

(No Model.)

4 Sheets—Sheet 1.

E. W. CLARK.
ORE CONCENTRATOR.

No. 463,482.

Patented Nov. 17, 1891.

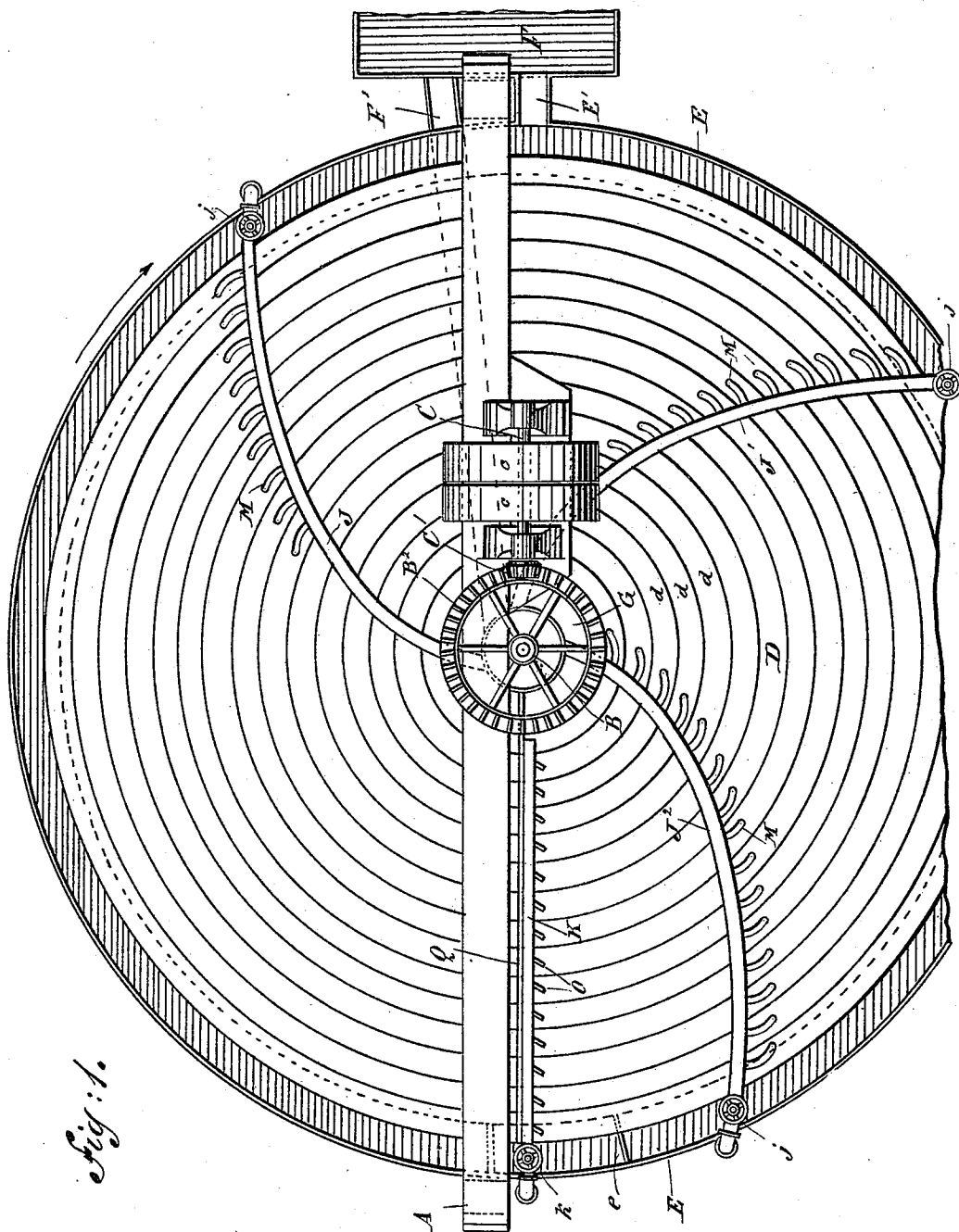


Fig. 1.

WITNESSES:

Chas. Nida
C. Sedgwick

INVENTOR

E. W. Clark
BY Munn & Co
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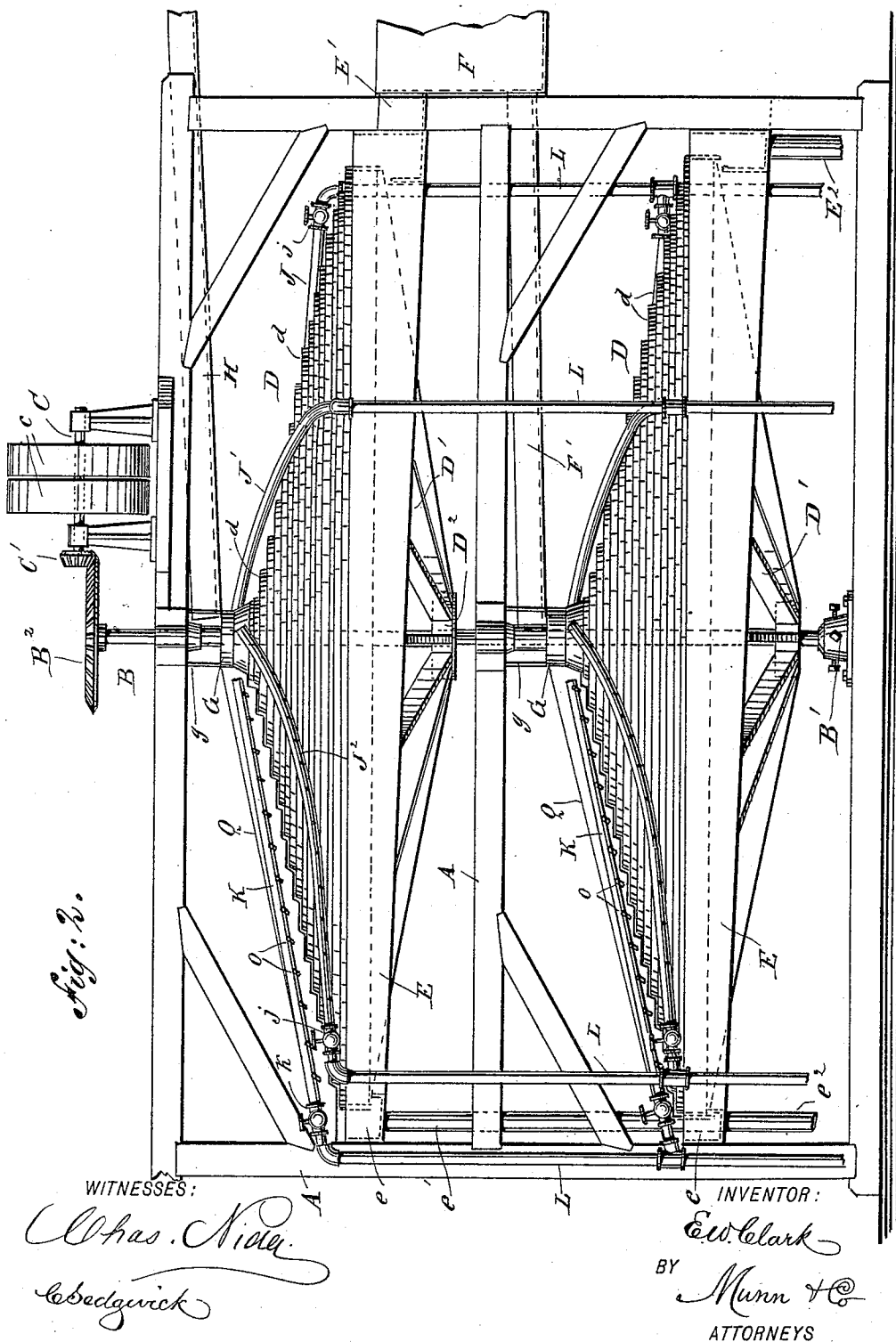
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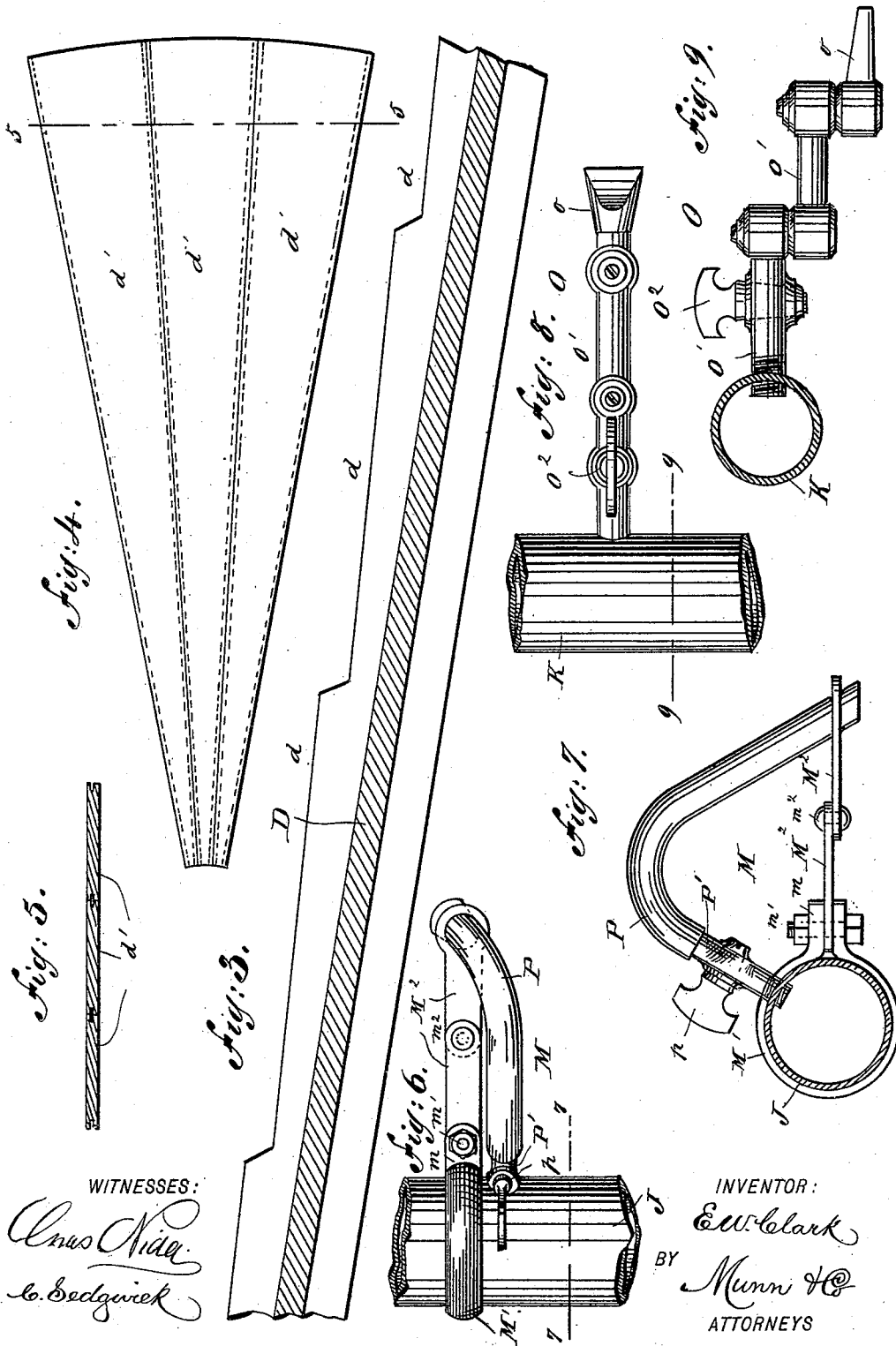
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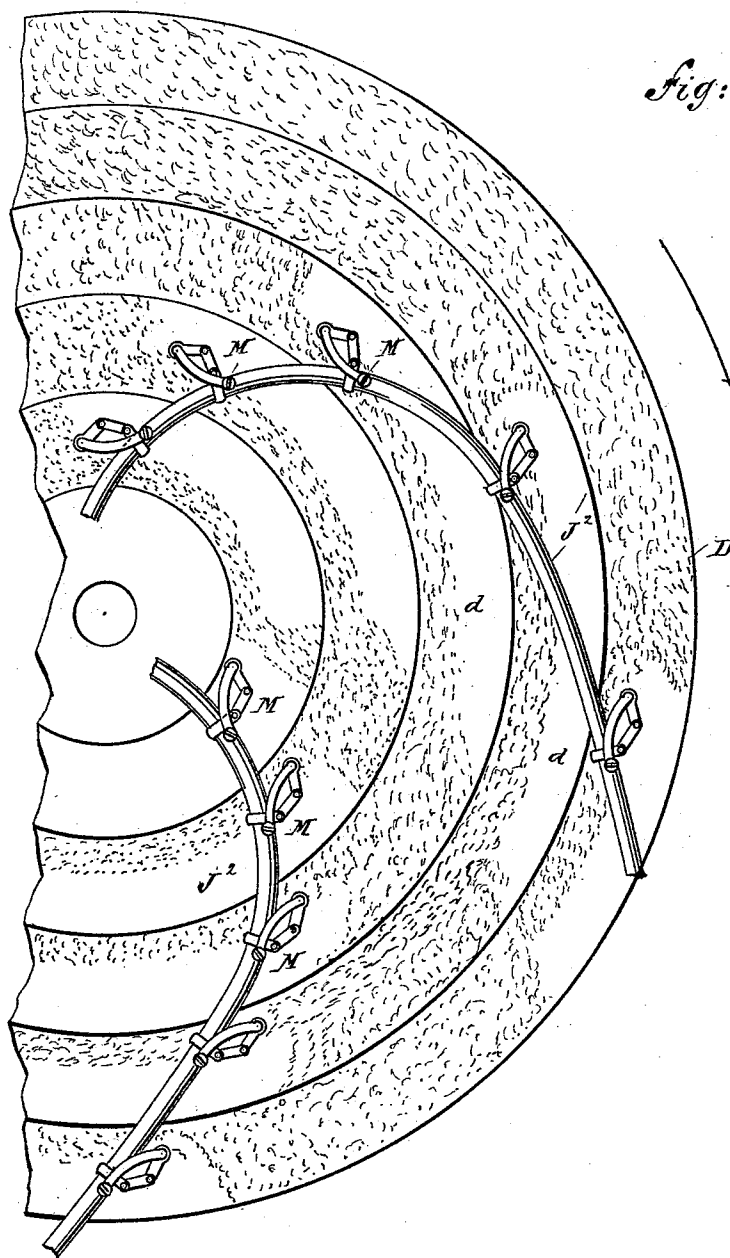


Fig. 10.

WITNESSES:

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INVENTOR:

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BY *Munn & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD W. CLARK, OF BUTTE CITY, MONTANA, ASSIGNOR TO HIMSELF, EDWIN M. CLARK, AND THE WESTERN IRON WORKS, ALL OF SAME PLACE.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 463,482, dated November 17, 1891.

Application filed January 29, 1891. Serial No. 379,520. (No model.)

To all whom it may concern:

Be it known that I, EDWARD W. CLARK, of Butte City, in the county of Silver Bow and State of Montana, have invented a new and Improved Ore-Concentrator, of which the following is a full, clear, and exact description.

My invention relates to improvements in ore-concentrators and slime-tables; and the object of my invention is to produce a simple, durable, and comparatively inexpensive concentrator, by means of which metals may be rapidly separated from the ground ores; and to this end my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a broken plan view of the concentrator embodying my invention. Fig. 2 is a broken side elevation of the same. Fig. 3 is a broken cross-section through one of the tables. Fig. 4 is a segment of a table showing the manner in which the table-boards are fastened together and arranged. Fig. 5 is a cross-section on the line 5 5 of Fig. 4. Fig. 6 is an enlarged detail view of one of the adjustable jets which deliver water upon the table. Fig. 7 is a cross-section on the line 7 7 of Fig. 6. Fig. 8 is an enlarged detail plan view of another form of adjustable jet. Fig. 9 is a sectional view on the line 9 9 of Fig. 8, showing the adjustable jet in side elevation; and Fig. 10 is a broken enlarged plan of the table, showing in detail the arrangement of the water-pipes above the same.

The apparatus is mounted in a suitable frame-work A, through which extends vertically a shaft B, which is mounted at the bottom in a step B', and which has at the top a gear-wheel B², which meshes with a pinion C' on the horizontal shaft C, said shaft being mounted in suitable supports on the top of the frame and having driving-pulleys c by which it may be rotated. The revolving of the shaft C will thus impart a slow rotary movement to the shaft B and the tables which are secured thereto.

The shaft B carries tables D, which are ar-

ranged in the upper and lower portions of the frame-work, there being one above the other, and in the drawings two tables are shown, although one may be used, or a greater number may be placed in the frame, if necessary. The tables are preferably circular in shape and have an opening in the center through which the shaft B extends, and the tables are inclined from the center toward the periphery, and are provided with a series of steps d, which are arranged concentrically thereon, so that when pulp is delivered upon the table the tailings and lighter portion of the pulp will be gradually washed to the edge of the table, as hereinafter described. The table is supported by braces D', which extend from collars D² on the shaft B; but the table may be supported in any convenient manner.

Extending around the edges of the tables and a little below the same are troughs E, which are supported on the frame A and which are inclined toward one side, and the upper of said troughs connects by a spout E', which is arranged in the lower portion of the trough, with a tank F, which is supported on one side of the frame, and a spout F' leads from the tank F and delivers upon the lower table D, so that the tailings which are washed from the upper table will thus be delivered on the lower table, and the worthless portions of them will be completely separated from the ores before they leave the table. The higher portions of the troughs E are provided with receptacles e, which align vertically in the two troughs. A spout e' leads from the upper receptacle to the lower one, and a spout e² leads from the lower receptacle and may be made to deliver in any desired place. These receptacles are adapted to catch the ore which is washed from the table in a manner hereinafter described.

Above each table D is a distributor G, which delivers upon the center of the table, and which is supported by hangers g, connecting with the frame A, and a spout H delivers into the upper distributor, and through this spout the ground ore or pulp is fed to the upper table.

Extending radially over the table-tops are curved pipes J, J', J², and K, which terminate near the center of the table, and which are

connected with water-supply pipes L, and are controlled by valves *j k*, respectively. In the drawings I have shown four of these pipes, which operate in the manner described below; but the number may be increased or diminished without departing from the principle of my invention. The pipes J, J', and J² are provided with adjustable jets M, which deliver upon the table and which are arranged so as to deliver one ahead of the other upon the steps *d*, so that the tailings will be successively washed from one step to another, and the pipe K is provided with jets O, which point outward and which are adapted to wash the ores from the table in the manner hereinafter described. The pipe K and jets O are arranged opposite the receptacles *e*, so that when the ores are brought beneath the pipe the jets will wash them into the receptacles, and in order that the ores shall not be carried beyond the pipe a scraper Q is secured to the pipe and made to fit upon the table-top.

The adjustable jets M comprise a ring M', which is clamped to the water-pipes, and which is split on one side and provided with projecting lugs *m*, and a bracket composed of the two sections M², which are pivoted together at *m*², is held between the lugs *m*, the lugs being clamped thereon by means of a bolt *m'*, and the outer section M² is perforated at its outer end to receive the end of a hose P, which at its inner end is connected with a pipe P', opening from the water-pipe, and having a cock *p*, by means of which the flow of water through the jet may be regulated. It will thus be seen that by swinging the bracket the jet may be made to deliver in different directions.

The jets O are substantially like an ordinary gas-fixture, comprising the sections O', which are jointed together and connected with the water-pipe K, and which are provided at their outer ends with nozzles *o* and at their inner ends with suitable cocks O². These jets also may be made to deliver in several different directions, the jets M or O (M preferably) may be arranged in the pipes J, J', and J², the jets M in the pipe K, if desired, or other adjustable jets may be used in place of either.

In Figs. 4 and 5 I have shown the manner in which the tables are preferably made, which consists in having a series of narrow boards *d'*, which taper toward the center and are tongued together, as best shown in Fig. 5, and the steps may be produced thereon in any convenient way.

The operation of the apparatus is as follows: The tables are slowly revolved in the direction of the arrows, Figs. 1 and 10, so as to move in the opposite direction to the water, which flows from the jets M, by means of the gearing described above, and the ground ore or pulp is delivered through the spout H into the upper distributor G, and from thence onto the central portion of the upper table. It will be noticed that the jets in the water-

pipe J do not extend to the center of the table, and when the ore strikes the table it will first come opposite the pipe J and the lighter and worthless portions will slide down within the range of the jets M, which will wash the tailings from the table and into the trough E. A portion of the metal will go down with the tailings as far as the jets M of the pipe J; but the metal, being heavier, will hang back and be left on the upper portion of each step, while the lighter and more worthless portion will be washed from the table, thus leaving a clean space on which the richer ores above are washed when they come opposite the jets in the pipe J'. The pipe J thus serves to relieve the pulp of a greater part of its bulk. The jets are arranged one in advance of the other, so as to deliver successively on the different steps, so that as the ores reach the jets a separation takes place on each step—that is, each step has in itself the function of a separate table—and the jets being arranged as described wash the lighter portions of the ore from one step to a step below, so that the part remaining is almost pure metal, and the tailings are washed into the trough E. As the table continues to revolve the concentrates are rewashed by the jets in the pipe J², and they are then removed from the table by the jets in the pipe K and by the scraper Q in the ordinary way. The tailings which have been washed into the trough E will be delivered into the tank F, and from thence onto the lower table, where the operation above described will be repeated, and when the tailings are washed from the second table they will be utterly worthless.

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

1. An ore-concentrator comprising a revolvable inclined table having concentric steps thereon and a series of water-pipes arranged to deliver upon the table, said pipes being provided with swinging jet-spouts, substantially as described.

2. The combination, with the table and the water-pipes above the table, of swinging brackets clamped to the pipes and branch pipes having their inner ends connected with the main pipes and their outer ends supported in the brackets, substantially as described.

3. The combination of the table, the water-pipes above the table, the split rings mounted on the pipes, the swinging brackets secured to the rings and provided with perforated outer ends, pipes connected with the main pipes and provided with cocks, and hose-pipes leading from the branch pipes through the perforated ends of the brackets, substantially as described.

EDWARD W. CLARK.

Witnesses:

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M. L. WINES.