

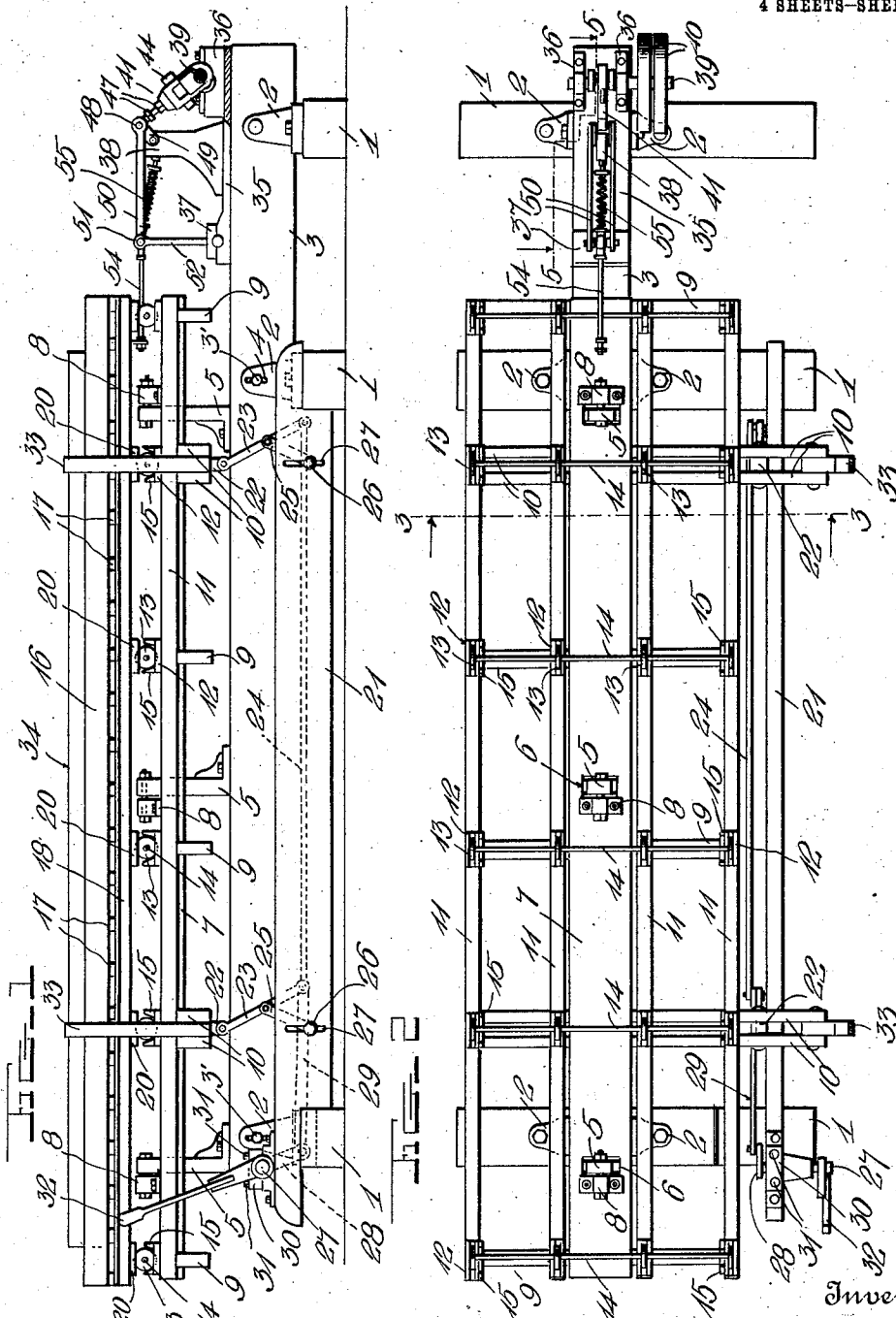
O. W. DUNHAM.  
SLUDGE TABLE.

APPLICATION FILED JAN. 10, 1910. RENEWED NOV. 25, 1910.

1,023,009.

Patented Apr. 9, 1912.

4 SHEETS—SHEET 1.



Witnesses

*[Signature]*

*C. H. Gustauer*

Inventor

*O. W. Dunham*

by

*A. B. Wilson & Co*

Attorneys

O. W. DUNHAM.

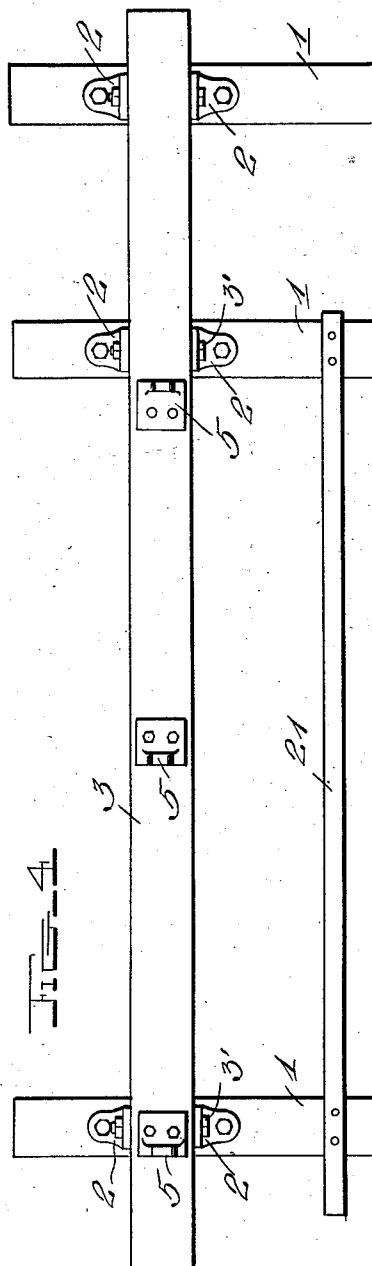
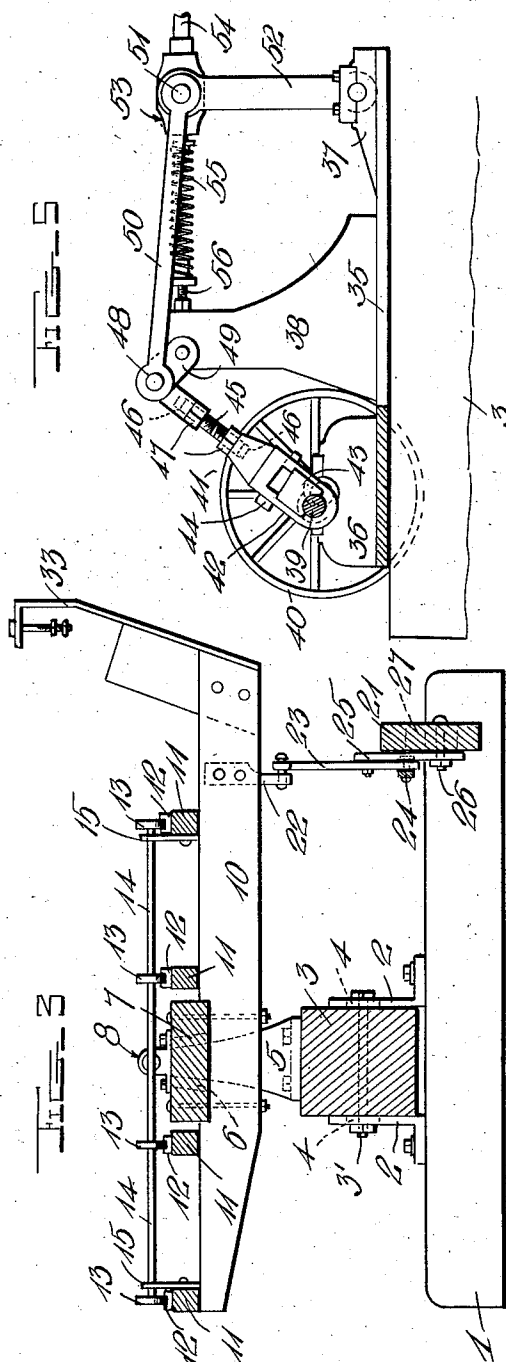
SLUDGE TABLE.

APPLICATION FILED JAN. 10, 1910. RENEWED NOV. 25, 1910.

1,023,009.

Patented Apr. 9, 1912.

4 SHEETS-SHEET 2.



Witnesses

*C. H. Dunham*

Inventor

*O. W. Dunham*

By *A. B. Wilson & Co*

Attorneys

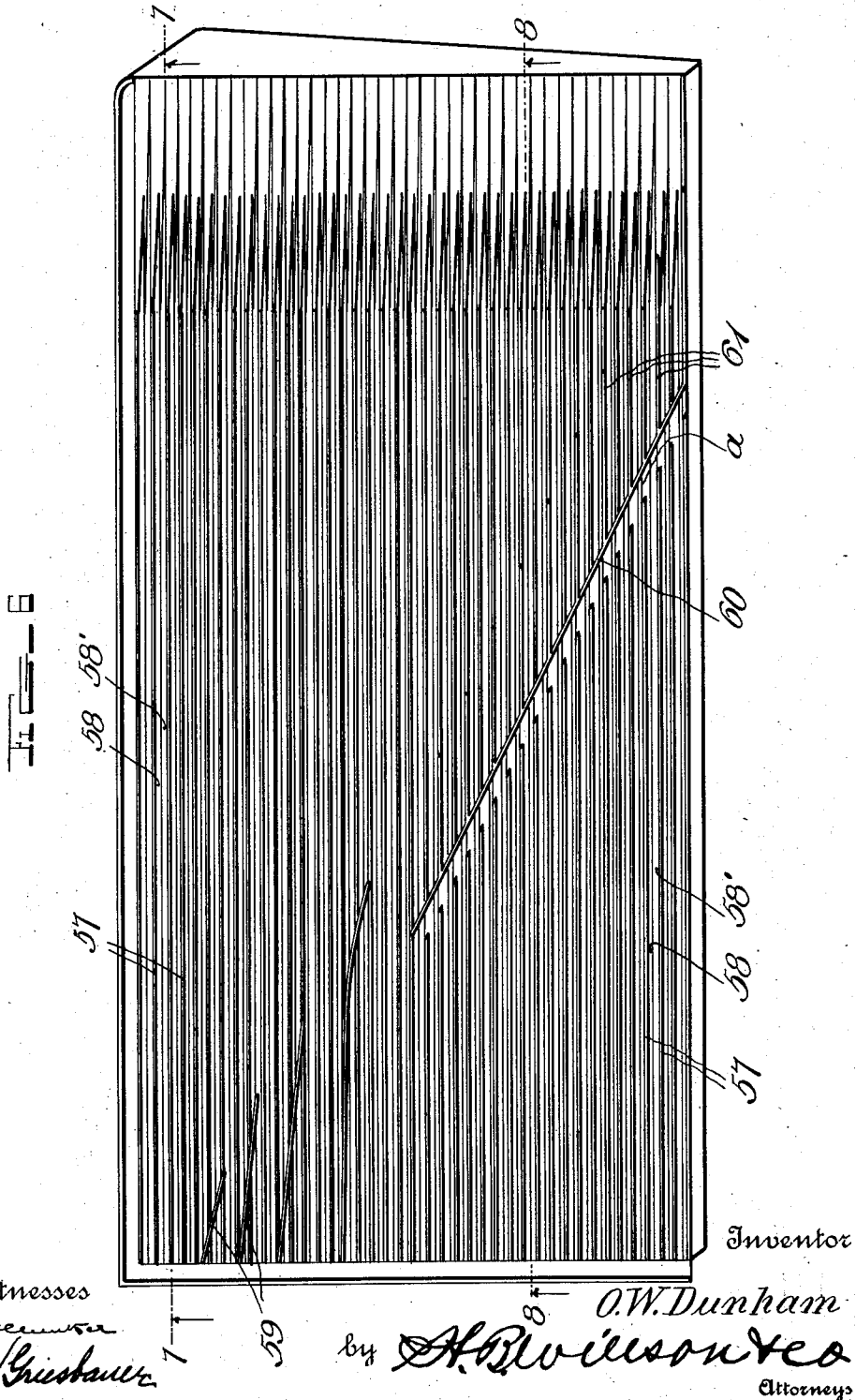
O. W. DUNHAM.  
SLUDGE TABLE.

APPLICATION FILED JAN. 10, 1910. RENEWED NOV. 25, 1910.

1,023,009.

Patented Apr. 9, 1912.

4 SHEETS—SHEET 3.

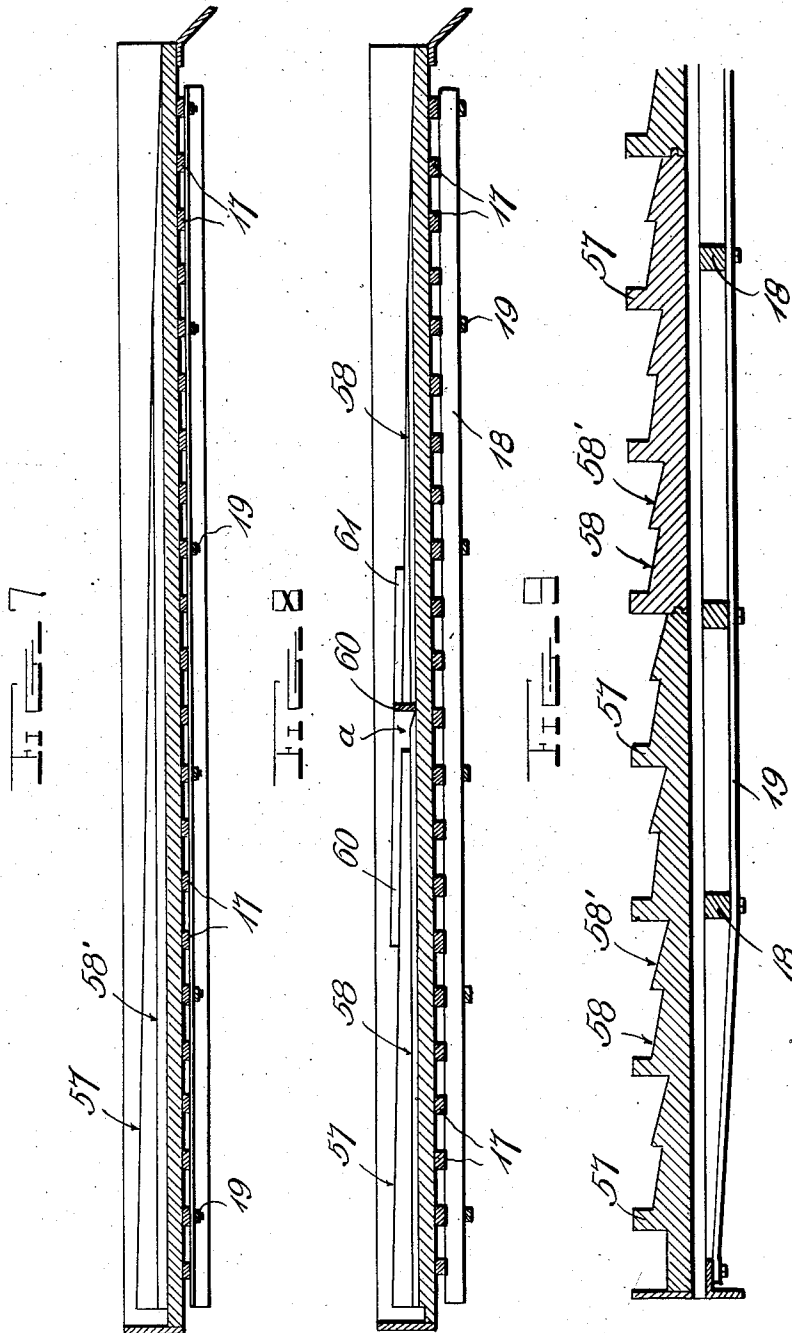


O. W. DUNHAM.  
SLUDGE TABLE.

APPLICATION FILED JAN. 10, 1910. RENEWED NOV. 25, 1910.

1,023,009.

Patented Apr. 9, 1912.  
4 SHEETS—SHEET 4.



Witnesses

*E. Schumaker*

*C. H. Giesbauer*

Inventor  
*O. W. Dunham*

by *A. B. Wilson & Co.*  
Attorneys

# UNITED STATES PATENT OFFICE.

ORSON WINFIELD DUNHAM, OF JOPLIN, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE BRAECKEL CONCENTRATOR COMPANY, OF JOPLIN, MISSOURI, A CORPORATION OF MISSOURI.

## SLUDGE-TABLE.

1,023,009.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed January 10, 1910, Serial No. 537,294. Renewed November 25, 1910. Serial No. 594,550.

*To all whom it may concern:*

Be it known that I, ORSON W. DUNHAM, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented certain new and useful Improvements in Sludge-Tables; 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 concentrating tables or sludge tables.

One object of the invention is to provide a concentrating table or sludge table having an improved construction of supporting and tilting mechanism, whereby the deck or top of the table may be supported at the desired angle.

Another object is to provide a table of this character having an improved construction of operating mechanism, whereby the proper motion is imparted to the table.

Another object is to provide a top or deck for sludge tables in which the riffles are so disposed that a more complete separation of the metallic particles of the ore from the gangue is obtained than was possible with the structures heretofore in use.

Another object is to provide a top or deck for concentrating tables having means separate and distinct from the retaining riffles for checking the flow of the material when it is introduced onto the deck and causing said material to start to move toward the concentrates discharge end of the deck. And still another object is to provide a concentrating table which is so constructed that the ore bearing sand that is washed over the checking riffles when a heavy feed comes onto the table is collected and guided to a return box so that it can be subsequently re-worked on the table.

Other objects and desirable features of my invention will be hereinafter pointed out.

With the foregoing 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 side view of a sludge table constructed in accordance with the invention; Fig. 2 is a top plan view of the supporting and tilting mechanism; Fig. 3 is a vertical cross sectional view on the line 3—3 of Fig. 2. Fig. 4 is a plan view of the sills and head block of the supporting frame; Fig. 5 is an enlarged side view of the table vibrating mechanism; Fig. 6 is a top plan view of the deck or table top; Fig. 7 is a vertical longitudinal sectional view of the same on the line 7—7 of Fig. 6; Fig. 8 is a similar view on the line 8—8 of Fig. 6; Fig. 9 is an enlarged vertical cross sectional view of a portion of the deck and riffles.

The table herein shown, which represents the preferred form of my invention is provided with a supporting frame comprising a series of transverse sills 1, on each of which is arranged a supporting bracket 2. Pivotaly mounted in the bearing bracket 2 of one of the end sills 1, is a longitudinally-disposed head block or beam 3. The beam 3 is adjustably secured in the brackets 2 of the other sills by means of clamping bolts 3', which are engaged therewith and have their ends projecting through elongated slots 4 formed in the brackets 2 as shown in Fig. 1. By thus pivotaly and adjustably securing the head block or beam 3, the concentrates discharge end of the table may be raised or lowered so as to obtain the desired level.

Secured to the upper side of the beam 3 is a series of deck supporting brackets 5 which project upwardly through slots 6 in an intermediate supporting beam 7 on which is bolted or otherwise secured a series of hangers 8, which are pivotaly connected to the upper ends of the brackets 5, thus pivotaly supporting the intermediate beam 7.

To the under side of the intermediate beam 7 is secured a series of transversely-disposed cross beams 9 and a series of similar beams 10, said beams 10 being preferably arranged in pairs, each member of which is spaced apart as shown; the cross beams 9 and 10 extend or project laterally on each side of the intermediate beam 7 and the projecting ends of said cross beams are connected by longitudinally-disposed stringers 11. The arrangement of beams just de-

scribed constitutes the supporting mechanism for the deck or top of the table which is now to be described.

On the stringers 11, at suitable intervals, 5 are secured short flanged track sections 12 which are arranged in line across the upper portion of the supporting mechanism and are spaced apart at suitable distances on the stringers. With the track sections 12 10 are engaged deck-supporting rollers 13, said rollers being connected together in series by shafts 14, and each series of rollers is held in position to roll a limited distance on their respective track sections by means 15 of retaining brackets 15 which are secured to the sides of the stringers 11 as shown. The deck 16 is formed from planks or boards of suitable width which are connected on their under sides by a series of slats 20 or cross strips 17, which in turn, are secured to longitudinal bars 18. The bars 18 are securely braced by transversely-disposed metal strips 19 which are secured thereto and to the lower side of the deck as shown. The 25 bars 18 correspond in number with and are spaced the same distance apart as the stringers 11 of the supporting mechanism, and on the under side of the bars 18 immediately above each of the track sections 12 30 are secured corresponding flanged track sections 20 which are engaged with the rollers 13, thus loosely supporting the deck or table top and permitting the latter to have a limited rolling longitudinal movement.

35 In order to adjust the top of the table transversely and hold it at the desired angle I have provided a suitable tilting mechanism for rocking the beam 7, cross-beams 9 and 10, and longitudinally disposed stringers 11 which form the supporting structure 40 for the top of the table. Said tilting mechanism preferably comprises a longitudinally-disposed supporting beam 21, which is connected at its opposite ends to the outer ends of two of the sills 1 of the supporting 45 mechanism. Pivottally mounted between the extended ends of the cross bars 10 are brackets 22 to which are connected the upper ends of tilting levers 23, the lower ends 50 of which are secured together by a connecting bar 24. The levers 23 have connected thereto midway between their ends, short links 25, the lower ends of which are loosely connected to the beam 21 by bolts 26 which 55 are engaged with slots 27 formed in the beam as shown. On one end of the beam 21 is mounted a rock shaft 27 having on one end a short crank arm 28 which is connected by a link 29 to one end of the connecting 60 bar 24, whereby when said shaft is rocked, the levers 23 will be operated thereby to tilt the table top or deck in one direction or the other. The shaft 27 is securely held after 65 being rocked to actuate the tilting mechanism by means of a clamping block 30

which is clamped into engagement with the shaft by clamping bolts 31 as shown. The shaft 27 is preferably provided with an operating lever 32 which is connected to one end thereof as clearly indicated in the drawing. 70

To the projecting ends of the cross bars 10 at one side of the deck are secured upwardly projecting brackets 33 to the right angularly projecting upper ends of which 75 is secured the water trough 34, by which water, in proper quantities, is supplied to the deck.

In order to impart the proper longitudinal motion to the deck or table top I provide a suitable vibrating mechanism which is here shown and preferably consists of a supporting mechanism comprising a base plate 35, on the outer end of which is formed bearing blocks 36 and on the inner end of 85 which is formed a bearing block 37. On the base plate adjacent to the bearing blocks 36 is formed an upwardly projecting standard 38. In the bearing blocks 36 is revolvably mounted a crank shaft 39, on one end 90 of which is mounted drive pulleys 40. With the crank shaft 39 is connected a weighted adjustable pitman rod 41, in the weighted lower end 42 of which is arranged a wear block 43 and a wedge-shaped adjusting key 95 44, whereby said block 43 is held in close engagement with the crank shaft and is adjusted to take up the wear of the same. The upper portion of the pitman rod 41 is connected with the weighted lower end 100 by a right and left hand threaded bolt 45, the oppositely threaded ends of which are screwed into right and left hand threaded sockets 46 formed in the upper and in the lower weighted ends of the pitman rod, and 105 on said oppositely threaded ends of the bolts are arranged set nuts 47 by means of which the bolt is secured in its adjusted position. The upper end of the pitman rod is loosely connected with a short pin 48 110 which is connected by links 49 to the upper end of the standard 38, and said pin is also connected by links 50 to a pin 51 in the upper end of a post 52, the lower end of which is pivottally mounted in the bearing 115 block 37 on the inner end of the base plate 35, as shown. In the upper end of the post 52 and on the pin 51 is a cross head 53, the outer end of which is connected to the adjacent end of the table top or deck by an operating rod 54. To the outer end of the cross head 53 is connected one end of a stiff coil spring 55, the opposite end of which is connected to the standard 38 by an adjusting screw 56, whereby the tension of the 125 spring 55 may be increased or diminished when desired. By means of the operating mechanism just described, the proper motion is imparted to the deck or table top to carry the pulp or slush longitudinally of 130

the deck and also transversely across same so as to cause the metallic particles of the ore to be separated from the gangue, it being, of course, understood that water is supplied to the upper side of the table in the same manner as in the concentrating tables now in general use.

On the upper surface of the deck or table top is arranged a series of longitudinally disposed retaining riffles 57 and separating riffles 58 and 58'. The retaining riffles 57 are of greater height than the riffles 58 and 58' and are provided to keep the metallic particles of ore from moving transversely across the table with the gangue. The top faces of the riffles 58 and 58' are inclined transversely of the deck and are arranged alternately with the riffles 57 across the deck, said riffles 58 and 58' being provided to cause the separation of the ore on an inclined surface instead of in an angle or corner, thus receiving the action of the water when it will best purify and separate the ores. The riffles 57 taper or are gradually inclined from the head end of the deck toward the concentrates discharge end of the deck and terminate on a straight line at a short distance from the concentrates discharge end, as shown in Fig. 6. The riffles 58 terminate a short distance from the extreme end of the table and the riffles 58' are cut somewhat deeper than the riffles 58 and taper clear to the concentrates discharge end of the deck, thus forming a series of parallel grooves on the concentrates discharge end portion of the table beyond the ends of the riffles 57 and 58, as shown in Fig. 6.

Inserted into the retaining and separating riffles at the head end and near the upper or feeding side of the deck are a series of obliquely disposed checking or feeding riffles 59, said riffles being spaced apart and gradually increasing in length from the head and toward the discharge end of the deck as shown in Fig. 6. The function of these checking riffles 59 is to check the feed of the material when it is deposited on the deck and prevent the heavier particles of the gangue from rushing transversely over the deck to the lower edge of same and escaping with the wash water, said checking riffles projecting above the riffles 57 and being so disposed that they cause the material to start to move longitudinally of the deck toward the discharge end of same, thereby distributing the material at the proper position for separation. In addition to the feeding or checking riffles 59, I provide an obliquely disposed stop strip 60 which is arranged diagonally across the deck below the discharge ends of the feeding riffles, said strip extending from a point immediately below and slightly to the left of the discharge end of the lower feeding riffle to the

lower side of the table top as shown. The stop strip 60 is preferably about  $\frac{3}{16}$  of an inch higher than the riffles 57 and forms a dividing line between the sand of the first separation and the diagonal discharge of the slimes at the second separation. Arranged on each alternate retaining riffle 57 which the stop strip crosses, and engaging the stop strip 60 at one end, are a series of tailing riffles 61, said riffles 61 branching laterally from the stop strip toward the concentrates discharge end of the deck and increasing in length from the upper toward the lower end of the stop strip, as shown. The tailing riffles project above the upper edges of the riffles 57 and they are used to prevent the sand from crowding over the diagonal stop strip onto the portion of the table at the left of said stop strip. The retaining riffles 57 which lie between the stop strip 60 and the head end of the deck are cut away about four inches from the rear side of the strip, thus forming a diagonal channel or passage *a* between the ends of the riffles 57 and the stop strip. This space is provided so that any light ore and sand which washes over the checking riffles when first fed to the table may be saved and subsequently introduced onto the table or worked over again so as to obtain a clean separation.

Having described the construction of the deck, I will now specifically point out how it separates the material which is fed onto the upper side of the deck adjacent the head end or left hand end of same. The inclined checking riffles 59, which are located adjacent the head end of the deck, check the downward flow of the material and prevent the major portion of the fine ore and sand from escaping with the heavier particles of gangue which are carried downwardly with the wash water, said checking riffles also operating to spread out the material and cause it to start to move longitudinally toward the concentrates discharge end of the deck. The longitudinal or endwise movement of the deck causes the material to work toward the discharge end of same, and as the riffles 57, 58 and 58' retard the downward flow of the material the different ores collect together at the discharge end of the deck according to their relative specific gravity, the heaviest ore such, for example, as lead, being discharged at a point adjacent the upper edge of the deck, the next heaviest ore such, for example, as iron, at a point a trifle lower down, and the lightest ore such, for example, as zinc, at a point still lower down. The upwardly inclined top faces of the riffles 58 and 58' retard the downward movement of the material more effectively than if said faces were flat, and as two of these upwardly inclined faces are located between each pair of riffles 57, a

thorough separation of the heavier and lighter particles is obtained, the different kinds of ores being spread over a comparatively great area and thus making it possible to obtain a good classification of ores. The ore and sand that escapes over the checking riffles 59 when a heavy feed is supplied to the table, is caught by the riffles which lie between the stop strip 60 and the head end of the deck, and the endwise movement of the deck causes this material to gradually work down into the channel *a* from which it is removed and subsequently returned to the deck for complete separation. I do not wish it to be understood that a complete separation is obtained on that portion of the deck lying between the head end of the deck and the stop strip 60 but a saving of values in the shape of a rich "middlings" or sand and particles of ore is obtained on this portion of the deck. The tailing riffles 61 which lie in front of the stop strip, prevent the tailings on the main portion of the deck from overflowing the stop strip and thus becoming mixed with the ore-laden sand or middlings in the channel *a*, said tailing riffles operating to push the tailings and sand forwardly or shunt it to the right, away from the stop strip.

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 appended claims.

Having thus described and ascertained the nature of my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a sludge table, a supporting mechanism comprising a series of sills, a head block pivotally connected to one of said sills, means for adjustably mounting said head block on the remainder of the sills, brackets extending upwardly from the head block, an intermediate supporting beam pivotally mounted on said brackets, a series of cross bars secured to the intermediate beam, a series of longitudinally-disposed stringers secured upon said cross bars, a table-top or deck above the supporting mechanism, and rolling supports for the deck carried by said stringers.

2. In a sludge table, a supporting mechanism comprising a series of sills, a head block pivotally connected to one of said sills, means for adjustably mounting said head block on the remainder of the sills, brackets extending upwardly from the head block, an intermediate supporting beam pivotally mounted on said brackets, a series of cross bars secured to the intermediate beam, a series of longitudinally-disposed stringers secured upon said cross bars, a table-top or deck above the supporting mechanism, flanged

track sections spaced upon said stringer a series of connected rollers arranged in alinement below the table-top and rolling within the track sections, and flanged track sections carried by said deck and engaging said rollers.

3. In a sludge table, a supporting mechanism comprising a series of sills, a head block pivotally connected to one of said sills, means for adjustably mounting said head block on the remainder of the sills, brackets extending upwardly from the head block, an intermediate supporting beam pivotally mounted on said brackets, a series of cross bars secured to the intermediate beam, a series of longitudinally-disposed stringers secured upon said cross bars, a table-top or deck above the supporting mechanism, rolling supports for the deck carried by said stringers, means for tilting the table-top transversely to any desired angle, and means for reciprocating the table-top longitudinally in any adjusted position.

4. In a sludge table, a supporting mechanism comprising a series of sills, a head block pivotally connected to one of said sills, means for adjustably mounting said head block on the remainder of the sills, brackets extending upwardly from the head block, an intermediate supporting beam pivotally mounted on said brackets, a series of cross bars secured to the intermediate beam, a series of longitudinally-disposed stringers secured upon said cross bars, a table top or deck above the supporting mechanism, flanged track sections spaced upon said stringers, a series of connected rollers arranged in alinement below the table top and rolling within the track sections, flanged track sections carried by said deck and engaging said rollers, and a power driven head motion for longitudinally reciprocating the deck upon the supporting rollers.

5. In a sludge table, a supporting mechanism comprising a series of sills, a head block pivotally connected to one of said sills and adjustably connected to the remainder of said sills, brackets extending upwardly from the head block, an intermediate supporting beam arranged above the head block and provided with hangers, means for pivotally supporting said intermediate beam by means of said hangers to said brackets, a series of spaced cross bars secured to the intermediate beam, a series of stringers secured upon said cross bars, a table top or deck loosely supported upon said stringers, and means pivotally connected to the cross bars adjacent one end for tilting the intermediate beam upon said hangers as a pivot.

6. In a sludge table, a supporting mechanism, a deck-receiving mechanism pivotally mounted on said supporting mechanism, a table top or deck loosely mounted on said table-receiving mechanism, means to tilt



said table top to the desired angle, means to impart the proper motion to said table top or deck, a series of retaining riffles arranged on said deck, said riffles being inclined or tapered toward the discharge end of the table, a series of feeding riffles arranged on said retaining riffles at the feeding end of the table, a diagonally disposed stop strip arranged across the table from a point below the feed riffles toward the discharge end of the table, and a series of tailing riffles arranged on said retaining riffles and connected at their inner ends with said stop strip.

7. In a sludge table, a supporting mechanism, a deck receiving mechanism pivotally mounted on said supporting mechanism, a table top or deck loosely mounted on said table receiving mechanism, a series of retaining riffles arranged on said deck, said riffles being gradually inclined from the head end of the deck toward the concentrates discharge end thereof and terminating a suitable distance from said discharge end, a series of separating riffles arranged between said main riffles, said separating riffles tapering toward the discharge end of the table, a series of feeding riffles arranged at the head end of the table, a diagonally disposed stop strip arranged across the table from a point below the feed riffles and extending toward the discharge end of the table, and a series of tailing riffles connected with said stop strip.

8. In a sludge table, a supporting mechanism, a deck receiving mechanism pivotally mounted on said supporting mechanism, a table top or deck loosely mounted on said table receiving mechanism, a series of retaining riffles arranged on said deck, said riffles being tapered from the head end of the table to a point a suitable distance from the concentrates discharge end thereof, a series of separating riffles arranged between said retaining riffles, said separating riffles also tapering from a point near the discharge end of the table toward said end, some of said riffles terminating a short distance from said discharge end of the table, a series of feeding riffles arranged near the head end of the table, a stop strip arranged diagonally across the table at the end of said feeding riffles, a series of retaining riffles arranged between said stop strip and the feed end of the table, said riffles being cut away at their forward ends to form a space along the rear side of the stop strip to permit the discharge of any material which may have passed over the retaining riffles and lodged between the same, and a series of tailing riffles connected with said stop strip.

9. A sludge table having a transversely inclined top or deck which is provided with longitudinally disposed retaining riffles, and

checking riffles arranged adjacent the head end of the deck near the upper edge of same for checking a heavy feed of material and causing it to start to move toward the concentrates discharge end of the deck, said checking riffles overlying the retaining riffles and being arranged diagonally or at an angle to said retaining riffles.

10. A sludge table having a transversely inclined top or deck which is provided with retaining riffles that extend longitudinally of the table toward the end of the table at which the concentrates are discharged, and a diagonally disposed stop strip extending upwardly from the lower edge of the deck toward the upper edge of same and intersecting some of said retaining riffles intermediate their ends, said stop strip being higher or deeper than said retaining riffles and said deck being provided with a channel or passageway that extends along the rear side of said stop strip and terminates at the lower tailings discharge side of the table.

11. A sludge table having a top or deck which is provided with longitudinally extending retaining riffles, checking riffles arranged adjacent the head end of the deck at an angle to said retaining riffles for checking the flow of material that is introduced onto the deck and causing said material to start to move toward the concentrates discharge end of the deck, and means for collecting together the ore bearing sand which washes over said checking riffles and guiding said sand to a receiving receptacle at the lower edge of the deck, thus preventing said sand from becoming mixed with the tailings and sand that are separated from the material on the concentrates discharge end of the deck.

12. A sludge table having a transversely inclined top or deck which is adapted to be reciprocated longitudinally, longitudinally extending retaining riffles on said deck, inclined checking riffles of varying length arranged adjacent the head end of the deck for checking the flow of the material that is introduced onto same and causing said material to start to move toward the concentrates discharge end of the deck, means for collecting together the ore bearing sand which washes over said checking riffles, and means for preventing the sand separated from the material on the concentrates discharge end portion of the deck from becoming mixed with the ore bearing sand that is separated from the material which passes over said checking riffles.

13. A sludge table having a transversely inclined top or deck which is adapted to be reciprocated or vibrated longitudinally, longitudinally extending retaining and separating riffles on said deck, said deck being provided with a diagonally disposed channel that extends upwardly across the riffles at the lower edge portion of the deck

for receiving the ore bearing sand separated from the material on the head end portion of the deck and guiding said sand to a receiving receptacle arranged adjacent the lower edge of the deck, a stop strip of greater depth than said riffles for preventing the tailings and sand separated from the material on the concentrates discharge end portion of the deck from becoming mixed with the ore bearing sand in said channel, and means which tends to prevent said tailings and sand from crowding up against said stop strip.

14. A sludge table having a top or deck that is provided with longitudinally extending retaining riffles, a diagonally arranged stop strip that extends partially across the deck through some of the riffles thereon and terminates below a series of riffles on the upper edge portion of the deck, said deck having a channel or passageway extending along the rear side of said stop strip which receives the ore bearing sand that is collected by the riffles which lie between said stop strip and the head end of the deck, and tailing riffles extending laterally from said stop strip toward the concentrates discharge end of the deck for preventing the tailings from washing over said stop strip into the channel on the rear side of same, said stop strip and tailing riffles being higher than said retaining riffles.

15. A sludge table having a top or deck that is provided with longitudinally extending retaining riffles which are reduced adjacent the concentrates discharge end of the deck, checking riffles arranged adjacent the head end of the deck at an angle to said retaining riffles for checking an ore feed and being higher than said retaining riffles, a diagonally arranged stop strip that intersects some of the retaining riffles at the lower edge portion of the deck, said stop strip extending only partially across the deck and terminating below said checking riffles, and short tailing riffles that branch laterally from said stop strip toward the concentrates discharge end of the deck, said tailing riffles and stop strip being higher than said retaining riffles.

16. A sludge table having a transversely

inclined top or deck which receives a longitudinally vibrating movement, longitudinally extending retaining riffles on said deck which are reduced in height adjacent the concentrates discharge end of the deck, obliquely disposed checking riffles arranged adjacent the head end of the deck for checking the flow of the material and causing it to start to move toward the concentrates discharge end of the deck, a diagonally disposed stop strip arranged intermediate said checking riffles and the lower edge of the deck, said deck having a channel or passageway at the rear side of said stop strip for receiving the ore bearing sand separated from the material which passes over said checking riffles, and short tailing riffles that branch laterally from the front side of said stop strip.

17. A deck or top for sludge tables provided with longitudinally extending retaining riffles, obliquely disposed checking riffles arranged adjacent the head end of the deck and projecting above said retaining riffles, said deck having a diagonally disposed channel arranged intermediate said checking riffles and the lower edge of the deck, a stop strip forming one wall of said channel and projecting above said retaining riffles, said channel having an outlet at its lower end, and short tailing riffles branching laterally from said stop strip toward the tail end of the deck, said tailing riffles being higher than said retaining riffles.

18. A top or deck for sludge tables provided with longitudinally extending retaining riffles, and checking riffles arranged adjacent the head of the deck and at an angle to said retaining riffles and overlying same for checking the flow of the material and causing it to start to move toward the concentrates discharge end of the deck, said checking riffles extending in the same general direction as said retaining riffles.

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

ORSON WINFIELD DUNHAM.

Witnesses:

FRANK H. BRAECKEL,

CHARLES H. MILLER.