No. 757,350. PATENTED APR. 12, 1904.

J. RUEDY.

CONCENTRATOR.

APPLICATION FILED AUG. 22, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

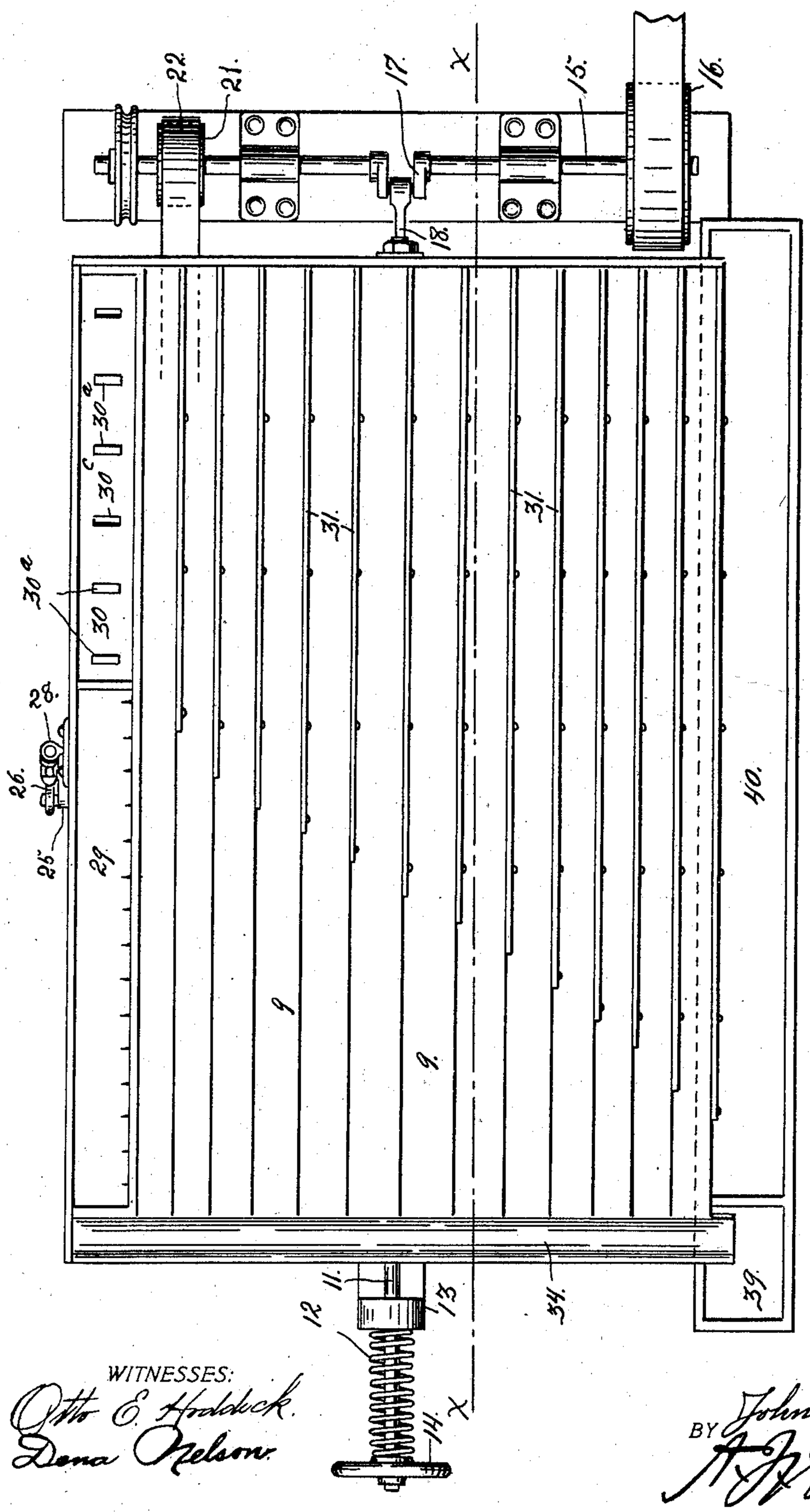

Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

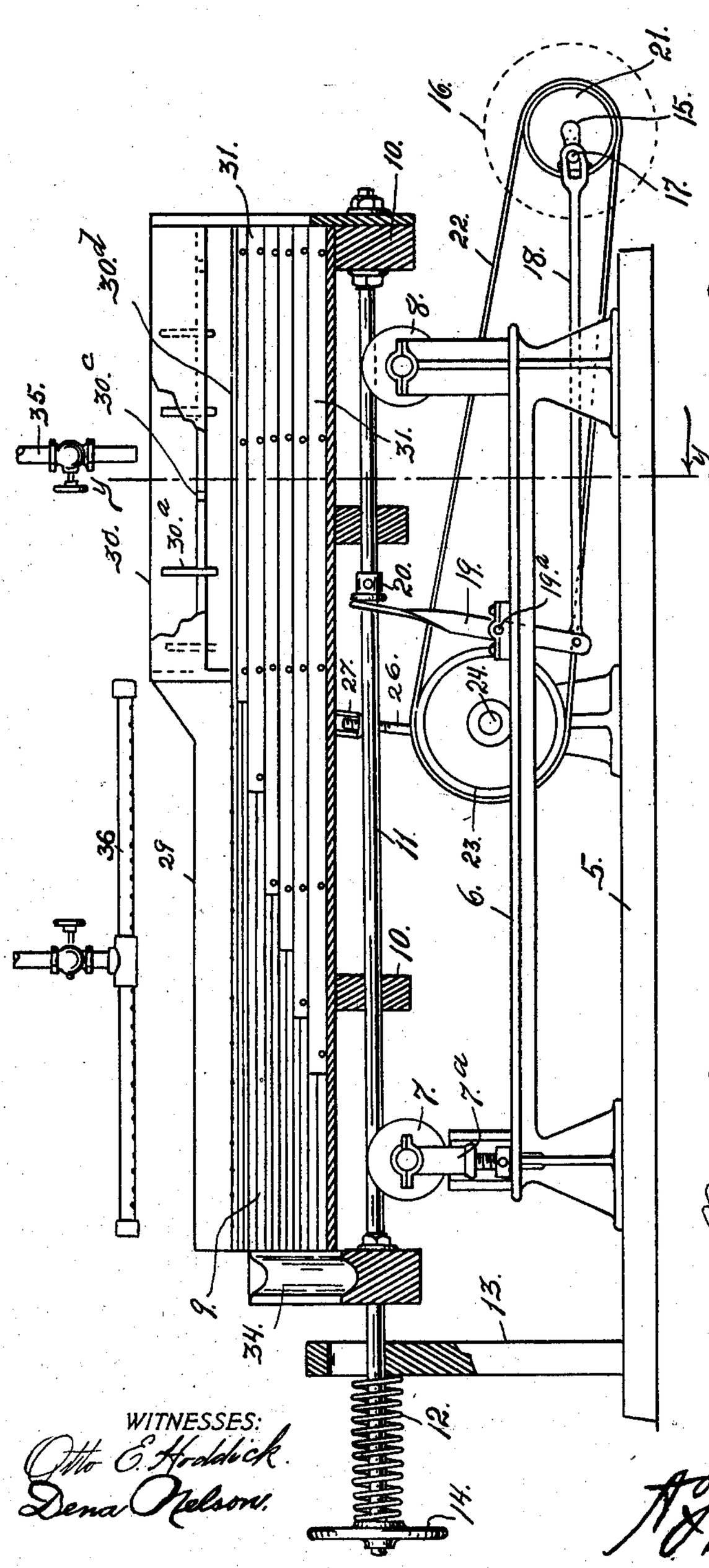

Fig. 2.

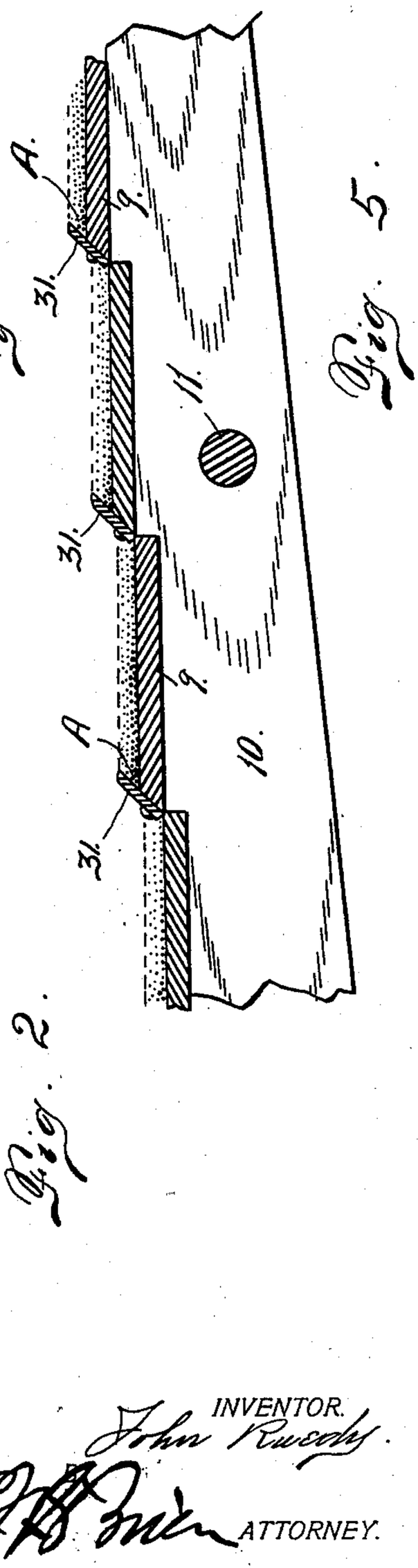

Fig. 5.

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NO MODEL. 3 SHEETS—SHEET 3.

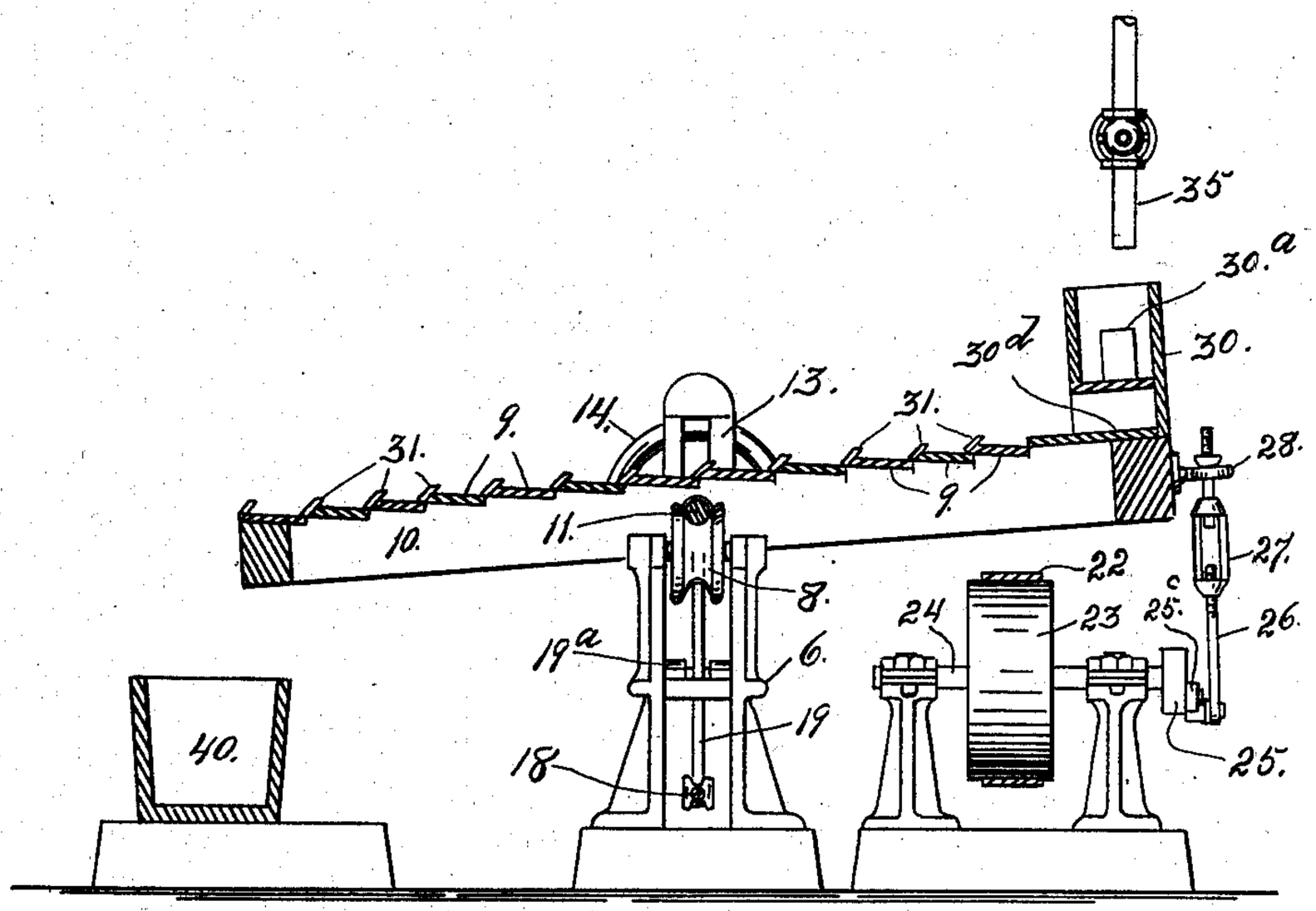

Fig. 3.

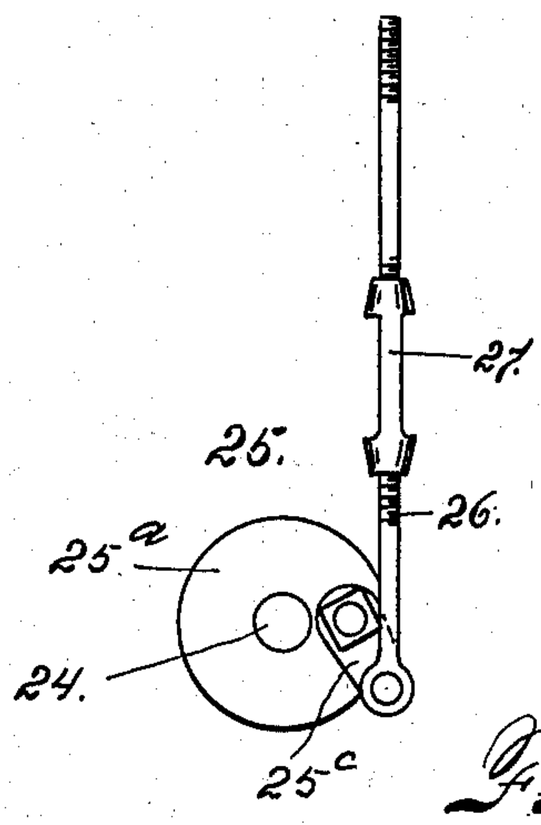

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN RUEDY, OF DENVER, COLORADO.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 757,350, dated April 12, 1904.

Application filed August 22, 1902. Serial No. 120 701. (No model.)

To all whom it may concern:

Be it known that I, JOHN RUEDY, 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 more particularly to a machine in which the gangue is separated from the mineral values by a washing and panning operation. Its object is to produce a concentrator of the class described by means of which practically all of the mineral values may be separated from the ore, which may be readily adjusted to produce the most effective results for any given grade of ore under treatment, which may be readily assembled for operation, which is light in weight and economical in use.

To this end the invention consists of a series of concentrating-pans forming a table which is centrally mounted on a reciprocating rock shaft or bearing, is provided with adjustable means for tilting said table, and is also provided with detachable riffles for regulating the overflow or escape of the material from one pan or shelf to another.

Having briefly outlined my improvement, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a top or plan view of a concentrator constructed according to my invention. Fig. 2 is a longitudinal section of the same, taken on the line *x x*, Fig. 1. Fig. 3 is a cross-section taken on the line *y y* of Fig. 2. Fig. 4 is a detail view of the adjustable crank and the connection employed for giving the oscillating or rocking motion to the pans or shelves of the table. Fig. 5 is an enlarged detail sectional view showing the construction and arrangement of the riffles secured to the edges of the pans or shelves.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the foundation of the machine, and 6 the bed or frame mounted thereon. In this frame are mounted the grooved sheaves 7 and 8. (See Fig. 2.) The sheave 7 is mounted in a vertically-adjustable bearing 7^a. Resting on these sheaves 7 and 8 are the pans or shelves 9, consisting of a series of flat strips or pieces, forming a transversely-stepped table mounted on cross beams or bars 10. Centrally secured on the cross-bars 10 and extending lengthwise of the table is the rock-shaft 11. This rock-shaft rests in the grooves of the sheaves 7 and 8 and is made to reciprocate on said sheaves. Its rear end, which projects beyond the frame 10, is provided with a spiral spring 12, which surrounds the shaft and rests between a rigid upright part 13 and a hand-wheel 14, threaded on the end of the said shaft. At the opposite or forward end of the machine is arranged the power-shaft 15, provided with the transmitting-pulley 16 and a crank 17. Extending from the crank 17 is a connecting rod or link 18, the inner end of which is pivoted to a vertical lever 19. This lever is fulcrumed, as shown at 19^a, on the frame 6, and its upper end is bifurcated to straddle the reciprocating rock-shaft 11. Just in front of this pivoted lever 19 is mounted a collar or stop 20, which is rigidly secured on the shaft 11.

Mounted on the power-shaft 15 is a second pulley 21, which is connected with a pulley 23 by a belt 22. This pulley 23 is mounted below and near the longitudinal center of the table 10 on a shaft 24, upon which is also mounted the adjustable crank 25. (See Figs. 2 and 3.) This crank is shown in detail in Fig. 4 and consists of a short crank-arm 25^c, which is secured to a disk or wheel 25^a, fast on the shaft 24, in such a manner as to permit the free end of the arm 25^c to be readily swung to and from the center of the disk 6, regulating the stroke of the crank. This crank-arm is pivotally mounted on the wheel or disk, and when in use its inner extremity is locked on the disk. To adjust it, the crank

is loosened where it is attached to the disk and swung in one direction or the other, according as it is necessary to increase or diminish its stroke, after which it is locked on the disk and is ready for operation. To connect this crank 25 to the longitudinal edge of the table, I have provided a connecting-rod 26, having a turnbuckle 27, which is swiveled on a pin 28, as shown in the drawings. Arranged above the edge of the table with which the aforesaid crank is connected are the feed and wash water troughs or launders 29 and 30. The launder 30 is provided with a series of projections 30^a to prevent the ore in the pulp which is fed to the launder from caking or packing. The pulp which is fed to this launder is obliged to pass around these projections 30^a on its way to the openings 30^c, through which it falls, to a spreading-board 30^d, whence it is carried by its own gravity and the rocking motion of the table to the concentrating pans or shelves 9. At the free or outer edge of each pan or shelf is secured a detachable riffle 31. These riffles are placed in an inclined position, as shown in detail in Fig. 5, forming a V-shaped recess A for retaining the mineral particles while the gangue is being thrown over the riffles by the rocking action of the table. A valve-controlled pipe 35 is mounted above the feed-launder 30 for supplying the necessary water to form, with the ore, a pulp of suitable consistency, while above the launder 29 is supported a perforated pipe 36 for supplying the table with the necessary wash-water, which is first discharged into the last-named launder.

It will be observed from an inspection of Figs. 1 and 3 of the drawings that the pans or shelves 9 are widest at the center of the table and gradually diminish in width toward its outer edges in both directions. The reasons of this construction is that when the table is subjected to a transverse rocking action with the shaft 11, which is located directly below the longitudinal center of the table, the motion is less on a line extending through the table's longitudinal center and increases toward the outer edges of the table in both directions from said line. Hence in order that the material in the longitudinal pans at the center of the table may have the necessary motion or agitation to separate the pulverized-ore particles from each other and allow the mineral values to settle the pans are given greater width, whereby the material, though having a slower movement, has a greater scope of travel on the wider pans than the pans farther from the center or the narrower pans, whereby the panning motion becomes equal or approximately equal in all of the pans.

In operation, the parts being assembled as above described, the sheave 7 is adjusted so as to slightly raise the table at this point, whereby the latter is longitudinally inclined, its head or right-hand extremity (see Figs. 1 and 2) being lowest. In this manner the pans are usually raised to keep them free from water, or nearly so, at their rear end or left-hand extremity, referring to Figs. 1 and 2, while the greatest depth of water is found in the forward end of the pans. The pulp containing the pulverized ore to be treated passes from the launder 30 to the pans 9, where it is carried successively from one pan to its adjoining pan by virtue of the rocking or oscillating motion to which the table is subjected during the rotation of the shaft 24 by the crank 25 and its connections. The heavier particles or mineral values of the pulp are retained by the riffles 31 and remain in the pans 9 nearer the feed edge of the table, while the lighter mineral values in the order of their gravity are caught by the pans farther from the feed edge of the table. The gangue is carried over each successive riffle, being deprived of a portion of the mineral values in each pan, until it is finally discharged from the table into the tailings-trough 40, having been completely or approximately completely impoverished of the mineral values originally contained in the pulp. The mechanism for rocking the table is so adjusted that when the outer extremity of the operating-arm 25^c is at its lowest point the table will occupy a slightly-inclined position, (see Fig. 3,) while when the same extremity of the crank is at its upward limit of movement the table will be considerably inclined, thus throwing the gangue-discharge edge of the table relatively lower than the feed edge of the table. It will be understood that this arrangement facilitates the discharge of the gangue over the riffles of the pans or shelves, while there is no tendency to throw the material in the opposite direction or toward the feed edge of the table, since the latter is never moved beyond the horizontal in that direction. The rocking motion of the table is regulated to produce this result to the end that the discharge from one pan to the other is intermittent, as distinguished from continuous, whereby each pan becomes in itself a complete concentrating device, which discharges a portion of the lighter material every time the table is tilted in one direction sufficiently for the purpose. As soon as this occurs the discharge is interrupted by the reverse movement of the table. During this last-named stroke or movement the concentrating function takes place, the gangue rising and the concentrates settling preparatory to the reverse stroke, which tips off the top or upper stratum of the pan's contents. Simultaneously with the separation of the mineral values from the gangue the concentrates or mineral values caught by the pans are carried rearwardly in the pans or shelves by the reciprocating motion of the table imparted by the lever 19, which is connected with the crank-shaft 15, as heretofore explained.

It will be seen that by virtue of the mech-

anism above described the table is carried forward by the movement of the pivoted lever 19 engaging the rigid collar 20 on the rock-shaft 11, the return stroke or travel of the table being produced by the recoil of the spiral spring 12, which is adjusted to return the table by a sudden impulse, and the next forward movement of the lever 19 engaging the collar 20 suddenly overcomes the rearward movement of the table, whereby the mineral values resting on the several pans 9 are carried gradually to the rear end of the pans up the slight incline of the latter. In this manner the concentrates are gradually carried to the receiving-trough 34, from which they pass to the receptacle 39.

From the foregoing it will be understood that the rocking motion of the table may be regulated by the relative position of the adjustable crank 25, according to the character of the material to be treated, while the adjustment of the sheave 7 and the tension of the spiral spring 12 fully control the travel of the mineral values toward the rear of the table.

Having thus described my invention, what I claim is—

1. A concentrating-table composed of a number of longitudinal pans widest at the center of the table and diminishing in width toward the opposite edges thereof arranged to have a transverse intermittent discharge from one to the other, the discharge being completely interrupted during the rocking stroke of the table in one direction, the said pans or shelves being provided with riffles projecting above their discharge edge and shaped to hold the concentrates on the pan, and means for simultaneously imparting to the table a longitudinal reciprocation and a rocking or oscillating movement.

2. A table for saving mineral values, said table having a series of longitudinal shelves widest at the center of the table and diminishing in width toward the opposite edges thereof, giving the table a stepped surface crosswise of its length, the shelves having a transverse discharge from one to another, and means for simultaneously imparting to the table a longitudinal reciprocation and a rocking or oscillating motion, the latter being regulated to make the transverse discharge intermittent whereby the discharge is completely interrupted during the rocking stroke of the table in one direction.

3. A table for saving mineral values, said table being provided with a series of longitudinally-disposed concentrating-pans adapted to retain a portion of the material under treatment, said pans being widest at the central portion of the table and diminishing in width toward the opposite edges thereof and means for simultaneously imparting to the table a movement having a tendency to cause the material to travel thereon from the head toward the tail of the table, and a movement causing the pans to overflow or discharge intermittently from one to another in a transverse direction, whereby the discharge is completely interrupted during appreciable intervals.

4. A table for saving mineral values, said table having a series of longitudinally-disposed pans arranged to give the table a transversely-stepped surface, the table being mounted on an axis lying in a vertical plane passed longitudinally through its central portion, the central pans being widest, and the other pans diminishing in width from the center in both directions, and means for imparting to the table a longitudinal reciprocation and a rocking motion at right angles to its longitudinal movement, substantially as described.

5. In a concentrating apparatus, the combination with a suitable support, of a concentrating-table provided with a series of longitudinally-disposed parallel pans rigidly connected with the table and giving its surface a transversely-stepped appearance, said pans being of varying width to compensate for the reduced motion in the vicinity of the table's axis, a shaft secured to the longitudinal center of the table and resting on the support, and means for simultaneously imparting to the shaft and table a longitudinal reciprocation and a transverse rocking or oscillating movement, the arrangement being such as to cause the pans to have an intermittent discharge from one to the other, the discharge being completely interrupted during one stroke of the rocking movement.

6. In a concentrating apparatus, the combination with a suitable support, of grooved wheels mounted thereon, a shaft engaging said wheels, and a concentrating-table having its central longitudinal portion secured to the shaft, said table being composed of a series of longitudinal, parallel pans decreasing in width from the central portion of the table in both directions, and means for imparting to the shaft and table a longitudinal reciprocation and a rocking motion at right angles to the reciprocation, substantially as described.

7. In concentrating apparatus, the combination with a suitable support, of grooved pulleys mounted thereon, one of said pulleys being vertically adjustable, a shaft engaging said pulleys, a concentrating-table mounted on the shaft, said table being composed of longitudinal parallel pans decreasing in width from the central part of the table in both directions, and means for simultaneously imparting to the table a longitudinal reciprocation and a transverse rocking motion, said means being arranged to give the pans an intermittent, transverse discharge from one to the other.

8. In a concentrating apparatus, the combination with a suitable support, of a shaft mounted to rock and slide longitudinally thereon, a concentrating-table having its central longitudinal portion made fast to said shaft,

said table being composed of a series of longitudinal, parallel pans decreasing in width from the central part of the table in both directions, and means for simultaneously imparting to the shaft and table a longitudinal reciprocation and a rocking motion, substantially as described.

9. The combination with a suitable support, of a shaft mounted thereon and having a longitudinal movement, said shaft being spring-actuated in one direction, a lever connected with the shaft for actuating the table in the opposite direction to place the spring under tension, and a concentrating-table having its central longitudinal portion attached to the shaft, said table being composed of a series of parallel, longitudinally-disposed pans widest at the center or in the vicinity of the table's axis, and means for imparting to the table a rocking movement at right angles to its longitudinal reciprocation, the rocking means being arranged to cause the pans to discharge intermittently from one to the other, the discharge from one pan to another being completely interrupted during the rocking stroke of the table in one direction.

10. The combination with a suitable support, of a table movably mounted thereon and composed of a series of parallel longitudinally-disposed pans widest at the center of the table, means for imparting to the table a longitudinal reciprocation, an operating-crank, and a suitable connection between the said crank and the table whereby a rocking movement is imparted to the table, calculated to cause the pans to have an intermittent discharge from one to the other, the discharge from one pan to the other being completely interrupted at predetermined intervals.

11. The combination with a suitable support, of a table movably mounted thereon and composed of a series of parallel, longitudinally-disposed pans widest at the center of the table, and means for imparting to the table a transverse rocking movement whereby the pans are made to overflow or discharge intermittently from one to another, the discharge being completely interrupted during the rocking stroke of the table in one direction.

12. In concentrating apparatus, the combination with a suitable support, of sheaves mounted thereon, a shaft engaging said sheaves, a spring surrounding the shaft, a hand-wheel threaded on the shaft and bearing against one extremity of the spring, a stationary support through which the shaft passes, a lever for imparting to the shaft a longitudinal movement in one direction whereby the spring is placed under tension, the spring imparting the movement in the opposite direction, and a table mounted on the support and composed of a series of parallel longitudinally-disposed pans, said pans being widest at the center of the table, means for feeding the material to be treated, to the table, means for supplying the necessary wash-water to the table, and means for imparting to the table a rocking movement at right angles to its reciprocating movement, whereby the pans are caused to overflow or discharge intermittently from one to another, the discharge or overflow from one pan to another being completely interrupted at regular intervals or during the rocking movement of the table in one direction, substantially as described.

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

JOHN RUEDY.

Witnesses:
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A. J. O'BRIEN.