

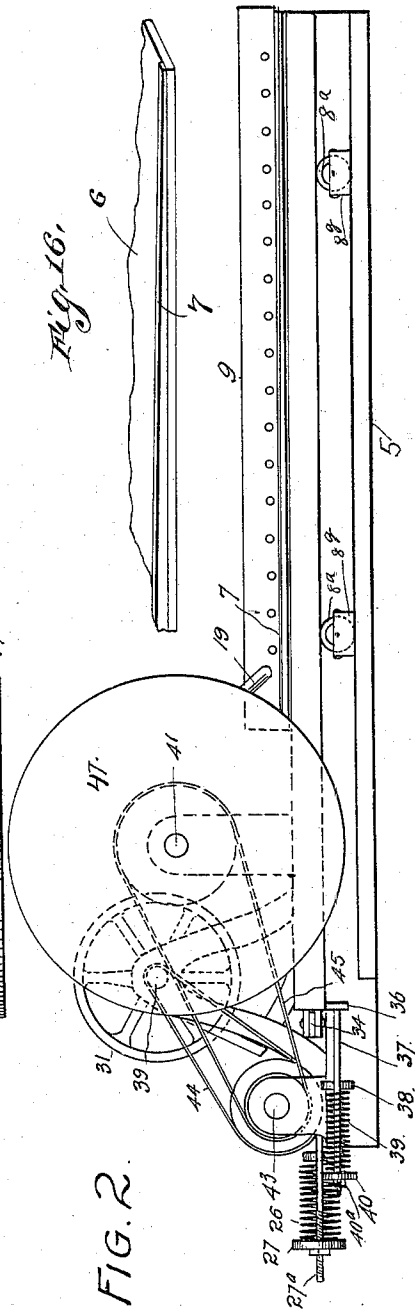
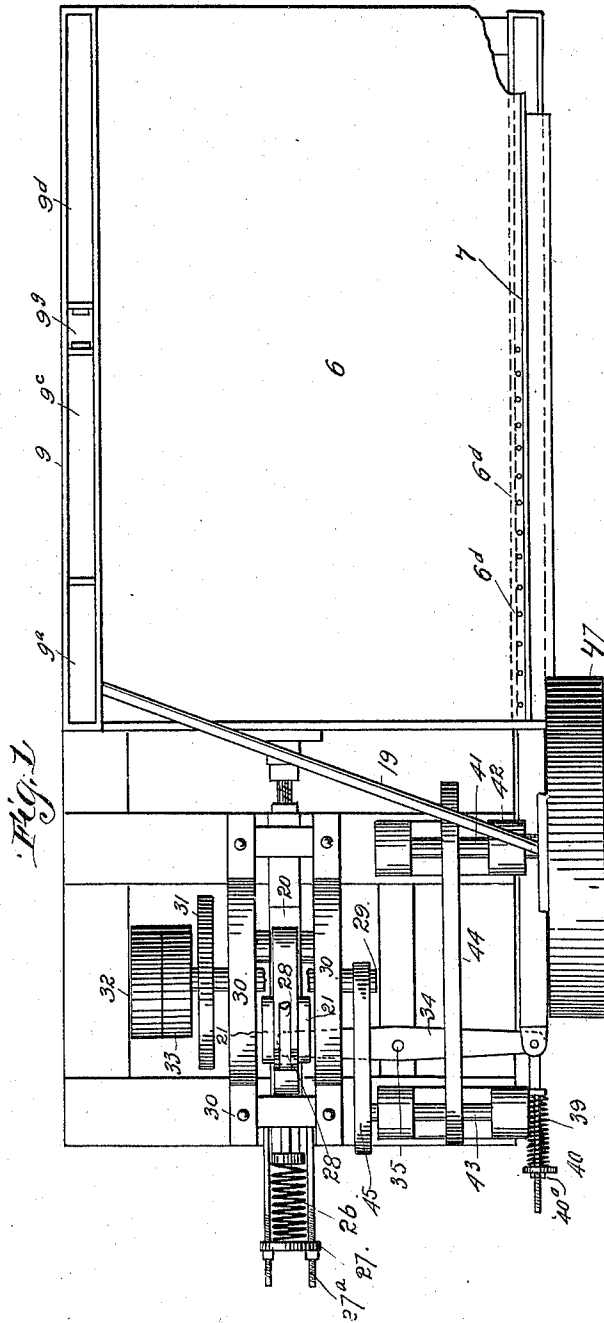
(No Model.)

4 Sheets—Sheet 1.

A. R. WILFLEY.
CONCENTRATOR.

No. 580,338.

Patented Apr. 6, 1897.



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Edith Kimball

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(No Model.)

4 Sheets—Sheet 2.

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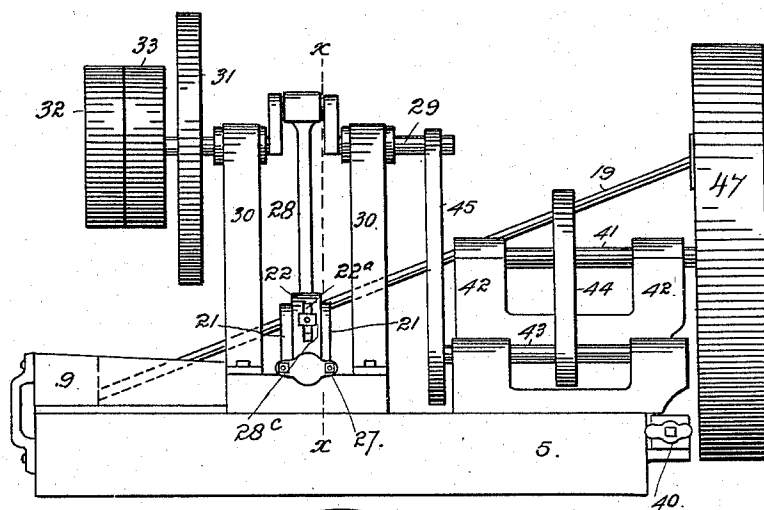


FIG. 3.

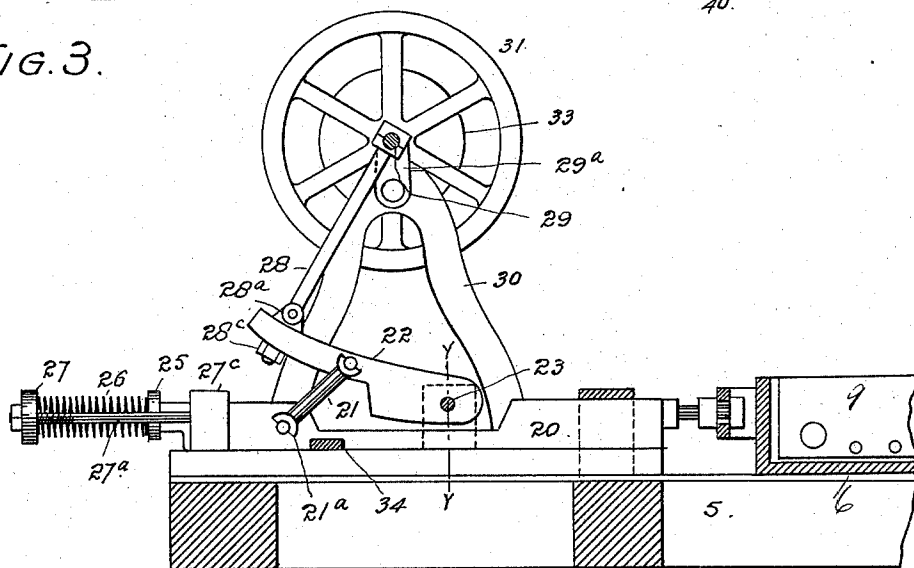
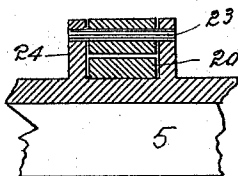


FIG. 4.

FIG. 5.



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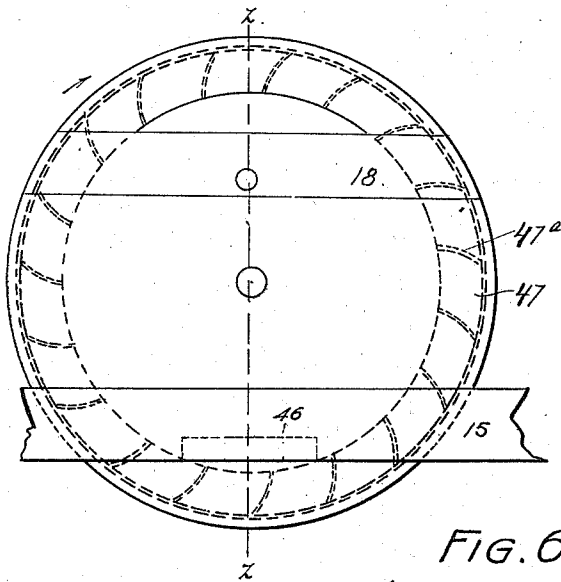


FIG. 6.

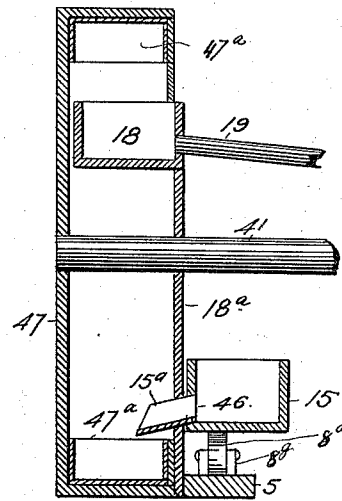


FIG. 7.

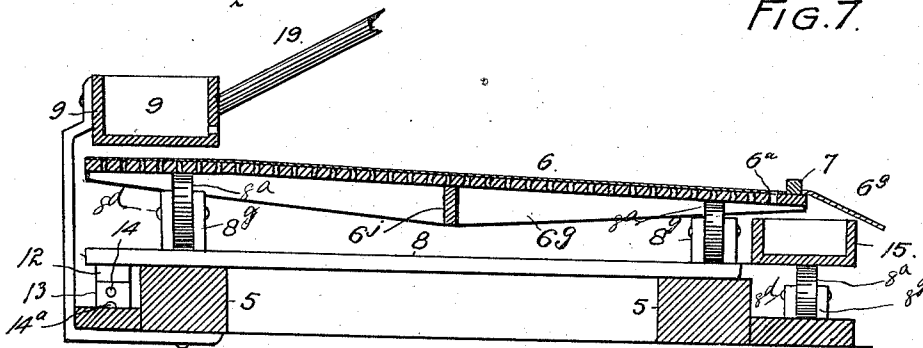


FIG. 8.

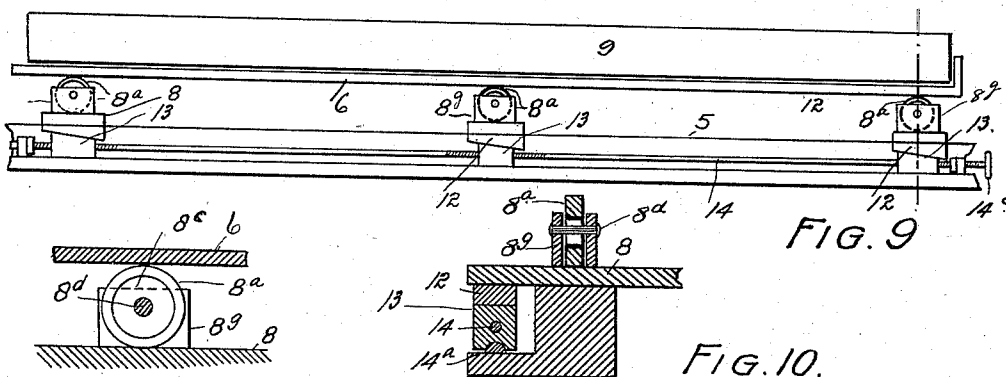


FIG. 9.

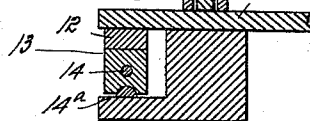
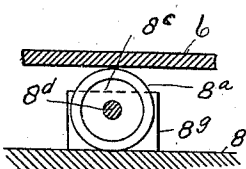


FIG. 10.

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4 Sheets—Sheet 4.

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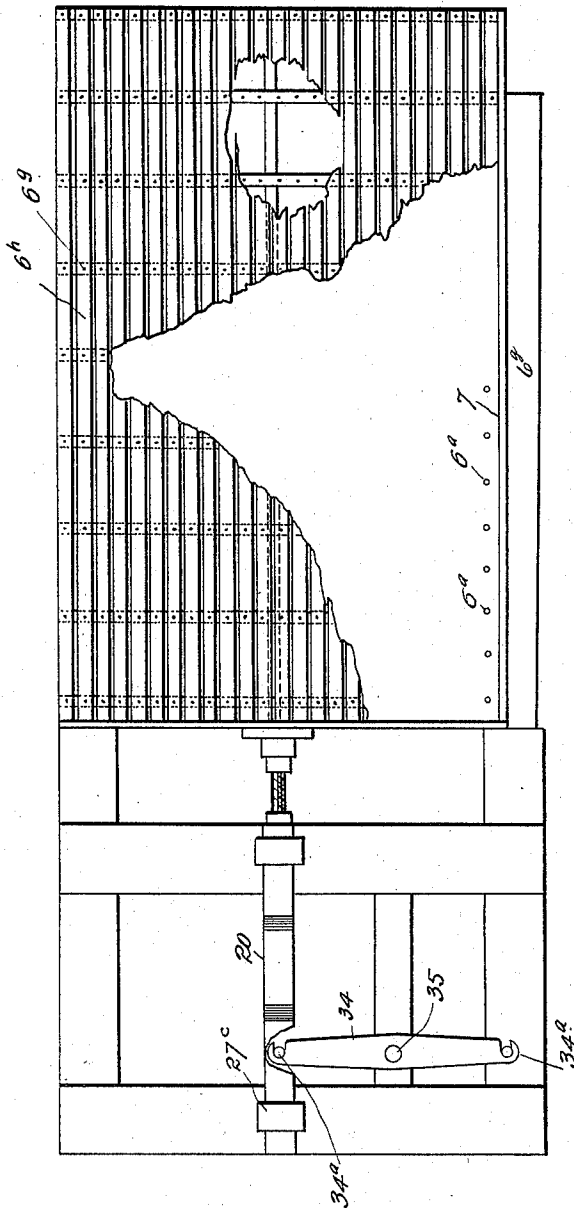


FIG. 12

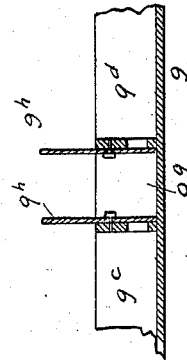


FIG. 14.

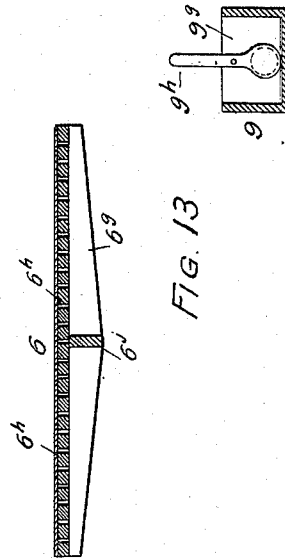


FIG. 13

FIG. 15.

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UNITED STATES PATENT OFFICE.

ARTHUR R. WILFLEY, OF DENVER, COLORADO.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 580,338, dated April 6, 1897.

Application filed October 26, 1896. Serial No. 610,109. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR R. WILFLEY, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in concentrators; and it consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a top or plan view of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a front end view of the apparatus. Fig. 4 is a section taken on the line *x x*, Fig. 3. Fig. 5 is a section taken on the line *y y*, Fig. 4. Fig. 6 illustrates the rotary elevator or bucket wheel. Fig. 7 is a section taken on the line *z z*, Fig. 6. Fig. 8 is a transverse section taken through the apparatus. Fig. 9 is a side elevation illustrating the means for regulating the transverse inclination of the table. Fig. 10 is a section taken on the line *y y*, Fig. 9. Fig. 11 illustrates the roller-support for the table and trough. Fig. 12 is a plan view of the table. Fig. 13 is a cross-section of the same. Fig. 14 is a fragmentary longitudinal section taken through the central portion of the feed-trough. Fig. 15 is a cross-section of the same. Fig. 16 is a fragmentary perspective view of the table, illustrating the tapering strip on the lower edge thereof.

Similar reference-characters indicating corresponding parts in the views, let the numeral 5 designate a suitable stationary supporting-frame upon which is mounted the transversely-inclined table 6, having a longitudinally-tapering strip 7 attached to the upper surface of its lower margin. The bottom of the table rests upon small wheels or rollers 8^a, which engage the supporting-frame and form

an antifrictional support for the table as the latter reciprocates. These rollers have a large opening 8^c, through which passes a small pin 8^d, fast in supports 8^e, secured to the transverse piece 8.

Above the upper margin of the table is located a stationary feed-trough 9, supported by arms 19, secured to the base 5. This trough is divided by suitable transverse partitions into four compartments 9^a, 9^b, 9^d, and 9^e. The ore to be treated is first discharged into the compartment 9^a of this trough and passes thence through suitable openings to the upper front corner of the table. The pure water necessary in the treatment of the ore is discharged into the central compartment 9^b, and passes thence through the openings controlled by suitable valves 9^h to the compartments on opposite sides. The compartments 9^c and 9^d are also provided with perforations to allow the pure water to escape to the table.

To the lower surface of the upper ends of transverse pieces 8, engaging the table, are secured a number of blocks 12, having inclined lower faces engaging the inclined faces of nuts 13, mounted on a screw-shaft 14, journaled on the stationary supporting-frame in such a manner that while it is allowed to rotate freely it is locked against longitudinal movement. The table is supported on rollers 8^a, attached to the upper surface of the cross-pieces 8. To one extremity of this screw-shaft is attached a hand-wheel 14^c. Hence as the threaded shaft is operated the nuts are made to travel in either direction, according as it is necessary to increase or diminish the table's inclination. These nuts are maintained in position by guides 14^a. Below the lower edge of the table is located a movable trough 15, mounted on rollers 8^a, engaging stationary supporting-brackets 8^e. The lower part of the table is provided with apertures 6^a, extending about half the distance from the head toward the foot or tail of the table. These apertures are to allow the pulp or water containing the float or fine mineral to pass through into the trough 15, through whose instrumentality it is carried backward and discharged by way of a chute 15^a into a rotating wheel 47, containing buckets 47^a, which carry the said material upward and discharge it into a stationary box 18, from which it

- passes by way of a suitable conduit 19 into the feed-trough 9, whence it is returned to the table for retreatment. The box 18 is held in place by a suitable support 18^a, secured to the framework 5. A slot or elongated opening is cut in this part 18^a, through which the chute 15^a projects. This elongated opening is necessary to permit the reciprocation of the trough.
- 10 To the head of the table is attached a bar 20, connected by means of links 21 with a rocking lever 22, having a stationary fulcrum 23. The links and lever form in effect a toggle for imparting reciprocating movement to the table. The support 24 for the fulcrum 23 straddles the bar 20, which is allowed to move freely. The bar 20 is provided with a stop 25, secured to its outer extremity and engaging a spring 26, whose outer end engages a sort of cap 27, through which pass two tension-rods 27^a, whose inner extremities are made fast to the stationary guide 27^c. Suitable nuts are applied to the outer extremity of the rods and engage the cap 27.
 - 25 The tension of the spring 26 is regulated by adjusting the nuts. The extremities of the links 21 are formed into half-bearings 21^a, engaging pins attached to the lever 22 and the bar 20, respectively. Links of this construction are made practicable by employing the spring 26, which prevents or takes up all lost motion, compensates for the wear of the parts, and maintains the elements in operative relation. This mechanism gives a smooth or practically noiseless reciprocation to the table, as contradistinguished from the jar or concussion incident to the operation of the ordinary bumping-table. Moreover, the links with the half-bearings are a great convenience in assembling the parts of the machine.
 - 40 The toggle is operated by means of a connecting-rod 28, leading from a crank 29^a of the motor-shaft 29, said rod being attached to the lever 22 by means of a bearing 28^a, adapted to move in a slot 22^a, formed in the lever. This movable bearing is held in place by a nut 28^c. By adjusting this bearing the stroke of the table may be regulated at will. The shaft 29 is journaled in a suitable supporting frame comprising two standards 30, secured to the stationary frame of the machine. This shaft carries a fly-wheel 31 and a pulley 32. The latter may be connected with any suitable power for operating the machine. A loose pulley 33 is also mounted on the motor-shaft adjacent the pulley 32 for the usual purpose. The trough 15 is operated through the instrumentality of a lever 34, fulcrumed on the frame at 35. The extremities of this lever are provided with half-bearings 34^a, engaging wrists attached to the bar 20 and the trough 15, respectively.
 - 60 Attached to a depending lug 36 on the forward extremity of the trough is a rod 37, carrying a stop 38, engaging one extremity of a spring 39, whose opposite extremity engages a cap 40, through which the rod 37 passes.

To the outer extremity of this rod is applied a tension-nut 40^a, which engages said cap. The lever 34, having the half-bearings, is maintained in operative relation with the other parts through the instrumentality of the two springs 26 and 39, which also take up lost motion and cause the trough to reciprocate without jar or concussion. As the shaft 29 is rotated, the table 6 and the trough 15 are simultaneously reciprocated through the medium of the mechanism heretofore described. It will be observed, however, that as the table moves in one direction the trough moves in the opposite direction, and vice versa.

The elevator-wheel 47 is mounted on a shaft 41, journaled in a suitable stationary support 42. Motion is communicated to the shaft 41 from a shaft 43 by means of a belt 45 engaging pulleys on the respective shafts. The shaft 43 is connected with the shaft 29 by means of a belt 44, leading from the shaft 39 to a pulley on the shaft 43.

It will be observed from the construction already described that the table 6 is moving fastest when it reaches its forward limit of movement. Hence it stops suddenly and gives the ore thereon a forward impetus, causing it to travel toward the tail of the table. As the table moves forward the trough 15 moves backward with practically the same speed, since the lever 34 is centrally fulcrumed. Hence the trough is moving fastest when it reaches its backward limit of movement, and the sudden stop causes the ore in the trough to travel toward the bucket-wheel.

In the operation of the machine the material is fed in the form of pulp into the compartment 9^a of the feed-trough and passes thence through the apertures therein to the upper left-hand corner 6^a of the head of the table. (See Fig. 8.) This corner of the table is less inclined than the body thereof, whereby there is a tendency on the part of the ore to accumulate at this end. The water and the lighter mineral particles pass transversely downward and reach the lower edge of the table, occupying a triangular space of considerable area at the lower right-hand corner of the table. (See Fig. 8.) This pulp, containing the light or float mineral, would naturally be dammed up by the ore in front of it and would have a tendency to pass over the strip 7 and escape with the gangue. Hence I have provided the table with apertures 6^a to allow this finer mineral to pass to the trough 15 and return thence to the feed-trough through the instrumentality of the chute 15^a, the bucket-wheel 47, and the conduit 19. This process of retreatment prevents the escape of the fine mineral.

The body of the ore takes a position forward of an imaginary line occupying a position opposite the right angle of the area occupied by the thin pulp or water containing the finer mineral, as heretofore described. The gangue is simultaneously carried forward longitudinally and downward transversely

and is discharged over the inclined flange 6^g, attached to the lower edge of the table and projecting over the trough 15. The flange 6 does not extend quite to the tail end of the table for the reason that the gangue, which leaves the table near this end, contains some mineral. This material I term "middlings." It passes into the trough 15 and is returned to the feed-trough for retreatment in the same manner as the finer mineral, which passes through holes in the table, as heretofore explained. Hence the gangue is discharged from the lower edge of the table over the narrow strip 7, the middlings or gangue containing some mineral passes into the rear end of the return-trough or the end near the tail of the table, while the mineral or concentrates pass over the tail end of the table or the extremities to the right, referring to Figs. 1 and 2.

As shown in Figs. 12 and 13, the table consists of longitudinal slats or pieces 6^h, secured to transverse pieces 6^g by suitable fastening devices. The pieces 6^g are widest at the center and taper toward their outer extremities. They are braced by pieces 6^j, set edgewise and engaging their central portions. The parts 6^h, 6^g, and 6^j are composed of wood. The slats 6^h are separated by narrow spaces to allow for swelling or expansion when the table is wet. These slats are covered by heavy linoleum 6^m, whose outer edge is se-

cured by suitable fastening devices. This construction is light, durable, and efficient and not nearly as expensive as it would be if the table were composed of metal.

Having thus described my invention, what I claim is—

The combination with a suitable frame, of a transversely-inclined table movably mounted thereon and having apertures in its lower edge, a narrow tapering strip attached to the table below said apertures, a trough located below the lower edge of the table and adapted to catch the material which passes through said apertures, an inclined flange attached to the lower edge of the table over which the gangue passes, said flange extending nearly to the tail of the table, the unflanged part of which allows the material to pass into the trough, a toggle mechanism for imparting a reciprocating movement to the table, and a lever connection between the table, and a trough for actuating the latter, the arrangement being such that when the table is moving in one direction, the trough is moving in the opposite direction, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR R. WILFLEY.

Witnesses:

G. J. ROLLANDET,
ALFRED J. O'BRIEN.