(No Model.) 2 Sheets—Sheet 1.

C. C. RUEGER.

ORE CONCENTRATOR.

No. 287,173. Patented Oct. 23, 1883.

FIG. 1.

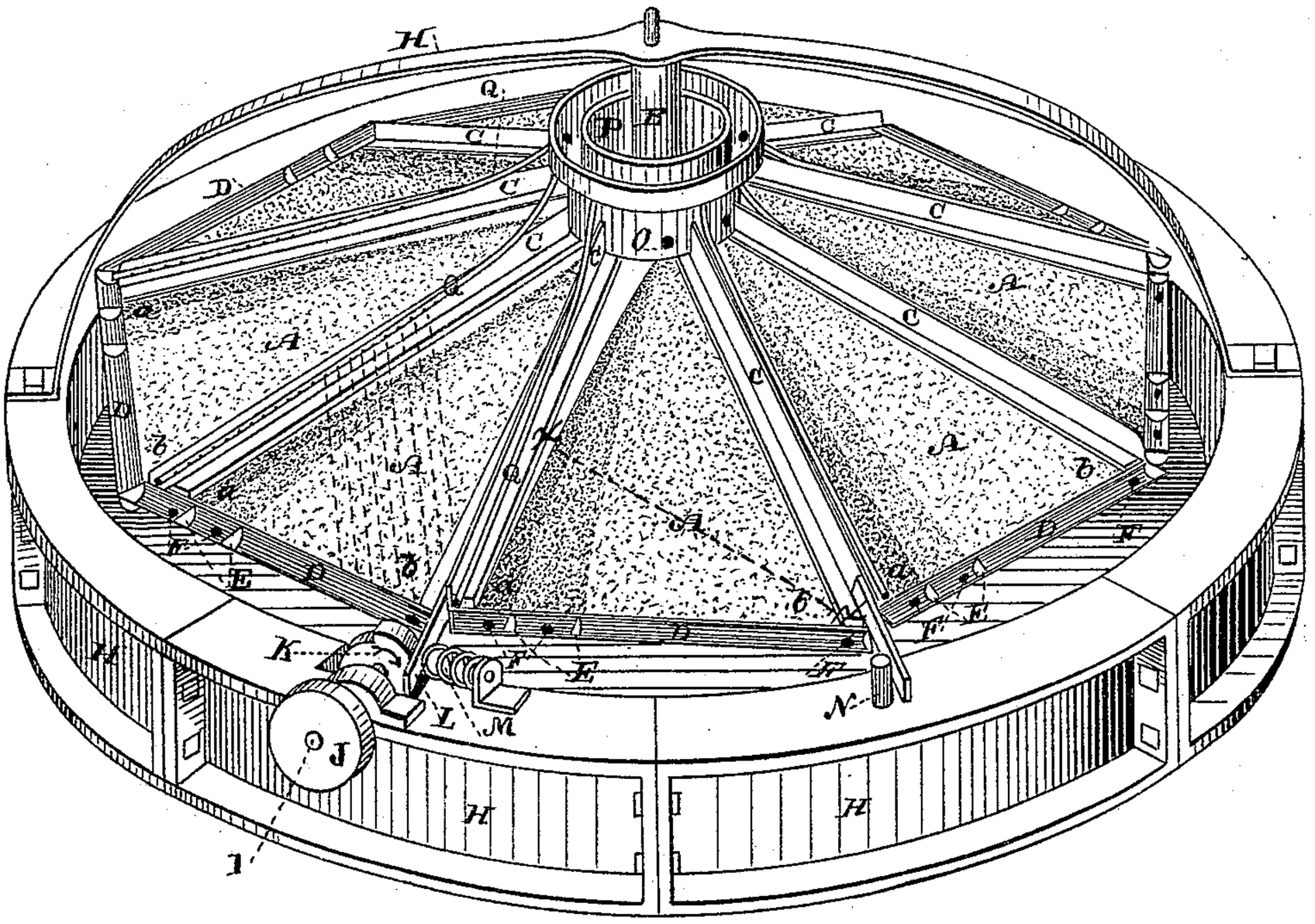
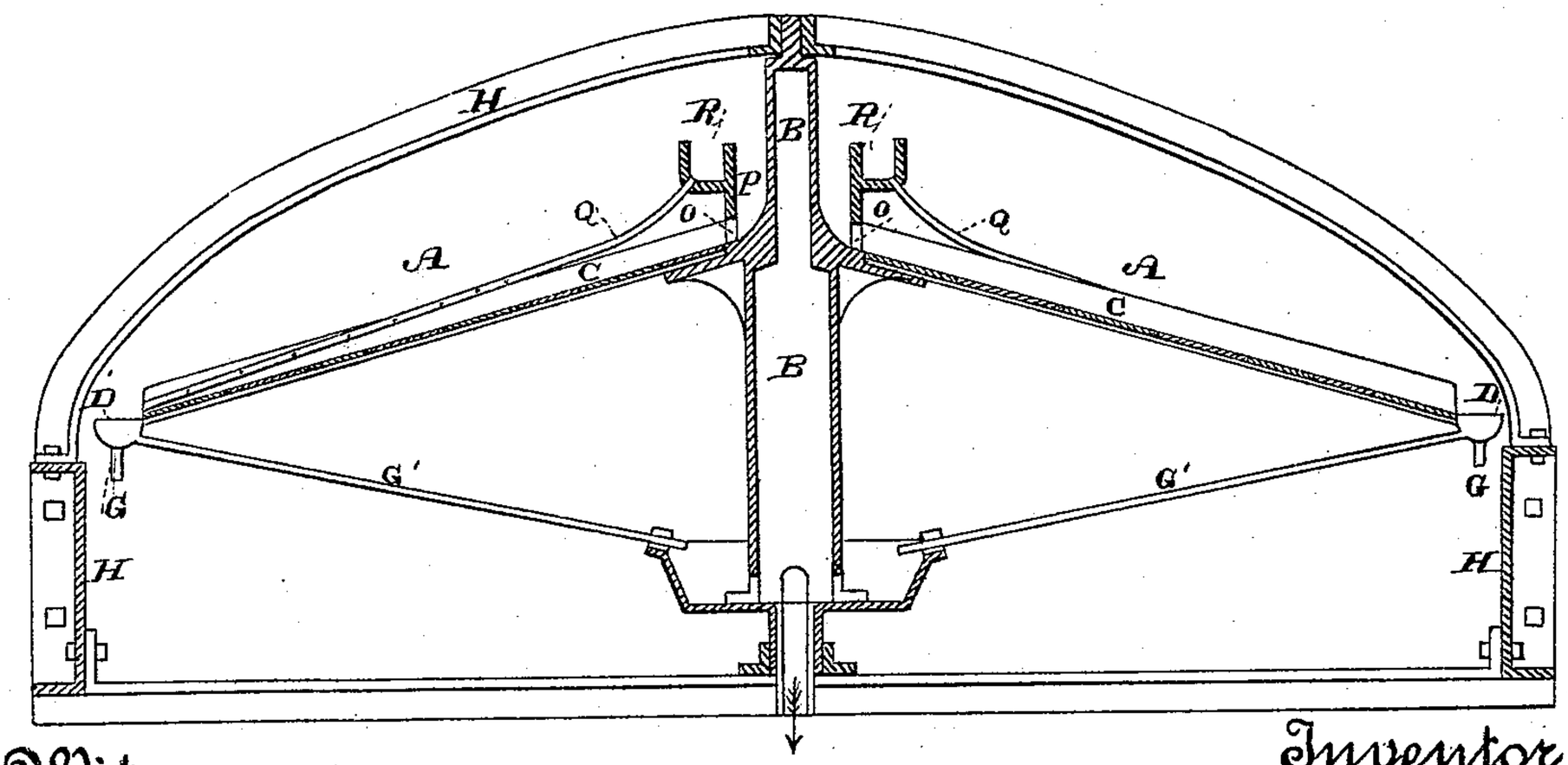


FIG. 2.



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(No Model.) 2 Sheets—Sheet 2.

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ORE CONCENTRATOR.

No. 287,173. Patented Oct. 23, 1883.

FIG. 3.

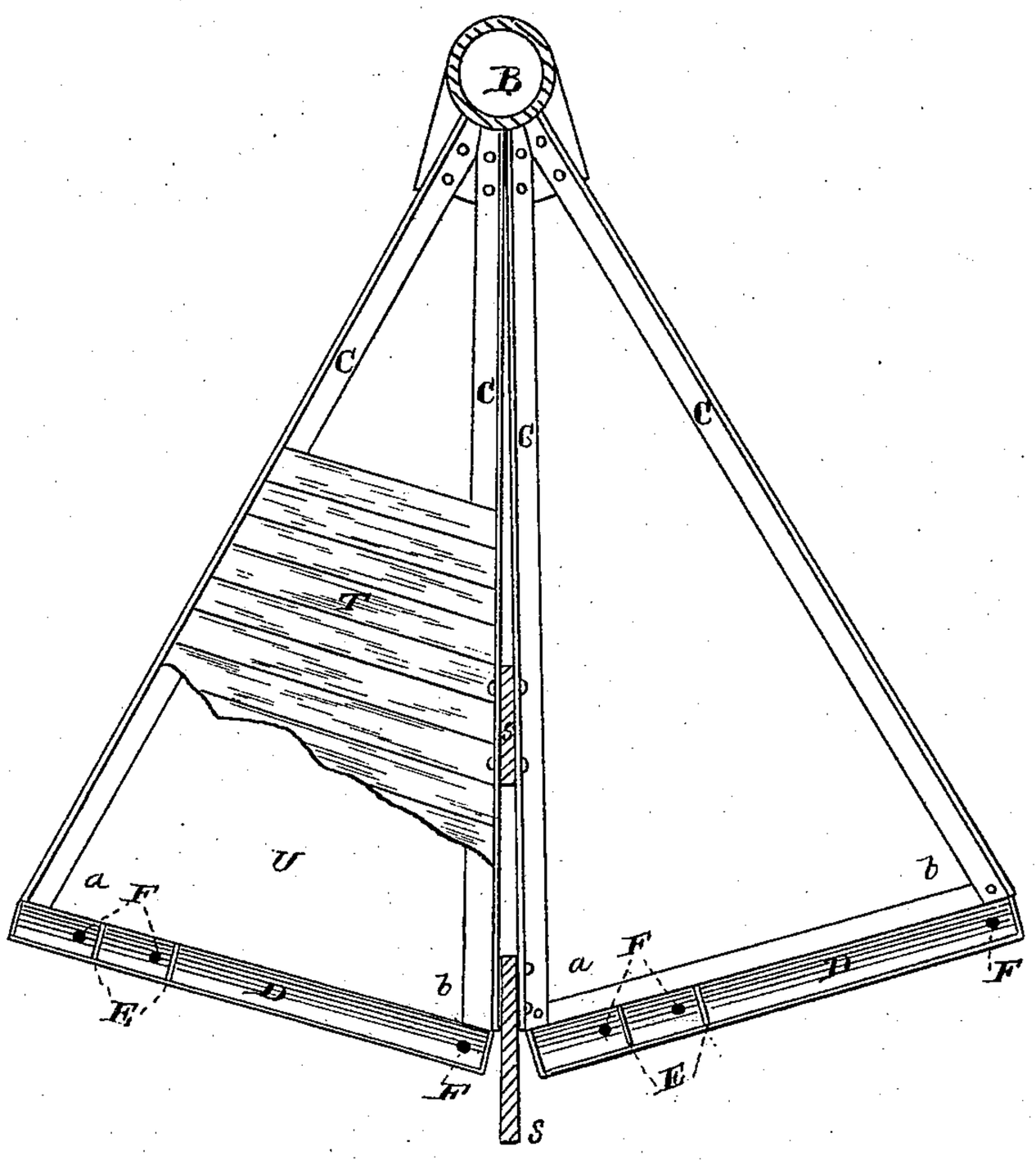
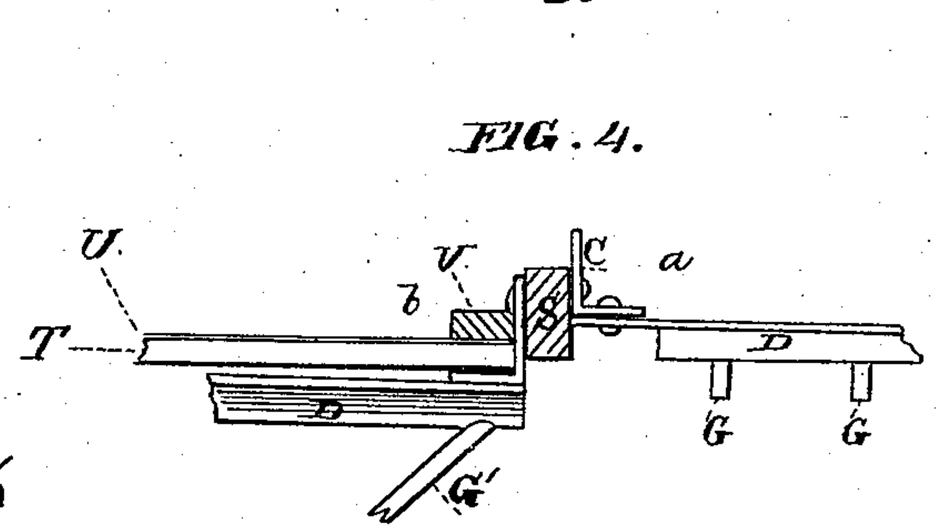


FIG. 4.



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UNITED STATES PATENT OFFICE.

CHARLES C. RUEGER, OF SAN FRANCISCO, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 287,173, dated October 23, 1883.

Application filed February 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. RUEGER, of the city and county of San Francisco, and State of California, have invented an Improved Ore-Concentrator; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to that class of concentrators which are used to separate ore when in the condition of more or less fine sand, and refers more especially to the machines known in the art as "percussion-tables."

My invention consists in certain details of construction and combinations of parts, as hereinafter described and claimed.

Figure 1 is a perspective view of my apparatus. Fig. 2 is a vertical section taken through the center. Fig. 3 is a top view of two tables, showing the frame only in the right-hand table, and the frame partly covered in the left-hand table, with other details of construction. Fig. 4 is a front view of a part of the discharge end of tables, showing details of construction and relative position of adjacent outside angles.

The machine is provided with a series of triangular tables, A, constructed in any manner that will give a durable and smooth working-surface. These triangular tables, together with other operating parts, as will hereinafter appear, are arranged radially around a vertical shaft, B, securely fastened to it in any desired manner and to each other. A suitable inclination is given to the tables, placing the three corners of each at different levels, but corresponding in each table, being highest at the center shaft, with the radial line of greatest pitch along one side of the table, so that only alternate outside corners of the triangles will be on the same level—*i. e.*, the higher outside corners, *a*, will correspond, as also will the lower outside corners, *b*. The triangular tables are constructed preferably as follows, Figs. 3 and 4: Two bars of angle-iron, C, of equal length, are joined to an apex by riveting their upper ends to a piece of iron plate, the lower ends being riveted to a cast-iron gutter-shaped bar, D, thus forming the triangle. Into the triangular frame thus formed a floor of boards is laid, so as to form a true plane, T. This plane surface is covered with thick rubber cloth, which gives a water-proof, smooth working-surface, U. The rubber cloth and board floor are held in place by strips V, screwed to the iron frame-work. A sufficient number of these triangular tables are arranged around the common central shaft, B, to close the circuit, and thus form a conical aggregation of tables. It is quite evident that though I have described my device as consisting of a series of tables any number greater than two can be used without departing from the spirit of my invention. The several tables are then firmly joined to each other by riveting together the angle-iron side bars, C, making provision for a possible change desirable in the inclination of the planes by inserting exchangeable pieces of iron, S, having rivet-holes of varying heights between the side bars. The cast-iron gutter-shaped bars D, which unite the angle-iron side bars, form the periphery of the conical aggregation of tables. The further purpose of these gutters D is to serve as receptacles and conduits for the various products flowing from the concentrating-planes. For each product a separate compartment is provided in the gutters by putting into them a sufficient number of partitions, E. The products of concentration take their exit from these compartments through holes F in the bottoms of the gutters connecting with outflow-pipes G G′, which conduct the products to receptacles suitably disposed underneath the machine. All the outflow-pipes G′ for the poor or waste product (and others, if desirable) are run to the bottom of the central shaft, and are firmly fastened to both gutter and shaft, so as to serve as a stay or brace to the tables, increasing the rigidity of the structure, and preventing injurious vibrations when in operation. The discharge ends of these pipes G G′ may be led in different directions, carrying the waste product in one direction and the valuable product in another; and, as shown, one set of pipes may carry its product to a circular trough or gutter surrounding the central shaft, from which it may be discharged into said shaft, if desired, by making it hollow and perforating it at proper points.

The supporting-frame for the concentrator consists of one or more arcs, H, of cast-iron, bolted together, for a full series of tables to

form a ring, and it is provided above and below the tables with bearings at the center for the upright shaft to which the tables are attached. On this cast-iron frame is the driving mechanism of the concentrator, consisting of a short horizontal shaft, I, with belt-pulley J and cam K attached. The cam, rotating, pushes against a bar, L, projecting from one of the tables, thus acting against the pressure of a spring, M, so disposed that when the bar is released from the cam-face the table recoils against one or more abutments, N. The rapid reciprocating action of the concentrator by the cam and spring effects the agitation of the pulp, and the percussion effects its diagonal course over the plane, in the manner subsequently described. In this manner one cam will drive a number of tables, which number is only limited by the closing of the circuit. By having a cam at each end of the shaft, and making the latter common to two frames, two full series of tables can be driven with one belt and with proportionately less power than one series, thus giving the greatest possible economy of space, power, and motive mechanism. The action of the concentrator most closely resembles that of the Rittinger side percussion-table, in so far that the ore pulp, while flowing down an inclined table, is agitated by an oscillating motion given to the plane, which allows the particles to settle in the order of their density. At the same time they are subjected to a lateral percussive action, which causes them to take a diagonal course on the plane in flowing down toward the discharge-edge. The Rittinger table, however, is a rectangular parallelogram, or a series of such parallelograms set parallel to each other, suspended from rods, and inclined at an angle of from three to six degrees, the upper and lower edges or rims being horizontal, making the line of greatest pitch run parallel to the long sides. In my invention the concentrating-table is of triangular form, a series of them radiating and inclined from a common central axis, and the line of greatest inclination *x x* running from a point on one of the radial sides to the opposite outside corner or angle, *b*, of the triangular table, so that the three angles of the table are at different elevations, the most acute central angle being the highest. In my invention, also, the ore pulp runs upon the tables through openings O in a circular trough-shaped distributer, P, which is common to the series of tables, and affixed to the central axis. The pulp spreads in a thin layer over the table and runs down toward the lowest corners, subjected meanwhile to an agitating action, which facilitates the settling of the denser particles, and a percussive action, which causes the pulp to travel toward the higher outside corner of the triangular plane. This agitating and percussive action is not uniform over the length of the table, as in the Rittinger machine, but accelerative, increasing as the pulp approaches the discharge-edge. The motion also is not in straight lines, as in the Rittinger machine, but in arcs of concentric circles, which induces a centrifugal action on the ore particles favorable to separation. The denser ore particles traveling most slowly downward, by virtue of their greater adhesion to the surface of the plane, are subjected longest to these actions, which causes them to take a more diagonal course than the less dense particles. In their course they are met by a current or currents of more or less clear water, (shown with dotted lines in drawings,) which flow from perforated pipes Q, extending from the central distributing-trough, R, to the higher outside corners of the tables. The flow of this clear water naturally being toward the lowest corner, it must cross the course of the concentrates, carrying the less dense particles still admixed therewith toward their proper place of discharge. The three usual products of concentration—*i. e.*, tailings or waste, concentrates, and a mixture of the two, called "middlings"—flow into the separate compartments of the gutter D, attached to the lower edges of the triangular tables, and thence through orifices and discharge-pipes into suitable receptacles in the manner already above described.

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

1. In a concentrating apparatus, the triangular tables A, having their angles at different levels, in combination with mechanism by which the tables receive a side percussive motion, means for delivering the pulp to be concentrated upon the tables at their highest angles, and pipes for delivering jets of water along the highest radial sides of said tables, substantially as described.

2. In a concentrating apparatus, a series of independent triangular tables, A, radiating and inclining downward from a common center, and having also an independent lateral inclination, in combination with means for discharging pulp and water upon the highest portion of the table, and a mechanism by which a rotary percussive motion is imparted to the tables, substantially as herein described.

3. In a concentrating apparatus, the combination of a series of independent triangular tables radiating from a common center, said tables being united to form a complete circuit in which the outside edges of each triangle will be on the same level, and means for imparting to said tables a percussive movement around the common center and toward the highest radial sides, substantially as herein described.

4. In a concentrating apparatus, a series of triangular tables, A, radiating from a common center, and having their adjacent exterior angles at different levels, in combination with the central pulp-supply, P, the radial water-pipes Q, the rotary cam K, acting upon the tables, the spring M, and the abutment N, substantially as herein described.

5. In a concentrating apparatus, the triangular tables A, having each of their angles at different levels, with devices for supplying pulp and water to the tables, and mechanism for producing a percussive action upon the tables, in combination with the gutter or trough D, partitions E, discharge-openings F, and pipes G G′, substantially as herein described.

In witness whereof I hereunto set my hand.

CHARLES CONRAD RUEGER.

Witnesses:

JAS. TOBIN,

J. H. BLOOD.