear end of each of the main longitudinal troughs of the first and second sets of separating devices just before the
 inner ends of the mineral grooves are reached are formed cross over spaces as in-
 100 dicated by the arrows shown in Fig. 1 of the drawings through which the sand from the longitudinal trough of one set of devices passes over to the longitudinal trough of the next set while the mineral in the sand
 105 settles or is washed into the mineral grooves. The width of the cross over spaces is regulated by adjustably mounted stop fingers 55 which are here shown, and are preferably,
 110 in the form of slotted plates or strips of suitable material arranged along the rear end of the series of mineral grooves as shown. The plates or stop fingers 55 are
 115 adjustably secured to the table by set screws or other fastening devices 56.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation. 120

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention as defined in the
 125 appended claims.

Having thus described my invention, what I claim is:

1. In an ore concentrator, the combination of a table provided in its upper side 130

with a series of longitudinally disposed troughs, the bottoms of which incline downwardly and inwardly from the opposite edges thereof, said troughs being offset from each other toward the rear side of the table, a series of parallel channels being formed in the bottom of the troughs arranged in line with the movement of the table, and a series of mineral discharging grooves and a mineral discharging opening being provided at the rear end of each longitudinal trough, a series of open riffles arranged on the table at the rear ends of the parallel channels, and means for vibrating the table diagonally.

2. In an ore concentrator, the combination of a table provided in its upper side with a series of longitudinally disposed troughs, the bottoms of which incline downwardly and inwardly from the opposite edges thereof, said troughs being offset from each other toward the rear side of the table, a series of parallel channels being formed in the rear sides of the bottoms of the troughs arranged in line with the movement of the table, and a series of mineral discharging grooves and a mineral discharging opening being provided at the rear end of each trough, a series of short riffles arranged on the tables at the rear ends of said parallel channels, a water discharging pipe arranged parallel with said series of

riffles, a feed box arranged near the forward end and side of the table, a series of de-watering or pulp retaining riffles arranged on the table adjacent to said feed box, and means for vibrating the table diagonally.

3. In an ore concentrator, the combination of a table provided on its upper side with a series of longitudinally disposed troughs, the bottoms of which incline downwardly and inwardly from the opposite edges thereof, said troughs being offset from each other toward the rear side of the table, a series of parallel channels being formed in the rear inclined sides of the bottom of said troughs, a series of mineral discharging grooves, and a mineral discharging opening being provided at the rear end of the trough, a series of riffles adjacent the parallel channels, adjustable stop fingers arranged at the inner end of each series of mineral discharging grooves, whereby the passage of the sand from one trough to the next may be regulated, and means for vibrating the table.

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

IRA F. MONELL.

Witnesses:

E. J. FINCH,

HOWARD WILLIAMS.

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